



ISCOS

2013 ISTANBUL

52nd Annual Meeting

October 28 - 30, 2013
İstanbul / TURKEY

**FINAL PROGRAM
& ABSTRACT BOOK**

www.iscos2013.org



Prescribe a lasting change that may bring patients from "I wish" to...



With consistent and precise dosing that may provide long-term relief of severe spasticity, Medtronic ITB TherapySM may be the catalyst for lasting personal achievements¹.

Meet Us At Our Booth

1. Azouvi P, Mahe M, Thiebaut JB, Denys P, Remy-Neris O, Bussel B. Intrathecal baclofen administration for control of severe spinal spasticity: functional improvement and long-term follow-up. Arch Phys Med Rehabil. 1996;77(1):35-39.

Innovating for life.



ISCoS

2013 ISTANBUL / 52nd Annual Meeting

October 28 - 30, 2013 Istanbul / TURKEY



ISCoS Headquarters



National Spinal Injuries Centre,
Stoke Mandeville Hospital,
Aylesbury, Buckinghamshire,
HP21 8AL, United Kingdom

Tel: +44 1296 315 866
Fax: +44 1296 315870
Email: admin@iscos.org.uk
Website: www.iscos.org.uk

Local Headquarters



Mailbox 33 Büyükesat 06672
Ankara - Turkey
Email: trscd@trscd.org
Website: www.trscd.org

Organising Secretariat



Feneryolu Mah. Bağdat Cad. Celal Turşucu Sokak No:4
Burç Sitesi B Blok Zemin Kat D:19 - 20 34724 Kadıköy / İstanbul
Tel : +90 (216) 414 11 11
Fax: +90 (216) 414 65 44
Email: iscos@opteamist.com
Website: www.opteamist.com

SpeediCath® Compact Set



reddot design award
winner 2013



The simplest all-in-one catheter solution

SpeediCath Compact Set is the first compact and discreet catheter and bag solution that's instantly ready to use. Thanks to a remarkably simple design, it's small enough to keep in a pocket or handbag.

- The only compact and discreet catheter with an integrated and sterile bag
- Simple and intuitive for everyday use in and out of home
- A unique hydrophilic coating for instant and easy use
- Designed for non-touch insertion



The Coloplast logo is a registered trademark of Coloplast A/S. © 2013.09. All rights reserved Coloplast A/S, 3090 Humlebæk, Denmark.



ISCoS
2013 ISTANBUL / 52nd Annual Meeting
October 28 - 30, 2013 Istanbul / TURKEY



[Table of Contents](#)



ISCoS

2013 ISTANBUL / 52nd Annual Meeting

October 28 - 30, 2013 Istanbul / TURKEY



Welcome

Dear Colleagues,

Since its establishment, Istanbul has been a cross road for culture and knowledge. It will be the focus of knowledge exchange again at the 52nd Annual Scientific Meeting of the International Spinal Cord Society in October, 2013. The conference will cover areas of interest to all involved in the management of spinal cord injuries. The programme will cover resource management in all settings, acute spinal cord injuries management with an emphasis on disaster situations, primary care, rehabilitation, prevention and education.

In addition the meeting will provide an opportunity to strengthen relationships with colleagues and develop new ones through the networking opportunities of the workshops, scientific presentations, discussions around the posters and through the sharing of ideas and mutual interests.

The Organizing Committee has developed a program of great interest focused on current issues associated with prevention and management of spinal cord injuries around the world, but with particular emphasis on emerging economies, public education regarding prevention, training of health professionals and the development of physical resources and management systems.

The work of the Prevention, Education and Scientific Committees will underpin these themes.

In the long history of Turkish hospitality, the Organizing Committee has extended its welcome to everyone to the 2013 Annual Scientific Meeting of ISCoS. On behalf of the Executive of ISCoS I also welcome you to the meeting and encourage your active participation.

Doug Brown

President

ISCoS



ISCoS

2013 ISTANBUL / 52nd Annual Meeting

October 28 - 30, 2013 Istanbul / TURKEY



Welcome

Dear Colleagues,

It is a great pleasure for the organizing committee to meet you at the 52nd Annual Meeting of the International Spinal Cord Society. This happening, of great scientific concern, gives us reason to be proud, as it is the first meeting of the ISCoS to take place in the amazing city of Istanbul, Turkey

I appreciate your contribution to the scientific program and your active support for the meeting. With the hard work of the organizing committee, a very comprehensive scientific program has evolved with presentations on research findings, keynote lectures and workshops by renowned speakers who will share with us their unique experience. I am certain that this meeting will be one of the most successful events ever on the topic of spinal cord injuries with formal presentations, poster presentations and discussions and informal discussions during three days of meeting and leisure activities.

The world is facing increasing threats of natural disasters, conflicts and violence, with rocketing high prevalence of casualties. Traffic accidents are also on the rise. This meeting is a good opportunity for us to learn together, to foster cooperation, to interchange ideas and produce important messages for lawmakers to take more efficient action against such disasters to prevent and also to provide the victims better opportunities to get treated and rehabilitated.

On behalf of the Turkish Society of Spinal Cord Diseases it is my pleasure and honour to give all of you a warm welcome to Istanbul, the historical city, rich in culture and diversity, undeniably one of the most beautiful cities in the world. I recommend you to take the time to explore its sights, historical monuments and wonders. Together with the exciting scientific meeting, the beauty of Istanbul will provide an unforgettable experience for all.

Mehmet Beyazova

ISCoS 2013 Chair



ISCoS

2013 ISTANBUL / 52nd Annual Meeting

October 28 - 30, 2013 Istanbul / TURKEY



Committees and Organisers

Executive Committees:

President	A/Prof. D. J. Brown, Australia
Past President	Dr. F. Biering-Sorensen, Denmark
President Elect and Editor	Prof. J. J. Wyndaele, Belgium
Honorary Secretary	Dr. S. Katoh, Japan
Honorary Treasurer	Mr. M. McClelland, UK
Executive Administrator	Marianne Bint, UK

Chairs of our Committees:

Education Chair	A/Prof. L. Harvey, Australia
Prevention Chair	Dr. H. S. Chhabra, India
Scientific Chair	Dr. S. Charlifue, USA

ISCoS Affiliated Societies:

Affiliated Societies Representatives

AFIGAP	Dr. B. Perrouin-Verbe (France)
APS	Dr. I. Lanig (USA)
ASIA	Dr. L. Vogel (USA)
ANZSCoS	Dr. S. Urquhart (Australia)
ASCoN	Dr. F. Hoque (Bangladesh) (not on Council)
DMGP	Dr. Y-B Kalke (Germany)
DUFSCoS	Mrs. Helma Bongers-Janssen (Netherlands)
JASCoL	Dr. S. Katoh (Japan)
KoSCoS	Dr. H. Y. Ko (Korea)
NoSCoS	Dr. Ann-Gret Karlsson (Sweden)
RoSCoS	Dr. Gelu Onose (Romania)
SASCA	Dr. F. Theron (South Africa)
SCI UK	Try Martin McClelland
SEP	Dr. Jesus Benito (Spain)
SLAP	Dr. F. Montero (Costa Rica)
SoMIPAR	Dr. G. Scivoletto (Italy)
Spinal Cord Society – Indian Chapter	Dr. H. S. Chhabra (India) (not on Council)
TrSCD	Dr. Müfit Akyüz (Turkey) (not on Council)



52nd Annual Scientific Meeting

Local Organizing Committee

Mehmet Beyazova (President)
Müfit Akyüz (Secretary General)
Bektaş Açıkgöz
Rıdvan Alaca
Gülümser Aydın
Ferda Aydoğdu
Belgin Erhan
İbrahim Gündoğdu
Şükrü Gündüz
Şafak Karamehmetoğlu
Işık Keleş
Barın Selçuk
Safiye Tuncer
Halil Ünalın
Elif Yalçın
Güneş Yavuzer
Kamil Yazıcıoğlu

Scientific Committee

Dr. Susan Charlifue (Chair)	UK
Dr. Sergio Aito	Italy
Dr. Müfit Akyüz	Turkey
Prof. Fin Biering-Sorensen	Denmark
A/Prof. Doug Brown	Australia
Prof. Amiram Catz	Israel
Dr. Harvinder Chhabra	India
Prof. Hans Frankel	UK
Dr. Michael Haak	USA
A/Prof. Lisa Harvey	Australia
Dr. Shinsuke Katoh	Japan
Mr. Martin McClelland	UK
Dr. Marcel Post	Netherlands
Dr. Gordana Savic	UK
Dr. Giorgio Scivoletto	Italy
Prof. John Steeves	Canada
Mr. Pradeep Thumbikat	UK
Dr. Dirk van Kuppevelt	Netherlands
Prof. Jean Jacques Wyndaele	Belgium

ISCoS Society Medal Holders

1975/1976:	Sir Ludwig GUTTMANN Dr. Ernest BORS	(UK) (USA)	(Deceased) (Deceased)
1978:	Dr. L. MICHAELIS Sir G. BEDBROOK	(UK) (Australia)	(Deceased) (Deceased)
1979:	Dr. M. MAURY	(France)	(Deceased)
1980:	Dr. J. S. YOUNG	(USA)	(Deceased)
1981:	Dr. A. G. HARDY	(UK)	(Deceased)
1982:	Prof. F. MEINECKE	(Germany)	(Deceased)
1983:	Pror. H. FRANKEL	(UK)	
1984:	Dr. Y. NAKAMURA	(Japan)	(Deceased)
1985:	Dr. M. WEISS Mr. P. HARRIS	(Poland) (UK)	(Posthumously) (Deceased)
1986:	Dr. H. HAHN	(USA)	(Deceased)
1987:	Prof. A. ROSSIER	(Switzerland)	(Deceased)
1988:	Dr. A. JOUSSE	(Canada)	(Deceased)
1989:	Mr. J. C. ROSS	(UK)	(Deceased)
1990:	Dr. P. DOLLFUS	(France)	
1991:	Dr. E. CARTER	(USA)	
1992:	Dr. A. KEY	(South Africa)	(Deceased)
1993:	Air Marshal (Rtd) A. CHAHAL	(India)	
1994:	Mr. I. NUSEIBEH	(UK)	
1995:	Dr. A. E. COMARR	(USA)	(Deceased)
1996:	Dr. G. ZÄCH	(Switzerland)	
1997:	Prof. H. MADERSBACHER	(Austria)	

ISCoS Society Medal Holders

1998:	Prof. T. IKATA	(Japan)	(Deceased)
1999:	Dr. W. GEISLER	(Canada)	
2000:	Prof. J. YEO	(Australia)	
2001:	Prof. J. J. Wyndaele	(Belgium)	
2002:	Mr. W. EL-MASRI	(UK)	
2003:	Prof. G. BRINDLEY	(UK)	
2004:	Prof. W. DONOVAN	(USA)	
2005:	Dr. R. SHROSBREE	(South Africa)	
2006:	Dr. L. ILLIS	(UK)	
2007:	Dr. F. BIERING-SORENSEN	(Denmark)	
2008:	Dr. J. DITUNNO	(USA)	
2009:	A/Prof D. J. BROWN Dr. P. MEYER	(Australia) (USA)	
2010:	A/Prof. A. KOVINDHA Dr. I. PERKASH	(Thailand) (USA)	
2011:	M. BINT Dr. E. IWATSUBO	(UK) (Japan)	
2012:	Dr. A. AITO	(Italy)	



ISCoS

2013 ISTANBUL / 52nd Annual Meeting

October 28 - 30, 2013 Istanbul / TURKEY



ISCoS Past Presidents

FOUNDER AND FIRST PRESIDENT

Prof Sir Ludwig Guttmann, CBE, FRS	1961-70
------------------------------------	---------

PRESIDENTS OF ISCOS

Dr. H. Talbot	USA	1970-73
Dr. A. Tricot	Belgium	1973-77
Prof. V. Paeslack	Germany	1977-80
Sir G. Bedbrook	Australia	1980-84
Prof. A. Rossier	Switzerland	1984-88
Dr. E. Carter	USA	1988-92
Dr. P. Dollfus	France	1992-96
Dr. H. L. Frankel	UK	1996-00
Prof. T. Ikata	Japan	2000-04
Prof. W. Donovan	USA	2004-08
Mr. W. El-Masri	UK	2008-10
Prof. F. Biering-Sorensen	Denmark	2010-12
A/Prof. D. J. Brown	(Australia)	2012-14



ISCoS

2013 ISTANBUL / 52nd Annual Meeting

October 28 - 30, 2013 Istanbul / TURKEY



Sir Ludwig Guttmann Lecture

The Sir Ludwig Guttmann Lecture was established by the International Medical Society of Paraplegia, now the International Spinal Cord Society, to recognize the pioneering work and lifelong contribution of Sir Ludwig Guttmann, the originator of modern multidisciplinary spinal cord care.

He was the first President of the International Medical Society of Paraplegia at its inception in 1961, the first Editor of the journal of the Society, Paraplegia, now Spinal Cord.

He was the inspiration and Founder of what is currently the Paralympics. In the mid 1940's, while treating young veterans at the Stoke Mandeville Spinal Injuries Unit in England, Dr Guttmann introduced sport and exercise as mandatory activities for the patients, thus rebelling against the widespread nihilism with which the rehabilitative potential of spinal cord injuries was regarded. From the first Stoke Mandeville Games for the paralysed that Dr Guttmann organized for 16 archers in July of 1948, the athletic movement for individuals with spinal cord injuries has grown tremendously.

He retired from clinical work in 1966 but continued his involvement with sport.

He died in 1980 leaving us his message that "spinal cord injured patients should be transferred as soon as possible to a specialized spinal injuries unit".

Sir Ludwig Guttmann's tireless effort and vision touched thousands of lives around the world - a legacy to be remembered and honoured by this Lecture.

It is an ISCoS tradition to invite a leading specialist each year to deliver the Lecture.

Previous Guttmann Lecturers:

1981 Sir G. Bedbrook, Australia

1993 W. C. Degroat, USA

2002 J. Fawcett, UK

2004 Prof. B. Kakulas, Australia

2005 Prof. H. Madersbacher, Austria

2006 Dr. M. J. DeVivo, USA

2007 Dr. K. T. Ragnarsson, USA

2008 Assist. Prof. P. Siddall, Australia

2009 Dr. J. F. Ditunno, USA

2010 Prof. W. H. Donovan, USA

2011 Daniel P. Lammertse, USA

2012 Dr. H. L. Frankel, UK

Sir Ludwig Guttman Lecture



Armin Curt, MD

Guttman Lecturer 2013

*Professor and Chairman
Spinal Cord Injury Center
University of Zürich, Switzerland*

*University Hospital Balgrist
Forchstrasse 340
CH 8008 Zürich, Switzerland*

- Medical Director of the Spinal Cord Injury Center, University Hospital Balgrist
- Professor and Chair in Spinal Cord Rehabilitation, University of Zürich Switzerland
- Specialized in Neurology and Clinical Neurophysiology
- Development of neurophysiological and clinical assessment protocols in spinal disorders
- Leadership of interdisciplinary / international rehabilitation research in SCI
- Founder of the European Multicenter Network in SCI (EMSCI)
- Development of clinical trial protocols and outcome measures
- Consultant for multiple pharmaceutical companies launching interventional trials in acute and chronic SCI

*** The Guttman Lecture will be held on Monday, October 28th, 2013 at 17.10 in A Hall.**



ISCoS
2013 ISTANBUL / 52nd Annual Meeting
October 28 - 30, 2013 Istanbul / TURKEY



ACKNOWLEDGEMENTS

Gold Sponsors



Silver Sponsors



Exhibitors





ISCOS

2013 ISTANBUL / 52nd Annual Meeting

October 28 - 30, 2013 Istanbul / TURKEY



Meeting Information

Dates

October 28 - 30, 2013

Congress Venue

Haliç Congress Center
Beyoğlu - Istanbul / Turkey

Badges and Identification

Registration badges will be used during the Congress. For identification purposes and admission to the session hall, participants are requested to wear their badges, which will be given to them upon registration. Admission to the Congress site will not be allowed without badge identification.

Accreditation & Evaluation

The Royal College of Physicians has awarded the Meeting a maximum of 18 CME credits. Attendees requesting CME credit are required to complete an online evaluation form. The details of how to complete the evaluation form will be sent to all delegates a few weeks after the Meeting by email.

Chair Persons & Speakers

Please ensure that you are available in your presentation room at least ten minutes before the start of the session. It is recommended that all speakers visit the Speaker Preview Room in order to hand in presentations and confirm audiovisual requirements at least two hours prior to the start of the session.

Exhibition Opening Schedule:

Date	Opening Time	Closing Time
October 28th, 2013 (Mon)	08.30	19.00
October 29th, 2013 (Tue)	08.00	17.00
October 30th, 2013 (Wed)	08.00	17.00

Internet Area

You may access computers and internet at the area which is located in front of A Hall.

Sponsored by



Mobile Phones

As a courtesy to speakers and other participants, all mobile phones must be turned off before entering the scientific sessions.

Congress Language

Official language of the congress is English.

No Smoking

The congress is a non-smoking event. For the comfort and health of all participants, smoking is strictly prohibited in the building.

Insurance

The meeting organizers cannot accept liability for personal injuries sustained, loss of or damage to property belonging to Congress participants (or their accompanying persons) either during the congress meetings and post congress activities. Please obtain proper travel and health insurance prior to your trip.



ISCoS

2013 ISTANBUL / 52nd Annual Meeting

October 28 - 30, 2013 Istanbul / TURKEY



Social Program

Welcome Reception

October 28th, 2013 Monday
Haliç Congress Center
18.30 - 19.30

Gala Dinner

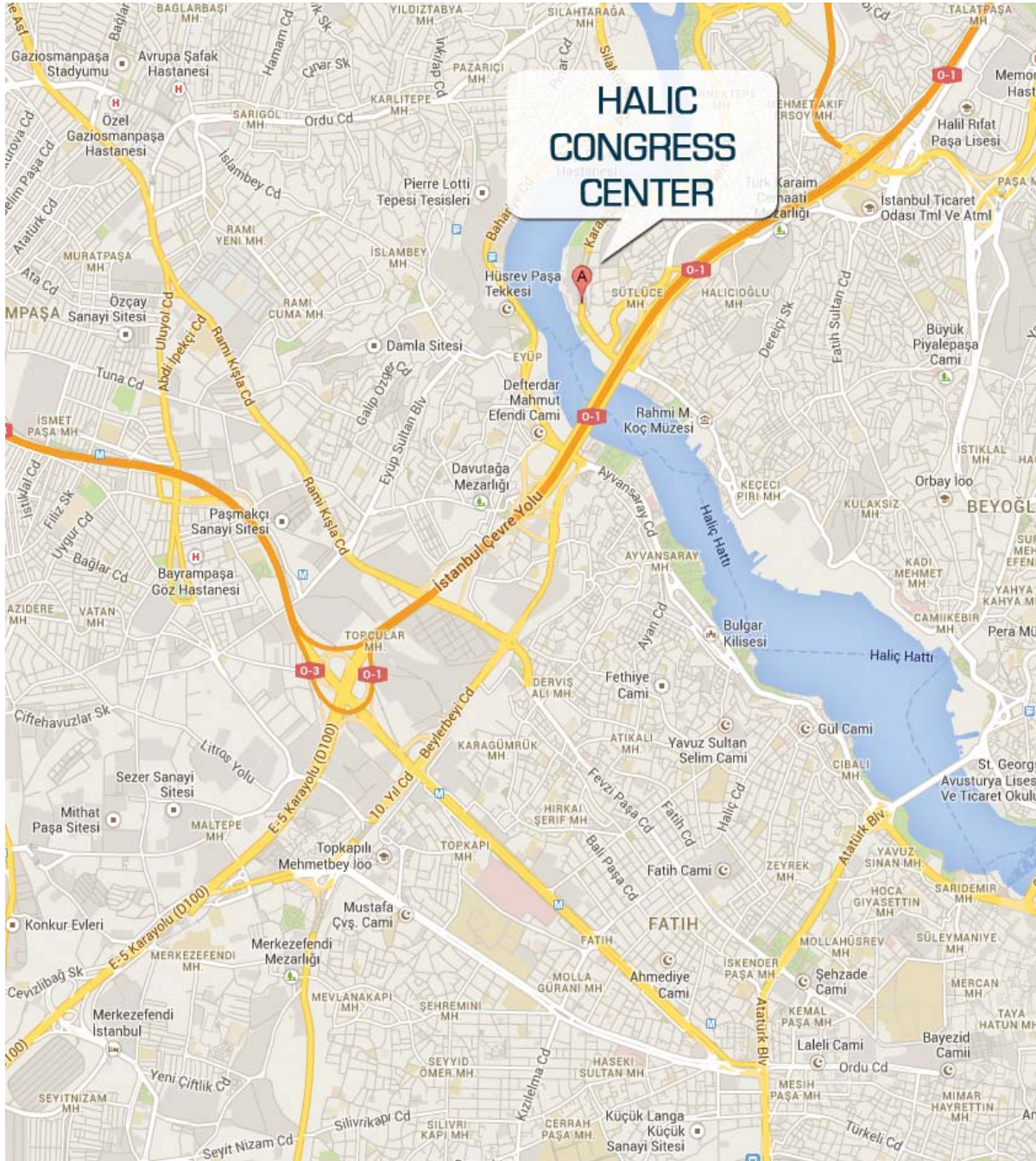
October 29th, 2013 Tuesday / 19.30 - 00.00
Adile Sultan Palace (Vaniköy Caddesi Siraevler Sokak No.12 Vaniköy 34684 Üsküdar - İstanbul)
Tel +90 216 332 23 33

** Free shuttle service will be provided from Hilton Garden Inn and from Hilton İstanbul at 18.00 to Gala Venue.*

Tours

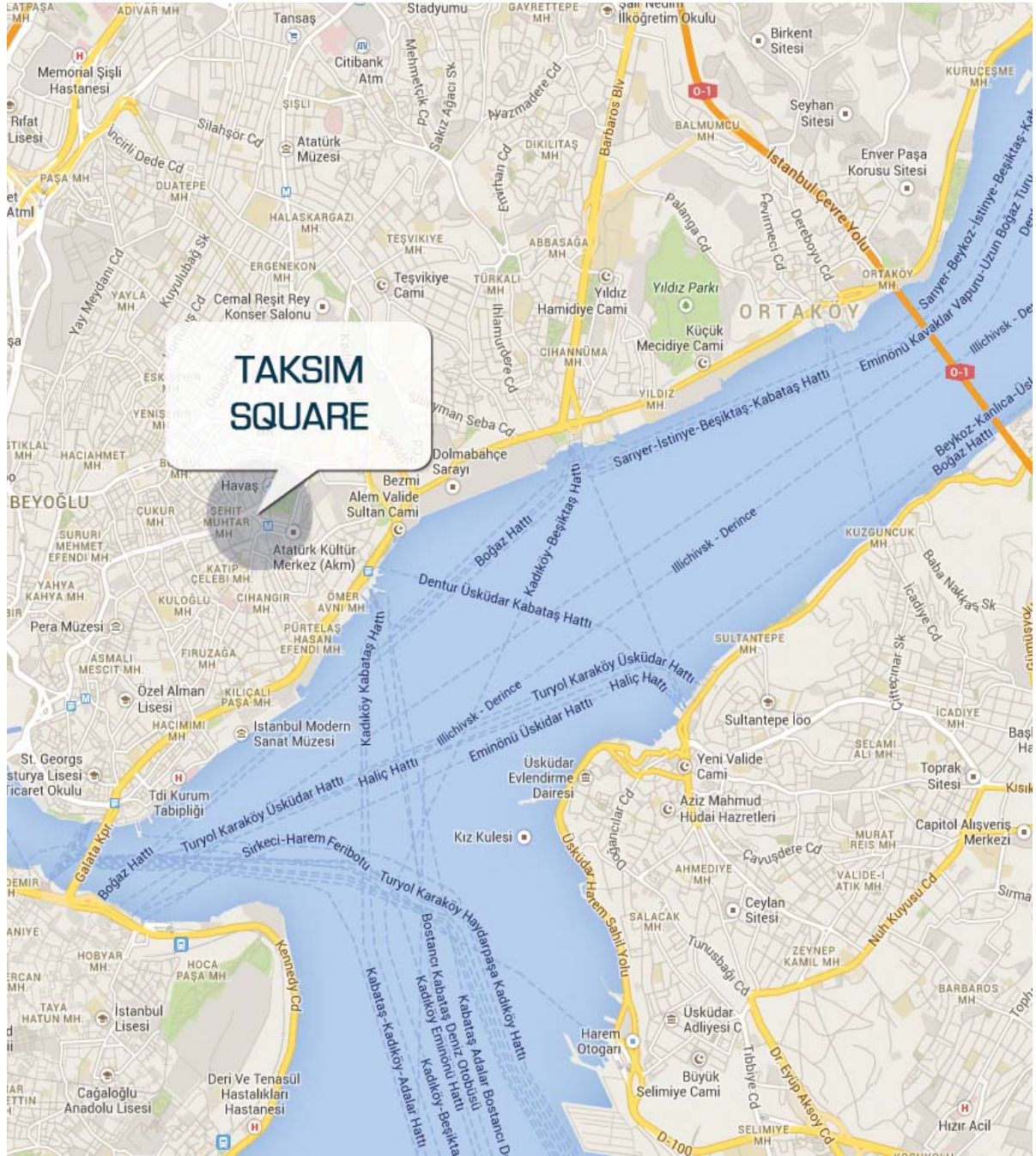
Several different tour program is available during or after the congress. Please address to Registration Desk to have detailed information.

- Regular İstanbul Tours
- Private Religious Tours in İstanbul
- City Sightseeing İstanbul
- Anatolian Tours
- Private Professional Guide
- Air Sightseeing



How to reach the Haliç Congress Center?

- Take a Metrobüs/City Bus/Minibus to the Haliç Congress Center and get off at the Sütlüce/Halicioğlu stop at the E-5 (D100) Highway, near the Haliç Bridge Overpass.
- There are also ferryboats from Üsküdar, Eminönü ve Kadıköy to the Sütlüce Pier, and it is a mere three-minute walk from there to the Haliç Congress Center.
- There are also mini-busses routes from Şişli and Şişhane.
- You may board the following İETT busses from Taksim, Eminönü and Mecidiyeköy to reach the Haliç Congress Center;






36T CEBECİ - TAKSİM
41ST SEYRANTEPE - TOPKAPI
47 YEŞİLPINAR-EMİNÖNÜ
47E BİNEVLER - EMİNÖNÜ
47Ç GÜZELTEPE - EMİNÖNÜ
54HT HASKÖY - TAKSİM - MECİDİYEKÖY
54HŞ HASKÖY - ŞİŞLİ - TAKSİM

■ By Taxi from;
 - Atatürk Airport - 20 minutes / 45 TL – 28 \$ – 20 €
 - Sabiha Gökçen Airport - 40 minutes / 83 TL – 52 \$ - 37 €
 - Taksim Square - 20 minutes / 30 TL – 15 \$ - 12 €


PROGRAM AT A GLANCE

October 28, 2013

	Hall A	Hall B	Hall C	Hall E
08:30-09:15	Opening Ceremony			
09:15-10:45	KEYNOTE LECTURE * Pathophysiology of SCI * Novel Therapeutic Approaches to Spinal Cord Repair			
10:45-11:05	COFFEE BREAK			
11:05-12:35	Award Eligible Papers	Workshop Focusing on Pleasure: How Can We Promote Orgasm After Spinal Cord Injury ?	Workshop Moving Towards a Common Definition of Quality of Life for People with Spinal Cord Injury (SCI)	Workshop Nursing Care of Patients with Spinal Cord Injuries: Acute Care Management and Rehabilitation 
12:35-13:50	Satellite Symposium 	LUNCH		
13:50-15:20	Award Eligible Papers	Workshop Models of Care: How Different Systems Address the Interaction Between Acute Care and Rehabilitation for New Traumatic SCI	Workshop International Spinal Cord Injury Data Sets	Workshop Organisation of SCI Treatment, Rehabilitation and Follow-Up: Are Ideas and Models Developed in High-Resource Countries Relevant to Medium and Lowresource Countries?
15:20-15:40	COFFEE BREAK			
15:40-17:00	Themed Papers Spinal Surgery & National Disaster	Workshop Workshop on Research Publication in Spinal Cord	Satellite Symposium 	
17:00-17:10	BREAK			
17:10-17:55	Sir Ludwig Guttmann Lecture			
17:55-18:30	Pre-Launch of the WHO and ISCoS International Perspectives on Spinal Cord Injury			
18:30	OPENING COCTAIL			

PROGRAM AT A GLANCE

October 29, 2013

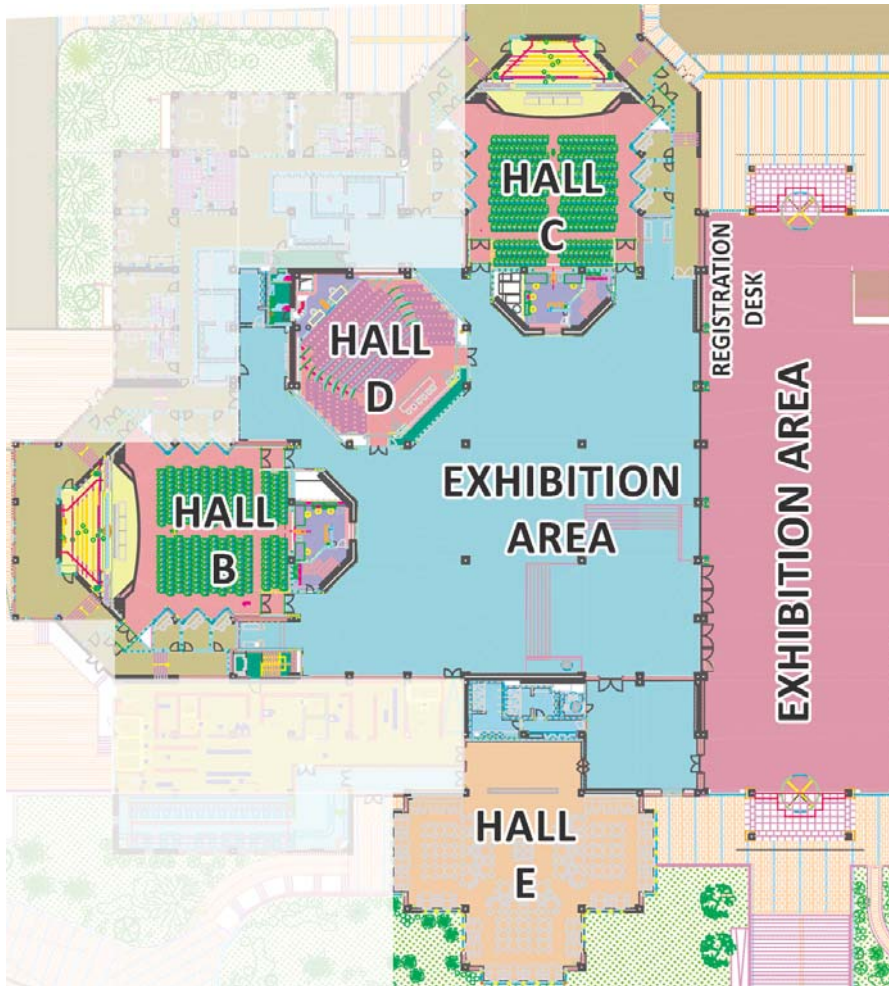
	Hall A	Hall B	Hall C	Hall D
08:00-08:50	KEYNOTE LECTURE *Natural Disasters and SCI			
08:50-10:20	Prevention Symposium Evidence Based Strategies for Prevention of Spinal Cord Injuries	Free Papers	Workshop Moving Towards a Common Definition of Quality of Life for People with Spinal Cord Injury (SCI)	
10:20-10:40	COFFEE BREAK			
10:40-12:40	Prevention Symposium Evidence Based Strategies for Prevention of Spinal Cord Injuries	Free Papers	Themed Papers Neurophysiopathology	Workshop Respiratory Care After Spinal Cord Injury
12:40-14:00	Satellite Symposium 	LUNCH		
14:00-15:30	Workshop Disaster Management and Spinal Cord Injury	Free Papers	Workshop Spinal Surgery in Elderly Population: What is Feasible, Does It Worth It?	Free Papers
15:30-16:00	COFFEE BREAK (Poster Session)			
16:00-16:45	ISRT Lecture			
19:30	GALA DINNER			

PROGRAM AT A GLANCE

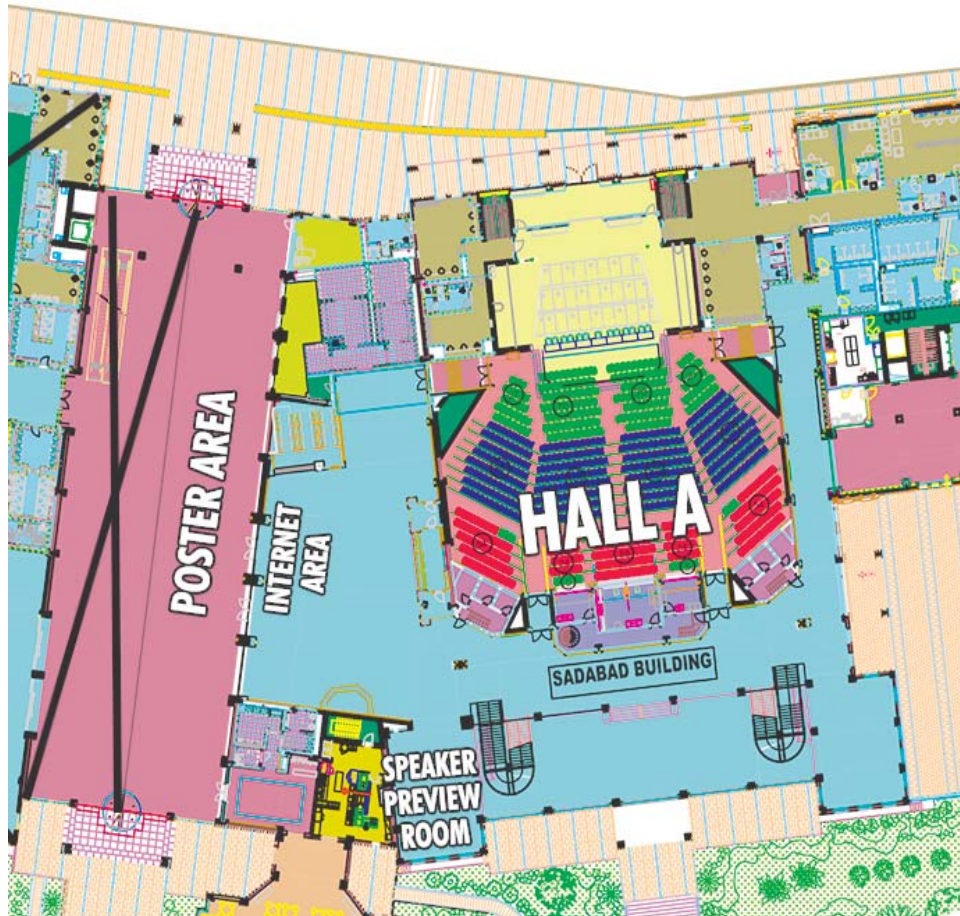
October 30, 2013

	Hall A	Hall B	Hall C	Hall D
08:00-08:45	KEYNOTE LECTURE *Rehabilitation and Medical Approach in Acute Care			
08:45-10:15	Themed Papers Acute Care	Free Papers	Workshop Analysing Confounding Factors and Suggesting Improvements in Classification Systems in Thoracolumbar and Cervical Spine Fractures	Workshop Pain in Patients with Spinal Cord Injury
10:15-10:35	COFFEE BREAK			
10:35-12:05	Workshop Labour Market Participation of Persons with SCI Across Europe: The ILIAS Project	Free Papers	Workshop Analysing Confounding Factors and Suggesting Improvements in Classification Systems in Thoracolumbar and Cervical Spine Fractures	
12:05-13:35	ISCOS AGM	LUNCH		
13:35-15:05	E-Learning Workshop www.elearnSCI.org- An Educational Initiative of ISCoS. Overview, History, Challenges, Usage and the Future.	Workshop Ultrasound Guided Botulinum Toxin Injections for The Treatment of Spasticity After SCI	Workshop International Collaborations: The Way of the Future	
15:05-15:20	COFFEE BREAK			
15:20-16:50	Workshop Autonomic Dysreflexia: A Clinical Entity not to Be Overlooked After Spinal Cord Lesion	Free Papers	Workshop International Collaborations: The Way of the Future	
16:50	CLOSING CEREMONY AWARD PRESENTATIONS			

Venue Map



Venue Map





ISCoS

2013 ISTANBUL / 52nd Annual Meeting

October 28 - 30, 2013 Istanbul / TURKEY



Meetings Schedule

October 28th, 2013 Monday

■ Spine Trauma Study Group
11.00 - 12.30 Hall F

■ Quality of Life
12.35 - 13.50 Hall F

■ Physio Network (SCRIPT)
12.35 - 13.45 Hall E

*** *Pre-Launch of the WHO and ISCoS International Perspectives on Spinal Cord Injury***
17.55 - 18.30 Hall A

October 29th, 2013 Tuesday

■ Data Sets
12.40 - 14.00 Hall E

■ Editorial Committee Text book on Comprehensive Management of SCI – ISCoS textbook
12.40 - 13.40 Hall G

■ ISCoS Textbook Comprehensive Management of SCI –Authors meeting
13.40 - 14.25 Hall G

■ Global SCI Consumer Group
14.00 - 16.00 Hall E

SCIENTIFIC PROGRAM

October 28, 2013

A - Hall

08:30-09:15

Opening Ceremony

09:15-10:45

KEYNOTE LECTURE

* Pathophysiology of SCI

John Steeves

* Novel Therapeutic Approaches to Spinal Cord Repair

James Fawcett

10:45-11:05

COFFEE BREAK

11:05-12:35

Award Eligible Papers

O-001 Neuroprotection Using Granulocyte Colony-Stimulating Factor for Acute Spinal Cord Injury: a Comparison with the High-Dose Methylprednisolone Therapy

Koshiro Kamiya

O-002 Abdominal Muscle Function in People with Complete High Thoracic SCI

Anna Bjerkefors

O-003 A Retrospective Analysis of the Perceived Outcome of Stem Cell Therapy for Persons Living With a Spinal Cord Injury

Melanie Skeen

O-004 Suicide in an Aging Spinal Cord Injury Population

Michael John DeVivo

12:35-13:50

Satellite Symposium

UTIs Still Bug Me!

-What About Best Practice?

Chair: *Claes Hultling*

Kent Revedal

Karen Logan

* Lunchboxes will be distributed during the session from the hall.

wellspect
HEALTHCARE

12:35-13:50

LUNCH

SCIENTIFIC PROGRAM

October 28, 2013

A - Hall

13:50-15:20

Award Eligible Papers

O-005 Psychometric Properties of the Nottwil Environmental Factors Inventory Short Form (NEFI-SF)
Carolina S. Ballert

O-006 Do Probiotic Prevent Antibiotic-Associated Diarrhea in Patients with Spinal Cord Injuries: A Randomized Controlled Trial
Samford Wong

O-007 Responsiveness of the Graded and Redefined Assessment of Strength, Sensibility and Prehension (GRASSP) in Individuals with Cervical Spinal Cord Injury (SCI)
Inge-Marie Velstra

O-008 Non-Invasive Brain-Computer Interfaces for Control of Upper Extremity Neuroprostheses in Tetraplegic Individuals – Results from the European Integrated Project TOBI
Ruediger Rupp

15:20-15:40

COFFEE BREAK

15:40-17:00

Themed Papers Spinal Surgery & National Disaster

O-009 Spinal Surgery for Spinal Injury Using Navigation System Including O-Arm
Nobuyuki Shimokawa

O-010 The Effects of the Timing of Spinal Surgery after Traumatic Spinal Cord Injury: A Systematic Review and Meta-Analysis
Joost J. van Middendorp

O-011 Spinal Cord Injury-Related Chronic Pain in Victims of the 2008 Sichuan Earthquake: a Prospective Cohort Study
Jan D. Reinhardt

17:00-17:10

BREAK

17:10-17:55

Sir Ludwig Guttman Lecture

* Hope, Hype and Neuroscience
Armin Curt

17:55-18:30

Pre-Launch of the WHO and ISCoS International Perspectives on Spinal Cord Injury

SCIENTIFIC PROGRAM

October 28, 2013

B - Hall

11:05-12:35

Workshop

Focusing on Pleasure: How Can We Promote Orgasm After Spinal Cord Injury ?

Chair: *Frédérique Courtois*

*Frédérique Courtois
Stacy Elliott
Andrei Krassioukov
Jens Sonksen*

12:35-13:50

LUNCH

13:50-15:20

Workshop

Models of Care: How Different Systems Address the Interaction Between Acute Care and Rehabilitation for New Traumatic SCI

Chair: *Peter Wing*

*Peter Wing
H. S. Chhabra
Vanessa Noonan
Rory Dixon
Nazirah Hasnan
Claes Hultling
James W. Middleton
Pradeep Thumbikat
Eric Weerts*

15:20-15:40

COFFEE BREAK

15:40-17:00

Workshop

Workshop on Research Publication in Spinal Cord

Chair: *Jean Jacques Wyndaele*

*Jean Jacques Wyndaele
Fin Biering-Sørensen
Rebecca Vickerstaff*

SCIENTIFIC PROGRAM

October 28, 2013

C - Hall

11:05-12:35

Workshop

Moving Towards a Common Definition of Quality of Life for People with Spinal Cord Injury (SCI)

Chair: Jane Horsewell

Marcel W.M. Post
Divya Parashar
Denise G. Tate
Szilvia Geyh
Jane Horsewell
Kim Anderson-Erisman
Lucy Robinson
Anke Scheel

12:35-13:50

LUNCH

13:50-15:20

Workshop

International Spinal Cord Injury Data Sets

Chair: Fin Biering-Sørensen

Fin Biering-Sørensen
Michael DeVivo
Susan Charlifue
Marcel Post
Joanne Odenkirchen

15:20-15:40

COFFEE BREAK

15:40-17:00

Satellite Symposium

Predictable Bowel Management Using Peristeen®



Chairs:

Klaus Krogh
Andrei Krassioukov

Dirk van Kuppevelt
Paul Skaife
Peter Christensen
Anton Emmanuel
Pia Faaborg

SCIENTIFIC PROGRAM

October 28, 2013

E - Hall

11:05-12:35

Workshop

**Nursing Care of Patients with Spinal Cord Injuries:
Acute Care Management and Rehabilitation**

Chair: Nurhan Bayraktar

Nurhan Bayraktar
Seher Başaran
Nuran Tosun
Fatma Akalın

wellspect
HEALTHCARE

12:35-13:50

LUNCH

13:50-15:20

Consumer Workshop

**Organisation of SCI Treatment, Rehabilitation and Follow-Up: Are Ideas and Models
Developed in High-Resource Countries Relevant to Medium and Lowresource Countries?**

Chair: Jane Horsewell

Jane Horsewell
Ramazan Baş
Kim Anderson-Erisman
Federico Montero
Shivjeet Singh Raghaw

15:20-15:40

COFFEE BREAK

SCIENTIFIC PROGRAM

October 29, 2013

A - Hall

08:00-08:50

KEYNOTE LECTURE

***Natural Disasters and SCI 1-2**

*Şahir Şafak Karamehmetoğlu
Niyazi Özüçelik*

08:50-10:20

Prevention Symposium

Evidence Based Strategies for Prevention of Spinal Cord Injuries

Chair: *H. S. Chhabra*

*M. Fitzharris
H. S. Chhabra
Herndon Murray
Kamil Yazıcıoğlu
Eric Weerts*

10:20-10:40

COFFEE BREAK

10:40-12:40

Prevention Symposium

Evidence Based Strategies for Prevention of Spinal Cord Injuries

Chair: *H. S. Chhabra*

*M. Fitzharris
H. S. Chhabra
Herndon Murray
Kamil Yazıcıoğlu
Eric Weerts*

12:40-14:00

Satellite Symposium

New Perspectives on the Management of Spasticity after Spinal Cord Injury with Intrathecal Baclofen therapy (ITB)

Moderator: *Indira Lanig*

What does ITB therapy have to offer?

Functionality before and after Intrathecal Baclofen therapy (ITB) in the management of Spasticity after Spinal Cord Injury

Annick Viaene

How to optimize care for patients suffering from spasticity?

The Organization of Spasticity Management: a Panel Discussion

*Anand Nene
Charlotte Kiekens
Peter New*



SCIENTIFIC PROGRAM

October 29, 2013

A - Hall

14:00-15:30

Workshop

Disaster Management and Spinal Cord Injury

Chair: Jane Horsewell

Colleen O'Connell
Jo Armstrong
Michael Baumberger
Claes Hultling
Géraldine Jacquemin
Shinsuke Kato
Fiona Stephenson
Eric Weerts

15:30-16:00

COFFEE BREAK (POSTER SESSION)

16:00-16:45

ISRT LECTURE

Phillip Popovich

19:30

GALA DINNER

ADILE SULTAN PALACE



SCIENTIFIC PROGRAM

October 29, 2013

B - Hall

08:50-10:20

Free Papers I

O-012 Botulinum Toxin Injections for Abdominal Pain in Tetraplegia
Mark Anthony Slatyer

O-013 Preserved Interaction Between A-Beta and A-Delta Fibers in Capsaicin-Induced Pain
Catherine R. Jutzeler

O-014 Spinal Cord Injury Pain Instrument (SCIPI): Validation Study of a New Tool to Screen for Neuropathic Pain After Spinal Cord Injury
Thomas Nathaniel Bryce

O-015 Pathogenesis of Obstructive Sleep Apnea in Quadriplegia
Laura Gainche

O-016 Sleep Disruption in Tetraplegia, Its Hormonal Basis and a Randomised, Double-Blind, Placebo-Controlled Crossover Trial of Melatonin Supplementation
Jo Spong

O-017 Attention and Information Processing Performance in People with Acute Quadriplegia and Obstructive Sleep Apnoea
Rachel Schembri

10:20-10:40

COFFEE BREAK

10:40-12:40

Free Papers II

O-018 Psychological Features and Sexual Variables in Women with and Without Spinal Cord Injury
Lina Di Lucente

O-019 Spinal Cord Injury (SCI) and Medications: A Double Whammy on Sexual Function?
Siddeshwar Patil

O-020 Sexuality of Inpatient Spinal Cord Injured Men in Turkish Rehabilitation Care Center
Kamil Yazicioğlu

O-021 Premature Ejaculation Developing as a Function of Conus or Epiconus Lesions
Frédérique Courtois

O-022 The Lived Experience of Sexuality and Urinary Incontinence for Women with Spinal Cord Injury
David Ditor

O-023 Residual Urine Volumes After Intermittent Catheterization in Men with Spinal Cord Injury
Jürgen Pannek

O-024 Intravesical Electrostimulation Versus Sacral Neuromodulation for Incomplete Spinal Cord Patients Suffering From Neurogenic Non-Obstructive Urinary Retention
Stefania Musco

O-059 Quality of Life Outcomes Following a Depression Trial
Denise Galluf Tate



SCIENTIFIC PROGRAM

October 29, 2013

B - Hall

12:40-14:00

LUNCH

14:00-15:30

Free Papers III

O-031 Cardiovascular Disease Risk Factor in Patients with Spinal Cord Lesion After Completing Primary Rehabilitation at URI Soca
Zen Jurancic Marijana

O-032 Causes of Death of Persons with Spinal Cord Injury Within Five Years After First Inpatient Rehabilitation
Rutger Osterthun

O-033 Aetiology and Demographics of Acute Traumatic Spinal Cord Injuries
Gordana Savic

O-034 Endocrine, Nutritional and Metabolic Diseases After Spinal Cord Injury: Mortality Risk and Trends
Yuying Chen

O-035 Relevance of Skin Physiology in the Sacral Region of Spinal Cord Patient with a View to the Risk For Pressure Ulcer – The Validation of Methods
Anke Scheel-Sailer

O-036 Statins May Prevent Longitudinal Bone Loss at the Knee in Chronic SCI
Leslie Morse

15:30-16:00

COFFEE BREAK (POSTER SESSION)

SCIENTIFIC PROGRAM

October 29, 2013

C - Hall

08:50-10:20

Workshop

Procedures, Products and Pragmatism: The Evolution of Inclusive Human Study Protocols

Chair: John Steeves

John Steeves
Linda Jones
Lorenzo Tanadini
Armin Curt
Kimberly Anderson

10:20-10:40

COFFEE BREAK

10:40-12:40

Themed Papers

Neurophysiopathology

O-025 The Allogeneic Transplantation of Embryonic Stem Cells-Derived Neural Stem/Progenitor Cells Into Injured Spinal Cord in Adult Common Marmosets

Hiroki Iwai

O-026 Optimal Time-Window of Neural Stem Cell Transplantation Therapy is at the Sub-Acute Phase of SCI in Non Human Primates

Soraya Nishimura

O-027 Autologous Bone Marrow Cell Transplantation in Acute Spinal Cord Injury- An Indian Pilot Study

Harvinder Singh Chhabra

O-028 Selective Ablation of the Tumor After iPSC Derived NSCs Transplantation by Controlling the Immune Suppression

Go Itakura

O-029 Segmental and Plurisegmental Processing Capabilities of the Human Lumbar Cord Isolated From Brain Motor Control

Simon Danner

O-030 Multicenter Prospective Controlled Clinical Trial of Neuroprotective Therapy Using G-CSF for Acute Spinal Cord Injury: Results of the One Year Follow-Up

Taigo Inada

SCIENTIFIC PROGRAM

October 29, 2013

C - Hall

12:40-14:00

LUNCH

14:00-15:30

Workshop

Spinal Surgery in Elderly Population: What is Feasible, Does It Worth It?

Chair: *Emre Acaroğlu*

*Emre Acaroğlu
Ahmet Alanay
Selçuk Palaoğlu
Serdar Kahraman
Murat Zinnuroğlu*

15:30-16:00

COFFEE BREAK (POSTER SESSION)

SCIENTIFIC PROGRAM

October 29, 2013

D - Hall

10:40-12:40

Workshop

Respiratory Care After Spinal Cord Injury

Chair: Ronald K. Reeves

Ronald K. Reeves
Michael Priebe

12:40-14:00

LUNCH

14:00-15:30

Free Papers IV

O-037 Correlates of Exercise Self-Efficacy in Persons with Recent Spinal Cord Injury
Carla Nooijen

O-038 What's Going On? – Time Course of Resting Energy Expenditure and Body Composition During First Rehabilitation in Patients with SCI: Preliminary Data
Wilma Schmid

O-039 Metabolic Rate During Hybrid Cycling is Higher Than During Handcycling at Equal Subjective Exercise Intensity
Thomas W. Janssen

O-040 A Systematic Review and Meta-Analysis of Respiratory Muscle Training in Tetraplegia
David J. Berlowitz

O-041 Evaluating Quickness of Upper Limb and Hand Function for Patients with Cervical Spinal Cord Injury without Bone Injury Using Simple Test for Evaluating Hand Function
Jun Shinbo

O-042 Assessment of Abdominal Muscle Function in Individuals with Motor Complete Spinal Cord Injury Above T6 in Response to Transcranial Magnetic Stimulation and Voluntary Activation
Jordan W. Squair

15:30-16:00

COFFEE BREAK (POSTER SESSION)

SCIENTIFIC PROGRAM

October 30, 2013

A - Hall

08:00-08:45

KEYNOTE LECTURE

***Rehabilitation and Medical Approach in Acute Care**
Andrei Krassioukov

08:45-10:15

**Themed Papers
Acute Care**

* Laboratory Evaluation of Two Devices for Secretion Removal: Acapella Versus Water Bottle
Gabi Mueller

* Pathways to Specialist Care for the Patient with Traumatic Spinal Cord Injury: Analysis of Linked Health Record Data
James W. Middleton

* Changing the Paradigm of Management of Ventilators in Spinal Cord Injured (SCI) Patients in Saudi Arabia: Development of a Diaphragm Pacing (DP) Program to Improve the Quality of Life of Patients While Decreasing the Intensive Care Unit Utilization
Sami Alnassar

* Changing the Paradigm of Chronic Ventilators in Pediatric Spinal Cord Injury: Diaphragm Pacing Can Allow Natural Ventilation and Improve Integration Into Society
Raymond Onders

10:15-10:35

COFFEE BREAK

10:35-12:05

Workshop

Labour Market Participation of Persons with SCI Across Europe: The ILIAS Project

Chair: *Marcel W.M. Post*

Marcel W.M. Post

Jan D. Reinhardt

Reuben Escorpizo

Jane Horseywell

Fin Biering-Sørensen

W. de Moes

Gerold Stucki

SCIENTIFIC PROGRAM

October 30, 2013

A - Hall

12:05-13:35

ISCoS AGM

13:35-15:05

E-Learning Workshop

**www.elearnSCI.org - An Educational Initiative of ISCoS.
Overview, History, Challenges, Usage and the Future.**

Chair: *Lisa Harvey*

*Lisa Harvey
H S Chhabra
D. Green
Andrei Krassioukov
S. Muldoon
Fin Biering-Sørensen*

15:05-15:20

COFFEE BREAK

15:20-16:50

Workshop

Autonomic Dysreflexia: A Clinical Entity not to Be Overlooked After Spinal Cord Lesion

Chair: *Christina-Anastasia Rapti*

*Christina-Anastasia Rapti
Jean Jacques Wyndaele
Athanasios E. Kyriakides
Nicolao Roussos
Berrin Gündüz
Anastasios Athanassopoulos
Charalampos Konstantinidis
Elias Panagiotopoulos
Andrei Krassioukov*

16:50

CLOSING CEREMONY / AWARD PRESENTATIONS

SCIENTIFIC PROGRAM

October 30, 2013

B - Hall

08:45-10:15

Free Papers V

O-047 Labor Market Participation of People with Spinal Cord Injuries in Switzerland: First Results from The Swiss Spinal Cord Injury Cohort Study
Jan D. Reinhardt

O-048 Return to Work 5 Years After Discharge from Initial Inpatient Rehabilitation in Spinal Cord Injury: Status and Predictors
Astri Ferdiana

O-049 International Survey of Perceived Barriers to Admission and Discharge from Spinal Cord Injury Rehabilitation Units
Peter W. New

O-050 The Use of Healthcare Services During Pregnancy, Childbirth and Childbed by Women with SCI - A Qualitative Study
Bertschy Sue

O-051 From Theory to Architecture of eHealth Communication in the Field of Spinal Cord Injury. The Online Platform 'PARAFORUM' as a Case in Point
Sara Rubinelli

O-052 Shoulder Pain and Limitations in Shoulder Range of Motion in Persons with SCI at Discharge From Inpatient Rehabilitation: Correlations with Limitations in Activities and Participation 5 Years After Discharge
Marcel Post

10:15-10:35

COFFEE BREAK

10:35-12:05

Free Papers VI

O-053 Walking in Water and on Land After an Incomplete Spinal Cord Injury
Federica Tamburella

O-054 Distinction Between Spinal and Supraspinal Control of Walking in Human Incomplete Spinal Cord Injury
Lea Awai

O-055 Clinical Testing of Safety and feasibility of the Ekso™ Exoskeleton Robot for Walking in Patients with a Spinal Cord Injury
Thomas Glott

O-056 Effect of Non-Invasive Brain Stimulation on Motor and Gait Improvement Using Electromechanical System in Incomplete Spinal Cord Injury
Hatice Kumru

O-057 Feasibility of a BCI-FES Non-Invasive System for the Restoration of the Upper Limb in Tetraplegic Persons
Emiliana Bizzarini

O-058 Study on the Motor Control Function in the Patients with Chronic Spinal Cord Injury with fMRI
Jianjun Li

SCIENTIFIC PROGRAM

October 30, 2013

B - Hall

12:05-13:35

LUNCH

13:35-15:05

Workshop

Ultrasound Guided Botulinum Toxin Injections for The Treatment of Spasticity After SCI

Chair: *Serdar Koçer*

Serdar Koçer

15:05-15:20

COFFEE BREAK

15:20-16:50

Free Papers VII

O-060 Validity of the ISCoS International Quality of Life Data Set
Marcel W. Post

O-061 The Impact of Age on Functional Outcome in Patients with Spinal Cord Lesion
Giorgio Scivoletto

O-062 Implications of Using Standardised Versus Non-Standardised Outcome Measures in the Rehabilitation of Persons with Spinal Cord Injury: A Quality Assurance Issue
Conran Joseph

O-064 Outcomes of Neurogenic Bowel Management in Individuals with a Spinal Cord Injury Existing at Least Ten Years
Jacinte Adriaansen

SCIENTIFIC PROGRAM

October 30, 2013

C - Hall

08:45-10:15

Workshop

Analysing Confounding Factors and Suggesting Improvements in Classification Systems in Thoracolumbar and Cervical Spine Fractures

Chair: *H. S. Chhabra*

*H. S. Chhabra
Patrik Kluger
Marcel Dvorak
Alex Vaccaro
Rahul Kaul
Peter Wing
Rainer Abel
Micheal Haak
Shincuke Katoh*

10:15-10:35

COFFEE BREAK

10:35-12:05

Workshop

Analysing Confounding Factors and Suggesting Improvements in Classification Systems in Thoracolumbar and Cervical Spine Fractures

Chair: *H. S. Chhabra*

*H. S. Chhabra
Patrik Kluger
Marcel Dvorak
Alex Vaccaro
Rahul Kaul
Peter Wing
Rainer Abel
Micheal Haak
Shincuke Katoh
Vijayanth Kanagraju*

12:05-13:35

LUNCH

SCIENTIFIC PROGRAM

October 30, 2013

C - Hall

13:35-15:05

Workshop

International Collaborations: The Way of the Future

Chair: Doug Brown

Doug Brown
Keith Hayes
Michael Stacey
David Berlowitz
Martin Schubert
Jane Horseywell
Phalgun Joshi

15:05-15:20

COFFEE BREAK

15:20-16:50

Workshop

International Collaborations: The Way of the Future

Chair: Doug Brown

Doug Brown
Keith Hayes
Michael Stacey
David Berlowitz
Martin Schubert
Jane Horseywell
Phalgun Joshi

SCIENTIFIC PROGRAM

October 30, 2013

D - Hall

08:45-10:15

Workshop

Pain in Patients with Spinal Cord Injury

Chair: Bilge Yılmaz

Bilge Yılmaz
Evren Yaşar
Engin Çakar



Professor John Steeves

ICORD
(International Collaboration On Repair Discoveries),
University of British Columbia (UBC)
and Vancouver Coastal Health (VCH)
c/o 818 West 10th Avenue, Vancouver General Hospital
Vancouver, BC, V5Z 1M9, Canada
Email: steeves@icord.org
TEL: +1-604-218-8895

Prof. Krassioukov is a clinician-scientist and an internationally recognized expert in the area of autonomic dysfunctions following spinal cord injury (SCI). He obtained his MD degree in Russia and completed his PhD training and thesis defence at the Ivan Pavlov Institute of Physiology in St Petersburg, Russia.

He is currently a Professor in the Division of Physical Medicine and Rehabilitation, Department of Medicine, and is a Co-Director and Scientist at the International Collaboration on Repair Discoveries (ICORD) at the University of British Columbia, Vancouver, BC, Canada. He is also a Staff Physician at the Spinal Cord Injury Program at the GF Strong Rehabilitation Centre in Vancouver. He is a Chair of the International Autonomic Standards Committee, collaboration between the American Spinal Injury Association (ASIA) and International Spinal Cord Society (ASIA/ISCOS). Prof. Krassioukov's research is supported by grants from the Canadian Institute for Health Research, Heart and Stroke Foundation, Canadian Foundation for Innovation, Craig Neilsen Foundation, Christopher and Dana Reeve Foundation, and many others. He has published more than 130 peer-reviewed manuscripts, books, book chapters and reviews.

Prof. Krassioukov's research has the unique ability to bring together both basic animal research and clinical practice with the ultimate goal of answering various questions that require this translational approach. During the last six years he has been a Chair of the ASIA/ISCOS International Autonomic Standards Committee that united an international group of experts who helped to develop the International Autonomic Standards to Document Remaining Autonomic Functions after SCI (ISAFSCI). Presently these standards have been translated into Chinese, Portuguese, and Spanish and gained wide recognition in the SCI clinical community. Numerous clinical trials already include these standards as an outcome in their investigations.

Prof. Krassioukov dedicates a significant amount of his time to teaching and the supervision of young scientists and students both in his laboratory and internationally. His teaching philosophy is to foster critical thinking, creativity, and independence so that students will acquire crucial skills that will prepare them for their future research or clinical career. His laboratory has become an international centre for training young clinicians and basic scientist with interest in autonomic dysfunctions following SCI and other neurodegenerative conditions. During the last five years graduate students, postdoctoral fellows, and young clinicians from Australia, Canada, China, England, Russia, Switzerland, USA, and other countries have undergone training in his laboratory.

Prof. Krassioukov is a member of numerous advisory boards for the International agencies involved in research in the area of SCI and disability. Prof. Krassioukov's work in the area of SCI has been recognized through numerous national and international awards including the Inaugural Alan Brown Award from the ASIA. Recently Prof. Krassioukov was inducted as a fellow of the Canadian Academy of Health Sciences.



James Fawcett
*Oxford University and
St. Thomas' Hospital London*

James Fawcett trained in medicine at Oxford University and St. Thomas' Hospital London. After practicing in hospital medicine for a few years he studied for a PhD under Michael Gaze at the National Institute for Medical Research in London. He moved to the Salk Institute in the laboratory of Max Cowan as junior faculty, then set up his own laboratory in the Physiology Department in Cambridge. Since 2001 he has been Chairman of the Cambridge University Centre for Brain Repair.

His early research work was on the formation of connections during brain development and he then became interested in using developmental biology principles to promote repair in the adult nervous system. His main interest has been the part played by molecules of the extracellular matrix in the inhibition of nerve fibre regeneration and in the restriction of plasticity in the adult nervous system. He showed that chondroitin sulphate proteoglycans in scar tissue block axon regeneration after spinal cord injury, and that digesting these molecules could promote repair. Recent work has shown that plasticity is restricted after childhood critical periods by the formation of matrix structures known as perineuronal nets and that plasticity can be reactivated in the adult CNS by digestion of proteoglycans in these nets with chondroitinase. For this digestion to improve function after spinal cord injury it is necessary to combine the treatment with rehabilitation. A recent focus has been working to increase the intrinsic ability of axons to regenerate. This work has concentrated on the role of integrins, integrin transport and integrin activation. He has also been involved in the design of microchannel interfaces for electrical recording from regenerated axons.

He has worked with Spinal Research, the Christopher Reeve Foundation and with the international organization of spinal injury charities, the ICCP, to develop guidelines for the conduct of clinical trials in spinal cord injury.



Prof. Andrei Krassioukov
*University of British Columbia
Vancouver, BC, Canada*

Prof. Krassioukov is a clinician-scientist and an internationally recognized expert in the area of autonomic dysfunctions following spinal cord injury (SCI). He obtained his MD degree in Russia and completed his PhD training and thesis defence at the Ivan Pavlov Institute of Physiology in St Petersburg, Russia.

He is currently a Professor in the Division of Physical Medicine and Rehabilitation, Department of Medicine, and is a Co-Director and Scientist at the International Collaboration on Repair Discoveries (ICORD) at the University of British Columbia, Vancouver, BC, Canada. He is also a Staff Physician at the Spinal Cord Injury Program at the GF Strong Rehabilitation Centre in Vancouver. He is a Chair of the International Autonomic Standards Committee, collaboration between the American Spinal Injury Association (ASIA) and International Spinal Cord Society (ASIA/ISCos). Prof. Krassioukov's research is supported by grants from the Canadian Institute for Health Research, Heart and Stroke Foundation, Canadian Foundation for Innovation, Craig Neilsen Foundation, Christopher and Dana Reeve Foundation, and many others. He has published more than 130 peer-reviewed manuscripts, books, book chapters and reviews.

Prof. Krassioukov's research has the unique ability to bring together both basic animal research and clinical practice with the ultimate goal of answering various questions that require this translational approach. During the last six years he has been a Chair of the ASIA/ISCos International Autonomic Standards Committee that united an international group of experts who helped to develop the International Autonomic Standards to Document Remaining Autonomic Functions after SCI (ISAFSCI). Presently these standards have been translated into Chinese, Portuguese, and Spanish and gained wide recognition in the SCI clinical community. Numerous clinical trials already include these standards as an outcome in their investigations.

Prof. Krassioukov dedicates a significant amount of his time to teaching and the supervision of young scientists and students both in his laboratory and internationally. His teaching philosophy is to foster critical thinking, creativity, and independence so that students will acquire crucial skills that will prepare them for their future research or clinical career. His laboratory has become an international centre for training young clinicians and basic scientist with interest in autonomic dysfunctions following SCI and other neurodegenerative conditions. During the last five years graduate students, postdoctoral fellows, and young clinicians from Australia, Canada, China, England, Russia, Switzerland, USA, and other countries have undergone training in his laboratory.

Prof. Krassioukov is a member of numerous advisory boards for the International agencies involved in research in the area of SCI and disability. Prof. Krassioukov's work in the area of SCI has been recognized through numerous national and international awards including the Inaugural Alan Brown Award from the ASIA. Recently Prof. Krassioukov was inducted as a fellow of the Canadian Academy of Health Sciences.



Şafak Karamahmetoğlu

*Istanbul University
Cerrahpaşa Medical Faculty
Physical Medicine and Rehabilitation Department
Kocamustafapaşa cad.
34098 Fatih İstanbul Türkiye
Email: karamahmetoglu@istanbul.edu.tr
TEL: 0090 212 440 00 11 – 0090 532*

He was born on 03.01.1956. He was graduated as a medical doctor from İstanbul University, İstanbul Medical Faculty in 1982. He continued his medical career in İstanbul University, Cerrahpaşa Medical Faculty of Medicine, Physical Medicine and Rehabilitation Department.

He is the founder of The Medical Society of Tetra-Paraplegia of Turkey and, Founder and First President of The Spinal Cord Paralytics Association of Turkey. He published first papers about spinal cord injury epidemiology in Turkey such as: Traumatic Spinal Cord Injuries in İstanbul, Turkey: An Epidemiological Study. Paraplegia. The International Journal of the Spinal Cord. 33:8:469-471, 1995., Traumatic Spinal Cord Injuries in Southeast of Turkey: An Epidemiological Study. Spinal Cord. The International Journal of the Spinal Cord. 35:8:531-533, 1997. He attended The Advanced Spinal Cord Injury Rehabilitation Course in 2000, Stoke Mandeville, Aylesbury, United Kingdom. He is a member of International Spinal Cord Society, The General Assembly for Disabled (Turkey), Turkish Society of Physical Medicine and Rehabilitation.

In 2009, he became the medical director of İstanbul University Cerrahpaşa University Hospital for 3 years. He was a member of the medical education group of the Turkish Higher Education Council for 3 years. Then, he has become the vice-rector of İstanbul University in 2013, he is in charge of Scientific Projects Department of İstanbul University.



Dogac Niyazi Ozucelik, M.D

Bakırköy Dr.Sadi Konuk Training and Research Hospital

Email: dogacniyazi@gmail.com

Tel: +90 532 5929180

Fax: +90 2125424491

He was born on 03.01.1971. He was graduated as a medical doctor from Ege University, Faculty of Medicine in 1995. He completed his Emergency Medicine Residency programme in Dokuz Eylül University, Emergency Medicine Department. He continued his medical career in Hacettepe University, Medical Faculty of Medicine, Emergency Medicine Department.

Between 2002 and 2008 he worked at Hacettepe University Emergency Medicine Department. He became an Associate Professor in Ankara in 2007. He finished his master in Health Management in Hacettepe University. He is the founder of Associations of Emergency Medicine in Turkey. In 2008 he assigned as a Chief of Emergency Medicine Department in Ministry of Health Bakırköy Dr. Sadi Konuk Training and Research Hospital, Emergency Department in İstanbul. Between 2011 and 2013 he worked in İstanbul Provincial Directorate of Health as Deputy Director of Health. He is also responsible for Training and Administrative of Emergency Department in Bakırköy Dr.Sadi Konuk Training and Research Hospital, Emergency Department and coordinator of Emergency Departments in Türkiye Kamu Hastaneleri Kurumu İstanbul Bakırköy Bölgesi Genel Sekreterliği.

He worked as an observer in Department of Emergency Medicine in State University of New York in 2006. He has completed their group training course in Emergency/Disaster Medicine in JICA in 2008. He has also experienced in national and international disasters management and hospital disaster planning since 1999.



Phillip G. Popovich, PhD
*Professor
Department of Neuroscience
Director
Center for Brain and Spinal Cord Repair (CBSCR)
Degree: The Ohio State University
Post-Doctoral Training: Neuroimmunology
Dr. Caroline Whitacre, The Ohio State University
Phone: (614) 688-8576
Fax: (614) 292-9805
Email: popovich.2@osu.edu*

NLM PubMed publications list for Phillip G. Popovich (last 10 years)

Research Areas

Neuroimmunology of spinal cord injury, immunological influences on neuronal degeneration and regeneration, neuroendocrine influences (e.g., stress/HPA axis activation) on inflammatory mediated injury/repair of the CNS.

Current Research

My laboratory is an interdisciplinary research group dedicated to studying the complexities of CNS injury, inflammation and tissue repair. We are currently funded (by NIH) to explore the consequences of resident (e.g., microglia) and recruited inflammatory cell (e.g., macrophages, T-lymphocytes) activation on axonal injury, demyelination and neurological function in models of rat and mouse SCI. Inflammation is an inevitable consequence of tissue damage and is necessary for efficient cell repair. However, acute inflammation also causes "collateral" damage to tissues before repair processes are initiated. In the spinal cord, where most cells are post-mitotic and exhibit poor regenerative/repair potential, inflammation can have devastating consequences. We are striving to develop novel therapies that will manipulate or over-ride normal immune function.

Equipment and Techniques

Spinal cord injury modeling, immunohistochemistry and state-of-the-art microscopy (light/fluorescence/dark-field/confocal) and image analysis (with stereology), laser-capture micro-dissection, behavioral analysis of locomotor and sensory function, neuroanatomical tract tracing, cell culture (neuronal/glial/macrophage/lymphocyte), FACS analysis, targeted leukocyte depletion, in situ hybridization, animal models of CNS autoimmune disease (e.g. EAE), lymphocyte phenotype and functional assays, basic molecular biology (e.g., PCR). We also have ongoing collaborations using customized DNA microarray technology. backdrop: Immunofluorescent double-labeling of microglia/macrophages after spinal cord injury. Double-labeled cells (green cytoplasm/orange membrane) express a molecule (CD8) that may be involved in macrophage-mediated neurotoxicity.

LoFric
origo™

Be you with LoFric Origo

Safe catheterisation in a clever package
so you can get on with your life.

- **Low friction.** LoFric Origo has a slippery tube coating called Urotonic™ Surface Technology. This coating is near friction-free going in and coming out, which makes it as comfortable as a catheter can be to use.
- **Insertion Grip.** The unique adjustable Insertion Grip means you don't have to touch the catheter tube to control it. That means a more hygienic procedure.
- **Discreet.** LoFric Origo comes in a clever, non-medical looking package and can be folded to fit your pocket. This makes it discreet to carry, and the package can be used as a hygienic disposal pouch when you're finished.

Wellspect HealthCare, Aminogatan 1, P.O. Box 14, SE-431 21 Mölndal, Sweden.
Phone: +46 31 376 40 00. www.lofric.com

wellspect
HEALTHCARE

© 2012 Wellmed HealthCare. All rights reserved. 75703 GRX 1209



WORKSHOPS ABSTRACTS

Monday, 28th October 2013

W-001

Hall: B / 11.05 - 12.35

Focusing on Pleasure: How Can We Promote Orgasm After Spinal Cord Injury ?

Chair: Frédérique Courtois

Frédérique Courtois, Stacy Elliott, Andrei Krassioukov, Jens Sonksen

Abstract (description of the focus on the symposium and topics that will be addressed)

The symposium will address the question of sexual health rehabilitation, sperm retrieval methods and their relationship to sexual pleasure and orgasm following a spinal cord injury (SCI). An overview of the sperm retrieval methods will first be presented, including vibrostimulation, midodrine treatment, electroejaculation, testicular biopsy, followed by the perceptions and risks associated with these procedures in men with SCI, in particular the adverse effects on autonomic dysreflexia. Will follow a review of what we currently know about the neurology of ejaculation and orgasm, and how it can explain the various experiences and perceptions associated with sperm retrieval methods. The symposium will close with the beneficial and after-effects of ejaculation (and orgasm?) on the individual's health, in particular on bladder control and urinary infections.

Suggested titles for each communication

- Dr Jean-Gabriel Prévinaire. Methods for orgasm, ejaculation and sperm retrieval after SCI : an overview
- Dr Andrei Krassioukov. The risks associated with ejaculation and climax: the good, the bad and the ugly
- Dr Frédérique Courtois. What we know about the neurology of ejaculation, orgasm and pleasure
- Dr Jens Sonksen. The therapeutic benefits of ejaculation on spasticity and bladder function.

Monday, 28th October 2013

W-002

Hall: C / 11.05 - 12.35

Moving Towards a Common Definition of Quality of Life for People with Spinal Cord Injury (SCI)

Chair: Jane Horsewell

Marcel W.M. Post, Divya Parashar, Denise G. Tate, Szilvia Geyh, Jane Horsewell, Kim Anderson-Erisman, Lucy Robinson, Anke Scheel

Abstract:

The workshop will summarise the current, frequently-used definitions of Quality of Life (QoL), with particular reference to people living with spinal cord injury, and will consider the question of whether an attempt to reach a common definition is possible or, indeed, useful. Recent insights from research carried out in many different parts of the world will address the issue of the measurement of QoL and will introduce a comparative, cross-cultural perspective. This perspective will be developed further through a structured panel debate involving SCI professionals, researchers and consumers. The workshop will encourage questions and input from the audience.

The ideas and discussions elicited during the workshop will inform and inspire the future projects and activities of the newly-established ISCoS Quality of Life Special Interest Group.

Format:

Workshop chair: Jane Horsewell

Presentation: Definitions of Quality of Life: how to move on?

Presenter: Marcel W.M. Post

Abstract:

Confusion on how to define and operationalize the concept of quality of life (QoL) in the context of health has been present as long as this term has been used. In this presentation, examples of definitions of QoL will be given to show the divergent conceptualizations. Several attempts have been made to order the various conceptualizations of QoL. Two QoL models will be discussed. These models help to order and interpret the QoL literature. It is advised to use the term QoL only as an umbrella term and to be clear about which QoL domain/domains constitute the topic of the study.

Presentation: Quality of Life and SCI: an Asian perspective

Decoding QoL in India: Challenges and opportunities

Presenter: Divya Parashar

Abstract:

There is a dearth of research on QoL in India. The presentation will include a summary of existing research in the area along with a discussion of the results of a qualitative study done with consumers with SCI on what QoL means to them with emphasis on the following areas: What contributes towards attaining optimum QoL for the participants? Does the definition of QoL change as time elapses since the SCI? The need to customize rehabilitation interventions to enhance an individual's QoL is of utmost importance in a country like India. Empowering the individual with SCI, to enlarge their scope of values beyond the injury, and to enhance problem solving coping and perceived manageability emerged as strong recommendations in light of the lack of infrastructure in a developing country like ours.

Presentation: Quality of Life and SCI: the American perspective

Presenter: Denise G. Tate

Monday, 28th October 2013

W-002

Hall: C / 11.05 - 12.35

Abstract:

The term "quality of life" has been defined in many ways by various authors. But objective and subjective definitions are described in the literature. Quality of life (QOL) has been defined as a dynamic process, responsive to changes in a person's situation over time and displaying both positive and negative aspects. These definitions commonly describe QOL as a temporal experience of relative satisfaction with life that can only be appraised by the individual him/herself. In relation to SCI, QOL assessments have focused on one's unique experience with injury, personal health status, level of functioning and the adjustment process following such major event in life. More recently, the definition has been expanded to also include aspects of community and social participation, environmental factors and access to technology to improve lifestyle and function. This paper will review some of the major initiatives in the United States regarding QOL assessments as well as results from studies utilizing such assessment tools.

Presentation: Quality of Life and SCI: a comparative approach
Presenter: Szilvia Geyh

Abstract:

There are good reasons to do international comparative research on the quality of life (QoL) of persons with SCI. QoL differs across countries in the general population depending on a wide range of environmental (e.g. work opportunities, culture and values) as well as personal factors (e.g. personality, self-esteem or social support). Still, there is little comparative research on QoL in SCI so far. Domains of QoL have been compared between eastern and western countries, and between developed countries within and beyond Europe. Satisfaction with relationships and self-care of persons with SCI seems to be similar across countries, while it may differ regarding other life domains (finances, work, leisure), however, the latter results are rather inconclusive. In our own research, we used QoL data from 243 persons with SCI from Australia, Brazil, Canada, Israel, South Africa and the United States to identify a cross-culturally valid measure of QoL and to compare QoL. We found satisfaction items from the World Health Organization Quality of Life Assessment to be cross-culturally valid. We found small but statistically significant differences in QoL between the countries. Employment status and time since injury were related to QoL irrespective of the country of residence. Based on literature and own research experience, challenges and avenues for future international SCI research are discussed.

Panel debate:
Moderators: Jane Horsewell
Denise G. Tate

Panel members: Kimberley Anderson-Erisman
Lucy Robinson
Anke Scheel
Marcel Post
Szilvia Geyh
Divya Parashar

Monday, 28th October 2013

W-003

Hall: D / 11.05 - 12.35

Nursing Care of Patients with Spinal Cord Injuries: Acute Care Management and Rehabilitation

Chair: Nurhan Bayraktar

Nurhan Bayraktar, Seher Başaran, Nuran Tosun, Fatma Akalın

Workshop Abstract:

In this workshop, nursing care of the patient with spinal cord injury (SCI) will be discussed in the following content:

Acute care interventions and management spinal cord injury

Seher Başaran, Res. Asist. MsN. BsN.

Hacettepe University Faculty of Nursing Ankara TURKEY

Correct emergency management at the time of injury is crucial because moving the client incorrectly can permanently damage the spinal cord. SCI management and care is a specialty area that related on interdisciplinary team of physicians, nurses, psychologists, physical therapists, and nutritionists to provide optimum care for patients. A trauma care especially spinal cord injury care in nursing has specialized training in stabilized spinal cord, works collaboratively with the trauma team, and gives care that takes a holistic approach to meeting patient's needs. Spine protection is essential to prevent early secondary complications that can occur include: lesion extension, respiratory insufficiency, cardiovascular insufficiency, hypothermia, pressure ulcers, urinary and faecal incontinence, and renal failure. The nurse must have experience with respiratory system, cardiovascular system, neurological system, neuropathic pain, genitourinary system, gastrointestinal system, musculoskeletal system, integumentary system, psychological and emotional support during acute care, autonomic dysreflexia. Nursing care of a patient with acute SCI is directed towards: maintaining alignment of the spine, preventing damage to the patient's skin, prevention of secondary complications and improving outcomes of SCI. Workshop's this part will discuss; acute care interventions and management SCI.

Perioperative Care of the Patients with Spinal Cord Injury

Nurhan Bayraktar, Prof. RN, PhD

Hacettepe University Faculty of Nursing Ankara TURKEY

Surgical interventions for SCI directed towards reducing the risk of further neurological deterioration and optimizing the potential for neurological recovery. Surgical spine intervention after traumatic SCI involves vertebral stabilization and/or decompression of neural tissue. Conventional surgical procedures, typically involve large open surgical exposures for decompression, instrumentation, and fusion. Improved modern surgical and anesthetic techniques, have allowed for earlier operative intervention with minimized patient morbidity. Neuroscience nurses have a critical role during the perioperative period in assessing and monitoring neurological status, implementing interventions to enhance healing and recovery, and providing patient and family education. Perioperative care of the patients is primarily focused towards: Monitoring the vital and neurological signs, maintaining the proper patient positioning, instruction of the patients about the treatment process, implementation of measures to reduce deep vein thrombosis risk, implementation of infection-control measures, implementation of patient safety measures, implementation of perioperative medications, fluids and blood products, pain management, psychosocial evaluation and support for patient and family, nutritional evaluation and support, monitoring neurological functioning, wound care, prevention and early detection of complications, and discharge planning. Optimal perioperative nursing care including physiologic and psychosocial approach is important in improving surgical outcomes.

Monday, 28th October 2013

W-003

Hall: D / 11.05 - 12.35

Rehabilitation of Patients with Spinal Cord Injury

Nuran Tosun, Assoc. Prof. RN, PhD

Gülhane Military Medical Academy, School of Nursing, Ankara TURKEY

Rehabilitation has been defined by the World Health Organization as a progressive, dynamic, goal-oriented and often time-limited process, which enables an individual with impairment to identify and reach his/her optimal mental, physical, cognitive and social functional level. SCI care involves more than treating just the medical and physiologic consequences of the injury. Comprehensive rehabilitation services must include a highly specialized interdisciplinary approach that addressed medical, physiologic, functional, psychological, and social issues. The primary goals of rehabilitation are prevention of secondary complications, maximization of physical functioning, and reintegration into the community. SCI rehabilitation is a very specialty area that relies on an interdisciplinary team of physicians, nurses, psychologists, physical therapists, occupational therapists, respiratory therapists, nutritionist, speech-language therapists, social workers, vocational counselor, sexual counselors, case managers, prosthetists, and orthotists to provide optimum care for patients. All interdisciplinary team members must be able to recognize the unique needs of this population and implement interventions to maximize patient outcomes, prevent the costly medical complications that are common in persons with SCI and that impact activities of daily living (ADLs) and functional mobility. The team must be able to implement complex discharge plans and arrange for life-long follow-up and health promotion.

A rehabilitation nurse has specialized training in rehabilitative and restorative principles, works collaboratively with the rehabilitation team, and ascribes to a philosophy of care that takes a holistic approach to meeting a patient's functional, emotional, medical, vocational, educational, environmental, and spiritual needs. The nurse assists patients with SCI/D to adapt to an altered lifestyle, designs and implements treatment strategies based on scientific nursing theory and evidence-based practice related to self-care, and promotes physical, psychosocial, and spiritual health. To provide competent care, nurses working with SCI patients must have experience with; neurological assessment and classification systems, bladder and bowel management, maintenance of skin integrity, autonomic dysreflexia and autonomic instability, nutrition, circulatory, respiratory, and musculoskeletal complications, spasticity and spasticity management, self-care, medications, pain management, psychosocial issues, sexuality and fertility, re-integration to, and safety in, the home and community setting. In this part of the workshop, it will be discussed the important aspects of the rehabilitation interventions and the role of the rehabilitation nurses.

Patient Centered Rehabilitation Nursing Interventions at Turkish Armed Forces Rehabilitation and Care Center

Fatma AKALIN, Rehabilitation Nurse

GATA, TAF Rehabilitation Center, Spinal Cord Injury Unit. Ankara TURKEY

Rehabilitation nursing is the key and core component of Turkish Armed Forces Rehabilitation Center, whose vision is to ensure for spinal cord injured patients who have physical and social disabilities with various reasons to overcome these physical and psychosocial impairments by themselves and their families with self confidence. Spinal Cord Injured patients are admitted to our center after their initial medical and surgical treatments have completed. After Admission as inpatient, The nurse is the coordinator for all the medical and rehabilitation interventions such as physiotherapy, occupational therapy, psychosocial intervention, diets and etc. The basic care and following the medical process is of course, routine nursing function. The nurse takes the past medical history and makes the nursing examination to identify nursing diagnosis. The important problem areas under the responsibility of nurses are bladder management, bowel management, education and treatment for pressure sore, and education and training about the rehabilitation emergencies like autonomic dysreflexia, infections.

Monday, 28th October 2013

W-004

Hall: B / 13.50 - 15.20

Models of Care: How Different Systems Address the Interaction Between Acute Care and Rehabilitation for New Traumatic SCI

Chair: Peter Wing

Peter Wing, H. S. Chhabra, Rory Dixon, Nazirah Hasnan, Claes Hultling, James W Middleton, Vanessa Noonan, Pradeep Thumbikat, Eric Weerts

Abstract:

While the rehabilitation care path of the person with a new TSCI has been increasingly delineated, the structure of the optimum acute care system for the early management has been less examined. One of the main topics for ISCoS 2013 is "Acute care/management of SCI", leading the organizing committee to plan 2 sessions on this topic.

Acute management of a person with a new traumatic SCI leads to rehabilitation either in general Rehabilitation units or in Spinal Injury Centres in a manner differing widely between more and less developed countries. With prolongation of the acute phase for any reason, care services vary greatly, for example in mechanical ventilator dependent tetraplegic patients who may be weaned in intensive care units (with many complications) or sent home with manual ventilation to inevitable death.

In this workshop, prominent clinician leaders in the field of SCI, with responsibility for care of the newly injured, will participate as panellists. Each will deliver a short presentation outlining the system(s) of care with which they are familiar, presenting available utilization indicator data. Each will describe how the acute and rehab components of their care system function together and will subsequently participate in discussion of facilitators and barriers associated with different systems of care.

Quantitative and qualitative data about care pathways may, depending on availability, include:

- The country or region described,
- The approx number of TSCI patients annually,
- The typical care path in the region. Eg major trauma centre to acute spinal cord specialty centre; integrated rehabilitation from what stage?
- The average time after injury the patient is admitted to an SCI-specialised acute care unit (ALOS to admission).
- The use of written standards for SCI care (where available, examples will be presented).
- The time after injury that discharge planning begins.
- The time a wheelchair is first available to the patient (approximate fit/measured fit/the patient's own chair).
- Average length of stay (ALOS) in acute care; in rehab care; in first hospital admission including all levels of care to DC home.
- Provisions made for prolonged acute care for the high level tetraplegic (HLT)/vented patient: (ICU or similar/hospital-extended care/home only?)
- Any stats on survival, quality of life and other outcome measures.
- Information by level of lesion, age where available.

The panel will discuss the quality of the link between acute care and rehab: whether they form a close part of same team/a consultation and transfer relationship/no useful link. Do those in acute care get good rehab; are those in rehab safely and efficiently managed for acute illness; do patients 'bounce' back and forth? Audience participation will be encouraged (time-dependent).

Monday, 28th October 2013

W-005

Hall: C / 13.50 - 15.20

International Spinal Cord Injury Data Sets

Chair: Fin Biering-Sørensen

Fin Biering-Sørensen, Michael DeVivo, Susan Charlifue, Marcel Post, Joanne Odenkirchen

Abstract:

Educational Objectives:

At the end of the course the attendees will be able to:

- Describe the International SCI Data Sets project and give examples of the available data sets;
- Report the International SCI Core Data Set according to published standards;
- Describe important points to consider when translating and assessing reliability and validity of an International SCI Data Set;
- Describe ongoing work to develop the 'Complete Clinical Record' and common data elements for SCI clinical research.

Synopsis:

Program:

Overview of the International SCI Data Sets available (Fin Biering-Sørensen)

Standardization in reporting data related to the International SCI Core Data Set (Michael DeVivo)

International SCI Data Sets: Guidance on translating and assessing reliability and validity (Susan Charlifue)

Ongoing work for the 'Complete Clinical Record' (Marcel Post)

NIH/NINDS partnership in defining common data elements (CDEs) for the International SCI Data Sets and ongoing development of CDEs for clinical SCI trials (Joanne Odenkirchen)

Monday, 28th October 2013

W-006

Hall: D / 13.50 - 15.20

Organisation of SCI Treatment, Rehabilitation and Follow-Up: Are Ideas and Models Developed in High-Resource Countries Relevant to Medium and Lowresource Countries?

Chair: Jane Horsewell

Jane Horsewell, Ramazan Baş, Kim Anderson-Erisman, Federico Montero, Shivjeet Singh Raghaw

Focus:

The main objectives of the workshop are:

1. To give TOFD (the Turkish SCI consumer organisation) the opportunity to present activities and plans for establishing an SCI unit and to receive feedback and input from SCI consumers/SCI professionals.
2. To consider the relevance and applicability of, for example, ESCIF policy statements and recommendations (e.g. the need for a centralised system of treatment, rehabilitation and follow-up in order to facilitate the comprehensive management of SCI, ways to ensure quality in SCI rehabilitation, the benefits of lifelong monitoring) to countries with fewer available resources and greater infrastructural challenges.
3. The panel debate will focus on the experience, viewpoints and priorities of SCI consumers from different parts of the world.
4. The workshop will encourage questions and input from SCI consumers and SCI professionals in the audience

Format:

Introduction: Chair, Jane Horsewell, President, European Spinal Cord Injury Federation
Co-chair, Ramazan Bas, President of TOFD

Presentation: TOFD: Working for people with SCI in Turkey
Presenter: Ramazan Bas, President of TOFD

Presentation: Comprehensive management of SCI in Europe: ESCIF policy and recommendations
Presenter: Jane Horsewell, President, The European Spinal Cord Injury Federation

Panel members: Ramazan Bas, TOFD
Kim Anderson-Erisman, United States
Dr Daniel Rubio de Souza, Brasil
Shivjeet Singh Raghaw, India

ESCIF would like to extend its sincere thanks to Coloplast and Hollister Inc. for their ongoing support of ESCIF and its activities – including the current workshop.

Monday, 28th October 2013

W-007

Hall: B / 15.40 - 17.00

Workshop on Research Publication in Spinal Cord

Chair: Jean Jacques Wyndaele

Jean Jacques Wyndaele, Fin Biering-Sørensen, Rebecca Vickerstaff

Program:

1. How to develop a research plan and get correct data. Fin Biering Sorensen
2. How to write results and discussion to prepare a manuscript for Spinal Cord. Why submit to Spinal Cord. The editorial process after submission. Jean Jacques Wyndaele
3. How an accepted manuscript gets published. Promotion aspects. Rebecca Vickerstaff
4. Discussion: All

Tuesday, 29th October 2013

W-008

Hall: A / 08.50 - 12.40

Prevention Symposium / Evidence Based Strategies for Prevention of Spinal Cord Injuries

Chair: H. S. Chhabra

M. Fitzharris, H. S. Chhabra, Herndon Murray, Kamil Yazıcıoğlu, Eric Weerts

Time	Topic	Speaker
20mts + 8mts	Evidence based strategies for Prevention of SCI due to RTCs	Dr M Fitzharris
20mts + 8mts	Evidence based strategies for Prevention of SCI due to Falls,	Dr H S Chhabra
20mts + 8mts	Evidence based strategies for Prevention of SCI due to Water accidents,	Dr Herndon Murray
20mts + 8mts	Evidence based strategies for Prevention of SCI due to Sports injuries	Dr Andrei Krassioukov
20mts + 8mts	Evidence based strategies for Prevention of SCI due to Fall of load from height	Dr Kamil Yazicioglu
20mts + 8mts	Evidence based strategies for Prevention of SCI due to violence	Mr Eric Weerts
40 mts	Panel Discussion Gaps in strategies for Prevention of SCI and the way forward	

Tuesday, 29th October 2013

W-009

Hall: C / 08.50 - 10.20

Procedures, Products and Pragmatism: The Evolution of Inclusive Human Study Protocols

Chair: John Steeves

John Steeves, Linda Jones, Lorenzo Tanadini, Armin Curt, Kimberly Anderson

Question:

Can we speed the completion of SCI clinical trials, using both complete and incomplete subjects, while preserving the sensitivity and accuracy for reliably detecting a subtle therapeutic effect?

Educational Objectives:

1. Discover the scientific and pragmatic issues associated with conducting a clinical trial involving the simultaneous participation of subjects with complete (AIS-A) and incomplete (AIS-B, AIS-C) SCI.
2. Even though participants with incomplete SCI have highly variable recovery patterns, learn how they can be partitioned into more homogeneous cohorts in an unbiased manner.
3. Consider and debate the strengths and limitations of various outcome measurement approaches. Does the same clinical endpoint need to be used for all trial participants or can we prospectively tailor outcome tools and endpoints to specific SCI cohorts?

Synopsis (abstract):

The recent development of more accurate diagnostic criteria, along with unbiased statistical algorithms, provides an opportunity for the identification of homogeneous cohorts with incomplete spinal cord injury (iSCI). The early enrolment of appropriate iSCI subjects (after small initial safety study on complete SCI) may benefit clinical translation for several reasons, including:

1. Because incomplete SCI subjects have some preserved neural connections they might respond better to any subtle therapeutic effect than subjects with sensorimotor complete (AIS-A) SCI
2. Most therapeutic interventions are discovered using animal models with iSCI; thus the use of people with iSCI should more closely approximate the preclinical situation
3. Inclusion of iSCI subjects would provide a faster and more comprehensive completion of a SCI trial due to the concurrent evaluation of a broader range of SCI severities (AIS-A through AIS-C)
4. For the moment, the inclusion of participants with mild SCI (e.g. AIS-D) in early phase trials may not be desirable, as the significant spontaneous recovery associated with the AIS-D population will likely mask the detection of any therapeutic effect.

Using the large and comprehensive EMSCI database, we have been identifying which iSCI subjects, can and should be included in acute or sub-acute Phase 2 clinical trials. We have completed analyses that suggest we can predict within the first 2 weeks after SCI what the pattern of neurological and functional recovery will be at 6 months for incomplete AIS-B and AIS-C SCI patients. The findings are promising as a diagnostic, but are equally important for human studies. Using a predetermined number of different anchor outcomes (clinical endpoints), the recursive partitioning algorithm will enable a clinical investigator to selectively include AIS-B and AIS-C patients for an accurate and reliable assessment of whether a therapeutic provides a benefit and is significantly different from appropriate controls.

Tuesday, 29th October 2013

W-010

Hall: A / 14.00 - 15.30

Disaster Management and Spinal Cord Injury

Chair: Colleen O'Connell

Colleen O'Connell, Jo Armstrong, Michael Baumberger, Claes Hultling, Géraldine Jacquemin, Shinsuke Kato, Fiona Stephenson, Eric Weerts

Workshop Summary:

Acute care and rehabilitation for persons with spinal cord injury (SCI) typically employs comprehensive interdisciplinary care with SCI specialty training. In disaster and crisis situations when needs are escalated, the delivery of such care can be drastically compromised, particularly when such events occur in low resourced settings. Non-government organizations (NGOs) with local and foreign health SCI experts are often engaged in international disaster response, in addition to mitigation, preparedness and recovery activities. Such expertise and increased attention to SCI has led to improved attention to and capacities in SCI care following disasters in some countries. The sustainability of such programs however can be challenging, especially in environments with ongoing scarcity of resources.

This panel of experts will report on recent experiences and studies covering the continuum of SCI care in disasters and crises, with a focus on large scale disasters. Topics will include the missions of various international NGOs, resource development such as technical tools and aids for emergency assessment and survey, delivery of rehabilitation and the associated medical and community reintegration outcomes and capacity building, and the development of disaster rehabilitation as an important and necessary component of any disaster management. The sessions themes include:

- SCI outcomes in recent disasters, highlighting the evidence which supports the role of rehabilitation interventions early in disaster response, the need for standardized tools specific to data collection and assessment, and the importance of designating SCI care sites
- Establishing SCI centres in low resource areas; implications for government collaborations and sustainability planning
- Capacity development – education and training initiatives for health care workers in areas with limited SCI expertise, including introduction of the ISCoS eLearnSCI modules
- SCI in crisis zones; unique challenges and needs, and role for expertise and early interventions
- Disaster rehabilitation as an emerging field of expertise within the SCI community, role for ISCoS members and NGOs, including future initiatives and collaborations.

Tuesday, 29th October 2013

W-011

Hall: C / 14.00 - 15.30

Spinal Surgery in Elderly Population: What is Feasible, Does It Worth It?

Chair: Emre Acaroğlu

Emre Acaroğlu, Ahmet Alanay, Selçuk Palaoğlu, Serdar Kahraman, Murat Zinnuroğlu

Workshop Abstract:

Aging of the population throughout the world brings unprecedented medical challenges. One of the most devastating health related quality of life problem emerges as the health and functionality of the spinal column, or thereby lack of it. Clinical research dedicated to the problems of the spinal column in elderly patients has demonstrated the potential threat to the quality of life by these and the feasibility as well as the efficacy of surgery. Based on this, spinal surgery addressing the problems associated with aging such as deformity, fractures and compression problems is getting to be better defined and more frequently used. This workshop will discuss those problems associated with aging in the context of the potential use of surgery as a solution and the intrinsic risks of surgery in the elderly population.

Wednesday, 30th October 2013

W-012

Hall: C / 08.45 - 12.05

Analysing Confounding Factors and Suggesting Improvements in Classification Systems in Thoracolumbar and Cervical Spine Fractures

Chair: H. S.Chhabra

H. S. Chhabra, Patrik Kluger, Marcel Dvorak, Alex Vaccaro, Rahul Kaul, Peter Wing, Rainer Abel, Micheal Haak, Shincuke Katoh, Vijayanth Kanagraju

Symposium Abstract:

There is still no consensus on the optimal management of the vertebral fracture which leads to spinal cord injury. There has been no prospective randomized control study so far in this field. The low level of evidence available is compounded by shortcomings in study design. One of the main limitations has been the availability of a good classification system which would help in optimizing uniformity in data collection and analysis. Even though various classification systems have been proposed and have gradually evolved, we are still not sure as to whether the classification systems in use at present are optimum in terms of reproducibility and guiding management.

In the proposed workshop, various classification systems in use for Thoraco-lumbar and Cervical Spine will be discussed. The weaknesses of the various classification systems and possible means to improve them will also be discussed in an effort to improve the existing systems. Two studies are presently being done by the Spine Trauma Study Group to assess any shortcomings of the existing Thoraco-lumbar and Cervical classification systems, namely "Comparative Interobserver and Intraobserver reliability of AO Spine classification & injury severity system and Thoracolumbar injury classification & severity score for thoracic and lumbar spine injuries" and "Comparative Interobserver and Intraobserver reliability of Sub -axial cervical spine injury classification system (SLIC), Cervical spine injury severity score (CSISS) and Allen Ferguson Classification for Cervical Spine Injuries". The results of these two studies will also be presented. A copy of the protocol of both the studies is enclosed.

We hope that the deliberations will help the participants and the Spine Trauma Study Group to get a better understanding in the field. The deliberations will also be useful for subsequent studies evaluating outcomes of Management of Vertebral Fractures.

Wednesday, 30th October 2013

W-013

Hall: D / 08.45 - 10.15

Pain in Patients with Spinal Cord Injury

Chair: Bilge Yılmaz

Bilge Yılmaz, Evren Yaşar, Engin Çakar

Workshop / Symposium Abstract:

Description of the focus of the workshop/symposium and topics that will be addressed

Pain is one of the most challenging problems in patients with spinal cord injury. The focus of this workshop is to remind the problem and to discuss the therapeutic strategies.

Suggested speakers and tentative topics for each speaker:

Bilge YILMAZ, MD Epidemiology of pain in patients with spinal cord injury

Definition and classification

Epidemiology

New research insights and genomic predisposition

Evren YASAR, MD Treatment approaches for pain in patients with spinal cord injury

Medications

Injections and nerve blocks

Physical therapy

Surgical options

Engin ÇAKAR, MD Stimulation techniques for the treatment of pain in patients with spinal cord injury

Transcranial magnetic stimulation

Transcranial direct current stimulation

Wednesday, 30th October 2013

W-014

Hall: A / 10.35 - 12.05

Labour Market Participation of Persons with SCI Across Europe: The ILIAS Project

Chair: Marcel W.M. Post

Marcel W.M. Post, Jan D. Reinhardt, Reuben Escorpizo, Jane Horseywell, Fin Biering-Sørensen, W. de Moes, Gerold Stucki

Background:

ILIAS (International Labour market Integration Assessment in Spinal cord injury) is a collaborative effort of the European Spinal Cord Injury Federation (ESCI) and, in its current first stage, research institutes in Denmark, the Netherlands, Norway and Switzerland. A total of 1346 persons with SCI (184 to 512 per country) completed an extensive questionnaire on work situation, barriers to work, vocational rehabilitation and work satisfaction. The questionnaires have been distributed through the national associations of persons with SCI in each country.

Overall objective:

To present the state of the field in labour market participation of persons with SCI in Europe

Specific aims:

To examine the work situation of persons with SCI in different countries participating in the ILIAS project.
To illustrate the different barriers to work at the micro-, meso-, and macro-levels.
To illustrate the practice of vocational rehabilitation within and outside Europe
To discuss the consumer perspective on work participation of persons with SCI

Presentations:

Dr. Marcel W.M. Post: Work situation after SCI in four European countries

Dr. Jan D. Reinhardt: Barriers to work: micro, meso and macro factors

Dr. Monika Finger: Vocational rehabilitation practices inside and outside Europe

Jane Horseywell: Consumer perspective on work participation of persons with SCI

Wednesday, 30th October 2013

W-015

Hall: A / 13.35 - 15.05

www.elearnSCI.org- An Educational Initiative of ISCoS. Overview, History, Challenges, Usage and the Future.

Chair: Lisa Harvey

Lisa Harvey, H S Chhabra, D. Green, Andrei Krassioukov, S. Muldoon, Fin Biering-Sørensen

Abstracts:

This workshop focuses on www.elearnSCI.org – an initiative of ISCoS to provide free online training for healthcare professionals in spinal cord injury. There will be a brief summary and overview for those not familiar with the resource but the majority of the workshop will be devoted to reflecting on how we can use online training to effectively educate healthcare professionals in the management of spinal cord injuries. We will examine the process involved in developing the resource, some of the challenges in coordinating those involved, and how we best move forward. Part of the workshop will be devoted to looking at usage statistics and the findings of a formal and independent evaluation to better understand what aspects of the resource have worked and where we may need to direct more attention. The workshop will also outline future plans to translate the website and to further develop some of the modules. There will be plenty of opportunities for the audience to discuss the pros and cons of different types of online learning and to share their ideas on how ISCoS can effectively provide online education and training for healthcare professionals around the world. The presenters of this workshop represent the Education Committee of ISCoS and were involved in the development of the resource (along with 240 other ISCoS members).

Wednesday, 30th October 2013

W-016

Hall: B / 13.35 - 15.05

Ultrasound Guided Botulinum Toxin Injections for The Treatment of Spasticity After SCI

Chair: Serdar Koçer

Serdar Koçer, Belgin Erhan

Abstracts:

BoNTA injections has an important place in the treatment of the spasticity among all therapeutic options. Injection into the muscle belly is the prerequisite for the success and safety of the treatment. Reaching the target muscle is not always easy.

Identification of the target muscle is usually done by palpation alone or using EMG - electrical stimulation. Another approach, ultrasonography is an interesting alternative as it offers the possibility to visualise the targeted muscle and to follow the injection of the product. Deep muscles as well as synergic muscles may be easily identified this way. Ultrasound guidance can also help to prevent iatrogenic injection as well as its associated adverse events. The ultrasound technique is fast, reliable and more comfortable for the patient than electrostimulation.

Finally ultrasonography gives also some information about the structural modifications of the spastic muscle which may modify the treatment.

The aim of this workshop:

- to discuss the advantages and limits of each techniques and especially ultrasound guidance.
- to learn to differentiate normal muscle and neurologic muscle
- to visualise ultrasonographic anatomy of muscles concerned by spasticity and injection sites for each muscle
- to discuss the indications.

Wednesday, 30th October 2013

W-017

Hall: C / 13.35 - 16.50

International Collaborations: The Way of the Future

Chair: Doug Brown

Doug Brown, Keith Hayes, Michael Stacey, David Berlowitz, Martin Schubert, Jane Horsewell, Phalgun Joshi

Abstracts:

The purpose of this workshop will be to share the learnings and experiences of those leading international multicentre trials and collaborations to simulate and engage new partnerships. The workshop will focus on benefits and barriers of international collaborations and presentations will provide the perspectives of researchers, clinicians and consumers.

Following the presentations, a set of small groups will discuss identified enablers and barriers and these will be further explored along with solutions via a panel discussion. Discussion topics that could be covered include best practice implementation, ethics, data privacy, cultural issues, common dataset elements, perspectives on stakeholder management and appropriate recognition for involvement in trials. The workshop will end with a summary of identified common elements for success and outline the next steps which may involve future ISCoS meeting Workshops.

Speakers and tentative topics:

Workshop chair: Doug Brown, ISCoS

Second chair: TBA

Presentation: The Paradigm Shift Towards International Collaborations

Presenter: Keith Hayes, ONF

Presentation: Successful International Collaborations- Researcher perspective

Presenter: Michael Stacey/ Jillian Swain, University of Western Australia and/or David Berlowitz, IBAS

Presentation: Successful International Collaborations (European EMSCI clinician perspective)

Presenter: Martin Schubert, University of Zurich Spinal Cord Injury Centre

Presentation: Successful International Collaborations- Consumer Perspective

Presenter: Jane Horsewell, European Spinal Cord Injury Federation

Presentation: Technological platforms for enabling collaborations

Presenter: Phalgun Joshi, RHI

Small Group discussions: Identified Barriers and Enablers

Panel Discussion: Looking at Solutions

Workshop Chair / 2nd chair - Summary of workshop

- Next steps

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

Autonomic Dysreflexia: A Clinical Entity not to Be Overlooked After Spinal Cord Lesion

Chair: Christina-Anastasia Rapidi

Christina-Anastasia Rapidi, Jean Jacques Wyndaele, Athanasios E. Kyriakides, Nicolaos Roussos, Berrin Gündüz, Anastasios Athanassopoulos, Charalampos Konstantinidis, Elias Panagiotopoulos, Andrei Krassioukov

Introduction:

Tetraplegia or high paraplegia due to spinal cord injury (SCI) is associated with significant dysfunction not only of the somatic nervous system but the autonomic nervous system too. This dysfunction mainly refers to the sympathetic nervous system and not to the parasympathetic nervous system, which in a significant portion bypasses spinal cord through the X cranial nerve.

Autonomic dysreflexia (AD) can occur in anyone with a SCI at or above sixth thoracic neurotome and it is a potentially life-threatening acute condition due to an excessive, uncontrolled sympathetic output in response to a noxious or noxious stimulus below the level of injury.

The aim of this workshop is to shed light on some special aspects of AD. The development of AD in different groups and situations (adults/children, complete/incomplete lesions, acute/sub acute and chronic SCI, bladder activity/sexual activity) may influence the differential diagnosis and management of the syndrome. The significance of early diagnosis and special types of AD will be addressed. The proper preventative measures in order to avoid serious long-term consequences of repetitive AD episodes will be also discussed. The importance of educational programs for patients, their families and health-care providers and the AD emergency card will be highlighted.

Topics that will be addressed (90min):

1. Introduction. What AD means pathophysiologically

2. Special aspects: Early and late onset of AD. The "silent" AD. AD impact on cardiovascular system.

The sympathetic reflex activity of the cord may do not be abolished during spinal shock. The differential diagnosis of AD during acute phase of SCI should be kept in mind. The development and severity of AD, in the chronic phase of SCI, has been correlated with the negative side of neuroplasticity. Does the under-diagnosis of AD (silent AD) play a role?

The impact of AD episodes on cardiovascular system is underestimated; cases of silent myocardial ischemia during an episode of autonomic dysreflexia have been reported. Is AD another predisposing negative factor for cardiovascular disease or AD just unmasks it?

3. AD in different groups of patients.

Are there differences concerning the age, the completeness of injury and the etiology of SCI?

4. Malignant AD.

Severe AD develops with a tendency of progressive worsening even when the alleviating factor is removed. Are all the patients with SCI candidates to present malignant AD?

5. AD educational programs. AD emergency card

Is there a need for AD educational programs for patients, their families and health-care providers? Is there a need for an AD emergency card carried by the patients with SCI at or above T6?

6. Therapeutic management of AD.

Which is the best therapeutic approach during an acute episode of AD. Is the long-term management of AD necessary? Can episodes of malignant AD be prevented?

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

Autonomic dysreflexia: pathophysiology

JJ Wyndaele

Autonomic dysreflexia (AD) is a syndrome of massive imbalanced reflex sympathetic discharge occurring in patients with spinal cord injury (SCI) mostly above the splanchnic sympathetic outflow (T5-T6). It must be considered a medical emergency. It is important as possibly life threatening and also because it is not seldom overlooked by those who care for SCI individuals.

Sir Anthony Bowlby recognized this syndrome already in 1890 when he described profuse sweating and erythematous rash of the head and neck initiated by bladder catheterization in an 18-year-old patient with SCI.

In 1947 L Guttman and D Whitteridge described how distension of viscera in a series of spinal patients had set up a response of autonomic mechanisms, which had induced profound effects on the cardiovascular activity in parts of the body above the level of the spinal lesion.

What is the cause and pathophysiology?

The most prominent component of an AD episode is a dramatic rise in blood pressure.

Numerous theories have been proposed to explain this phenomenon. Most of them involve a mechanism of sympathetic nervous system overactivity. Normal regulation of sympathetic output from the spinal cord is modulated by input from the higher centers; after SCI this input can be lost, and spinal circuits alone are responsible for sympathetic activity at and below the lesion level. A synaptic re-organisation would happen, a lessening of gliosis around the pre-synaptic sympathetic neurons, an exaggerated reaction of sympathetic pre-ganglionic neurons to afferent stimuli, with as yet undefined role of spinal interneurons.

AD occurs mostly in individuals with SCL at or above the T6 level because the splanchnic circulation becomes involved in this sympathetic overactivity. But also cases have been described with lesions as low as T10. The "loading" of the related nerves by strong sensory input, not necessarily noxious, carried into the spinal cord via intact peripheral nerves, travels up the spinal cord and causes splanchnic and subdiaphragmatic vasoconstriction with raise in blood pressure from a massive reflex sympathetic stimulation. Compensatory mechanisms from the brain as reaction to the blood pressure raise, detected by baroreceptors in the neck can only work above the level of the lesion, by vasodilatation in the centrally controlled part of the body, slowing the heart rate through the intact vagus nerve (parasympathetic). More theories have been forwarded: increased responsiveness of vasculature to adrenergic agonists as seen in tetraplegic patients; the upregulation of dopamine β -hydroxylase (involved in catecholamine synthesis) and substance P. The development of AD is a multifactorial complex issue, for which more research is needed.

Once the inciting stimulus is removed, reflex hypertension resolves.

Clinical picture

AD is characterized by the acute elevation of arterial blood pressure (BP) and bradycardia (slow heart rate), although tachycardia (rapid heart rate) also may occur. Objectively, an increase in systolic BP greater than 20–30 mmHg is considered as dysreflexic sign. As the resting arterial BP in individuals with cervical and high thoracic SCI is lower than in able-bodied individuals, acute elevation of blood pressure to normal or slightly elevated ranges may indicate AD in this population. The higher the injury level, the greater the degree of clinically-manifest cardiovascular dysfunction.

One factor determining the severity of AD is the completeness of the spinal injury: < 30% of incomplete tetraplegics versus > 90 % in complete lesions. While AD occurs more often in the chronic stage there has also been clinical evidence of AD in the first days and weeks after injury.

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

AD can present with a variety of symptoms and can vary in intensity from asymptomatic, to mild discomfort and headache, to a life threatening emergency, such as when systolic blood pressure climbs to or even above 300 mmHg. Untreated episodes of AD may have serious consequences, including intracranial hemorrhage, retinal detachment, seizures and death. The patient with AD generally gives a history of blurry vision, headaches, and a sense of anxiety. Feelings of apprehension or anxiety commonly are present. The BP raise is usually quick and close monitoring and observation are needed when development of AD can be feared.

Triggering AD

Episodes of AD can be triggered by many potential causes. Essentially every strong stimulus below the level of SCI, including painful, irritating, or just strong can start AD. Causative mechanisms can be e.g. bladder distention, UTI, urologic investigations, genital infections, bowel distention/impaction, bowel testing, gastric ulcers or infection, hemorrhoids, menstruation, labor and delivery, sexual intercourse, ejaculation and many more.

AD is most commonly triggered by irritation of the urinary bladder or colon, as during investigations, manipulation etc. AD proved more frequent and more severe with endoscopy than with urodynamic cystometry.

Physical Examination

A patient with AD will have sudden, significant rise in systolic and diastolic blood pressure, profuse sweating above the level of lesion (face, neck, and shoulders), flushing of the skin in the same regions, blurred vision, spots in the visual field, nasal congestion. Patients with AD may display no symptoms, despite elevated blood pressure.

Differential diagnosis for AD

Essential hypertension and pheochromocytoma.

References

- Bycroft et al Autonomic dysreflexia: a medical emergency. Postgrad Med J 2005;81:232-235.
- Campagnolo et al . Autonomic dysreflexia. Medscape 2013 .
- Krassioukov et al. A Systematic Review of the Management of Autonomic Dysreflexia Following Spinal Cord Injury Arch Phys Med Rehabil. 2009 April; 90(4): 682-695.
- Vaidyanathan et al Pathophysiology of autonomic dysreflexia: long-term treatment with terazosin in adult and paediatric spinal cord injury patients manifesting recurrent dysreflexic episodes. Spinal Cord. 1998 Nov;36(11):761-70.

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

Special aspects: Early and Late onset of Autonomic Dysreflexia. The "silent" Autonomic Dysreflexia. Autonomic Dysreflexia impact on cardiovascular system.

AE Kyriakides

Autonomic nervous system regulates circulation by affecting the force and frequency of cardiac contraction and/or by affecting vasodilation or vasoconstriction in response to feedback from sympathetic and parasympathetic afferents. Spinal cord injury (SCI) above the T6 level results to 'decentralization' of the sympathetic nervous system and patient remains with no supraspinal sympathetic control of cardiovascular functions.

Early autonomic dysreflexia

Low resting blood pressure, orthostatic hypotension, and loss of diurnal fluctuation are blood pressure abnormalities commonly presented during the acute post-injury phase. In addition episodes of autonomic dysreflexia (AD) have also been reported during this period suggesting that the sympathetic reflex activity of the cord may not be completely abolished during spinal shock.

AD during the period of "spinal shock" was considered impossible. Silver has first reported at early seventies and reviewed thirty years later (2000) a group of patients who developed AD within 7–31 days post injury.

Krassioukov A, later has also reported three cervical complete tetraplegics who developed AD in acute phase. The earliest episode occurred on the 4th post injury day and no patient had a history of cardiovascular disease. Although pathophysiology of early AD is not clear, the differential diagnosis of AD during acute phase of SCI should be kept in mind as the recommended acute management is directed toward maintenance of the mean arterial blood pressure above a critical threshold in order to maintain spinal cord perfusion.

Pathophysiology. 'Negative side of neuroplasticity'

It is important to focus on pathophysiology in order to better understand the mechanisms of AD either in acute or chronic stages of SCI.

Disruption of the descending cardiovascular pathways results in sympathetic hypoactivity, alteration in morphology of sympathetic preganglionic neurons, plastic changes within the spinal circuits, and development of peripheral alpha-adrenoreceptor hyperresponsiveness.

Studies reveal that immediately after SCI, plasma catecholamines are low and remain low as long as there is no stimulation below the level of SCI. These findings support the concept of sympathetic hypoactivity below the level of high-SCI when not being subjected to afferent stimuli. These low plasma catecholamine levels are supposed to be responsible for the peripheral vascular alpha-adrenoceptors hyperresponsiveness possibly through an upregulatory or denervation supersensitivity mechanism. However, whether this hyperresponsiveness is a consequence of an increased number of receptors, abnormalities of postreceptor coupling mechanisms, or reduced presynaptic reuptake was not yet determined. The observation that clearance of catecholamines does not appear to be affected in quadriplegics would exclude the last explanation.

Other studies have proposed that the enhanced pressor response to noradrenaline in SCI patients was a consequence of lack of baroreceptor-mediated sympathoinhibition because patients with chronic autonomic failure secondary to other causes have not demonstrated such an exaggerated response. If loss of baroreceptor control was the principle mechanism we could probably explain why AD has reported to present even in acute phase.

Little is known about the alteration in morphology of sympathetic preganglionic neurons. Research in animals has demonstrated reversible atrophy of sympathetic preganglionic neurons probably as a consequence of partial deafferentation from the loss of descending projections from medullary neurons. Parallel animal studies have revealed sprouting of dorsal root afferents and spinal neurons that initially lose synaptic inputs, to have them replaced with inappropriate synapses. This negative side of neuroplasticity has been related with the development and severity of AD in the chronic phase of SCI, as it needs time to occur.

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

Nevertheless, reorganization and plastic changes of spinal cord pathways combined with loss of baroreceptor control as well as peripheral alpha-adrenoceptor hyperresponsiveness are likely more related to episodes of AD developed either in acute or chronic stages of SCI

Asymptomatic ('silent') AD

Literature has described asymptomatic paroxysmal hypertension during bladder contractions and voiding or during a routine bowel program.

Asymptomatic ('silent') AD was also reported during a vibrostimulation for sperm retrieval. The majority of SCI patients didn't report symptoms characteristic of AD and remained unaware of their arrhythmias and ECG abnormalities.

In a up-to-date study blood pressure and symptoms of AD were continuously monitored during urodynamic studies (UD) and systolic blood pressure elevations >20 mmHg was considered an AD reaction. AD patients were divided into a symptomatic group and a silent group and several parameters were compared. Patients with more symptomatic AD tended to have significant BP elevation and more rapid BP increments, and this was negatively correlated with age. BP monitoring during UD and other invasive procedures is strongly recommended.

The impact of AD episodes on cardiovascular system.

Consequently individuals with cervical or high thoracic SCI face two major opposite effects on blood pressure (BP). On one hand, they experience severe hypotension during both the acute and chronic stages. On the other hand life-threatening episodes of AD represent another aspect of disordered cardiovascular control. These repetitive BP fluctuations increase the possibility of shear injury to the blood vessel endothelium that may predispose to serious cardiovascular complications.

If the episode of AD is difficult to control and there is persistent coronary artery constriction, asymptomatic myocardial ischemia can occur. Few cases of asymptomatic myocardial ischemia following AD have been reported in the literature. Exceptionally interesting case of silent myocardial ischemia with no previous cardiovascular history presented by Ho. This case had also absence of coronary artery disease in a follow up angiography, suggesting that his myocardial ischemia have been caused by significant cardiac vasculature constriction during the AD episode.

Although none of published cases of cardiovascular complications secondary to AD resulted in fatality the impact of AD should not be underestimated, as cardiovascular disease is still the most common cause of death in chronic SCI when considering underlying and contributing causes together. Documentation and early recognition of AD should be included as part of the standard neurological assessment and management of individuals with SCI.

References:

- Silver JR. Early autonomic dysreflexia. A review. *Spinal Cord*. 2000;
- Krassioukov AV, Furlan JC, Fehlings MG: Autonomic dysreflexia in acute spinal cord injury: an under-recognized clinical entity. *J Neurotrauma* 2003;
- Claydon VE, Elliott SL, Sheel AW, Krassioukov A. Cardiovascular responses to vibrostimulation for sperm retrieval in men with spinal cord injury. *J Spinal Cord Med* 2006;
- Huang YH, Bih LI, Liao JM, Chen SL, Chou LW, Lin PH. Blood pressure and age associated with silent autonomic dysreflexia during urodynamic examinations in patients with spinal cord injury. *Spinal Cord*. 2012;
- Boot CR, Groothuis JT, Van Langen H, Hopman MT. Shear stress levels in paralyzed legs of spinal cord-injured individuals with and without nerve degeneration. *J Appl Physiol* 2002;
- Ho CP, Krassioukov AV. Autonomic dysreflexia and myocardial ?ischemia. *Spinal Cord* 2010;
- Teasell R, Arnold J, Krassioukov A, Delaney GA. Cardiovascular consequences of loss of supraspinal control of the sympathetic nervous system after spinal cord injury. *Arch Phys Med Rehabil* 2000;
- Wan D, Krassioukov A. Life-threatening outcomes associated with autonomic dysreflexia: A clinical review. *The Journal of Spinal Cord Medicine* 2013

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

Autonomic dysreflexia in different groups of patients

Berrin Gunduz

Early recognition of autonomic dysreflexia (AD) is extremely important because it can cause seizures, intracranial hemorrhage and even death, increasing the morbidity and mortality after spinal cord injuries (SCI). It is important to determine the clinical and demographic factors associated with AD to better identify the patients at greater risk.

The most known factor associated with AD is the level of the injury; as it is shown that the patients with injury level T6 and higher have the risk of AD. Nevertheless there are some case reports about lower level of patients with AD. The severity of the symptoms has also been related to the level of the injury, the higher level patients have more severe symptoms.

AD is more common in complete injuries and is more often determined in the chronic stage of SCI; but it is thought that AD may be overlooked and not clearly defined in the acute phase of the injury.

There is not any data about age and AD; however the older patients have a higher risk of silent AD. It is explained by decreased diastolic blood pressure elevation and possibly diminished sensitivity of baroreceptors.

AD in pediatric SCI patients is also more common in complete injuries and in patients who were injured after 6 years of age.

Data on AD in different group of patients is limited. Autonomic dysfunction is emphasized in the last decade and 'International standards to document remaining autonomic function after spinal cord injury' has been introduced. In the future the AD in different groups of SCI can be recognized better.

References:

1. Krassioukov AV, Furlan JC, Fehlings MG. Autonomic dysreflexia in acute spinal cord injury: an under-recognized clinical entity. *J Neurotrauma* 2003; 20(8):707-16.
2. Garstang SV, Walker H. Cardiovascular and autonomic dysfunctions after spinal cord injury. In: *Spinal Cord Medicine* (Kirshblum S, Campagnolo DI, eds). Lippincott Williams Wilkins, Philadelphia 2011, pp.136-54.
3. Huang YH, Bih LI, Liao JM, Chen SL, Chou LW, Lin PH. Blood pressure and age associated with silent autonomic dysreflexia during urodynamic examinations in patients with spinal cord injury. *Spinal Cord* 2013; 51: 401-6.
4. Hickey KJ, Vogel LC, Willis KM, Anderson CJ. Prevalence and etiology of autonomic dysreflexia in children with spinal cord injuries. *J Spinal Cord Med.* 2004;27 Suppl 1:S54-60.
5. Schottler J, Vogel LC, Sturm P. Spinal cord injuries in young children: a review of children injured at 5 years of age and younger. *Dev Med Child Neurol* 2012;54(12):1138-43.
6. Krassioukov A, Biering-Sørensen F, Donovan W, Kennelly M, Kirshblum S, Krogh K, Alexander MS, Vogel L, Wecht J; Autonomic Standards Committee of the American Spinal Injury Association/International Spinal Cord Society. International standards to document remaining autonomic function after spinal cord injury. *Spinal Cord Med* 2012;35(4):201-10.

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

Malignant autonomic dysreflexia

Ch Konstantinidis

Introduction:

Autonomic dysreflexia (AD) is a common complication among patient with spinal cord lesion located above T6 level. AD is characterized by hypertension, and changes of the heart rate which increasing at the beginning and decreasing as the phenomenon goes on. Stimuli below the level of lesion can provoke a sympathetic response. This results to tachycardia and vasoconstriction which leads to hypertension. Carotid and aortic baroreceptors detect the high blood pressure and in individuals with intact spinal cord, the sympathetic system is deactivated in order to control blood pressure. In patients with spinal cord lesions above the T6 level there is no descending connection with the spinal sympathetic nucleus and chain, so the initial sympathetic response cannot be suppressed at the lower part of the body. Through the cranial sympathetic nucleus and nerves sympathetic deactivation takes place only at the upper part of the body resulting to compensatory vasodilatation. As the phenomenon goes on, the parasympathetic system is activated resulting bradycardia. Clinical consequences are excessive hypertension, visual changes, flashing and headache due to vasodilatation at the upper part of the body, cyanosis due to vasoconstriction at the lower part of the body, tachycardia which gives its place to bradycardia, sweating, piloerection and nasal congestion due to sympathetic activity. As the blood pressure increases without any control the possibility of a stroke is enhanced. Under all these circumstances AD can be an emergency medical condition with potential life threatening consequences. On the other hand in the majority of these cases the phenomenon is self limited and subsides after the removal of the initial stimuli.

Objectives:

To introduce to the audience a kind of AD termed by S Elliott and A Krassioukov "malignant" AD. This is a severe AD with a tendency of progressive worsening even when the alleviating factor is removed and maintains for prolonged time, from some hours to a week or more.

Discussion:

Bladder distention or bowel impaction, are the most common stimuli which cause AD. Pressure ulcers, toenails into the skin or other wounds may be the responsible factors for AD, as well. Sexual activity and stimulation of the genitalia can also lead to AD. In some patients, ejaculation not only provokes AD but may drives to malignant AD. According the limited existing data in the literature this kind of AD is the outcome of a complete disruption of the sympathetic pathways (as it is demonstrated by Sympathetic Skin Responses - SSRs) in addition to excessive sympathetic stimulation which takes place during ejaculation. The prolonged period of the phenomenon can be explained by the hypothesis of urethral damage (disruption of urethral mucosa) during ejaculation due to high intra urethral pressure caused by semen emission in prostatic urethra accompanied by severe external sphincter dyssynergia. The distention of the prostatic urethra and a concomitant micro trauma of the mucosa can maintain the sympathetic stimulation until the hilling process takes place and the sphincter decrease its contractions. Most possible candidates for malignant AD are patients with complete disruption of the sympathetic pathways, who did not experience ejaculation at the past and try sperm retrieval with vibrostimulator. Awareness of malignant AD during sperm retrieval is very important for the prompt recognition and treatment.

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

Autonomic dysreflexia educational programs. AD emergency card.

C-A Raptidi

Is there a need for autonomic dysreflexia (AD) educational programs for patients, their families and health-care providers?

Individuals with spinal cord injuries face a frightening and tragic change in their health condition, a condition that affects body and mind and their participation in everyday life. During the rehabilitation program they must be trained in a variety of new ways on activities of daily living including the management of bladder and bowel disorders, spasticity, transfers and mobility with wheelchairs, etc. Under conditions of such pressure, patients, who are expected to have episodes of AD, are not adequately informed neither themselves nor their relatives.

This fact has been documented very clearly in the literature. F Colleen and colleagues refer that in a group of individuals with SCI above T6, 41% had not heard of AD. Individuals with SCI and their family members have gaps in their knowledge of AD and 22% of individuals with SCI reported symptoms consistent with unrecognized AD.

Pediatric population with SCI is a special group. Does the pediatric patient report episodes of AD? According to J Schottler and colleagues, young (1-21 years old) individuals with SCI and injury levels at or above T6, stated in 50% of patients and 53% of caregivers that they did experience AD. The patients with greater knowledge of AD were more likely to have traumatic etiologies, to have T6 or higher injuries, to be in the oldest age at injury group, to be older at time of examination and to have had a shorter duration of injury. It was surprising that four (12%) pediatric patients with injuries at T8, T10, T11 and T12 reported experiencing AD.

Caroline R Jackson & Rick Acland, reported that 41% of the staff in emergency departments could not answer any questions concerning AD. Medical staff knowledge is severely lacking in this area and further teaching initiatives are required to rectify this.

Unpublished data of our Neuropathic Bladder Unit (period 2011-2012): 88, traumatic SCI patients in chronic phase: 51.13% they had not heard of AD. Forty-eight of them were at high risk for AD (lesion >T6) and in 31,25%, they themselves or their caregivers were not aware of AD.

What is an AD emergency card?

An AD card is an instruction card to explain dysreflexia to healthcare providers. A card that patients who are susceptible to AD should carry on them, an emergency medical card, some form of medical alert. AD card should provide useful information giving a short summary of causes and treatment.

There are many different types of AD cards: Cards that can be printed by the patient himself from internet (usually by web sites of spinal injury associations); these cards have only general information. Cards that have personal information should be printed by the primary healthcare provider, PRM department. Cards in different shapes and sizes.

The AD emergency card should have a convenient shape, like a wallet card, to be easily carried, should have some personal information, should be official and printed by the primary healthcare provider PRM department, which is responsible for the accuracy of personalized information. The neurological level of injury, the baseline blood pressure (regularly updated as needed), the diagnostic criteria for AD (according to ASIA/ ISCoS guidelines) and an emergency management plan should be written on this card.

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

The documentation of the AD episode in the individual's medical record may be helpful in the management of a forthcoming episode of AD. The following personalized data concerning previous AD episodes are useful to be printed on AD card:

- Presenting signs and symptoms and their course
- Recordings of blood pressure and pulse
- Treatment instituted and response to it
- The cause of the episode that has been identified.

In Conclusion

It is vital that those patients at highest risk for AD to receive immediate and ongoing education about AD. It is also important that all patients and caregivers regardless the level of injury, especially those patients with pediatric onset of SCI, must be properly educated about AD, its associated risks, signs and symptoms of an AD episode, and how to properly treat AD if it occurs.

Some thoughts on future strategies:

- Campaign in general hospitals, raised awareness
- Leaflets and Prominent posters with medical information concerning AD in emergency rooms
- Information in triage folders
- AD certified staff of emergency rooms (2 day courses, courses accredited by ISCoS ??)
- Protocol for the emergency department
- Close liaison with spinal team
- AD cards accredited by ISCoS?? That can be formally translated in different languages.
- Medical alert bracelets

References

1. McGillivray CF, Hitzig SL, Craven BC, Tonack MI, Krassioukov AV. Evaluating knowledge of autonomic dysreflexia among individuals with spinal cord injury and their families. J Spinal Cord Med. 2009;32(1):54-62. PubMed PMID: 19264050; PubMed Central PMCID: PMC2647501.
2. J Schottler1, L Vogel1, R Chafetz and MJ Mulcahey. Patient and caregiver knowledge of autonomic dysreflexia among youth with spinal cord injury. Spinal Cord (2009) 47, 681-686.
3. Caroline R Jackson, et al. Knowledge of autonomic dysreflexia in the emergency department. Emerg Med J 2011;28:866-869 doi:10.1136/emj.2009.085159.
4. Spinal Cord Medicine. Acute Management of Autonomic Dysreflexia: Individuals with Spinal Cord Injury Presenting to Health-Care Facilities
<http://www.pva.org/site/apps/ka/ec/product.asp?c=ajlRK9NjLcJ2E&b=6423003&en=dILKIUMGLbIOK0PzEiUJ7OOJhLOIZNIIILZKfPYF&ProductID=883871>

Wednesday, 30th October 2013

W-018

Hall: A / 15.20-16.50

Therapeutic management of autonomic dysreflexia

A Krassioukov

International Collaboration on Repair Discoveries (ICORD), Division of Physical Medicine and Rehabilitation, Department of Medicine, University of British Columbia, and GF Strong Rehab Centre, Vancouver, Canada

Objective

To present the latest clinical evidence on management and prevention of autonomic dysreflexia (AD).

Methods

A key word search of several databases (Medline, CINAHL, EMBASE and PsycInfo), in addition to manual searches of retrieved articles, was undertaken to identify all English-language literature evaluating the efficacy of interventions for AD. Randomized controlled trials (RCTs), prospective cohort studies, and cross-sectional studies addressing pharmacological and non-pharmacological interventions for the management of AD in individuals with spinal cord injury (SCI) were included. Studies that failed to assess AD outcomes (e.g. blood pressure) or symptoms (e.g., headaches, sweating) were excluded.

Results

Forty studies were assessed; including 6 RCTs. Preventative strategies to reduce the episodes of AD caused by common triggers (e.g. urogenital system, surgery) primarily were supported by Level 4 (pre-post studies) and Level 5 (observational studies) evidence. The initial acute non-pharmacological management of an episode of AD (i.e. positioning the patient upright, loosening tight clothing, and eliminating any precipitating stimulus) is supported by clinical consensus and physiological data (Level 5 evidence). The use of antihypertensive drugs in the presence of sustained elevated blood pressure is supported by Level 1 (prazosin) and Level 2 evidence (nifedipine and prostaglandin E2).

Conclusions

Clinicians should be aware of AD following SCI to facilitate its early recognition and appropriate management, thereby preventing potentially life-threatening AD complications.



LECTURES ABSTRACTS

Monday, 28th October 2013

L-001

Hall: A / 09.15 - 10.45

KEYNOTE LECTURE / Pathophysiology of SCI

John Steeves

ICORD (International Collaboration On Repair Discoveries), University of British Columbia (UBC) and Vancouver General Hospital, Vancouver, BC, Canada

Structural and functional changes, associated with secondary cell damage resulting from spinal cord injury (SCI), will be discussed, as well as selected therapeutic interventions, as they relate to secondary damage mechanisms. The consequences of disrupted blood flow (ischemia) and excitotoxicity (excess calcium and glutamate) will be evaluated as they impact cell death and inflammatory reactions after SCI. Selected experimental interventions and clinical trials to ameliorate secondary damage will be reviewed, including surgical, pharmacological and cell transplant approaches.

Monday, 28th October 2013

L-002

Hall: A / 09.15 - 10.45

KEYNOTE LECTURE / Novel Therapeutic Approaches to Spinal Cord Repair

James Fawcett

John van Geest Centre for Brain Repair, University of Cambridge, Robinson Way, Cambridge CB2 0PY, UK

Repair of the spinal cord can be through axon regeneration, plasticity and replacement of function with prosthetics.

Plasticity is the ability of the nervous system to make new circuits to bypass damage. There are now several potential treatments that enhance plasticity. The level of plasticity is much reduced in humans after age 5, but treatments such as chondroitinase or anti-NogoA are able to restore plasticity in adults. In general it is necessary to train the nervous system to use new connections, so plasticity treatments need to be combined with appropriate rehabilitation. It may also be possible to enhance connections that remain after SCI using a combination of subthreshold electrical stimulation with intensive rehabilitation, leading to a remarkable recovery of some functions.

Axon regeneration after SCI fails because it is blocked by inhibitory molecules released in the damaged spinal cord, particularly chondroitin sulphate proteoglycans and NogoA. Additionally spinal axons have very poor regenerative ability, and various methods are being developed to enhance their ability to regenerate. An alternative approach is to graft stem cell-derived or embryonic cells into the damaged cord, which can grow axons for long distances and act as relays for host axons.

Basic electronic prosthetics have been available for some time, for instance bladder stimulators and hand grip stimulators. The sophistication and range of prosthetics is increasing rapidly. There is also the possibility of retrieving electrical signals directly from the brain to control prosthetic limbs and other devices.

Monday, 28th October 2013

L-003

Hall: A / 17.10 - 17.55

Sir Ludwig Guttman Lecture / Hope, Hype and Neuroscience

Armin Curt

Spinal Cord Injury Center, University of Zurich, University Hospital Balgrist, Switzerland

In many neurological disorders, so in spinal cord injury, patients even when receiving best and timely acute care management followed by intense rehabilitation training are left with serious disabilities and challenges. Understandably not only patients but also general public are anxious for any research discoveries in neuroscience that might be potentially translatable into treatments.

The in general considerable desire for any improvement in patients and caregivers becomes caught in crossfire of public announcements about novel findings which owing to circumstances for scientific as well as commercial competition may feed unrealistic expectations and aggravate a critical appreciation due premature and uncritical reports.

Therefore, scientific advocacy groups are challenged to engage in a responsible process for managing, educating and assuring valid information. This also includes respecting conditions of nonhazardous hope in patients and community while preventing irresponsible states of hype. In spinal cord injury where so far proper treatments both of the damaged neural tissue and the nervous system as a whole are still awaited the true advances in translational research and if procurable application in humans need to be made transparent.

Accordingly the research community of clinicians and scientists will be accountable to enforce clinically meaningful studies to proof the applicability of potential novel treatments in an efficient and rigorous fashion. The latter will also be of value to antagonize the manifold frauds in unjustifiably commercialized treatments offered to patients that seek for any help.

Obviously all of this demands a rather complex process but is a prerequisite to foster translational research where preserving our credibility in medical research is fundamental to maintain the appropriate engagement of the society (not limited to funding but also in adequate recognition) and sustain a reasonable faith and participation of patients in the development of novel treatments.

Monday, 28th October 2013

L-004

Hall: A / 17.55 - 18.30

Pre-launch of the WHO and ISCoS International perspectives on spinal cord injury

Following on from the success of the World Health Organization (WHO) and World Bank World report on disability (2011), International perspectives on spinal cord injury is a new global report which addresses the need for better research and data on spinal cord injury. The report is a joint publication of WHO and the International Spinal Cord Society (ISCOS). It has been developed with support from Swiss Paraplegic Research (SPF) and draws together contributions from around the world.

The aims of International perspectives on spinal cord injury are to:

- assemble and summarize information on, in particular, the epidemiology, services, interventions and policies that are relevant, together with the lived experience of people with spinal cord injury across the life course and throughout the world;
- make recommendations for actions based on this evidence that are consistent with the aspirations for inclusion and participation as expressed in the Convention on the Rights of Persons with Disabilities

The report is structured according to the following chapters:

1. Understanding spinal cord injury
2. A global picture of spinal cord injury
3. Prevention of spinal cord injury
4. Health-care and rehabilitation needs
5. Health systems strengthening
6. Attitudes, relationships and adjustment
7. Spinal cord injury and enabling environments
8. Education and employment
9. The way forward: recommendations

This pioneering report provides data on the magnitude of spinal cord injury around the world and evidence to support policies and programmes that can improve the lives of people with spinal cord injury. While the incidence of traumatic and non-traumatic spinal cord injury can and should be reduced, there will always be new cases of spinal cord injury, often affecting individuals in the prime of life. Ensuring an adequate medical and rehabilitation response, followed by supportive services and accessible environments, will help minimize the disruption to people with spinal cord injury and their families. These measures will also reduce the overall costs to society, in terms of dependency and lost productivity, and to the individual, in terms of lower self-esteem and reduced quality of life. Spinal cord injury is preventable, survivable and need not preclude health and social inclusion.

Drawing on the best available scientific evidence, International perspectives on spinal cord injury is a valuable resource for policy-makers, service-providers, professionals and people with spinal cord injury and their families. Action by governments and other stakeholders is urgently required, without which, spinal cord injury will remain, all too often, a catastrophe.

Tuesday, 29th October 2013

L-005

Hall: A / 08.00 - 08.50

KEYNOTE LECTURE / Natural Disasters and SCI 1-2**Şahir Şafak Karamehmetoğlu**

A natural disaster is a major adverse event resulting from natural processes of the Earth (earthquakes, tornados, floods, volcanic eruptions, tsunamis etc). A natural disaster can cause loss of life or property damage, and typically leaves some economic damage.

Natural disasters causing spinal cord injury may be cited as earthquakes, tornadoes according to the literature. The most frequent cause of spinal cord injury as a natural disaster is earthquake. The burden of a natural disaster is affected by a lot of predictors. The evaluation of the pre-event status of the affected society may be revealed as a complex situation. In an already vulnerable society with substantial deficiencies in the existing health system, the severity of the result of the disaster may be devastating.. Most of the hospitals might be collapsed, and medical care to the patients might be under most primitive conditions. Relief provided to the disaster victims has reduced quality for the following reasons: 1. Sudeness of natural disaster, 2. Unpredictability of natural disaster, 3. Lack of proper public health indicators, 4. Lack of efficient coordination, 5. Insufficient, overestimated, or irrelevant relief, 6. Relief delayed because of bureaucracy, 7. Lack of policies on the delivery of disaster relief.

Generally local emergency services become overwhelmed and international assistance is required.

Medical rehabilitation services are often poorly developed in disaster affected regions and not highly prioritized by responding teams. Rehabilitation has historically been underemphasized in global disaster planning and response. Recently, disaster medicine and disaster rehabilitation has raised awareness of the critical importance of rehabilitation intervention during the immediate postdisaster emergency response.

To optimize the effectiveness of limited resources, disaster preparedness and the provision of feasible and necessary aid is of outmost importance. An appropriate, rapid, crisis intervention could be achieved by continual surveillance. Experts could evaluate and coordinate the international disaster responses and make use of stored emergency material and emergency teams. A successful disaster response will depend on accurate and relevant medical intelligence and socio-geographical mapping in advance of, during, and after the event causing the disaster. More effective and feasible equipment coordinated with the relief provided by the rest of the world is necessary. If policies and agreements are developed as part of disaster preparedness, on international, bilateral, and national levels, disaster relief may be more relevant, less chaotic, and easier to estimate, thus, bringing improved relief to the disaster victims.

Earlier rescue and earlier onset of rehabilitation were significant positive predictors of rehabilitation effectiveness, whereas delayed onset of rehabilitation combined with prolonged time to rescue resulted in lesser positive effect. Earthquake victims with spinal cord injury may achieve significantly improved functional rehabilitation outcomes on a formal, institutional rehabilitation program.

Long-term disability following natural disasters significantly burdens survivors and the impacted society. Nevertheless, medical rehabilitation programming has been historically neglected in disaster relief planning. More comprehensive rehabilitation programs should therefore be considered for future large-scale rehabilitation disaster relief efforts in order to minimize spinal cord injury due to natural disasters especially earthquakes..

Keywords: natural disaster, earthquake, spinal cord injury, rehabilitation

Tuesday, 29th October 2013

L-006

Hall: A / 08.00 - 08.50

KEYNOTE LECTURE / Natural Disasters and SCI 1-2

Niyazi Özüçelik

Tuesday, 29th October 2013

L-007

Hall: A / 16.00 - 16.45

ISRT Lecture**Phillip Popovich**

Wexner Medical Center at The Ohio State University, Center for Brain and Spinal Cord Repair

Immune responses and spinal cord injury

Traumatic spinal cord injury (SCI) causes marked intraspinal inflammation that can affect CNS repair. SCI also affects immunologic homeostasis throughout the body. Normal immune function is maintained by bidirectional communication between the nervous and immune systems. After SCI, basal neural-immune communication is adversely affected with the level of injury affecting both the amount and type of immune dysregulation. When SCI occurs at high levels, immune function is impaired. Conversely, lower level SCIs preserve neural-immune circuitry and can cause a paradoxical increase in immune function including the onset of trauma-induced autoimmunity (TIA). Altered immune function has significant implications for repair of the injured spinal cord but also defense against pathogens and wound repair. In this presentation, data will be presented that illustrate the broad-reaching implications of intraspinal inflammation and why manipulating intraspinal inflammation could improve CNS repair and recovery of function. Other data will reveal the paradoxical effects of injury at different spinal levels showing evidence for trauma-induced autoimmunity (TIA) or immune suppression. Autonomic dysreflexia will be discussed as a novel mechanism underlying post-injury immune suppression after high level SCI.

Wednesday, 30th October 2013

L-008

Hall: A / 08.00 - 08.45

KEYNOTE LECTURE / Rehabilitation and Medical Approach in Acute Care

Andrei Krassioukov

Professor, Dep. Medicine, Associate Director and Scientist, ICORD;
Director of Autonomic Research Unit; University of British Columbia;
Staff Physician, Spinal Cord Program, GF Strong Rehabilitation Centre, Vancouver, BC, Canada

Spinal cord injury (SCI) is a devastating condition that affects not only motor and sensory functions but is also associated with a myriad of secondary conditions that must be addressed in the acute post injury period. It should be recognized that the model of the acute rehabilitation may vary depending on available resources and regional specifics. However, the primary goals of acute rehabilitation should be very similar across the various settings: prevention of complications, minimize impairments, and maximize function.

It is well known that implementation of specialized acute care and rehabilitation are crucial components of preventive measures for various complications of SCI that could occur within hours after the injury. These measures should include the following: frequent position changes (prevention of pressure wounds), monitoring of ventilatory/respiratory parameters, initiation of the deep breathing maneuvers, incentive spirometry, chest physical therapy, assisted cough (prevention of pulmonary complications), monitoring and management of cardiovascular dysfunctions (prevention and management of orthostatic hypotension and autonomic dysreflexia) and others. It is crucial to recognize that despite the improvement of the medical care and increase in survival rate following acute SCI the incidence of secondary complications including of atelectasis/pneumonia, pressure sores, and autonomic dysreflexia during acute rehabilitation continues to persist.

Management during the acute period of SCI requires the involvement of many clinicians in order to develop management/rehabilitation plans throughout the acute period of hospitalization. The acute period of rehabilitation should involve assessment of individual with SCI by members of the multidisciplinary team using standardized guidelines and include assessment of the type, level, and severity of the injury to aid in the development of a comprehensive plan of care. Development of the rehabilitation pathway will require early evaluation, assessment, and treatment by a physical medicine and rehabilitation specialist, physical therapists, occupational therapists, rehabilitation nurses, speech and language pathologists and other rehabilitation team members. A crucial component of this early rehabilitation plan is the inclusion of education for the patient and family members.

Initiation of the intervention by rehabilitation specialists in the acute post injury period may prevent the development of the secondary complications, shorten length of stay and prepare patient for transfer to the next level of care. We also should consider that the advances in technology and more research in the area of SCI may also contribute to an improvement in patient acute rehabilitation.



ORAL ABSTRACTS

Monday, 28th October 2013

O-001

Hall: A / 11.05 - 12.35

Neuroprotection using granulocyte colony-stimulating factor for acute spinal cord injury: A comparison with the high-dose methylprednisolone therapy

Koshiro Kamiya¹, Masashi Yamazaki², Akihiko Okawa¹, Takeo Furuya¹, Hiroshi Takahashi³, Kei Kato¹, Taigo Inada¹, Mitsutoshi Ota¹, Satoshi Maki¹, Yasuo Ito⁴, Kazuhisa Takahashi¹, Masao Koda¹

¹Department of Orthopaedic Surgery, Graduate School of Medicine, Chiba University, Japan

²Department of Orthopaedic Surgery, University of Tsukuba, Japan

³Department of Orthopaedic Surgery, Toho University Sakura Medical Center, Japan

⁴Department of Orthopaedic Surgery, Japanese Red Cross Kobe Hospital, Japan

Objective:

We have previously reported that we performed clinical trials for neuroprotective therapy using G-CSF for patients with acute SCI. In a phase I/IIa trial, we have confirmed the safety and usefulness of G-CSF. To verify the efficacy of G-CSF, we have compared G-CSF therapy with standard high-dose methylprednisolone (MPSS) therapy.

Materials-Methods:

In a G-CSF group (n = 28), patients with acute cervical SCI were treated in our hospital from August 2009 to July 2012 within 48 hours of the injury, and G-CSF (10 µg/kg/day) was administered intravenously for five consecutive days. In the MPSS group (n = 34), patients with acute cervical SCI underwent high-dose MPSS therapy from August 2003 to July 2005 following the NASCIS II protocol. We evaluated adverse events and motor and sensory functions of the patients using the American Spinal Cord Injury Association (ASIA) score and ASIA impairment scale (AIS) three months after onset.

Results:

The frequency of pneumonia was significantly lower in the G-CSF group. The ASIA motor score was significantly higher in the G-CSF group (27.7 ± 19.8) than in the MPSS group (12.0 ± 11.0) ($P < 0.01$). In patients with severe paresis, AIS = B and C (12 patients in the G-CSF group and 14 patients in the MPSS group), the increased motor score was also significantly higher ($P < 0.01$) in the G-CSF group (44.4 ± 17.2) compared with the MPSS group (17.4 ± 13.6). Conclusion: The present results indicate that G-CSF is safer than MPSS for patients with acute SCI. Moreover, the beneficial effects of G-CSF neuroprotective therapy on their neurological recovery appear to be superior when compared with MPSS therapy. We believe that neuroprotection using G-CSF can be used as a new therapeutic strategy for acute SCI.

Keywords: Neuroprotection, granulocyte colony-stimulating factor, spinal cord injury

Monday, 28th October 2013

O-002

Hall: A / 11.05 - 12.35

Abdominal muscle function in people with complete high thoracic SCI

Anna Bjerkefors¹, Jordan W Squair³, Tania Lam², Zhen Chen² Mark G Carpenter²

¹School of Kinesiology, University of British Columbia, Vancouver, BC, Canada '¹ International Collaboration of Repair Discoveries, University of British Columbia, Vancouver, BC, Canada '¹ The Swedish School of Sport and Health Sciences, Stockholm, Sweden '¹ Karolinska Institute, Stockholm, Sweden

²School of Kinesiology, University of British Columbia, Vancouver, BC, Canada '¹ International Collaboration of Repair Discoveries, University of British Columbia, Vancouver, BC, Canada

³School of Kinesiology, University of British Columbia, Vancouver, BC, Canada

Introduction:

The ASIA Impairment Scale (AIS) is the current gold standard used to classify a SCI. A key limitation is that there is no motor testing in the thoracic segments, which makes conclusion about the completeness of the neurological lesion in the thoracic segments difficult to ascertain.

Objective:

To use electromyography recording (EMG) and ultrasound imaging technique (US) to measure activation of abdominal muscles during different trunk muscle tasks in persons with SCI (above T6) and to compare these with able-bodied persons (AB).

Materials - Methods:

Thirteen people with motor complete SCI (11 AIS A, 2 AIS B; C4-T5) and 13 matched AB volunteered to the study. Subjects performed maximal voluntary isometric contractions during seven trunk muscle tasks. Thicknesses of rectus abdominis (RA), obliquus externus (OE), obliquus internus (OI) and transverses abdominis (TrA) were measured bilaterally using US. EMG was recorded from RA, OE, and OI/TrA bilaterally.

Results:

All individuals with SCI were able to voluntarily activate their abdominal muscles above resting EMG threshold during maximal trunk muscle tasks. The activation pattern was task specific in the majority of the SCI subjects, but with lower amplitudes in the SCI group. The US measurement during rest indicated mean lower values (71–111%) for abdominal muscles thickness in the SCI group. Muscle thickness changes above resting measurements were observed in ten SCI subjects, in at least one abdominal muscle.

Conclusion:

These findings indicate that individuals with high thoracic SCI were able, to some extent, activate abdominal muscles during voluntary movement, and that EMG and US could be used as sensitive methods for providing a measure of preserved function in deep and superficial abdominal muscles. The study highlights a need to revise the current AIS classification scale to include motor tests also for muscles of the trunk.

Keywords: ASIA classification, electromyography, ultrasound imaging technique

Monday, 28th October 2013

O-003

Hall: A / 11.05 - 12.35

A retrospective analysis of the perceived outcome of stem cell therapy for persons living with a spinal cord injury

Melanie Skeen¹, Carina Eksteen¹, Michael Pepper²

¹Department of Physiotherapy, University of Pretoria, South Africa

²Department of Immunology, Faculty of Health Sciences, University of Pretoria, South Africa

Stem cell therapy is seen potentially as a means to achieve healing and improve function in patients with spinal cord injuries and many clinical trials are being run in this regard. Methods and Patients: Persons living with spinal cord injuries in South Africa who have received stem cell therapy in various forms were identified. Data on the nature of the injury, the nature of the treatment and its cost, and measurement of person's functional status using the SCIM III was collected retrospectively using a questionnaire.

Results:

Comparisons were drawn between the persons, pre and post stem cell function, using the SCIM III. Sources of stem cells included xenogeneic and allogeneic stem cells. Cells were administered orally, subcutaneously, intravenously, intramuscularly. Cost ranged from R0- R700 000. Although most of the patients reported that they felt "better" after the treatments, there was no significant improvement in SCIM scores. Subjective and variable improvements in sensory function were reported.

Conclusions:

There is little evidence for benefit from currently practiced "stem cell" therapies for spinal cord injuries. There is an urgent need for the implementation of stem cell regulations in South Africa to avoid patient exploitation. There is also a requirement for further education of both persons living with spinal cord injuries and the professionals working with these persons to prevent injury and to enable correct information to be given and prevent false expectations in therapy. Correct ethical research is to be encouraged in the field and patients selected for trials on the right basis and safe verified procedures be done on patients once the required research is complete.

Keywords: SCI, stem cell, SCIM III

Monday, 28th October 2013

O-004

Hall: A / 11.05 - 12.35

Suicide in an aging spinal cord injury population

Michael John DeVivo¹, Yuying Chen¹, James Krause², Lee Saunders², Yue Cao²

¹University of Alabama at Birmingham, Birmingham, Alabama, United States

²Medical University of South Carolina, Charleston, South Carolina, United States

Objective:

Assess the frequency, methods and risk factors for suicide among persons with spinal cord injury (SCI) and determine suicide's impact on life expectancy.

Materials-Methods:

45,516 persons with SCI treated at a model system were included in the study. Survival status was determined by routine follow-up, Social Security Death Index, National Death Index (NDI), state vital statistics, and newspaper obituaries searches. Causes of death were determined from the NDI, death certificates, hospital discharge summaries, and autopsy reports. Suicide frequencies and standardized mortality ratios (SMR) were calculated by age, sex, neurologic status, and time post-injury. Age-adjusted suicide rates by decade and years of life expectancy gained by eliminating suicides were calculated.

Results:

10,025 deaths occurred among 543,348 person-years of follow-up. Suicide was the tenth leading cause of death (3.6%; SMR = 3.6). The leading suicide method was gunshot (49.0%), followed by drugs (23.3%), hanging/strangulation/suffocation (8.4%), and cutting/piercing instruments (5.0%). Suicide declined from 10.4% of deaths under age 30 (SMR = 3.8) to 0.7% of deaths over age 59 (SMR = 2.5). Suicide caused more deaths and had a higher SMR among persons with paraplegia than tetraplegia. Post-injury years 2-9 had the highest proportion and SMR of deaths due to suicide (5.4%; SMR = 4.4). Suicide accounted for 3.8% of deaths among men (SMR = 3.2) and 2.8% of deaths among women (SMR = 8.4). The age-adjusted suicide rate decreased from 815 in the 1970s to 315 from 2000-2004; before increasing to 433 since 2005. Based on a 25 year old person, prevention of all suicides would produce a life expectancy gain of 0.3, 0.6, and 0.9 years for high tetraplegia, low tetraplegia, and paraplegia, respectively.

Conclusion:

Raising awareness of suicide methods and risk factors can help focus health promotion priorities and increase life expectancy following SCI.

Keywords: Spinal cord injury, suicide, epidemiology

Monday, 28th October 2013

O-005

Hall: A / 13.50 - 15.20

Psychometric properties of the Nottwil Environmental Factors Inventory Short Form (NEFI-SF)

Carolina S Ballert, SwiSCI Study Group

Swiss Paraplegic Research, Nottwil, Switzerland

Objective:

Based on the ICF Core Sets for spinal cord injury (SCI), we developed a questionnaire, the Nottwil Environmental Factors Inventory (NEFI), and a NEFI short form (NEFI-SF; only referring to environmental barriers) for application in surveys of persons with SCI. Psychometric properties of NEFI-SF have yet to be established. This study aimed to establish psychometric properties for the NEFI-SF including construct validity, internal consistency, discriminative validity, and predictive validity.

Materials-Methods:

NEFI-SF has been included as measure of EF in a cross-sectional community survey of the Swiss Spinal Cord Injury Cohort Study (SwiSCI) including 1577 persons with SCI. To derive a psychometric model, we drew a random sample of 500 participants from this study. To assess dimensionality of NEFI-SF, a principal component analysis was used. The adequacy of NEFI-SF items for an SCI population was determined by person-item targetting. Internal consistency was assessed with Cronbach's alpha and corrected item-total correlations. Discriminative validity of NEFI-SF items, independence, usability of the response options, item fit, discriminatory power and invariance across groups were investigated with Rasch analysis. Predictive validity was examined with regression analysis: Rasch-transformed NEFI-SF-scores and socio-demographic variables served as predictors of the USER-P participation and the SCIM functional independence measure.

Results:

NEFI-SF items differentiated two dimensions, i.e. attitudinal and physical barriers. NEFI-SF showed good internal consistency (Cronbach's alpha=0.83) and discriminative validity. Person-item targetting revealed a local floor effect in the Swiss SCI population, i.e. many persons perceived no barriers. NEFI-SF performed well in predicting participation and functional independence. NEFI-SF total scores explained additional 16% and 18% of variance in SCIM and USER-P scores, respectively in regression models adjusted for socio-demographic and injury related variables.

Conclusion:

This psychometric analysis supports the usability of the NEFI-SF items in the SCI population. Further adjustments accounting for misfitting items and item-person targetting will be considered.

Keywords: Environmental factors, measurement, psychometrics

Monday, 28th October 2013

O-006

Hall: A / 13.50 - 15.20

Do probiotic prevent antibiotic-associated diarrhoea in patients with spinal cord injuries: a A randomized controlled trial

Samford Wong¹, Ali Jamous¹, Jean O'driscoll³, Ravi Sekhar⁴, Mike Weldon⁴, Chi Yuen Yau⁶, Shashi Hirani⁵, George Grimble², Alastair Forbes²

¹National Spinal Injuries Centre, Stoke Mandeville Hospital, Aylesbury, UK

²Centre for Gastroenterology and Clinical Nutrition, University College London, London, UK

³Department of Microbiology, Stoke Mandeville Hospital, Aylesbury, UK

⁴Department of Gastroenterology, Stoke Mandeville Hospital, Aylesbury, UK

⁵Health Service Research, City University, London, UK

⁶Medicine for Older People, Stoke Mandeville Hospital, Aylesbury, UK

Objective:

Antibiotic-associated (AAD) and Clostridium difficile-associated diarrhoea (CDAD) associated with undernutrition are associated with adverse clinical outcomes¹. Probiotics can help to maintain a healthy gut-microflora and prevent the development of AAD/CDAD². There is limited evidence of probiotic effectiveness in patients with spinal cord injuries. The present study aimed to determine (i) the efficacy of a probiotic drink containing a minimum of 6.5×10^9 Lactobacillus casei Shirota (LcS) in reducing the incidence of AAD/CDAD; (ii) if undernutrition and use of proton pump inhibitors (PPI) are risk factors for AAD / CDAD.

Methods:

164 patients (50.1±17.8 years) with SCI were randomly allocated to receive LcS (n=79) or no probiotic (routine care, n=85). Probiotic was given once daily for the duration of the antibiotic and continued for 7-days after the course finished. Undernutrition-risk was assessed by using the Spinal Nutrition Screening Tool score³

Results:

No significant difference was found between probiotic and control groups in number of prescribed medications; number of antibiotics; use of PPI and occurrence of CDAD. The probiotic group had significantly lower incidence of AAD (17.1% vs 52.9%, $p<0.001$). Only one CDAD case was reported. Overall, 64.5% of patients were at undernutrition-risk. There was evidence to suggest that undernutrition (64.1% v 33.3%, $p<0.01$) and use of PPI (38.4% v 12.1%, $p=0.022$) was associated with AAD. Multivariate logistic regression identified poor appetite ($<1/2$ meal eaten) (OR: 5.045, 95% CI: 1.283, 19.84) and routine care (no probiotic) (OR: 8.459; 95% CI: 3.224, 22.196) were independent risk factors for AAD.

Conclusion:

Consumption of the probiotic LcS could reduce incidence of AAD in this vulnerable group of patients. A phase-2 multicentre, randomized-placebo-controlled study is warrant to assess if probiotics improve patients' outcomes.

Keywords: Spinal cord injuries; antibiotic-associated diarrhoea; probiotics

Monday, 28th October 2013

O-007

Hall: A / 13.50 - 15.20

Responsiveness of the Graded and Redefined Assessment of Strength, Sensibility and Prehension (GRASSP) in individuals with cervical spinal cord injury (SCI)

Inge-Marie Velstra¹, Marc Bolliger², Lorenzo Tanadini², Michael Baumberger³, Hans Rietman⁴, Armin Curt²

¹Swiss Paraplegic Centre, Clinical Trial Unit, Nottwil, Switzerland

²Spinal Cord Injury Center, Balgrist University Hospital, Zurich, Switzerland

³Swiss Paraplegic Centre, Nottwil, Switzerland

⁴Roessingh Research and Development, Lab of Biomechanical Engineering; University of Twente, Enschede, The Netherlands

Design:

Prospective longitudinal multi-centre cohort study

Objective:

To study the responsiveness of the GRASSP in detecting changes during and after rehabilitation in individuals with cervical SCI.

Methods:

Assessments were performed one, three, six and twelve months post injury. The GRASSP, the Spinal Cord Independence Measure (SCIM III) and the American Spinal Injury Association (ASIA) Impairment Scale were performed. For internal responsiveness, a linear mixed model was used to determine changes over time. Paired t-tests (Bonferroni adjusted) were performed to identify significant differences between time intervals. External responsiveness was quantified by linear regression analysis. Upper Extremity Motor Score (UEMS), the Light Touch (LT) of ASIA and the SCIM self-care subdomain score (SCIM-SS) were used as external standards of GRASSP.

Results:

74 individuals with acute tetraplegia entered the study. The GRASSP mean sub scores strength, sensibility, qualitative grasping and quantitative grasping differed significantly over time ($p < .000$). Pairwise comparisons showed that the GRASSP sub score strength had significantly improved from baseline to all follow up time points except from six to twelve months. The GRASSP sub scores sensibility, qualitative grasping and quantitative grasping had significantly improved from baseline to six months, however no significant change was found between three and six months, as well as between six and twelve months.

A one unit change in the GRASSP sub scores strength, sensibility and quantitative grasping, resulted in an average change of ≤ 0.69 in the external standards UEMS, LT and SCIM-SS. The sub scores of GRASSP have therefore a better resolution than the external standards. This provides evidence that the GRASSP is a responsive assessment that is sensitive to changes over time.

Conclusion:

GRASSP demonstrated good responsiveness in measuring changes in upper limb function over time and may be of value to improve the sensitivity of clinical assessments in clinical trials.

Keywords: Tetraplegia, GRASSP, responsiveness

Monday, 28th October 2013

O-008

Hall: A / 13.50 - 15.20

Non-invasive Brain-Computer interfaces for control of upper extremity neuroprostheses in tetraplegic individuals – Results from the European Integrated Project TOBI

Ruediger Rupp¹, Martin Rohm¹, Matthias Schneiders¹, Norbert Weidner¹, Vera Kaiser², Alex Kreiling²,
Gernot R. Mueller Putz²

¹Spinal Cord Injury Center, University Hospital, Heidelberg, Germany

²Institute of Knowledge Discovery, Graz University of Technology, Graz, Austria

Objective:

Recently reports are published about the use of highly invasive, intracortical brain-computer interfaces (BCIs) in individuals with very high spinal cord injury (SCI) for control of a robot arm in the lab. Beside general ethical aspects their limited long-term stability is of serious concern.

The aim of the European Integrated Project TOBI - Tools for Brain-Computer Interaction - (ICT-2007-224631, www.tobi-project.org) was to examine the possibilities of non-invasive BCIs for control of assistive devices under real world conditions. Particularly, an upper extremity neuroprosthesis was developed and evaluated.

Materials-Methods:

The novel neuroprosthesis contains of a combination of an easy to handle electrode forearm sleeve, with which a cylinder and key grip could be reliably generated, and an active elbow orthosis. It can be personalized to the needs of an individual end user. A hybrid BCI (hBCI) is used as a user interface consisting of a shoulder position sensor and a motor imagery (MI)-BCI. 19 chronic tetraplegic patients with restricted hand-/finger- and partly elbow function have been screened, from whom 14 were not included in the study due to joint contractures or bad BCI-performance.

Results:

Two tetraplegic neuroprosthesis end users with missing hand-/elbow function (ASIA A, mot. and sens. level C4, mot. ZPPs C4) were able to perform activities of daily living (ADLs) e.g. eating of an ice cone, signing with a ball pen or drinking from a glass. Since in both end users the Mm. biceps were severely denervated the restoration of elbow function was only possible by use of a motor-driven elbow orthosis.

Conclusion:

The results show that end users with high SCI can perform ADLs with the personalized, hBCI-controlled grasp/elbow neuroprosthesis, which they could not do without. However, since the MI-BCI-control is not intuitive, the feasibility of non-invasive decoding of imagined movements is currently being tested.

Keywords: Upper extremity neuroprosthesis, Functional Electrical Stimulation, Brain-Computer Interface

Monday, 28th October 2013

O-009

Hall: A / 15.40 - 17.00

Spinal surgery for spinal injury using navigation system including O-arm

Nobuyuki Shimokawa, Yaoki Nakao

Spinal Center, Tsukazaki Hospital, Japan

Objective:

We have used the spinal navigation system for spinal injury since 2007. Especially we have used it for the pedicle screw insertion. O-arm (Medtronic, CO, USA) is one of the latest intraoperative imaging platform to allow real-time multi-dimensioned surgical imaging optimized for spinal surgeries. We would like to demonstrate the usefulness and feasibility of the spinal navigation system for spinal injury.

Materials-Methods:

Forty eight spinal injury cases underwent spinal surgery using navigation system, 33 were male and 15 female; their age ranged from 15 to 90 years old, mean 63.3. There were 24 cases of cervical diseases, 14 of thoracic, and 10 of lumbar. The navigation system indicated for the pedicle screw insertion of whole spine, for the decision making of the margin of the bone resection for decompression, and for the percutaneous vertebroplasty/kyphoplasty of the compression/burst vertebral body fracture at the thoraco-lumbar spine, and for checking the corrective intraoperative alignment. After surgery we checked the pedicle screw position of the all cases, and evaluated them using Neo's classification.

Results:

We inserted 354 pedicle screws using navigation system and classified them with Neo's classification, grade0: 331 screws(93.5%), grade 1: 21 screws(5.9%), grade 2: 2 screw(0.6%),grade 3:0 screw(0%). No neurovascular or infectious complication associated with surgery occurred.

Conclusion:

The indication of the pedicle screw insertion should be decided before operation, even if we use the O-arm. Spinal injury with severe instability has the risk of alignment change between preoperative alignment and intraoperative alignment. So, intraoperative navigation system is much more useful and suitable for severe spinal injury. Preoperative detail and further evaluation is the most important. The most practical purpose of the navigation system is the risk management.

Keywords: Spinal injury, navigation system, O-arm

Monday, 28th October 2013

O-010

Hall: A / 15.40 - 17.00

The effects of the timing of spinal surgery after traumatic spinal cord injury: A systematic review and meta-analysis

Joost J. van Middendorp¹, Allard J.F. Hosman³, Suhail A.R. Doi²

¹Stoke Mandeville Spinal Foundation, National Spinal Injuries Centre, Stoke Mandeville Hospital, Aylesbury, United Kingdom

²Clinical Epidemiology Unit, School of Population Health, University of Queensland, Brisbane, Australia

³Spine Unit, Department of Orthopaedics, Radboud University Nijmegen Medical Center, Nijmegen, the Netherlands

Objective:

To perform a systematic review and quality-adjusted meta-analysis.

Materials-Methods:

Studies evaluating the effects of the timing of spinal surgery after tSCI were searched through the Medline database (1966 to August 2012). A 15-item, tailored scoring system was used for assessing included studies' susceptibility to bias. Random effects and quality effects meta-analyses were performed. Models were tested for robustness using one-way and criterion-based sensitivity analysis and funnel plots. Results are presented as weighted mean differences (WMDs) and odds ratios (ORs) with 95 per cent confidence intervals (95% CIs).

Results:

A total of 18 studies were analysed. Heterogeneity was evident among the studies included. Quality effects models showed that – when compared to 'late' surgery – 'early' spinal surgery was significantly associated with a higher Total Motor Score improvement (WMD: 5.94 points, 95% CI: 0.74, 11.15) in 7 studies, neurological improvement rate (OR: 2.23, 95% CI: 1.35, 3.67) in 6 studies and shorter length of hospital stay (WMD: -9.98 days, 95% CI: -13.10, -6.85) in 6 studies. However, one-way and criterion-based sensitivity analyses demonstrated a profound lack of robustness among pooled estimates. Funnel plots showed significant proof of publication bias.

Conclusion:

Due to various sources of heterogeneity within and between original studies, there is no robust evidence supporting either 'early' or 'late' spinal surgery after tSCI. Where the conduct of a surgical, randomized controlled trial seems to be an infeasible undertaking in acute tSCI, methodological safeguards require utmost attention in future cohort studies.

Keywords: Spinal cord injury, timing of surgery, meta-analysis

Monday, 28th October 2013

O-011

Hall: A / 15.40 - 17.00

Spinal cord injury-related chronic pain in victims of the 2008 Sichuan Earthquake: A prospective cohort study

Huacong Wen¹, Jan D. Reinhardt², James E. Gosney², Michael Baumberger³, Xia Zhang¹, Jianan Li¹

¹The First Affiliated Hospital of Nanjing Medical University, Nanjing, China

²International Society of Physical and Rehabilitation Medicine (ISPRM) – Committee for Rehabilitation Disaster Relief (CRDR)

³Swiss Paraplegic Centre, Nottwil, Switzerland

Objective:

Chronic pain is one of the most important complications in spinal cord injury (SCI) impacting various areas of life. To date, pain types, trajectories and treatments have not been systematically investigated in earthquake victims with SCI. This study aimed to characterize spinal cord injury (SCI)-related pain and treatment in victims of the 2008 Sichuan earthquake.

Materials-Methods:

Twenty-six patients from Mianzhu County, China who sustained SCI from the 2008 Sichuan earthquake were enrolled in this prospective cohort study. Data was collected on pain severity with a Visual Analogue Scale, depression with PHQ-9, quality of life (QoL) with WHOQOL-BREF, and social participation with CHART-SF at three assessment points. Detailed pain descriptions including therapeutic interventions were elicited at the fourth assessment. Pain determinants were analyzed with a longitudinal Tobit regression and Pearson correlations of pain severity with depression, QoL, and social participation stratified by measurement point were calculated.

Results:

Chronic pain was highly prevalent and prevalence of neuropathic pain was nearly twice that of nociceptive pain. Most patients reported pain since onset and severity was not significantly reduced over time. Cervical injury, complete lesions, and education level were significant pain determinants. Depression and QoL scores were highly correlated with pain at the first two assessments points but not at the third measurement. Most patients did not seek treatment because they regarded pain as either a normal condition after SCI or were afraid of drug dependency.

Conclusion:

This initial longitudinal assessment and characterization of SCI-related pain in earthquake victims provides a foundation for further exploration of the biological and psychosocial determinants of pain severity and of the correlation of chronic pain with other outcomes of interest in this population. Patient pain treatment seeking behavior and therapeutic interventions should be evaluated concurrently.

Keywords: Earthquake, pain, depression

Tuesday, 29th October 2013

O-012

Hall: B / 08.50 - 10.20

Botulinum toxin injections for abdominal pain in tetraplegia

Mark Anthony Slatyer¹, Warren Jennings Bell²

¹University of Tasmania, Australia

²St John's Hospital, Calvary Health Care Tasmania, Australia

Chronic abdominal pain represents a significant burden of illness for individuals with spinal cord injury (SCI) and investigation of abdominal pain often fails to identify an underlying aetiology. Abdominal pain in tetraplegia may present with abdominal muscle spasticity and some studies have discussed the treatment of abdominal muscle spasticity following SCI. Priebe et al. (1997) investigated gabapentin in controlling spasticity following SCI in various muscles including abdominal muscles¹. Laffont et al. (2003) documented abolition of abdominal muscle spasticity following intrathecal baclofen in tetraplegia².

Until now there have been no published studies of intramuscular Botulinum Toxin (BT) for abdominal muscle spasticity in tetraplegia. Recently 4 tetraplegic patients presented with neuropathic abdominal pain and abdominal muscle spasticity. All patients underwent abdominal muscle block procedures with Bupivacaine hydrochloride 0.5%, temporarily leading to partial resolution of symptoms. Thereafter 100 units of BT in equally divided doses was injected into 4 locations along the affected abdominus rectus (AR) muscle, leading to almost complete resolution of AR spasticity and neuropathic pain within 2 weeks. After 14 weeks the procedure was repeated with 200 units of BT in equally divided doses into 4 locations of the AR muscle. Complete resolution of neuropathic pain followed with no further requirement for analgesic medication.

It is often a difficult task for clinicians caring for patients with SCI to investigate and find a cause for abdominal pain. Our study suggests BT can be used to treat abdominal muscle spasticity and therefore abdominal pain in tetraplegia, but care should be taken to ensure the underlying cause for the spasticity is identified. In all subjects of this study an underlying pathology was eventually identified. Whilst BT is a novel means for treating abdominal muscle spasticity, it is vital to continue investigation into the underlying aetiology.

Keywords: Abdominal spasticity, Tetraplegia, Botulinum Toxin

Tuesday, 29th October 2013

O-013

Hall: B / 08.50 - 10.20

Preserved interaction between a-beta and a-delta fibers in capsaicin-induced pain

Catherine R Jutzeler, Armin Curt, John L Kramer

Spinal Cord Injury Center, University Clinic Balgrist, Zurich, Switzerland

Objective:

Individuals with neuropathic pain report sensation of spontaneous pain (e.g., burning). Capsaicin is a model of neuropathic pain, since it induces symptoms similar to those of neuropathic pain states (i.e., spontaneous pain). Capsaicin binds to the transient receptor potential vanilloid 1 (TRPV1), which acts as a transducer of noxious thermal and chemical stimuli in nociceptive sensory neurons. We assessed the interaction of a-beta fibre stimulation on pain pathways applying high-frequency electrical stimulation (HFES) in dermatomes conditioned with capsaicin.

Materials-Methods:

Seventy-one healthy subjects were randomly distributed to four subgroups defined by the non-/application of capsaicin and location of HFES (100Hz, 3mA, 10 minutes) that was applied 60 minutes after capsaicin application on homo-/contralateral or remote spinal segments. Contact heat (CHEPS) and somatosensory evoked potentials (SSEP) were examined repeatedly during the different conditions.

Results:

Pain induced by capsaicin (e.g., spontaneous burning, NRS=5.1) increased significantly over the course of 60 minutes. Ten minutes HFES exerted a significant pain reduction (NRS=1.6) independent from the site of application (homo-/contralateral or remote). However, evoked pain by CHEP stimulation that increased significantly over the course of capsaicin application was relieved only by segmental (homo-/contralateral) HFES. The repeated measures of CHEPS and SSEPS revealed only changes within the CHEPS (i.e, shortening of latencies) while SSEPS remained stable.

Conclusion:

Capsaicin affects a-delta fibre associated responses (pain and evoked potentials) while the sensory interaction of a-beta stimulation on induced pain and CHEPS remained preserved.

Keywords: Neuropathic pain, capsaicin, high-frequency electrical stimulation

Tuesday, 29th October 2013

O-014

Hall: B / 08.50 - 10.20

Spinal Cord Injury Pain Instrument (SCIPI): Validation study of a new tool to screen for neuropathic pain after spinal cord injury

Thomas Nathaniel Bryce¹, John Scott Richards⁶, Marcel Dijkers¹, Jesse Fann², Larry Brooks⁵, Charles Bombardier³, Chiodo Anthony⁴, Denise Tate⁴

¹Department of Rehabilitation Medicine, Icahn School of Medicine at Mount Sinai, New York, USA

²Department of Psychiatry & Behavioral Sciences, University of Washington, Seattle, USA

³Department of Rehabilitation Medicine, University of Washington, Seattle, USA

⁴Department of Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, USA

⁵Department of Rehabilitation Medicine, University of Miami Leonard M. Miller School of Medicine, Miami, USA

⁶Department of Physical Medicine and Rehabilitation, University of Alabama at Birmingham, Birmingham, USA

Objective:

To preliminarily evaluate the validity of an interview-based spinal cord injury (SCI) neuropathic pain screening instrument by examining the relationship between individual items and blinded clinician ratings of pain subtype.

Materials-Methods:

A new instrument to screen for neuropathic pain in persons with SCI, the Spinal Cord Injury Pain Instrument (SCIPI) was administered to 123 persons with SCI (AIS A-D, any level, 75% males, mean age 40 (SD 11), who on average had 2.4 (0.8) pains. The SCIPI was completed for each pain a subject had; independently, an experienced SCI physician, based on clinical history and physical, classified the same maximum 3 pains as neuropathic versus non-neuropathic, using the pain taxonomy of the International Association for the Study of Pain. The relationship between clinical judgment and the seven SCIPI items, individually and combined, was analyzed using standard statistical techniques.

Results:

Four SCIPI items (electric shock-like pain; pins and needles/tingling; hot/burning or cold/freezing overlying skin; pain in insensate body area) were significantly associated with those physician diagnoses of which the clinician was certain or very confident. When these 4 were combined, a score of 2 or higher predicted physician rating quite well: sensitivity 0.72; specificity 0.78; overall accuracy 0.76; with area under the curve 0.77.

Conclusion:

The SCIPI appears to have similar or better sensitivity, specificity, and diagnostic accuracy in an SCI population than existing neuropathic pain screening tools, such as LANSS, DN4, NPQ and PDQ. Further study is needed.

Keywords: Neuropathic pain, screening, validity

Tuesday, 29th October 2013

O-015

Hall: B / 08.50 - 10.20

Pathogenesis of obstructive sleep apnea in quadriplegia

Laura Gainche¹, Mariannick Le Guen², John A Trinder¹, Peter D Rochford², Fergal J O'donoghue², David J Berlowitz², Amy S Jordan¹

¹Department of Psychology, School of Psychological Sciences, University of Melbourne, Parkville, VIC, Australia

²Institute for Breathing and Sleep, Austin Health, Heidelberg, VIC, Australia

Objective:

Obstructive sleep apnea (OSA) is estimated to be two to five times higher in patients with quadriplegia than in able-bodied (AB) individuals. In order to better understand the causes of OSA in quadriplegia we investigate the upper airway (UA) function in quadriplegia.

High UA resistance can predispose to OSA. In people with quadriplegia the spinal sympathetic circuits lose tonic control and induce vascular engorgement of the airway. This causes the nasal (and possibly pharyngeal) mucosa to thicken, which likely increases the UA resistance. Other factors might also increase the UA resistance in this population. We hypothesized that nasal (R_{na}) and pharyngeal (R_{ph}) resistance will be 1) elevated in patients with quadriplegia and OSA (Quad-OSA) compared to AB individuals with and without OSA, and 2) reduced to AB levels with phenylephrine (restores vasoconstriction of the blood vessels).

Materials-Methods:

AB individuals and participants with quadriplegia both with and without OSA are recruited. Subjects are instrumented with epiglottic and choanal pressure catheters, nasal mask and pneumotachograph. All measurements are performed supine during wakefulness. R_{na} and R_{ph} (at a flow rate of 200mL/s), are determined for 10 minutes, before and after application of decongestant (0.5ml of phenylephrine 0.5%).

Results:

Ten participants Quad-OSA, and nine AB control have been studied. The Quad-OSA have a significantly higher R_{na} at baseline (7.54 ± 1.96 on average, compared to 2.99 ± 0.60 in the AB, $p=0.02$), which is decreased to AB levels after phenylephrine, ($R_{na}=1.11 \pm 0.15$ on average, and $R_{na}=1.26 \pm 0.24$ in the AB, $p=0.3$).

Conclusion:

These data suggest that after quadriplegia the R_{na} is particularly elevated. The recovery of R_{na} to AB levels after phenylephrine suggests that this elevation is due to the decreased sympathetic activity in quadriplegia. The results, to date, highlight the high R_{na} and R_{ph} as potential risk factors for OSA in quadriplegia.

Keywords: Sleep, quadriplegia, apnea

Tuesday, 29th October 2013

O-016

Hall: B / 08.50 - 10.20

Sleep disruption in tetraplegia, its hormonal basis and a randomised, double-blind, placebo-controlled crossover trial of melatonin supplementation

Jo Spong¹, Gerard A Kennedy², Jimmy Tseng³, Marnie Graco¹, Douglas J Brown⁴, David J Berlowitz¹

¹Institute for Breathing and Sleep, Austin Health, Heidelberg, Victoria, Australia

²Institute for Breathing and Sleep, Austin Health, Heidelberg, Victoria, Australia; School of Social Sciences & Psychology, Victoria University, Melbourne, Victoria, Australia

³Department of Medicine, Austin Health, Heidelberg, Victoria, Australia

⁴Victorian Spinal Cord Service, Austin Health, Heidelberg, Victoria, Australia

Objective:

People with motor and sensory complete cervical spinal cord injury (tetraplegia) have interrupted melatonin production and commonly report poor sleep. This study investigated the effect that 3mg melatonin supplementation has on the objective and subjective sleep of people living with tetraplegia.

Materials-Methods:

Participants with complete tetraplegia were randomised to receive 3mg/d melatonin or placebo for three weeks, followed by a two-week washout period and the alternate treatment. Four testing sessions were conducted; at baseline (night prior to the first treatment) and the last nights of each treatment and washout period. Each testing session involved full polysomnography and a questionnaire battery that assessed mood, sleep symptoms and health-related quality of life. A sleep diary was completed throughout the study, beginning two weeks prior to the first testing session. Urine and plasma samples were collected to assay for melatonin levels.

Results:

Eight participants with a mean age of 49.5yrs (range 28-69yrs) and an average of 16.9yrs (range 6-25yrs) post injury were recruited. One participant was tested in the sleep laboratory and six in the home. One participant withdrew from the study after baseline. Baseline endogenous circulating melatonin levels were diminished and increased following 3mg/d melatonin supplementation. The amount of increase in circulating melatonin varied between participants. Subjective sleep experience improved following melatonin supplementation; significantly so for reported amount of sleep (hrs) per night (Melatonin M=6.43hrs(0.79), Placebo M=5.64hrs(0.75), $\beta=0.77$, 95% CI=0.03,1.51, $p<0.05$) and for psychological wellbeing on the AQOL (Melatonin M=3.29(1.25), Placebo M=4.29(1.25), $\beta=-0.96$, 95% CI=-1.48,-0.44, $p<0.001$). Objective sleep measures were unchanged.

Conclusion:

3mg of melatonin two hours prior to sleep improved subjective sleep in complete quadriplegia. Replication of this study in a larger cohort and further investigation of the pharmacokinetics of melatonin metabolism in this population is required.

This project is proudly supported by the Transport Accident Commission.

Keywords: Melatonin, Sleep, Tetraplegia

Tuesday, 29th October 2013

O-017

Hall: B / 08.50 - 10.20

Attention and information processing performance in people with acute quadriplegia and obstructive sleep apnoea

Rachel Schembri¹, Jo Spong², David J Berlowitz², COSAQ study team³

¹Department of Medicine, University of Melbourne, Australia

²Institute for Breathing and Sleep, Austin Health, Melbourne, Australia

³The international COSAQ collaborative group

Obstructive sleep apnoea (OSA) can have effects on daytime functioning, including deficits in memory, attention and information processing. The prevalence of OSA in acute quadriplegia is as high as 83%. Our group is currently leading a randomised controlled trial examining the effect of OSA treatment in acute quadriplegia on neurocognitive performance.

Objective:

To examine the relationship between initial OSA severity and attention and information processing performance in patients with OSA and acute quadriplegia.

Materials-Methods:

103 acute quadriplegic patients (93 male) aged 18-85 years (M=46.09, SD=16.70) participated across 10 international sites. An overnight sleep study and neuropsychological testing was performed on average 74.36 days since injury (SD=62.09, range=8-511). Those with an apnoea hypopnoea index (AHI) of less than 10 were excluded from the study prior to neuropsychological testing. Attention and information processing were assessed using the paced auditory serial addition task (PASAT).

Results:

Participants were divided into mild OSA (AHI 10-<30, N=44) and moderate/severe OSA (AHI >=30, N=59), and PASAT performance was compared between these groups. PASAT performance was significantly worse in the moderate/severe OSA group (M=79.95, SD=47.17) than the mild OSA group (M=108.18, SD=46.81), $t(101)=3.02$, $p=.003$.

Conclusion:

Increased severity of sleep apnoea is related to poorer performance in information processing and attention in acute quadriplegia. The severity of deficits found in participants with mild OSA and acute quadriplegia was worse than PASAT results reported in the literature for patients with mild traumatic brain injury, chronic fatigue syndrome, lupus and multiple sclerosis. This poor attention and information processing is likely to have important implications for the daytime functioning and rehabilitation outcomes of people with quadriplegia.

This project is proudly supported by the Transport Accident Commission. Additional support provided by the National Health and Medical Research Council (scholarship 616605).

Keywords: Cognition, sleep apnoea, spinal cord injury

Tuesday, 29th October 2013

O-018

Hall: B / 10.40 - 12.40

Psychological features and sexual variables in women with and without spinal cord injury

Lina Di Lucente¹, Merirosi Benevento¹, Federica Ricci², Sara Simonelli¹, Martina Addari¹, Monica Torre¹,
Giorgio Scivoletto¹, Marco Molinari¹

¹IRCCS Fondazione S. Lucia, Rome, Italy

²Azienda Ospedaliera Universitaria S. Andrea, Rome, Italy

Objective:

the aim of this study is to evaluate differences and correlations between psychological features (anxiety, depression, self esteem, extraversion) in women with and without spinal cord injury (SCI); to evaluate if psychological status improve sexual variables (sex-appeal, orgasm, masturbation, sexual intercourses with disabled people, preliminaries, sexual intercourse with and without usual partner, sexual intercourse frequency). Finally to evaluate the effects of psycho-sexual rehabilitation in the samples compared.

Materials-Methods:

97 subjects enrolled (47 women with and 50 women without SCI), average aged 40.06, SD± 18.2. They underwent to clinical evaluation to asses neurological and sexual-urological status with psychological history. Standardized tests including CBA STAI X 2 sheet 3 for anxiety, CBA-QD sheet 8 for depression, self esteem, and extraversion tests (CBA sheet 5 scale E) were administered together with a Psycho-Uro-Sexual Questionnaire. Student's T test to compare the psychological status between the subjects with SCI). Pearson's correlation to examine the relationship between the various variables of sexual life and the psychological status of the women with SCI.

Results:

women with SCI show significant higher values of anxiety and depression and lower values of extroversion and self-esteem compared to women without SCI. They also show several different sexual habitus. However in the SCI group, Pearson's analysis did not revealed any relationship between psychological status and sexual variables.

Conclusion:

this study shows no significant relationships between sexual and psychological variables; however we found statistically significant differences between the two groups compared; maybe in subjects with SCI within four months there are other variables to considered that can influence psychosexual status (i.e. disease insight and the independence in daily life activities).

Keywords: Spinal cord injury, sexual habits, psychological features

Tuesday, 29th October 2013

O-019

Hall: B / 10.40 - 12.40

Spinal Cord Injury (SCI) and medications: A double whammy on sexual function?

Siddeshwar Patil, Aheed Osman, Joy Roychowdhury, Naveen Kumar, Ajay Boppana, Prof W El Masry

Midland Centre for Spinal Injuries, Oswestry, UK

Introduction:

Sexual dysfunction as a result of spinal cord injury is well known. The resulting physical and psychological issues from the SCI make it imperative that this group often require medications. It is possible that often these medications can cause adverse effects including sexual function.

Aims:

To identify the number of SCI individuals who use medications that can affect sexual function. We also evaluated the effectiveness of discussion relating to sexual function for these patients.

Materials and Methods:

Retrospective cohort study of 543 consecutive patients reviewed at the outpatients between January and June 2012 as part of their annual follow-up visit. Data collected from medical case records, electronic patient records and drug charts. Medications known to affect sexual function as described in British National Formulary 58 were reviewed. Documentation relating to sexual function

Results:

211 patients were included in the study. Nearly 50% were neurologically complete (Frankel A). More than 50% of the patients were on medications that could adversely affect sexual function. Almost 30% were on one medication, 18% on 2 medications, over 7% on 3 or more medications.

14% were not on any medications and 31% were on medications that did not have a known adverse effect to sexual function. 17% of the patients were on medications for erectile dysfunction.

Almost 85% of patients had some discussion regarding sexual function at their follow up visit but this was not always complete.

Conclusion:

In addition to their SCI, a sizeable proportion of patients with SCI are on medications that can adversely affect their sexual function. Majority of the consultations were inadequate in identifying and addressing concerns regarding sexual function. Healthcare Professionals looking after SCI patients need to be more aware of this aspect and should also be more willing to enquire about sexual dysfunction with their patients.

Keywords: Sexual dysfunction; spinal cord injury

Tuesday, 29th October 2013

O-020

Hall: B / 10.40 - 12.40

Sexuality of inpatient spinal cord injured men in Turkish Rehabilitation Care Center

Kamil Yazicioglu, Ümüt Güzelkçük, Ferdi Yavuz, Bilge Yılmaz

Physical Medicine and Rehabilitation Department, Turkish Armed Forces Rehabilitation Center, Gülhane Military Medical Academy, Türkiye

Objective:

The sexual data of 75 male spinal cord injured people were collected. Their mean age was 26 (min 20, max 35). The inclusion criteria was being injured for at least six months. 51 (68%) of them single and 24 of them (32%) were married. 18 patients (24 %) had children.

66 (88%) patients had some kind of impairment in their sexual life. They all reported they needed some information about sexuality and 31 patients reported that they had not got any information, 9 patients got the information from the other patients, while only 35 (46,7%) patients got sexual help from the rehabilitation team.

They all reported some kind of erection, but only 20 patients had adequate erection. The duration of erection in minutes were as follows: 23 pts were less than 1 mnts, 22 pts were between 2 and 5 minutes, 20 pts were longer than 6 minutes. While 80 % of pts had experienced masturbation, 45% of (n:34) the pts had sexual intercourse. While only 2 patients had achieved orgasm, 32 pts had not. 22 (64,7%) patients think their partners had achieved orgasm. 30 pts don't think themselves as sexually attractive, 24 pts have concerns about environment behavior about his sexual attraction, 17 pts have difficulty finding sexual partner, 6 pts' partners have low sexual desire, 4 pts have concerns about urinary accidents, 1 pts has concern for GIT accidents, 2 pts have concerns to give damage to his body, 2 pts have concerns to give damage to his partner etc.

The expectations for the sexual life in future were as follows: To have erection 39 pts, to have children 12 pts, to have coitus 8 pts, to have ejaculation 6 pts, to have orgasm 6 pts, to give sufficient orgasm to the partner 2 patients.

Keywords: Sexuality, Turkish spinal cord males

Tuesday, 29th October 2013

O-021

Hall: B / 10.40 - 12.40

Premature ejaculation developing as a function of conus or epiconus lesions

Frédérique Courtois¹, Kathleen Charvier², Isabelle Côté³, Valérie Dahan⁴, Nicolas Morel Journal⁵

¹Frédérique Courtois, Sexology, Université du Québec à Montréal, Montreal, Canada

²Kathleen Charvier, Physiatry, Hospices Civils de Lyon, Saint-Genis Laval, France

³Isabelle Côté, Physiatry, Institut de réadaptation en déficience physique de Québec, Québec, Canada

⁴Valérie Dahan, Physiatry, Institut de réadaptation Gingras Lindsay de Montréal, Montreal Canada

⁵Nicolas Morel Journal, Urology, Hospices Civils de Lyon, Saint-Genis Laval, France

Spinal cord injuries impair ejaculation function. Yet, lesions to lower sacral segments appear to result in premature ejaculations (rather than anejaculation) developing following injury.

Objective:

Analysing the retrospective clinical data on ejaculation function in men with conus or epiconus lesions.

Materials-Methods:

34 men with conus or epiconus lesions consulting our rehabilitation service over a 10 year period. The lesions varied from L5-S1 to S3-S4 and were mostly incomplete. Anal sensation was consistently lost in 6% of the patients, diminished in 79%, paresthetic in 12% and normal in 3%. Anal reflex was absent in 30% of the patients, diminished in 60% and normal anal 10%. Bulbocavernosus and bulboanal reflexes were absent in 38%, diminished in 41% and normal in 21%.

Results:

Of the 34 patients with lower sacral lesions, 91% reported maintaining ejaculation, but 83% complained of premature ejaculation (eg, upon mere sexual thought or desire) that developed after the injury. 72% of these patients described the ejaculation as dribbling, and although the lesion was incomplete in most cases, 78% reported no sensation or little sensations upon ejaculation, and 15% painful sensations (eg. electric discharge upon ejaculation). Only 7% reported climax.

Conclusion:

Men with lower spinal lesions to the conus terminalis or epiconus appear to develop premature ejaculation as a result of injury. Most patients describe the ejaculation as dribbling and lacking sexual sensations. The findings are in marked contrast with those from men with higher thoracic or cervical lesions who generally lose ejaculation with natural stimulation, but can reach ejaculation with vibrostimulation, which then appears propulsive and accompanied with sexual autonomic sensations including climax. The result are discussed in terms of our current knowledge on the neurophysiology of ejaculation.

Keywords: Ejaculation, spinal cord injury, conus terminalis lesions

Tuesday, 29th October 2013

O-022

Hall: B / 10.40 - 12.40

The lived experience of sexuality and urinary incontinence for women with spinal cord injury

David Ditor¹, Jackie Cramp¹, Frédérique Courtois², Jarold Cosby¹, Maureen Connelly¹

¹Department of Kinesiology, Brock University, St. Catharines, Canada

²Département de Sexologie, Université du Québec à Montréal, Montréal, Canada

Objective:

To examine the lived experiences of sexuality for women who have, or are concerned about, urinary incontinence (UI) as a consequence of spinal cord injury (SCI).

Materials-Methods:

Seven women (24-61 years old) with SCI (C5-L3; AIS A-D; 0.5-31 years post-injury), participated. All participants experienced UI, or a concern for UI, that had an effect on sexuality. Interviews were conducted using a standardized, open-ended, interview-guide approach.

Results:

The main emerging themes were, i) the fear of UI during sex, or oral sex, especially during a bladder infection, and how this fear can lessen the enjoyment or cause withdrawal or delayed participation ii) constantly comparing current sexual satisfaction to that pre-injury when UI was not an issue, iii) the importance of taking precautions to prevent or minimize UI or its consequences during sex (ie, catheterizing before sex and having a mat available to protect the mattress), and the negative effects that these precautions have on mood or spontaneity, iv) the partner's reaction can determine the woman's feelings towards the phenomenon, positively or negatively, and influence her willingness to have sex with that person, v) UI during sex can be mistaken for orgasm as the sensations can be similar, vi) disguising UI from the partner (ie, calling it sweat or female ejaculation), vii) the awkwardness of disclosing the possibility of UI during sex to a new partner. Additional themes included i) reduced body-image after SCI, ii) the lack of information regarding sex after SCI, especially from doctors, and the related frustration and disappointment, iii) concerns about pregnancy, delivery and child care.

Conclusion:

Urinary incontinence has immense physical and psychological impacts on sexual function and satisfaction for women with SCI. It is imperative that appropriate resources be made available to women with SCI, and their partners, about sexuality.

Keywords: Sexuality, urinary incontinence, quality of life

Tuesday, 29th October 2013

O-023

Hall: B / 10.40 - 12.40

Residual urine volumes after intermittent catheterization in men with spinal cord injury

Jürgen Pannek¹, Peter Bartel¹, Jörg Krebs²

¹ Neuro Urology Unit, Swiss Paralepic Centre, Nottwil, Switzerland

² Clinical Trial Unit, Swiss Paralepic Centre, Nottwil, Switzerland

Objective:

Although intermittent catheterization (IC) is the gold standard for bladder evacuation in men with spinal cord injury (SCI), the efficacy of this technique has not been assessed. We have analysed residual urine volumes after IC in men with SCI and the effect of residual urine on the rate of symptomatic urinary tract infections (UTI). Furthermore, we have investigated the effect of the catheter type on residual urine volumes and the rate of symptomatic UTI.

Materials-Methods:

In a prospective investigation, 60 men with SCI and experienced in IC (≥ 6 months) emptied their bladder twice by IC. Immediately after catheterization, residual urine was determined by ultrasonography. Personal characteristics and bladder diary details (annual UTI rate, catheter type) were collected.

Results:

The median residual urine volume after IC was 7.0ml (IQR 20.3ml). No residual urine was observed after 42% (n=50) of all catheterizations (n=120). Unsatisfactory residual volumes (i.e. >50 ml) were observed after 9% (n=11) of all catheterizations. There was no significant ($p=0.95$) difference between the median residual urine volume of men with recurrent (>2 UTI/year) UTI (2.5ml, IQR 29.3ml) and the volume of those with sporadic (≤ 2 UTI/year) UTI (6.0ml, IQR 20.0ml). In addition, there was no significant difference between the catheter types used regarding residual urine volumes ($p=0.07$) or the annual UTI rate ($p=0.22$).

Conclusion:

Bladder evacuation by IC is an efficient method, resulting in no or small residual urine volumes. The small residual urine volumes generally observed after IC do not predispose for symptomatic UTI. The catheter type does not seem to affect residual urine volumes.

Keywords: Neurogenic bladder dysfunction, residual urine

Tuesday, 29th October 2013

O-024

Hall: B / 10.40 - 12.40

Intravesical electrostimulation versus sacral neuromodulation for incomplete spinal cord patients suffering from neurogenic non-obstructive urinary retention

Giuseppe Lombardi, Stefania Musco, Federico Nelli, Alessandro Ierardi, Maria Finita Celso, Giulio Del Popolo

Neuro-Urology, Careggi University Hospital, Florence, Italy

Objective:

To compare the efficacy of intravesical electrostimulation (IVES) versus sacral neuromodulation (SNM) in subjects with incomplete spinal cord lesions (SCL) with neurogenic non-obstructive urinary retention (N-NOR).

Materials-Methods:

In this retrospective, 77 patients with N-NOR underwent IVES (minimum 28 sittings) followed, after returning to voiding baseline symptoms by percutaneous first stage of SNM (lasted minimum 4 weeks). After the 2 neuromodulation treatments, responders were patients experiencing both a 50% reduction of volume per catheterization/ml and a 50% reduction in number of catheterizations/day when comparing the 7-day voiding diary at the end of both procedures versus baselines. New urodynamics were performed afterward. Responders to first stage of SNM underwent permanent SNM.

Results:

Forty-eight patients responded to neither treatment, whereas 29 responded to both IVES and first stage SNM. No significant statistical differences ($p > 0.05$) were detected in the voiding diaries. Following the 2 procedures, the first sensation of bladder filling was either maintained or recovered by all responders, while the same 11 subjects reached a Bladder Contractility Index more than 100. The 29 responders to IVES lost their clinical benefits in a mean follow-up of 9.6 months. Only 10 out of the 29 subjects became non-responsive to permanent SNM, in a mean follow-up of 54 months.

Conclusion:

A strict correlation in terms of clinical and urodynamic patterns was demonstrated in patients with incomplete SCL and N-NOR at the end of IVES compared to first stage SNM. However voiding improvement with IVES was short-term compared to the effects of permanent SNM.

Keywords: Intravesical electrostimulation (IVES), sacral neuromodulation (SNM), neurogenic non-obstructive urinary retention (N-NOR)

Tuesday, 29th October 2013

O-025

Hall: C / 10.40 - 12.40

The allogeneic transplantation of embryonic stem cells-derived neural stem/progenitor cells into injured spinal cord in adult common marmosets

Hiroki Iwai¹, Hiroko Shimada¹, Soraya Nishimura¹, Yoshiomi Kobayashi¹, Tsunehiko Konomi¹, Keiogo Hikishima², Osahiko Tsuji³, Kanehiro Fujiyoshi⁴, Hideyuki Okano², Yoshiaki Toyama¹, Masaya Nakamura¹

¹Orthopaedic Surgery, Keio University, Tokyo, Japan

²Physiology, Keio University, Tokyo, Japan

³Orthopaedic Surgery, Saitama Social Insurance Hospital, Urawa, Japan

⁴Orthopaedic Surgery, Murayama Medical Center (National Hospital Organization), Tokyo, Japan

Objective:

In the last meeting of ISCoS 2012, we reported the efficacy and the safeness of the allogeneic transplantation of fetal neural stem/progenitor cells (NS/PCs) for spinal cord injury (SCI) in common marmosets (*Callithrix jacchus*). However, fetal tissues were clinically not used in Japan due to ethical problems. We aim to transplant induced pluripotent stem cells-derived NS/PCs (iPSC-NS/PCs) for human SCI and embryonic stem cells-derived NS/PCs (ESC-NC/PCs) is one of the positive control for iPSC-NS/PCs. Therefore, the objective of this study is to investigate the effectiveness and the safeness of allograft of ESC-NS/PCs into injured spinal cord in non-human primates.

Materials-Methods:

Adult female common marmosets received contusive cervical SCI. Fourteen days after injury, we grafted a million of marmoset ESC-NS/PCs in the original culture method, which tended to induce ESC-NS/PCs into oligodendrocytes, into the lesion epicenter and PBS (phosphate buffered saline) was injected instead of the NS/PCs in the control group. FK506 (0.05 mg/kg) was subcutaneously injected daily to suppress immunorejection. Motor function was assessed by original open field rating scale, bar grip test. The spinal cord tissues were extracted 12 weeks after transplantation and processed for histological analyses.

Results:

The transplantation group showed a better performance in both the motor function tests, compared to the control group. A large number of the grafted cells were survived and differentiated into neurons, astrocytes and oligodendrocytes. There was no tumor formation for 12 weeks after transplantation. NF-H (neurofilament 200 kDa), PECAM-1 (platelet endothelial cells adhesion molecules-1) and HE (hematoxylin-eosin) positive areas, and LFB (luxol fast blue) positive myelinated areas were significantly larger in the grafted group than the control group.

Conclusion:

This is the first study to report the efficacy and safeness of the allogeneic transplantation of ESC-NS/PCs for SCI in non-human primates.

Keywords: Spinal cord injury, transplantation, embryonic stem cells

Tuesday, 29th October 2013

O-026

Hall: C / 10.40 - 12.40

Optimal time-window of neural stem cell transplantation therapy is at the sub-acute phase of SCI in non-human primates

Soraya Nishimura¹, Kenji Yoshida², Hiroki Iwai¹, Yoshiomi Kobayashi¹, Shinsuke Shibata³, Hayao Ebise², Ikuko Koya³, Takashi Sasaki⁴, Atsushi Shimizu⁵, Jun Kudoh⁶, Yoshiaki Toyama¹, Hideyuki Okano², Masaya Nakamura¹

¹Dept Orthopaedic Surgery, Keio University School of Medicine, Tokyo, Japan

²Genomic Science Laboratories, Dainippon Sumitomo Pharma Co., Ltd., Osaka, Japan

³Department of Physiology, Keio University School of Medicine, Tokyo, Japan

⁴Center for Integrated Medical Research, Keio University School of Medicine, Tokyo, Japan

⁵Department of Molecular Biology, Keio University School of Medicine, Tokyo, Japan

⁶Laboratory of Gene Medicine, Keio University School of Medicine, Tokyo, Japan

Objective:

The microenvironment of injured spinal cord significantly affects the fate of neural stem cells (NSCs) transplanted into the spinal cord. Analyses of microenvironmental changes of injured spinal cord, which are critical to determine a therapeutic time-window of NSCs transplantation for spinal cord injury (SCI), was previously reported in rodent SCI models, but not in a non-human primate SCI model. Here, we examined the global gene expression analyses to investigate microenvironment of injured spinal cord in adult common marmosets (*Callithrix jacchus*) to determine an optimal time-window of NSCs transplantation in primate SCI model.

Materials-Methods:

Contusive SCI was induced at C5 level in adult female common marmosets. The injured spinal cords were harvested from each experimental animal at 1, 2, 4 and 6 weeks post injury (WPI). Transcriptome analyses, such as microarray and next generation sequencing and histological analyses were performed using these samples. The control animals received only laminectomy without SCI.

Results:

Transcriptome analyses revealed that the expressions of genes associated with inflammatory cytokines or reactive oxygen were significantly up-regulated at 1 WPI and decreased at 2 WPI and thereafter. In contrast, the expressions of genes about synaptic transmission were down-regulated at 1 WPI and slightly elevated at 2 WPI. Furthermore, the expression of chondroitin sulfate proteoglycans (CSPG) was increased at 2 WPI and thereafter. Histological analysis revealed that macrophage infiltration around the lesion site was significant at 1 WPI and mostly disappeared 6 WPI. On the other hand, GFAP+ and CSPG+ areas became prominent at 6 WPI.

Conclusion:

The acute inflammatory response after SCI was diminished at 2 WPI, however the glial scar formation and the CSPG accumulation were already irreversible at 6 WPI. These findings suggested that the optimal time-window of NSCs transplantation might be around 2 to 4 WPI at the sub-acute phase of SCI in non-human primates.

Keywords: Spinal cord injury, microenvironment, primate

Tuesday, 29th October 2013

O-027

Hall: C / 10.40 - 12.40

Autologous bone marrow cell transplantation in acute spinal cord injury - An Indian pilot study

Harvinder Singh Chhabra, Mohit Arora, Rajesh Sharawat, Kanchan Sarda

Indian Spinal Injuries Centre, New Delhi, India

Objective:

To determine the safety and feasibility of autologous bone marrow transplantation in Acute Spinal Cord Injured.

Materials-Methods:

This Phase I/II, prospective, randomized, single blind, controlled pilot study was conducted under supervision of an International Clinical Advisory Panel after regulatory approvals including that of Indian Council of Medical Research. Twenty one acute (10 – 14 days post injury), American Spinal Injury Association Impairment Scale (AIS) A, traumatic spinal cord injury subjects with neurological level T1–T12 were randomized into three groups. The first and the second groups received bone marrow cells (BMCs) through injection into the injured spinal cord site via durotomy and via intrathecal route respectively. The third was control group. All subjects underwent a standardized rehabilitation program. Participants were assessed at baseline and at 6, 12 and 18 months. Safety and tolerability were evaluated through monitoring for any adverse events and tests including magnetic resonance imaging (MRI). Efficacy assessment was done through neurological, functional and psychological evaluation, electrophysiological studies and urodynamics.

Results:

BMC transplantation by surgery and intrathecal route was tolerated well. No significant adverse findings were found on MRI in any subject. There was no significant improvement in any of the neurological, electrophysiological or urodynamic efficacy variables in any group. Statistically significant improvement was seen in functional scores as evaluated by Spinal Cord Independence Measure and Beck Depression Inventory as well as International Spinal Cord Injury Scale scores in all groups with no statistically significant difference in scores between the groups.

Conclusion:

BMC transplantation through injection into the injured spinal cord site via durotomy and via intrathecal route is safe and feasible in AIS A thoracic level spinal injuries at 12 month follow-up. No efficacy could be demonstrated which could be attributed to the procedures.

Keywords: Spinal cord injury; acute; human trial; autologous bone marrow transplantation

Tuesday, 29th October 2013

O-028

Hall: C / 10.40 - 12.40

Selective ablation of the tumor after iPSC derived NSCs transplantation by controlling the immune suppression

Go Itakura¹, Yoshiomi Kobayashi¹, Yuichiro Takahashi¹, Satoshi Nori¹, Soraya Nishimura¹, Morito Takano¹, Hiroki Iwai¹,
Tunehiko Konomi¹, Akio Iwanami¹, Yoshiaki Toyama¹, Hideyuki Okano², Masaya Nakamura¹

¹Department of Orthopedic Surgery, Keio University School of Medicine, Tokyo, Japan

²Department of Physiology, Keio University School of Medicine, Tokyo, Japan

Objective:

Previously, we reported functional recovery after transplantation of mouse as well as human induced pluripotent stem cell-derived neurospheres (iPSC-NS) into rodents spinal cord injury (SCI) models (Tsuji et al, PNAS 2010; Nori et al, PNAS 2011). Although iPSCs are useful for SCI treatment, tumorigenicity of transplanted cells should be resolved before clinical applications. In this study, we sought to determine the feasibility of the selective ablation of the grafted cells by controlling the immune suppression.

Materials-Methods:

We used neurospheres derived from a human iPSC line (253G1), which is already evaluated as an unsafe clone in our previous study. We transplanted the 253G1-derived neurospheres into the intact spinal cord of BALB/Ca mice with immune suppressors. In vivo bioluminescent imaging (BLI) was used to evaluate the survival of transplanted cells chronologically. After confirming the growth of the grafted cells in the BALB/Ca mice with immune suppressors, immune suppression was discontinued.

Results:

The graft survival rate was 100% (n = 21/21). The BLI-photon counts of the grafted cells showed that survival of the neural stem cells after transplantation, followed by the deterioration of motor function. After discontinuing the immune suppression, we observed the immediate rejection of the grafted cells and motor functional recovery in all the mice (n = 6/6). Through the histological analysis, we also confirmed the ablation of the graft derived tumor.

Conclusion:

We confirmed that the selective ablation of iPSC-NS derived tumor after transplantation into spinal cord by controlling the immune rejection. Taking advantage of the immune rejection, controlling a graft survival could be a safety lock against iPSC-NS derived tumor in the cell therapy for SCI.

Keywords: iPS, tumor, ablation

Tuesday, 29th October 2013

O-029

Hall: C / 10.40 - 12.40

Segmental and plurisegmental processing capabilities of the human lumbar cord isolated from brain motor controlSimon M. Danner¹, Milan R. Dimitrijevic²¹Center for Medical Physics and Biomedical Engineering, Medical University of Vienna, Vienna, Austria & Institute for Analysis and Scientific Computing, Vienna University of Technology, Vienna, Austria²Physical Medicine and Rehabilitation, Baylor College of Medicine, Houston, TX, USA

The spinal cord is a relatively simple structure with long white-matter ascending and descending tracts with gray-matter neural networks in its center. However, the human lumbar spinal cord is more than a relay system carrying impulses between brain motor structures and spinal motor nuclei. Its role in motor performance within an integrated nervous system can be seen as that of a common final network, involved in the execution of control over reflex and volitional activity as well as posture and gait. In fact, the lumbar spinal cord has a large population of interneurons which form neural circuits, their functional organization is flexible, giving it a multifunctional character that can provide modulator actions, reconfiguration and flexible operation. Thus, the lumbar spinal cord can be considered to be a "spinal brain," providing another perspective from which to understanding its role in motor control.

This is a human neurophysiological study in 11 adults with separation of lumbar cord from brain input by accidental, traumatic spinal cord injury. By applying sustained epidural stimulation of posterior lumbar roots with different frequencies and strengths synchronously to all five lumbar segments it was possible to examine segmental and plurisegmental processing capabilities of sustained and rhythmical motor outputs. The main message by presenting this results of "a by accident tailored human model" is the demonstration that motor outputs depend from the frequency of sustained lumbar cord input. This will be followed by the discussion on possible mechanisms underlying this finding and their significance for neurocontrol of posture and gait. Furthermore, we shall outline how such neurophysiological neurocontrol features can be of value for planning, monitoring and evaluation of neurophysiological repair procedures.

Keywords: Processing, motor control, spinal cord injury

Tuesday, 29th October 2013

O-030

Hall: C / 10.40 - 12.40

Multicenter prospective controlled clinical trial of neuroprotective therapy using G-CSF for acute spinal cord injury: Results of the one year follow-up

Taigo Inada¹, Masashi Yamazaki², Akihiko Okawa¹, Takeo Furuya¹, Hiroshi Takahashi³, Kei Kato¹, Koshiro Kamiya¹, Satoshi Maki¹, Mitsutoshi Ota¹, Kota Suda⁴, Yasuo Ito⁵, Takayoshi Ueta⁶, Kazuhisa Takahashi¹, Masao Koda¹

¹Orthopaedic Surgery, Graduate School of Medicine, Chiba University, Japan

²Orthopaedic Surgery, University of Tsukuba, Japan

³Orthopaedic Surgery, Toho University Sakura Medical Center, Japan

⁴Orthopaedic Surgery, Spine Cord Injury Center Hokkaidoh Chuo Rosai Hospital, Japan

⁵Orthopaedic Surgery, Kobe Red Cross Hospital, Japan

⁶Orthopaedic Surgery, Japan Labour Health and Welfare Organization Spine Injuries Center, Japan

Objective:

Glanulocyte colony-stimulating factor (G-CSF) is a cytokine that is clinically used to treat neutropenia. G-CSF also has non-hematopoietic functions and could potentially be used to treat neuronal injury. We previously reported that G-CSF mobilized bone-marrow derived cells into the injured spinal cord, and directly suppressed neuronal apoptosis. Based on those result, we started a phase II clinical trial to assess the safety and feasibility of G-CSF therapy for patients with acute spinal cord injury (SCI). The aim of the present study was to evaluate the neurological recovery during the first year after G-CSF administration.

Materials-Methods:

From August 2009 to March 2011, a trial was performed in 47 acute SCI patients within 48 hours after injury. Patients were divided into two groups (not randomly), the G-CSF group and the control group. The G-CSF group (n=23) were received intravenous G-CSF treatment (10 µg/kg/day) for 5 consecutive days, while the control group (n=24) did not. We evaluated motor function using the American Spinal Cord Injury Association (ASIA) motor score and the ASIA impairment scale (AIS) immediately after the admission, one week, three months, six months and one year after G-CSF administration. We also assessed the increased ASIA motor score in both groups.

Results:

All cases in the G-CSF group (13.0±11.2) showed significant improvement in motor score compared with that in the control group (2.58±8.1) at 1 week after administration (p<0.01). The increase in ASIA motor score was maintained at the one year follow-up. One year after the injury, the mean increase in motor score was 27.1±20.1 in the G-CSF group, whereas 18.4±17.3 in the control group (p<0.05).

Conclusion:

The present results demonstrated that G-CSF administration induced greater improvement of motor function in patients with acute SCI for one year. The G-CSF may become the new therapeutic drug for the acute SCI.

Keywords: Spinal cord injury, Glanulocyte colony-stimulating factor, neuroprotective therapy

Tuesday, 29th October 2013

O-031

Hall: B / 14.00 - 15.30

Cardiovascular disease risk factor in patients with spinal cord lesion after completing primary rehabilitation at URI Soca

Zen Jurancic Marijana, Erjavec Tatjana, Savrin Rajmond

University Rehabilitation Institute of Republic of Slovenija, Ljubljana, Slovenia

Objective:

Persons with spinal cord lesions are at a greater risk of cardiovascular diseases related to early atherosclerosis in such patients. The aim of the study was an analysis of the standard risk factors for cardiovascular diseases in a group of persons with spinal cord lesions after completing primary rehabilitation and a comparison of the results with those of CINDI, a national program in the area of the prevention of cardiovascular diseases in general population, performed between 2002 and 2006.

Materials-Methods:

The study included 50 patients with spinal cord lesions after completing primary rehabilitation at URI Soca. Clinical risk factors included blood pressure and body mass index while laboratory risk factors included 4-fraction lipidogram, fasting blood sugar and the level of C-reactive protein (CRP). Smoking status was defined. The average values of the standard risk factors were compared to the CINDI results.

Results:

The average blood pressure value (123/70 mmHg), total cholesterol (4.6 mmol/L), glucose (4, 7 mmol/L) and body mass index (24.2) were lower than those of the general population, while the percentage of smokers (50%) was higher. The average value of the C-reactive protein was higher (5.5 mmol/L). The total cardiovascular risk evaluated with Framingham (<10%) and SCORE tables (<1%) was low in the majority of the persons with spinal cord lesions.

Conclusion:

Due to specific physiological and morphological changes the assessment of the cardiovascular risk with Framingham and SCORE tables in persons with spinal cord lesions is undervalued. New tables of cardiovascular risk need to be designed. Prevention programs against cardiovascular diseases should be conducted more frequently than in the general population.

Keywords: Spinal cord lesion, cardiovascular risk, Framingham table

Tuesday, 29th October 2013

O-032

Hall: B / 14.00 - 15.30

Causes of death of persons with spinal cord injury within five years after first inpatient rehabilitation

Rutger Osterthun, Marcel Post, Floris Van Asbeck, Christel Van Leeuwen, Casper Van Koppenhagen

De Hoogstraat Rehabilitation, Utrecht, The Netherlands

Objective:

To determine mortality, causes of death and determinants of death of individuals with SCI within five years after first inpatient rehabilitation

Materials-Methods:

Prospective cohort study in 8 rehabilitation centres in the Netherlands. Persons were included on first clinical rehabilitation after SCI. Inclusion criteria: age between 18 and 65; ASIA impairment scale A-D and expected long-term wheelchair dependency. Information about survival, cause of death, relevant co-morbidity and psychosocial circumstances contributing to death was derived from the rehabilitation physician or general practitioner with a form developed for this project. Determinants of death were taken from the prospectively collected database. Descriptive statistics were calculated and a comparison between deceased and survivors was performed using chi-square and t-tests.

Results:

Mean age at injury was 40.6 years, 74.3% were male, 59.9% had paraplegia, 69.1% had a motor complete lesion and 73.0% had a traumatic lesion. A total of 27 persons (12.2%) deceased during the follow-up period. Main causes of death were cardiovascular (37.0%), pulmonary disease (29.6%) and neoplasm's (14.8%). Older age at injury, non-traumatic cause of injury, family history of cardiovascular disease, less social support and a medical history on admission were significantly related to death.

Conclusion:

The main causes of death were cardiovascular and pulmonary disease. The causes of death tend to be the same as in the general population and most of them seem not directly related to SCI.

Keywords: Spinal cord injury, mortality, causes of death

Tuesday, 29th October 2013

O-033

Hall: B / 14.00 - 15.30

Aetiology and demographics of acute traumatic spinal cord injuries

Gordana Savic¹, Hans Frankel¹, Ali Jamous¹, Susan Charlifue²

¹National Spinal Injuries Centre, Stoke Mandeville Hospital, Buckinghamshire Healthcare NHS Trust, UK

²Craig Hospital, Englewood, CO, USA

Aim:

To describe changes in aetiology and demographic characteristics of patients with acute traumatic spinal cord injury (SCI) admitted to a single UK centre between 1944 and 2010.

Method:

Retrospective analysis of new admissions 1991-2010 and comparison with historic data 1944-1990 (Frankel et al. Spinal Cord 1998; 36: 266-274). Inclusion criteria: UK residents, traumatic SCI, admission to the centre within one year of injury and minimum one year post injury survival.

Results:

2573 patients admitted 1944-1990 and 1570 patients admitted 1991-2010 fulfilled the inclusion criteria. Comparative analysis showed similar aetiology patterns, with road traffic accidents (RTAs) being the most frequent cause of injury (49.7% and 43.3% respectively), followed by falls (29.1% and 33.9%) and sport injuries (10.4% and 16.4%). Falls replaced RTAs as the leading cause around the ages of 40 and 50 respectively, and represented 60.1% and 77.9% of all causes in those over 60 years old at injury.

The average age at injury increased (mean from 32.4 to 37.8 and median from 27.5 to 33.7 years), as did the proportion of people injured at an older age (from 6.5% to 13.0% for those over 60). The largest age at injury groups were 18-20 and 21-23 year olds.

The proportion of women increased slightly over time, from 19.7% to 21.7% overall, but was significantly higher in the older age groups in both cohorts (36.3% and 34.3% in those over the age of 60, compared with 17.2% and 17.7% in those under 30).

Conclusions:

RTAs, followed by falls, were the leading causes of traumatic SCI, but this trend reversed in those injured at an older age. The average age at injury, proportion of older people and proportion of women increased over time.

Acknowledgements:

Mrs Pauline Bateman for assistance with medical records. Buckinghamshire Healthcare Charitable Spinal Trust Fund, UK for funding.

Keywords: Spinal cord injury, aetiology, demographics

Tuesday, 29th October 2013

O-034

Hall: B / 14.00 - 15.30

Endocrine, nutritional and metabolic diseases after spinal cord injury: Mortality risk and trends

Yuying Chen, Michael J Devivo

Department of Physical Medicine and Rehabilitation, University of Alabama at Birmingham, Birmingham, Alabama, USA

Objective:

To assess whether the mortality of endocrine, nutritional and metabolic diseases is increased in persons with spinal cord injury (SCI) and whether this cause-specific mortality after SCI has changed over time.

Methods: Data and statistics were retrieved from the National SCI Statistical Center and National Center for Health Statistics in the US. The mortality experience, as of December 2009, of 45,489 persons with traumatic SCI injured since 1936 (99.5% injured after 1972) treated at a model system or Shriners hospital was compared to the general population, using standardized mortality rate (SMR). To identify risk factors, the SMR was further stratified by age, gender, years since injury, and neurologic impairment. Trends in annual age-adjusted cause-specific mortality rates after SCI were also calculated by decade.

Results:

Of total 10,575 deaths over 576,698 person-years of follow-up, 248 deaths (2.3%) were known to be caused by endocrine, nutritional and metabolic diseases (ICD-9 codes 240-279; 170 deaths from diabetes). Had persons with SCI had the same mortality as the general population, the expected number of deaths from the endocrine, nutritional and metabolic diseases would have been 119.9 (SMR=2.1). The increased mortality was observed among males and females (SMR=2.1 and 1.9, respectively), all ages (SMR=2.6, 2.2, and 2.0 for age 0-29, 30-59, and 60-99, respectively), all neurologic categories except persons with functional motor incomplete injuries (SMR=1.1), and various years post injury. The annual mortality rate of endocrine, nutritional and metabolic diseases after SCI has also increased from 8 deaths in 1970s, 50 deaths in 1980s, 67 deaths in 1990s, 73 deaths in 2000-2004, to 85 deaths in 2005-2009 per 100,000 population.

Conclusion:

Our study findings highlight the need of prevention, early screening and intervention for endocrine, nutritional and metabolic diseases to improve life expectancy after SCI.

Keywords: Spinal cord injuries, Mortality, Metabolic diseases

Tuesday, 29th October 2013

O-035

Hall: B / 14.00 - 15.30

Relevance of skin physiology in the sacral region of spinal cord patient with a view to the risk for pressure ulcer –The validation of methods

Anke Scheel-Sailer¹, Angela Frotzler¹, Gabi Müller Verbiest¹, Simon Annaheim², Rene Rossi², Siegfried Derler²

¹Swiss Paraplegic Center

²Laboratory for Protection and Physiology, EMPA, Swiss Federal Laboratories for Materials Science and Technology, St. Gallen, Switzerland

Objectives:

To assess the reliability of skin physiology measurements in the sacral region of patients with a spinal cord injury (SCI) with or without pressure ulcers (PU)

Study design:

An experimental, controlled study.

Setting:

A Swiss acute care and rehabilitation clinic specialized in SCI

Subjects:

A total of 36 participants were studied, 20 participants with SCI without a PU, 6 patients with SCI and PU stage 1 and 10 healthy participants as control group.

Methods:

Redness, hydration, elasticity and perfusion of the skin in the sacral region were measured in the laying position using Corneometer CM 825, Mexameter MX 18, Cutometer MPA 580 and PeriFlux System 500. Two trained examiners measured skin physiology in 10 healthy persons and in patients with SCI with or without a PU. Intrarater and interrater reliability was calculated and between groups comparisons were performed.

Results:

The Intraclass Correlation Coefficient was between $R=0,526$ ($p=.048$) and $R=0,913$ ($p=.000$). Redness ($p=0.028$) and perfusion ($p=0.028$) measured over a PU differed significantly between patients with SCI with or without a PU. In contrast, elasticity and humidity didn't. Regarding the area with healthy skin patients with and without a PU redness ($p=0.072$) and perfusion ($p=0.123$) showed no significant differences, Comparing the skin of healthy person and patients with SCI without PU redness ($p=0.009$) and perfusion ($p=0.001$) differed significantly.

Conclusion:

These biophysical methods are valid. Skin physiology is significantly different in SCI patients and over a PU grade 1. It is an important aspect to understand the etiology and pathology of PU.

Keywords: P ressure ulcer, skin physiology, sacral region

Tuesday, 29th October 2013

O-036

Hall: B / 14.00 - 15.30

Statins may prevent longitudinal bone loss at the knee in chronic SCI

Leslie Morse¹, Helen Stott¹, Ashley Doherty¹, Antonio Lazzari³, Eric Garshick³, Ross Zafonte¹, Ricardo Battaglini²

¹Spaulding-Harvard SCI Model System, Charlestown, MA, USA

²The Forsyth Institute, Cambridge MA, USA

³Boston VA Healthcare, MA, USA

Objectives:

Spinal cord injury (SCI) results in increased risk of osteoporosis and low-impact fractures, particularly at the knee. However, there are few treatment options to effectively prevent bone loss in chronic SCI. We investigated clinical and demographic factors as well as medication use associated with longitudinal bone loss at the knee in chronic SCI.

Methods:

We studied participants with chronic SCI. 146 participants with SCI were enrolled and received at least 2 DXA scans. Medical history, medications, smoking history, and fracture history were obtained. We determined bone density at the distal femur a mean of 20 months apart (range 16 to 35 months) using a GE iDXA densitometer (DXA). Least significant change calculations based on short term precision studies were used to categorize participants as follows: (1) no bone loss or (2) significant bone loss at the distal femur. Predictors of bone loss were assessed using logistic regression and univariate predictors with a p-value of >0.10 or of clinical significance were included in a multivariable model.

Results:

In univariate models, subjects with motor complete injuries were twice as likely to lose bone compared to those with motor incomplete injuries (p=0.02). Current statin users were 70% less likely to lose bone at the distal femur (p=0.02) compared to those not taking a statin. After adjusting for initial femur BMD, gender, and injury completeness, statin users were 67% less likely to have a significant decrease in femur BMD (p=0.04).

Conclusions:

Our results suggest that current statin use may prevent bone loss in chronic SCI. Statins have been reported to reduce bone loss and fracture risk in other populations. If confirmed, these findings may support future investigation testing statins as a therapeutic intervention to prevent bone loss, treat osteoporosis, or reduce fractures in conditions associated with disuse osteoporosis, including SCI.

Keywords: Osteoporosis, SCI, rehabilitation medicine

Tuesday, 29th October 2013

O-037

Hall: D / 14.00 - 15.30

Correlates of exercise self-efficacy in persons with recent spinal cord injury

Carla Nooijen¹, Marcel Post³, Linda Valent⁴, Rogier Broeksteeg², Tebbe Sluis², Henk Stam¹, Rita Van Den Berg Emons¹

¹Erasmus Medical Center, Department of Rehabilitation Medicine, Rotterdam, The Netherlands

²Rijndam Rehabilitation Center, Rotterdam, The Netherlands

³Rehabilitation Center De Hoogstraat, Utrecht, The Netherlands

⁴Rehabilitation Center Heliomare, Wijk aan Zee, The Netherlands

Objective:

Physical exercise levels are low in persons with spinal cord injury (SCI). It is therefore important to start promoting exercise during inpatient rehabilitation. Exercise self-efficacy (ESE) is the confidence persons have in their abilities to exercise and has been found an instigating factor in forming intentions to exercise and staying physically active. The goal of this study was to determine correlates of ESE in persons with recent SCI. It was hypothesized that ESE would be lower in participants who were female, older or less physically fit, with higher body mass index (BMI), lesion level or complete lesion, or more complaints of fatigue, pain or depression.

Methods:

30 Wheelchair-bound persons with recent SCI completed the Exercise Self-Efficacy Scale (ESES) 2 months before discharge from initial inpatient rehabilitation after onset of SCI. Furthermore, gender and age were registered and questionnaires on fatigue (FSS), pain (CPG), and depression (CES-D) completed. BMI and lesion characteristics were assessed and physical fitness (peak power, peak oxygen uptake) determined during a maximal handcycling test.

Results:

Using univariate regression analyses, BMI ($\beta=-0.41$, $p=0.04$), fatigue ($\beta=-0.62$, $p<0.01$), and peak power ($\beta=0.60$, $p<0.01$) were identified as significant correlates of ESE. A trend was found for pain ($\beta=-0.32$, $p=0.090$). Multivariate regression analyses controlling for gender and lesion level showed lower ESE to be related to higher BMI ($\beta=-0.50$, $p<0.01$) and more fatigue ($\beta=-0.61$, $p<0.01$). Trends were found for pain ($\beta=-0.32$, $p=0.095$) and peak power ($\beta=0.48$, $p=0.093$).

Conclusion:

ESE was not significantly related to demographic and SCI characteristics. Persons with SCI with higher BMI or more fatigue however showed lower ESE. Knowledge of correlates of ESE might identify persons at risk for lower exercise levels after discharge and thereby might help to promote exercise in persons with SCI after discharge from inpatient rehabilitation.

Keywords: Self-efficacy, exercise

Tuesday, 29th October 2013

O-038

Hall: D / 14.00 - 15.30

What's going on? – Time course of resting energy expenditure and body composition during first rehabilitation in patients with SCI: Preliminary data

Wilma Schmid, Peter Felleiter, Yvonne Haerberli, Michael Baumberger, Claudio Perret

Swiss Paraplegic Centre, Nottwil, Switzerland

Objective:

The aim of the present study was to assess and compare REE, body composition and body mass of patients with traumatic SCI during the first 10 weeks of the rehabilitation process.

Materials-Methods:

In eight male patients with SCI (age 18-51 years [median: 27.5]; BMI 19.3-29.9 kg/m² [25]; lesion level C5-Th12, AIS A or B) REE, percentage of body fat and body mass were determined 2, 6 and 10 weeks after traumatic SCI. Data were analysed with a non-parametric Friedman test and the level of significance was set at $p < 0.05$. Significant differences were identified by means of a Wilcoxon test. Results were presented as median (25th/75th percentile).

Results:

REE showed a significant ($p=0.025$) reduction between week 2 and 10 and was 1725kcal/day (1600;1880) after 2 weeks, 1505kcal/day (1393;1573) after 6 weeks, and 1450kcal/day (1285;1593) after 10 weeks. At the same time, body mass decreased significantly from 82.0kg (71.3;101.0) after 2 weeks, to 77.7kg (64.0; 93.2) after 6 weeks ($p=0.012$) and 74.7kg (65.0; 93.0) ($p=0.018$) after 10 weeks, respectively. Concerning percentage body fat content, no significant changes were found during the measurement period, with values of 19% (8;23), 19% (8;22) and 16% (10; 23) at 2, 6 and 10 weeks, respectively.

Conclusion:

During the first 10 weeks of first rehabilitation in patients with SCI, REE seems to be significantly reduced. At the same time, body mass decreases significantly, which might be due to a massive muscle atrophy, within the first few weeks of rehabilitation, a phenomenon, which favours the appearance of pressure ulcers. The time frame of 10 weeks seems to be too short to find changes in body composition. Based on the present results, it seems reasonable that measuring REE and body mass on a regular base can help to support dieticians in optimizing the nutritional management of patients with SCI.

Keywords: Body composition, resting energy expenditure, nutritional management

Tuesday, 29th October 2013

O-039

Hall: D / 14.00 - 15.30

Metabolic rate during hybrid cycling is higher than during handcycling at equal subjective exercise intensity

Thomas W Janssen¹, Jelle De Jong², Mark Q Overwater², Arjan J Bakkum²

¹Amsterdam Rehabilitation Research Center, Reade, Amsterdam, The Netherlands

²MOVE Research Institute Amsterdam, Faculty of Human Movement Sciences, VU University Amsterdam, The Netherlands

To increase cardiorespiratory fitness and to fight obesity, individuals with spinal cord injury (SCI) should exercise at sufficiently high metabolic rates. However, the metabolic rate an individual is able to exercise at for a certain period is largely dependent on the subjectively experienced exercise intensity. Due to the limited active muscle mass, upper-body exercise (e.g., handcycling) may provoke a high subjective intensity at relatively low metabolic rates. Adding more muscle mass to handcycling by electrically activating the paralyzed leg muscles (e.g., hybrid cycling) might increase the metabolic rate while exercising at the same subjective exercise intensity.

Objective:

To compare the metabolic rate during hybrid cycling versus handcycling at equal subjective exercise intensity levels.

Methods:

Eight individuals with an SCI (age 41±12 yrs, TSI 12±10 yrs) performed 5-min bouts of hybrid cycling (Berkelbike, Netherlands) at low (level 3 on a 10-point adapted Borg scale) and high (level 6) subjective intensity while metabolic rate was measured by open-circuit spirometry (Cosmed K4b2, Italy) and heart rate was monitored. Two days later, handcycling bouts were performed at the same subjective intensity. For both modalities, intensity levels were realized by adjusting the power output.

Results:

Hybrid cycling induced higher ($p<0.05$) levels of metabolic rate during low (+18%) and high (+25%) exercise intensity than handcycling. In addition, heart rate (+16%) and oxygen pulse (oxygen uptake per heart beat; +14%) were significantly higher during hybrid cycling at high and low intensity, respectively, indicating a higher training stimulus to the cardiac system. Apparently, subjective intensity is not strictly related to metabolic rate, allowing the individuals to expend more energy while feeling the same.

Conclusion:

Hybrid cycling induces a higher metabolic rate at equal subjective exercise intensity levels, suggesting that this mode of exercise is more suitable for increasing cardiorespiratory fitness and fighting obesity in individuals with SCI.

Keywords: Electrical stimulation, exercise, cardiorespiratory fitness

Tuesday, 29th October 2013

O-040

Hall: D / 14.00 - 15.30

A systematic review and meta-analysis of respiratory muscle training in tetraplegia

David J Berlowitz¹, Jeanette Tamplin²

¹Institute for Breathing and Sleep, Austin Health, Heidelberg, Australia

²Music therapy, Melbourne Conservatorium of Music, University of Melbourne, Australia

Respiratory function is severely comprised following tetraplegia. Various types of respiratory muscle training (RMT) to improve respiratory function for this population have been described, but the interventions vary and sample sizes are small.

Objectives:

To perform a systematic review to determine the efficacy of RMT versus standard care or sham treatments on pulmonary function, dyspnoea, respiratory complications, respiratory muscle strength, and quality of life for people with tetraplegia.

Materials-Methods:

Search methods; We searched MEDLINE, EMBASE, CINAHL, ISI Web of Science, PubMed, the relevant Cochrane and clinical trials registers. We hand-searched reference lists of relevant papers and literature reviews. There was no language restriction. All randomised controlled trials that involved an intervention described as RMT versus control were considered for inclusion. Two reviewers independently selected articles for inclusion, evaluated methodological quality and extracted data. Additional information was sought from the authors when necessary. Results are presented as mean differences (using post-test scores) and 95% confidence intervals.

Results:

Eleven studies with a total of 212 participants were included. The meta-analysis revealed a significant benefit of respiratory muscle training for three outcomes: vital capacity (mean difference [95% confidence interval]= 0.40l [0.12-0.69]), maximal inspiratory pressure (10.69 cm H₂O [3.42-17.57] and maximal expiratory pressure (10.31 cm H₂O [2.80-17.82]). No effect was found for forced expiratory volume in one second or dyspnoea. Quality of life outcomes were not able to be combined for meta-analysis and respiratory complications were only reported in a single study.

Conclusion:

Despite the relatively small number of studies included, meta-analysis reveals that respiratory muscle training is effective for increasing respiratory muscle strength and perhaps also lung volumes for people with tetraplegia. Further research is needed to determine dosage, duration of effect and effect on functional outcomes such as dyspnoea, cough efficacy, respiratory complications, hospital admissions and quality of life.

Keywords: Tetraplegia, respiratory muscle training, lung function

Tuesday, 29th October 2013

O-041

Hall: D / 14.00 - 15.30

Evaluating quickness of upper limb and hand function for patients with cervical spinal cord injury without bone injury using simple test for evaluating hand function

Jun Shinbo, Hiroaki Sameda, Sumio Ikenoue, Kan Takase, Eiko Hashimoto, Takahiro Enomoto, Aya Kanazuka, Masaya Mimura

Orthopedic Department, Funabashi Municipal Medical Center, Japan

Objective:

It has been reported that in assessing tools for evaluating spinal cord injury (SCI) outcomes, further validation studies are required to identify the most appropriate tools for specific targets in a human SCI study. Simple test for evaluating hand function (STEF) is designed to objectively evaluate the speed of carrying objects to an arranged area and inserting sticks into holes or turning over cloths. The aim was to evaluate quickness of upper limb and hand function for patients with cervical spinal cord injury without bone injury (CSCIWBI) using STEF.

Materials-Methods:

23 patients with CSCIWBI were enrolled. Ability of manipulating the objects by the upper limb and hand was assessed using STEF (The maximum score is 100 points.) at each hand at 2, 4, 6, 8, 12, 24 and 24 weeks. Laminoplasty was performed 3 weeks after injury in cases with delayed neurological recovery. At 2 weeks after injury, all the upper arms were categorized based on the treatment and STEF score (border point: 60) into four groups: Conservative-Low STEF group (CL), High STEF group (CH), Operative-Low STEF group (OL) and Operative-High STEF group (OH). The rate of improvement was calculated as the amount of STEF score improvement or deterioration per week. Data analyses were performed using Mann-Whitney U-test.

Results:

The average rate of improvement from 2 to 8 weeks in CL and OL were 5.5 and 6.4 respectively and no statistical difference was found between them. Whereas, the average rate from 8 to 48 weeks in the CL and OL were 0.07 and 0.129 respectively and statistical difference was observed between them.

Conclusion:

STEF could be a useful tool for the evaluation of upper arm function of patients with CSCIWBI. Surgical treatment could have positive impact on the improvement of quickness of upper limb and hand function.

Keywords: Upper limb and hand function, cervical spinal cord injury without bone injury, Simple Test for Evaluating Hand Function (STEF)

Tuesday, 29th October 2013

O-042

Hall: D / 14.00 - 15.30

Assessment of abdominal muscle function in individuals with motor complete spinal cord injury above T6 in response to transcranial magnetic stimulation and voluntary activation

Jordan W Squair¹, Anna Bjerkefors², Tania Lam³, Zhen Chen³, Mark G Carpenter³

¹School of Kinesiology, University of British Columbia, Vancouver, BC, Canada,

²School of Kinesiology, University of British Columbia, Vancouver, BC, Canada, ³International Collaboration of Repair Discoveries, University of British Columbia, Vancouver, BC, Canada, ⁴Department of Neuroscience, Karolinska Institute, Karolinska Institute, Stockholm, Sweden, ⁵The Swedish School of Sport and Health Sciences, Stockholm, Sweden

³School of Kinesiology, University of British Columbia, Vancouver, BC, Canada, ⁴International Collaboration of Repair Discoveries, University of British Columbia, Vancouver, BC, Canada,

Background:

Assessments of the level and completeness of a spinal cord injury do not include motor tests of the trunk muscles, which makes the conclusion about motor connectivity to these muscles uncertain.

Objective:

To assess responses in the abdominal muscles to transcranial magnetic stimulation (TMS) and to measure abdominal muscle activity during different trunk muscle tasks in individuals with motor complete SCI above T6 and to compare these with those of matched able-bodied individuals (AB).

Materials-Methods:

Five individuals with SCI (level ranging from C5 to T3) and five height and gender matched AB volunteered for the study. TMS was delivered bilaterally over primary motor cortex during resting and sub-maximal (or attempted) contractions. Responses in the abdominal muscles and the diaphragm were measured using surface electromyography (EMG). Additionally, maximal voluntary (or attempted) static contractions were performed during three different trunk muscle tasks.

Results:

During voluntary contractions all SCI subjects were able to elicit EMG activity above resting levels (i.e. 2 SD above mean root mean square EMG value) in more than one abdominal muscle across tasks. Responses to TMS in the abdominal muscles occurred in all SCI and AB subjects. Ranges of onset latencies were similar between groups and for all muscles, but peak-to-peak amplitudes were smaller in the SCI group.

Conclusion:

Results indicate that individuals with motor complete high thoracic SCI were able to activate abdominal muscles during voluntary contractions and in response to TMS. Our findings show that the activation was induced directly by activation of the corticospinal pathways, and not induced indirectly by stretch reflex activations of the diaphragm. In conclusion, both TMS measurements and voluntary EMG measurements provide useful, non-invasive methods, to assess motor preservation within abdominal muscles in persons with SCI.

Keywords: Corticospinal pathways, motor cortex, motor evoked potentials

Wednesday, 30th October 2013

O-043

Hall: A / 08.45 - 10.15

Laboratory evaluation of two devices for secretion removal: Acapella versus water bottle

Gabi Mueller¹, Ines Bersch Porada², Sabrina Koch Borner², Anja Raab², Marga Jonker², Franz Michel³, Michael Baumberger³

¹Clinical Trial Unit, Swiss Paraplegic Centre, Nottwil, Switzerland

²Physiotherapy, Swiss Paraplegic Centre, Nottwil, Switzerland

³Clinic, Swiss Paraplegic Centre, Switzerland

Objective:

Secretion removal is a key issue in patients with acute spinal cord injury and known to be most effective at vibration frequencies around 13 Hz and with the greatest amplitudes possible. The Acapella® devices and the water bottle are used for secretion mobilization in daily clinical practice but without detailed knowledge on optimal settings of the devices. The aim of this study was to evaluate three different Acapella® devices and the water bottle at different settings and with various flows to determine the optimal device and settings for effective secretion mobilization.

Materials-Methods:

Three different Acapella® devices (green, blue, choice) were tested at flows of 6, 12, 20, 30, 40 and 50 l/min and at all five settings. The water bottle was filled with 5, 10 or 15 cmH₂O and tested at flows of 3, 6, 10, 12 and 20 l/min. For all devices and combinations of settings, we measured the frequency and amplitude of the vibration as well as the required pressure to generate vibration.

Results:

Setting 4 was optimal for all three Acapella® devices. The water bottle should be filled with 5 cmH₂O and used at a flow of 12 l/min. At these settings, all devices reached vibration frequencies of 13±2 Hz. The required pressures to generate vibrations were between 8 and 11 cmH₂O for the Acapella devices and 5 cmH₂O for the water bottle. The Acapella® devices may be more efficient for secretion mobilization than the water bottle, because they achieve greater amplitudes.

Conclusion:

The Acapella green® device on setting 4 has shown the best oscillatory characteristics for secretion mobilization. Since the water bottle is a very cheap device, it may be an option for secretion mobilization in developing countries.

Keywords: Airway clearance therapy, chest physiotherapy, respiratory secretions

Wednesday, 30th October 2013

O-044

Hall: A / 08.45 - 10.15

Pathways to specialist care for the patient with traumatic spinal cord injury: Analysis of linked health record data

Lisa N Sharwood¹, James W Middleton², Sandra Muecke³, Tracie Reinten Reynolds³

¹Rehabilitation Studies Unit, The University of Sydney, Australia

²State Spinal Cord Injury Service, NSW Agency for Clinical Innovation, Chatswood, Australia

³Ambulance Service NSW, Australia

Objective:

To describe pathways of care for patients sustaining traumatic spinal cord injury (TSCI), investigating factors that predict delayed admission to specialist care.

Materials-Methods:

Retrospective analysis of linked health record dataset from July 2006 to June 2009. Data for all patients transferred by NSW Ambulance Service between July 2006-June 2009 following TSCI and admitted to an Acute Spinal Cord Injury Unit (SCIU) for specialist care were analysed with respect to age, gender, geographic location and mechanism of injury, level and presence of bony injury, neurological impairment, Injury Severity Score (ISS), ambulance and hospital triage and prioritisations, inter-hospital transfers and admissions and length of hospitalisation prior to rehabilitation or discharge.

Results:

The cohort of 203 patients with TSCI comprised 80.3% males with a mean age of 42.7 years (19.5 SD). Falls (44%) and transport-related incidents (41%) were the principal injury mechanisms. Ambulance protocols applied included Trauma (73%), Spinal (62%) and Head Injury (17%), with 63% overall being immobilised with a cervical collar and/or spine board/scoop stretcher. Mortality was 4.9% (n=10). Tetraplegia was more common (57%) than paraplegia, with 40% of all cases having complete lesions. A majority (146; 74%) reached specialist care in SCIU hospitals within 24 hours; with 118 (60%) patients arriving within 12 hours of injury, with 55% of injuries having occurred in metropolitan Sydney. Median times to arrival at first hospital (1.2-1.3 hrs), imaging (1.4-1.5 hrs), and SCIU admission (8.5-9.8 hrs) were similar for those with SCI alone and multi-trauma, although the latter group had much longer maximum delays and on average took considerably longer to commence rehabilitation. Over half (56%) underwent spinal surgery.

Conclusion:

Patients with TSCI and multi-trauma may experience long delays in transfer to definitive care in a specialist SCI unit and be at greater risk of secondary complications and poorer outcomes.

Keywords: Early management pathways, delayed admission, specialised SCI care

Wednesday, 30th October 2013

O-045

Hall: A / 08.45 - 10.15

Changing the paradigm of management of ventilators in spinal cord injured (SCI) patients in Saudi Arabia: Development of a diaphragm pacing (DP) program to improve the quality of life of patients while decreasing the intensive care unit utilization

Sami Alnassar¹, Al Falah Hitham², Mostafa Adel Khair El Din², Mahmood El Kordi², Raymond Onders³

¹College of Medicine, King Saud University, Riyadh, Saudi Arabia

²King Saud Medical City, Riyadh, Saudi Arabia

³University Hospitals Case Medical Center, Case Western Reserve University, Cleveland, United States

Objective:

Review the present state of ventilator dependent SCI patients in Saudi Arabia and outline the development of a complete service for managing these difficult patients. DP can successfully replace mechanical ventilation (MV) in SCI patients with intact phrenic nerves. This leads to an improvement in the quality of life, decreased pneumonias, decreased costs and can help in spinal cord recovery.

Methods:

Collaborative relationships were developed between a functioning DP implant site and sites in Saudi Arabia with MV dependent SCI patients. Present management was reviewed, team identified and initial pilot patients were implanted.

Results:

Saudi Arabia has a large group of MV SCI patients managed hospital ICUs who are unable to receive formal spinal cord rehabilitation. There is very limited home ventilator use. An initial pilot group of 9 SCI patients were implanted with no surgical complications. Seven patients have been completely weaned from the ventilator. Identification of the locations of patients early after their injury has been performed to allow earlier implantation. Development of long term care facility outside of hospital ICUs is ongoing.

Conclusions:

Development of a new program to manage and improve the care of SCI patients with any new technology requires a step wise team program as identified in this report. The first phase is to review the present management. The second phase is to have a small pilot program to see how the technology can be used and train people in the new technology. It is also important to make sure the technology and the results can be duplicated. These first two phases have been completely in Saudi Arabia showing that DP can replace ventilators with good success. The last ongoing phase that is presently being started is to make sure there is funding and personnel to offer the technology to all eligible patients.

Keywords: Ventilators, diaphragm pacing, middle east

Wednesday, 30th October 2013

O-046

Hall: A / 08.45 - 10.15

Changing the paradigm of chronic ventilators in pediatric spinal cord injury: Diaphragm pacing can allow natural ventilation and improve integration into society

Raymond Onders, Maryjo Elmo, Cindy Kaplan

Department of Surgery, University Hospitals Case Medical Center, Case Western Reserve University School of Medicine, Cleveland, United States

Objective:

Diaphragm Pacing (DP) with laparoscopically placed intramuscular electrodes has successfully replaced tracheostomy mechanical ventilation (TMV) in adult spinal cord injured patients and delays ventilators in patients with amyotrophic lateral sclerosis. The incidence of cervical cord injuries is disproportionately high in children with resultant difficulties and expense of TMV.

Methods:

Prospective trial data base of patients implanted under FDA and/or IRB approved was retrospectively analyzed for SCI patients implanted under the age of 18..

Results:

Twelve patients between the ages of 27 months and 17 years were implanted from 2009 to 2013. Eleven patients were under the age of 10. Weights ranged from 14.5Kg to 68Kg. Additionally at operative exploration, two patients had denervated diaphragms and were not implanted. Other abdominal procedures did not limit DP since three patients had ventriculo-peritoneal shunts, one patient had a Baclofen Pump and all the patients had feeding tubes. Time spent on mechanical ventilation ranged from 9 days to 76 months with a 29 month average. No patients had peri-operative or post operative complications. To date, there have been no long term complications. Over 50 % (six) patients achieved full time pacing. Three patients are off the ventilator 12-16 hours daily while the others are still in the conditioning phase. Two patients using PCV required decreases of 25% and 33% in pressure to maintain same tidal volumes after only two weeks of conditioning. One patient, from the neuroplasticity effects of functional electrical stimulation regained full volitional breathing with easy removal of the wires. Scoliosis and hard shell back braces can affect pacing. Parents report improvement in freedom, independence, mobility, and activity with pacing.

Conclusions:

Early DP is the optimal utilization and may help with functional recovery. Diaphragm pacing improves quality of life and can be another option in children dependent on tracheostomy ventilation

Keywords: Diaphragm Pacing, ventilators, pediatric injuries

Wednesday, 30th October 2013

O-047

Hall: B / 08.45 - 10.15

Labor market participation of people with spinal cord injuries in Switzerland: first results from the Swiss Spinal Cord Injury Cohort Study (SwiSCI)

Jan D. Reinhardt, and the SwiSCI Study Group

Swiss Paraplegic Research, Nottwil, Switzerland

Objective:

We aimed to describe labor market participation (LMP) of persons with spinal cord injuries (SCI) in Switzerland; to examine associations of LMP with demographic and injury related factors; and to compare LMP between SCI and general population.

Materials-Methods:

In this cross-sectional observational study, data on LMP from 1216 persons with SCI of working age living in Switzerland were analyzed. We used logistic regression to predict current employment by type, degree, and cause of SCI, gender, current age, years of formal education and time since injury. To account for potential non-linear relationships fractional polynomials were fitted for the continuous predictors.

Results:

53.8% of the participants were employed at the time of the study. Of those not employed 48% had the desire to work and 54% felt able to work for at least up to 12 hours/week. Adjusted odds of being employed were increased for males (OR=2.0, 95% CI: 1.5-2.7), participants with paraplegia (OR=1.9, 95% CI: 1.4-2.5), traumatic SCI (OR=1.5, 95% CI: 1.0-2.2), and those who had been employed at the time of SCI (OR=1.5, 95% CI: 1.1-2.1). Complete injuries decreased the probability of being employed (OR=0.75, 95% CI: 0.6-1.0). The likelihood of being employed showed a concave relationship with current age with a maximum at around age 40. The odds of being employed increased asymptotically with formal education and linearly with time since injury. Net employment rates of men and women were 58% and 44% respectively; both around 30% below those in the general population.

Conclusion:

While the LMP of persons with SCI is comparatively high in Switzerland, the full LMP potential of people with SCI is still not realized. Persons with complete tetraplegia in early old age seem particularly at risk for not being employed.

Keywords: E mployment, labour market participation, determinants

Wednesday, 30th October 2013

O-048

Hall: B / 08.45 - 10.15

Return to work 5 years after discharge from initial inpatient rehabilitation in spinal cord injury: Status and predictors

Astri Ferdiana¹, Marcel W. M. Post², Sonja De Groot², Ute Bültmann¹, Jac J. L. Van Der Klink¹

¹Department of Health Sciences, Community and Occupational Medicine, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands

²Rudolf Magnus Institute of Neuroscience and Center of Excellence for Rehabilitation Medicine, University Medical Center Utrecht and De Hoogstraat, Utrecht, The Netherlands

Objective:

To determine the rate and predictors of return to work (RTW) after spinal cord injury (SCI) and to describe the work situation 5 years after discharge from initial inpatient rehabilitation.

Materials-Methods: Prospective cohort study including 227 patients from 8 SCI rehabilitation centers in the Netherlands. A total of 147 participants completed the 5 year follow-up questionnaire. Work was defined as paid work for either ≥ 1 hour/week or ≥ 12 hours/week. Predictors of RTW were identified using logistic regression analysis with sociodemographic, injury severity, pre-injury occupation, and self-efficacy variables measured at discharge.

Results:

At 5 years, 50.8% of the participants had returned to work for ≥ 1 hour/week and 42.9% had returned to work for ≥ 12 hours/week. Compared to before the injury, more participants worked part-time and had a low physical intensity occupation. Satisfaction with work was high. Forty percent of the participants received RTW support and 80% received disability benefits. In bivariate analysis, secondary education, Functional Independence Measure (FIM) motor-score, and level and physical intensity of pre-injury occupation were significant predictors of RTW ≥ 1 hour/week. In the multivariate logistic regression analysis, a higher FIM motor-score (OR 1.03 [95% CI 1.01 – 1.05]) and lower physical intensity of pre-injury occupation (OR 2.85 [95% CI=1.16 – 7.05]) were independent predictors of RTW at ≥ 1 hour/week. Similar results were obtained using the ≥ 12 hour/week criterion.

Conclusion:

Five years after discharge, only half of the participants had returned to work, mostly on a part-time basis. The majority was still dependent on disability benefit. The results underscore the importance of reaching the patient's highest possible level of functioning in inpatient rehabilitation. Vocational rehabilitation should enhance skills and qualification of those with middle/high physical intensity in their pre-injury occupation to increase their access to suitable jobs post-SCI.

Keywords: Employment, return to work, vocational rehabilitation

Wednesday, 30th October 2013

O-049

Hall: B / 08.45 - 10.15

International survey of perceived barriers to admission and discharge from spinal cord injury rehabilitation units

Peter W New¹, Giorgio Scivoletto², Éimear Smith³, Andrea Townson⁴, Anupam Gupta⁵, Ronald K Reeves⁶, Marcel W.m. Post⁷, Inge Eriks Hoogland⁸, Zaheer A Gill⁹, Maurizio Belci¹⁰

¹Spinal Rehabilitation Unit, Caulfield Hospital, Alfred Health, Victoria, Australia

²Spinal Cord Unit, IRCCS Fondazione S. Lucia, Rome, Italy

³National Rehabilitation & Mater Misericordiae University Hospitals, Dublin, Ireland

⁴GF Strong Rehab Centre, British Columbia, Vancouver, Canada

⁵Neurological Rehabilitation Division, Department of Psychiatric & Neurological Rehabilitation, National Institute of Mental Health & Neurological Sciences, Bangalore, India

⁶Department of Physical Medicine & Rehabilitation, Mayo Clinic College of Medicine, Rochester, Minnesota, USA

⁷Rudolf Magnus Institute of Neuroscience and Center of Excellence in Rehabilitation Medicine, University Medical Center Utrecht and De Hoogstraat, Utrecht, The Netherlands

⁸Swiss Paraplegic Research, Swiss Paraplegic Center, Nottwil, Switzerland

⁹Spinal Rehabilitation Unit, Armed Forces Institute of Rehabilitation Medicine (AFIRM), Rawalpindi, Pakistan

¹⁰National Spinal Injuries Centre, Stoke Mandeville Hospital, Buckinghamshire Healthcare NHS Trust, Aylesbury, UK

Objective:

Little is known about the extent to which patient flow problems occur for patients with spinal cord damage regarding access to spinal rehabilitation units (SRUs) or subsequent barriers to discharge. The objective of this project was to compare perceived barriers to patient flow in 10 SRUs from around the world who manage patients with spinal cord damage from any cause (i.e. traumatic and non-traumatic).

Methods:

Survey completed between December 2010 and February 2013 regarding perception of barriers for admission into and discharge from SRUs in Australia, Canada, India, Ireland, Italy, Netherlands, Pakistan, Switzerland, United Kingdom, and USA. Opinion also asked regarding the utility of data on the timeliness of access to SRUs and discharge barriers for benchmarking and quality improvement purposes.

Results:

The perceived barriers in accessing SRUs ranged from no access problem to a severe access problem (no access problems n=3; minor access problems n=3; moderate access problems n=2; severe access problem n=2). Most units (n=9/10) agreed that collecting data on timeliness of access to SRUs for acute hospital patients may help improve patient outcomes and health system processes by providing information for benchmarking and quality improvement purposes. All units reported perceived barriers to discharge from SRUs. Compared to admission barriers, a much greater perception of barriers to discharge was reported (minor problem n=2; moderate problem n=4; severe problem n=4). All units agreed that collecting data on barriers to discharge from SRU may help improve patient outcomes and system processes.

Conclusion:

Perceived barriers to patient flow in SRUs are reported in many countries. Projects to identify and minimize the occurrence and impact of admission and discharge barriers could increase access to rehabilitation and improve the rehabilitation outcomes for patients.

Keywords: Spinal cord diseases; health services accessibility; patient discharge

Wednesday, 30th October 2013

O-050

Hall: B / 08.45 - 10.15

The use of healthcare services during pregnancy, childbirth and childbed by women with SCI - A qualitative study

Bertschy Sue¹, Geyh Szilvia¹, Pannek Juergen²

¹Swiss Paraplegic Research, Nottwil, Switzerland; University of Lucerne, Department of Health Sciences and Policy, Lucerne, Switzerland

²Swiss Paraplegic Center, Nottwil, Switzerland

Introduction:

Women after a spinal cord injury (SCI), who decide to get pregnant and to become mothers, have special healthcare service needs. The proposed study aims to examine what are the met and unmet needs of the women? What are the barriers and facilitators of access for using healthcare services? In what respect can the provision of healthcare services be enhanced?

Methods:

A descriptive-explorative qualitative study using focus groups and individual interviews was conducted. 13 mothers with SCI who gave birth after the injury within the past 15 years participated. Interview transcripts were analyzed using qualitative content analyses.

Results:

In our study the SCI mothers used during pregnancy and labor available regional facilities (e.g. gynecology practice, birth hospital and childbirth classes).

The mothers named a wide variety of factors which may influence healthcare service use, e.g. body awareness and self-efficacy, or knowledge of obstetrician about SCI complications, e.g. recurrent urinary tract infections, constipation, spasticity or autonomic dysreflexia. Other possible influencing factors for service use were, e.g. the patient-doctor relationship or the trust in the competence of the provider. Suggestions by the women to enhance services included, e.g. a hotline for medical advice.

Conclusion:

The results suggest that healthcare services geared towards women with SCI who are pregnant could be enhanced in Switzerland. Access barriers resulted from the complexities of medical knowledge, difficulties accessing information on available services, and a lack of experienced healthcare providers.

Keywords: Healthcare services, pregnancy, SCI

Wednesday, 30th October 2013

O-051

Hall: B / 08.45 - 10.15

From theory to architecture of eHealth communication in the field of spinal cord injury: The online platform 'PARAFORUM' as a case in point

Sara Rubinelli¹, Mirjam Brach¹, Andrea Glässer², Fabian Diesner², Gerold Stucki¹

¹Department of Health Sciences and Health Policy, University of Lucerne and Swiss Paraplegic Research, Lucerne and Nottwil, Switzerland

²Swiss Paraplegic Research, Nottwil, Switzerland

Objective:

eHealth communication – that mediated by the internet or other digital media - is nowadays promoted as a key-channel to enhance self-management of health conditions and impairments. This paper addresses the challenges of enhancing self-management skills of persons with spinal cord injury through online platforms, and illustrates them by explaining the design of the platform called 'PARAFORUM'. PARAFORUM is an innovative internet-based platform that enables discussion and sharing among the main spinal cord injury stakeholders. The platform will be launched by the Swiss Paraplegic Foundation in Fall 2013.

Materials-Methods:

The analysis presented is grounded on, first, a critical review of the literature on eHealth communication with a specific focus on spinal cord injury, second, a content-analysis of the main online platforms targeted to spinal cord injury and, third, the design of PARAFORUM.

Results:

By using PARAFORUM as a case in point in the context of self-management skills in spinal cord injury, this paper, first, introduces the limitations of traditional online platforms that mainly provide information to users in comparison to online platforms that support diversified interactive exchange among users. Second, it presents evidence on how interactive platforms can promote the growth of users' self-management skills in spinal cord injury through the mediation of their health literacy. Third, it explains the difficulties linked to the management of these interactive platforms from an institutional and organizational point of view.

Conclusion:

Despite the echo on eHealth communication, there is little evidence on how to build online platforms to empower users in the management of health conditions and impairments. By bringing together evidence from eHealth communication and consumer-oriented technology, this paper identifies criteria for best practices in the field of spinal cord injury.

Keywords: eHealth communication, internet, self-management of spinal cord injury

Wednesday, 30th October 2013

O-052

Hall: B / 08.45 - 10.15

Shoulder pain and limitations in shoulder range of motion in persons with SCI at discharge from inpatient rehabilitation: Correlations with limitations in activities and participation 5 years after discharge

Inge Eriks Hoogland¹, Sonja De Groot², Govert Snoel³, Gerold Stucki⁴, Marcel Post⁵, Luc Van Der Woude⁶

¹Swiss Paraplegic Research and Swiss Paraplegic Centre, Nottwil, Switzerland

²Rehabilitation center Reade, Amsterdam and Center for Human Movement Sciences, University of Groningen, University Medical Center Groningen, The Netherlands

³Rehabilitation Center Het Roessingh, Enschede, The Netherlands

⁴Swiss Paraplegic Research and Department of Health Sciences and Health Policy, University of Lucerne and SPF, Lucerne, Switzerland

⁵Swiss Paraplegic research, Nottwil, Switzerland and Rudolf Magnus Institute for Neuroscience and Center of Excellence in Rehabilitation Medicine, University Medical Center Utrecht and Rehabilitation Center De Hoogstraat Utrecht, the Netherlands

⁶Center for Human Movement Sciences, University of Groningen, Groningen, the Netherlands and Center for Rehabilitation, University Medical Center Groningen, Groningen, the Netherlands

Objective:

To examine the relationship of musculoskeletal shoulder pain and limitations in shoulder range of motion (ROM) at discharge from first rehabilitation with activities and participation five years later in persons with spinal cord injury (SCI).

Method:

Prospective study with measurement of shoulder pain and shoulder range of motion (ROM) at discharge from inpatient rehabilitation and activity scores (Maximal exercise performance (POpeak), performance time of Wheelchair skills test (WST), Functional Independence Measure (FIM) Motor score and Transfers scale score and participation (Physical activity Scale for persons with a Disability (PASIPD), Social sub-score of the Sickness Impact Profile 68 (SIPSOC) and employment status 5 years later. Possible confounders, age, gender, time since injury (TSI), level of lesion, completeness of the lesion and body mass index were included in the multivariate regression analyses.

Results:

138 persons were included with a mean age of 39 years and a mean TSI of 311 (SD 149 days) days at discharge; 72% were male, 32 % were tetraplegic, and 65% suffered a motor complete SCI. At discharge 32% of the persons had a limited shoulder ROM, while 39% suffered from shoulder pain.

Shoulder ROM, but not shoulder pain, was associated with lower ability to make an independent transfer, lower FIM motor score lower likelihood to return to work. No significant associations were found with POpeak, performance of time of WST, SIPSOC, and the PASIPD.

Conclusion:

The presence of limitations in shoulder ROM, but not shoulder pain at discharge is associated with limitations in activities and employment 5 years later.

Keywords: Shoulder, outcomes, longitudinal

Wednesday, 30th October 2013

O-053

Hall: B / 10.35 - 12.05

Walking in water and on land after an incomplete spinal cord injury

Federica Tamburella¹, Giorgio Scivoletto¹, Elena Cosentino², Marco Molinari¹

¹Clinical Movement Analysis and Research Laboratory Fondazione S. Lucia I.R.C.C.S., Italy

²IRCCS S. Camillo, Venice, Italy

Objective:

Although no data are available on the effects of water environment on the gait of spinal cord injury (SCI) subjects, hydrotherapy is often used in the rehabilitation protocols of SCI patients. The aim of this matched case-control study is to characterize gait features of incomplete SCI subjects walking in water and on land in comparison to healthy subjects (CTRL), in order to identify the specificity of water environment on influencing gait in SCI subjects.

Materials-Methods:

15 CTRL and 15 subjects with incomplete SCI, both traumatic and non-traumatic lesions, level D at ASIA Impairment Scale and able to walk at least 3 meters without aids between parallel bars, were enrolled (7 females - 8 males; 7 had cervical injuries and 8 had thoracic or lumbar lesions). Kinematic gait parameters and joint angles range of motion (ROM) were analyzed on land and in a water environment at a self-selected walking speed, by means a two dimensional commercial motion system. For underwater recordings water level was set at the xiphoid process level.

Results:

Compared to on land data, SCI patients' gait in water was characterized by speed and stance phase reduction, gait cycle time increment and invariance of stride length and ROM values. Comparison with CTRL data remarked that, walking in water reduces gait differences between groups. Furthermore in water SCI subjects presented a reduction in hip and knee joint angles' variability, while in controls, a larger variability was observed.

Conclusion:

SCI subjects' gait in water is associated with kinematic parameters more similar to those of CTRL, particularly regarding speed, stride length and stance phase, supporting the idea that walking in a water environment may be of rehabilitative significance for SCI subjects.

Keywords: Spinal cord injury, water, gait rehabilitation

Wednesday, 30th October 2013

O-054

Hall: B / 10.35 - 12.05

Distinction between spinal and supraspinal control of walking in human incomplete spinal cord injury

Lea Awai, Marc Bolliger, Armin Curt

Spinal Cord Injury Center, Balgrist University Hospital, University of Zurich, Switzerland

Objective:

This study aimed at revealing the amount of influence of supraspinal and spinal motor centers on different gait measures (time-distance and pattern quality) in patients recovering from spinal cord injury (SCI). Walking capacity is abundantly evaluated in clinical trials using time-distance parameters, which scale impairment or monitor improvement over time. However, the mechanisms behind altered time-distance measures and the amount of supraspinal and spinal neural control remain unknown.

Materials-Methods:

Gait pattern and walking capacity of 22 sensory-motor incomplete SCI (iSCI) patients and 21 control subjects were analyzed using a 3-D infrared motion-capture system. Locomotion was studied at various defined walking speeds on a treadmill and over ground.

Results:

Patients demonstrated severe limitations in walking speeds. They were especially restricted in increasing their walking speed beyond preferred speed. Yet, they could control step length and cadence according to walking speed similar to control subjects. However, hip-knee interjoint coordination was distinctly altered in patients and provided information upon which patients could be classified into 4 categories of impairment. The shape of the hip-knee cyclogram and its cycle-to-cycle consistency normalized with increasing speed in healthy controls while remaining diminished in iSCI patients. Indirect measures for remaining supraspinal drive expressed as lower extremity motor score and angular velocity at toe-off were good predictors for speed and gait pattern but less related to range of motion (ROM).

Conclusion:

The ambulatory capacity of iSCI patients is composed of locomotor performance (time-distance measures) and locomotor quality (gait pattern), which provide information on neural control of locomotion and recovery mechanisms. Although clearly pathological, patients are able to reproduce their gait pattern to achieve a certain economization. The diminished susceptibility of the pattern to supraspinal input (e.g. voluntary changes of speed and muscle force) suggests predominant spinal neural control while time-distance measures more strongly rely on supraspinal control.

Keywords: Incomplete spinal cord injury, gait pattern, neural control

Wednesday, 30th October 2013

O-055

Hall: B / 10.35 - 12.05

Clinical testing of safety and feasibility of the Ekso™ exoskeleton robot for walking in patients with a spinal cord injury

Arve Opheim¹, Ole Christian Andersen², Trygve Danielsen², Thomas Glott², Sandra Linnea Hansen², Gyri Ingebretsen², Anna Beth Nettelund², Grethe Manum²

¹Sunnaas Rehabilitation Hospital, Nesoddtangen, Norway; Rehabilitation Medicine, University of Gothenburg, Gothenburg, Sweden

²Sunnaas Rehabilitation Hospital, Nesoddtangen, Norway

Standing position may bring positive health gains for persons with spinal cord injuries (SCI), such as improved circulation. The Ekso™ is a computer controlled, rigid exoskeleton robot with motorized hip and knee, and spring-based ankle joints. The Ekso™ can assist a paralytic person with spinal cord injury and good arm function to stand up, walk forward with a walking frame or crutches and sit down again.

Objective:

To assess the safety and feasibility of training with the Ekso™ for persons with different levels and severities of SCI, and to measure physiological variables during the training.

Materials-Methods:

Single subject design. Four physiotherapists have been certified for training of patients with Ekso™, and will carry out the training. Recruitment of potential eligible patients at the SCI unit started in March 2013. We aim to include at least ten patients. Outcome variables: The time standing and walking, the mode of walking, on-off times, the level of assistance during walking, pain, spasticity and perceived exertion. Adverse events such as pressure marks, wounds, dizziness, falls and fractures will be registered, as well the experiences of both patients and therapists. Energy expenditure during walking will be assessed in some of the patients.

Results:

Preliminary results from the first patients indicate an increased walking and standing time during the training period. The patients experience the training as fairly easy, and give positive feed-back about the experiences of the training. No adverse events or medical issues like falls, dizziness, or pressure marks have occurred so far. Complete results will be presented at the conference.

Conclusion:

Preliminary results and experience from certification training indicate that Ekso™ is a safe and feasible training tool for patients with SCI, but a final conclusion of the study is yet to early to present, but will be presented at the conference.

Keywords: Robotics, spinal cord injuries, walking

Wednesday, 30th October 2013

O-056

Hall: B / 10.35 - 12.05

Effect of non-invasive brain stimulation on motor and gait improvement using electromechanical system in incomplete spinal cord injury

Hatice Kumru, Cecilia Flores, Narda Murillo, Jesus Benito, Jm Tormos, Joan Vidal

Institut Guttmann, Institut Universitari de Neurorehabilitació adscrit a la UAB, 08916 Badalona – Barcelona, Spain and Univ Autònoma de Barcelona, 08193 Bellaterra (Cerdanyola del Vallès), Spain

Objective:

Incomplete spinal cord injury (SCI) patients have the potential to regain some ambulatory function and optimal reorganization of remaining circuits can contribute to this recovery. We hypothesized that non-invasive brain stimulation (repetitive transcranial magnetic stimulation (rTMS) or tDCS) may promote more active recovery of motor function using electromechanical system.

Methods:

Thirty-two incomplete SCI patients were randomized to receive active rTMS or sham stimulation coupled with rehabilitation therapy, when patients began gait training using electromechanical system. Active rTMS (at 20 Hz) or anodal tDCS consisted of 20 daily sessions over the leg motor area. We compared lower extremity motor score (LEMS), ten meter walking test (10MWT) for walking speed, timed up and go (TUG), Walking Index for SCI (WISCI II) scale and Modified Ashworth Scale (MAS) at baseline, after the last session and 4 weeks later, in the active rTMS, anodal tDCS and sham stimulation groups.

Results:

A significant improvement was observed after last rTMS session in the active group for LEMS and spasticity, but not for gait scales. Anodal tDCS, neither sham stimulation, did not induce any improvement in LEMS, gait assessment, neither in spasticity after last session.

Conclusion:

Twenty daily sessions of high-frequency rTMS can improve motor score and spasticity, but not walking speed in the lower limbs in incomplete SCI, but not anodal tDCS, neither sham stimulation. The study provides evidence for the therapeutic potential of rTMS in the lower extremities in the early phase SCI rehabilitation.

Keywords: Non-invasive brain stimulation, incomplete SCI; gait training with electromechanical system

Wednesday, 30th October 2013

O-057

Hall: B / 10.35 - 12.05

Feasibility of a BCI-FES non-invasive system for the restoration of the upper limb in tetraplegic persons

Emiliana Bizzarini¹, Giuliana De Maio¹, Matteo Lostuzzo², Sandro Scagnetto¹, Sara Meretto¹, Alberto Avon², Luca Chittaro², Agostino Zampa¹

¹Department of Rehabilitation Medicine, IMFR - Udine, Italy

²Department of Mathematics and Computer Science, University of Udine - Udine, Italy

Objective:

The aim of the study was to test the feasibility of a Brain Computer Interface (BCI) non-invasive system to allow complete spinal cord injured (SCI) persons to control the movement of grasping induced by Functional Electrical Stimulation (FES). We used imagination of the hand movements as BCI paradigm. Physiological signals were recorded by surface electroencephalography (EEG) on the motor area and, through automatic recognition of brain activity patterns as event-related desynchronization-synchronization, commands were issued to a functional electrostimulator.

Methods:

Participants: 3 SCI patients with a neurologic level C4-C5, age 47.33±18.90 years, Asia Impairment Scale A.

Material:

Electroencephalograph Micromed S.p.A. with System Plus Evolution software and eight electrodes, a modified version of BCI 2000 software, a USB-driven actuator, a Stiwell Med4 Electrostimulator.

We tested the feasibility of the BCI-FES integrated system through a hand dynamometer TSD121C BIOPAC System to measure the strength in grasp, a Data Glove 5DT Ultra to measure the range of motion of every finger during grasp and the test Box and Block to evaluate the coordination and hand ability.

Results:

At the end of the training we measured a mean value of force for the grasp of 49.42±5.85 Newton while using the BCI-FES system, a range of motion (ROM) for all the fingers during grasping reaching a mean value of 35.71±25.15% of the maximal ROM and a score at the Box and Block test of 7±7.21.

Conclusion:

We believe that new BCI technologies could have a role in the rehabilitation of the upper limb in tetraplegic persons, in particular during the intensive rehabilitation phase as they can be responsible for the preservation of the motor patterns and in the promotion of good cortical plasticity. The study should be extended to a larger sample in order to assess the statistical significance of the results we obtained.

Keywords: SCI, BCI, FES training

Wednesday, 30th October 2013

O-058

Hall: B / 10.35 - 12.05

Study on the motor control function in the patients with chronic spinal cord injury with fMRI

Feng Gao¹, Jianjun Li¹, Chetwyn Chan², Hongyu Chu³, Mingliang Yang¹, Liangjie Du¹

¹Department of Spinal and Neural Functional Reconstruction, China Rehabilitation Research Center, Beijing, China

²Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hong Kong, China

³Faculty of Rehabilitation Medicine, Capital Medical University, Beijing, China

Objective:

This study is to investigate the differences on the modulation of motor control between the normal subjects and the chronic spinal cord injury (SCI) patients.

Materials-Methods:

Nine normal subjects and eight patients with chronic SCI (more than 1 year after injury) matched by education level, age and gender, were recruited in China Rehabilitation Research Center. Functional MRI images were collected when they were conducting the repetitive movement imagery task, which was the repetitive alternative movement of hand tapping.

Results:

There were significant differences in the BOLD responses in basal ganglia (putamen, striatum), lateral cerebellum, dentate nucleus, superior parietal cortex, dorsolateral prefrontal cortex, supplementary motor area, pre-supplementary motor area and premotor area in the contrast between the chronic SCI group and healthy group. These varieties relied not only on the locations activated, also on the intensities activated during the retrieval process involving in motor control.

Conclusion:

Lack of active movements and sensory feedback would affect the process of motor preparation which taps on the retrieval of motor program during motor control in individuals with SCI. Those functional changes were significant not only to explore new rehabilitation strategy for SCI patients, such as the utilization of motor imagery in the SCI rehabilitation, but also to implement the compensation strategy for SCI patients, such as the utilization of brain-computer interface, in which the drawing of the signal of brain motor control played important role.

Keywords: Spinal cord injury, motor control, fMRI

Tuesday, 29th October 2013

O-059

Hall: B / 10.40 - 12.40

Quality of life outcomes following a depression trial

Denise Galluf Tate¹, Marty Forchheimer¹, Charles Bombardier², Jesse Fann², Allen Heinemann³

¹University of Michigan, USA

²University of Washington, USA

³Rehabilitation Institute of Chicago, USA

Objective:

To examine the impact of a treatment for major depression disorder following spinal cord injury on quality of life outcomes.

Materials-Methods:

A 12 week, multisite, randomized, double blind placebo controlled trial (Project to Improve Symptoms and Mood after SCI, PRISMS) treatment using an antidepressant medication (Venlafaxine XR) was conducted for improving mood and pain among persons with SCI. Participants were at least one month post-SCI and diagnosed with major depression disorder (MDD) or dysthymia. Depression was measured using the HAM-D and the PHQ-9. Quality of life was assessed using the SF-12 Health Status questionnaire and the SWLS (Satisfaction With Life Scale). From a global perspective, the effects of disability on one's life was assessed using the Sheehan Disability Scale. Pain was assessed using the SCIPI, a newly developed measure for neuropathic and non-neuropathic pain. All measures were used pre and post-trial.

Results:

Six sites screened 2536 people and 133 were randomized to treatment versus control. Subjects were 74% males, on average 40 years old and 11 years post-injury and 53% were classified as ASIA A. No significant findings were found with respect to changes in mood. Trends were observed when using PHQ scores reduction of 25% or more during week 3 ($p < .08$) with treatment group showing less depression. Quality of life related to health and satisfaction did not show any differences. However, when assessing treatment impact on different aspects of their lives including work, social and family life, subjects in the treatment group reported less interference ($p < .008$) following the antidepressant treatment. Significant treatment results were also found for non-neuropathic pain.

Conclusion:

Quality of life includes key aspects of life beyond health and overall satisfaction. As such, it is an important outcome when considering the effects of treatment for depression following SCI.

Keywords: Quality of life, depression, antidepressants

Wednesday, 30th October 2013

O-060

Hall: B / 15.20 - 16.50

Validity of the ISCoS International Quality of Life Data Set

Marcel W Post¹, Jacinthe J Adriaansen¹, Susan Charlifue², Floris W Van Asbeck³

¹Rudolf Magnus Institute of Neuroscience and Center of Excellence in Rehabilitation Medicine, University Medical Center Utrecht and De Hoogstraat, Utrecht, the Netherlands

²Craig Hospital, Englewood CO, USA

³Spinal Cord Injury Department, De Hoogstraat, Utrecht, the Netherlands

Objective:

To examine the construct and concurrent validity of the ISCoS International Quality of Life(QOL) Data Set.

Materials-Methods:

Cross-sectional study. Included were persons who obtained their SCI between 18 and 35 years of age, who were at least 10 years post-SCI, and who were wheelchair-user in daily life. They completed an on-line questionnaire including the QoL Data Set as part of the ALLRISC study. The QOL Data Set consists of three items on satisfaction with life as a whole, satisfaction with physical health and satisfaction with psychological health. Each item is answered on a 0-10 point Numerical Rating Scale. Reference measures were the Mental Health Inventory (MHI-5) and items of the WHOQOL-BREF.

Results:

Data of 169 participants were available. Mean time after SCI was 25 years (range 10-47), 89% had a traumatic SCI, 80% a motor complete SCI and 44% tetraplegia. Mean age was 48.6 years (SD 9.2), 68.6% were male, 58.6% were in a stable relationship and 40.8% had paid work.

Mean scores were 6.8 (SD 1.9) for overall QOL, 5.8 (SD 2.1) for physical QOL and 7.0 (SD 2.0) for psychological QOL. No floor- or ceiling effects were found. Strong inter-correlations (0.51-0.72) were found between the items, and together the three items make a reliable scale (Cronbach's alpha 0.81). The correlations with the reference measures showed the expected pattern. The WHOQOL item on general satisfaction was strongest associated with the life as a whole item (0.59 versus 0.46 and 0.48). The WHOQOL health item was strongest associated with the physical health item (0.70 versus 0.38 and 0.40). The MHI-5 score was strongest associated with the psychological health score (0.72 versus 0.56 and 0.41).

Conclusion:

The ISCoS International Quality of Life Data Set appears valid in Dutch persons with SCI. Validation in other countries and cultures is recommended.

Keywords: Quality of life, validation study, psychometrics

Wednesday, 30th October 2013

O-061

Hall: B / 15.20 - 16.50

The impact of age on functional outcome in patients with spinal cord lesion

Giorgio Scivoletto¹, Mariella Pazzaglia², Letizia Laurenza¹, Federica Tamburella³, Marco Molinari¹

¹Spinal Cord Unit, IRCCS Fondazione S. Lucia, Roma, Italy

²Department of Psychology, Sapienza University of Rome, Rome, Italy

³Clinical and Research Movement Analysis (CaRMA) Lab, Rome, Italy

Objective:

The incidence of spinal cord injury and the demand for rehabilitation services continue to rise. To date, there are no systematic data available that evaluate the effect of age on the clinical neurological outcome after SCI.

Materials-Methods:

We analysed data sets of 600 patients classified either as tetraplegics or paraplegics, complete or incomplete, in each of four age cohorts (<30; 30-40; 40-50; >50). Functional outcome was evaluated by the Barthel Index, the Rivermead Mobility Index, the Walking Index for Spinal Cord Injury. Data analyses included regression models adjusted for the severity of SCI (ASIA impairment).

Results:

In complete and incomplete paraplegics, but not in tetraplegics, age has a significant effect on functional outcome when it is measured as a Barthel Index score and Rivermead Mobility Index score at discharge. There was a greater degree of improvement in younger patients (age groups: <30; 30-40) than in older individuals (age groups 50-60, >60) independent of functional status at admission and medical problems.

Conclusion:

In patients with lower spinal cord injuries who retained upper body movement, age had a greater impact on functional outcome than was the case for those who had spinal cord impairments in the entire body. The impact on young paraplegics may be important when it comes to identifying different forms of rehabilitation treatment on the basis of age.

Keywords: Spinal cord injury; age; functional outcomes

Wednesday, 30th October 2013

O-062

Hall: B / 15.20 - 16.50

Implications of using standardised versus non-standardised outcome measures in the rehabilitation of persons with spinal cord injury: A quality assurance issue

Conran Joseph¹, Julie Phillips², Kerstin Wahman³, Lena Nilsson Wikmar¹

¹Department of Neurobiology, Care Sciences and Society, Division of Physiotherapy, Karolinska Institutet, Stockholm, Sweden

²Department of Physiotherapy, University of the Western Cape, Cape Town, South Africa

³Department of Neurobiology, Care Sciences and Society, Division of Neurodegeneration, Section Neurorehabilitation, Karolinska Institutet, Stockholm, Sweden; Rehab Station Stockholm/Spinalis R&D Unit, Stockholm, Sweden

Objective:

In order to ensure quality health care, outcome measures and diagnostic equipment should be reliable, let alone valid and sensitive to change. The objectives of this paper are to validate the concepts contained in the Spinal Cord Independence Measure III as the standardised outcome measure (SOM) and the rehabilitation outcome levels as the non-standardised measure (NSOM) to the categories of the International Classification of Functioning, Disability and Health (ICF), and to evaluate the consistency of responses where similar concepts of functioning were measured.

Methods:

Two examiners performed the mapping of concepts contained in each outcome measure to the categories of the ICF, and subsequently reliability coefficients were computed for the responses from both examiners. Also, responses from participants to both outcome measures were collated from either an interviewed administered data collection procedure or from the medical records of the patients. The data from the cohort were collected on admission to the in-patient rehabilitation centre and at discharge.

Results:

All concepts of the standardised outcome measure were linked to the ICF, whereas certain items of the non-standardised outcome measure could not be linked. The inter-rater reliability was also substantial between the examiners for the SOM with poor reliability coefficients for the NSOM. Where similar concepts of functioning were observed between the two measures, discrepancies were found in the responses to those items as measured in 76 patients with spinal cord injury. A difference of 70% was found between the responses related to stair management in both outcome measures.

Conclusion:

The use of a NSOM, with poorly defined concepts, some invalidated items and low reliability could result in undesirable variation when different health professionals perform patient evaluations, and could subsequently result in suboptimal planning of rehabilitation services of patients along the disease progress.

Keywords: Rehabilitation, ICF, outcome measures

Wednesday, 30th October 2013

O-064

Hall: B / 15.20 - 16.50

Outcomes of neurogenic bowel management in individuals with a spinal cord injury existing at least ten years

Jacinte Adriaansen¹, Floris Van Asbeck², Dirk Van Kuppevelt³, Govert Snoek⁴, Marcel Post¹

¹Rudolf Magnus Institute of Neuroscience; Center of Excellence for Rehabilitation Medicine Utrecht; University Medical Center Utrecht; De Hoogstraat Rehabilitation, Utrecht, the Netherlands

²De Hoogstraat Rehabilitation, Utrecht, the Netherlands

³Rehabilitation Centre Sint Maartenskliniek, Nijmegen, the Netherlands

⁴Rehabilitation Centre Het Roessingh, Enschede, the Netherlands

Objective:

To describe bowel management in individuals with a spinal cord injury (SCI) existing at least ten years, who live in the Netherlands and to examine associations between demographic and injury-related characteristics and bowel management, bowel problems and satisfaction.

Methods:

Cross-sectional multicentre study. Wheelchair-dependent persons with a SCI existing at least 10 years were invited for a check-up by the local rehabilitation physician at one of the eight participating rehabilitation centres. The International SCI Bowel Function Basic Data Set was used to gather information on bowel function and bowel management. Two weeks prior to this visit participants completed a questionnaire including the Neurogenic Bowel Dysfunction (NBD) Score.

Results:

Data of the first 100 participants (mean time since injury: 25 years) showed that 8% used no interventions at all. Seventy percent used one or more conservative methods: straining/bearing down to empty (9%), digital ano-rectal stimulation (11%), digital evacuation (37%), suppositories (20%), mini-enema (26%), enema (2%), other (7%). Twenty-two percent used a non-conservative Method: trans-anal irrigation (11%), colostomy (6%), ileostomy (3%) or sacral anterior root stimulation (2%). A combination of methods was used by 42% of the participants. Oral laxatives were used by 38% of the participants. The most common reported problems were haemorrhoids (37%) and constipation (21%). A higher NBD-score was significantly associated with digital ano-rectal stimulation, digital evacuation and the use of suppositories. Sixteen percent was dissatisfied with their bowel management, all of whom used a conservative method. Dissatisfaction was significantly associated with younger age, more frequent episodes of incontinence and a higher NBD-score.

Conclusion:

Few participants were dissatisfied with their bowel management, but it was remarkable that all of them used a conservative method. Hence, we may have to be less reluctant with discussing the option of a non-conservative method in case of problems with using conservative methods.

Keywords: Bowel management, long-term care



POSTER ABSTRACTS

P-001

Temporal and spatial evaluation of the DNA damage, apoptotic cell death and morphological injury in an experimental acute spinal cord contusion model

Selim Ayhan¹, Gokhan Bozkurt², Atilla Akbay², Ayse Ayhan³

¹Department of Neurosurgery, Malatya State Hospital, Malatya, Turkey; Department of Neurosurgery, Hacettepe University School of Medicine, Ankara, Turkey

²Department of Neurosurgery, Hacettepe University School of Medicine, Ankara, Turkey

³Department of Pathology, Seirei Mikatahara Hospital, Hamamatsu, Japan

Objective:

To evaluate DNA damage, apoptotic cell death and mapping the intensity and the distribution of morphological injury in a moderate-severe acute spinal cord contusion model by means of histopathology and ssDNA alterations.

Materials-Methods:

35 Wistar male rats were divided into trauma (n=30) and sham (n=5) operation groups. A 50gr/cm weight drop method was used to perform spinal cord injury (SCI). Rats were sacrificed 1, 6, 24, 48, 72 and 168 hours after injury, and 0.5cm-spinal cord segments were examined within and around the lesion cranially and caudally up to a total of 2.5cm. These segments were evaluated for neuronal and glial damage by Hematoxylin and Eosin (HE) and immunohistochemical studies using anti-ssDNA antibody to evaluate both DNA damage index and apoptotic counts. The final results were mapped in order to better visualize the extent, intensity and the distribution for all the parameters examined.

Results:

Central zone underwent necrosis one hour after injury. Not only apoptotic cell number and DNA damage index increased with time ($p < 0.001$), but there was also a specific spatial alterations among different segments ($p < 0.001$). Mapping the apoptotic cells or the DNA damage clearly revealed the severity and the intensity of the injury by means of primary and secondary damage.

Conclusion:

The DNA damage and apoptotic cell count increased by time and were well correlated with morphological findings in traumatic SCI. DNA damage can easily be elucidated by means of ssDNA immunostaining; and apoptosis starting from its earliest phases can be evaluated thoroughly. Our study is one of the first in the literature to map the DNA damage and the apoptotic cells in SCI by means of this convenient, easy and reproducible technique.

Keywords: Acute spinal cord injury, apoptosis, ssDNA

P-002

Short-term recovery of interlimb coordination during locomotion in incomplete spinal cord injury rats after less invasive neuromuscular electrical stimulation therapy

Tsukasa Kanchiku, Hidenori Suzuki, Yasuaki Imajo, Yuichiro Yoshida, Toshihiko Taguchi

Department of Orthopedic Surgery, Yamaguchi University Graduate School of Medicine, Ube, Japan

Objective:

Combination therapy is essential for functional repairs of the spinal cord. Rehabilitative therapy can be considered as the key for reorganizing the nervous system after spinal cord regeneration therapy. Functional electrical stimulation has previously been used as a neuroprosthesis for quadriplegics and can be used for providing rehabilitative therapy to tap into central nervous system reorganization after spinal cord regeneration therapy. We have developed a less invasive rodent model of neuromuscular electrical stimulation (NMES) capable of being combined with spinal cord regeneration therapy. The objective of this study was to evaluate its ability to promote recovery of interlimb coordination during locomotion.

Materials-Methods:

Ten fisher rats (12 weeks after birth, weight: 160-175g) received an incomplete thoracic spinal cord contusion injury (T9, 150kD Infinite Horizon impactor) and were assigned to one of two groups: those receiving the motor therapy using NMES (iSCINMES, n=5) or those receiving no training (iSCINT, n=5). Five intact animals served as normal controls. Seven days post-injury, animals of iSCINMES group received the ankle repetitive movement NMES therapy for 15 min/day for 3 days, via needle electrodes inserted percutaneously into bilateral ankle flexors and extensors. Motor function was evaluated using the BBB locomotor scale for the first 6 days and on 14th day post injury. 3D kinematic analysis of treadmill walking was performed on day 14 post-injury.

Results:

Rats receiving NMES therapy exhibited improved interlimb coordination. Symmetry indices improved significantly in the iSCINMES group.

Conclusion:

The results suggested that NMES therapy could provide an effective therapeutic tool for motor therapy following iSCI. Future work will utilize this model to investigate the underlying mechanisms of functional neuromuscular stimulation therapy to promote recovery and plasticity and the efficacy of a combination treatment with spinal cord regeneration therapy after spinal cord injury in rodents.

Keywords: Spinal cord injury, rehabilitation, neuromuscular electrical stimulation

P-003

Alpha9 integrin activation in neurite outgrowth and axon regeneration

Menghon Cheah¹, Melissa Andrews², Joost Verhaagen³, Reinhard Fässler⁴, Andreas Faissner⁵, James Fawcett¹

¹John van Geest Centre for Brain Repair, University of Cambridge, Cambridge CB2 0PY, United Kingdom

²School of Medicine, University of St Andrews, North Haugh, St Andrews KY16 9TF, United Kingdom

³Netherlands Institute for Neuroscience, 1105 BA, Amsterdam, Netherlands.

⁴Department of Molecular Medicine, Max Planck Institute of Biochemistry, 82152 Martinsried, Germany

⁵Department of Cell Morphology and Molecular Neurobiology, Ruhr University Bochum, 44780 Bochum, Germany

Objective:

Two recent separate studies in our laboratory have shown that $\alpha 9$ integrin (a cell adhesion receptor subunit) promotes neurite outgrowth on growth inhibitory tenascin-C, and kindlin-1 (a cytoplasmic integrin activator) overcomes the inhibition of chondroitin sulfate proteoglycans (CSPG) such as aggrecan by activating integrins to enhance axon growth. This study aims to combine the beneficial effects of both $\alpha 9$ integrin and kindlin-1 to promote better neurite outgrowth and axon regeneration.

Materials-Methods:

Adult rat dorsal root ganglion (DRG) neurons are transfected for forced expression of $\alpha 9$ integrin and kindlin-1 and then cultured on aggrecan and tenascin-C substrates for neurite outgrowth analysis. For the in vivo study investigating sensory axon regeneration, the constructs AAV- $\alpha 9$ -V5 and AAV-kindlin1-GFP are packaged into adeno-associated virus (AAV) serotype 5 for transducing adult rat DRGs in the lower cervical region after a hemilaminectomy and dorsal root/column crush. This is followed by sensory behavioural testing to confirm if anatomical axon regeneration is coupled with functional recovery and regenerative sprouting does not induce hyperalgesia.

Results:

Consistent with previous studies, kindlin-1-expressing neurons are able to overcome the growth inhibition of aggrecan for neurite outgrowth; and $\alpha 9$ integrin-expressing neurons extend neurites on tenascin-C. However, when plated on tenascin-C + aggrecan substrate, neurons expressing $\alpha 9$ integrin only are unable to fully overcome the combined inhibition of both tenascin-C and aggrecan. This is likely due to an inactivation of the $\alpha 9$ integrin receptor by aggrecan. Significant neurite outgrowth and axon regeneration is observed from neurons co-expressing both $\alpha 9$ integrin and kindlin-1.

Conclusion:

Alpha9 integrin activation results in better neurite outgrowth and axon regeneration in the presence of both tenascin-C and CSPG as $\alpha 9$ integrin is a receptor for tenascin-C and kindlin-1 overcomes the inhibition of CSPG.

Keywords: Alpha9 integrin, Kindlin-1

P-004

The effects of electrical field stimulation in spinal cord injured rat

Min Cheol Joo

Wonkwang University Hospital and School of Medicine, South Korea

Objective:

To investigate the effects of electrical field stimulation could influence the regeneration of injured spinal cord.

Materials-Methods:

A total of 20 Sprague-Dawley female rats weighing 250~300 g were divided into 3 groups: control(CON, n=5), spinal cord injury(SCI) only (n=5) and spinal cord injury with electrical stimulation(SCI+ES, n=10) group. A complete spinal cord transection was performed surgically at the 10th thoracic vertebra level in SCI and SCI+ES group. The electrode for electrical stimulation was implanted into injured spinal cord region and electrical stimulation was applied 2 hours for seven days from the day of operation. The three groups were subjected to functional analysis using BBB locomotor scales and TTSE at the 2nd and 7th day. Somatosensory evoked potential (SEP) by tibial nerve stimulation were recorded at the preoperative, 2nd and 7th day. Western blot assays were performed to determine the quantity of PGP9.5, ERK1/2, pERK1/2, NFkB, p38, ROK? and GAPDH.

Results:

BBB locomotor scales at the 2nd and 7th day showed 1.6 ± 1.7 and 8.0 ± 5.1 in SCI group and 2.7 ± 2.6 and 8.9 ± 4.3 in SCI+ES group. TTSE score at 2nd and 7th day showed 300 ± 0 and 226.7 ± 85.5 in SCI group and 300 ± 0 and 260 ± 82.3 in SCI+ES group. P1 latencies at the 2nd and 7th day were 19.2 ± 1.6 and 18.8 ± 0.99 msec in CON group, 24.4 ± 2.1 and 24.3 ± 2.6 msec in SCI group and 23.3 ± 2.0 and 22.3 ± 1.8 msec in SCI+ES group ($p < 0.05$). P1-N1 amplitude at the 2nd and 7th days were 6.2 ± 3.4 and 7.6 ± 3.1 uV in CON group, 5.2 ± 1.6 and 6.3 ± 2.6 uV in SCI group and 6.1 ± 2.6 and 9.2 ± 3.7 uV in SCI+ES group ($p < 0.05$). In western blot study, there was significant decrease in the density of PGP 9.5, NFkB, p38 and ROK? in the SCI group.

Conclusion:

These results suggest that the electrical field stimulation at the injured spinal cord region can improves electrophysiological and behavioral patterns.

Keywords: Spinal cord injury, electrical field stimulation

P-005

Effects of granulocyte colony stimulating factor (G-CSF) on spinal cord injury-Induced neuropathic pain in rats

Masao Koda¹, Kei Kato¹, Taigo Inada¹, Koshiro Kamiya¹, Masashi Yamazaki², Chikato Mannoji³, Masayuki Hashimoto⁴, Akihiko Okawa¹, Mitsutoshi Ota¹, Satoshi Maki¹, Takeo Furuya¹

¹Department of Orthopedic Surgery, Chiba University Graduate School of Medicine, Japan

²Department of Orthopedic Surgery, University of Tsukuba, Japan

³Department of Orthopedic Surgery, Chiba Aoba Municipal Hospital, Japan

⁴Department of Orthopedic Surgery, Chiba Medical Center, Japan

Objective:

Spinal cord injury (SCI) has a number of disabling consequences. Chronic neuropathic pain following SCI is rated as the most difficult symptom to manage. In the present study, we verified the effect of granulocyte colony-stimulating factor (G-CSF) on neuropathic pain by using the rat SCI model.

Materials-Methods:

Thoracic (T8) spinal cord contusion injury was produced in male Sprague-Dawley rats using the New York University impactor (10g from 6.25mm height). Three weeks after injury, the rats recovered from motor dysfunction and tactile allodynia was observed in their hind paw. G-CSF (15µg/kg/day) was administered intraperitoneally for 5 consecutive days. We administered saline as a control. Tactile allodynia of the hind paw was assessed using von Frey filaments. The 50% paw withdrawal threshold (PWT) in response to stimuli was determined by the up-and-down method. The lumbar enlargement of the spinal cord was removed and subjected to immunohistochemistry and cDNA microarray analysis.

Results:

Tactile allodynia (50% PWT) was significantly attenuated after G-CSF administration. Immunohistochemistry revealed that the number of OX-42-positive activated microglia significantly decreased. cDNA microarray analysis revealed that a number of genes related to inflammation was down-regulated in G-CSF-treated rats.

Conclusion:

The present results showed that G-CSF administration produced a pain-relieving effect for below-level neuropathic pain after SCI in rats. It is believed that activation of microglia in the spinal cord is associated with neuropathic pain after SCI, and that inhibition of microglial activation may participate in pain relief.

Keywords: Neuropathic pain, G-CSF

P-006

The preliminary study on the multi-systemic microcirculation changes in the rats with the completely cervical spinal cord injury

Jianjun Li¹, Yutong Feng¹, Mingliang Yang¹, Ruijuan Xiu², Jian Zhang²

¹Department of Spinal and Neural Functional Reconstruction, China Rehabilitation Research Center, Beijing, China

²Chinese Academy of Medical Science & Peking Union Medical College, Beijing, China

Objective:

Spinal cord injury (SCI) is commonly associated with devastating paralysis. However this condition also results in a variety of autonomic dysfunctions. The purpose of this study was to investigate microcirculatory blood flow and its law of changes in the site of the extremities, vital organs, and the injured spinal cord of the rat in the acute phase of cervical spinal cord injury

Materials-Methods:

The Moor laser Doppler flowmetry was used in the anesthetized female rats to assess microvascular blood flow (MVBF) of the surface of ear, forelimb, hindlimb, injured spinal cord, gastrocnemius muscle, liver and kidney before and after complete C8 spinal cord injury at 1, 3, and 7 days post-SCI. The mean arterial blood pressure (MAP) and heart rate are recorded during the assessment.

Results:

Significant changes in MVBF can be found in the surface of ear, forelimb, hindlimb, gastrocnemius muscle, liver and kidney post the spinal cord injury, but the changes of MVBF in injured spinal cord were not significant. The changes between the time window of 1, 3, 7day were not significant, that means the recovery of MVBF was not obvious.

Conclusion:

The MVBF of the surface of ear, forelimb, hindlimb, gastrocnemius muscle, liver and kidney post the spinal cord injury was decreased. MAP was decreased while the HR increasing post the injury. Injury level and severity directly correlate to the severity of autonomic dysfunctions following SCI. The MVBF changes was correlated with the reason that following the high cervical spinal cord injury the parasympathetic (vagal) control will remain intact while the spinal sympathetic circuits will lose their tonic supraspinal autonomic control.

Keywords: Spinal cord injury, microcirculation

P-007

Clarification of the molecular bases of the aging-induced vulnerability of spinal cord

Koshiro Kamiya¹, Takeo Furuya¹, Akihiko Okawa¹, Hiroshi Takahashi³, Kei Kato¹, Taigo Inada¹, Mitsutoshi Ota¹, Satoshi Maki¹, Masayuki Hashimoto⁴, Chikato Mannoji⁵, Masashi Yamazaki², Kazuhisa Takahashi¹, Masao Koda¹

¹Department of Orthopaedic Surgery, Graduate School of Medicine, Chiba University, Japan

²Department of Orthopaedic Surgery, University of Tsukuba, Japan

³Department of Orthopaedic Surgery, Toho University Sakura Medical Center, Japan

⁴Department of Orthopaedic Surgery, Chiba Medical Center, Japan

⁵Department of Orthopaedic Surgery, Chiba Aoba Municipal Hospital, Japan

Objective:

The incidence of spinal cord injury (SCI) in Japan is bimodal, with peaks from 2 to the 30s and in the 70s. SCI in aged patients is often caused by relatively low-energy traumas, including stumbles. It is widely believed that the patho-mechanisms of SCI in aged patients are mainly attributed to subclinical spinal canal stenosis.

However, is there a possibility that aged spinal cord itself is vulnerable to the external force? If so, what factor causes the vulnerability of aged spinal cord? To date, the precise aging-related molecular changes in spinal cord are unclear. Thus, we performed experiments to clarify the molecular bases of the vulnerability of aged spinal cord.

The purpose of the present study was to clarify the molecular basis of aging-related vulnerability of spinal cord.

Materials-Methods:

1.Spinal cord samples were isolated from aged and young adult rats while they are under general anesthesia, and protein was extracted from the spinal cord samples. 2.Differentially expressed proteins between young and aged rats were screened by two-dimensional polyacrylamide gel electrophoresis (2D-PAGE) followed by mass spectrometry analyses. 3.Picked-up proteins were further confirmed with western blot analyses of the spinal cord protein samples and immunohistochemistry of spinal cord histological slides.

Results:

By 2D PAGE and following mass spectrometry, peripherin and alpha-crystallin B subunit were detected as differentially up-regulated proteins in aged rat spinal cord. Up-regulation of those proteins was further confirmed by immunohistochemistry and western blot analysis. Peripherin expression was observed mainly in neuron and crystallin expression was detected in microglia.

Conclusion:

Peripherin is known to exert neuronal toxicity and crystallin is known to act as molecular chaperone. Up-regulation of those proteins might be related to molecular changes in aged spinal cord.

Keywords: Aged spinal cord, molecular changes, vulnerability

P-008

Correlation of MR diffusion tensor imaging and clinical measures in cervical spinal cord injuries

Hyun Yoon Ko¹, Soo Yeon Kim¹, Sung Wha Ko², Yong Beom Shin²

¹Rehabilitation Hospital, Department of Rehabilitation Medicine, Pusan National University Yangsan Hospital, Pusan National University School of Medicine, Yangsan, South Korea

²Rehabilitation Hospital, Department of Rehabilitation Medicine, Pusan National University Hospital, Pusan National University School of Medicine, Busan, South Korea

Objective:

To characterize diffusion properties across the spinal cord lesion and to correlate with clinical and electrophysiological measures.

Materials-Methods:

Six patients with cervical spinal cord injury (4 males and 2 females; neurological level of lesion, C4-C6; mean age, 48.33 years; time since injury, mean 45.5 months) and 8 healthy subjects (5 males and 3 females, mean age 33.5 years) participated in this study. Diffusion tensor imaging (DTI) data of the spinal cord were acquired with a Siemens 3T MR scanner. We measured the apparent diffusion coefficient (ADC) and fractional anisotropy (FA) of the spinal cord at maximal compression level and proximal and distal levels to the compression site with no signal change in conventional MRI. Neurological and electrophysiological measures, American Spinal Injury Association (ASIA) Impairment scale, Korean Modified Barthel Index (K-MBI), somatosensory evoked potentials (SSEP) and motor evoked potentials (MEP) were assessed in patients with cervical spinal cord injury. For the statistical analysis, one-way ANOVA test (post hoc; Student Newman Keuls) was performed using SPSS software package.

Results:

Our results indicate that patient with spinal cord injury has increased ADC value and decreased FA value compared with normal controls ($p < 0.05$). Moreover, the upper and lower region of the lesion revealed the significantly higher ADC and lower FA value compared with normal control ($p < 0.05$). However, there was no significant difference between the upper region and the injury level, while significant difference was found between the lower region and the upper region of the injury ($p < 0.05$). There was no significant correlation between DTI parameters and K-MBI scores and evoked potentials.

Conclusion:

DTI can be used for the quantitative evaluation of the extent of spinal cord damage, and eventually for monitoring the effects of future regeneration.

Keywords: Diffusion tensor imaging, clinical measure, spinal cord injury

P-009

Mesenchymal stem cells for locomotor recovery in traumatic spinal cord injury: Systematic review and meta-analysis of rodent models

Roberto S. Oliveri¹, Segun Bello², Fin Biering Sørensen³

¹Cell Therapy Facility, Department of Clinical Immunology, Copenhagen University Hospital Rigshospitalet, Copenhagen, Denmark

²The Nordic Cochrane Centre, Copenhagen University Hospital Rigshospitalet, Copenhagen, Denmark

³Department of Spinal Cord Injuries, Copenhagen University Hospital Rigshospitalet, Copenhagen, Denmark

Objective:

Multipotent mesenchymal stem cells (MSCs) demonstrate substantial anti-inflammatory, immunomodulatory, and neurotrophic effects. We wanted to systematically assess the efficacy of MSCs for locomotor recovery in established rodent models of traumatic spinal cord injury (SCI).

Materials-Methods:

After sensitive literature search, we extracted data from all eligible studies comparing MSCs versus control (placebo or no treatment). We also performed meta-analyses, trial sequential analysis (TSA), subgroup analyses, and meta-regression.

Results:

We identified 83 eligible studies comprising a total of 1568 rats. Funnel plot did not indicate publication bias. Forty-eight studies (58%) were described as randomised and 46 studies (55%) reported blinded outcome assessment. Median time from SCI to intervention was 7 days. Random-effects meta-analysis yielded a difference in mean Basso-Beattie-Bresnahan (BBB) locomotor score of 3.9 (95% CI 3.2 to 4.7; $p < 0.001$) in favour of MSCs. Cumulative meta-analysis suggested that evidence of beneficial efficacy was available as early as 2006. TSA confirmed the findings of the meta-analyses with upper monitoring boundary being crossed by the cumulative Z-curve before reaching the calculated diversity-adjusted required information size. Subgroup analyses suggested association of effect size with a number of moderator variables which, however, became non-significant after adjustment with multivariate meta-regression. Notably, many studies had truncated follow-up with final BBB score assessment conducted before reaching stationary plateau phase, suggesting that the true average intervention effect may be larger. Finally, using a translational grading system for pre-clinical neuroprotective therapies, we estimated a high score, ranking MSCs substantially higher than other previously tested SCI interventions.

Conclusion:

MSCs have substantial beneficial effect on locomotor recovery in models of traumatic SCI and represent an intervention with substantial translational potential. The results should, however, be interpreted with the usual precautions concerning internal and external validity of animal studies in relation to the design of future clinical trials involving human individuals.

Keywords: Mesenchymal stem cells, meta-analysis, systematic review

P-010

Beneficial role of astrogliosis in promotion of functional recovery of completely transected spinal cord following transplantation of hESC-derived oligodendrocyte and motoneuron progenitors

Slaven Erceg¹, Dunja Lukovic¹, Irena Sanchez¹, Lourdes Valdez Sanchez¹, Victoria Moreno Manzano², Miodrag Stojkovic³, Shomi S Bhattacharya¹, Marcela Garita Hernández¹, Francisco Diaz

¹Andalusian Molecular Biology and Regenerative Medicine Centre (CABIMER), Seville, Spain

²Research Center "Principe Felipe", Neuroregeneration Group, Valencia, Spain

³SPEBO MEDICAL, Leskovac, Serbia

Spinal cord injury (SCI) results in neural loss and consequently motor and sensory deficit below the injury. Neural progenitors derived from hESC and iPS cells neural induces locomotor improvement following their transplantation into the animal models of SCI, but little is known about the effects and the underlying mechanism of these grafted cells on local tissue and endogenous neural stem cells. Recently, we have reported the regenerative effects and significant improvement of locomotor function in complete transection rat model of SCI following transplantation of oligodendrocyte progenitors cells (OPC) and motoneuron progenitors (MP) derived from hESC. In the present study, we further analyzed the underlying cell and tissue mechanisms of functional recovery after cell transplantation of OPC and MP hypothesized that beneficial effect is mediated by regenerative signalling pathways activated in the host tissue by transplanted cells. Here we show that transplantation of hESC-derived OPC and MP promote astrogliosis, thorough activation of jagged1-dependent Notch and Jak/STAT signalling supporting axonal survival.

Keywords: Stem cells, human embryonic stem cells, cell therapy

P-011

AAV vector allows widespread and long-term secretion of chondroitinase ABC in rat CNS

João Nuno Alves¹, Melissa Andrews¹, Annaliese Ward², Nicholas Michelmore², Debayan Dasgupta², Joost Verhaagen³, Elizabeth Moloney², Roger Keynes², James Fawcett¹, John Rogers², Elizabeth Muir²

¹Cambridge Centre for Brain Repair, University of Cambridge, UK

²Department of Physiology Development and Neuroscience, University of Cambridge, UK

³Netherlands Institute for Neuroscience, Amsterdam, the Netherlands

The enzyme chondroitinase ABC has been shown to promote axon regeneration in spinal cord injury and is therefore a potential component of treatment. Because of the risks attending prolonged or repeated infusions, gene therapy could be a desirable route of administration. We have modified the bacterial chondroitinase gene so that it can direct efficient secretion of active chondroitinase from mammalian cells, and inserted it into lentiviral and AAV vectors, to allow long-term expression by glia and/or neurons in the CNS. Whereas lentiviral vectors transduce neurons and glia locally, AAV vectors can also be retrogradely transported up axons so as to transduce neurons that project to the site of injection. Lentiviral and AAV chondroitinase vectors were injected into adult rat cortex. Both produce widespread chondroitinase activity, as assessed by 'stub' antibody staining, including activity in the corpus callosum and contralateral cortex, indicating secretion from long-range axonal projections. To test the effect in spinal cord injury, lentiviral chondroitinase vector was injected adjacent to a dorsal column crush lesion at level C4. The corticospinal tract was then traced by anterograde labelling with BDA, and the animals were perfused 4 weeks post-lesion. Corticospinal axons showed reduced retraction, enhanced regrowth along the edge of the lesion cavity, and enhanced lateral sprouting proximal to the lesion. These results show that viral vectors can deliver chondroitinase efficiently to the adult CNS, and that it has biological activity comparable to direct injection of the enzyme.

Keywords: Chondroitinase, AAV

P-012**The importance of sulfation in chondroitin sulfate glycosaminoglycans in nerve regeneration**

João Nuno Alves, Jessica Kwok, James Fawcett

John Van Geest Centre for Brain Repair, Cambridge, UK

The upregulation of chondroitin sulfate proteoglycan (CSPGs) after central nervous system (CNS) injuries leads to an impediment of functional recovery. Perineuronal nets (PNNs) play an important role in the inhibition of plasticity. Biological activity of the CSPGs depends on the chondroitin sulfate glycosaminoglycans (CS-GAGs) and their sulfations. The axon guidance molecule Sema3A co-localizes with PNN structures in the mature CNS during development. Previous research has suggested an interaction between Sema3A and PNN structures, mainly to chondroitin 4,6-sulfate (C4,6S), and also shown that Sema3A is upregulated, like CSPGs, after a CNS injury and contributing to inhibition of neurite outgrowth. The anti C4,6S phage-displayed antibody GD3G7 has become one of the ways to disrupt the binding between C4,6S and Sema3A. In this study, we showed significant blockage of aggrecan inhibition in DRGs neurons in the presence of GD3G7 antibody. This is evidence of the efficiency of GD3G7 as a new potential strategy to enhance CNS regeneration after injury. Also, while C4S acts as a negative regulator on neurite growth, C6S showed the reverse, increasing and promoting neuronal growth. This sulfation of CS GAGs is mediated by specific sulfotransferases (CST). Sulfation in these different positions confers specific biological activities to the CS GAGs. It is likely that upregulation of specific sulfation pattern(s) on CS GAG after injury might be responsible for different levels of growth inhibition. We observed the different effects on plasticity and neuronal growth in DRGs in the presence of GAGs with different CST knockdowns through ShRNA. There was a significant increase in neurite outgrowth by knocking down C4ST (4 ST-KO) and a significant decrease in neurite length in the case of C6ST-KO. We have planned further experiments combining the presence of CST-KOs and other important extra cellular matrix molecules, such as Sema3A.

Keywords: CSPGs, sulfation, Sema3A

P-013

A neuroprotective effect of anti-interleukin-6(IL-6) receptor antibody after spinal cord injury in mice

Youhei Takahashi, Tsukasa Kanchiku, Hidenori Suzuki, Yasuaki Imajo, Yuichiro Yoshida, Tomotoshi Murakami, Toshihiko Taguchi

Department of Orthopaedic Surgery, Yamaguchi University Graduate School of Medicine, Ube, Japan

Objective: The objective of this study was to evaluate the effectiveness of anti-interleukin-6 (MR16-1) to reduce the secondary injury after spinal cord injury (SCI).

Materials-Methods: Thirteen adult female C57BL/6J mice (10 weeks after birth) were used. They were assigned to the following groups: MR16-1 treated group (n=5) (group A), control group (n=5) (group B), sham group (n=3) (group C). Thoracic spinal cord contusion injury was performed using an IH-impactor with an impact force of 60 kdyn. MR16-1 were continuously injected between 1-14 days(350µg/day) using AlzetR osmotic pumps. Every week, motor and sensory functions were evaluated using Basso Mouse Scale (BMS) and Plantar Von Frey Test. Two to 8 weeks after injury, histological examination and Western blot analysis were performed.

Results:

Eight weeks after surgery, BMS of group A was 5.1 ± 0.5 and group B was 3.0 ± 0.2 . The mice in group B had lower paw withdrawal thresholds than group A to Plantar Von Frey Test as an allodynia evaluation. In addition, the area of Luxol Fast Blue-stained tissue, which represents spared myelin sheath, was significantly increased by the MR16-1 treatment.

Conclusion:

These results suggest that inhibition of inflammation is a promising neuroprotective approach to limit secondary injury after SCI and that MR16-1 could be a potential therapeutic approach for clinical treatment of SCI.

Keywords: Spinal cord injury, anti-interleukin-6, neuroprotection

P-014

Spinal cord stimulation to restore cough in subjects with spinal cord injury – Long-term outcomes

Anthony F. DiMarco, MD¹, Krzysztof E. Kowalski, PhD², Dana R. Hromyak, BS³, Robert T. Geertman, MD, PhD⁴

¹The MetroHealth System, MetroHealth Research Institute and Department of Physical Medicine and Rehabilitation, Cleveland, Ohio, USA; Case Western Reserve University, Department of Medicine, Cleveland, Ohio, USA

²The MetroHealth System, MetroHealth Research Institute, Cleveland, Ohio, USA; Case Western Reserve University, Department of Medicine, Cleveland, Ohio, USA

³The MetroHealth System, MetroHealth Research Institute, Cleveland, Ohio, USA; Case Western Reserve University, Department of Research, Cleveland, Ohio, USA

⁴The MetroHealth System, Case School of Medicine, Division of Neurological Surgery and Department of Neurosciences, Cleveland, Ohio, USA

Objective:

Spinal cord stimulation (SCS) has been shown to restore an effective cough mechanism by activation of the expiratory muscles in subjects with spinal cord injury. The purpose of this study was to re-assess the clinical parameters related to use of the cough system in subjects who have had the implant for a minimum of 2 years (mean 4.60±0.59 years) well beyond the period of close follow-up.

Materials-Methods:

Maximum airway pressure generation (Paw) and other clinical assessments, including questionnaires related to secretion management, were collected in subjects implanted with the study device for a minimum of 2 years (n=10).

Results:

Each subject continued to use the device on a regular, usually daily, basis. Pre-implant Paw was 28.3±4.8cmH₂O. During SCS, Paw were 103.1±20.4 and 107.7±23.0cmH₂O at the 1 year and mean 4.60 year follow-up points, respectively (p<0.05 compared to pre-implant and NS when compared to 1 year follow-up during SCS). The need for trained caregiver support related to secretion management decreased dramatically. The incidence of acute respiratory tract infections pre-implant decreased significantly from 1.35±0.30 to 0.30±0.15 events/year at the 1 year mark and remained low at 0.19±0.12 events/year at the mean 4.60 year follow-up (p<0.05 compared to pre-implant and NS when compared to 1 year follow-up). There were significant improvements in each of the measures related to airway clearance. Subject life quality related to respiratory care improved significantly.

Conclusion:

Study subjects continued to use the cough stimulation system on a long-term basis beyond the period of close follow-up and continued to derive significant clinical benefits suggesting that this technique may have a high degree of clinical utility.

Support:

NIH-NINDS (R01NS049516 and RC1NS068576) and NCRR (M01RR0080 and UL1RR024989).

Disclosure:

Dr. DiMarco is a Founder of and has a significant financial interest in Synapse BioMedical, Inc, a manufacturer of diaphragm pacing systems.

Keywords: Spinal cord injury, spinal cord stimulation, cough

P-015

Spinal cord injury: Insufflation and exsufflation cough assist

Aram Mashoof Fard, Kathryn Harris

Duke of Cornwall Spinal Treatment Centre, Salisbury Foundation Trust, Salisbury, UK

Respiratory complications are the leading cause of morbidity and mortality in people with spinal cord injury and are more pronounced in individuals with higher level complete injuries. A major contributor to respiratory illness in individuals with cervical SCI is secretion retention. The inefficiency of the cough and decrease in peak cough expiratory flow in upper spinal cord lesions is one of the main factors that cause sputum retention.

Objective:

This literature review aims to establish whether the use of mechanical in-exsufflation has a greater effect on respiratory outcomes than manual techniques. It also reviews the reported complications of applying this technique.

Materials-Methods:

The databases MEDLINE/ PubMed, EMBase and CINHALL were searched up to January 2013 for relevant keywords. All studies that examined secretion removal in people with spinal cord injury, irrespective of the design, published in English were included.

Results:

Evidence supporting the use of mechanical in-exsufflation in spinal cord injury patients while positive, is limited. One study showed less than 1% rate of ventilator acquired pneumonia. A success rate of 97% was reported in weaning patients from mechanical ventilation. A comparable success rate in tracheostomy decannulation was also reported. Studies examining insufflation combined with manual assisted cough provided the most consistent high level evidence. Feedback from patients indicates that they prefer in-exsufflation compared to other secretion removal techniques. However it is important to emphasise that complications such as abdominal distension, aggravation of gastro-oesophageal reflux, haemoptysis, chest and abdominal discomfort, acute cardiovascular effects and pneumothorax have also been reported.

Conclusion:

This review highlights the need for randomised controlled studies that measure the effectiveness of in-exsufflation in reducing respiratory complications and improve the weaning and decannulating success in patients with high level spinal cord injuries.

Keywords: Spinal cord injury, cough assist, in-exsufflation

P-016

Positive effects of inspiratory muscle training in spinal cord injury

Karin Postma¹, Karin Postma², Tebbe A Sluis¹, Michael P Bergen¹, Johannes B Bussmann²

¹Rijndam Rehabilitation Center, Rotterdam, The Netherlands

²Erasmus MC, Department of Rehabilitation Medicine, Rotterdam, The Netherlands

Objective:

To study the efficacy of inspiratory muscle training (IMT) in persons with spinal cord injury (SCI) and low pulmonary function (PF) during inpatient rehabilitation.

Materials-Methods:

We performed a randomized controlled trial in 4 rehabilitation centers with specialized SCI units in the Netherlands. A total of 40 persons with SCI and low forced expiratory volume in 1 second (FEV1 < 80% of predicted value) were randomly assigned to the intervention or control group. Baseline characteristics were: mean (SD) age 46.8 (14.3) years, 87.5 % men, 77.5 % tetraplegia, 57.5 % motor complete lesion, 85.0 % traumatic cause, and median (IQR) time after injury 79.5 (58.0 – 112.0) days. During an 8 week training period, all persons received usual rehabilitation treatment and persons in the intervention group performed IMT with a threshold trainer 5 times a week in addition. The primary outcome measure was maximal inspiratory pressure (MIP) measured at the mouth. Secondary outcome measures were: FEV1, forced vital capacity, peak expiratory flow, maximum voluntary ventilation, peak cough flow, maximal expiratory pressure, perceived ability to cough, and breathlessness.

Results:

The 19 persons in the intervention group performed 35 to 44 training sessions in total. The median (IQR) intensity at the start of training was 53 (39 – 60) % of baseline MIP. Mean (SD) MIP improved significantly more in the intervention (26.5 (12.0) cmH2O) compared to the control group (14.6 (12.0) cmH2O; p=.004). The number of persons with low MIP (< 60 cmH2O) decreased in the intervention group from 13 to 5 and in the control group from 11 to 7. The changes in all other outcome measures did not differ between groups.

Conclusion:

IMT is an effective treatment in persons with SCI during inpatient rehabilitation.

Keywords: Breathing exercises, respiratory muscles, pulmonary function

P-017

Improvement in respiratory functions with a respiratory therapy program in a person with a chronic tetraplegia

Natasa Puzic, Irena Groselj

Department for the Rehabilitation of Patients with a Spinal Cord Lesion, University Rehabilitation Institute Soca, Lubiana, Slovenia

Objective:

In persons with chronic cervical spinal cord lesion respiratory functions are impaired due to respiratory muscles paralysis and often worsen in time because of complications and ageing. A 30 years old male with chronic tetraplegia (15 years, level C3, AIS A) and with a tracheotomy tube had preserved diaphragmal activity, but low respiratory volumes, needed several aspirations per day and had frequent respiratory tract infections. The aim of a comprehensive respiratory muscles training and therapy program was to improve respiratory functions and decrease complication rates.

Methods:

A three weeks in-patient respiratory program consisted of inspiration and expiration muscle training, learning and performing of the glossopharyngeal breathing and of regular use of mechanical insufflation–exsufflation. The patient continued with an at least three times a week training at home.

Results:

At the end of the program and at the 6 months follow-up there was an improvement in vital capacity, maximum inspiratory and expiratory pressures. The speech improved. The number of aspirations per day decreased and no respiratory tract infection occurred.

Conclusion:

In a patient with a chronic C3 tetraplegia a short comprehensive in-patient respiratory therapy program followed by training at home can improve respiratory functions and decrease complication rates.

Keywords: Chronic tetraplegia, glossopharyngeal breathing, respiratory therapy

P-018

Expiratory muscle reconditioning for cough production in spinal cord injury (SCI)

Krzysztof E. Kowalski, PhD¹, Dana R. Hromyak, BS², Robert T. Geertman, MD, PhD³, Anthony F. DiMarco, MD⁴

¹The MetroHealth System, MetroHealth Research Institute, Cleveland, Ohio, USA; Case Western Reserve University, Department of Medicine, Cleveland, Ohio, USA

²The MetroHealth System, MetroHealth Research Institute, Cleveland, Ohio, USA; Case Western Reserve University, Department of Research, Cleveland, Ohio, USA

³The MetroHealth System, Case School of Medicine, Division of Neurological Surgery and Department of Neurosciences, Cleveland, Ohio, USA

⁴The MetroHealth System, MetroHealth Research Institute and Department of Physical Medicine and Rehabilitation, Cleveland, Ohio, USA; Case Western Reserve University, Department of Medicine, Cleveland, Ohio, USA

Objective:

Spinal cord stimulation (SCS) results in expiratory muscle activation and has the potential to restore an effective cough mechanism. The purpose of the present study was to assess the impact of chronic intermittent SCS on expiratory muscle strength following SCI.

Materials-Methods:

In 17 SCI subjects, single disc electrodes were implanted at the T9, T11 and L1 spinal levels and connected to an implanted radiofrequency receiver. Post-implantation, each subject was instructed to apply stimulation, by activating an external transmitter, 2-3 times/day and as needed for secretion management. Stimulus parameters were set at values resulting in near maximum airway pressure generation (Paw) (30-40V, 50Hz, 0.2ms). Paw was measured at total lung capacity as an index of expiratory muscle strength.

Results:

Mean Paw during spontaneous efforts was 23 ± 3 cmH₂O. Initially, SCS at T9, T11, L1 alone resulted in mean Paw of 53 ± 9 , 54 ± 8 and 34 ± 7 cmH₂O, respectively. Initial combined stimulation with a 2-lead system (T9+T11, T9+L1 or T11+L1) resulted in Paw of 67 ± 10 cmH₂O. After 3-4 months of daily stimulation, SCS at T9, T11, L1 alone resulted in Paw values of 96 ± 14 , 88 ± 15 and 76 ± 13 cmH₂O, respectively ($p < 0.05$ for each compared to initial). During combined stimulation, Paw increased to 119 ± 16 cmH₂O ($p < 0.05$), which approximates the normal range.

Conclusion:

SCS has the potential to completely reverse expiratory muscle atrophy and improve expiratory muscle strength. Moreover, each study subject reported greater ease in raising secretions with use of the SCS cough system, and the incidence of respiratory tract infections was significantly reduced. These findings also support the concept that this technique may provide a useful method to restore an effective cough mechanism in subjects with SCI.

Support:

NIH-NINDS (R01NS049516 and RC1NS068576) and NCRR (M01RR0080 and UL1RR024989).

Disclosure:

Dr. DiMarco is a Founder of and has a significant financial interest in Synapse BioMedical, Inc, a manufacturer of diaphragm pacing systems.

Keywords: Spinal cord injury, spinal cord stimulation, cough

P-019

Diaphragm Pacing: Not only can it replace tracheostomy mechanical ventilation but it can be a bridge to functional recovery

Raymond Onders, Maryjo Elmo, Cindy Kaplan

Department of Surgery, University Hospitals Case Medical Center, Case Western Reserve University School of Medicine, Cleveland, United States

Objective:

High cervical tetraplegics with intact phrenic nerves can be removed from mechanical ventilation (MV) with diaphragm pacing (DP). This report outlines the use of DP electrodes to assess for diaphragm EMG (dEMG) burst activity and to analyze if the neuroplastic effects from the functional electrical stimulation (FES) of DP can lead to the return of volitional breathing.

Methods:

Prospective trial data base under FDA and/or IRB approval. Patients underwent laparoscopic placement of electrodes. Assessment of dEMG was obtained pre diaphragm conditioning and after conditioning through the implanted electrodes under both volitional breathing and hypoxic stress attempts while removed from MV.

Results:

A total of 95 spinal cord injured patients have had diaphragm pacing from 2000 to 2013 (subset of 250 total implanted patients). Ages ranged from 2 to 74 years old. EMG data was obtained on 28 patients pre diaphragm conditioning. Of those patients 15 had positive dEMG activity. This changed their category of injury to incomplete to C3-5. Time on MV averaged 2.7 years (range 10 days to 10 years). Three patients with no EMG activity at the time of implantation developed good EMG activity and 8 patients with some burst activity showed significant improvement after conditioning. Six patients regained some volitional breathing with an additional five patients regaining complete volitional control of their diaphragm. The implanted electrodes are easily removed.

Conclusions:

The ability to analyze implanted diaphragm electrodes allows for accurate staging of injury for C3-5. After conditioning the diaphragm with FES a group of patients recovered diaphragm function. Regaining this level of function can have positive implications for survival. Early implantation after injury provides a greater likelihood of complete recovery of volitional breathing. The ability to wean off a life support device significantly improves quality of life.

Keywords: Tetraplegia, ventilators, diaphragm pacing

P-020

Diaphragm pacing stimulating system in tetraplegic patients: Two cases report and first Turkish experience

Aydin Sanli¹, Sevgi Ozalevli², Bahar Agaoglu¹, Ahmet Onen¹, Nezir Ozdemir¹

¹Department of Thoracic Surgery, Dokuz Eylul University Faculty of Medicine, Izmir, Turkey

²School of Physical Therapy and Rehabilitation, Dokuz Eylul University, Izmir, Turkey

Aim:

To discuss the efficacy of DPSS (Diaphragm Pacing Stimulating System) was applied to two tetraplegic patients for the first time in Turkey.

Patients:

The first patient, 31 years old is tetraplegic with the level of C1-2 because of sea accident. She had used tracheostomy and mechanical ventilator (MV) and supplemental oxygen therapy (O2) for one year. The preoperative peripheral oxygen saturation (SpO2) level of the patient was 97 %. She was taking a breath by herself only 45 seconds after then SpO2 level % was decreasing from 97 to 84. The second patient, 14 years old is tetraplegic patient with C3-C5 because of judo training injury. She had used CPAP for 6 months and she had abdominal breathing with O2 support. DPSS was done by laparoscopically implanting two electrodes to the diaphragmatic regions which respond electrical stimulation best. In postoperative period, DPSS protocol (duration and frequency of application) was prepared individually for each patient.

Results:

The first patient has started using DPSS together with MV at the beginning postoperative 2nd week and she could be weaned from MV for 3 hours without the need for O2 on postoperative 2nd month and for 4 hours on postoperative 3rd month. In second patient, at the second week of postoperative period abdominal breathing was disappeared and she was weaned from support of CPAP and O2 and her tracheostomy was closed. The clinical and functional improvements (sputum and aspiration frequency, coughing power, fatigue tolerance, sense of smell, quality of speech, quality of sleep and mental state) were observed in the both patients.

Conclusion:

DPSS which can be done safely was shown to improve respiratory function and other wellness of the tetraplegic patients and could have positive effects on quality of life, therefore DPSS application must become widespread among tetraplegic patients hence earlier period.

Keywords: Diaphragm Pacing Stimulating System; tetraplegia

P-021

Unilateral diaphragm palsy in SCI and role of phrenic nerve stimulator implantation

Bakul Soni, Jyotindra Nirmal, Tun Oo

North West Regional Spinal Injuries Centre, Southport, United Kingdom.

A young male aged 21 years sustained C3 level complete cervical spine injury in a fall due to epileptic fit in the year 2010. He was in due course able to wean off ventilatory support and was found to have right sided unilateral diaphragm palsy. He then developed recurrent chest infections of right base due to inadequate aeration and also required night NIV support for hypercapnia.

Testing with transcutaneous phrenic nerve stimulation in the neck on the right side has shown adequate diaphragm contraction indicating that the palsy is of upper motor neuron type and hence suitable for unilateral diaphragmatic stimulator implantation procedure.

We would like to know the opinion of the audience of their experience with unilateral Phrenic Nerve Stimulator surgery in SCI and selection of cases for such procedure.

Keywords: Spinal cord injury, unilateral diaphragm palsy, phrenic nerve stimulator

P-022

Multidisciplinary approved guidelines for successful weaning of patients with complete acute spinal injuries from non-invasive ventilation at Mater Hospital, Dublin

Anne Marie Horgan, Jacqueline Byrne, Geraldine Jordan, Edward Carton, Ailbhe Dunne, Dervilla Danaher

National Acute Spinal Injuries Unit, Mater Misericordiae University Hospital, Eccles Street, Dublin 7, Ireland

Objective:

Provide MDT protocol for weaning SCI patient from non-invasive ventilation (NIV). Respiratory function is primary concern in management of patients with complete cervical/thoracic SCI. Such complications are the result of weakened/de-innervated respiratory muscles, retained secretions, chest trauma & autonomic system dysfunction. SCI patient is prone to atelectasis & ventilatory failure.

Partial/complete weaning from mechanical ventilation can be considered as a goal for patients with acute SCI of cervical/thoracic neurological involvement. Non-invasive ventilation (NIV) is a safe, effective technique that can be used to facilitate weaning process, prevent acute respiratory failure or post-extubation failure¹.

Materials-Methods:

International practice of weaning ventilation reviewed. Drafted MDT (physiotherapy, medical & nursing) guidelines. Pilot commenced, providing indications for commencing procedure, inclusion/ exclusion criteria, patient monitoring & criteria to discontinue trial. Suitable SCI patients commenced trial with 100% successful wean. Outcome measures included FVC graphing, chest x-ray, ABGs & rapid shallow breathing index.

Results:

Safe to initiate weaning process in SCI patients when factors contributing to respiratory failure have been treated & patient has achieved satisfactory gas exchange on minimal ventilatory support, using MDT guidelines framework.

Conclusion:

Develop MMUH MDT policy encompassing aims & indicators for weaning trials, criteria of inclusion/exclusion, weaning parameters (clinical, mechanical & biochemical) & procedure to be taken by clinician/therapist in weaning procedure.

References:

1. Boles J.M. et al (2007) Weaning from Mechanical Ventilation. European Respiratory Journal, 29:1033-1056.

Keywords: Respiratory, weaning, non-invasive-ventilation

P-023

Weaning of prolonged ventilator-dependent tetraplegic patients in a rehabilitation clinic: Initial experience in Turkey

Ibrahim Gündoğdu¹, Fatma Aytül Çakıcı¹, Tacettin Mirzaoğlu¹, Hande Sancioğlu¹, Erhan Arif Öztürk¹, Begüm Ergan Arsava³, Eray Işık⁴, Gülten Ütebey², Hakan Korkmaz⁴

¹Department of Physical Therapy and Rehabilitation, Ministry of Health Ankara Diskapi Yıldırım Beyazıt Training and Research Hospital, Ankara, Turkey

²Department of Anesthesiology and Reanimation, Ministry of Health Ankara Diskapi Yıldırım Beyazıt Training and Research Hospital, Ankara, Turkey

³Department of Chest Diseases, Ministry of Health Ankara Diskapi Yıldırım Beyazıt Training and Research Hospital, Ankara, Turkey

⁴Department of Otolaryngology, Ministry of Health Ankara Diskapi Yıldırım Beyazıt Training and Research Hospital, Ankara, Turkey

Background:

As life support facilities become increasingly available, more patients with spinal cord injury undergo mechanical ventilation that may be required for prolonged periods. Resources for weaning are either limited (ICU beds, weaning centers) or inadequate and many of these patients do not require the intensity of treatment or monitoring available in an intensive care unit.

Objective:

Implementation of a weaning program for tetraplegic patients requiring prolonged mechanical ventilation in a rehabilitation clinic.

Participants/Methods:

Five tetraplegic patients discharged from ICU to their home with tracheostomy and home type mechanical ventilator admitted to rehabilitation clinic over a 2 year period were included in this case series study. Multidisciplinary rehabilitation program and weaning protocol was performed with the clinical liaison of rehabilitation, ICU, anesthesiology and reanimation, ENT and chest disease clinics. Ventilation mode changed from SIMV to PSV gradually and progressive ventilator free breathing method was used.

Results:

Ventilator-dependent 5 male tetraplegic patients aged 17 to 70 years and single neurological levels of patients according to AIS were C4 AIS B, C5 AIS A, C6 AIS A, one patient with central cord syndrome and C1 AIS A. Mechanical ventilator time before the start of weaning protocol were 300, 33, 217, 53 and 71 days respectively. Four out of five ventilator dependent tetraplegic patients admitted to our clinic successfully weaned from mechanical ventilator and tracheotomy tube and discharged to their home. Mechanical ventilator weaning times of four patients were 45, 34, 20 and 33 days. C1 patient using accessory respiratory muscles was partially weaned from MV after 90 days of program.

Conclusion:

Follow up in the ICU or discharge to home with mechanical ventilator for tetraplegic patients with prolonged weaning period further complicates the process and our results support the need for such an outlet for countries without specialized weaning centers.

Keywords: Tetraplegia, ventilator weaning, rehabilitation center

P-024

Can a C1 complete tetraplegic patient be weaned from mechanical ventilation?: Acase report

Ibrahim Gündoğdu, Ece Ünlü, Tacettin Mirzaoglu, Hande Sancioğlu, Erhan Arif Öztürk, Ajda Bal Hastürk, Fatma Aytül Çakıcı

Department of Physical Therapy and Rehabilitation, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey

Objective:

To describe confounding predictors of weaning potential.

Case:

Subject is a 17-year-old national wrestler suffered a traumatic fracture- dislocation of C3-C4 in a wrestling match. After surgical decompression and posterior stabilization he was failed to wean from mechanical ventilator (MV) in an intensive care unit (ICU) for 72 days. He has been transported to our clinic for evaluation of weaning potential. On neurological examination, pin prick and light touch sensations were impaired at C2 and absent at C3 and below bilaterally. There was no motor function in upper and lower extremities and sensory-motor function-deep anal pressure sensations were absent at S4-S5. Therefore patient classified as a C1 AIS A. Phrenic nerve conduction studies showed an absent response from diaphragms. Needle diaphragm electromyography showed fibrillations, positive sharp waves and single polyphasic MUAP indicating severe partial axonal degeneration of the phrenic nerves. Fluoroscopy revealed no movement of diaphragm bilaterally. SEP&MEP responses were absent. On the first day of admission, he could tolerate spontaneous breathing only for one minute which, on the 30th day, improved up to 100 minutes/day after trials of weaning. Within this time interval sensation at C3 level also recovered to impaired sensory function bilaterally. At 3rd month, needle EMG revealed same results but with polyphasic MUAPs and he tolerated spontaneous breathing during daytime for 12-16 hours and has been discharged from the hospital. Clinical, fluoroscopic and electrophysiological evaluations at 1st year indicated there had been no change.

Conclusion:

While AIS, SEP&MEP, nerve conduction study and fluoroscopy results were inadequate to show partial preservation of the diaphragm motor function, only needle EMG results predicted the weaning potential. Our case may indicate the importance of multidimensional evaluation of weaning potential of these patients and necessity of giving the appropriate time with patience to these patients to recover.

Keywords: Ventilator weaning, quadriplegia/rehabilitation

P-025

Early rehabilitation: an integral part of intensive care for acute tetraplegic patients

Tacetin Mirzaoglu, Eda Gurcay, Ibrahim Gundogdu, Fatma Aytul Cakci

Department of Physical Therapy and Rehabilitation, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey

Objective:

To assess the most common problems among patients with acute spinal cord injury (SCI) during intensive care unit (ICU) follow-up.

Cases:

A total of 8 cases [7 males, 1 female] with acute SCI were included. The mean age of the patients at the time of injury was 27.7 years. There were 1 central cord syndrome and 7 neurologically complete tetraplegics. Causes of injuries were: sports (3), motor vehicle accidents (2), falls (1), and diving (2). After spinal column stabilization, all cases were admitted to the ICU. Positioning and passive range of motion exercises were regularly administered. Due to requirement of respiratory support, mechanical ventilator was performed to all patients. The length of stay in ICU ranged between 13-90 days, with an average of 51.8 days. The most common problems were determined as spasticity (specially for upper extremities), pressure sores (on sacral, and heel locations), heterotopic ossification (in hip and knee joints), neuropathic pain, pulmonary/urinary infections, bladder and bowel incontinence. Functional independence measure (FIM) of motor score and disability rating scale (DRS) were used for evaluation of functional status of the patient, and the mean of scores were 13.1 and 10.1 consequently.

Results:

At the time of ICU discharge; four patients weaned from mechanical ventilation. However functional status showed no improvement.

Discussion:

Rehabilitation is a therapeutic programme that fosters recovering function at the highest level of independence. Need for respiratory support and many other problems extend ICU period and reduce the chance of early rehabilitation. For preventing problems and achieving optimal functional outcomes, we recommend early rehabilitation programme which is developed individually for each patient with physical therapy modalities should be an integral part of the ICU and should start in the ICU as soon as the patient is medically stable.

Keywords: Spinal Cord Injuries/complications, spinal Cord Injuries/rehabilitation, intensive care unit

P-026

**Autonomic dysreflexia as a cause of posterior reversible encephalopathy syndrome in a spinal cord injury:
A case report**

Kristof Kempeneers, Rens Busschots, Ellen Roels, Charlotte Kiekens, Koen Peers

Physical and Rehabilitation Medicine, University Hospitals Leuven, Campus Pellenberg, Belgium

Study design:

Case report and review of literature discussing autonomic dysreflexia (AD) as a cause of posterior reversible encephalopathy syndrome (PRES)

Case:

A 75-year-old male with traumatic C5 incomplete tetraplegia (AIS B) secondary to a C5 fracture sustained in 2010 presented at the emergency department with raised high blood pressure, flushing of the face and upper thorax and neurological symptoms such as confusion, incoherent reaction to instructions and uncontrolled movements of arms and legs. CT-scan of the brain did not show any significant abnormalities. MR-scan revealed typical imaging signs for PRES, on both T2-weighted and flair sequences: hyperintense signals subcortical in the left temporal and both occipital lobes as well as in the cerebellum. The list of differential diagnosis for this tetraplegic patient was long, but finally the diagnosis of PRES secondary to AD was made. The cause of AD was supposed to be a pressure ulcer. Raised blood pressure was treated medically. Neurological symptoms subsided over the next days.

Search:

Medline and Embase were searched with terms "autonomic dysreflexia" and "posterior reversible encephalopathy syndrome".

Results:

Three recently published case-reports were found. Every case-report describes a spinal cord injured patient that suffered PRES secondary to AD. One patient didn't survive due to cerebral hemorrhage.

Conclusion:

Recognition of PRES secondary to AD is impeded by multiple factors in a spinal cord injured patient, but of utmost importance as symptoms and radiographic abnormalities can be reversible by prompt treatment. When neurological symptoms are present, magnetic resonance imaging should be performed to evaluate possibility of PRES or other complications. Preventive measures include recognition and treatment of AD and its underlying cause.

Keywords: Autonomic dysreflexia, posterior reversible encephalopathy syndrome, spinal cord injury

P-027

Medical consultation requests during inpatient hospitalization of spinal cord injury patients

Ibrahim Gündoğdu, Erhan Arif Öztürk, Fatma Aytül Çakıcı

Department of Physical Therapy and Rehabilitation, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey

Background:

Interdisciplinary liaison between the numerous medical and surgical specialties following inpatient hospitalization provides the continuum of care for spinal cord injury (SCI) patients. Tertiary hospitals accept referrals for more complex SCI patients and a multidisciplinary work entails frequent interactions with many other services.

Objective:

To describe utilization of clinical consultation for patients with traumatic and non-traumatic SCI during the course of their inpatient care, to define current state of interaction between clinics before implementing a new protocol of SCI care.

Setting:

Reference tertiary hospital that accepts mainly acute SCI patients from all over Turkey with an emergency and trauma center.

Methods:

Medical records of 460 traumatic and non-traumatic SCI patients' inpatient stays (2006–2012) identified from Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital Statistic Center were reviewed retrospectively.

Results:

The mean age at admission was 44±19 years (4-87 years). 283 (61.5%) patients were male, the length of stay was a median of 37 days (s.d: 43.7), 26 (5.56%) patient died during inpatient hospitalization. Total number of 1297 inpatient medical consultations was performed by more than 200 specialists from 28 different clinics. More than half of the medical consultations carried out by only five different clinical specialists. The most requested medical consultation were from physical therapy and rehabilitation clinic (26.13%) and neurology (11.79%), infectious disease (8.94%), chest diseases (5.85%), emergency department (5.47%), otolaryngology (4.47%), intensive care unit (3.85%), plastic surgery(3.85%) neurosurgery(3.31%).

Conclusion:

Inpatient care of SCI patients with complex disabilities are among those most likely need consultation during acute and post-acute period. Our results may indicate which clinics should be in close collaboration during the course of inpatient care of patients with SCI.

Keywords: Referral and consultation, spinal cord injuries

P-029

Management of traumatic cervical spine fracture associated with vertebral artery injury

Yaoki Nakao¹, Nobuyuki Shimokawa¹, Yutaka Mitsuhashi²

¹Department of Spine Center, Tsukazaki Hospital, Japan

²Department of Neurosurgery, Osaka City University, Japan

Objective:

Spinal injuries are frequently associated with vertebral artery (VA) injury. Damage to the VA can result in significant ischemic injury, which can be fatal. However, many aspects of the management of VA injury remain controversial, including the screening criteria, the diagnostic modality, and the optimal treatment for various lesions. We present a case series of traumatic cervical fracture-dislocation associated with vertebral artery injury and discuss the management of them.

Materials-Methods:

This study is a report of retrospective clinical series. A chart review was performed to include patients who presented after blunt trauma with cervical fracture associated with subluxation. An associated VA injury was also required for inclusion. Seven patients were identified.

Results:

Two patients were female and the mean age was 52 years. Five patients suffered an associated spinal cord injury. Four patients underwent closed reduction before surgical stabilization. Five patients underwent internal fixation. Treatment for VA injury was variable, with 4 of 7 patients undergoing anticoagulant and/or antiplatelet therapy. The remaining 3 patients took proximal occlusion of VA. None of the patients experienced an ischemic complication except for a case having demonstrated cerebellar infarction prior to the embolic procedure.

Conclusion:

The management of VA injury associated with cervical spine injury is controversial with several treatment options available, including observation alone, antiplatelet therapy, anticoagulation therapy, or invasive intervention. Although some authors described that management with observation alone seems safe, cerebrovascular injuries have the potential for devastating complications. We usually observe under administering antiplatelet and/or anticoagulative agent before the spinal fixation as long as we can wait. However, in cases needed to be reduced promptly, we conduct proximal occlusion of VA prior to the surgery. In this way, we have achieved acceptable results.

Keywords: Vertebral artery injury, cervical spine injury, embolization

P-030

Spinal dural arteriovenous fistula: A rare and curable cause of paraplegia

Evrim Ögüt¹, Aylin Sarı¹, Osman Sümengen²

¹Physical Medicine and Rehabilitation Clinic, Ministry of Health Erenköy Physical Medicine and Rehabilitation Hospital, Istanbul, Turkey

²Radiology Clinic, Ministry of Health Erenköy Physical Medicine and Rehabilitation Hospital, Istanbul, Turkey

Spinal dural arteriovenous fistula (SDAVF) is rare but still the most commonly encountered vascular malformation of the spinal cord and a treatable cause for progressive para- or tetraplegia. The typical clinical presentation of SDAVF is progressive myelopathy with neurological deterioration such as paraparesis, sensory disturbance, and sphincter dysfunction. Early diagnosis is difficult due to the rarity of SDAVF and the nonspecific symptoms. If the SDAVF diagnosis is missed on initial evaluation, the neurological deterioration can worsen over time. Spinal angiography is the gold standard imaging modality for the diagnosis of SDAVFs.

We report a 68-year-old male who had a 8 months history of gradually progressive bilateral lower extremity weakness, sensory loss, bowel and bladder dysfunction. His initial diagnoses included intervertebral disc degeneration, spondylosis, radiculopathy and received conservative and medical treatment. Despite these interventions his symptoms deteriorated. Spine magnetic resonance imaging (MRI) showed diffuse high signal lesion within the spinal cord from the level of the eighth thoracic vertebra to the conus medullaris on T2- weighted images and the angiograms demonstrated the SDAVF affecting both the thoracic and lumbar spine. The patient later underwent embolization with some improvement in his neurologic symptoms. His rehabilitation programme is still ongoing.

SDAVF is often not suspected and the time to diagnosis is long. Therefore, the understanding of this rare but treatable disease is critical for physicians who manage and treat myelopathy.

Keywords: Spinal dural arteriovenous fistula, paraplegia

P-031

Clinical features and surgical outcome of acute cervical spinal cord injury of non-bony involvement -from a review of the national spinal cord injury database-

Toshikatsu Tominaga¹, Kataoka Hideo¹, Furusawa Kazunari², Sumida Mikio³

¹Yamaguchi Rosai Hospital, Japan

²Kibikogen Medical Rehabilitation Center, Japan

³Aijinkai Hospita, Japan

Introduction:

Large-scale investigation, including of clinical features and outcome of surgical treatment for acute cervical spinal cord injury of non-bony involvement(acscinb) is almost nothing so far. Surgery of those cases was still controversial.

Subjects and Methods:

Out of 3006 database of spinal cord injury nationwide registered, with cervical cord injury, hospitalization within 2 months of the injury, 1316 cases that the basic attributes was obvious was subjects. We made a comparative study of 604 cases of bony involment and 712 cases of non-bony involment. Then, in cases of injury hospitalization within 3 days, we have carried out a comparative study about 50 cases of non-surgical cases and 71 cases of surgical cases of ASIA C impairment scale.

Results:

The mean age of acscinb was 63±23 years old, and approximately 12% increased in the last 10 years. There was no gender difference at 80% for men, and there was no difference in cause of injury. In a comparison of the cases of non-surgical and surgical case, there was no difference in sex, age, cause of injury, the functional level. There was no difference in the ADL scale transition function of ASIA impairment scale, duration of hospitalization, muscle strength gain, ADL acquisition at the time of discharge. However, significantly better than in the cases of non-surgery, the total score of upper limb muscle strength regain showed many cases of surgery at discharge. And, return to work rate was also significantly better than non-surgery.

Assessment:

Acscinb has been increasing over time due to the aging society was considered in Japan, and benenit of surgery for acscinb was in labour.

Keywords: Surgical outcome, acute cervical spinal cord injury of non-bony involvement, the national spinal cord injury database

P-032

Does LSC score affect the clinical and radiological outcome of the acute thoracolumbar burst fractures treated by indirect reduction and short segment stabilization?

Kazuto Miura, Hiroshi Ninomiya, Kazunari Kamimura, Tatsuo Makino

Department of Orthopedic Surgery, Tachikawa General Hospital, Nagaoka, Japan

Objective:

To evaluate the alignment after indirect reduction and short segment stabilization for thoracolumbar burst fractures indicated anterior surgery

Materials-Methods:

From 2009 to 2012, seventeen vertebrae in 15 patients (3 women and 12 men) were enrolled in this study. The average age was 43.3 years old (18-72 years old).

Inclusion criteria were thoracolumbar burst fracture (T11-L4) of AO type A3, B1, B2 and B3 shown on both radiographs and computed tomography (CT), posterior longitudinal ligament evaluated to be intact, possible for patient to undergo surgery within 72 hours after injury and possible for patient to have implants removed.

Results:

No relationships was shown between loss of correction and load sharing classification (?6 or ?7 points), loss of correction and TLICS score (indicated posterior surgery or anterior/combined surgery)

Conclusion:

To determine whether common classification systems of thoracolumbar burst fractures can associate (predict, affect) the radiological outcomes of indirect reduction with ligamentotaxis and short-segment stabilization

Keywords: Burst fracture, thoracolumbar spine, ligamentotaxis

P-033

Surgical management of Acute Traumatic Spinal Cord Injury (TSCI): Oswestry experience

Siddeshwar Patil, Naveen Kumar, Moe Moe Myint

Midland Centre for Spinal Injuries, Oswestry, UK

Objectives:

To investigate the indications and outcomes of surgical management of TSCI in a Regional Spinal Injuries Centre setting.

Methods:

Patients admitted with acute TSCI, those required surgical intervention between Jan-2002 and Dec-2007 and with at least 4 years follow-up were included. Those who underwent surgical fixation prior to admission and stabilization done after 6 weeks were excluded. Electronic Patient Record was used to collect demographic details, injury details, indication for surgery, surgical procedure details, neurology, complications and outcome at last follow up were recorded

Results:

2.8 % patients were included (16/552 first time admission). 56.2% were male patients. Mean age at injury was 39 years (Range 16–63). Road Traffic Accident was the major mode of injury (56.2%) followed by falls (31.2%). The indications for surgical intervention were as follows; Neurological deterioration in 31%, Instability in 43.7%. 12.5% each, for informed choice by the patients and failed skeletal traction for dislocations. Majority (9/16) underwent an anterior approach. Half had bone grafting done for fusion. One patient developed nerve root impingement in the immediate postoperative period. The mean follow-up period was 7 Yrs (4 -10). Documented morbidity was, VTE (2), fracture site pain (3) and neuropathic pain (2). Although no improvement was noted in the Frankel Grade in any patient, the motor score was observed to have improved in some patients.

Conclusion:

Surgical management for TSCI associated with biomechanical instability and progressive neurological deterioration at a dedicated SCI Centre has good outcome with less complications.

Keywords: Spinal surgery; spinal cord injury; outcomes

P-034

An unusual case of cervical spinal schwannoma

Timur Ekiz¹, Meryem Doğan Aslan¹, Cem Hatipoğlu², Özlem Taşoğlu¹, Neşe Özgirgin¹

¹Department of Physical Medicine and Rehabilitation, Ankara Physical Medicine and Rehabilitation Training and Research Hospital, Ankara, Turkey

²Department of Radiology, Ankara Physical Medicine and Rehabilitation Training and Research Hospital, Ankara, Turkey

Peripheral nerve sheath tumors are derived from perineural cells, neural fibroblasts and schwann cells. Schwannoma also known as neurinoma is a benign tumor arising from schwann cells. Schwannoma constitutes 6-8% of primary intracranial tumors. On the other hand, schwannoma sited in cervical spinal radix is very rare.

A 42-year-old woman admitted to our clinic with cervical pain, progressive weakness and numbness on her left upper extremity for the last three months. The neurological examination was consistent with weakness (3/5) in the left biceps brachii, wrist extensors/flexors, fifth digit abduction and distal interphalangeal flexion. Left arm muscles were globally atrophic. Sensory examination yielded diffuse paresthesias at the left upper extremity. Deep tendon reflexes were absent. Laboratory results including complete blood count and liver/kidney functions were normal. Magnetic resonance imaging demonstrated a contrast-enhancing, intradural extramedullary mass with a cystic component which is arising from C7 neural foramen, occupying the left side of the spinal canal, pressing the medulla spinalis and elongating through the left C7-Th1 neural foramen to the left apex pulmonis. She underwent C6-Th1 hemilaminectomy and surgical excision of the mass was performed. The histopathology of the mass was consistent with schwannoma. Postoperatively intensity modulated radiation therapy with target volume technique was applied and then she participated in a rehabilitation program.

In this report, presenting our unusual case, we would like to emphasize that schwannoma must be kept in mind for the differential diagnosis in similar cases and prompt diagnosis, surgical management and rehabilitation is of paramount importance.

Keywords: Peripheral sheath tumor, rehabilitation, schwannoma

P-035

An unusual cause of spasticity increase in sci patients: Case report

Giorgio Scivoletto¹, Francesco Ciro Tamburrelli², Letizia Laurenza¹, Emiliana Di Geronimo², Alessandro Morini², Marco Molinari¹

¹Spinal Cord Unit, IRCCS Fondazione S. Lucia, Rome, Italy

²Department of Spinal Surgery, Catholic University of Rome, Rome, Italy

We report an unusual case of increased spasticity with high grade disability due to cauda equina compression in a 45 year-old female with a preexisting complete paraplegia. Twenty years before the patient sustained a traumatic fracture of T8 with spinal cord injury that resulted in a complete paraplegia (ASIA A). After a so very long span of time she started to complain a very discomfort increase of the spasticity of the lower limbs with episodes of muscular spasms. The episodes became even more frequent with a severe loss of independence in the daily life activities. Bladder function worsened too with increased urinary incontinence despite the pharmacological treatment. Well-known causes of increasing spasticity (pressure sores, urinary tract infections/stones, bowel impact, lower limbs fractures) were investigated but they resulted negative. Finally a thorough MRI investigation of the spine showed a huge intraspinal mass occupying space at L4-L5 that caused severe lumbar nerve roots compression. Surgical removal of the mass and neurological decompression were carried out. At macroscopic examination the mass resulted of soft tissue with small fragment of hard tissues inside that at histological examination revealed as bony and cartilaginous fragments.

Soon after the operation spasticity and incontinence dramatically improved and patient regained her previous normal life.

Conclusions: in case of inexplicable spasticity increase in SCI patients, an MRI examination of the spine at and below the level of lesion is mandatory. In this patients the MRI revealed an unexpected (due to the absence of sensitive symptoms and pain) intraspinal mass. We would expect that the compression of the cauda equine roots would result in a damage of the roots and a decrease of spasticity. However, the presence of the cystic formation represented an "irritative factor" that resulted in an increase of spasticity symptoms.

Keywords: Spinal cord injury, spasticity, intraspinal mass

P-036

Two cases of the occipital plate breakage after occipitocervical fixation surgery

Chikato Mannoji¹, Masao Koda², Takeo Furuya², Yuzuru Okamoto¹, Tamiyo Kon¹, Masahi Yamazaki³, Kazuhisa Takahashi², Masazumi Murakami¹

¹Chiba Aoba Municipal Hospital, Chiba, Japan

²Chiba University Graduate School of Medicine, Chiba, Japan

³Graduate School of Comprehensive Human Sciences, University of Tsukuba, Tsukuba, Japan

Introduction:

Some patients with upper cervical myelopathy need not only decompression, but also occipitocervical fixation. A posterior screw and rod system with an occipital plate is now widely used. Here we report two very rare cases of occipital plate breakage after occipitocervical fixation.

Case Reports:

Case 1

The patient was a 69-year-old man with myelopathy. Magnetic resonance imaging (MRI) showed a pseudo tumor behind the dens compressing the spinal cord. Computed tomography (CT) showed an old Jefferson fracture and degenerative change at the middle and lower cervical level. We performed a C1 laminectomy and posterior fixation from the occipital to T1 region with instrumentation including an occipital plate. The patient was dysphagic after the surgery and received a second surgery 5 months after the primary surgery to adjust the O–C2 angle. During the second surgery, we noticed that the occipital plate had broken where a setscrew was attached to connect the plate and the left rod, which was not evident from the radiograms before the surgery.

Case 2

The patient was a 72-year-old man with myelopathy because of an ossified posterior longitudinal cervical ligament and os odontoideum. MRI showed that his spinal cord was compressed at C1–C2 and C4–C6. We performed a C1 laminectomy, C2–C6 laminoplasty with posterior fixation from the occipital to T1 region with the same instrumentation system as used in case 1. Radiograms revealed left rod breakage at C1, 2 months after surgery. Multiplanar reconstruction (MPR) CT showed that the occipital plate had broken at the same site as in case 1, but on the right side. The patient underwent revision surgery.

Conclusion:

It is difficult to detect occipital plate breakage using radiograms, but MPR CT is useful for revealing any breakage.

Keywords: Occipitocervical fixation, instrumentation failure, occipital plate breakage

P-037

The effectiveness of cervical decompression with open-door laminoplasty in elderly patients

Dongwuk Son¹, Hosang Kim²

¹Yongsan Busan National University Hospital, Pusan, South Korea

²Maryknoll Hospital, New Kowloon, Hong Kong

Objective:

Cervical open-door laminoplasty is commonly used for multiple level cervical spondylotic myelopathy. To date, a lot of studies about surgical techniques, complications and outcomes have been reported. However, reports of clinical outcomes in elderly patients those who had cervical open-door laminoplasty were rare. We reviewed our experiences and assessed outcomes of cervical open-door laminoplasty in elderly patients (age \geq 65 years) and compared with non-elderly patients (age $<$ 65 years).

Materials-Methods:

A retrospective study of the short term result in patients who had open-door laminoplasty for cervical myelopathy caused by ossified posterior longitudinal ligament (OPLL) and / or cervical spondylosis was performed. From January 2005 to December 2012, total 74 patients underwent open-door laminoplasty; 27 patients were elderly and 37 patients were non-elderly. Patients with traumatic cervical myelopathy or spinal cord infarction were excluded. We assessed prognostic factor including ages, sex, symptom duration, intramedullary signal changes on T2-weighted MRI images, pre-operative modified JOA scores, mean canal width, expansion ratio of antero-posterior diameter and open-door angle. Short term outcome was calculated with recovery ratio of modified JOA score at the 6 months follow up in our outpatient department.

Results:

Mean age were 71.4 and 51.8 years old. Mean canal width of antero-posterior diameter increased 6.4? and 5.8? after laminoplasty and expansion ratio was 49.1% and 43.0%. Mean recovery ratio of modified JOA score was 54.6% and 58.0%. Achieved JOA score were same. Pre-operative JOA score had close relationship to the clinical outcomes. And there are no statistically differences in clinical outcomes between elderly patients group and non-elderly group.

Conclusion:

We conclude that cervical open-door laminoplasty also assures good clinical outcomes for multiple level cervical spondylotic myelopathy in elderly patients. There is a need to actively consider this operation for the elderly patients with cervical myelopathy before loss of neurologic function.

Keywords: Cervical spondylotic myelopathy, cervical open-door laminoplasty, elderly patients

P-038

Surgical management of syringomyelia associated with spinal adhesive arachnoiditis as a late complication of tuberculous meningitisDongwuk Son¹, Hosang Kim²¹Yongsan Busan National University Hospital, Pusan, South Korea²Maryknoll Hospital, New Kowloon, Hong Kong

Syringomyelia secondary to TB meningitis is an exceedingly rare condition. The present paper presents a case who developed post meningitic arachnoiditis resulting in the generation of syringomyelia. As these cases are usually associated with extensive arachnoid adhesions and multifocal loculations, surgical attempts generally fail to improve the neurological status. The aim of this paper is to demonstrate the MR features of cervico-thoracic syringomyelia following TB meningitis and to discuss the neurosurgical aspect of the treatment of this rare entity.

A 44 year old male presented with a progressive spastic paraparesis and urinary disturbance and was demonstrated to have a case of syringomyelia from C2 to T3 which was thought to be secondary to adhesive spinal arachnoiditis related to a history of tuberculous meningitis. Following meticulous microlysis of the adhesions, a syringopleural shunt placement was performed. Postoperatively, the syringomyelia had been completely obliterated and improvement of the symptoms had been also achieved.

MRI is the first choice of investigation in detecting TB related myelopathy as it provides a greater detail of pathological changes within and around the spinal cord such as syrinx formation and arachnoiditis. The MR findings are also helpful in deciding the management and predicting the outcome. Presence of multifocal loculations and arachnoid adhesions is the likely cause of treatment failures and poor prognosis.

In our case presented here, we used a syrinopleural shunt; this may be the optimal approach for managing syringomyelia associated with adhesive arachnoiditis. However, this opinion needs to be validated further by other surgeons reporting their experience.

Keywords: Syringomyelia, syrinopleural shunt, tuberculous Meningitis

P-039

Results of pedicle screw stimulation and estimation of surgeons during scoliosis surgery

Murat Zinnuroglu¹, Alpaslan Senkoylu²

¹Department of Physical Medicine and Rehabilitation, Gazi University Faculty of Medicine, Ankara, Turkey

²Department of Orthopaedics and Traumatology, Gazi University Faculty of Medicine, Ankara, Turkey

Objective:

Pedicle screws are commonly used for stabilization in spinal surgeries. Neurological deficits may be seen due to the misplaced screws/holes even if the surgeon is experienced. In this study, in addition to the pedicle screw/hole stimulation the estimation of experienced and resident surgeons on the pedicle screw position were compared.

Materials-methods:

Pedicle screw/hole stimulation was performed during surgery of patients with idiopathic scoliosis. Monopolar ball-tip stimulator was used for stimulation. Muscle responses were recorded from bilateral abductor hallucis, tibialis anterior, vastus lateralis, adductor magnus (AM), rectus abdominis (RABD), external anal sphincter (EAS) ve abductor digiti minimi muscles. Maximum stimulus intensity was 20 V. Modifications related to the pedicle/hole were made when there was a muscle response below 10 V. Pedicle/hole stimulation was performed after the experienced and resident surgeons stated their estimations between 1-5 (1 representing "poor" and 5 as "very good") about the position of the pedicle/hole.

Results:

Pedicle screw/hole stimulation was performed in 165 segments of 13 patients with IS aged between 13-18. Muscle responses were most frequently noted in AM, VL, EAS and RABD muscles. The pedicle screw stimulations which resulted in muscle responses below 10 V were primarily 1st lumbar, 12th thoracic levels and 2nd and 3rd lumbar levels. There was a good correlation on the estimation of the screw position between the experienced and resident surgeons (r:0.798). No correlation was found between the pedicle screw/hole stimulation and the estimation of surgeons (r: 0.160 and 0.220).

Conclusion:

Although there was a good correlation regarding the estimation of surgeons on the position of the screws during the pedicle screw/hole placement considering the anatomic landmarks, muscle responses could be elicited through the screws that were estimated to be well positioned especially in the lower thoracic and upper lumbar regions.

Keywords: Scoliosis surgery, pedicle screw stimulation, intraoperative neurophysiological monitoring

P-040**Intraoperative neurophysiological monitoring and mapping during brain stem surgery**Alp Özgün Börcek¹, Murat Zinnuroğlu², Kutluk, Pampal³, Özgür Öcal¹, Eray Erduran²¹Department of Neurosurgery, Gazi University Faculty of Medicine, Ankara, Turkey²Department of Physical Medicine and Rehabilitation, Gazi University Faculty of Medicine, Ankara, Turkey³Department of Anesthesiology and Reanimation, Gazi University Faculty of Medicine, Ankara, Turkey

Surgical treatment of brainstem lesions is limited due to the presence of important neural structures and lack of reliable anatomic landmarks. We report a case who has undergone a brain stem surgery with the guide of neurophysiological methods to identify the location of motor pathways and especially the lower cranial nerves and nuclei.

Surgical treatment was planned for a 15-year-old male who presented with deviation and weakness in the right side of the tongue and dysphagia after the magnetic resonance imaging revealed a space occupying lesion on the right side of the medulla oblongata that was close to the midline. In addition to the electrode montage for motor (MEP) and somatosensory evoked potentials (SEP), subdermal EEG electrodes were placed on bilateral orbicularis oris, soft palate, vocal cords, trapezius muscles and tongue to monitor 7th,9th,10th,11th, and 12th cranial nerves respectively. Following the craniotomy, motor pathways and the location of 7th,9th,10th,11th, and 12th cranial nerves and nuclei were identified. Bipolar stimulator was used for stimulation. Responses from vocal cords were noted and a temporary but serious bradycardia was developed by the stimulation of the 10th cranial nerve (nucleus ambiguus). The area over the suspected lesion was stimulated and biopsies were delivered following the incision of the non-responsive area. Partial excision was performed for the lesion that was compatible with a low grade glial tumor. MEPs and SEPs were not changed as compared to the baseline values. There was a mild increase in the paresis of the tongue which recovered within a few days in the postoperative period.

Neurophysiological methods may help to identify the motor pathways and especially the location of life-threatening lower cranial nerves and nuclei and very confined safe entry zones during brainstem surgeries. Therefore, the application of neurophysiological methods may significantly diminish the postoperative neurological complications.

Keywords: Brain stem surgery, intraoperative neurophysiological monitoring, cranial nerve

P-041

Multimodal intraoperative neurophysiological monitoring in young children

Alpaslan Şenköylü¹, Murat Zinnuroğlu², Alp Özgün Börcek³, İrfan Güngör⁴, Kadir Kaya⁴, Kemali Baykaner³, Mehmet Beyazova², Necdet Altun¹

¹Department of Orthopaedics and Traumatology, Gazi University Faculty of Medicine, Ankara, Turkey

²Department of Physical Medicine and Rehabilitation, Gazi University Faculty of Medicine, Ankara, Turkey

³Department of Paediatric Neurosurgery, Gazi University Faculty of Medicine, Ankara, Turkey

⁴Department of Anesthesiology and Reanimation, Gazi University Faculty of Medicine, Ankara, Turkey

Objective:

To define the success rate and performance of multimodal intraoperative neurophysiological monitoring (MIONM) in two different age groups of children.

Materials-Methods:

A retrospective cohort analysis in a case series of 43 consecutive patients younger than 11 years old who underwent MIONM. The patients were divided into two cohorts according to their age. Those under the age of five were in group A (n=16), and those older than six were in group B (n=27). After 2mg/kg propofol induction, the baseline somatosensory evoked potentials (SSEPs) and the transcranial electrical motor evoked potentials (tcMEPs) were recorded. Then all of the patients were intubated under a single dose of atracurium 0.5mg/kg. The anesthesia was maintained with 4-6 mg/kg/h propofol, 0.1-0.2 µg/kg/h remifentanyl, and 0.25mg/kg/h ketamine hydrochloride (HCl). A 50% decrement in the tcMEP amplitude compared with the baseline values was accepted as a serious event.

Results:

Except for the SSEPs in three cases, the tcMEPs and SSEPs were recorded for all patients. There was no false-negative outcome. A total of ten serious events were determined in both groups, with three occurring in group A and seven in group B. Eight out of the 10 patients with serious events had the kyphosis component. The diagnosis was congenital kyphoscoliosis in six patients, diastematomyelia in two patients, post-traumatic kyphosis in one patient, and post-tuberculosis (post-TB) kyphosis in another. The tcMEPs had fully recovered by the end of the operation except for the patient with post-TB kyphosis. There were no statistically significant differences in the mean threshold values with regard to transcranial stimulus intensity for the tcMEPs between the two groups.

Conclusions:

For younger patients, MIONM can be performed successfully with a standard anesthesia protocol. The partial or complete loss of tcMEPs was noted more frequently in the patients with kyphosis.

Keywords: Multimodal spinal cord monitoring, tcMEP, SSEP

P-042

**Traumatic retropulsion of T10 vertebra in a 5-year-old boy with involvement of neurocentral synchondrosis:
A case report and review of the literature**

Amro Fayed Alhabib¹, Abdulaziz Hesham Abobotain¹, Sami Aleissa²

¹King Saud University, Riyadh, Saudi Arabia

²King Abdulaziz Medical City, Riyadh, Saudi Arabia

Study Design:

Report of traumatic retropulsion of T10 vertebral body in a 5-year-old boy.

Objectives:

To describe a rare pediatric fracture where there was involvement of the neurocentral synchondrosis (NCS). To evaluate the characteristics of this type of fractures in children.

Summary of Background Data:

NCS is the junction between the vertebral body and the pedicle bilaterally where the vertebra grows horizontally. It closes between 11-16 years. It is a known location for spine fracture. It was mainly reported in children less than 2 years of age secondary to non-traumatic injury. In addition, pediatric spine fractures tend to affect junction areas. To our knowledge, this is the first case of thoracic retropulsion of vertebral body with involvement of NCS in a child.

Methods:

This 5-year-old boy was involved in a motor vehicle collision where he was ejected from the car. He had bilateral lower limb paresthesia and weakness. The fracture involved the neurocentral synchondrosis on the left side and impacted vertebral body into the pedicle on the right side. Additionally, there was posterior vertebral element injury. He was treated with wide laminectomy and posterior pedicle screw instrumentation.

Results:

At 18 months follow up, the patient showed a normal neurologic status and a normal alignment of the spine.

Keywords: Traumatic spondylolisthesis, pediatric spine fracture, neurocentral synchondrosis

P-043

High impact fractures of sacrum and pelvis with no neurological loss – A report of 2 cases

Kappaganthu Venkatesh Prasanna, Lorecar Salcada Lolong, Khang Lau, Shrikant D Pande, Sherry H Young

Changi General Hospitals, Singapore

Introduction:

Sacral fractures are common in trauma related cases. Whilst sacral fractures can be sustained as high energy fractures in road traffic accidents and polytrauma cases, they can also occur as insufficiency fractures in relatively trivial incidents in osteoporotic bones. We report two high impact Denis zone 2-3 sacral fractures in relatively young patients who have fortunately avoided neurological damage.

History:

Two cases, one male and one female both migrant workers to Singapore, who sustained Denis type 2 sacral fractures are discussed. Fractures sustained were unstable and needed to be fixed. Sacral fractures sustained were close to sacral foraminae, however escaped neurological loss.

Results:

Denis et al in 1988 described sacral fractures into 3 zones according to radiological location. While Zone 1 fractures occur in osteoporotic bones and escape neurological damage, Zone 2-3 fractures are usually associated with neurological loss. However more recent work done by Sugimoto et al contradicts this theory and has found that the incidence of lumbosacral plexus injury was not related to the zone of sacral fracture. Instead they found that risk factors for lumbosacral plexus palsy included longitudinal displacement of pelvis, transverse sacral fractures.

Conclusion:

High impact sacral fractures are usually associated with neurological damage according to Denis classification of zonal sacral fractures. However recent work done by Sugimoto et al contradicts this and adds on that the incidence of lumbosacral plexus injury is not related to zone of sacral fractures. Instead they found that risk factors for lumbosacral plexus palsy included longitudinal displacement of pelvis and transverse sacral fractures. Our findings in 2 cases are concurrent to their findings. More work is needed in this regards to confirm or negate this.

Keywords: Sacral fractures, Denis zones of sacral fractures, lumbosacral plexus

P-044

High cervical arteriovenous fistulas fed by dural and spinal arteries and draining into single medullary vein

Kiyoshi Onda¹, Yuichi Yoshida¹, Kounosuke Watanabe¹, Hiroyuki Arai¹, Hideo Okada², Tomoaki Terada²

¹Niigata Neurosurgical Hospital, Japan

²Wakayama Rosai Hospital, Japan

Background:

We have reported a complex arteriovenous fistula (AVF) at C1 with multiple dural and spinal feeders which were linked with a common medullary venous channel, and have emphasized necessity to collect similar cases for better understanding of this type of disease.

Materials and Methods:

Three such cases, two male and one female in their sixties who presented with hematomyelia (2) or progressive myelopathy (1), were treated surgically, and the operative findings were compared with digital subtraction angiography (DSA) to determine angioarchitecture.

Results:

The C1 and C2 radicular arteries and anterior and posterior spinal arteries supplied feeders to single medullary draining vein in various combinations and via various routes. The drainage veins run down along affected ventral nerve roots and lay ventral to the spinal cord. The shunt sites to the vein were multiple: dural, along the ventral nerve root in the subarachnoid space, and on the spinal cord. In two cases with hemorrhagic onset the drainer flowed rostral and in one case with congestive myelopathy it went both rostral and caudal. Preoperative determination of shunt sites and feeding arteries was difficult because of complicated recruitment of the feeders and multiple shunt sites. Angioarchitectural understanding of the cases was accomplished postoperatively by comparing DSA and operative video meticulously. The outcome of these AVF was favorable by direct surgical interception.

Conclusions:

High cervical AVF is unique in angioarchitectural characteristics different from that in the other spinal regions.

Keywords: Spinal arteriovenous fistula, craniocervical junction, angioarchitecture

P-045

Traumatic spinal cord injury and concomitant skull base fracture: A case report

Ibrahim Gündoğdu¹, Natalya Kuzovich Özen¹, Deniz Erdoğan¹, Fatma Aytül Çakıcı¹, Bora Güreş², Ali Özdek³

¹Department of Physical Therapy and Rehabilitation, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey

²Department of Neurosurgery, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey

³Department of Otolaryngology, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey

Objective:

To draw attention to an emergency situation that may arise in the rehabilitation setting

Case:

A 31 year-old female admitted to emergency room after fall from height. Initial radiological examination revealed T11-12 vertebral burst fracture-dislocation, L1 transverse-spinous process fracture and oblique fracture of petrous-mastoid portions of right temporal bone that resulted in paraplegia and facial nerve paralysis. The patient had no history of otorrhea/rhinorrhea. Computerized tomography, magnetic resonance imaging and nasal endoscopy failed to identify any origin of rhinorrhea. Following T10-L2 posterior stabilization surgery and explorative tympanomastoidectomy (16th day), she was admitted to our clinic. On neurological examination, patient classified as T11 AIS B and rehabilitation interventions started for present spinal cord and facial nerve injuries. At 35th day of admission, neurology consultation was requested due to acute onset of headache and nuchal rigidity. Laboratory and lumbar puncture CSF findings confirmed the diagnosis of bacterial meningitis which improved dramatically during the first 24 h of the treatment.

Discussion:

Due to the complex anatomy of the skull base, the fracture may damage vital structures and the dura mater further causing cerebrospinal fluid leak. Central nervous system infections represent only 4% of those experienced by trauma patients; however, in the presence of CSF leakage the incidence increases to 50%. Cerebrospinal fluid leakage occurs frequently in skull base fractures but it is not always recognized which may produce potentially serious consequences on the prognosis. In addition, bacterial meningitis occurs rarely in the setting of traumatic spinal injury as after spinal surgery for traumatic thoracic fracture-dislocation injuries.

Conclusion:

If bacterial meningitis develops after skull base fractures, symptoms often take days to develop during the period maximal rehabilitation takes place. We conclude that condition triggered after explorative tympanomastoidectomy and rehabilitation team members should be aware of this condition by means of dual injuries.

Keywords: Spinal cord injuries, Basilar Skull Fractures, meningitis

P-046

Monitoring upper limb activity during and after spinal cord injury rehabilitation

Michelle Louise Starkey¹, Michael Brogioli¹, Werner Popp¹, Urs Albisser¹, Angela Frotzler³, Anne Brust³, Kasper Leuenberger², Roger Gassert², Armin Curt¹

¹SCI Research Lab, Balgrist University Hospital, University of Zurich, Forchstrasse 340, 8008, Zurich, Switzerland.

²Rehabilitation Engineering Lab, Institute of Robotics and Intelligent Systems, ETH Zurich, Leonhardstrasse 27, 8092, Zurich, Switzerland.

³Schweizer Paraplegic Centre, Guido A. Zäch Strasse 1, 6207, Nottwil, Switzerland.

Objective:

To investigate upper limb function following spinal cord injury by extracting details of movement during specific upper limb activities such as wheelchair use.

Materials-Methods:

Subjects (12 tetraplegic subjects, mean age 54.25 ± 17.89 years) wore one REACT (an inertial movement unit) at each wrist, one around the chest one on a wheel of the wheelchair. Whilst wearing REACT subjects were instructed to carry on with their usual activities of daily life. The wheeling activities were filmed with a GoPro located at the back of the wheelchair facing the floor so that both wheels were in view. Videos were coded and the results used to validate the REACT data. All data was analysed in MATLAB using a custom-designed algorithms and all statistical tests were performed using the SPSS Statistics software.

Results:

We developed a novel wheelchair algorithm which was able to classify from sensor data whether the wheelchair was moving or not with an accuracy of $99.03 \pm 0.78\%$. Further, we tested the accuracy of the algorithm to discriminate between whether the user was propelling the wheelchair actively (with their own arms/hands) or whether their movement was passive (they were pushed). Active and passive wheeling were discriminated with an accuracy of $88.49 \pm 4.88\%$. We were able to classify 9 patients as active wheelers ($89.31 \pm 8.72\%$ of recording time actively wheeling) and 3 as passive wheelers ($3.89 \pm 0.35\%$ active wheeling). The two groups showed a significant difference in active wheeling ($p < 0.01$).

Conclusion:

Novel sensor technology provides detailed, online information about wheeling activity in subjects suffering from tetraplegia not only during rehabilitation but also during everyday life. In the future, not only gross levels of activity-intensity but also detailed upper limb movements will be distinguished and will complement current outcome assessments providing insights into upper limb outcomes.

Keywords: Upper limb; activity tracking; motion detectors; spinal cord injury; GRASSP, wheeling; rehabilitation; functional recovery

P-047

User centered design of the MoreGait device for home-based robotic locomotor training – Results of an end user survey

Daniel Schliessmann, Christian Schuld, Norbert Weidner, Ruediger Rupp

Spinal Cord Injury Center, Heidelberg University Hospital, Heidelberg, Germany

Objective:

A novel approach for an automated locomotor training was provided by the MoreGait (Motorized Orthosis for home Rehabilitation of Gait). Five prototypes were used by 25 individuals with chronic, motor incomplete spinal cord injury (SCI) during 8 weeks at home. Since the study results show significant improvements of walking speed and endurance, a follow-up project was initiated for development of a pre-market prototype. For definition of its technical specifications the users' experiences with and wishes for a home-based robotic locomotion therapy were collected following a user centered design approach.

Materials-Methods:

A questionnaire was set up to systematically obtain feedback from end users. It comprised 74 questions, which were based on a standardized questionnaire (QUEST) extended by device-specific questions. The ratings were given on a 1-5 or a binary scale. Overall satisfaction was assessed by a Visual Analogue Scale (VAS, range 0-1). The survey items were analyzed using descriptive statistics.

Results:

Twenty study participants completed the survey. While the overall satisfaction was good (VAS: 0.67 ± 0.28), the high noise emission of the pneumatic drives was in the focus of criticism. End users reported to feel safe and comfortable during training. They liked the ease of use and simple adjustment. Interestingly, a feedback based on machine-derived parameters was more appreciated than from a clinical expert. The users would have liked to continue the training with MoreGait.

Conclusion:

The feedback from study participants testing a novel robotic device support the concept of an autonomous locomotor training at home. Particularly, based on the high ratings on "usability", "safety" and "confidence in machine-derived feedback parameter" the main specifications of the MoreGait II device will be resumed from the first prototype. The user centered design approach led to a replacement of the noisy pneumatic drives with more silent electrical drives.

Keywords: Home-based therapy, robotic locomotion training, user centered design

P-048**FLOAT: A body weight support system for over-ground gait and balance training**Marc Bolliger¹, Heike Vallery², Peter Lutz³, Michael Fritsch⁴, Lea Awai¹, Armin Curt¹¹Spinal Cord Injury Center, Balgrist University Hospital, University Zurich, Zurich, Switzerland²Delft University of Technology, 2628 CD Delft, The Netherlands³Lutz Medical Engineering, 8455 Ruedlingen, Switzerland⁴Dep. of Biomedical Engineering, Khalifa University, Abu Dhabi, UAE

After an injury to the nervous system extensive locomotor training is essential to provide the damaged neuronal networks with appropriate functional input to promote plasticity in the remaining intact circuits. Therefore, body weight supported treadmill training or robotic-assisted step training are established “massed” practice interventions for regaining walking function. However, there is debate over whether these methods are superior to conventional over-ground locomotor training. Robotic overhead body weight support systems seem to be a promising tool for increasing the outcome of over-ground gait training. There are only a few systems that provide support during over-ground gait training and they suffer from several drawbacks such as limited degrees of freedom and/or undesired interaction forces, mainly caused by inertia. To overcome these drawbacks, we have developed the FLOAT, a novel mechanical concept based on cable robot technology. This body weight support system allows three-dimensional gait training while reducing undesired interaction forces to a minimum. The design allows accurate control of a three-dimensional force vector acting on a human subject during body weight supported over-ground walking in a large area. The first experiments with subjects with a sensory-motor incomplete spinal cord injury have been promising. All subjects were scored as dependent walkers (WISCI<15) but within the FLOAT system patients were able to walk without walking aids, even with low support forces. They showed a more pronounced hip extension and more upright posture compared to non-supported over-ground walking. This new system will allow extensive locomotor gait training with appropriate afferent feedback in a safe environment. We describe the robotic concept of this new body weight support system and show detailed kinematics of patients walking in this system.

Keywords: Gait training, body weight support, overground walking

P-049

Functional Electrical Stimulation (FES) and Brain Computer Interface (BCI) for improving upper limb functionality in spinal cord injured patients

Federica Tamburella¹, Iolanda Pisotta¹, Giorgio Scivoletto¹, Luca Muzzioli¹, Martin Rohm², Ruediger Rupp², Gernot Müller Putz³, Alex Kreilinger³, Febo Cincotti⁴, Marco Molinari¹

¹Clinical Movement Analysis and Research Laboratory Fondazione S. Lucia I.R.C.C.S., Rome, Italy

²University Hospital, Spinal Cord Injury Center, Heidelberg, Germany

³Graz University of Technology, Graz, Austria

⁴Clinical Neurophysiology Neuroelectrical Imaging and BCI Lab IRCCS Santa Lucia Foundation, Rome, Italy.

Introduction:

Functional Electrical Stimulation (FES) of paralyzed muscles can be used to improve physical function in spinal cord injuries (SCI) subjects. Recently it has been suggested that motor imagery training, by means of a brain computer interface (BCI), might have value as an adjunct to restorative interventions targeting post-SCI deficits, due to cortical networks in congruence with imagery of specific movements. The objective of this case report is to quantify the outcome of a combined FES- and BCI training for improvement of restricted hand/wrist movements.

Material-Methods:

1 tetraplegic patient (C6 lesion level, time since injury > 9 months, no voluntary motor function in fingers\hand) started FES training: flexor\extensor muscles of wrist and fingers were stimulate for 30-45 minutes, 5 times\week for 20 weeks. For BCI Training EEG was recorded from 13 electrodes placed over the scalp sensorimotor areas. Real-time signal processing and feedback were provided to patient. Each BCI training session (about 60') consisted of 8 runs, 30 imagery trials each run. Before\after trainings following scales were used: Manual Muscle Test, Modified Ashworth and Visual Analogue Scale for defining perception of pain, spasticity and motivation/satisfaction, NASA-TLX.

Results:

After FES training, the patient showed an improvement in strength, especially at the wrist, associated with a complete reduction of pain and spasticity, in line with a progressive improvement in BCI performance. Also VAS and NASA-TLX's results revealed a high level of satisfaction and motivation.

Discussion:

FES- and BCI training approaches are feasible therapy options in the rehabilitation of tetraplegic individuals with SCI. The outcome of this single case study shows that a clinically relevant reduction of secondary complications after SCI can be achieved. It has to be shown in further studies which component – FES or BCI – is mostly contributing to this effect.

Keywords: FES, BCI, SCI

P-050

Psychometric analysis of centre of pressure assessment by means of stabilometric platform in patients with incomplete spinal cord injury

Federica Tamburella¹, Giorgio Scivoletto¹, Marco Iosa², Marco Molinari¹

¹Clinical Movement Analysis and Research Laboratory Fondazione S. Lucia I.R.C.C.S., Rome, Italy

²Clinical Laboratory of Experimental Neurorehabilitation Fondazione S. Lucia I.R.C.C.S., Rome, Italy

Objective:

Balance impairment has recently been proposed to be highly predictive of functional recovery in spinal cord injury (SCI) patients and thus worth of specific evaluation and rehabilitation. In spite of the common use of observational clinical scales, a more objective balance evaluation can be obtainable analysing Centre of Pressure (COP) parameters by means of stabilometric platforms (SP). The goal of this serial cross-sectional study is to analyse reliability, validity and responsiveness of COP parameters under different testing conditions, for defining which are more suitable to assess balance in SCI patients.

Materials-Methods:

23 patients with incomplete SCI have been repetitively assessed, along 1-year for a total of 111 evaluation sessions, by means of Berg Balance Scale, Tinetti Scale and stabilometric evaluation performed combining sensory conditions (open (OF) and closed feet (CF), open (OE) and closed eyes (CE)). COP's path length (L), mean (V), antero-posterior (VAP) and latero-lateral (VLL) velocity and COP ellipse area (A) were examined. Reliability, validity and responsiveness of COP parameters in association with visual/base conditions were analysed.

Results:

Correlations of COP parameters with scale-scores are higher in OE than in CE condition, and in OF than in CF conditions. The most reliable, sensitive and effective COP parameters are L, V, VAP, VLL while A is the less one. The support base condition affects balance performances.

Conclusion:

SP are tools more reliable, valid and responsible for an objective evaluation of SCI subjects balance performance in comparison to clinical tools. The most indicative COP parameters are V, VAP, VLL. To perform SP assessment both EO and EC, without feet position constriction can be expected to yield reliable data. V data recorded in OF-OE condition, can help clinicians for assessing clinically significant change due to an intervention.

Keywords: Spinal cord injury, stabilometry, balance

P-051

Reeducation through sporting activities does improve aerobic fitness in SCI patients?

Davide Villa, Paolo Martinelli, Sabrina Cugusi, Giulia Zoli, Daniela Senese, Laura Menna, Roberta Vannini

Montecatone Rehabilitation Institute SpA, Imola, Italy

Objective:

Reeducation through Sporting Activities (RSA) started in the Spinal Unit at Montecatone Institute in 2003 to promote social rehabilitation, improvement of psychological condition and sporting activity per se, the latter considered an important prevention tool of secondary cardiovascular complications of SCI. Such complications are known to be favored by physical inactivity and poor aerobic activity. It is now established that a steady aerobic training has, among other things, a preventive effect on cardiovascular complications in SCI patients.

In the present study we wanted to evaluate a possible aerobic reconditioning in SCI patients during regular sessions of rehabilitation through RSA, in addition to a psychological, social and neuromuscular improvement.

Materials-Methods:

The intensity of cardiovascular effort was evaluated and compared between a workout of standard wheelchair tennis (1 coach and 5 patients playing a round) and a wheelchair tennis control (test) session that included a training program specifically organized to improve aerobic capacity (ratio 1: 1 coach/patient). Quantification of the type and intensity of the effort was carried out through the detection of heart rate during and after exercise and Borg's scale, filled by the patient, that evaluates the perceived fatigue during exercise and the quality of recovery between exercises.

Results:

The analysis of the collected data showed that during a session of standard RSA activities the proposed exercises in relation to their type, intensity and duration of exercise breaks do not induce patient's aerobic workout.

Conclusion:

Evidences from the present study suggest that submitting a patient to reeducation through standard RSA does not automatically improve his aerobic fitness.

For this to happen a RSA training program must provide specific work level and defined breaks between exercises. Monitoring the effectiveness of aerobic work programme can be carried out with a heart rate monitoring and Borg's scale.

Keywords: Spinal cord injury, sport activities, aerobic fitness

P-052

Self-reported physical activity and arm accelerometry: Measuring physical activity in individuals with spinal cord injury during inpatient rehabilitation

Dominik Zbogor¹, Janice J Eng¹, William C Miller², Andrei V Krassioukov³, Molly Verrier⁴

¹Department of Physical Therapy, Faculty of Medicine, University of British Columbia, Vancouver, Canada; International Collaboration on Repair Discoveries, Vancouver, Canada

²Department of Occupational Science & Occupational Therapy, Faculty of Medicine, University of British Columbia, Vancouver, Canada; International Collaboration on Repair Discoveries, Vancouver, Canada

³International Collaboration on Repair Discoveries, Vancouver, Canada

⁴Toronto Rehabilitation Institute-University Health Network, Toronto, Canada; Department of Physical Therapy, Faculty of Medicine, University of Toronto, Toronto, Canada

Objective:

Both subjective and objective measures have been employed to measure physical activity in individuals with spinal cord injury (SCI). However, little is known about physical activity experienced during inpatient rehabilitation. Understanding differences in measurement tools is important for accurate portrayal of activity during rehabilitation as they may reflect different facets of physical activity.

Methods:

Using consecutive admissions to a Canadian inpatient SCI rehabilitation centre, we investigated the relationship between the Physical Activity Recall Assessment for People with Spinal Cord Injury (PARA-SCI) and wrist accelerometry at admission and discharge. The PARA-SCI categorizes intensity of activities as nothing, mild, moderate, or heavy and documents time spent on activities. For this study the sum of moderate and heavy activity was used. Patients wore wrist accelerometers on the same days the PARA-SCI was administered. Data from two weekdays near admission was averaged to obtain activity for a typical weekday. The same was done for discharge.

2x2 repeated measures ANOVAs were conducted to explore interactions between the PARA-SCI and accelerometry at admission and discharge from inpatient SCI rehabilitation.

Results:

The 78 participants in this investigation were 49±17 years old. Average time in rehabilitation was 99±49 days. Fifty six percent have paraplegia. There was significant interaction between measurement modality and time: Wilk's Lambda=.87, $F(1,77)=12.03$, $p=.001$, $\eta^2=.14$, where accelerometry counts increased from admission (158240 ± 13939) to discharge (190261 ± 13885) while PARASCI minutes stayed constant (119 ± 7 to 106 ± 9 for admission to discharge, respectively) (values=means±SE). This interaction was present in both individuals with tetraplegia and paraplegia and when therapy sessions were excluded from analysis.

Conclusion:

Over time, patients may be doing more but feel they are working at the same intensity as recovery occurs commensurate with increasing activity. The increase in accelerometry supports this hypothesis and highlights that objective and subjective measurement tools reveal different aspects of physical activity.

Keywords: Inpatient rehabilitation, wrist accelerometry, PARA-SCI

P-053

Relation of different upper extremity grip positions with wheelchair propulsion distance in spinal cord injury patients

Chitra Kataria

Indian Spinal injuries Centre, India

Background:

Most patients with spinal cord injury use a wheelchair as the primary means of mobility. In order to carry out efficient wheelchair propulsion activity good upper extremity strength and effective grip is required. The purpose of this study was (1) to determine the relationship between voluntary forced isometric grip strength and distance covered during single stroke of wheelchair propulsion and (2) to evaluate the status of forced isometric grip strength in three different positions of upper extremity to propel wheelchair backwards & forwards in SCI patients.

Objective:

The purpose of the study was to determine which out of the three holds, central anterior and posterior is better for wheelchair propulsion in spinal cord injury patients.

Materials-Methods:

A Sample of 30 SCI patients with age group of 18-40 years were recruited. All subjects who fulfilled the inclusion criterion were included in the study. Prior familiarization with the procedure and instrumentation was done. Forced isometric grip strength measurement was obtained with the wheelchair locked followed by measurement of wheelchair propulsion (forward and backward) distance using single stroke.

Results:

A significant positive correlation was seen between forced isometric grip strength in three different handrim positions of upper extremity (70, 50, 0 elbow flexion) and the distance covered during forward and backward wheelchair propulsion.

Conclusion:

There exists a significant positive correlation between a forced isometric grip strength in different upper extremity positions and wheelchair propulsion distance (forward and backward). Posterior hold is better than central hold for forward wheelchair propulsion and anterior hold is better than central hold for backward wheelchair propulsion. Inference drawn from these results may clinically help in setting up proper rehabilitation protocols with respect to wheelchair training thus contributing to freedom of mobility and participation for paraplegics.

Key words – paraplegia, wheelchair propulsion, forced isometric grip strength.

Keywords: Paraplegia, wheelchair propulsion, forced isometric grip strength

P-054

Trajectories in wheelchair exercise capacity after spinal cord injury

Casper Van Koppenhagen¹, Sonja De Groot³, Trynke Hoekstra², Floris Van Asbeck¹, Eline Lindeman¹, Luc Woude³

¹De Hoogstraat Rehabilitation, Utrecht, the Netherlands

²Free University of Amsterdam, Amsterdam, the Netherlands

³University of Groningen, Groningen, the Netherlands

Objective:

- 1) to identify different trajectories in the course of exercise capacity in the period between the start of active spinal cord injury (SCI) rehabilitation and five years after discharge;
- 2) to examine determinants of the trajectories in the course of exercise capacity.

Design:

Prospective cohort study. Measurements at the start of active inpatient rehabilitation (start), three months later (3M), at discharge of inpatient rehabilitation (discharge), one year (1Y), and five years after discharge (5Y).

Setting:

Eight rehabilitation centres in The Netherlands.

Participants:

130 persons with SCI, aged 18-65, and wheelchair-dependent at least for long distances.

Interventions: Not applicable

Main outcome measures: Wheelchair exercise capacity: Peak Oxygen Uptake (VO₂peak (L.min⁻¹)), Peak Power Output (POpeak (W)).

Results:

We found four different trajectories in the course of POpeak: (1) HIGH-PRO (33% of total study group): high progressive scores (Start: 49 W – 5Y: 77 W), (2) DETER (12%): progressive scores during inpatient rehabilitation with deteriorating figures after discharge (Start: 29 W – Discharge: 60 W – 5Y: 39 W), (3) LOW-PRO (52%): low progressive scores (Start: 20 – 5Y: 31 W), and (4) LOW-RISE (3%): low inpatient scores with strong progressive scores after discharge (Start: 29 W – 5Y: 82 W). VO₂peak showed similar trajectories. Logistic regression of factors that might be distinctive between HIGH-PRO and LOW-PRO trajectory revealed that older age, female gender, tetraplegic lesion and low functional status were associated with LOW-PRO trajectory.

Conclusion:

Wheelchair exercise capacity after SCI shows for the vast majority a positive trend and can be described in distinct trajectories dependent on personal, lesion and functional characteristics. Conducting a peak wheelchair exercise test in SCI follow-up care might help to identify persons at risk for a debilitating cycle of exercise capacity with long-term health consequences.

Keywords: Spinal cord injury, exercise capacity, longitudinal

P-055

Valid detection of wheelchair propulsion with two accelerometers

Hedwig Kooijmans, Herwin L.D. Horemans, Jireh J.Y. Lim, Suzanne Kooke, Johannes B. Bussmann

Department of Rehabilitation Medicine, Erasmus MC University Medical Center, Rotterdam, the Netherlands

Objective:

Propelling a wheelchair is the most important mobility-related activity for people who are unable to walk due to a spinal cord injury (SCI). Although accelerometers are used in research to quantify wheelchair propulsion as a measure of physical activity, they do not distinguish between driver propulsion and passive wheelchair driving ("being pushed"). They are also complex with respect to configuration and analysis. We assessed whether self-propelled wheelchair propulsion can validly be detected by a set of two accelerometers.

Materials-Methods:

In a rehabilitation center, six wheelchair-dependent people with an SCI (age 29 to 60 yrs; 5 complete lesions) performed a series of representative daily activities according to a protocol (including wheelchair propulsion and other non-wheelchair propulsion activities).

Two ActiGraph GTX3+ accelerometers were used; one attached at the wrist, the other on the spokes of one wheelchair wheel. Based on the movement intensity of the two accelerometers, a custom-made algorithm in MatLab differentiated between self-propelled wheelchair driving and other activities (e.g. being pushed or arm movements not related to wheelchair driving).

Using video recording for reference, two assessors analyzed the duration of self-propelled wheelchair driving and other activities. Validity scores between the accelerometer and the video-analyses were expressed in terms of agreement, sensitivity and specificity scores.

Results:

Overall agreement for the detection of self-propelled wheelchair driving was 0.90 (0.43-0.99). Overall sensitivity was 94.0% and overall specificity 95.5%. Disagreement between accelerometer output and video analysis data resulted mainly from two parts of the protocol: wheelchair driving at a very low speed on a treadmill, and people being pushed in the wheelchair while making excessive arm movements.

Conclusion:

Valid detection of self-propelled wheelchair driving is provided by two accelerometers and a simple algorithm. Disagreement with the video analysis resulted mainly from two atypical activities.

Keywords: Activity monitoring, wheelchair propulsion, physical activity

P-056

Motorized or manual wheelchair in patients with spinal cord injury: Preliminary results

Ebru Yilmaz Yalcinkaya, Berrin Gunduz, Alkan Ozturk, Fatih Kahraman, Belgin Erhan

Physical Medicine and Rehabilitation Clinic, Istanbul Physical Therapy and Rehabilitation Training and Research Hospital, Istanbul, Turkey

Objective:

The purpose of this study was to determine the features of patients with Spinal Cord Injury (SCI) in terms of type of their wheelchair

Materials-Methods:

Fourty one patients with SCI admitted for having wheelchair to our hospital were recruited. Inclusion criteria were: >18 years old and using wheelchair for at least 6 months. 17 patients were interviewed and asked about features of their wheelchair. They were asked to score their satisfaction of their wheelchair. Descriptive statistics, Man Whitney –u test and Chi square test were used for statistics

Results:

Twenty three of 41 patients were met the inclusion criteria and 17 of them were reached and interviewed by phone call. Mean age was 38 years. Only 59% were trained for wheelchair using. Seventy one percent had wheelchair cushion and 3 (18%) had pressure ulcer. 10 patients (59%) use motorized type wheelchair and 7 (41%) use manuel type wheelchair. Patient with motorized type wheelchair were significantly independent than manuel type wheelchair during using wheelchair. However satisfaction of wheelchair score did not differ between two groups. There was significant positive correlation between satisfaction score and wheelchair using years.

Conclusion:

Preliminary results show us that motorized type wheelchairs give the patients more independency. Although wheelchair cushions are very important for preventing pressure ulcers, 29% of the patients in this group do not use them.

Keywords: Wheelchair, spinal cord injury, pressure ulcer

P-057

Survey of wheelchair prescription in patient with spinal cord injury

Ji Cheol Shin, Mi Hwa Cho, Hye Eun Yang, Seo Yeon Yoon, Na Young Kim

Department and Research Institute of Rehabilitation Medicine, Yonsei University College of Medicine, Seoul, South Korea

Objective:

The purpose of this study is to introduce the wheelchair prescription process for SCI patients in Severance Rehabilitation Hospital, Korea. Prescribing appropriate wheelchair helps to perform activities of daily living, mobility, returning to society, and psychological independence.

Methods:

Medical records of 209 SCI patients who visited Severance Rehabilitation Hospital in January, 2011 to December, 2012 were reviewed.

Results:

Among 209 patients, 157 were male and 52 were female. Of the 122 tetraplegic and 87 paraplegic patients, 94 had complete injury, and 115 incomplete injury. Average age was 37 year-old. After injured, the mean period of first wheelchair prescription was 3.6 month.

Prescribed dependent wheelchair ambulation type was 47 cases, indoor level propulsion type was 35, outdoor level was 107 cases. 20 was performed both gait and wheelchair ambulation.

Dependent wheelchair ambulation type was affected sitting tolerance and balance, necessity of head rest and recline back seat, and back height adjustability. These can be classified under 3 types. (subtype 1: 11, subtype 2: 31, subtype 3: 5)

Indoor level propulsion type had common elements for patients with upper extremity weakness and limitation of hand function, classified to two groups considering sitting balance. (subtype 1: 17, subtype 2: 11) In spite of upper extremity normal function, 7 cases were limited outdoor level propulsion. Because they had associated problem (cognitive dysfunction, obesity, pain, aging, etc.).

Outdoor level propulsion type was prescribed both paraplegic and tetraplegic patients. Depending on sitting balance of paraplegic patients, 15 cases were needed back height adjustability element and 58 cases did not. Also, 32 cases were tetraplegic patients that are expected to be recovered motor function.

Conclusion:

Neurological and functional assessment by multidisciplinary approach is needed to wheelchair prescription. The information catalogued in this study, will provide the evidence base for the development of wheelchair prescription guidelines for SCI.

Keywords: Spinal cord injury, wheelchair prescription

P-058

Physical exercise, stress, burnout and fatigue in persons with complete spinal cord injury

Anne M Lannem¹, Marit Sørensen²

¹Department of Coaching and Psychology, Norwegian School of Sport Sciences, Oslo, Norway and Research Department, Sunnaas Rehabilitation Hospital, Nesodden, Norway

²Department of Coaching and Psychology, Norwegian School of Sport Sciences, Oslo, Norway

Objective:

Previous studies on physical exercise, stress, burnout and fatigue in persons with incomplete spinal cord injury demonstrated that physical exercise and degree of coping with disability-stress seemed to mediate the association between disability-stress and both burnout and fatigue. In addition, they experienced burnout and fatigue more frequently than the general population. In order to investigate if persons with complete SCI report similar results, a new questionnaire was sent to a sample of people with complete SCI.

Materials - Methods:

A total of 185 persons with SCI (AIS A), 147 males and 38 females, of which 62 persons with tetraplegia and 122 persons with paraplegia participated in a cross sectional survey.

Results: The mean age was 51 (19 - 75) years, and years' post-injury ranged between 2 and 54 years. The mean burnout score was 2.8 (SD = 0.7), and 10 persons, 6 % of those who completed the Pines burnout measure, scored above 4, the cut-off point for burnout. Mean score for fatigue severity scale was 3.8 (SD = 1.3). Of the sample, 45 % scored 4 or above, whereas 15% scored 5 or above. Physical exercise was positively correlated with perceived exercise mastery ($r = .39, p < .01$) and negatively correlated with fatigue ($r = -.19, p < .5$). The results of the mediation analyses did not demonstrate the same path between disability stress and perceived exercise mastery through physical exercise and coping for persons with complete SCI as it did for persons with incomplete SCI.

Conclusion:

The study demonstrated that the sample of persons with complete SCI experienced burnout and fatigue more similar to the general population and less frequently than persons with incomplete SCI. Possible explanations for this difference will be discussed.

Keywords: Spinal cord injury, exercise, stress coping

P-059

Energy consumption in physical activities after spinal cord injury

Tobias Holmlund¹, Kerstin Wahman²

¹Department of Neurobiology, Care Sciences and Society, Stockholm, Sweden

²Department of Neurobiology, Care Sciences and Society, Division of Neurodegeneration, Stockholm, Sweden

Objective:

Studies have shown that the spinal cord injured (SCI) population has a higher risk of cardiovascular disease (CVD). It is also known that physically activity could prevent the onset of CVD, and that exercise recommendations made for able-bodied persons are not adjusted for SCI population. The objectives of this study were twofold; firstly to determine the resting energy expenditure measured as basal metabolic rate (BMR) and secondly the energy expenditure in thirteen different activities calculated as metabolic energy turnovers (MET), i.e. how many times (turnovers) more than the BMR each activity consumes.

Materials-Methods:

Fifteen participants, ten men and five women, with SCI Th7-12, AIS level A-B were recruited. For measuring purposes the Jaeger Oxycon Pro (mL·kg⁻¹·min⁻¹) was used to determine the BMR and the Jaeger Oxycon mobile for the activity testing.

Results:

The mean BMR for men was 1400 kcal/ 24 h (1032- 1775) and for women 1012 (kcal)/24 h (719 - 1293). The range of MET for activities with different levels of energy expenditures differed with the low energy expenditure ranging between 1,4 MET (watch TV) to 3,2 MET (propelling indoors), for the middle energy expenditure between 3,4 MET (hand bike slow) to 4,3 MET (resistance training), and lastly for the high energy expenditure ranging between 4,7 MET (arm cranking 36-42W) to 6,2 MET (propelling outside exercise).

Conclusion:

This SCI sub-population has a mean energy consumption that is 24% (women 25%, men 23%) lower than able-bodied persons. These results emphasize the importance of a physically active daily lifestyle and resistance training to increase the energy expenditure.

Keywords: Energy expenditure, metabolic energy turnover, basal metabolic rate

P-060

An ergotrainer as a simple and cheap method to train and test with a handcycle

Carla Nooijen¹, Patrick Dubbelman¹, Paul Ter Horst², Rogier Broeksteeg², Linda Valent³, Rita Van Den Berg Emons¹

¹Erasmus Medical Center, Department of Rehabilitation Medicine, Rotterdam, The Netherlands

²Rijnndam Rehabilitation Center, Rotterdam, The Netherlands

³Rehabilitation Center Heliomare, Wijk aan Zee, The Netherlands

Objective:

An ergotrainer, as often used by cyclists, can also be used in combination with a handcycle. Using an ergotrainer, persons who are wheelchair-bound can train inside. Furthermore, an ergotrainer measures the power, making it possible to cycle with controlled resistance. However, accuracy and reproducibility of this power measurement for handcycling is unknown. The aim of this study was to test the reproducibility and accuracy of the power measurement of an ergotrainer combined with a handcycle.

Methods:

An able-bodied person performed a test protocol in an add-on handcycle placed in a Tacx Flow ergotrainer. A PowerTap, known to measure power accurately, was built into the handcycle and used as the reference method. During the test protocol the power (range: 10-130 Watt) measured with the ergotrainer and with the PowerTap was registered and compared. For testing reproducibility, the test protocol was performed twice.

Results:

The power measurement with the ergotrainer was found to be highly reproducible; maximal difference between tests was 2 Watt. Furthermore, deviations were strongly related to the setting of the ergotrainer. For each setting of the ergotrainer, a correction equation was made which can be used for adjusting the power.

Conclusion:

Using correction equations, a Tacx Flow ergotrainer combined with a handcycle can be used to measure power. Of importance is to standardise the tire pressure and the placement of the handcycle in the ergotrainer. If these conditions are met, this ergotrainer can be used as a simple and cheap instrument for training and testing in a handcycle.

Keywords: Handcycling, training, testing

P-061

Speed and energy consumption measurement in spinal cord injury subjects

Giorgio Scivoletto¹, Federica Tamburella², Letizia Laurenza¹, Marco Molinari¹

¹Spinal Unit, IRCCS Fondazione S. Lucia, Rome, Italy

²Clinical and Research Movement Analysis (CaRMA) lablab, Rome, Italy

Objectives:

The Walking Index for Spinal Cord Injury (WISCI) together with walking speed are the default outcome measures of walking for spinal cord injury (SCI) subjects. However, recently, energy consumption has been indicated as a key factor to achieve a functional walking. Aim of the study is to evaluate walking speed and energy consumption of walking at different WISCI levels: self-selected (SSWISCI) and maximum (MaxWISCI).

Participants and Methods:

50 individuals with chronic SCLs. The speed of walking at 10, 50 and 100 meters/second (m/sec) and the physiologic cost index (PCI) were measured under two conditions: SSWISCI and MaxWISCI. The SSWISCI was the usual level in the community confirmed by staff and the Max WISCI was the highest possible level, which was safe at a comfortable speed. The paired T test compared velocity and energy consumption of the two conditions.

Results:

The velocity was greater at 50 (0.62 m/sec vs 0.49 m/sec, p.002) and 100 meters (0.57 m/sec vs 0.44 m/sec, p.006) for the SSWISCI compared to the MaxWISCI and the PCI less at 50 (0.54 ± 0.49 beats/m vs 0.77 ± 0.8 beats/m, p.04) and 100 meters 0.55 ± 0.3 beats/m vs 0.67 ± 0.45 beats/m, p.01).

Conclusion:

Findings confirm that chronic SCI show that changes in walking levels is accompanied not only by a change in speed, but also by a change in energy consumption and suggest that energy consumption could be a useful outcome measure for clinical trials.

Keywords: Spinal cord lesions; walking speed; physiologic cost index

P-062

**The influence of intensive training on sitting balance and trunk stability in individuals with spinal cord injury:
A pilot study**

Wiebke Höfers¹, Anne Lannem²

¹CatoSenteret, Norway

²Sunnaas Rehabilitation Hospital, Norway

Objective:

Sitting balance and trunk stability are important for independence in persons with spinal cord injury (SCI), but there is little research with regard to intensive training, sitting balance and trunk stability. The aim of this study was therefore to examine if intensive training can affect sitting balance and trunk stability in persons with SCI.

Materials-Methods:

Two persons, with respectively AIS-A, level T6 and AIS-C, level C6 participated in a pilot study. Modified Functional Reach Test (mFRT), Trunk Impairment Scale (TIS) and Patient's Global Impression of Change (PGIC) scale were used to evaluate different aspects of sitting balance and trunk stability before and after the intervention periods. The intervention period included 4 hours of daily intensive exercise, 5 days a week for 2 weeks, followed by 2 weeks at home without treatment and ending up with 2 following weeks with intensive training 4 hours per day, 5 days a week. The treatment focused on weight bearing and functional activities, gait, stability training and strength for upper and lower extremities.

Results:

One participant showed significant improvement in mFRT to the right side. The same participant showed slight significant improvement in the coordination part of TIS. The other participant showed significant improvement in mFRT to the left side. Furthermore, he showed significant improvement in TIS, dynamic part. PGIC showed little change for the participants.

Conclusion:

The results of this study indicated that intensive training might influence sitting balance and trunk stability in persons with SCI. Further research is needed, and we suggest a protocol with a randomized controlled trial with intensive training compared with an ordinary rehabilitation program.

Keywords: Intensive training, trunk stability, sitting balance

P-063

A systematic review of the participation and quality of life outcomes following physical disability as a result of an earthquake

Joanne Nunnerley¹, Gary Hooper², Tim Woodfield², Kathryn Mcpherson³, Jennifer Dunn¹

¹Department of Orthopaedic Surgery & Musculoskeletal Medicine, University of Otago, Christchurch, Burwood Spinal Unit, Christchurch, New Zealand

²Department of Orthopaedic Surgery & Musculoskeletal Medicine, University of Otago, Christchurch

³Health and Rehabilitation Research Institute, AUT University, Auckland, New Zealand

Objective:

Earthquakes produce a unique injury picture, including a large number of a Spinal cord injuries, but little is known about the health and wellbeing outcomes of individuals injured in earthquakes. The primary aim of this review was to quantify levels of participation and Quality of Life (QOL) in individuals with earthquake related injuries.

Method:

This systematic review was based on the guidelines from the National Health Service Centre for Reviews and Dissemination. A literature search was conducted in Ovid on Medline, Embase, PsycINFO, CINAHL, and AMED databases, with inclusion criteria limited to studies involving participation or QOL outcomes in adults with physical injury sustained in an earthquake. One researcher undertook the search, with 10% of the articles independently reviewed for reliability by a two other researchers. Quality screening and appraisal was completed independently by 2 researchers using the Critical Appraisal Skills Programme (CASP). From the included studies data was extracted on; the intervention aims, study aims, study design, methods used, characteristics of participants, characteristics of the study setting, outcome measures used, and reported findings.

Results:

Of 414 identified articles, only four articles meet the inclusion criteria. The included articles reported outcomes from the 2001 Gujarat, and 2008 Sichuan earthquake. The results from these studies from earthquakes occurring in developing countries indicated that victims, who experienced Spinal Cord Injury or fractures, continued to have limitations in function, participation and reduced QOL between 1.5 and 2 years post injury.

Conclusion:

The research into participation outcomes following physical disability from earthquake injury is limited and has methodological limitations. The results indicate potential benefit from participation focused rehabilitation for individuals with earthquake related trauma, which may include international assistance in developed countries. More research is required into participation and QOL outcomes for people injured in earthquakes in developed countries.

Keywords: Earthquake, participation, systematic review

P-064

The influences on return to employment/productivity for people injured as a result of the Christchurch February 22nd earthquake: A grounded theory study

Joanne Nunnerley¹, Jennifer Dunn¹, Kathryn Mcpherson³, Tim Woodfield², Gary Hooper²

¹Department of Orthopaedic Surgery & Musculoskeletal Medicine, Burwood Hospital, Christchurch, New Zealand

²Department of Orthopaedic Surgery & Musculoskeletal Medicine

³Health and Rehabilitation Research Institute, AUT University, Auckland, New Zealand

Objective:

Return to work (RTW) following injury improves quality of life, restores important pre-injury roles and is a means of social interaction. Despite the importance of employment, the RTW rate in spinal cord injury (SCI) and other trauma populations is comparatively low. A systematic review of the literature showed low RTW following injury in an earthquake in a developing country, but no studies investigated these outcomes in a developed country.

The aim of this study was to explore factors that influenced return to employment/productivity (such as home making, school or education programs, community organisation and leisure time activities) for individuals with moderate or severe injuries requiring hospitalisation as a result of the February 22nd Christchurch earthquake.

Method:

Semi-structured Interviews of 14 people with moderate or severe injuries, including SCI, were performed at two time points. In addition professionals and employers involved in the RTW process were interviewed. The study used a constructivist grounded theory methodology in keeping with Charmaz's approach. Data Analysis focused on the differences in the RTW processes and outcomes that were specific to the earthquake.

Results:

Results show good RTW rates in the injured individuals from the Christchurch earthquake. There are unique factors influencing RTW in individuals injured in the Christchurch earthquake compared to other trauma populations. These themes identified include the shared experience of being involved in the earthquake, the secondary effects of the earthquakes, and the uniqueness of the injury.

Conclusion:

The return to employment/productivity following traumatic injury as a result of an earthquake is complicated by ongoing environmental factors. However the positive influences on RTW could be utilised in the non-earthquake related trauma population to improve employment/productivity outcomes.

Keywords: Earthquakes, return to work

P-065

3 year follow-up of persons with spinal cord injury following the Haiti earthquake

Colleen OConnell¹, Fiona J V W Stephenson³, David Charles²

¹Department of Physical Medicine and Rehabilitation, Horizon Health Network, Fredericton Canada; Team Canada Healing Hands, Canada

²Secrétaire d'Etat, Bureau du Secrétaire d'Etat à l'Intégration des Personnes Handicapées (BSEIPH) Nazon, Haïti

³Team Canada Healing Hands; Healing Hands for Haiti Foundation, Port au Prince, Haiti

Objective:

The purpose of this study is to determine the outcomes of persons who sustained spinal cord injuries (SCI) due to the Haiti earthquake (January 12, 2010), identify survival trends, post-injury complications, access to resources, status of integration into the community, ongoing needs and challenges.

Materials-Methods:

A survey tool was developed with input from the Haiti Secretariat of State for Persons with Disability (SEIPH) and representatives from 17 national and international non-government organizations(NGO) involved in SCI care in Haiti. Open and closed ended questions on history, current status and experiences, validated measures SCIM and Reintegration to Normal Living Index were included. Utilizing the SCI database maintained since the earthquake with 145 SCI earthquake survivors, individuals were phone contacted, and with informed consent, participated in either face-to-face interviews or phone interviews. All questions were field tested prior to survey initiation, with feedback from persons living with SCI.

Results:

All respondents reported receiving education and followup care from an international NGO, though none knew their ASIA classification. Majority reported two or fewer urinary infections annually, despite reusing catheters average of one month. Infections are managed by increasing fluid intake. Most had pressure ulcers during hospitalization, but few since discharge. Most manage bowel care with daily or every two day routines. Neuropathic pain and spasticity are common complications, with little access to medications. Poor accessibility of homes/ community, and unemployment hinder community reintegration. The majority have flashbacks to the earthquake.

Conclusion:

Such information will assist the SCI community in identifying ongoing needs, and to lay the framework for developing a national strategy for treatment of catastrophic injuries such as SCI. At the same time, such outcomes information will inform the international disaster response community on the long term outcomes of persons with SCI, and aid in planning for future disaster events.

Keywords: Earthquake, outcomes, reintegration

P-066

A prospective comparison study of functional outcomes and demographic characteristics in Indian patients after traumatic and atraumatic Spinal cord Lesions (SCL)

Shiv Lal Yadav, Sanjeev Sharma, Upinder Pal Singh

Department of Physical Medicine & Rehabilitation, All India Institute of Medical Sciences, Ansari Nagar, New Delhi - 110029, India

Objective:

The purpose of this study to compare neurological and functional outcomes in patients among traumatic and atraumatic spinal cord lesions after in-patient rehabilitation both at admission and discharge, correlation of duration and length of stay (LOS) and also Influence of age and gender on functional outcomes.

Materials-Methods:

36 patients with traumatic and atraumatic spinal cord lesions, admitted in spinal cord injury unit for rehabilitation, were prospectively followed-up. Demographic characteristics and Functional outcomes i.e. Spinal cord independence measure (SCIM), Modified Barthel's score (MBI), Rivermead mobility index (RMI) and quality of life basic data set of both groups were compared before admission and after discharge from rehabilitation unit.

Results:

In all, 19 patients were traumatic and 17 patients were atraumatic SCL in etiology. Age, duration of injury and functional outcomes were comparable on baseline in both categories. LOS was found to be similar in both groups (Traumatic 7.26 ± 3.88 weeks v/s Atraumatic 7.29 ± 3.72 weeks). Incomplete lesion was significantly higher in the atraumatic group when compared with the traumatic group ($P < 0.002$). Outcomes measures i.e. SCIM, MBI, RMI and quality of life basic data set were significantly improved in both groups ($p = 0.001$) following rehabilitation. In traumatic SCL, age, and LOS was found to be positively correlated significantly ($p = 0.043$, $p = 0.001$ respectively) with MBI scores. For atraumatic SCL, age was found to be positively correlated significantly with duration of injury ($p = 0.039$) and LOS ($p = 0.028$). In both categories, total SCIM was found to be positively correlated significantly ($p = 0.01$) with MBI scores.

Conclusion:

According to the results of this study, although patients with atraumatic cases had more incomplete SCL but there was no significant difference in LOS and functional outcomes between traumatic and atraumatic SCL.

Keywords: Traumatic & atraumatic Spinal cord lesions, rehabilitation, outcome assessment and functional outcomes

P-067

Non traumatic spinal cord injuries compared to traumatic spinal cord injuries; Are there differential rehabilitation outcomes?

Naveen Kumar

Midlands Centre for spinal Injuries, Robert Jones & Agnes Hunt Orthopaedic Hospital, Oswestry, UK

Objectives:

To study the demographics, injury characteristics, neurological and functional outcomes of patients with non traumatic spinal cord injury (NT-SCI) and compare these to traumatic SCI (T-SCI).

Materials - Methods:

Analysis of 2 year prospective data collection including 27 consecutive patients admitted to a tertiary care SCI rehabilitation unit with NT-SCI and comparison with 65 consecutive patients with T-SCI. Outcomes were further analysed comparing NT-SCI to T-SCI, for co-morbidities and complications during inpatient stay, discharge outcome, length of hospital stay and ASIA Impairment Scale (AIS). Secondary outcome measures included initial mobilisation and discharge SCIM III scores, length of rehabilitation (LOR), and discharge destination between the groups.

Results:

Overall, individuals with NT-SCI were more likely ($p=0.00066$) to be older (mean age 59.6 vs 43.7 years) and have paraplegia (88.9 vs 72.4%) than those with T-SCI. Common aetiologies for NT-SCI were post-surgical complication (37%) vascular (26%), infection (22%), myelopathy (11%) and tumour (3.1 %). Common region of injury and AIS classification at admission, in NT-SCI was thoracic (77%) and AIS-C (41%) respectively. All AIS-B improved to AIS-C. Amongst NT-SCI, most (64%) of AIS-C improved to AIS-D, AIS-D (37%) was the most common at the time of discharge followed by AIS-C (33%). Common SCI-related complications (44%) in NT-SCI, included urinary tract infection (33%) pulmonary embolism and anaemia (16.6 % each) heterotopic ossification and pressure ulcers (1% each). Outcome comparisons did not reveal significant differences in SCIM change ($p=0.01875$), LOR ($p=0.87496$) or discharge destination between NT-SCI and T-SCI.

Conclusion:

This study notes differing demographic and injury characteristics between NT-SCI and T-SCI groups. However, rehabilitation outcomes were not significantly different between the two groups.

Keywords: Spinal cord injuries, traumatic & non-traumatic

P-068

Nontraumatic and traumatic spinal cord injury: Demographic characteristics, epidemiological profile and medical complications

Kadriye Öneş, Nurdan Paker, Ayşe Nur Bardak, Belgin Erhan, Berrin Gündüz, Derya Soy, Berna Çelik, Mustafa Aziz Yıldırım, Çiğdem Çınar, Canan Yılmaz

Physical Medicine Rehabilitation Clinic, Istanbul Physical Medicine Rehabilitation Training Hospital, Istanbul, Turkey

Objective:

The aim of this study was to compare demographic characteristics epidemiological profile and medical complications of nontraumatic (NTSCI) and traumatic spinal cord injury (TSCI) patients.

Materials-Methods:

This study was designed as retrospective case series study.

Results:

Out of totally 130 patients with spinal cord injury (83 men and 47 women), 94 were traumatic patients (TSCI) and 36 nontraumatic patients (NTSCI). The mean age of the patients was 43.53 +/- 17.22 years. The mean age of the TSCI patients was 38.48 +/- 13.89 years. The mean age of the NTSCI patients was 56.69 +/- 18.28 years. The leading cause of TSCI was falls from a high height (n=54, 41.53 %), followed by motor vehicle accidents (n=25, 19.23%). The leading cause of NTSCI was degeneration (n=26, 20 %), followed by tumoral causes (n=10, 7.69 %). The most common complication in NTSCI group and TSCI were urinary tract infection. Similar incidences were found for urinary tract infections (51.07% vs 44.4%), pain at admission, heterotopic ossifications. In addition significant differences were noted between NT/SCI and T/SCI for rehabilitation length of stay (44.88 days vs 52.25 days), and neurologically complete injury (5.5% vs 34.04%).

Conclusion:

There were differences between NT and traumatic SCI groups so SCI patients should not be considered as a unique group and should be divided into groups according to etiologic factors. It is important to plan the rehabilitation program, targets of rehabilitation.

Keywords: Nontraumatic, traumatic, spinal cord injury

P-069

Non-traumatic spinal cord injury in Switzerland: Etiology and rehabilitation outcomes

Inge Eriks Hoogland and the SwiSCI Study Group

Swiss Paraplegic Research, Nottwil, Switzerland

Objective:

To describe frequency, etiology and rehabilitation outcomes of all new non-traumatic spinal cord injury (NTSCI) cases admitted for inpatient rehabilitation in the four specialized spinal cord injury (SCI) centers in Switzerland.

Methods:

Retrospective medical record study including all persons with a newly acquired SCI admitted to the Swiss SCI centers between 01.01.2005 to 31.12.2009. Data definitions were derived from the International Spinal Cord Core Data Set and the International Spinal Cord Injury Non-traumatic Data Set.

Results:

421 persons with a newly acquired NTSCI could be identified. Median age of the persons was 63 years (IQR 50-73 years) and 62% were male. The majority (63%) suffered paraplegia, 23 % tetraplegia and 14% conus cauda lesion. The main etiologies were vertebral column degenerative disorders (30%), particularly disc prolapse (38%) and spinal stenosis (41%); vascular disorders (27%), mostly due to ischemia (63%) and neoplastic causes (29%), which were predominantly of malignant type (63%). Injury severity at discharge was in 10% AIS A, 9% AIS B, 18% AIS C, 55% AIS D. After a median length of stay of 3.3 months (IQR 2.0-5.0 months), 75% of the persons were discharged to their home residence; 8 % were readmitted to a hospital; and 7% were referred to a nursing home. Persons with neoplastic etiology were less likely to be discharged home (68%). Average length of stay ranged from 2.5 to 5.5 months in persons with vertebral column disease and infectious etiology, respectively. During first rehabilitation 3% of the persons died, mainly those with inflammatory and auto-immune or neoplastic etiology.

Conclusion:

This study provides first evidence on current numbers, etiology, rehabilitation outcomes and inpatient survival of persons with NTSCI treated in one of the four specialized Swiss SCI centers.

Keywords: Non-traumatic, rehabilitation outcomes, SwiSCI

P-070

Demographic characteristics of spinal cord injury due to tumor

Sevgi Ikbali Afsar, Sacide Nur Saracgil Cosar, Oya Umit Yemisci, Nigar Gurbuz, Aysegul Dogan, Metin Karatas

Department of Physical and Rehabilitation Medicine, Baskent University Faculty of Medicine, Ankara, Turkey

Objective:

To evaluate demographic and clinical characteristics of patients with spinal cord injury (SCI) due to tumor who were admitted to our rehabilitation program as an inpatient.

Materials-Methods:

The sample consisted of 237 newly-injured patients with SCI whose medical records were retrospectively reviewed. A total of 14 patients (6 males, 8 females) with SCI developing due to tumor were included in the study.

Results:

Mean age of patients was 58 ± 11.37 years. Overall 50% (n=7) of the tumors were primary and 50% (n=7) were metastatic tumors. Based on neurological levels, 1 (7.1%) patient was tetraplegic, 11 (78.6%) were paraplegic and 2 (14.3%) had conus-cauda equina injury. The American Spinal Injury Association Impairment Scale (AIS) grade at admission was A in 7 (50%) patients, B in 1 (7.1%) patient, C in 2 (14.3%) patients, and D in 4 (28.5%) patients. One patient's AIS grade of C at admission became D at discharge. No change occurred in the AIS grade of the other patients. The mean inpatient duration was 31 ± 17 days. The most common rehabilitation period complication was urinary tract infection (42.9%). At the end of the stay, 5 (35.7%) patients were urinary independent. While 1 (7.1%) patient was ambulated for therapeutic purposes, 6 (42.9%) patients were discharged at the wheelchair level and 7 (50%) patients at the ambulation within the community level at the end of the rehabilitation. A lower extremity orthosis was used by 2 (14.3%) patients and an assistive device for ambulation by 7 (50%) patients. The mean Functional Independence Measurement (FIM) motor score was 38.77 ± 22.93 at admission and 54.33 ± 22.19 at discharge with a mean FIM gain score of 23.75 ± 33.75 .

Conclusion:

Inpatient rehabilitation may increase the functional capacity of patients with SCI developing due to tumor.

Keywords: Rehabilitation, spinal cord injury, tumor

P-071

Epidemiology of traumatic spinal cord injuries in the Netherlands in 2010

Johanna Nijendijk, Marcel Post, Floris Asbeck

Center of Excellence for Rehabilitation Medicine, University Medical Center Utrecht and De Hoogstraat Rehabilitation, Utrecht, the Netherlands

Objectives:

1 To update epidemiological data concerning traumatic spinal cord injury (TSCI) in The Netherlands. 2 To evaluate whether patients were referred to specialized rehabilitation centers.

Materials-Methods:

Retrospective descriptive study. From a national database all records of patients discharged from a Dutch acute care hospital in 2010 with the ICD-9 diagnosis codes 806 (fracture of the spine with injury of the spinal cord) or 952 (injury to the spinal cord without apparent spinal fracture) were identified. For all records an anonymized copy of the acute care hospital discharge letter was requested and the received letters were analyzed to identify patients with TSCI. We defined TSCI as a newly acquired traumatic transverse lesion of the spinal cord or cauda equina, resulting in loss of motor, sensory, bladder or bowel function below the level of the lesion, lasting longer than 2 weeks. Further, data on demographic and SCI characteristics and discharge destination was extracted.

Results:

A total of 486 records with the ICD-9 codes 806 or 952 were identified. On 416 we got permission to receive the discharge letter, leading to 380 unique patients and 36 duplicates. On 376 patients we received information. A total of 185 patients with TSCI were identified according to our criteria, of whom 30 died during acute care hospital stay. We estimated the incidence of TSCI as 14.0/million/annum including and 11.7/million/annum excluding patients who did not survive the acute phase. Most patients were male (74%) had tetraplegia (69%), and an incomplete lesion (62%). Median age was 62 years (range 13-96). Discharge destination of survivors was a rehabilitation centre specialized in SCI in 78% of patients with complete TSCI and in 47% of patients with incomplete TSCI.

Conclusion:

The incidence of TSCI surviving the acute phase in The Netherlands in 2010 was estimated to be 11.7/million/annum.

Keywords: Epidemiology, aetiology, the Netherlands

P-072

Traumatic spinal cord injuries in Botswana; Incidence, etiology, demography, clinical characteristics and mortality

Inka Löfvenmark¹, Cecilia Norrbrink², Lena Nilsson Wikmar¹, Claes Hultling¹, Sharon Chakandinakira³, Marie Hasselberg⁴

¹Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, Stockholm, Sweden

²Department of Clinical Sciences, Danderyd Hospital, Danderyd, Sweden

³Spinalis Botswana SCI Rehab Centre, Gaborone, Botswana

⁴Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden

Objective:

To describe the incidence, distribution, causes and clinical characteristics of traumatic spinal cord injuries (TSCI) in Botswana.

Materials-Methods:

Patients with an acute TSCI admitted to Princess Marina Hospital, Gaborone, Botswana during a 2 year period were assessed with regard to neurological level and completeness of injury. Information about cause of injury, socio demography, gender and age was also collected. Additional cases with chronic TSCI (n=50) were included to study the circumstances of car crashes.

Results:

Forty-nine patients with acute TSCI were included. There were 71% males and mean age for the cohort was 33 years, range 4-81. Tetraplegia was found in 59% and complete injuries in 59%. The most common level of injury was C4 (26%) with 61% being complete lesions. The main cause of injury was car crashes (63%), followed by assault (16%) and falls (14%).

Ten persons died before being referred to the rehabilitation unit, and 1 person died after 6 months. All except one of these had a tetraplegia. Time of survival ranged between 2-50 days with a median time of 28.5, excluding the patient that died 6 months post injury.

Among the survival group, 73 % lives in a house with water and electricity and 60% uses pit-latrines and 55% traditional bath.

Out of the 81 persons assessed having either acute or chronic TSCI due to a car crash, over 70% were single car accidents with the major reason being a burst tire, followed by hitting or avoiding animals on the road.

Conclusion:

Incidence of TSCI in Botswana seems low (13/million/year), however there are most likely some patients admitted to other hospitals or who remains unidentified. Tire burst is the most common reason for car crashes, which might be an important factor for future prevention measures, as well as the issues of assault.

Keywords: Traumatic spinal cord injury, Botswana, epidemiology

P-073

Systematic review of demographics, injury characteristics, survival, and functional outcomes following non-traumatic spinal cord injury in developed countries

Rabin Bhandari¹, Jillian Clark¹, Ruth Marshall²

¹University of Adelaide, Adelaide, Australia

²SA Spinal Cord Injury Service, Hampstead Rehabilitation Centre, South Australia

Objective:

Review and present the published data on demographics, aetiology, impairment, survival, and functional outcomes following non-traumatic spinal cord injury (NTSCI) in developed countries, in order to propose a research framework for NTSCI management, guide clinicians in triaging patients for specialist care, and aid service planning.

Materials-Methods:

Literature search of Medline and Embase (1959 to February 2013). Relevant articles in any language regarding participants older than 16years presenting with NTSCI in developed countries (as defined by the WHO) were included.

Results:

472 abstracts reviewed: 20 articles from 10 developed countries met study criteria. All publications selected were based on information obtained from non-acute rehabilitation units and databases. Of these, six were prospective studies, 13 were retrospective, and one was unclear as to data collection. 10 publications presented data on participants with traumatic spinal cord injury as well as NTSCI, with 10 presenting only NTSCI data. Data from a total of 7874 participants with NTSCI were reviewed to analyse length of stay, functional/activity scale scores, and discharge destinations. The types of outcomes published were not consistent between all papers.

Conclusion:

Data regarding the characteristics and outcomes of NTSCI cohorts are inconclusive. There is only very limited evidence to aid clinicians and administrators in developed countries to plan for the management of NTSCI. Areas of improvement are suggested: namely, to show incidence rates, to show clear outcomes by aetiology and impairment preferably from the acute care setting, and to show survival by aetiology and impairment.

Keywords: Nontraumatic, spinal, review

P-074

High incidence of cervical spinal cord injury in a rural area in Japan in 2011: An epidemiological study

Shinsuke Katoh, Tetuya Enishi, Nori Sato

Department of Rehabilitation, Tokushima University Hospital, Tokushima, Japan

Objective:

Between 1990 and 1992, Japan Medical Society of Spinal Cord Lesion (JASCoL) conducted a nationwide postal epidemiological survey, and found that the annual incidence of spinal cord injury (SCI) was 40.2 / million and 75% of them were cervical injury. Percentage of the people at the age of 65 or older increased from 12.1% in 1990 to 23.3% in 2010, and we experienced significant increase of cervical injuries in elderly. We conducted epidemiological study in a rural area where most of SCI would be treated locally to show the epidemiological changes.

Materials-Methods:

Postal questionnaire was sent to 96 hospitals which may treat SCI patients as the primary care in the area (about 780,000 inhabitants). The questionnaire included age, gender, neurological level, presence of skeletal injury, causes of injury and Frankel grade. There were 76 replies in which most of major hospitals in the area were included.

Results:

Ninety-five patients in Frankel A to D were registered (mean age: 67.6) including 69 males (66.0) and 26 females (67.6). The annual incidence was 122.3 / million/ year. There were 65 patients with cervical injury without skeletal injury, 22 with cervical injury with skeletal injury and 8 thoracic or lumbar injury with skeletal injury. Their mean ages were 67.6, 70.6 and 58.5, and the ratios of Frankel C and D was 92.3%, 59.1% and 75.0%, respectively. Low energy injuries including low falls (less than 2 metres), fall on the level ground and fall from stairs complied 58.5%?68.2%?50.5%, respectively.

Discussion and conclusion:

There is significant difference of the incidence of SCI even in Japan. In the urban area, the incidence is still around 40 / million / year, but it is more than 100 in other rural area. Further study is necessary to elucidate this significant difference of the incidence.

Keywords: Epidemiology, elderly, cervical

P-075

Comparison of rehabilitation outcomes following falls related and traumatic spinal cord injury

Naveen Kumar

Midlands Centre for spinal Injuries, Robert Jones & Agnes Hunt Orthopaedic Hospital, Oswestry, UK

Objectives:

To study the demographics, injury characteristics, neurological and functional outcomes of patients with falls related spinal cord injury (FR-SCI) and compare these to those with traumatic SCI (T-SCI).

Materials - Methods:

Analysis of 2-year prospective data collection including 36 consecutive patients admitted to a tertiary care SCI rehabilitation unit with FR-SCI and comparison with 29 consecutive patients with T-SCI. Factors taken in to account for FR-SCI are cause of fall, height of fall, medication use and use of alcohol. Outcomes were further analysed comparing FR-SCI to T-SCI, for complications during inpatient stay, discharge outcome, length of hospital stay and ASIA Impairment Scale (AIS). Secondary outcome measures included initial mobilization and discharge SCIM-III scores, length of rehabilitation(LOR), and discharge destination.

Results:

Overall, individuals with FR-SCI were more likely ($P<0.0002$) to be older(mean age 60.5vs.43.8 years) and have tetraplegia (78 vs 27%) than those with T-SCI. Common aetiologies for FR-SCI were fall, from level ground(51%), stairs (30%) & height (19%). Common region of injury and AIS classification at admission, in FR-SCI was cervical (78%) and AIS-C(44%) respectively. All AIS-B improved to AIS-C or D Amongst FR-SCI, only (52%) of AIS-C improved to AIS-D, AIS-D(58%) was the most common at the time of discharge followed by AIS-C(28%). 1-in-4 patients in FR-SCI, SCI was associated with alcohol consumption as well due to medication. Common SCI-related complications in FR-SCI, included urinary tract infection (30%) pulmonary embolism(15%) ventilation associated pneumonia (13%) and pressure ulcers(3%). Outcome comparisons did not reveal significant differences in SCIM change ($p=0.05592$) or LOR ($p=0.16726$) between FR-SCI and T-SCI. However the significant difference was noted with discharge to Interim facility, 42% amongst FR-SCI and only 3% in T-SCI group.

Conclusion:

Results highlight the need for specific consideration to discharge destination be made of amongst the rehabilitation needs of individuals who sustain SCI as a result of a fall.

Keywords: Spinal cord injuries, traumatic & fall

P-076

Readmissions to a specialty spinal unit in Western Australia: A forty-year review

Anne Michele Watts, John Kingston Ker

Sir George Bedbrook Spinal Unit, Royal Perth Hospital, Shenton Park Campus, Western Australia

Objective:

The aim of this study was to analyse the readmission rates, admitting diagnoses and lengths of hospital stay (LOS) for individuals with traumatic spinal cord injury to the specialty spinal unit in Western Australia for the past forty years.

Background:

Secondary complications are common and they require hospitalisation that is costly to the patient, their family and the health care system. The first step towards designing prevention is to conduct a retrospective review to quantify the magnitude of the problem and the admitting diagnoses.

Study Design:

Retrospective study

Method:

Linkages were made between the patient medical record number, specialty spinal unit database, manual records in the form of a historic cardex system, hospital patient files and Western Australia Health Department database. This analysis included patients who sustained a traumatic spinal cord injury between January 1971 and December 2011. Readmission rates, admitting diagnoses and LOS were calculated for each pre-determined diagnostic group.

Results:

815 people met the inclusion criterion and 463 (56.8%) required one or more readmissions to the specialty state spinal unit after their post-acute rehabilitation. Readmissions ranged from 1 to 40 per person, with a total of 2,722 readmissions for this study group. Average LOS was 19.05 days. Readmission reasons were: genito-urinary (34.5%), integumentary (skin) (21%), musculoskeletal (9.0%), respiratory (3.3%) gastrointestinal (3.0%), psychosocial (1%). Average LOS for pressure ulcers was 80.7 days, fracture of the lower limb was 36 days, cellulitis / burns was 26.4 days, upper limb surgery was 38.7 days, urinary tract infection was 13.9 days and chest infection / pneumonia was 16.3 days.

Conclusion:

These readmission rates, admitting diagnoses and the LOS in the traumatic SCI population for a 40 year period on a single unit, provide a platform to determine particular preventative strategies.

Keywords: Traumatic spinal cord injury, complications, secondary conditions

P-077

The characteristics of spinal cord injured patients rehabilitated during one year period: Initial hospitalization versus rehospitalization

Berrin Gunduz, Derya Soy, Berna Çelik, Kadriye Öneş, Nurdan Paker, Ayse Nur Bardak, Belgin Erhan, Ebru Yılmaz Yalcinkaya, Özlem Şatır, Ahmet Bozan, Merve Aktimur, Abdullah Eslem Erdem

Istanbul Physical Medicine Rehabilitation Training Hospital, Istanbul, Turkey

Objective:

The aim of our study was to evaluate the inpatient spinal cord injured (SCI) patients with respect to demographic data and clinical characteristics during 1 year period.

Materials-Methods:

One hundred thirty one SCI patients out of 167 who were rehabilitated at our hospital during year of 2012 and could be reached by telephone were included. The demographic and clinical data, the date of referral for rehabilitation, the date of hospitalization and length of stay were retrieved from the records. Missing information about the number of rehospitalizations and follow up was questioned by phone call. Descriptive statistics, chi-square and t-test were used as statistical methods.

Results:

One hundred thirty one patients were hospitalized for rehabilitation (78 men and 53 women); mean age of was 43.32 ± 16.76 years, median disease duration was 690 days (60-18900). Eighty six patients reported that they were regularly followed up.

Fifty four patients (41%) were hospitalized for initial rehabilitation; they had a LOS for 60.28 ± 36.49 days. The etiology was traumatic in 65%. The rehospitalized 77 patients had a mean LOS of 52.87 ± 24.43 days. The etiology was traumatic in 64%. In 70% of the patients it was their 2nd hospitalization for rehabilitation; follow up and robotic training were the most frequent reasons of rehospitalization (46 and 22% respectively).

The two groups were similar in respect to gender, etiology, level of lesion, waiting duration, LOS, follow-up ratio. The medical treatment only differed for neuropathic pain being more frequent in the rehospitalized group.

Conclusion:

Most of the SCI patients rehabilitated during one year period are rehospitalized patients. The demographic characteristics and LOS are similar in both groups. Neuropathic pain is more frequent in the rehospitalized patients.

Keywords: Spinal cord injury, rehabilitation

P-078

Epidemiology of Traumatic Spinal Cord Injury (TSCI) in Switzerland: Evidence from the Swiss Spinal Cord Injury Cohort Study (SwiSCI)

Sonja Meier, and the SwiSCI Study Group

Swiss Paraplegic Research, Nottwil, Switzerland

Objective:

To evaluate incidence, etiology, demographic and SCI characteristics of TSCI patients receiving first rehabilitation in Switzerland.

Design:

Retrospective and multicenter medical records study.

Participants/Methods:

We identified patients over 16 years who started first rehabilitation in one of the four Swiss referral centers for SCI between 2005 and 2010. Socio-demographic, clinical and first rehabilitation data were extracted from the medical records. Crude, age- and sex-specific incidence rates per million population (IR) were calculated.

Results:

541 patients were included, 77% were male and median age was 44 years (IQR: 30-61). The crude annual IR of TSCI was 17.1 (95% CI: 15.7 – 18.6), with IRs of 27.2 (95% CI: 24.7 – 29.9) and 7.6 (95% CI: 6.3 – 9.0) for males and females, respectively. The youngest age group (16-25 years) showed the highest male-to-female IR ratio (IRR: 6.8 (95% CI: 3.6 – 14.1), with sports and leisure accidents as predominant cause (43%). In the oldest age group (≥ 66 years), falls accounted for the majority of TSCI (68%). Median duration of first rehabilitation stay for tetraplegic persons (47%) ranged from 8.9 to 3.5 months for AIS scores A to D respectively; for paraplegic persons (53%) from 5.9 to 3.5 months. Overall, 79% were discharged to their private residence.

Conclusion:

In Switzerland, the overall incidence rate of TSCI is similar to other European countries. Evident targets for future prevention policy include the reduction of sports and leisure accidents in young males as well as falls in the elderly. In international comparison, duration of first rehabilitation for TSCI patients is extended.

Support:

Swiss Paraplegic Foundation

Keywords: Epidemiology, traumatic spinal cord injury, incidence

P-079

Clinical and demographic characteristics and functional outcomes in traumatic spinal cord injured patients at a national rehabilitation center in Turkey

Meryem Doğan Aslan, Özlem Taşoğlu, Didem Yenigün, Neşe Özgirgin

Ankara Physical Medicine and Rehabilitation Training and Research Hospital, , Ankara, Turkey

Objective:

To determine clinical, demographic characteristics and functional outcomes in traumatic spinal cord injured patients.

Materials-Methods:

We retrospectively reviewed hospital records on 103 patients with traumatic spinal cord injury. Age, gender, length of hospitalization, type of injury, ASIA impairment scale, complications, type of bladder and rehabilitation outcomes were recorded.

Results:

Mean age of the patients was 31.8±13.1. Of cases 85.4% was male, 14.6% was female. The average length of hospitalisation was 85.9±52.3 days. Motor vehicle accidents accounted for 43.7%, falls 42.7%, trapping under wreckage 7.8% and diving 5.8% of injuries.

Thoracal injury was most common with 49.5% and followed by cervical (32%) and lomber (18.4%) respectively. According to ASIA impairment scale, of the patients 59.2% were ASIA A, 18.4% ASIA B, 7.8% ASIA C and D. Apart from these 12.6% were cauda equina and conus medullaris syndrome and 1.9% were central cord syndrome.

Complications were neurogenic bladder (94.2%), neurogenic bowel (92.2%), neuropathic pain (66%), respiratory dysfunction (65%), spasticity (55.3%), decubitis (38.8%), depression (32%), contracture (28.2%), osteoporosis (11.7%), autonomic dysreflexia (8%), heterotopic ossification (7.8%) and deep venous thrombosis (3.9%) respectively.

Prerehabilitation functional status were as follows; 46.6% unable to sit and stand, 37.9% unable to stand, 1.9% verticalized in parallel bars, 2.9% ambulated in paralel bars, 10.7% ambulated with brace and walking aids.

Postrehabilitation functional status were; 3.9% unable to sit and stand, 22.3% unable to stand, 21.4% verticalized in parallel bars, 9.7% ambulated in paralel bars, 42.7% ambulated with brace and walking aids.

Bladder types according to the urodinamy results were 57.3% hyperreflex dyssynergic, 25.2% hypoactive detrussor, 9.7% normoactive dyssynergic, 2.9 % hyperreflex synergic. Management of neurogenic bladder was performed with clean intermittent catheterisation in 66% of patients, indwelling catheter in 19.4%, spontaneous micturation 8.7% and cystofix in 1%.

Conclusion:

Significant improvement was determined in functional outcome after rehabilitation program.

Keywords: Spinal cord injury, complication, rehabilitation

P-080

Vehicular crashes as a cause of spinal cord injury: Descriptive statistics from the national spinal cord injury database in the US

Ying Tang, Tori Allen, Yuying Chen

Department of Physical Medicine and Rehabilitation, University of Alabama at Birmingham, Birmingham, Alabama, USA

Objective:

Provide descriptive detail about the vehicular crashes as a cause of spinal cord injury (SCI).

Materials-Methods:

Data of 4,978 persons who sustained a SCI in 2005 or later were retrieved from the National SCI Database. External causes of injury documented by ICD-10 CM were reviewed. This study was limited to those injuries caused by vehicular crashes, V20 to V79 (n=1,513), that present impacts with other vehicles and single vehicle accidents.

Results:

Descriptive analysis of 1,513 participants showed a mean age of 36.8 years, 73.7% were male, and 70.7% were white. The majority of vehicular crashes (n=998, 66.0%) happened while participants were in cars; followed by motorcycles (20.2%) and vans, pick-up trucks, and sport utility vehicles (SUVs, 11.2%). About 24.7% of vehicular crashes were collisions with cars, pick-up trucks, vans, or SUVs; 21.4% were collisions with fixed objects; and 26.4% were involved with non-collision transport, such as overturning cars without collision. Of 1,192 injuries involved cars, trucks, vans, SUVs, heavy transports, and buses, 56.9% were drivers, 24.2% were passengers, and 18.9% were others, including persons outside of the vehicle, boarding or alighting the vehicle, as well as unspecified occupants. These findings did not significantly differ by age, gender and race.

Conclusion:

Our study findings highlight the need of further investigation to identify factors associated with the common types of vehicles and collisions that cause a SCI for the development of an effective prevention program.

Keywords: Spinal cord injuries, traffic accidents, epidemiology

P-081

Demographic characteristics of inpatient rehabilitation traumatic spinal cord injury; Retrospective study

Ayşe Nur Bardak, Belgin Erhan, Berrin Gündüz, Derya Soy, Berna Çelik, Kadriye Öneş, Pınar Oral, İmran Eren, Ebru Yılmaz

İstanbul Physical Medicine and Rehabilitation Training Hospital, İstanbul, Turkey

Objective:

We investigate the demographic characteristics of patients with traumatic spinal cord injury that we have rehabilitated in our clinic.

Materials-Methods:

Medical records of patients with spinal cord injury admitted to the our rehabilitation clinic during 2010-2013 were collected and reviewed retrospectively. We evaluated demographic characteristics with traumatic injury patients.

Results:

In the last three years a total of 300 spinal cord injuries treated in hospital patient files were examined, 198 patients with (62.9%), traumatic, 102 patients (32.4%) were non-traumatic spinal cord injury. Traumatic spinal cord injury 58 patients were female (29.3%), 140 were male (70.7%). The mean age of the patients was 38 ± 15 . The most common cause of injury, fall from height (47%), the second reason motor vehicle accidents (26.8%). The most frequently injured region, thoracic region (45.5%) 27.8% prevalence of lesions in the lumbar region, the cervical region was 26.3%. According to the classification of ASIA motor complete the vast majority of cases (32.8% AIS A, AIS B 25%, 8). Motor incomplete AIS C 29.2%, a rate AIS D was 22.2%. The most common injury in the period of summer and autumn 27.3% 28.3% as investigated. Average length of stay in our clinic, 1.7 months.

Conclusion:

Profile of the patients we look at our clinic, traumatic spinal cord injury are seen in male patients more than female patients, and the most common cause of falls. We can say that the most common trauma seen as the summer and autumn seasons.

Keywords: Spinal cord injury, trauma, epidemiology

P-082

Epidemiology of spinal cord injury patients and issues of post discharge care in these patients: A report of experience in a single centre in Singapore

Kappaganthu Venkatesh Prasanna, Lorecar L Salcada, Kheng Lau, Shrikant D Pande, Sherry H Young

Changi General Hospitals, Singapore

Introduction:

Spinal cord injury (SCI) leads to multisystem malfunction and disability. Previously SCI was disease of young persons involved in high speed RTAs and contact sports. Survival after SCI has vastly improved largely due to regular follow up and monitoring

Aim:

Aim of our study is to look at epidemiology of SCI over the last year (Apr2012- Mar 2013) from a single centre in east of Singapore and compare this with current SCI pattern in other developed world. We also set out to find out whether the post-discharge, follow-up in these patients is adequate

Materials-Methods:

We looked at all traumatic spinal cord injury patients admitted to rehabilitation medicine department in a single district general hospital, (Changi general Hospital) from the period April 2012 to March 2013. The nature of injury, surgical versus conservative management, levels of cord injury, recovery from neurological damage, complications during the acute rehabilitation phase and length of stay were all recorded. We also followed up to see what outpatient follow-up arrangement was

Results:

In all we reviewed over 50 patients with traumatic SCI. We note that age of sustaining SCI is higher as well as the mechanism of SCI injury is different in Singapore population in comparison to developed world. We also note that there is no formal follow-up programme post discharge in SCI patients

Conclusion:

In conclusion we see a different epidemiological characteristic in SCI patients (in Singapore) compared to developed world. We also recommend a regular follow up post discharge in these patients in order to improve quality of life and life expectancy

Keywords: Epidemiology, SCI, quality of life and life expectancy

P-083

Discharge status and factors influencing discharge disposition of SCI patients in Korea

Ji Cheol Shin, Na Young Kim, Seo Yeon Yoon, Han Kyul Park, Min Kyung Jo

Department and Research Institute of Rehabilitation Medicine, Yonsei University College of Medicine, Seoul, South Korea

Objective:

Knowledge of the factors that affect place of discharge in combination with information on predictors of other rehabilitation outcomes would be useful in the establishment of appropriate rehabilitation goals for the person who is admitted to inpatient rehabilitation. Therefore, identifying and quantifying factors that influence discharge location following rehabilitation for spinal cord injury patients are required.

Materials-Methods:

Eligible clients were patients with spinal cord injury admitted to the department of rehabilitation medicine, Severance hospital (Seoul, Korea) and discharged alive between January, 2011 and December, 2012. Medical charts of individuals were reviewed and data regarding individual characteristics, health-related characteristics, hospitalization factors and insurance were extracted. Discharge locations are classified into general hospital, rehabilitation special hospital and home. Insurances are classified into national health, automobile and industrial accident compensation insurance.

Results:

A total of 204 SCI patients were assessed. In total, 32% of patients were discharged to home post rehabilitation. 68% of chronic, 21% of subacute and 28% of acute; 22% of tetraplegia and 41% of paraplegia; 33% of AIS-A, 19% of AIS-B, 18% of AIS-C, 40% of AIS-D; 37% of NSI, 29% of automobile insurance and 0% of IACI; There is no significant difference according to insurance in patients with incomplete injury, but 27% of patient with complete injury supported by automobile insurance discharged to home whereas 44% of NSI group did.

Conclusion:

One of the most important goals of rehabilitation is to make it possible for people to live and function independently within the community. This study shows discharging is decided when the patient who has vague expectation of recovery realizes hospitalization does not improve medical condition. Discharge planning considering individual characteristics and medical status is needed.

Keywords: Discharge planning, spinal cord injury

P-084

SASCIS – Swedish ageing with a spinal cord injury study: Housing and health

Lizette Mårtensson¹, Sophie Jörgensen², Maria Haak¹, Björn Slaug¹, Jan Lexell², Susanne Iwarsson¹

¹Department of Health Sciences, Centre for Ageing and Supportive Environments (CASE), Lund University, Lund, Sweden

²Department of Rehabilitation Medicine, Skåne University Hospital, Lund, Sweden; Department of Health Sciences, Lund University, Lund, Sweden

Objective:

People with spinal cord injuries (SCI) live longer with their disabilities than ever. It is well known that accessible housing environments support wellbeing and activity in daily life (ADL) in older people. Our knowledge of housing aspects, such as environmental barriers and accessibility, as well as aspects of health, such as ADL and life satisfaction in people ageing with a SCI is so far incomplete. The aim of this study was to describe a group of people ageing with SCI based on various aspects of housing and health.

Materials-Methods:

As a part of the interdisciplinary project SASCIS, 123 men and women with a traumatic or non-traumatic SCI for at least 10 years and age 50 years or older were recruited. Person and environmental data were collected through interviews at home visits.

Results:

Men accounted for two thirds of the participants. It was an even distribution between those cohabiting and those living alone, but men were more likely to cohabit than women. Those who were cohabiting had higher levels of life satisfaction and fewer functional limitations than those living alone. Individuals above 65 years were somewhat more dependent in ADL and used more often assistive devices than those that were younger. Accessibility problems were extensive in the entire group, and slightly more common among men and those living alone.

Conclusion:

This first study on home and health among people ageing with a SCI increases our knowledge of person-environment relations in this patient group. Further studies planned based on the data collected will generate a knowledge base for the development of interventions for people ageing with SCI and their specific needs.

Keywords: Spinal cord injuries, aging, accessibility

P-085

SASCIS – Swedish Ageing with a Spinal Cord Injury Study: Demographics, injury characteristics and outcome

Sophie Jörgensen¹, Lizette Mårtensson², Susanne Iwarsson², Jan Lexell¹

¹Department of Rehabilitation Medicine, Skåne University Hospital, Lund, Sweden; Department of Health Sciences, Lund University, Lund, Sweden

²Department of Health Sciences, Centre for Ageing and Supportive Environments (CASE), Lund University, Lund, Sweden

Objective:

An increasing number of people around the world are ageing with a spinal cord injury (SCI). Over the next decades many will need health care, support and resources to maintain an active and healthy lifestyle. To increase our knowledge of their functioning and disability and what challenges they meet as they age, we have initiated a large study – SASCIS – that will assess people in southern Sweden ageing with a SCI. The aim of this presentation is to describe the study population in terms of demographics, injury characteristics and outcome.

Materials-Methods:

All participants were recruited through the SCI Unit in the Department of Rehabilitation Medicine, Skåne University Hospital, Lund, Sweden. Inclusion criteria were: i) traumatic or non-traumatic spinal cord injury for at least 10 years and ii) age 50 years or older. A total of 192 individuals, out of 797 individuals, met the inclusion criteria and 123 gave their written informed consent to participate. Data regarding their impairments, activity limitations, participation restrictions, health-related quality of life, life satisfaction, and personal and environmental factors were collected through interviews at home visits and from medical records.

Results:

The mean age of the 123 participants was 63 years (range 50-89 years), with on average 24 years post injury (range 10-56 years), and men accounted for about two thirds of the study population. Non-traumatic SCI, due to various medical conditions, accounted for 38%, followed by traffic accidents (24%). Almost one third were classified as complete (AIS A) and 39% had suffered a cervical injury.

Conclusion:

These initial results confirm that there is a large group of people ageing with a SCI in Sweden. Data from the SASCIS will provide in-depth descriptions of this population and be used as a foundation to develop specific follow-up programs and lifestyle interventions.

Keywords: Spinal cord injuries, ageing, demographics

P-086

Causes of death in an aging spinal cord injury population

Michael John DeVivo¹, Yuying Chen¹, James Krause², Lee Saunders², Yue Cao²

¹University of Alabama at Birmingham, Birmingham, Alabama, United States

²Medical University of South Carolina, Charleston, South Carolina, United States

Objective:

Identify causes of death following spinal cord injury (SCI).

Materials-Methods:

45,516 persons with SCI treated at a model system were included in the study. Survival status was determined by routine follow-up, Social Security Death Index and National Death Index (NDI), state vital statistics, and newspaper obituaries searches. Causes of death were determined from searches of the NDI, death certificates, hospital discharge summaries, and autopsy reports. Leading causes of death and cause-specific standardized mortality ratios (SMR) were calculated by current age (0-29, 30-59, > 60) and time post-injury (year 1, 2-9, > 10).

Results:

10,025 deaths occurred among 543,348 person-years of follow-up. The leading causes of death before age 30 were accidents (14.4%), pneumonia (12.7%), and suicide (10.4%). Between age 30 and 59, the leading causes were pneumonia (13.7%), septicemia (12.5%), and accidents (8.9%). At age 60 or greater, pneumonia (16.5%), ischemic heart disease (14.6%), and cancer (12.8%) caused the most deaths. SMRs decreased with advancing age and were highest for septicemia, pulmonary embolus, and pneumonia. During the first post-injury year, pneumonia was the leading cause of death (18.3%), followed by non-ischemic heart disease (14.3%), and other respiratory diseases (11.6%). Pneumonia (15.3%), septicemia (10.1%), and ischemic heart disease (9.8%) were the leading causes of death during the second through ninth years, while pneumonia (12.9%), cancer (12.5%), and septicemia (11.5%) were most common after that. Pulmonary embolus had the highest SMR during the first post-injury year (172.2), followed by septicemia (61.4) and pneumonia (40.4). Beyond the first post-injury year, septicemia had the highest SMR, followed by pulmonary embolus and pneumonia in years 2-9, while pneumonia ranked second and pulmonary embolus third thereafter.

Conclusion:

Raising awareness of how causes of death vary by age and time post-injury can help focus health promotion and disease prevention priorities and increase life expectancy following SCI.

Keywords: Spinal cord injury, epidemiology, mortality

P-087

Older adults with new spinal cord injuries and their rehabilitation outcomes: A case note audit

Kirily Holton¹, Ruth Marshall¹, Jillian Clark²

¹South Australian Spinal Cord Injury Service, Adelaide, South Australia

²South Australian Spinal Cord Injury Research Centre, Adelaide, South Australia

Objective:

To describe the characteristics of the population of spinal cord injured older adults admitted to the South Australian Spinal Cord Injury Service (SASCIS) for inpatient rehabilitation. To evaluate the rehabilitation outcomes of older adults presenting with all-cause spinal cord injury.

Materials-Methods:

Setting: South Australian Spinal Cord Injury Service (SASCIS) inpatient rehabilitation unit

Participants: All patients aged 65 years or older, who were admitted between 1st August 2007 and 31st July 2010 inclusive with a new spinal cord injury

The study was a retrospective, observational cohort study performed using a case note audit. Data were collected manually from case notes and from the electronic patient record system.

Results:

32 patients met the criteria for inclusion. Mean age was 71.1 years, and males are over-represented (n=23; 71.9%). Non-traumatic spinal cord injuries were over-represented in our sample (n= 20; 62.5%). Almost 60% of our sample presented with paraplegia and a majority of individuals were classified as AIS C and D (n= 26; 81.3%). Mean FIM on admission was 66.4 (range 41-114). On discharge, it was 89.3 (45-122), with a FIM efficiency of 0.33. There were no significant differences for causation or level. Mean length of stay in the rehabilitation unit was 117.3 days (range 13-288). Complications during the rehabilitation admission were seen in 27 (87.4%) patients and almost half of the patients (15) were transferred to an acute hospital during their rehabilitation. Sixteen (16) participants discharged home with or without supports. One year survival in this population was 78.1%.

Conclusion:

The rehabilitation outcomes of this population in SASCIS are similar in each of the injury sub-groupings analysed (level and causation), suggesting that injury variables should not significantly influence the decision for admission to rehabilitation. Further research is required in the older adult population to better understand the rehabilitation needs of this group.

Keywords: Spinal cord injury, older adults, South Australia

P-088

Spinal cord injury in elderly

Mónica Alcobendas¹, Ramiro Palazón¹, Carlos Vicario², Ana Esclarín¹, Rosa María Casado¹, Silvia Ceruelo¹

¹Hospital Nacional de Paraplégicos, Toledo, Spain

²Orthopaedic Surgery and Traumatology Department, Hospital Ntra. Sra. Prado, Talavera, Spain

Objective:

To review clinical characteristics, complications and functional outcomes in traumatic and non-traumatic spinal cord injuries (SCI) in patients older than 65.

Design: Descriptive retrospective study in acute SCI admitted in a monographic SCI hospital since January 2010 to December 2011

Materials-Methods:

Patients diagnosed of SCI and older than 65 years were selected. Depending on the etiology of their SCI, were allocated in the traumatic or in the non-traumatic group. Demographic characteristics, lesion data, and complications occurred during in- patient period were collected. Functional capacity was measured with SCIM III (Spinal Cord Independence Measure) and WISCI II (Walking Index Spinal Cord Injury) scales. Statistics analysis was performed with SPSS 20.

Results:

111 patients were included, mean age was 72.5 years, 58% were non-traumatic lesions. Significant differences were detected in the comparative analysis between traumatic and non-traumatic lesions, there were more cervical traumatic lesions (66%) and more incomplete non-traumatic lesions (78%), in the non-traumatic group there were more women (45%) than in the traumatic group. Respiratory (47%), digestive (27%) complications and mortality (13%) had a higher incidence in the traumatic group. Non-traumatic lesions achieved higher SCIM III scores (47 points)

Conclusion:

Recently, an increase of SCI in patients older than 65 has been reported. In these patients traumatic lesions are less frequent than non-traumatic ones. Furthermore, lesions are frequently incomplete and more complications and mortality are reported than in other groups of patients with SCI. These elderly patients achieved poor functional outcomes in spite of the neurological improvements.

Keywords: Spinal cord injury, elderly

P-089

Peculiar causes of traumatic spinal cord injury (SCI) in pediatric population

Mónica Bettencourt Dias, Sofia Galvão Bento, Filipe Bettencourt Oliveira, Ana Maria Vasconcelos, Virgínia Craveiro Reis, Isabel Lopes Batalha

Centro de Medicina e Reabilitação de Alcoitão, Cascais, Portugal

Introduction:

SCI's are devastating events that result in permanent disability for injured children. Approximately 250,000 patients are presently living with SCI in the US (20% are less than 20 years old) and road accidents are the leading cause (40%) in children. However, there has been a decrease in SCI caused by road accidents, due to population education, and currently became important not to exclude other traumatic causes.

The aim of this study is to analyze traumatic causes of SCI other than road accidents in a sample of patients of our pediatric rehabilitation department.

Materials - Methods:

The authors retrospectively reviewed traumatic cases of SCI with a rare etiology treated between 30/06/1998 and 11/01/2013. All cases occurred at ages under 18 years old.

Results:

11 children with a mean age at injury of 11.3 years (range 0 day to 16 years). Six patients are female (64,6%) and five male (45,5%). The etiologies identified were trauma due to direct impact of a moving object (gate, wheel, falling fruit), accidental shot of firearm, aggression with a knife, football trauma in a child with Pott's disease, hit (farming machine, train), diving accident, trauma at birth and height fall. 63,6% children presented paraplegia and 27,3% tetraplegia, 54,5% were classified as AIS A and in 36,4% the level of injury was at thoracic spine.

Conclusion:

Unlike the literature we have more female patients than male and all cases were unpredictable accidents. Although there has been a decrease in the number of injured children in road accidents, we still have to deal with other accidental or inflicted traumas in children either in domestic or leisure environments. These may result in severe disability compromising their participation in multiple activities. Therefore, we have to promote safe environments with adult supervision.

Keywords: Children, unpredictable accidents, traumatic spinal cord injury

P-090

Secondary conditions among youth with spinal cord injuries

Erin H. Kelly¹, Ann Flanagan², Lawrence C. Vogel³

¹Shriners Hospitals for Children, Chicago, IL; University of Illinois, Chicago, IL, USA

²Shriners Hospitals for Children, Chicago, IL, USA

³Shriners Hospitals for Children, Chicago, IL; Rush Medical College, Chicago, IL, USA

Objective:

Examine the frequency of bowel/bladder incontinence, pressure ulcers, body mass index (BMI), and pain, and explore relationships between these conditions and community participation and quality of life (QOL) among youth with spinal cord injury (SCI).

Materials-Methods:

Youth with SCI ages 5-18 receiving care within one specialty hospital system in the United States completed standardized measures of pain, physical and psychosocial QOL, and community participation. Healthcare providers completed questions about bowel/bladder incontinence, pressure ulcers, and BMI. Analyses included Mann-Whitney tests and linear regression analyses.

Results:

The 113 participants were an average age of 12.18 years (SD=4.26); 58% were male. Youth had been injured an average of 5.99 years (SD=4.37); 69% had paraplegia. 45% and 69% of youth had experienced bowel and bladder incontinence in the last three months, respectively, and 46% of youth wore diapers for 24 hours each day. 14% of youth had experienced at least one pressure ulcer in the past year, and 44% of these reported the ulcer(s) had limited their activity. 20% of youth were overweight (BMI=85th-94th percentile) and 25% obese (BMI>=95th percentile); 35% of youth reported experiencing at least some pain in the past few days. After controlling for age, youth reporting urinary incontinence experienced decreased social QOL ($p=0.024$); youth who wore diapers full-time experienced decreased social ($p<0.038$) and overall psychosocial ($p=0.049$) QOL; and youth who had experienced a pressure ulcer in the last year experienced decreased psychosocial QOL ($p=0.006$). In addition, youth who reported their pressure ulcer had limited their activity participated in fewer activities ($p=0.026$) and participated less often ($p=0.019$).

Conclusion:

Incontinence and pressure ulcers were related to psychosocial QOL among youth with SCI, and having a pressure ulcer that limited activity was related to participation. Results suggest that comprehensive care addressing physical and psychosocial health is imperative.

Support:

Shriners Hospitals for Children.

Keywords: Youth, secondary complications, psychosocial outcomes

P-091

The length of stay (LOS) of spinal cord lesion (SCL) patients admitted for rehabilitation to Rheumatology and Rehabilitation Hospital (RRH), Ragama, Sri Lanka

Palitha Karunapema¹, Roy Perera², Anjana Withanaarachchi¹

¹Rehabilitation and Rheumatology Hospital, Sri Lanka

²North Colombo Teaching Hospital, Sri Lanka

Objective:

To describe the length of stay (LOS) of spinal cord lesion patients admitted to Rheumatology and Rehabilitation Hospital (RRH), Sri Lanka, for rehabilitation program after acute management of SCL.

Materials-Methods:

Inclusion criteria – All SCI patients who referred to RRH after the acute management and discharged between 1st of January 2011 to 30th of June 201

Exclusion criteria – The patients who did not give informed consent, transferred or recurrent admissions.

Data collection method – The data was extracted from bed head tickets and recorded to data collections forms using predetermined rules. There after data was entered into EpiInfo software

Data analysis –The data analysis was performed using SPSS (16.0) version.

Results:

A total of 62 patients were included in the study. Twenty one patients excluded from the study due to transfers to other hospitals and recurrent admissions. Almost 20% (13) of the patients left against medical advice prior to proper discharge.

Mean age of the study population was 38 years while majority of them are male. The mean total LOS was 175 days and LOS at RRH was 93 days. The mean LOS stay is 148 days and 182 days for Non-Traumatic and Traumatic SCL respectively. The LOS at RRH of patients with complete SCI lesion was 63 days while that of incomplete SCI lesion was 85 days.

Conclusions:

LOS of patients with SCL in Sri Lanka is within the customary LOS range in Europe and Asia. The LOS for rehabilitation at RRH is around 50 % of total LOS following a SCI. No significant difference of LOS was observed for different levels of lesions.

Keywords: LOS, SCI

P-092

Rehabilitation outcome for spinal cord injury due to degenerative disorders of the spine

Parinaz Sharifi¹, Peter New²

¹Spinal Rehabilitation Unit, Caulfield Hospital, Alfred Health, Caulfield, Victoria, Australia

²Spinal Rehabilitation Unit, Caulfield Hospital, Alfred Health, Caulfield, Victoria, Australia; Epworth - Monash Rehabilitation Medicine Unit, Southern Medical School, Monash University, Melbourne, Victoria, Australia

Objective:

The aim of this project is to describe the demographic characteristics, range of aetiology of degenerative disorders, clinical characteristics, complications and functional outcomes following rehabilitation in patients with spinal cord damage secondary to degenerative disorders. This will help provide relevant information to patients and their families, rehabilitation teams and researchers as to expectations regarding rehabilitation outcomes.

Materials-Methods:

Medical records of patients admitted to the Spinal Rehabilitation Unit at Caulfield Hospital over a 17 year period (1/1/1995 – 30/6/2012) with the diagnosis of NTSCI due to degenerative disorders were identified using relevant ICD 10 codes. The information was extracted from files. We also compared mobility status, bladder and bowel continence, living arrangements and supports provided for the patient on admission, discharge and 12-months post discharge.

Results:

Age: 28-95 (Median 66)

Sex: 54.9% Male

Most prevalent causes: Disc prolapse (40%), spinal stenosis (31%)

Level: 82.7% paraplegic

87% had surgical intervention

Admission Discharge

ASIA A 18.87 % 17.65 %

ASIA B 1.89 % 1.96 %

ASIA C 18.87 % 15.69 %

ASIA D 47.17 % 50.98 %

Not sp 11.32 % 11.76 %

ASIA E 0 % 1.96 %

Bladder Continent 19.51 % 54.76 %

IMC 4.88 % 16.67 %

IDC/SPC 68.29 % 28.57 %

Aneuric 0 % 0 %

Median length of rehabilitation admission: 62 days

Median FIM score on admission and discharge: 35 Vs. 74

68% were discharged home with family

Conclusion:

The improvement in ASIA was paralleled by improvements in mobility, bladder and bowel and FIM scores. This study shows that these patients have good potentials to improve through rehab.

Keywords: Spinal cord injury, degenerative, rehabilitation

P-093

Preliminary face validity of target SCIM III median values for prediction of functional outcome after traumatic SCI

Farnoosh Farahani, B. Cathy Craven, Heather Flett, Molly Verrier

Lyndhurst Centre, Toronto Rehabilitation Institute-UHN, Toronto, Canada

Background:

Many stakeholders are seeking threshold values to define achievement of expected functional abilities for neurological level of injury (NLI).

Objective:

To assess the face validity of target median discharge Spinal Cord Independence Measure (SCIM III) values reported by Catz et al., (2011) for measuring functional achievements at rehab discharge among traumatic spinal cord injury (SCI) patients of various NLI.

Methods:

Data was obtained from a local SCI registry (n=96). Patients' age, gender, neurological level, AIS, rehab onset, rehab length of stay (LOS) and SCIM III at admission and discharge are routinely collected as part of the registry. Functional ability of 14 patients with traumatic complete SCI was assessed during rehab using the SCIM III and compared to the median discharge SCIM III scores reported by Catz for NLI C4, C5, C6, T3, T4, T6, T9, T11, and T12.

Results:

Of the 14 patients included in this evaluation, 10 (71%) exceeded Catz's median discharge SCIM III score for that NLI. The total SCIM III gains were evaluated, and 4 of 14 patients met or exceeded Catz's median SCIM III gain values. There was variation in the timing of rehab onset (10-125 days, M=29) as well as the timing of the initial SCIM III assessment in rehab (6-167 days, M=40) and rehab LOS (55 to 276 days, M=134).

Conclusion:

The target median discharge SCIM III scores for specific NLI were shown to have face validity and apply to patients with complete SCI in our institution. In our setting, the median discharge SCIM III score appears to be a better intervention target than the median SCIM III gains as the gains are strongly influenced by variability in the timing of rehab onset, SCIM assessment and rehab length of stay.

Keywords: Spinal cord injury, spinal cord independence measure (SCIM III), neurological level of injury

P-094

Functional ability predictors for spinal cord injured individuals - ARasch analysis perspective

Daniela De Campos Barbetta, Marcos Renato Assis

Sarah Network of Rehabilitation Hospitals, Spinal Cord Rehabilitation Program, Brasília, Brazil

Objective:

The aim of the study was to identify predictive variables for functional ability in subjects with spinal cord injury at the hospital admission and discharge and in the post-rehabilitation improvement (delta).

Materials-Methods:

Five hundred and eighty patients admitted to the rehabilitation program of the SARAH Hospital Network were included in the study. Patients were assessed by Functional Independence Measurement (FIM) scale using Rasch modeling. In order to establish the predictive variables for functional ability, multiple regression analyses of the independent variables such as age, gender, education level, level and completeness of the lesion, time of lesion and length of rehabilitation were carried out.

Results:

Among the variables considered in the study, the completeness of lesion as well as the patient age was considered as predictive factor at the hospital admission and discharge. Moreover, the neurological level and completeness of lesion were shown to predict post-rehabilitation improvement.

Conclusion:

Among the variables selected for this study only three were considered predictors of ability, and the extent of the lesion was considered the main predictor. In addition to the level of neurological lesion, others issues must be considered in rehabilitation programs including those associated with the characteristic of the spinal cord injury and the patients either. The predictive variables identified in this study should be considered, at least in part, as confusing factors in intervention studies.

Keywords: Spinal cord injury, rehabilitation, functional assessment

P-095

Challenges and opportunities of spinal cord injury rehabilitation in China Mainland – Experience from China Rehabilitation Research Center

Jianjun Li, Feng Gao, Mingliang Yang, Liangjie Du

China Rehabilitation Research Center, Beijing, China

Objective:

This study is to describe the current status and characteristics of spinal cord injury (SCI) rehabilitation in China mainland, and to explore the strategies to facilitate the development of this professional work according to the actual situation.

Materials-Methods:

A self-constructed questionnaire was conducted from the medical documents and face-to face interviews within 260 subjects with SCI. The contents surveyed consisted of the history of injury, the first-aid, the management in the acute phase, and the programme and outcomes of rehabilitation after SCI.

Results:

The subjects recruited in this study came from all over the country with big regional discrepancies. The injuries resulted from traffic accidents and falling were apt to get complete injury ($p<0.05$). The individuals with spine protection during the transferring and without the second transfer were apt to get incomplete injury ($p<0.05$). The ability and level of the first-sent hospitals, as well as the time point of the intervention of rehabilitation programmes significantly got influences on the injury degree and outcomes ($p<0.05$).

Conclusion:

The situation of the spinal cord injury rehabilitation was different all over the country, especially there was a huge gap between the urban area and the countryside. The shortages of professional knowledge of first-aid, early rehabilitation, and the specialized hospitals were the challenges for the SCI rehabilitation. As a result, the popularization of the first-aid knowledge, the prevention of secondary injury, the training of the professionals, and the construction of the specialized institutions were summarized as the key suggestions for this work in China Mainland.

Keywords: Spinal cord injury, rehabilitation, China mainland

P-096

Comprehensive management of spinal cord injury: The issue of lifelong care and follow-up

Antti Dahlberg¹, Frans Pennix², Colm Whooley³, Jane Horsewell⁴

¹The Finnish Association of Spinal Cord Injured Akson, Finland

²The Dutch Spinal Cord Injuries Association, the Netherlands

³Spinal Injuries, Ireland

⁴European Spinal Cord Injury Federation, Switzerland

Objectives:

People with SCI are under constant threat of complications that can lower their quality of life. Long term medical issues create a financial burden – both for the individual and for society – and can threaten the sustained reintegration of people with SCI in the community.

European Spinal Cord Injury Federation (ESCIF) has launched a new project about lifelong care and follow-up in order to formulate a policy statement on this crucial issue.

The aims of the project are:

- to describe the purposes of lifelong care and follow-up
- to identify and describe the benefits of follow-up, from the vantage points of various stakeholders
- to identify ideal components of follow-up, their frequency and by whom/where these should be carried out
- to define problems of existing systems in ESCIF member countries, especially in the current economic crisis
- to formulate a policy statement

Methods:

Literature search, consultation with SCI medical professionals, analysis of current systems, interviews and discussions with SCI consumers

Results:

The presentation will summarize the findings and recommendations of the working group and will open these to discussion with SCI professionals and consumers. The information and conclusions will be of interest to the SCI community worldwide.

Conclusions:

Earlier ESCIF policy statements have been used successfully to develop the organization of SCI management in various European countries. ESCIF hopes that a similar recommendation about lifelong care and follow-up will influence positively on decision-makers in the member countries. It will encapsulate the view of SCI consumers which should form an integral part of the SCI agenda in considerations of how to sustain or improve present systems of lifelong care and follow-up, and how to introduce and organize a new system where no system exists.

Keywords: Spinal cord injury, comprehensive management of SCI, quality of life

P-097

The impact of associated injuries in traumatic spine injury

Rajesh Sharawat, Harvinder Singh Chhabra

Indian spinal injuries center, India

Objective:

To evaluate whether the impact of associated injuries influence delay in rehabilitation outcomes, expenses and length of stay of traumatic low paraplegics.

Materials-Methods:

This Pilot study done at a tertiary level spinal injury center was a prospective monocentric analysis. We evaluated patients for rehabilitation stay, gross expense and SCIM at discharge. Descriptive statistics using Mann Whitney were analyzed to describe the results. P value=0.05 was considered to be statistically significant.

Results:

Total 42 paraplegics (AIS A) including 21 with associated injuries and 21 with no associated injury were compared. The median age was 31 (minimum 15 yrs, maximum 60 yrs). There were 28 patients sustained RTA and 14 sustained fall from height. Length of stay was significantly higher in patients with associated injury but this was not statistically significant ($p=0.18$). The expenses were also not significant amongst these groups ($p=0.7$). Functional outcomes were better in the group with no associated trauma ($p=0.08$)

Conclusion:

Associated trauma increased the length of stay of traumatic low paraplegics. Functional outcomes are compromised and expenses are higher in those with associated injury.

Keywords: Length of stay, SCIM, expenses

P-098

Suicidal ideation in Korean persons with spinal cord injury: Comparison with the control group

Hye Ri Kim¹, Hyungseok Nam², Hyung Ik Shin¹

¹Department of Rehabilitation Medicine, Seoul National University College of Medicine, Seoul, South Korea; National University Bundang Hospital, South Korea

²Department of Rehabilitation Medicine, Seoul National University College of Medicine, Seoul, South Korea

Objective:

To investigate the prevalence of suicidal ideation and attempt in Korean persons with spinal cord injury (SCI) and the factors related with suicidal ideation in comparison with the control group (CG).

Materials-Methods:

A total of 382 community dwelling persons with chronic SCI were enrolled and 1104 age, sex, education level matched persons were randomly selected from the general population for CG. Suicidal ideation and attempt were recorded positive if the subjects had that experience during the last year. Psychosocial variables as well as injury related factors were evaluated.

Results:

Suicidal ideation was found in 34.8% (127/365) of the SCI persons and 10.4% (115/1104) in CG ($p<0.001$). The rate of suicidal attempt among the subjects with suicidal ideation was 17.3% (22/127) in SCI and 8.7% (10/115) in CG ($p=0.048$). Multiple logistic regression revealed that SCI itself (OR 2.865) was a significant risk factor for suicidal ideation. However, completeness of injury and injury level were not related with the suicidal ideation. Depressive mood (OR 11.194, $p<0.001$), female gender (OR 3.706, $p<0.001$) were significant risk factors of suicidal ideation in SCI group with predictive percentage of 77.5%.

Conclusion:

The suicidal ideation was much frequent in Korean persons with SCI compared to CG and were closely related with psychosocial adjustment, which necessitate the active intervention to prevent suicide regardless of injury severity.

Keywords: Suicidal ideation, spinal cord injury, risk factor

P-099

Development of an ICF based documentation for Physio (PT) - and Occupational Therapists (OT) to map and analyze the rehabilitation process of patients with spinal cord injury

Ines Bersch, Ulla Stoll, Jessica Decker, Michael Baumberger, Diana Sigrist Nix

Swiss Paraplegic Centre, Nottwil, Switzerland

Objective:

The demand of documentation is that it should:

- be easy to understand and handle
- be timesaving
- be comprehensive
- be ICF based
- allow to extract data
- control the rehabilitation process of each individual
- give evidence of the applied methods
- create final reports
- be useable for the interdisciplinary team
- optimize the complexity of rehabilitation program by noticing the key aspects for each individual

Materials-Methods:

24 ICF domains were chosen. For each domain 2 to 39 working hypothesis/problems were defined. Each hypothesis was structured in body function and -structure, activity and participation dividing capacity and performance as well as context (personal/products and technologies). Standard assessments were listed to each hypothesis. To the hypothesis in each level a purpose was defined with according interventions. The interventions were named by effectiveness and not by concept. In addition a list of products and technologies essentially used in SCI Rehabilitation was established. The list was also classified in ICF domains. If devices are necessary are they mentioned and the user of the documentation can just add it. This documentation catalogue for PTs and OTs is connected to the documentation of the care and has an interface to the medical rehabilitation and social service. All interventions are finally mapped with the standard rate of the Swiss Accounting System for PT and OT.

Results:

The documentation catalogue is transferred into a computer program. The test phase for 15 therapists will start after instruction (June) in July till September 2013. After this necessary adaptations will be made. The roll out for 51 PTs and 32 OTs will be in February 2014.

Conclusion:

This documentation catalogue allows showing the rehabilitation process with therapeutic interventions and outcome measurements for an individual patient as well as the comparison between defined patient groups.

Keywords: Documentation catalogue, ICF based, interdisciplinary tool

P-100

Level of attendants' knowledge for a patient with traumatic spinal cord injury

Khunjamayum Ashalata Devi

Indian Spinal Injuries Center, India

Objective:

To assess the level of attendants knowledge during pre-hospital care and during acute phase for a patient with traumatic spinal cord injury.

Materials-Methods:

An specially design questioner for doing a survey on 45 attendants including close relative, friends and care giver was done.

Results:

This study reveals that total score of pre hospital is 30% and post hospital score is 70%.

Conclusion:

Pre hospital care is as important as post hospital care in SCI patients. As per data collected 30% of people were not aware of the pre hospital care which increases the number of traumatic SCI and moreover lack of proper handling of patients at site of injury increases the damage cause by accidents. So there is an urgent need of awareness for the pre- hospital care regarding SCI with the help of various camps and other educational programs

Keywords: Awareness

P-101

Reliability of the Portuguese version of the international quality of life spinal cord injury (SCI) dataset

Aline Oyakawa¹, Carolina Castineira¹, Jm Greve¹, J. Furlan², M. Forchheimer³, D. Tate³, A. Baptista⁴, F. Fregni⁵

¹Instituto de Ortopedia e Traumatologia, University of Sao Paulo Medical School, Brazil

²Dept. of Neurology, University of Toronto, Canada

³Physical Medicine and Rehabilitation, University of Michigan, USA

⁴ABBR Associacao Brasileira Benef. de Reabilitacao, Brazil

⁵Harvard University/ Spaulding Hospital, USA

Objective:

Survival after SCI with improved quality of life (QOL) increased significantly recently. Clinical trials on recovery and related QOL outcomes are conducted in various countries. This global research effort resulted in the need for data standardization and measures pertaining to SCI, so that reliable data can be compared across countries. Here we explore the validation of an instrument measuring quality of life after SCI.

Materials-Methods:

The current English version of the International Quality of Life SCI dataset was independently translated into Portuguese by a group of bilingual Brazilian investigators. The approved English version was first translated by two investigators and then back translated to English by another team of two independent other investigators. These versions were then compared for consistency and accuracy. A final version was assembled including all final revisions. To assess its intra and inter rater reliability, two physicians independently administered the same translated form to 50 SCI patients. The form was administered twice to the same patient within two weeks to determine consistency across time.

Results:

Subjects were on average 42 years old classified 44% as tetraplegia and 56% as paraplegia. Intra-reliability for both raters across time had an average agreement rate of 45%. Inter-rater reliability had 64% agreement.

Conclusions:

SCI patients had not an excellent agreement about their quality of life in two weeks, which does not seem a translation issue, it probably reflects the subjective definition of quality of life; "an individual's overall perception of and satisfaction with how things are in their life", so it's constantly changing.

Keywords: Quality of life, dataset

P-102

The impact of traumatic SCI on person's health related quality of life

Anda Nulle¹, Inese Sviklina¹, Anita Vetra²

¹National Rehabilitation Centre Vaivari, Jurmala, Latvia; Riga Stradins University, Riga, Latvia

²Riga Stradins University, Riga, Latvia

Objective:

To investigate the impact of traumatic SCI on the health related QOL.

Materials-Methods:

Prospectiv study.

28 adult male patients with traumatic SCI were enrolled in the investigation.

The age of the participants was from 18 to 60 years (average age 35, 7 years).

The causes of the injury: 16- traffic accidents, 7 – diving cases, 5 – falls from heights.

Time after SCI was 2 months till 25 years (average 7, 5 years).

Level and severity of injury according the ASIA Impairment Scale (AIS): 14 tetraplegic patients (AIS A -3, AIS B-6, AIS C-4, AIS D-1), 14 paraplegic patients (AIS A-6, AIS B-3, AIS C-5).

SCIM was determined by the rehabilitation team and average score was 68.6 (8-90).

All the participants filled in the SF - 36 questionnaire form. The results were transformed according to the standardized system and each of the 8 indicators was analysed. Scores on all the subscales are transformed linearly to a possible range of 0–100. Higher scores indicate more favourable physical functioning/psychological well-being.

Results:

The SF-36 Health Survey scale score for eight dimensions: physical functioning (PF)-37.8, role limitations caused by physical health problems (RF)-33.9 bodily pain (BP)-48.3, general health perception (GH)-45.3, vitality (VT)-55.6, social functioning (SF)-45, role limitations caused by emotional health problems (RE)-45.4 and mental health (MH)-48.6. Summary Scores are lower in total physical functioning (PCS) 36.07 than mental health ones (MCS)-53.8

Conclusions:

The lowest scores of health related QOL are in the domain of the impact of physical health condition to the participation in work and other everyday activities (RF) and in physical functioning (PF). The best results are in the domain of mental health.

The larger number of participants is needed for analyse impact of level and severity of SCI, time period after trauma and SCIM score on the QOL.

Keywords: Spinal cord injury (SCI), quality of life (QOL), spinal cord independent measurement (SCIM)

P-103

Physical activity and quality of life in persons with spinal cord injury in Odisha, India

Shankar Ganesh, Chittaranjan Mishra

Swami Vivekanand National Institute of Rehabilitation Training and Research, India

Objective:

Advances in the medical management of spinal cord injury (SCI) have resulted in increased patient longevity. Rehabilitation is not complete without the full inclusion and participation of people with disabilities in the physical and psychosocial environment. Quality of life (QOL) is a valid health indicator in persons with spinal cord injury and correlates strongly with community life. During the last decade, quality of life has been monitored in subjects with spinal cord injury (SCI) in various countries but there is a lack of information about QOL of SCI patients in Odisha. The aim of this study is to find the QOL of SCI patients in Odisha and find out the relationship between physical activity and QoL.

Materials-Methods:

84 persons (76 males, 8 females with mean age of 32.54 +10.75) were interviewed. The average length of time since the onset of injury was of 26.73 (SD 23.94) months. QOL and Physical activity was measured by World Health Organization Quality of Life Measure Abbreviated version (WHOQOL- BREF) and Physical Activity Scale for Individuals with Physical Disabilities (PASIPD).

Results:

Pearson correlation showed a strong positive association between level of Physical activity and all domains of WHOQOL-BREF ($p < 0.05$). Multiple regression analysis showed physical activity and employment are significant predictors of QOL.

Conclusion:

The findings of the study showed that persons with SCI in Odisha enjoy a lower QOL and reduced Physical activity. The results suggest that interventions promoting physical activity and generating employment for SCI patients may help them achieve a better QOL.

Keywords: Spinal cord injuries, quality of life, limitation of activity

P-105

Trends in the European Multicenter Study on Human Spinal Cord Injury (EMSCI) cohort during the last decade

Christian Schuld¹, René Koller², Steffen Franz¹, Doris Maier⁴, Rainer Abel³, Martin Schubert², Armin Curt²,
Emsci Study Group⁵, Norbert Weidner¹, Ruediger Rupp¹

¹Spinal Cord Injury Center, Heidelberg University Hospital, Heidelberg, Germany

²Spinal Cord Injury Center, Balgrist University Hospital, Zurich, Switzerland

³Spinal Cord Injury Center, Clinic Hohe Warte, Bayreuth, Germany

⁴Spinal Cord Injury Center, Trauma center, Murnau, Germany

⁵European Multi-Center Study about Spinal Cord Injury

Objective:

The European Multicenter Study on Human Spinal Cord Injury (EMSCI) was founded 2001 to provide a clinical basis for new interventional therapies in spinal cord injury (SCI). Besides standardized clinical outcome measures (ISNCSCI, SCIM, WSCI, walking tests) documenting the course of rehabilitation, the basic patient characteristics also represent a valuable data source. The aim of this study is to identify trends over the last decade in a representative European SCI cohort.

Materials-Methods:

The EMSCI database queried February 8th 2011 served as data source. Basic data are sex, height, age, type, etiology (traumatic, ischemic), level of injury and length of primary rehabilitation. Additionally, the initial ASIA Impairment Scale (AIS) is accompanying the basic data set. Data were categorized into three time windows (<= 2004, 2005-2007, >= 2008) to better identify trends.

Results:

The database sample contains of 2,161 SCI subjects with a traumatic or ischemic SCI from 19 SCI-centers. Of these 77.4% are male, 50.3% have a paraplegic lesion, 93.1% have a traumatic cause and 44.5% have a complete (=AIS A) lesion. The AIS distribution remains almost constant as well as the percentage of females (23%). A clear trend is visible towards a higher proportion of tetraplegic lesions (rising from 47.6% to 51.1%). The mean age is increasing (para: 39.9 to 43.2 years; tetra: 46.6 to 50.3 years). The length of stay is declining (para: 129.0 to 117.3; tetra: 157.4 to 139.7).

Conclusion:

The EMSCI cohort shows several trends in the last decade: The proportion of tetraplegic patients increases as well as age. Length of primary rehabilitation declined markedly, which is of great concern since sufficient time for rehabilitation is necessary to transfer neurological recovery into better functional outcomes. The EMSCI assessment scheme is only applied to traumatic and ischemic SCIs. An inclusion of non-traumatic patients is intended.

Keywords: General trends, patient characteristics, demography

P-106

Experiences, needs and desires of people with spinal cord injury about psychosocial rehabilitation: An exploratory qualitative study

Christel M.c. Van Leeuwen, Astrid Onderwater, Marcel W.m. Post

Center of Excellence for Rehabilitation Medicine, Utrecht University Medical Center, Utrecht, The Netherlands;
Hoogstraat Rehabilitation Center, Utrecht, The Netherlands

Objective:

To explore experiences, needs and desires about psychosocial rehabilitation in persons with spinal cord injury (SCI).

Materials / Methods:

This was a qualitative study involving three in-depth focus group interviews with in total 20 persons with SCI in three rehabilitation centers in The Netherlands. The interviews were conducted until informational redundancy was achieved. Data analysis was performed following guidelines for qualitative research and using MAXQDA 10 software.

Results:

Persons with SCI reported a wide variety of experiences and needs about psychosocial rehabilitation. There were persons who tried to manage the psychological and social challenges on their own, while others preferred individual and group therapy with professionals, family members and experience experts. Desires were categorized into three broad categories: (1) to better involve the social network and the employer during the rehabilitation process, (2) to organize group meetings with other persons with SCI to share knowledge and experiences, and (3) to stimulate participation in society by reactivation, improving personal strengths and communication skills, and the help of volunteers or buddies.

Conclusions:

This study suggests that it is important to check in every person with SCI what his or her needs are with respect to psychosocial issues during the whole rehabilitation process and also in the period at home. The different needs and desires identified in this study provide important input about why and how psychosocial rehabilitation can be improved.

Keywords: Spinal cord injury, qualitative, psychosocial rehabilitation

P-107

Perceived facilitators and barriers of self-management in traumatic spinal cord injury

Sarah Elizabeth Patricia Munce¹, Fiona Webster², Michael G. Fehlings³, Sharon E. Straus⁴, Eunice Jang⁵, Susan Brenda Jaglal⁶

¹Institute of Health Policy, Management & Evaluation, University of Toronto, Toronto, Ontario, Canada

²Department of Family and Community Medicine, University of Toronto, Toronto, Ontario, Canada

³Krembil Neuroscience Program, University Health Network, University of Toronto, Toronto, Ontario, Canada

⁴Li Ka Shing Knowledge Institute at St. Michael's Hospital and University of Toronto, Toronto, Ontario, Canada

⁵Ontario Institute for Studies in Education, University of Toronto, Toronto, Ontario, Canada

⁶Department of Physical Therapy, University of Toronto, Toronto, Ontario, Canada

Objective:

Informed by the Knowledge to Action framework as well as the Medical Research Council's framework, the specific research objective was to understand the perceived facilitators and barriers of self-management to prevent secondary complications from the perspectives of individuals with traumatic spinal cord injury (SCI), their family members/caregivers, as well as health care professionals from the acute care and rehabilitation settings.

Materials-Methods:

A descriptive qualitative approach was used and involved telephone interviews with 26 participants across all three stakeholder groups. Analysis was conducted using inductive thematic analysis as described by Braun and Clark (2006).

Results:

Seven patient-caregiver dyads as well as 12 health care professionals participated in the study for a total of 26 participants. The majority of individuals with traumatic SCI were male with a female caregiver, who was most often a spouse. Facilitators of self-management for the individual with traumatic SCI included physical caregiver support (e.g., changing catheters, checking skin integrity), emotional caregiver support, decisional authority in care and treatment, and the individual's own positive outlook or acceptance of his or her condition. Barriers of self-management included caregiver burnout (including the dual role of family member-"nurse"), the individual's own negative outlook or lack of self-advocacy, and lack of funding for (community) programs and/or funding schemes that do not support the individual and his/her caregiver.

Conclusion:

This is the first phase of a two part study to determine the considerations for a self-management support program that is sensitive to the needs of individuals with traumatic SCI. These findings suggest that such a program may need to include modules that support caregivers in their various roles (e.g., providing practical skills training to caregivers, supporting the emotional needs of caregivers themselves) as well as address the ongoing mental health needs of individuals with the traumatic SCI.

Keywords: Traumatic spinal cord injury, self-management, caregivers

P-108

Social participations after spinal cord injury

Nur Kesiktas¹, Nurdan Paker², Murat Uludag⁴, Derya Soy², Kerem Gun⁴, Safak Karamehmetoglu⁴, Nurten Eskiuyurt³

¹IMAE GKDC

²Istanbul Physical Medicine and Rehabilitation Education Hospital, Istanbul, Turkey

³Istanbul University Istanbul Medical Faculty, Istanbul, Turkey

⁴Istanbul University Cerrahpasa Medical Faculty, Istanbul, Turkey

Objective:

Both clinical and environmental factors is important in that it provides opportunities to mitigate the effects of an impairment when a medical "cure" is not available. The more environmental barriers can be reduced, the more a person with an impairment is able to participate in social, educational, and vocational aspects of life. Our aims are evaluation of social participations of spinal cord injured individuals (SCI), their practical solutions and the role of family in social participation.

Materials-Methods:

One hundred-twenty patients whose average age were $31,92 \pm 10,6$ (age range 18-50) with SCI for more than one year ($29,80 \pm 14,07$ months) were participated into study. Participants neurologic status was distributed as follows: 17 % cervical, 25 % T1-6, 25% T7-12, 33% lumbar. Turkish version of Craig Hospital Inventory of Environmental Factors-Short Form (CHIEF SF- TR) were applied for evaluation participation. American Spinal Injury Association Impairment Scale (AIS) and Spinal Cord Independence Measurement III (SCIM) were used for the evaluation of the neurological loss severity and functional status. Emotional status was assessed by Hospital Anxiety and Depression Scale (HADS). CHART SFT was used for handicap. SPSS version 10.0 for Windows was used for statistical analyses.

Results:

Significant differences were found between the levels of SCI mean total CHIEF SFT scores. CHIEF SF Tr correlated with HADS ($p < 0.01$). There were statistically significance according to gender of SCI for sponsorship of their families ($p < 0.05$). Main areas for providing practical solutions to the problems faced by SCI was health.

Conclusion:

Family sponsorship is very important in our country. Their solutions are focused on management of health.

Keywords: Social participant, family sponsorship

P-109

Meaning of self-management from the perspectives of individuals with traumatic spinal cord injury, caregivers, and health care professionals

Sarah Elizabeth Patricia Munce¹, Fiona Webster², Michael G. Fehlings³, Sharon E. Straus⁴, Eunice Jang⁵, Susan Brenda Jaglal⁶

¹Institute of Health Policy, Management & Evaluation, University of Toronto, Toronto, Ontario, Canada

²Department of Family and Community Medicine, University of Toronto, Toronto, Ontario, Canada

³Krembil Neuroscience Program, University Health Network, University of Toronto, Toronto, Ontario, Canada

⁴Li Ka Shing Knowledge Institute at St. Michael's Hospital and University of Toronto, Toronto, Ontario, Canada

⁵Ontario Institute for Studies in Education, University of Toronto, Toronto, Ontario, Canada

⁶Department of Physical Therapy, University of Toronto, Toronto, Ontario, Canada

Objective:

The specific research objective was to understand the meaning of self-management from the perspectives of individuals with traumatic spinal cord injury (SCI), their family members/caregivers, as well as health care professionals from the acute care and rehabilitation settings.

Materials-Methods:

A descriptive qualitative approach was used and involved telephone interviews with 26 participants across all three stakeholder groups. Analysis was conducted using inductive thematic analysis as described by Braun and Clark (2006).

Results:

Seven patient-caregiver dyads as well as 12 health care professionals participated in the study for a total of 26 participants. The majority of individuals with traumatic SCI were male with a female caregiver, who was most often a spouse. Meaning of self-management differed between individuals with traumatic SCI and their caregivers versus health care professionals. The dyad group viewed self-management as wellness awareness (i.e., the incorporation of good nutrition and exercise), routines/contingencies to prevent secondary medical complications, and an independence conflict of striving for independence/risking injury in striving for independence. The term self-management itself was unfamiliar to the majority of individuals with traumatic SCI and their caregivers. The health care professional group viewed self-management in traumatic SCI as the individual with the SCI directing someone else for his or her own care. This group also viewed self-management as chronic disease management.

Conclusion:

This is the first phase of a two part study to determine the considerations for a self-management support program for individuals with traumatic SCI. Understanding the differing perspectives of self-management from these three stakeholder groups is a foundational step in the development of targeted self-management program in this population.

Keywords: Traumatic spinal cord injury, self-management, caregivers

P-110

Employment status of adults with pediatric-onset spinal cord injury

Kathy Zebracki¹, Kathleen M Chlan², Lawrence C Vogel³

¹Shriners Hospitals for Children, Chicago, IL USA; Loyola University Chicago, IL USA

²Shriners Hospitals for Children, Chicago, IL USA

³Shriners Hospitals for Children, Chicago, IL USA; Rush Medical College, Chicago, IL USA

Objective:

To assess employment status in adults with pediatric-onset spinal cord injury (SCI) as a function of neurological impairment.

Materials-Methods:

A cross-sectional, follow-up survey of 447 individuals ages 20-48 (M=31.4, SD=5.8) who sustained a SCI prior to age 19 (M=13.8, SD=4.4; 0-18) completed a structured questionnaire assessing sociodemographic and injury-related factors. Participants were separated into four impairment groups: C1-C4 ABC (n=65), C5-C8 ABC (n=154), T1-S5 ABC (n=187), and AIS D (n=41). Unemployment was defined as those interested in being in the workforce and excluded students, homemakers, and retirees. T-tests and chi-square tests were used to analyze the data.

Results:

Employment status differed among the impairment groups ($p < .05$) with rates of employment as follows: 37% C1-C4 ABC, 40% C5-C8 ABC, 54% T1-S5 ABC, and 59% AIS D. Between group differences, however, did not emerge for percent employed fulltime (> 35 hours/ week), length of employment at current job, or personal annual income (M= \$43,350, SD= \$41,380). Within group differences emerged on sociodemographic factors and medical complications. Individuals were more likely to be employed when attained a college degree or higher (C1-C4 ABC, $p < .01$, T1-S5, $p < .001$, AIS D, $p < .05$), injured at an older age (C5-C8 ABC, $p < .05$), and female (T1-S5, $p < .01$). They were more also likely to be employed when they did not have pressure ulcers (T1-S5, $p < .001$), bladder accidents (AIS D, $p < .05$), urinary tract infections (AIS D, $p < .05$), autonomic dysreflexia (C1-C4 ABC, $p < .05$), and muscle spasms (C5-C8 ABC, $p < .001$).

Conclusion:

Rates of employment are higher in those with less impairment; however, neurological level does not affect rate of fulltime status, length at current job, or income.

Individuals who obtain higher education are more likely to be employed. The influence of secondary complications on employment varied by neurological level and type of complication.

Keywords: Employment, pediatric-onset spinal cord injury, long-term outcomes

P-111

Barriers to and facilitators of coping with spinal cord injury for Iranian patients: A qualitative study

Hassan Babamohamadi¹, Reza Negarandeh², Nahid Dehghan Nayeri²

¹Nursing and Allied Health Department, Semnan University of Medical Sciences, Semnan, Iran

²Nursing and Midwifery Care Research Center, Faculty of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

Objective:

The purpose of the present study was to explore the perspectives and experiences of Iranian patients regarding barriers and facilitators to their ability to cope with spinal cord injury (SCI).

Material-Methods:

A qualitative design, based on the content analysis approach, was used to collect and analyze the experiences of 18 patients with spinal cord injury in two centers in Tehran, Iran. After using purposeful sampling for selection of the participants, semi-structured interviews were held for data collection.

Results:

Lack of "knowledge", "financial resources", "employment opportunities", "suitable facilities and accessibility" as well as "societal acceptance and support" emerged as barriers; and having "self-confidence", "religious beliefs", "support networks" and "positive thinking" emerged as facilitators in coping with spinal cord injury.

Conclusion:

Participants believed that with these hindering factors in place, adapting to their new condition had been difficult, therefore they can only manage to adapt partially to their situation. Additional multidisciplinary endeavors are needed to help this group cope adequately and further research is required to influence policy making and legislation processes efficiently.

Keywords: Barriers, facilitators, spinal cord injury

P-112

An assessment protocol on accessibility of testbed environment for people with spinal cord injury

Jeonghyun Kim, Shinyoung Lim, Jongbae Kim, Myoungjun Lim

Korea National Rehabilitation Research Institute (NRRI), Seoul, South Korea

A Quality of Life Technology (QoLT) research team at NRRI design and build a QoLT testbed for assessing QoLT products, i.e., highly advanced assistive devices, and prescribing appropriate living environment for people with Spinal Cord Injury(SCI). To design effective and efficient method of prescription and delivery of appropriate independent living environment for people with SCI, the QoLT team at NRRI designs a tentative assessment protocol focused on performance and satisfaction, parts of accessibility and usability, and evaluate the tentative protocol for seven months. The tentative assessment protocol for accessibility and usability of assistive devices in testbed environment for independent living of people with SCI is designed and verified with outcomes of 15 cases. The tentative assessment protocol is designed by referring Canadian Occupational Performance Measurement (COPM) with ten scale-based scoring and performed by an Occupational Therapist. The 15 subjects are people with SCI – seven cervical spinal cord injury, five thoracic spinal cord injury, three lumbar spinal cord injury. 15 subjects are taken surveys before and after living in the testbed from one week up to four weeks, which is a part of the tentative assessment protocol. The testbed consists of real home environment settings, which are bedroom, kitchen, restroom, bathroom, living room, entrance door, and smart home controllers with number of home assistive devices according to the subject's disabilities. 13 cases out of 15 ones reveal noticeable enhancements in performance and satisfaction categories of the assessment protocol. Two cases are unable to assess because these cases have individuals with upper limbs disability that causes unavailability of ADL and environment controlling. The QoLT team at NRRI witnesses enhancement of satisfaction by two to six points. In this paper, authors are going to present the process and outcomes of the tentative assessment protocol, and discuss further research in this area.

Keywords: Spinal Cord Injury, accessibility, testbed

P-113

The barriers limiting the social integration of wheelchair users with spinal cord injury in Turkish society

Mufit Akyuz, Elif Yalcin, Barin Selcuk, Ibrahim Degirmenci

Ankara Physical Medicine and Rehabilitation Training and Research Hospital, Ankara, Turkey

Objective:

The aim of this study is to determine the most important barriers limiting the social integration of wheelchair users with spinal cord injury after discharge from the rehabilitation centre.

Materials-Methods:

Spinal cord injury patients were consecutively selected from archival records of the Ankara Physical Medicine and Rehabilitation Training and Research Hospital stratified according to time since injury. A survey of barriers to social integration was administered to 100 individuals with spinal cord injury. A semi-structured phone interviews were conducted to record participants' experiences and opinions about the limitations of their daily social participation. The following themes were questionnared to determined which is the most important barriers limiting the social integration of the patients. (1) health problems, (2) economic issues; (3) emotional and psychological barriers, (4) architectural and accessibility barriers; (5) perceptions and attitudes of persons who are not disabled, including professionals

Results:

Participants identified a range of both motivational and socio-environmental factors that were limiting the integration. The architectural barriers were the most commonly cited factor limiting participation, followed by perceptions and attitudes of persons who are not disabled. Also seventeen percent of subjects with spinal cord injury reported that health problems mainly the pain was one of the important factors reducing their social integration.

Conclusion:

The most important factor affecting is architectural barriers which we thought is one of the greatest problem especially in the developing countries.

One of the significant findings to emerge from this study is that perceptions and attitudes of persons who are not disabled is also an important problem. This problem seems to be overlook by most of the members of the rehabilitation team. It may probably shows that social educational programs about the disabled people should be organized both for the health care members and general population.

Keywords: Social barriers, social integration, spinal cord injury

P-114

European Multicenter Study about Spinal Cord Injury: From outcome measures to interventions in SCI rehabilitation

Markus Wirz, Armin Curt

University Hospital Balgrist, Spinal Cord Injury Center, Zürich, Switzerland

Objective:

The validity and reliability of numerous outcome measures for the application in clinical trials has been confirmed in several independent cohort studies (including the EMSCI network- European Multicenter Study about Spinal Cord Injury). However, for the EMSCI network it remains unclear which specific rehabilitation interventions become applied, how intense patients train and which algorithms are being used for the prescription of rehabilitative training during the progression of inpatient rehabilitation.

Materials-Methods:

The current project focuses on the ambulatory rehabilitation in patients with acute incomplete spinal cord injury (SCI) and encompasses physical and sports therapy interventions. The goal of this project is to assess the above mentioned interventions and to compare them with similar recordings from the SCIREhab endeavor. As a first step a simple and practical recording form which can be used at the point of care (POC) was developed and a cross-sectional pilot trial was conducted.

Results:

Included were 20 patients from four EMSCI centers who underwent a total of 539 therapy sessions. On average 10 sessions were performed in a week which lasted 43 minutes. The highest amount of therapy time was spent with exercises for improving strength or range of motion. The instrument was not able to classify 25% of the therapy time. The majority of therapists found the recording procedure practical and easy. They felt that only 63% of their interventions could be classified.

Conclusion:

The assessment of physical and sports-therapy interventions can be integrated in clinical practice. The recording form will be further improved and a longitudinal recording will be performed.

Keywords: Physical therapy, sports therapy, intervention

P-115

Customised devices improve accessibility and choices for people with spinal cord injury

Sheelagh Anne Donohoe¹, Simon Campanella², Ruth Marshall³

¹Spinal Outreach Rehabilitation Team, South Australian Spinal Cord Injury Service, Hampstead Rehabilitation Centre, South Australia, Australia

²Occupational Therapy Department South Australian Spinal Cord Injury Service Hampstead Centre, South Australia, Australia

³South Australian Spinal Cord Injury Service, South Australia, Australia; Division of Orthopaedics and Trauma, Faculty of Health Sciences, University of Adelaide, South Australia, Australia

Introduction:

Devices play an important role in spinal cord injury rehabilitation, facilitating function, participation and quality of life.

Setting:

South Australian spinal cord injury service and South Australian community.

Aim:

To design customised devices that may facilitate independence and improved choices for people with spinal cord injury living in the community.

Results:

We focussed on safe, independent wheelchair to car transfers and community sports participation. The devices designed, manufactured and tested at our facility were as follows:

1. Car transfer 'bolster' - light weight personalised device, adaptable for the driver or passenger
2. Sacral protector - removable device attached to the car door frame using magnetic fixation
3. Bowling splint - light weight customised device enabling clients with C6 tetraplegia to participate in lawn bowls alongside ablebodied competitors.

Conclusion:

The value of collaboration in the design, manufacture and evaluation of the utility, safety and effectiveness of customised devices will be discussed.

Keywords: Customised, choices, device

P-116

Evaluation of electronic forms for neurological and functional assessment after spinal cord injury

Jiri Kriz

Spinal Cord Unit, University Hospital Motol, Prague, Czech Republic

Objective:

To standardize assessment of spinal cord injured (SCI) patients in the Czech Republic.

Materials-Methods:

Spinal Cord Unit Prague is an active member of EMSCI group from 2007. We are regularly sending collected data from our center to the central EMSCI database. A few years ago we decided to standardize assessment of spinal cord injured patients in all departments in the Czech Republic. Therefore we started to coordinate lectures for neurological and functional assessment of SCI patients for physicians, physiotherapists and occupational therapists, who are involved in care about SCI people. Currently we have prepared user friendly electronic forms which could be very easily filled up and will provide valuable data for future collection.

Results:

In the present time there are four active electronic forms. The first one is ISNCSCI (ASIA) protocol, which is translated to Czech language in accordance with the English version. This form enable an automatic evaluation of Neurological Level of Injury and ASIA Impairment Scale. Further available forms (in Czech version as well) are SCIM III form and functional tests form including WSCI 2, TUG, 10MWT and 6MWT. The last form has been developed for spasticity assessment. All forms are equipped with function for automatic evaluation, saving the document, printing and copying final data to the medical report, which is a function ensuring the standardization of the discharging reports from all departments taking care about SCI patients.

Conclusion:

Use of electronic forms helps to standardize examination of SCI patients. We expect, that in the near future it will be possible to collect anonymous data from all departments taking care about SCI people.

Keywords: Neurological assessment, functional assessment, electronic form

P-117

Economic cost of spinal cord injury

Afitap Icgasioglu¹, Yasemin Yumusakhuylu¹, Basak Bilir Kaya², Sadiye Murat¹, Ercan Madenci¹

¹Department of Physical Therapy and Rehabilitation, Istanbul Medeniyet University, Goztepe Training and Research Hospital, Istanbul, Turkey

²Department of Physical Therapy and Rehabilitation, Istanbul Erenkoy Physical Therapy and Rehabilitation Hospital, Istanbul, Turkey

Objective:

The objective of this study was to analyze the economic cost of spinal cord injuries in relation to hospital stay.

Materials-Methods:

51 patients disabled from spinal cord injury, who were admitted to the Erenkoy Physical Therapy and Rehabilitation Hospital for inpatient rehabilitation were evaluated retrospectively. The cost we calculated was including the pharmacological therapy, bed-days, speciality consultations, laboratory, X-rays and other imaging studies. All values were calculated according to the SUT (Medical Practice Report) payment list.

Results:

Of the 51 cases studied, 37.3 % were women and 62.7 % were men and a mean age was 42.64, with the standard deviation 16.77 years. The mean hospital stay for the patients were 53.8 days with a standard deviation of 29.35 days. Total expenses for hospital stay were estimated at 355576.51 TL.

Conclusion:

Recent studies indicate that most of the SCI direct costs were associated with inpatient rehabilitation care, but in Turkey there is not any study related to this topic so this is the first and preliminary work. The studies which include controlled inpatient rehabilitation are necessary.

Keywords: Spinal cord injury, economic cost, burden of illness

P-118

Condensed client-centred modular spinal cord injury rehabilitation service: Towards more cost-efficient rehabilitation?

Annemie If Spooren¹, Helma Mh Bongers³, Rob J.e.m. Smeets², Henk A.m. Seelen¹

¹Adelante Centre of Expertise in Rehabilitation and Audiology, Hoensbroek, The Netherlands

²CAPHRI, Dep. of Rehabilitation Medicine, Maastricht University, Maastricht, The Netherlands

³Adelante Rehabilitation Centre, Hoensbroek, The Netherlands

Background:

Rehabilitation of persons with Spinal Cord Injury (SCI) mainly consists of a comprehensive all-inn package of care according to lesion level and lesion completeness with a long inpatient stay and high costs. In general, this kind of care does not specifically take into account patients' individual goals and patients' changing needs throughout their lifespan. A client-centred modular therapy program that focuses on patients' individual needs and that offer the opportunity for re-training individual goals after discharge may solve these problems.

Objective:

- a) to develop a condensed client-centred modular SCI rehabilitation service aimed at increasing the quality of life, the improvement on individual chosen goals and patients' autonomy, reducing length-of-stay and costs and
- b) to evaluate this service on cost-effectiveness.

Methods:

cohort study adjacent to the Umbrella SCI project in which the condensed rehab service is delivered in Adelante Rehabilitation Centre, which will be compared with standard care performed in the past in 8 Dutch rehabilitation centres.

Results:

A modular rehabilitation program was developed consisting of 3 rehabilitation phases: 1) a shorter initial clinical rehab program, aimed at a 'wheelchair mobilised' patient with stabile autonomous functions; 2) an early home phase in which the patient is transferred to a (semi-) home environment (with essential care provided!) and in which the patient may safely acquire experience as to skills (s)he wants to train additionally. 3) Patients are offered the opportunity for a short readmission for a client-centred rehab module to train on individual needs based on their experiences at home. At present the cost-effectiveness of this program is being assessed.

Conclusion:

This client-centred modular rehabilitation program is fully operational. Results on cost-effectiveness will substantiate whether or not this program should be implemented on a broader scale.

Keywords: Client-centred, cost-effectiveness, modular, rehabilitation program

P-119

Access to medical service in Korean people with spinal cord injury

Jeong Gil Kim¹, Hye Ri Kim², Hyung Ik Shin²

¹Department of Rehabilitation Medicine, Seoul National University College of Medicine, Seoul, South Korea

²Department of Rehabilitation Medicine, Seoul National University College of Medicine, Seoul National University Bundang Hospital, Seoul, South Korea

Objective:

To investigate the accessibility to medical service in Korean people with Spinal Cord Injury (SCI) comparing that of control group (CG), and examine the influencing factors.

Materials-Methods:

A total of 363 community dwelling persons with chronic SCI were enrolled and 1,089 age, sex matched persons were randomly selected from the general population for CG. Self-reported access to medical service was measured by asking "Was there a time in the last one year when you needed to visit hospital but you could not?" This question was followed by asking the reasons for not receiving medical service when it is needed. Psychosocial variables as well as injury related factors were evaluated.

Results:

Sixty (16.5%) persons were found to have difficulties in receiving medical service due to accessibility in SCI group, whereas, 45 (4.7%) persons reported access problems in CG ($p < .001$). The reasons for inaccessibility to medical services were the inaccessible transportation (27 persons, 45%), lack of money (24 persons, 40%), and difficulty in making appointment at hospital (9 persons, 15%) in SCI group. In CG, availability (lack of available time) and acceptability (decide not to visit hospital because symptoms were mild) rather than accessibility were frequent reasons for not receiving medical service when it is needed.

Conclusion:

Persons with SCI were experiencing barriers to medical services when it is needed more frequently than CG and the barriers were environmental rather than personal compared to CG, which necessitate social policy development to remove or reduce them.

Keywords: Medical service, spinal cord injury

P-120

Inter-rater reliability and concurrent validity of the SCIPUS during inpatient spinal cord injury rehabilitation

Anthony S Burns¹, Jude J Delparte², Heather M Flett³, Diane J Leber², Carol Y Scovil²

¹Brain and Spinal Cord Rehabilitation Program, Toronto Rehabilitation Institute, University Health Network and Division of Psychiatry, Department of Medicine, University of Toronto, Toronto, Canada

²Brain and Spinal Cord Rehabilitation Program, Toronto Rehabilitation Institute, University Health Network, Toronto, Canada

³Brain and Spinal Cord Rehabilitation Program, Toronto Rehabilitation Institute, University Health Network and Department of Physical Therapy, University of Toronto, Toronto, Canada

Objective:

Pressure ulcer (PU) development during inpatient spinal cord injury (SCI) rehabilitation can have a significant impact on length of stay and other rehabilitation outcomes. It is therefore important to identify individuals at risk for PU development and implement appropriate prevention strategies. The purpose of this study was to assess the inter-rater reliability and concurrent validity of the Spinal Cord Injury Pressure Ulcer Scale (SCIPUS), a SCI-specific PU risk assessment tool.

Materials-Methods:

Nurses in the inpatient SCI rehabilitation program were trained to administer the SCIPUS. Completion of the SCIPUS at inpatient admission, by the admitting nurse(s), was then implemented across the program. A second blinded assessor completed the SCIPUS and Braden scales. Intraclass correlation coefficients (ICCs) were calculated to assess inter-rater reliability. Concurrent validity (with Braden scale) was assessed for total scores (Spearman ρ) and risk categorization (ICC).

Results:

96 charts were reviewed. Total SCIPUS scores were found to have excellent inter-rater reliability (ICC=0.90); although there was variability for individual items. Age, pulmonary disease, renal disease, and diabetes had the highest raw agreement whereas completeness, mobility, and moisture had the lowest (>20% disagreement). There was moderate concurrent validity with the Braden for total scores ($\rho=0.59$) but weak concurrent validity for risk categorizations (ICC=0.15). Eighty-six percent of cases were rated high or very high risk using the SCIPUS whereas only 12% of cases were rated high or very high risk using the Braden.

Conclusion:

The SCIPUS is a promising PU risk assessment tool specific to SCI. Analysis suggests excellent inter-rater reliability for composite SCIPUS scores. Since the SCIPUS incorporates a broader range of risk factors, not surprisingly, the concurrent validity with the Braden scale was weak to moderate. Future work will assess additional psychometric properties (sensitivity and specificity) of the SCIPUS.

Keywords: Spinal cord injury, pressure ulcer, risk factors

P-121

Efficacy of pressure ulcer management programs by providing visual feedbacks

Jeongin Jeong¹, Mihwa Cho¹, Minji Lee¹, Jicheol Shin²

¹Severance Rehabilitation Hospital, South Korea

²Research Institute of Rehabilitation Medicine, South Korea

Background:

The prevention of pressure ulcers for SCI patients is very important. However, when occurred, it is more important to provide adequate care in its first stage to prevent it from getting worse. This study was to develop a program providing easier care for the family and nurses to perform.

Method:

By a thorough literature review, the "Manual Guide for Pressure Ulcers" containing definition, pictures, grades, and management of pressure ulcers was developed for the patient to use at all times. To motivate self-care on Grade I and II pressure ulcer patients, a visual pressure ulcer management program using the smart phone was applied. To evaluate and strictly measure the effects of the program, we used a 4-point scale.

Result:

A total of 14 patients participated in this ulcer management program from October 1, 2012 till February 28, 2013. Of the 14, 6 were Grade I and 8 were Grade II pressure ulcer patients.

(1) The satisfaction of nursing practice before and after applying the program was increased from 3.1 to 3.5.

(2) Self management of pressure ulcer before and after applying the program was meaningfully increased from 2.79 to 3.54.

Conclusion:

We found that by providing visual feedbacks, patients with pressure ulcers could not only see their condition visually but also be provided with a high quality of satisfactory nursing care. By visually confirming their results, better and active nursing care was provided. For further standardized nursing care, education must constantly be provided.

Keywords: Pressure ulcer management

P-122

The prevalence of pressure ulcers as a chronic complication of spinal cord injury in the developing world

Elissa Zakrasek, James Crew, Graham Creasey

Physical Medicine and Rehabilitation, Stanford University, Palo Alto, California, USA

Objective:

Multidisciplinary rehabilitation has dramatically improved outcomes for SCI patients in the developed world since World War 2. In areas of the developing world, however, comprehensive rehabilitation medicine is lacking. This deficiency incurs innumerable individual and societal costs. Scarce resources, societal stigmas, and paucity of education leave SCI patients at a great disadvantage in preventing and managing SCI complications such as pressure ulcers (PUs). Acute and rehabilitative care for SCI in the developing world is highly variable and difficult to study. We therefore performed a literature review to define the prevalence of SCI-related PUs during the "chronic" stage after acute hospitalization and rehabilitation.

Materials-Methods:

We performed an English-only PubMed search for cross-sectional, case-control and cohort studies since 1998 noting the prevalence of SCI-associated PUs in developing countries (defined as World Bank low- and middle-income countries). We excluded studies only reporting PU prevalence during acute hospitalization or rehabilitation. Additional papers were identified through references of the above articles.

Results:

Seven papers were identified meeting our inclusion criteria. In the chronic stage of life after SCI, the prevalence of PUs ranges from 27-54%, mean 38%. Six studies included patients with mixed levels of injury and ASIA grades and one study only included T1-S2 injuries. After excluding this study, the mean prevalence was 40%. Risk factors for PU development commonly cited in these papers included a dearth of trained rehabilitation specialists and long hours spent on inadequate pressure relief surfaces.

Conclusion:

Gelis noted a PU prevalence of 15-30% in his review of chronic stage SCI-associated PUs in the developed world. Unsurprisingly, we found the corresponding prevalence of PUs to be much greater in the developing world. Furthermore, our findings probably significantly under-represent true prevalence given decreased life expectancy of SCI patients and difficulty obtaining such data in countries largely lacking rehabilitation specialists.

Keywords: Spinal cord injury, pressure ulcers, developing countries

P-123

Cadaveric dissection of the pelvis in sitting for finite element modelling of pressure ulcer risk

Jillian Swaine, Michael Stacey

School of Surgery, University of Western Australia, Perth, Australia

Objective:

To determine the anatomy of the weight-bearing region of the pelvis in simulated sitting by dissecting a soft preserved cadaver.

Methods:

This cross sectional case study was a 74 year old able-bodied male, 1.72m, 65-70kg, soft preserved cadaver. He was positioned in a simulated sitting position by placing him on his left side and flexing his hips and knees to 100°. The buttocks were scanned using a portable ultrasound to identify the anatomy before dissection. A senior surgeon dissected the right buttock layer by layer down to the ischial tuberosity bone of the pelvis. Each layer was identified, described and photographed.

Results:

The ultrasound images of the soft preserved cadaver correlated well with the ultrasound images of able-bodied and participants with spinal cord injury collected in previous studies. The conjoint tendon of the biceps femoris muscle and semitendinosus muscle originates on the ischial tuberosity was identified. This conjoint tendon appears to be loaded during sitting (i.e. hamstring complex). The semimembranosus muscle also originates on the ischial tuberosity and it too may be loaded during sitting. Overlying these structures is the fat and skin layers. It was noted that only the medial border of the gluteus muscle might be loaded by the ischial tuberosity in sitting.

Conclusion:

The pelvis is a prevalent location for pressure ulcers in upright sitting but its anatomy, associated muscles and soft tissue layers in a sitting position are relatively unknown in the literature. The upright pelvis is a complex bony structure with the ischium pressing down into the hamstring complex, the medial border of the gluteus, fat and skin layers. Knowledge of these gross anatomical structures is key to informing future studies using open MRI images and constructing Finite Element Models of the pelvis and soft tissue layers.

Keywords: Sitting-acquired pressure ulcers, cadaveric dissection

P-124

Pressure ulcer patterns, prediction and impact on spinal cord injury rehabilitation

Pınar Oztop Ciftkaya¹, Nur Saracgil Cosar², Oya Ümit Yemişci², Banu Sarıfakıoğlu³, Seniz Akcay Yalbuздag⁴,
Kubra Ustaomer⁵, Nuri Çetin²

¹Department of Physical Medicine and Rehabilitation, Baskent University, Istanbul, Türkiye

²Department of Physical Medicine and Rehabilitation, Baskent University, Ankara, Türkiye

³Department of Physical Medicine and Rehabilitation, Namık Kemal University, Tekirdağ, Türkiye

⁴Department of Physical Medicine and Rehabilitation, Bursa Sevkett Yılmaz Education and Research Hospital, Bursa, Türkiye

⁵Department of Physical Medicine and Rehabilitation, Yıldızlı Güven Hospital, Trabzon, Türkiye

Objective:

To determine the occurrence, predictors and consequences of pressure ulcers in patients with spinal cord injury during inpatient rehabilitation.

Materials-Methods:

A retrospective comparison study was carried out reviewing medical records of 186 patients who were diagnosed with spinal cord injury and accepted to an inpatient rehabilitation program at rehabilitation unit of a tertiary research hospital. The occurrence, location and stage of pressure ulcers; and possible risk factors for the occurrence of pressure ulcers such as personal and lesion characteristics, complications and functional independence during rehabilitation were registered. The impact of pressure ulcers on inpatient rehabilitation was assessed by estimating their influence on length of stay.

Results:

Forty four of 186 patients (23.6%) had one or more pressure ulcers; most of them were located at the sacrum (54.5%); and the most frequent stages were stage 3 (38.6%) and stage 2 (36.4%). The significant risk factors for pressure ulcers were male gender ($p=0.002$), traumatic etiology ($p=0.007$), completeness of the lesion (0.000), paraplegia (0.049) and low admission score on the Functional Independence Measure. The length of stay of patients admitted with a pressure ulcer was significantly longer than that of those without pressure ulcer ($p=0.006$).

Conclusion:

Pressure ulcers remain a dominant health problem for people with spinal cord injury and they have a significant impact on rehabilitation.

Keywords: Pressure ulcer, rehabilitation, spinal cord injury

P-125

Dermatological problems following spinal cord injury in Korean patients

Zee A Han¹, Myung Eun Chung², Ja Young Choi⁴, Young Jin Ko³

¹National Rehabilitation Center, Department of Spinal Cord Injury Rehabilitation, Seoul, South Korea

²Department of Rehabilitation Medicine, Saint Vincent Hospital, College of Medicine, The Catholic University of Korea, Suwon, South Korea

³Department of Rehabilitation Medicine, Seoul Saint Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, South Korea

⁴Department of Physical Medicine and Rehabilitation, National Health Insurance Service Ilsan Hospital, Gyeonggi, South Korea

Objective:

To identify dermatological conditions following spinal cord injury (SCI).

Materials-Methods:

We reviewed the medical records of 1408 SCI patients treated for the recent 12-year period at the rehabilitation center of National Health Insurance Corporation Ilsan Hospital in Korea and identified 253 patients who were referred to dermatology for skin problems. Dermatological diagnoses were analyzed in relation to neurologic completeness, extent of paralysis, neurologic injury level (NIL) and time since SCI.

Results:

Of the 253 SCI patients referred to dermatology, a total of 335 dermatological conditions were diagnosed. The most common dermatological finding was infectious (n=123; 36.7%) followed by eczematous lesions (n=119; 35.5%). Among the infectious lesions, fungal infection (n=76, 61.8%) was the most common, followed by bacterial (n=27, 21.9%) lesions. Seborrheic dermatitis (n=59, 64.1%) was the most frequent eczematous lesion. There was no significant difference in occurrence of infectious skin lesions between neurologically complete and incomplete SCI patients. Ingrown toenail occurred more frequently in tetraplegics whereas vascular skin lesions occurred more commonly in paraplegics (P<0.05). Xerotic dermatitis showed a higher occurrence within 12 months of injury rather than thereafter (P<0.05). 72.4% of the infectious skin lesions manifested below the NIL (P<0.001) and 94.7% of the fungal skin lesions were observed below the NIL (P<0.001). 61.5% of the eczematous lesions and 94.9% of seborrheic dermatitis cases occurred above the NIL (P<0.001).

Conclusion:

The most common dermatological condition in SCI patients among those referred to the dermatology department was fungal infection, followed by seborrheic dermatitis. Although dermatologic problems after SCI are not critical in SCI outcome, they negatively affect the quality of life in these patients. Patients and caregivers should be educated about appropriate skin care and routine dermatological examinations should be performed to prevent these complications.

Keywords: Spinal cord injury, skin disease, dermatology

P-126

A valid postural scale for a pressure ulcer prevention self-management program

Jillian Swaine, Michael Stacey

School of Surgery, University of Western Australia, Perth, Australia

Objective:

The aim was to determine if positive self-report of wheelchair postural problems was more likely to coexist with measured abnormal pelvic tilt (greater than $\pm 4^\circ$) than a normal pelvic tilt ($\pm 0 - 4^\circ$).

Materials-Methods:

In this cross sectional study, eighteen participants with SCI completed the Postural Scale for Wheelchair Users self-report questionnaire with domains: pain, aesthetics, health and function. A total score of 24 (50%) or greater indicated problematic posture and a formal assessment was required. Participants' pelvic tilts in the frontal (XZ) plane were measured with the Horizon™ digital inclinometer with good reliability (ICC = 0.823).

Results:

The mean age was 41.3 years (SD = 11.4); weight was 82.1 kg (SD = 14.3); median months post injury was 34.7; 3 were female and 15 male and 11 were paraplegia and 7 tetraplegia. The mean total score of the Postural Scale for Wheelchair Users self-report questionnaire was 20 (SD = 6) and the mean pelvic tilt in the frontal (XZ) plane was $2^\circ \pm (SD = 2)$. Positive self-report of postural problems was significantly more likely to coexist with a measured pelvic obliquity (greater than $\pm 4^\circ$) than a normal pelvic tilt ($\pm 0 - 4^\circ$) (75% versus 14.29% respectively, $p = 0.0444$, Fisher's exact test).

Conclusion:

A score of 24 or greater was considered positive for postural problems on the Postural Scale for Wheelchair Users self and it was significantly more likely to coexist with abnormal pelvic tilt. This questionnaire will be used in a pressure ulcer prevention self-management program.

Keywords: Pressure ulcer prevention, self-management, postural assessment

P-127

Novel tools for measuring pelvic posture in AusCAN risk assessment for sitting-acquired pressure ulcers

Jillian Swaine, Michael Stacey

School of Surgery, University of Western Australia, Perth, Australia

Objective:

1. To develop two protocols to measure pelvic tilt in the frontal (XZ) and sagittal (YZ) planes while seated a wheelchair and 2. To determine the intrarater reliability of two therapists and the interrater reliability of two pelvic tilt angles measured by two therapists using Rysis™ and Horizon™ tools.

Materials-Methods:

This cross sectional study involved eighteen participants who were 18 years of age or older with SCI and using a manual or power wheelchair. Data acquisition protocols were developed for each of the two measurement methods; 2D seated posture photographic software (Rysis™) and a digital inclinometer (Horizon™).

Results:

The mean age was 41.3 ± 11.4 years; median months post injury was 34.7; 3 were female and 15 male and 11 were paraplegia and 7 tetraplegia. A two-way random effects model with absolute agreement and single measurements was used. Overall, the ICCs for intrarater reliability were good to excellent (0.842 – 0.981).

Interrater reliability results were varied:

ICCs of 0.823 with $p < 0.001$ (CI = 0.505–0.935) using Horizon™ in the frontal plane (XZ), the ICC from Horizon™ in the sagittal (YZ) plane was 0.574 with $p < 0.001$ (CI = -0.043-0.846). Using Rysis™ ICC was 0.565 with $p < 0.001$ (CI = 0.134-0.813) in the frontal plane (XZ) using the same model. Rysis™ measurements in the sagittal plane (YZ), had an ICC of 0.497 with $p < 0.001$ (CI = 0.036-0.781).

Conclusion:

Intrarater reliability was excellent and interrater reliability was good to excellent for Horizon™ in the frontal (XZ) plane; however, there was evidence of systematic error with therapist 1 measuring larger angles compared with other therapist 2. The ICCs for both angles for Rysis™ and Horizon™ (sagittal plane) were poor. Horizon measurements in the frontal plane (pelvic obliquity) will be used in an international prospective study: AusCAN Risk Tool for Sitting-Acquired Pressure Ulcers.

Keywords: Sitting-acquired pressure ulcers, reliability, pelvic posture measurement

P-128

Applying new best practice guidelines for AusCAN prevent pressure ulcer prevention self-management program: An implementation science approach

Jillian Swaine, Marianne Romeo, Lorraine Johnson, Luke Brennan, Janine Aird, Fraser Clarke, Michael Stacey

School of Surgery, University of Western Australia, Perth, Australia

Objectives:

1) To review 3 published pressure ulcer prevention guidelines: National Pressure Ulcer Advisory Panel (NPUAP)/ the European Pressure Ulcer Advisory Panel (EPUAP) Pressure Ulcer Prevention Guidelines, the Pan Pacific Pressure Ulcer Prevention Guidelines and the Canadian Best Practice Guidelines for Pressure Ulcer Prevention and Management for Spinal Cord Injury; 2) to identify the top 5 guidelines based on a priori criteria; and 3) use implementation science to design self-management behaviour change modules for each of the 5 guidelines.

Materials-Methods:

One senior occupational therapist with wheelchair/pressure management expertise reviewed the NPUAP/EPUAP guidelines and created a table for each guideline; 4 additional therapists (3 occupational therapists and 1 physiotherapist) reviewed and mapped the Pan Pacific and the Canadian Best Practice guidelines against the NPUAP/EPUAP guidelines. All 5 therapists were asked to independently identify the top 5 guidelines based on 2 a priori criteria (must be in all 3 guidelines and have a level of evidence higher than expert opinion/consensus).

Results:

The top five guidelines were: risk assessment, skin inspection, repositioning, support surfaces, nutritional assessment and intervention. Skin health was added ad hoc based on recommendations from pressure ulcer prevention experts. Operational definitions were developed for each behaviour. An implementation science approach was followed. Target behaviours were identified in detail. Capacity, motivation and opportunity were described for each of the behaviours for a home based, Western Australia context and behaviour change techniques were chosen. Interface pressure mapping, transcutaneous oxygen and ultrasound were included in a new behaviour change technique. All three of these techniques are now in a "biofeedback" category.

Conclusion:

An implementation science approach was applied to systematically developing a pressure ulcer prevention self-management program for individuals with spinal cord injury. This new program forms the treatment arm in a randomised controlled trial as compared with usual pressure ulcer prevention education.

Keywords: Pressure ulcer prevention, self-management, implementation science

P-130

Therapeutic effect of the recombinant human epidermal growth factor (rhEGF) in pressure ulcer

Kang Hee Cho, Young Jae Kim

Department of Rehabilitation Medicine, Chungnam National University Hospital, Daejeon, South Korea

Objective:

To investigate the effect of the recombinant human epidermal growth factor (rhEGF) on pressure ulcer treatment.

Materials-Methods:

Eighteen patients who had stage 3 or 4 pressure ulcer were divided into two groups. For experimental group, we cleaned the wound with normal saline, applied 0.5 ml of EasyEF liquid? (rhEGF 0.5 mg/10 ml) and covered the wound with the humidified gauze 2 times a day. For control group, we cleaned with normal saline and covered with the medifoam for 2 times a day. We estimated the change of the size and the stage of the ulcer weekly for 4 weeks. The longest region of the wound was measured by the width, and the longest line perpendicular to the width was measured by the length.

Results:

The width and length of the stage 3 ulcer of experimental group significantly decreased, while control group showed a slightly decreased. The experimental group showed significant improvement compared to the control group ($p<0.05$) in stage 3 ulcer. In stage 4 ulcer treatment, there were no significant differences between the two groups. In experimental group, 5 regions of the six stage 3 ulcer improved into the stage 2 ulcer during the study, even though only 1 region improved into the stage 2 ulcer in control group.

Conclusion:

We confirmed that rhEGF was effective in the stage 3 ulcer. rhEGF treatment may be useful for healing of the stage 3 ulcers.

Keywords: Recombinant human epidermal growth factor, pressure ulcer

P-131

An assessment of health-related quality of life, patient-reported outcomes for spasticity in spinal cord injury

Shanti Thavaneswaran, Funke Stauble

Medtronic International Trading Sàrl, Tolochenaz, Switzerland

Objective:

Intrathecal baclofen (ITB) is used to treat severe spasticity associated with spinal cord injury (SCI). This study analyses patient-reported outcomes (PROs) used to measure health-related quality of life (HRQoL) in ITB clinical studies to date, to determine if there is a consensus for PRO instruments used to assess spasticity at baseline, and treatment impact of ITB. Subsequent to this, results from a systematic review examining HRQoL PRO instruments in the SCI indication utilised in broader spasticity-related, non-intervention-specific studies were analysed.

Materials-Methods:

ITB studies were gathered from a Medtronic International internal database. A systematic review, employing MEDLINE and EMBASE, searched for studies reporting HRQoL instrument use across indications in which spasticity was measured. Thirteen studies were identified for SCI.

Results:

Of the 51 identified ITB clinical studies, 29 employed clinical-reported outcomes (CROs) exclusively, the most frequent being the Ashworth/Modified Ashworth Scale (39 studies; 88%). Only eight studies utilised a validated HRQoL instrument, of which the majority (7) were generic health status measures.

In the SCI analysis, strong diversity of HRQoL instrument was observed. The first spasticity-specific HRQoL instrument to date, the Patient-Reported Impact of Spasticity (PRISM) (developed for an SCI-specific population) was reported in two studies. The preference of generic instruments was of note (68% of PROs overall), the most frequently-employed being SF-36.

Conclusion:

Based on overall findings there is a demonstrated need for consistency in use of a HRQoL PRO instrument for spasticity-specific outcomes in SCI. This need is further supported by reported inadequacies of the most-utilised CRO for spasticity, the Ashworth Scale, where a gaining consensus has highlighted issues of inter-rater reliability and lack of sensitivity to changes that may be patient-relevant. Future research could leverage the power of a PRO-based tool for both clinical and HRQoL assessment of spasticity, not unlike what is used in pain assessment.

Keywords: Spasticity, patient-reported outcomes, health-related quality of life

P-132

An assessment of the epidemiology of spasticity associated with spinal cord injury in Europe

Elmira Lechat¹, Julia Langham², Naman Demaghlatus¹, Shanti Thavaneswaran¹

¹Medtronic International, Tolochenaz, Switzerland

²PHMR Associates, London, United Kingdom

Objective:

The incidence of secondary complications of spinal cord injury (SCI) is not well-researched and a better understanding of the epidemiological burden of the complication of spasticity, in particular, is needed. The objective of this study was to conduct a systematic review of the literature to estimate the prevalence and incidence of spasticity associated with SCI in Europe.

Materials-Methods:

A systematic literature search (using MEDLINE, EMBASE, Cochrane Library, CINAHL plus and Web of Science) was conducted to identify studies, published between 2000 and September 2012, reporting incidence or prevalence of spasticity associated with SCI in Europe (Germany, France, UK, Italy, Spain, Finland, Portugal, Ireland, Austria, Switzerland, Denmark, Sweden, Norway, Poland, Israel, Netherlands, Belgium and Greece). Search was not restricted by interventions or outcome measures, but was limited to English language publications.

Results:

No eligible epidemiology studies were identified. An extended search was carried out to include studies published prior to 2000 and non-European studies. Six relevant studies from five publications were identified. Two European studies reported data from an identical Swedish SCI patient database; however each study reported different spasticity prevalence estimates, ranging from 12-68%, which may be attributed to the difference in definition and type of spasticity each study used and time-point of measurement. Data from one Malaysian study and two US studies reported an incidence range of spasticity associated with SCI of 27% at discharge and 78% at 1 year post-discharge.

Conclusion:

This review confirms that epidemiological evidence of spasticity following SCI in Europe is insufficient, and therefore constitutes a significant limitation in accurately assessing the burden of this condition. Further to that, the severity, onset and type of spasticity (e.g. focal, non-focal, multi-focal) on this patient population needs to be explored in further detail, as the epidemiological data has been shown to vary according to these factors.

Keywords: Spinal cord injury, spasticity, epidemiology

P-133

Incidence of spasticity in spinal cord injury and characteristics of patients with spasticity

Belgin Erhan, Berrin Gündüz, Derya Soy Buğdaycı, Berna Çelik, Kadriye Öneş, Nurdan Paker, Ayşenur Bardak, Evrim Coşkun Çelik, Fatih Kahraman

Istanbul Physical Medicine and Rehabilitation Training and Education Hospital, Istanbul, Turkey

Spasticity is a very common complication among spinal cord injured (SCI) patients that interferes with their quality of life. The aim of the study is to evaluate the incidence and related factors of spasticity among our SCI patients

Material-Methods:

SCI patients who were treated at Istanbul Physical Medicine and Rehabilitation Training Hospital between September 2012 and December 2012 were enrolled. The patients were grouped into two groups depending on whether they had spasticity (Group1) or not (Group 2). We compared the two groups with respect to demographic data (age, gender, marital status, etc), etiology (traumatic, non traumatic), level (cervical, upper thoracic, lower thoracic-lumbar) and severity (complete, incomplete) of the injury, and time since injury. Descriptive statistics, Mann Whitney-U tests and Pearson correlation tests were used for statistics.

Results:

A total number of 116 SCI patients (47 women and 69 men) were assessed. Sixty eight (58.6%) patients had spasticity and 48 (41.4 %) (patients did not have spasticity. There were no statistically significant differences between two groups in demographic data, etiology and severity of injury and duration of injury. Twenty five cervical, 19 upper thoracic and 24 lower thoracic-lumbar level injury were seen in Group 1 and; 2 cervical, 3 upper thoracic and 43 lower thoracic-lumbar level injury in Group 2. Injury level differed between the groups. Spasticity was more common and frequent in the upper level injuries.

Conclusion:

The incidence of spasticity among our SCI patients was 58.6% which is similar with the previous reports. Although, spasticity is not related with age and time, it has a correlation with the level of injury. Special emphasizes should be given to those patients with upper lesions in order to control morbidity which may increase due to spasticity.

Keywords: Spinal cord injury, spasticity

P-134

Spasticity the first year after traumatic SCI

Lars Werhagen¹, Cecilia Norrbrink¹, Inger Lauge Johannesen³, Jens Christian Sørensen⁴, Troels Staehelin Jensen², Katarzyna Trok⁵, Fredrik Phiel⁵, Nanna Brix Finnerup²

¹Karolinska institutet, Danderyds hospital, Stockholm, Sweden

²Danish Pain Research Center, Aarhus University, Denmark

³Spinal Cord Injury Unit, Viborg Hospital, Denmark

⁴Department of Neurosurgery, Aarhus University Hospital, Denmark

⁵Department of Neurology, Karolinska University Hospital, Stockholm Sweden

Setting prospective study

Introduction:

The study was performed at Karolinska University hospital Stockholm, Sweden, and at Aarhus University Hospital, Denmark.

Spasticity after Traumatic SCI (TSCI) is a challenge in SCI rehabilitation and affects quality of life. Spasticity is believed to start early after the spinal shock. The aim of the present study was to study the presence, intensity, and treatment of spasticity. A secondary aim was to study the relation to neuropathic pain, completeness and level of injury the first year after TSCI.

Methods:

Neurological examination (incl. Modified Asworth scale, reflexes, clonus) was performed. The patients filled out questionnaires within three month after injury (BL), 6 and 12month after injury. The studied parameters were AIS grade, the NL and spasticity graded by the patients on a NRS 0-10, including both stiffness and spasms.

Results:

Included were 90 patients at BL and 87 after one year. At BL 63/90(70%) and 1 year after injury 70/87 (81%) experienced spasticity. 12 month after injury 22/26 (85%) with a complete SCI and 47/61 (77%) with incomplete SCI experienced spasticity. One year after injury 41/49 (84%) with a cervical level, 23/28 (82%) with a thoracic and 1/10 (10%) with a lumbar level experienced spasticity. At BL 22/99 (24%), after 6 month 37/80 (46%) and 12 month after injury 41/87(47%) were under pharmacological treatment with Baclofen. Of 70 patient with spasticity 35(50%) suffered from NP and 9 of 17 (53%) without spasticity experienced NP.

Conclusion:

Spasticity is present in 8 out of ten 12 months after TSCI and half the patients are under pharmacological treatment with Baclofen. No relation was found between spasticity and NP.

Acknowledgement:

ALF grant from Stockholm County,
Karolinska Institutet Strategic Research in Health Care
The Norrbacka Eugenia Foundation
The Swedish Cancer and Traffic Injury Society

Keywords: Spasticity AIS Neuropathic pain traumatic SCI

P-135

Ultrasonographically guided obturator nerve block for adductor spasticity in a paraplegic patient

Elif Yalçın, Mufit Akyuz, Olcay Ilgu, Neslihan Bilge Ozer

Ankara Physical Medicine and Rehabilitation Training and Research Hospital, Ankara, Turkey

Ultrasound guidance provides a new approach in peripheral nerve blocks, that facilitates the identification of nerves, may aid in avoiding damage to nonneural structures and allows real-time monitoring of the local-anesthetic solution spread. The anatomy of the ON is very difficult and there is a large variability in the courses and divisions of the ON described from cadaveric studies. Also there is huge variability of division of the nerve into anterior and posterior branches within, or proximal, to the obturator canal. (figure) The anterior branch lies between the adductor longus and adductor brevis muscles which is primarily motor to the adductors but gives rise to cutaneous sensory branches to the medial thigh. The posterior branch, which is also primarily motor but has a terminal sensory articular branch to the medial side of the knee joint, is located between the adductor brevis and adductor magnus muscles. (figure) In this report, we describe fenol injection for obturator nerve block with ultrasonography guidance in combination with nerve stimulation to a patient with paraplegia, T5 ASIA A. Neurolysis using 6% phenol was applied with the guidance of ultrasonography and a peripheral nerve stimulator guidance in combination with nerve stimulation. The visual analogue scale scores decreased significantly for pain, spasticity and hygiene. A drastic increase in the ROM values was shown in hip abduction and the walking quality with a walker was obviously increased. (figure) This case report suggests that ultrasound-guided obturator-nerve identification and block are technically easy and highly successful.

Keywords: Obturator nerve block, ultrasonography, fenol

P-136

Intrafusal effects of botulinum toxin injections for spasticity

Arzu Yagiz On¹, Chetan Phadke², Yesim Kirazli¹, Ismail Farooq², Chris Boilas²

¹Department of Physical Therapy and Rehabilitation, Ege University Medical School, Izmir, Turkey

²Upper Motorneuron Spasticity Research Program, West Park Healthcare Centre, Toronto, Canada

Objective:

Botulinum toxin injections have been reported to affect both extrafusal and intrafusal fibers. However, it is difficult to isolate the intrafusal effects from extrafusal and central effects. Here we present a novel method of measuring the effect of botulinum toxin-A on muscle spindle activity in patients with spasticity.

Materials-Methods:

We assessed H-reflex, maximum M-wave, and Achilles tendon reflex serially in ten patients with spasticity due to stroke. Spasticity was evaluated by using modified Ashworth Scale. All the assessments were made pre-, 2, 4, and 12 weeks post-botulinum. In order to assess the intrafusal effects, we subtracted the %change in Hreflex amplitude from baseline (representing extrafusal and central effects) from the %change in Achilles tendon reflex amplitude from baseline (representing intrafusal, extrafusal and central effects).

Results:

Using this formula, our results suggest that botulinum induces significant chemodeneration of the intrafusal muscle fibers (33% decreases). Intrafusal effects were greatest at 2 weeks, but tapered off by 12 weeks post-botulinum ($p < 0.017$). We found a significant positive correlation between the intrafusal effects of botulinum toxin and changes in modified Ashworth scale.

Conclusion:

Our method of assessing the effects of botulinum toxin shows significant effect on intrafusal fibers, which correlates with clinical manifestation of spasticity. Future studies need to investigate ways to maximize intrafusal effects and minimize extrafusal effects of botulinum therapy.

Keywords: Spasticity, botulinum toxin

P-137

The use of botulinum toxin for spasticity after spinal cord injury

Ramiro Palazon¹, Mónica Alcobendas¹, Ana María Benavente², Eduardo Vargas¹, Ana Esclarín¹, Francisco Talavera¹

¹Hospital nacional de Paraplégicos, PM&R Department, Toledo, Spain

²Hospital Virgen de la Salud, PM&R Department, Toledo, Spain

Objective:

To describe the use and effects of botulinum toxin (BT) injections in persons with spinal cord injury (SCI) and focal spasticity.

Materials - Methods:

Chart review of patients with SCI receiving their first injection of BT for spasticity control at a monographic SCI hospital since 2010 to 2012. Collected data were neurological level, ASIA impairment scale (AIS); type and intensity of spasticity, pharmacologic and other therapies; goals, site and doses of BT used; changes in tonus and function; and self-reported outcome on clinical follow-up.

Results:

Charts of 92 patients were reviewed. Oral baclofen was previously used in most of them. Dosages of onabotulinum toxin ranged from 30 to 200 units per muscle, and abobotulinum toxin ranged from 50 to 700 units per muscle, depending on muscle size. Average improvement in tonus (according to Modified Ashworth Scale) was 1.3 points per muscle. Most of the people experienced goniometric and functional improvements. 87 patients felt they had achieved their functional improvement objectives.

Conclusion:

BT seems to be an effective treatment for focal spasticity and a good adjuvant to pharmacologic interventions for general spasticity in persons with SCI.

Keywords: Spasticity, spinal cord injury, botulinum toxin

P-138

Effects of intrathecal baclofen bolus injection on spasticity and gait

Yoonhong Park¹, Duk Hyun Sung¹, Du Hwan Kim²

¹Department of Physical and Rehabilitation Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, South Korea

²Department of Physical and Rehabilitation Medicine, Keimyung University School of Medicine, Daegu, South Korea

Objective:

The aim of this study is to evaluate the effects and side effects of intrathecal baclofen (ITB) bolus injection, and to assess the effective ITB bolus dose in ambulatory spastic patients.

Materials-Methods:

Ambulant 11 ITB pump candidates with muscle hypertonia caused by hereditary spastic paraplegia, brain injury, cerebral palsy and myelopathy were investigated. A 12.5~25 µg ITB bolus was injected via lumbar puncture at first day, and a dose of bolus was adjusted in second day respectively. Only 4 patients were injected in third day to assess the effective ITB bolus dose. We evaluated Ashworth score, Penn spasm frequency score, reflex score, manual muscle test, numeric rate scale of pain, Tinetti gait score, 10 meter walking time, self-questionnaire about spasticity, soleus Hoffmann reflex/M-wave amplitude (H/M) ratio, gait speed and range of motion at knee during gait.

Results:

The successful and effective dose of ITB bolus is 9.38 µg in one, 12.5 µg in four, 25 µg in four, 50 µg in one patient. A significant decrease in Ashworth score, reflex score, 10 meter walking time, H/M ratio and an increase in self questionnaire about spasticity were noted after ITB bolus. One patient presented back pain and the pain was resolved after blood patch.

Conclusion:

ITB bolus injection produced a reduction in tone and is associated with significant fast walking ability and improvement in quality of life. To avoid overdose of ITB trial test, we suggest that initial dose less than 50 µg is appropriate.

Keywords: intrathecal baclofen(ITB), ITB bolus injection

P-139

BDNF induced by treadmill training contributes to suppression of allodynia and spasticity through functional KCC2 expression in lumbar enlargement after spinal cord injury in adult rats

Syoichi Tashiro¹, Munehisa Shinozaki², Masahiko Mukaino³, Francois Renault Mihara², Liang Zhang¹, Yoshiaki Toyama⁴, Meigen Liu¹, Hideyuki Okano², Masaya Nakamura⁴

¹Department of Rehabilitation Medicine, KEIO university school of Medicine, Tokyo, Japan

²Department of Physiology, KEIO university school of Medicine, Tokyo, Japan

³Department of Rehabilitation Medicine, Asahikawa university hospital, Hokkaido, Japan

⁴Department of Orthopaedic surgery, KEIO university school of Medicine, Tokyo, Japan

Background:

Spasticity and allodynia are major sequelae after spinal cord injury (SCI). Previous studies demonstrated that BDNF was induced by training, that KCC2, Kalium-Chloride cotransporter 2, was down-regulated by BDNF administration in mature neurons, and that allodynia and spasticity were exacerbated by KCC2 down-regulation, separately. However, in terms of spasticity and allodynia, the correlation among treadmill training, BDNF and KCC2 expression after SCI still remains unclear. Here, we investigated how training affects post SCI spasticity and allodynia, focusing on BDNF and KCC2 using rat contusive SCI model.

Material-Method:

In 50 adult rats, moderate contusive SCI was induced at Th10 level using an IH impactor (200 Kdynes). The animals were divided into 2 groups at random. In the training group, treadmill training was performed using robotic device from 7 to 21 days after SCI. In the control group, no exercise was performed. Spasticity and allodynia were assessed up to 7 weeks after SCI. Changes in BDNF and KCC2 expression of lumbar enlargement were assayed by western blotting.

Result:

Western-blotting analyses revealed that the treadmill training after SCI induced the up-regulation of BDNF expression followed by the up-regulation of pKCC2 expression. Immunostaining for pKCC2 showed that KCC2 expression at 7th week increased both at the plasma membrane of spinal motoneurons and lamina I-II in the training group compared to the control group. Furthermore, spasticity and allodynia, as well as the locomotor function, significantly improved in the training group compared to the control group

Conclusion:

BDNF induced by training did not trigger down-regulation of KCC2 and exacerbation of spasticity and allodynia in moderate contusive spinal cord injury model rats. Continuous BDNF up-regulation during and after the training period does not disturb KCC2 up-regulation after the training period, leading to suppression of spasticity and allodynia.

Keywords: Rehabilitation, KCC2, BDNF

P-140

Intermittent catheterization in patients with traumatic spinal cord injury: Obstacles, worries, level of satisfaction

Yeşim Akkoç¹, Bilge Yılmaz², Rıdvan Alaca², Belgin Erhan³, Berrin Gündüz³, Necmettin Yıldız⁴, Haydar Gök⁵, Kurtuluş Köklü⁶, Ece Çınar¹, Ebru Alemdaroğlu⁶, Murat Ersöz⁶, Hale Karapolat¹, Yasin Demir², Ayşe Nur Bardak³, Işıl Turna³, Necdet Çatalbaş⁴, Seçilay Güneş⁵, Hakan Tunç⁶

¹Department of Physical Medicine and Rehabilitation, Ege University, Izmir, Turkey

²Department of Physical Medicine and Rehabilitation, Gulhane Military Medical Academy, Ankara, Turkey

³Istanbul Physical Medicine and Rehabilitation Teaching and Research Hospital, Istanbul, Turkey

⁴Department of Physical Medicine and Rehabilitation, Pamukkale University, Denizli, Turkey

⁵Department of Physical Medicine and Rehabilitation, Ankara University, Ankara, Turkey

⁶Ankara Physical Medicine and Rehabilitation Teaching and Research Hospital, Ankara, Turkey

Objective:

The aim of this study is to examine the obstacles people with traumatic spinal cord injury (SCI) face performing intermittent catheterization (IC), also their worries and level of satisfaction.

Materials-Methods:

268 patients performing IC for at least 3 months were asked to fill-out a questionnaire about their opinions on IC.

Results:

69.5% of patients performed IC themselves, 10.4% had performed by their mothers, 7.8% by another caregiver and 7.4% by their spouse. For the 82 (30.5%) patients unable to apply IC, reasons were; insufficient hand function (56.1%), being unable to sit appropriately (35.4%) and spasticity (8.5%). 70% of male patients had insufficient hand function, 20% couldn't sit and 10% had spasticity while 56.3% of female patients couldn't sit, 37.5% had insufficient hand function and 63% had spasticity. Difference between sexes was found to be statistically different ($p < 0.05$).

Worries patients had when starting IC were; fear of being dependent on IC (50.2%), accidentally injuring self (43.8%), embarrassment (43.2%), causing an infection (40.2%), bleeding (32.7%), fear of feeling pain (30.2%) and hygiene (24.7%). More women felt embarrassment, other items were similar in both sexes.

46.9% of patients had urinary incontinence in intervals. Of those, 45.6% had one or more incontinence episodes a day. 45.6% just had leaks while 33.6% needed a change of clothes. 75.6% used pre-lubricated catheters, 19.8% used hydrophilic, 4.5% used nelaton. 66.6% expressed satisfaction with their catheters. 63.1% stated IC was very easy. 47.9% said IC improved their quality of life. When asked which they would prefer 97.4% chose IC over continuous catheterization.

Conclusion:

69.5% of patients performed IC themselves. Men's most common obstacle was insufficient hand function while women's was being unable to sit appropriately. Patients' most common worries were being dependent on IC for life. 46.9% had incontinence in intervals. 47.9% said IC improved their life quality. 97.4% preferred IC over continuous catheterization.

Keywords: Neurogenic bladder, bladder rehabilitation, intermittent catheterization

P-141

Neurogenic bladder evaluation and management after spinal cord injury: Current practice among physiatrists working in turkey

Yeşim Akkoc¹, Murat Ersoz², Haydar Gok³, Ece Cinar¹

¹Department of Physical Medicine and Rehabilitation, Ege University School of Medicine, Izmir, Turkey

²Ankara Physical Medicine and Rehabilitation Teaching and Research Hospital, Ankara, Turkey

³Department of Physical Medicine and Rehabilitation, Ankara University School of Medicine, Ankara, Turkey

Objective:

To determine the current trends in surveillance and management of the patients with neurogenic bladder secondary to spinal cord injury (SCI) among physiatrists in Turkey.

Materials-Methods:

A questionnaire was sent by mail or e-mail to the physiatrists who routinely work with and provide care for patients with SCI. The questionnaire included questions evaluating the current practice on assessment and follow-up of upper and lower urinary tract dysfunction, their optimal frequency and management.

Results:

100 physiatrists completed and returned the questionnaire. For surveillance of the upper urinary tract dysfunction (UUTD), 93% of the respondents preferred ultrasound. 57% of the physiatrists favored a yearly assessment and 36% preferred 6 months intervals. Multichannel urodynamics, voiding cystourethrography combined with urodynamics and videourodynamics were preferred by 62%, 25% and 10%, respectively for surveillance of the lower urinary tract dysfunction. Urodynamic evaluation was performed annually by 67% of the physiatrists. In patients with detrusor overactivity that has not responded to the combination of intermittent catheterisation (IC) and anticholinergic agents, 66% of the respondents preferred to increase the dose and 22% to change the medication. For treatment of areflexic bladder, 78% preferred the IC and 12% preferred the Crede or Valsalva maneuvers. Asymptomatic bacteriuria was not treated by 33% of the respondents in patients doing IC and 44% of them in patients with indwelling urethral catheters. 84% of the physiatrists preferred to administer antibiotics for 10-14 days for treatment of a symptomatic urinary tract infection.

Conclusion:

This survey indicates that there are some differences in current practice of physiatrists for surveillance and management of SCI patients with neurogenic bladder. The results emphasize the need for development of guidelines and implementation of CME activities in this field.

Keywords: Neurogenic bladder, spinal cord injury, urologic surveillance

P-142

The incidence of detrussor sphincter dyssynergia in spinal cord injured patients

Berrin Gunduz, Belgin Erhan, Meltem Vural, Nilgün Tekin, Nigar Capkan, Fatih Kahraman

Istanbul Physical Medicine Rehabilitation Training Hospital, Istanbul, Turkey

Objective:

Detrussor sphincter dyssynergia (DSD) is defined as failure of relaxation or involuntary contraction of the urinary sphincter during a bladder contraction; the incidence is reported to be 96% in suprasacral spinal cord injuries. Our aim was to investigate the incidence of detrussor sphincter dyssynergia (DSD) in traumatic spinal cord injured (SCI) patients.

Materials-Methods:

Videourodynamics of SCI patients were evaluated retrospectively. The demographic and clinical data were retrieved from the hospital records. The paediatric patients, patients with other diseases that will affect the urodynamics (traumatic brain injury, diabetes, etc), patients in the spinal shock period, non traumatic SCI patients or patients with insufficient data were excluded. DSD was diagnosed with increased EMG activity and lack of opening of bladder neck on flouroscopy during a detrussor contraction. Descriptive statistics, t- test and chi-square test were used to analyze results.

Results:

Three hundred eight patients, 86 with tetraplegia and 222 with paraplegia (218 male, 90 female) were eligible for the study. The mean age of the patients was 41.81 ± 13.84 years; the median duration of injury was 13 months (range 2-480 months). The most common etiologies were traffic accident (n:118) and fall from height (n:116). Two hundred twenty four of the patients had suprasacral, 84 had sacral injuries. Out of 224 suprasacral injuries, only 94 had DSD. DSD was not found to be correlated with age, gender, injury severity and time since injury.

Conclusion:

The incidence of DSD (42%) in this group of suprasacral injured patients was lower than the previous reports. Since without DSD the neurogenic bladder is safer and easier to manage detecting DSD at the proper time is important; the incidence should be examined in further studies.

Keywords: Spinal cord injury, neurogenic bladder, detrussor sphincter dyssynergia

P-143

Validation of assessment method and outcomes with interferential medium frequency electrical stimulation (IMFES) therapy for micturition control in mainly post spinal cord injury (SCI) patients with neurogenic bladder (NB)

Gelu Onose¹, Cristina Daia¹, Aurelian Anghelescu¹, Tiberiu Spiricu², Liliana Onose³, Magdalena Lapadat¹, Cristina Popescu¹, Mariana Neculae¹

¹Teaching Emergency Hospital "Bagdasar-Arseni", Bucharest, Romania

²University of Medicine and Pharmacy "Carol Davila", Bucharest, Romania

³Medical Service of Metrorex, Bucharest, Romania

Objective:

Two non-urodynamic classifications were used aiming to assess the efficiency of an IMFES standardized therapeutic method for micturition control (MC) rehabilitation in NB

Materials-Methods:

Comparison of Bors-Comarr (BCS) with an own classification (OCS), quantified scales (intrinsic and extrinsic validation) based on a related prospective study - 332 inpatients with NB, at the P (neural-muscular) RM Clinic Division of our hospital - fulfilled between September 2006 - April 2011; the cases were divided in two lots: IMFES (162, mean 39.63 years, st.dev. 17.06) and control (170 cases, mean 39.96 years, st.dev 17.58), stratified by AIS sensory (SS) and motor (MS) scores.

(Main) Results:

BCS/OCS intrinsic: sensibility (0.82/0.68), specificity (0.48/0.73), test efficiency (0.65/0.71) and extrinsic: Somers (0.921, 95% confidence interval - c.i. - 0.909-0.933), Spearman (0.970, 95% c.i. 0.962-0.978), ? Cronbach (0.969, 95% c.i. 0.962 - 0.975), Kendall (0.921, 95% c.i. 0.909-0.933), Pearson (0.949, 95% c.i. 0.939-0.959). The number of inpatients that significantly improved their MC was overall higher in the IMFES lot (mean 365.80, st.dev. 488.61) compared to controls (mean 824.94, st.dev. 63.22); $p < 0.001$, especially for those AIS B at admission, with SS between 160-224 (IMFES: mean 283.09, st.dev. 403; control: 1061.29, st.dev. 437.17; $p < 0.001$) and AIS C, with SS between 160-224 and MS below 40 (IMFES: 229.63, st.dev. 389; control: mean 694.14, st.dev. 671.89; $p < 0.001$). For the AIS A and/or B cases, with SS between 89-160 and respectively, for those AIS C and/or D, with SS between 160-224 and MS over 40, the method is useless but - obviously - for different reasons.

Conclusion:

OCS is valid for evaluation and IMFES is useful in rehabilitation of incomplete - SCI patients with NB.

Keywords: Neurogenic bladder, validation, interferential medium frequency electric currents stimulation

P-144

Renal function tests in spinal cord injury

Sibel Mandiroğlu, Serdar Kaymaz, Meltem Aras

Ankara Physical Medicine and Rehabilitation Training & Research Hospital, Ankara, Turkey

Objective:

The assessment of renal function is important in the management patients with spinal cord injury (SCI). The objectives of this study were to evaluate glomerular filtration rate (GFR) as a renal function test in patients with SCI and to assess whether there is a difference of GFR among patients with different levels of impairment and time since injury.

Materials-Methods:

Fifty patients (38 male, 12 female; mean age: 36,8 years) with SCI were included in the study. Glomerular filtration rate (GFR) as defined by creatinine clearance was estimated using Cockcroft-Gault formula. Creatinine clearance above 90 ml/min without any kidney damage was defined as normal (grade 0) and below 15 ml/min as grade 5. Chronic urinary complications such as vesicoureteral reflux, hydronephrosis and bladder stone were also investigated. Analysis were performed to reveal correlations of GFR with demographics, duration of SCI, ASIA levels of impairments and urination type. Statistically important level was defined as $p < 0.05$.

Results:

The mean duration of SCI was 24,9 months. 62% of the cases were classified as ASIA A, 12% ASIA B, 18% ASIA C and 8% ASIA D. Only, one patient was found to have grade 5 renal function. Glomerular filtration rate declined significantly in patients with longer duration of SCI ($p < 0.05$, $r = -0.27$). No significant correlations were found between ASIA levels of impairment, co-illness and urination type and GFR.

Conclusion:

Our results, suggest that in the clinical setting renal functions as defined by GFR estimation can be used in the follow-up of patients with spinal cord injury.

Keywords: Cockcroft-Gault formula, glomerular filtration rate, spinal cord injury

P-145

Chronic renal failure after spinal cord injury in young patient

Dong Hwan Lee¹, Hyun Woo Kim², Won Hee Park³, Joon Chul Kim⁴

¹Department of Urology, Incheon St. Mary's Hospital, The Catholic University of Korea, South Korea

²St. Paul's Hospital, The Catholic University of Korea, Seoul, South Korea

³Department of Urology, Inha University, Incheon, South Korea

⁴Department of Urology, Bucheon St. Mary's Hospital, Bucheon, South Korea

A 34-year-old man was hospitalized due to fall-down accident from 3 m height. His L2 spine was bursting-fractured and orthopedic surgery was performed. 2 weeks later after surgery, he complained of voiding difficulty and urodynamic study was done. Poor bladder compliance, low and intermittent flow rate, high residual urine and normal bladder capacity were noted. Clean intermittent catheterization(CIC) was recommended, however, he only took alpha-blockers instead of CIC. 2 years later, he visited our clinic because of poor general condition(hemoglobin;7.9, BUN/Cr; 31.4/2.9). Poor bladder compliance, decreased bladder capacity, low flow rate and high residual urine were also noted on urodynamic study. Bilateral hydronephrosis due to vesicoureteral reflux were found. We recommended him to take anticholinergic drugs and CIC, however, he refused.

In this case, we should remember that improper bladder managements might lead to renal failure. Especially in young patients, CIC should be informed thoroughly to prevent permanent renal damages and improve quality of life. Patients have to be educated why and how CIC should be done. If CIC is informed to patients by well-trained health professionals, most patients can do it. And also, patients should be encouraged not to become depressed. Early evaluation of bladder function and proper managements is the best way to prevent renal failure.

Keywords: Renal failure, spinal cord injury, clean intermittent catheterization

P-146

Patients with neurogenic lower urinary tract dysfunction - Do we need surveillance cystoscopy?

Matthias Walter, Ulla Sammer, Sharmistha Guggenbühl Roy, Dorothee Birnböck, Stephanie Knüpfer, Martina Liechti, Ulrich Mehnert, Thomas M Kessler

Neuro-Urology, Spinal Cord Injury Center & Research, University of Zürich, Balgrist University Hospital, Zürich, Switzerland

Objective:

In general, it is agreed that patients with neurogenic lower urinary tract dysfunction (NLUTD) are at increased risk for bladder cancer. But there is no consensus on the type and frequency of investigations to detect urological malignancies at an early stage. Considering the conflicting literature, we aimed to examine the value of surveillance cystoscopy in patients with NLUTD.

Materials-Methods:

A consecutive series of 110 patients (42 females, 68 males, mean age 51 ± 16 years) suffering from NLUTD for at least 5 years was prospectively investigated in a cross-sectional study, using cystoscopy and bladder washing cytology at a single university spinal cord injury (SCI) center.

Results:

Due to suspicious cystoscopy and/or cytology findings, seven of 110 (6%) patients underwent transurethral resection of the bladder lesion and/or random bladder biopsies. Relevant histologic findings were present in four patients: A T1 G3 bladder cancer in one male patient with diabetic cystopathy (78 years old, diabetes mellitus since 26 years, spontaneous bladder emptying), a nephrogenic adenoma in two patients [one female with spina bifida (21 years old, relying on intermittent self-catheterization), one male with SCI (52 years old, SCI since 20 years, relying on intermittent self-catheterization)], and an intestinal metaplasia in one female patient with cerebral palsy (45 years old, relying on a suprapubic catheter).

Conclusion:

Using surveillance cystoscopy, we found relevant histological findings in almost 4% of our patients suffering from NLUTD for at least 5 years. Thus, surveillance cystoscopy seems warranted, although the ideal starting point and frequency remain to be determined in further prospective studies.

Keywords: Cystoscopy, neurogenic lower urinary tract dysfunction, follow-up

P-147

Comparison of the efficacy between 2 different doses of Bot-A injections in the detrusor for overactive bladder treatment after spinal cord injury

Mailka Louki, Iliouana Zibi, Saida Moqrab, Serdar Kocer

Centre de Reeducation de COUBERT, France

Objective:

The first line treatment of Overactive bladder after Spinal cord injuries is CIC combined with anticholinergic treatment. In case of inefficacy of anticholinergic drug or important side effects the BT-A injections in the detrusor muscle is a second line treatment.

Since 2011 French authorities reimburse the treatment for 200 U of Botox®. Before this decision usual dose injected was 300 units. For Some of our patients the efficacy is similar between these 2 protocols while for some others the efficacy is different

Materials and Methods:

In this retrospective observational Study we compared the clinical and urodynamic efficacy of 200 and 300 units of Botox in the detrusor. The injection protocol and follow up protocol was similar in both group.

18 patients are included, 16 SCI and 2 spina bifida (average age 42)

Results:

In this group of patients the initial dose was 300 u with a good clinical and urodynamic results (except one patient and not injected any more). 3 others had a very important overactive bladder and injected with 300 u even if the reimbursement is for 200 U. 7 on them had 200 U, for 3 of them the efficacy is similar and on 4 of them the efficacy was not good enough (decreased duration and/or some degree of incontinence). They need to be injected higher dose (300U)

Conclusion:

On 22% patients 300 U of Botox is more efficient than 200 U. We are now working on the data and trying to understand the factors who influence the efficacy.

Keywords: Overactive bladder, botulinum toxin injections, SCI

P-148

Effectiveness of incobotulinum in neurogenic bladder secondarily resistant to bladder injections of onabotulinum and abobotulinum

Elena Andretta¹, Cristina Zuliani², Giorgio Artuso¹

¹Urology Department, General Hospital Dolo, Venice, Italy

²Neurology Department, General Hospital Mirano, Venice, Italy

Objective:

In about 25% neurogenic bladders appears immunological resistance to botulinum toxin A (BTX-A) injected in the bladder. We evaluated the effectiveness of Incobotulinum (INC), a new BTX-A free from complexing proteins, in nonresponders to Onabotulinum and Abobotulinum.

Materials and methods:

4 thoracic SCI pts (3 males, mean age 53 ys) were enrolled. They became unresponsive after a mean of 2.3 treatments. To detect BTX-A resistance they underwent the extensor digitorum brevis (EDB) test. Urodynamic (UD) was performed before and after bladder injections of INC 200 UI.

Results:

All the patients had urinary incontinence due to detrusor-sphincter dyssinergia; the mean value of detrusorial overactivity was 70 cm H₂O with a mean reflex bladder capacity of 270 cc.

The EDB test showed 1 responder, 1 partial responder and 2 unresponder to BTX-A.

15-25 days post-INC injections 3 pts were unchanged clinically and instrumentally. The 4th pt – the responder to BTX-A at EDB test, improved clinically and instrumentally (detrusorial overactivity decreased to 40 cm H₂O from 70, bladder capacity increased to 400 cc against 250).

Conclusion:

INC could be considered in neurogenic bladder unresponsive to the usual BTX-A. In our experience 1/4 patient, the lonely without immunological resistance, improved his incontinence thanks to INC.

Keywords: Neurogenic bladder, botulinum toxin, immunological resistance

P-149

Relationship between level of injury and urodynamic findings in spinal cord injury patients

Sevgi Ikbali Afsar¹, Banu Sarifakioglu², Oya Umit Yemisci¹, Seniz Akcay Yalbuздag³, Sacide Nur Saracgil Cosar¹, Kubra Ustaomer⁴

¹Department of Physical and Rehabilitation Medicine, Baskent University Faculty of Medicine, Ankara, Turkey

²Department of Physical and Rehabilitation Medicine, Namık Kemal University Faculty of Medicine, Tekirdag, Turkey

³Bursa Sevket Yilmaz Training Research Hospital, Bursa, Turkey

⁴Yildizli Guven Hospital, Trabzon, Turkey

Objective:

To investigate the relationship between lesion level and urodynamic findings in spinal cord injury (SCI) patients.

Materials-Methods:

The medical records of 236 newly injured SCI patients admitted to our inpatient rehabilitation hospital were evaluated retrospectively and 131 patients who had urodynamic evaluation for neurogenic bladder were included in the study. Neurological levels of the patients were compared with the detrusor dysfunction as determined by urodynamic investigation.

Results:

There were 91 (69.5%) males and 40 (30.5%) females with a mean age of 39.1±15.17 years. The spinal cord lesion was cervical in 31 (24%) patients, thoracic in 83 (63%) patients and lumbosacral (13%) in 17 patients.

Forty-five percent (45%) of the patients with cervical cord injury, 32% of the patients with thoracic cord injury, and 29% of the patients with lumbosacral cord injury had detrusor hyperactivity. The ratios of low compliance bladders in the cervical, thoracic, and lumbosacral lesions were 58%, 54%, and 64%, respectively. There was no statistically significant relationship between detrusor hyperactivity or compliance and lesion level ($p>0.05$).

According to the The American Spinal Injury Association Impairment Scale (AIS) classification, 83 (63%) patients had a complete lesion and 48 (37%) patients had an incomplete lesion. Hyperactive detrusor was determined in 31% of the patients with complete injury and 42% of the patients with incomplete injury. There were 45 (54%) bladders with low compliance in the complete lesion group and 29 (60%) bladders with low compliance in the incomplete lesion group. No statistically significant relationship was found between detrusor hyperactivity or compliance and AIS grade ($p>0.05$).

Conclusion:

We concluded that it not possible to determine the type of neurogenic bladder depending on the level and severity of lesion in SCI patients and urodynamic evaluations are essential for neurogenic bladder management in these patients.

Keywords: Neurogenic bladder, urodynamic evaluation, spinal cord injury

P-150

Extent of resected bladder tissue in patients with spinal cord injury undergoing bladder augmentation: Does size matter?

Jürgen Pannek¹, Peter Bartel¹, Jörg Krebs², Konrad Göcking¹

¹Neuro-Urology Swiss Paraplegic Centre, Switzerland

²Clinical Trial Unit Swiss Paraplegic Centre, Switzerland

Objective:

Bladder augmentation is a treatment option for refractory neurogenic lower urinary tract dysfunction (NLUTD) resulting from spinal cord injury (SCI). We have analysed the long-term results of bladder augmentation with an ileum patch and the effect of the extent of resected tissue on the treatment outcome in our patients.

Materials-Methods:

In a retrospective chart study, we evaluated the urodynamic parameters and continence rates of SCI patients who had undergone bladder augmentation in our institution between 4/2007 and 12/2012. The patients were classified into three groups according to the size of resected bladder tissue: 1) size < 30cm³, 2) 30cm³ ≤ size ≤ 60cm³, 3) size > 60cm³.

Results:

The case histories of 887 patients were examined. Bladder augmentation had been performed in 22 patients (14 men, 8 women) with a median age of 30.8 years (range 16.3-60.0 years), a median 13.4 years (range 1.6-44.7 years) post SCI. The median sizes of resected bladder tissue were 21cm³ (group 1: n=7), 42cm³ (group 2: n=7) and 78cm³ (group 3: n=8) (p<0.0001). The median bladder capacity had improved significantly (p<0.03) from 235ml to 500ml in group 1, from 280ml to 500ml in group 2 and from 263ml to 475ml in group 3. The median compliance had also improved from 11ml/cmH₂O to 47ml/cmH₂O in group 1 (p=0.2), from 8ml/cmH₂O to 72ml/cmH₂O in group 2 (p=0.03) and from 25ml/cmH₂O to 130ml/cmH₂O in group 3 (p=0.09). There were no significant (p>0.2) differences in the bladder capacity or compliance changes between the groups. Bladder augmentation resulted in urinary continence in all patients.

Conclusion:

Bladder augmentation with an ileum patch is an effective treatment for refractory NLUTD. The extent of the resected tissue does not seem to play a major role in the treatment success.

Keywords: Neurogenic bladder dysfunction, ileum augmentation

P-151

Bladder calculi in patients with spinal cord injury – A typical long term complication?

Jürgen Pannek¹, Peter Bartel¹, Jörg Krebs², Konrad Göcking¹

¹Neuro-Urology Swiss Paraplegic Centre, Switzerland

²Clinical Trial Unit Swiss Paraplegic Centre, Switzerland

Objective:

Bladder calculi are considered a typical long term complication of neurogenic lower urinary tract disorder (NLUTD) as a result of spinal cord injury (SCI). We have evaluated the rate of bladder calculi after SCI and the association with the bladder evacuation mode.

Materials-Methods:

In a retrospective chart study, we identified patients undergoing surgery for bladder calculi in our institution between 2004 and 2012. For these patients, the bladder evacuation mode (reflex voiding (RV), intermittent catheterization (IC), suprapubic catheter (SP), indwelling catheter (C)) as well as the time to lithotripsy and the time to any recurrence were extracted from the records.

Results:

The case histories of 1,017 patients were examined. Bladder calculi were detected in 93 SCI patients (69 men / 24 women, 54 complete / 39 incomplete) with a median age of 50 years (range 17-83 years) at the time of surgery. The median time post SCI was 15 years (range 0-63 years). The distribution of the bladder evacuation mode was as follows: SP 50 patients, IC 27 patients, RV 11 men, C 5 patients. The median time from SCI to surgery was 95 months (range 2-606 months). The shortest interval was observed in patients with C (median 31 months, range 5-84 months), followed by those with SP (59 months, range 2-199 months), IC (116 months, range 2-480 months) and RV (211 months, range 7-606 months). A median recurrence rate of 30% was observed after a median time of 19 months (range 1-60 months). Recurrences occurred most frequently in patients with C (40%) followed by SP (28%) and IC (22%).

Conclusion:

The rate of bladder calculi is low if NLUTD is adequately managed. Permanent catheters (SP or C) are a risk factor the formation of bladder calculi and should therefore be avoided whenever possible.

Keywords: Neurogenic bladder dysfunction, bladder calculi

P-152

Homeopathic prophylaxis of urinary tract infections in patients with neurogenic bladder dysfunction

Jürgen Pannek¹, Martine Cachin Jus², Mohinder Jus²

¹Neuro-Urology Swiss Paraplegic Centre, Switzerland

²SHI Homöopathische Praxis, Switzerland

Recurrent urinary tract infections (UTI) in patients with spinal cord injury are a frequent clinical problem. Often, preventive measures are not successful. We present the case reports of 7 patients with recurrent UTI who received additional homeopathic treatment. Of these patients, 4 remained free of UTI, whereas UTI frequency was reduced in 3 patients. Our initial experience with homeopathic prevention of UTI is encouraging. For an evidence-based evaluation of this concept, prospective studies are required.

Keywords: Homeopathy, recurrent urinary tract infection, neurogenic bladder dysfunction

P-153

Comparative study of the efficacy and safety of muscarinic M3 receptors antagonists in the treatment of neurogenic detrusor overactivity

Magdy M Hassouna¹, Lindsie A Blencowe², Colleen F McGillivray³, Karen D Ethans⁴

¹Brain and Spinal Cord Rehabilitation Program, Toronto Rehabilitation Institute - University Health Network, Toronto Ontario, Canada; Division of Urology, Toronto Western Hospital - University Health Network, Toronto Ontario, Canada; Department of Medicine, University of Toronto, Toronto Ontario, Canada

²Brain and Spinal Cord Rehabilitation Program, Toronto Rehabilitation Institute - University Health Network, Toronto Ontario, Canada

³Brain and Spinal Cord Rehabilitation Program, Toronto Rehabilitation Institute - University Health Network, Toronto Ontario, Canada; Department of Medicine, University of Toronto, Toronto Ontario, Canada

⁴Physical Medicine and Rehabilitation, Department of Medicine, University of Manitoba, Winnipeg Manitoba, Canada

Objective:

Neurogenic Detrusor Overactivity (NDO) is a common complication associated with spinal cord injury (SCI). Anticholinergic therapy is the first line therapy for NDO, despite a paucity of research on their use in the SCI population. This study aimed to compare the safety and efficacy of three anticholinergic therapies in the SCI population.

Materials - Methods:

This multi-center, double-blind, randomized-control trial had three arms, comparing Oxybutynin (Uromax®), Trospium (Trosec™) and Darifenacin (Enablex™). Twenty-three individuals with NDO secondary to SCI and urinary incontinence (minimum 1 episode daily) despite previous anticholinergic therapy were recruited and randomized to a treatment arm for 12 weeks. Drug efficacy and safety were assessed using baseline and week 12 urodynamic assessment, adverse event (AE) reporting, and incontinence frequency on a 3-day voiding diary completed at baseline and every 4 weeks. Quality of Life was assessed at baseline and every 4 weeks using the International Consultation on Incontinence Questionnaire (ICIQ) and the Incontinence Quality of Life Questionnaire (I-QOL).

Results:

Urodynamic parameters and incontinence assessments were not significantly different between treatment arms at any of the study time points, indicating the treatments had comparable therapeutic effect. However, AE reporting showed Trospium to have the most number of total, drug-related and possibly drug-related AEs. Oxybutynin scored better than Trospium at 8 weeks on the I-QOL (social embarrassment mean change; -16.9 Oxy., -11.4 Dar. vs 0.0 Trosp. p=0.04, 0.09 and 1.0 respectively) and the ICIQ (mean change; 4.3 Oxy., 2.6 Dar. vs 0.3 Trosp. p=0.004, 0.02 and 0.66 respectively).

Conclusions:

In adults with NDO secondary to SCI, the results of this study suggest that Oxybutynin, Darifenacin, and Trospium have similar therapeutic effect. Trospium was associated with a greater number of AEs and had a lesser effect on QOL in comparison to Oxybutynin and Darifenacin. However, the small sample size limits our conclusions.

Keywords: Neurogenic detrusor overactivity, spinal cord injury, anticholinergic therapy

P-154

a1-adrenoceptor blockers improve voiding efficiency via suppression of the external urethral sphincter activity in rats with spinal cord injury

Hirokazu Ishida, Hironobu Akino, Osamu Yokoyama

Department of Urology, Faculty of Medical Sciences, University of Fukui, Fukui, Japan

Objective:

An ideal therapy for lower urinary tract dysfunction in spinal cord injury (SCI) patients would decrease detrusor overactivity, thereby, promoting urine storage at low intravesical pressure, and promoting efficient voiding at low pressure by decreasing detrusor-sphincter dyssynergia (DSD). In this study we investigated whether a1-adrenoceptor blockers improved voiding dysfunction of chronic SCI rats by monitoring cystometrogram and external-sphincter electromyogram (EUS-EMG) under unanesthetized state. Methods: The effects of intervenous a1D-adrenoceptor blockers, naphtopidil and BMY7378, and a1A-adrenoceptor blockers silodocin were evaluated during cystometry in decenterated, unanesthetized female Sprague-Dawley rats with spinal cord chronically transected at the Th8. Parameters measured included voided volume, residual volume, voiding efficiency, and EUS-EMG.

Materials-Methods:

The effects of intervenous a1D-adrenoceptor blockers, naphtopidil and BMY7378, and silodocin were evaluated during cystometry in decenterated, unanesthetized female Sprague-Dawley rats with spinal cord chronically transected at the Th8. Parameters measured included voided volume, residual volume, voiding efficiency, and EUS-EMG.

Results:

Compared the control value at 100% to each drug concentration variation. Naphtopidil (0.1mg and 1mg/kg) increased voiding efficiency(from 100% to 219.4±60.1%, 276±98.8%, p<0.05) and decreased residual volume (from 100% to 53.25±13.5%, 49.6±19.7%, respectively; both p<0.05) and compared to control values at EUS-EMG, significantly increased burst period (from 100% to 387±275, 582±477%,p<0.05) and significantly increased silent period (100% to 226±127, 339±308%,p<0.05). BMY 7378 (0.1mg/kg, 1mg/kg) increased voiding efficiency(from 100% to 199±39.6%, 255±86.6%, p<0.05), but was not affected by residual volume. BMY 7378 (1mg/kg) increased voided volume (100% vs. 294±232%, p<0.05) and increased burst period (100% vs. 180±85.7%, p<0.05) and increased silent period (100% vs. 180±101%, p<0.05) Silodosin was not significant affected any parameters.

Conclusion:

a1D-adrenoceptor blocker might reduce NVC and urethral resistance associated with DSD, resulting in improvement voiding efficiency in SCI rats. This report is the first to evaluate the effects of a1-adrenoceptor blocker on EUS-EMG in SCI models.

Keywords: a1 blocker, EUS-EMG, SCI rat

P-155

Endoscopic correction of vesicoureteral reflux in neurogenic bladder

Elena Andretta¹, Deris Gianni Boemo², Francesco Battaglini³, Mauro Pastorello⁴, Oreste Risi⁵, Giorgio Artuso¹

¹Urology Department, General Hospital Dolo, Venice, Italy

²Molecular Medicine Department, Institute of Hygiene, University of Padova, Padova, Italy

³Pediatric Surgery Department, General Hospital Vicenza, Vicenza, Italy

⁴Urology Department, General Hospital Negrar, Verona, Italy

⁵Neuro-Urology Unit, General Hospital Treviglio, Bergamo, Italy (BERGAMO)

Objective:

We assessed the endoscopic treatment of vesicoureteral reflux (VUR) in neurogenic bladder (NB).

Materials-Methods:

19 patients (pts) - 16 males, mean age 32±6.2 years, 74% spinal cord injury (SCI) - were recruited. The same mean degree of reflux (2.8) was present in SCI and spina bifida pts. In 79% of pts there was overactive NB - 9 with dyssinergia - treated with anticholinergics or detrusor injections of botulinum toxin A; most of them (84%) voided by intermittent catheterization (CIC). The VUR, regarding 23 ureteral units (UU), was mainly monolateral (79%) and passive (53%); the degree was 1-2[^] in 32% UU, 3[^] in 52% and 4[^] in 16%. In 2 pts a monolateral passive 3[^] degree VUR was relapsed to the surgical correction; in another case the reflux concerned an ureteral stump.

21 UU were injected with the sting technique; in 1 bilateral VUR the Hydrodistention Implantation Technique was adopted. The bulking agents were used at the mean dose of 1±0.36 ml; the non-biodegradable agent Vantris was employed in 5% UU. The median follow-up is 36±9.9 months.

Results:

No complications were observed.

The overall success rate was 70%. In 30% UU the VUR downgraded and the treatment was repeated within 1 year (mean time 8.6 months). In 37% pts additional therapies for NB were necessary.

A lower success rate was observed in high degree VUR (cured 100% VUR 1-2[^], 70% VUR 3[^] and 33% VUR 4[^]), in congenital NB (40% VUR cured in spina bifida against 79% in SCI) and in pts who didn't void by CIC (66% cured against 75%).

Conclusion:

The endoscopic subureteral injection of bulking agents has a 70% success rate in adults with NB. Non-biodegradable agents are poorly used.

Keywords: Vesicoureteral reflux, bulking agents, neurogenic bladder

P-156

Risk factors for upper urinary tract deterioration in spinal cord injured patients based on videourodynamic findings

Won Hee Park¹, Tack Lee¹, Hyun Woo Kim², Dong Whan Lee², Joon Chul Kim², Myung Soo Choo³

¹Department of Urology, College of Medicine, Inha University, Incheon, South Korea

²Department of Urology, The Catholic University of Korea, Seoul, South Korea

³Department of Urology, Asan Medical Center, Ulsan University, Seoul, South Korea

Objective:

Upper urinary tract deterioration is the most important factor in increasing morbidity and mortality in spinal cord injured patients. We analysed risk factors of upper urinary tract diseases based on videourodynamic studies and focused the bladder compliance.

Materials-Methods:

Total 160 spinal cord injured patients were divided into 2 groups, on the basis of the presence of upper urinary tract diseases, and compared according to various objective factors. And neurogenic bladder classification was done according to the anatomical level of injury. The association of bladder compliance with upper/lower tract complications was also identified. Bladder compliance was defined as lower than 12.5ml/cm H₂O.

Results:

Upper urinary tract diseases were developed in 13 patients. When those patients with and without upper urinary tract diseases (complicated and normal groups, respectively) were compared, the rates of patients with chronic urethral or suprapubic catheterization, upper motor neuron injury, quadriplegia, complete injury and low compliance were higher in the complicated than the normal group. No significant differences in compliance were noted in relation to sex, age or level of injury. Low bladder compliance was developed in 37.4% patients. The patients whose interval since the time of injury was more than one year had a significantly higher incidence than those of less than one year. Low compliance was more common in patients using an indwelling catheter than in those using the other methods. Low compliance was statistically associated with more deformity of the bladder shape and upper tract complications.

Conclusion:

Chronic urethral or suprapubic catheterization, upper motor neuron injury, complete injury with quadriplegia, and low compliance were thought to be risk factors for inducing upper tract diseases in spinal cord injured patients. Low bladder compliance could be developed with time, or due to the result of wrong treatment.

Keywords: Spinal cord injury, videourodynamic study, complication

P-157

Sensory evoked cortical potentials of the lower urinary tract in healthy men

Martina D Liechti¹, Stephanie Knüpfer¹, Flavia Gregorini¹, Martin Schubert², Armin Curt², Thomas M Kessler¹, Ulrich Mehnert¹

¹Neuro-Urology, Spinal Cord Injury Center & Research, University of Zürich, Balgrist University Hospital, Zürich, Switzerland

²Neurology, Spinal Cord Injury Center & Research, University of Zürich, Balgrist University Hospital, Zürich, Switzerland

Objective:

To examine quantifiable sensory measures regarding their reliability for different electrical stimulation sites in the male lower urinary tract (LUT).

Materials-Methods:

Ten healthy men (19-37 years old, 1.85±0.05 meters tall) underwent two sessions (1-3 weeks interval) of sensory assessments during electroencephalographic recording and one-millisecond, repetitive (0.5Hz) square wave electrical stimulation of the LUT. Current perception thresholds (CPTs) and sensory-evoked cortical potentials (SEPs) were examined for urethral (distal, membranous, proximal) and bladder stimulation sites (trigone, bladder wall). After 0.5-30Hz band-pass plus 50Hz notch filtering and artifact rejection, data were segmented and averaged per subject and localization. Here, the focus was put on the cortical component N1 recorded from the Cz electrode referenced to Fz (10/20 system). Statistical tests comprised analysis of variance (ANOVA), intraclass correlation coefficients (ICC), linear regressions, and paired t-tests. Values are given as mean ± standard deviation.

Results:

All subjects were able to perceive the stimulations at low intensities. CPTs were significantly higher for bladder wall (9.0±8.8mA) than proximal (3.6±3.9mA, p=0.019) and distal urethra (3.8±3.1mA, p=0.014) with excellent reliabilities (ICC:0.72-0.95), except for bladder wall (ICC=0.13). Typical LUT SEPs were found with good reproducibility. N1 latencies were most reliable (ICC:0.61-0.77) and localization-specific (bladder wall:127.1±18.6ms, trigone:133.5±14.2ms, proximal urethra:130.8±17.9ms, membranous urethra:126.1±32.2ms, distal urethra:113.0±14.6ms), but decreased with age (p<0.01 for bladder wall, membranous urethra, distal urethra). Similarly, N1 amplitudes were highly reproducible (ICC:0.85-0.98) within subjects. However, they greatly varied between subjects, which partly could be explained by individual CPTs and stimulation intensities.

Conclusion:

Typical and reliable LUT SEPs can be induced in healthy men. The between-subjects variability of SEPs and also CPTs is rather high compared to the within-subjects variability which currently limits the diagnostic use. However, LUT SEPs and CPTs provide promising measures to monitor treatment outcome and functional recovery. Further investigations are warranted in larger cohorts and patients.

Keywords: Lower urinary tract, sensory evoked potentials, electrical stimulation

P-158

Standardised intermittent catheterisation training programme to improve compliance to catheterisation in individuals with a spinal cord injury

Annette Halvorsen¹, Karoline Skibsted Als²

¹Annette Halvorsen, Spinal Unit St. Olavs Hospital, Trondheim, Norway

²Karoline Skibsted Als, Coloplast A/S, Høtveddam 3, Humlebæk, Denmark

Objective:

The primary aim of the present project was to standardise training and to secure IC as a gold standard bladder management also after discharge from rehabilitation.

Materials-Methods:

8 rehabilitation centres in France, Italy and Norway developed the IC Education Programme in collaboration with Coloplast A/S. A retrospective cohort of (n= 316) individuals with SCI discharged with IC prior to initiating the IC Education Programme was compared to a prospective group (n=84) of SCI individuals discharged with the IC Education Programme in terms of training satisfaction and product usage. A questionnaire was sent out the cohorts and responses were anonymous.

Results:

The IC training programme significantly increased the number of individuals continuing IC up to one year after discharge from rehabilitation by 99% in the IC Education Programme and 83% in the retrospective group ($p<0.05$). Response rates on the questionnaire were 63% and 59% for the retrospective group and the IC Education Programme group respectively. The IC programme improved training satisfaction in the following key areas: Understanding of the physiology of the urinary tract ($p=0.0002$), keeping a healthy bladder with IC ($p=0.0047$), step by step IC ($p=0.0002$) and overcoming barriers to IC ($p=0.002$).

Furthermore, individuals in the IC Education Programme had a significantly lower score of the Qualiveen short form ($p=0.032$).

Conclusion:

An intermittent catheterisation training programme may be effective for improving adherence and to secure IC as a gold standard bladder management up to one year after discharge from rehabilitation.

Keywords: Standardised, training

P-159

A study of neurogenic lower urinary tract dysfunction in patients with multiple sclerosis(MS)

Konstantina Petropoulou¹, Aggeliki Stavrianou¹, Georgios Neochoritis¹, Georgios Siamos¹, Stamatina Kaligerou¹, Prokopios Manthos¹, Loukas Vassis¹, Eythymios Petsepes¹, Kyriaki Kalokairinou², Charalampos Konstantinidis³, Christina Anastasia Raptidi¹, Prodromos Kosmidis²

¹2nd PRM Department, National Rehabilitation Center, Ilion, Athens, Greece

²Radiology Department, National Rehabilitation Center, Ilion, Athens, Greece

³Urology Department, National Rehabilitation Center, Ilion, Athens, Greece

Objective:

We present the neurogenic bladder dysfunction in patients with multiple sclerosis MS, who are undergoing inpatient rehabilitation program and the necessity of their bladder function investigating

Materials-Methods:

We studied 66 patients(Male:21, Female:45 with mean age 48,6 and 50,06 respectively) with MS, who were admitted to our clinic from 2008-2012.The reason for referral from the attending Neurologists focused mainly on the rehabilitation program. Only in 3 patients had preceded a full evaluation of the urinary bladder function. According to our clinics protocol all the patients were clinically and laboratory tested with voiding diary, ultrasound of urinary system and retrograde cystography. 38 patients also underwent a complete urodynamic study.

Results:

Findings of neurogenic bladder (hyperactive/ underactive detrusor or dyssynergia) were observed in 78,78%, while in patients with "normal" bladder (10,6% of patients) were referred for regular annual examination. The patients treated either only with medication (anticholinergics 71%, a-blockers 15%) or with a combination of medication and intermittent catheterization. The recommendation of bladder management was: 2 patients with suprapubic catheter (3,03%), 25 with voluntary or uncontrolled voiding (37,8%), 13 with intermittent 'self'-catheterization CISC (19,7%),19 intermittent catheterization from a caregiver CIC (28,8%) and 5 with a combined voluntary and CISC/CIC voiding(7,6%).

Conclusion:

Patients with MS usually occur symptoms of neurogenic bladder disorder, which are often not noticed, because of the severity of the movement disorders. Neurological Departments rarely investigate the neurogenic bladder dysfunction. According to our study, we suggest all patients with MS should be examined for lower urinary tract dysfunction during their disease.

Keywords: Neurogenic bladder, multiple sclerosis

P-160

Development of interview forms for the international spinal cord injury datasets for bowel and bladder

Denise Galluf Tate, Martin Forchheimer, Anthony Chiodo, Gianna Rodriguez, Anne Pelletier Cameron, Rachel Hartwig, Connie Pines

Department of Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, MI, USA

Objective:

To develop a clinical interview version of the international SCI datasets for bowel and bladder based on the bowel function core data and extended dataset and the lower urinary tract dataset.

Materials-Methods:

The international SCI datasets were developed to be completed by clinicians after patient assessments. These datasets could be more widely used if designed as clinical interview tools to collect data directly from patients and by complementing it with medical records review. The interview measure- Bowel and Bladder Treatment Index (BBTI)- was developed with input from physicians, psychologists, researchers and therapists. Researchers reviewed the item content of these datasets and developed questions under each item. Pilot tested was conducted and revisions made accordingly to also incorporate patient feedback.

Results:

The revised BBTI is currently being used with a large sample of persons with SCI. A short form was developed. Validation will consist of cross-referencing responses across measures of similar content and by evaluating the degree responses correspond to information from the respondents' records. A training manual is being developed.

Conclusion:

The development of these interview guides and scoring profiles will assist clinicians and researchers in obtaining consistent, reliable and easy to use information about bowel and bladder care after SCI. This information will promote efficiency in managing these two important issues affecting the quality of life of persons with SCI. Similar tools can be developed for other datasets.

Keywords: Bowel, bladder, datasets

P-161

The effects of bowel and bladder dysfunction on quality of life after SCI

Denise Galluf Tate, Martin Forchheimer, Gianna Rodriguez, Anne Pelletier Cameron, Anthony Chiodo, Claire Kalpakjian, Michelle Meade

University of Michigan, Ann Arbor, MI, USA

Objective:

To examine the effects of bowel and bladder management and complications on quality of life after spinal cord injury

Materials-Methods:

This study uses a mixed model to determine the effects of neurogenic bowel and bladder management, related complications, health behaviors and relationship with providers on the quality of life of persons with SCI. Subjects will be interviewed with the newly designed BBTI (Bowel and Bladder Treatment Index which is based on the international datasets) and information will be collected also on quality of caregiver support, patient-provider working alliance, adherence to treatment and health behaviors. Quality of life (QOL) is being assessed using the Life Satisfaction Index, and SCI-QOL, a newly developed measured using PROMIS and Neuro-QOL data banks. Interviews have been conducted with a sample of 12 subjects so far with the goal of 50 subjects by the time of the ISCoS meeting. Qualitative interviews are being conducted also to provide additional information about subjects' feelings and problem solving skills.

Results:

Very few studies have focused on the impact of neurogenic bladder and bowel on QOL or psychosocial and behavioral factors associated with bladder and bowel dysfunction. Qualitative findings so far clearly illustrate the devastating effects of loss of function on people's self-esteem and sense of dignity. These findings also show that persons with SCI often have difficulty maintaining social relationships due to fear of accidents. For women with tetraplegia bladder management is particularly challenging.

Conclusion:

Studies are needed to design interventions to assist persons with SCI with managing bowel and bladder dysfunction while developing strong coping skills and healthy behaviors to address these important issues while minimizing their effects on QOL.

Keywords: Bowel, bladder management, quality of life

P-162

Supraconal spinal cord injury significantly impairs colorectal emptying during defecation

Mikkel Mylius Rasmussen¹, Klaus Krogh³, Dorte Clemmensen², Henrik Bluhme⁴, Yazan Rawashdeh⁵, Peter Christensen¹

¹Department of Surgery, Aarhus University Hospital, Denmark

²Department of Neurosurgery, Aarhus University Hospital, Denmark

³Neurogastroenterology Unit, Department of Hepatology and Gastroenterology, Aarhus University Hospital, Denmark

⁴Department of Nuclear Medicine and PET Center, Aarhus University Hospital, Denmark

⁵Department of Urology, Aarhus University Hospital, Denmark

Objective:

To explore how supraconal spinal cord injury (SCI) affects colorectal emptying at defecation and relate findings to subject symptomatology expressed by bowel function scores and gastrointestinal transit time.

Materials-Methods:

Colorectal contents were marked by oral intake of ¹¹¹In coated resin pellets. Assessment of movement during defecation was done by means of scintigrams before and after defecation. Results from 15 subjects with SCI (14 male, median age = 47 (range: 22-74) years, SCI level C5-Th9) were compared with those from 16 healthy volunteers (12 male, median age = 31 years (range: 24-42)). Bowel symptoms were described from standard symptom scores and gastrointestinal transit time (GITT) was assessed by radiopaque markers.

Results:

Median emptying at defecation was 31 % of the rectosigmoid (range: 0 to complete emptying of the rectosigmoid and 49 % of the descending colon) in subjects with SCI and 89 % of the rectosigmoid (range 53 % to complete emptying of the rectosigmoid, the descending colon and 3 % of the transverse colon) in the control group, $p < 0.01$. Colorectal emptying at defecation was associated with St. Marks fecal incontinence score ($p = 0.02$), but not to the Cleveland constipation score ($p = 0.17$), the Neurogenic Bowel Dysfunction score ($p = 0.12$) or GITT ($p = 0.99$)

Conclusion:

Supraconal SCI results in significantly reduced emptying of stools at defecation. This is independent of changes in GITT.

Keywords: Neurogenic bowel dysfunction, supraconal spinal cord injury, colorectal scintigraphy

P-163

Colonic transit time, bowel motions frequency and stool form: Lack of any correlation in patients with spinal cord injury

Gabriele Bazzocchi, Alessandra Avogadri, Erica Poletti

Gastroenterology and Internal Medicine. Montecatone Rehabilitation Institute, University of Bologna. Imola, Italy

In healthy and disease, hard as well as fluid stools can well predict different intestinal transit patterns: watery stools are equated with rapid and hard stools with slow colonic transit. Moreover, high defecatory frequency is predictive for accelerated transit and fluid stools and relationship among them can change in the opposite direction. Delayed Colonic Transit Time (CTT) is found in very high percentage of patients with SCI, independently by level and completeness of the lesion. We investigated what relationship among transit time, defecatory frequency and stool consistency characterize bowel dysfunction in SCI patients.

A single abdominal X-ray film was obtained after daily ingestion of 10 radioopaque pellets for six days, during which 87 patients affected by post-traumatic SCI (29% tetraplegic) scheduled defecation with the usual modalities adopted for assisting evacuation. Evacuation number and types of stool according to the Bristol Stool Form (BSF) score were recorded filling a Bowel Motion diary.

Delayed CTT was found in 61 (70%) of patients; no differences in comparison with Normal CTT among age, gender, lesion level, defecation frequency, BSFscore, percentage of patients with normal, hard and fluid stools were found. Pearson's correlation between CTT and defecation number was 0.32, and it was >1 for BSFscore and CTT, and for BSFscore and defecation number.

This study confirms that in a high percentage of patients with SCI colonic transit is delayed. Slow transit occurs also if the number of scheduled defecations is normal. Stool form and consistency are not predictive for bowel motion frequency and for CTT. These data suggest that in SCI patients evacuation is incomplete and fecal impact can occur even if defecation features are normal. Consequently, studies with radiopaque markers are mandatory for investigating if there is an important post-evacuation fecal residual, since it can occur even in patients having regular bowel habit.

Keywords: Bowel management, intestinal transit time, fecal impact

P-164

Neurogenic bowel dysfunction in patients with spinal cord injury

Derya Bugdaycı, Berna Çelik, Kadriye Öneş, Nurdan Paker, Ayşe Nur Bardak, Belgin Erhan, Berrin Gündüz, Feride Sabırlı, Dilber Akbaş

Istanbul Physical Rehabilitation & Medicine Training Hospital, İstanbul, Turkey

Objective:

The aim of this study was to evaluate neurogenic bowel dysfunction and behavior in patients with spinal cord injury in the rehabilitation setting.

Materials-Methods:

Fifty patients with spinal cord injury in the inpatient rehabilitation unit of the İstanbul Physical Medicine and Rehabilitation Training Hospital between 01.03.2012-01.03.2013 were included in this study. All the patients were evaluated in terms of demographical characteristics, defecation habits prior and after the injury and management of the defecation.

Results:

Twenty-six percent of the patients were women. Mean age was 37.9 ± 15.14 (15-73) years. Mean duration of injury was 29.83 ± 47.87 (1-240) months. Fifty-four of the patients had motor complete injury. Defecation habits were abnormal in the 26% of the patients who were tetraplegics. Major problem was constipation. One fifth of these patients had history of defecation problems before the injury. The methods used for defecation were digital stimulation in 12%, suppositories in 28% and enemas in 12%. Thirty-four percent of the patients were completely dependent in term of defecation. Time required for each defecation was more than 30 min in 20% cases. The rate of autonomic dysfunction was 30%, daily fecal incontinence and weekly incontinence reported in 12% and 18%, respectively. Abnormal desire for defecation was 46%. One forth of the cases had hemorrhoid. None had intestinal surgery. The most frequent complications were spasticity (1/3) and urinary incontinence (1/4). Defecation problems were very important for the 60% of the persons.

Conclusion:

Defecation problems which lead a poor quality of life, is very important for the most of the people with spinal cord injury. For this reason, it must be evaluated by the rehabilitation team.

Keywords: Spinal cord injury, neurogenic bowel

P-165

Management of neurogenic bowel dysfunction in Japanese patients with spinal cord injury: A survey using International Bowel Function Basic Spinal Cord Injury Data Set (IBBSD)

Masashi Nomi, Atsusi Sengoku

Hyogo Rehabilitation Center Hospital, Japan

Objective:

International bowel function basic spinal cord injury data set (IBBSD) was developed by a working group consisting of members appointed by the International Spinal Cord Society (ISCoS) and the American Spinal Injury Association (ASIA) in 2009 as a standardized format for collection and reporting of minimal amount of information on bowel functions in spinal cord injury (SCI) persons. This is the first survey using IBBSD in Japan.

Materials-Methods:

Face to face interviews using IBBSD were conducted in patients with chronic SCI mainly in our outpatient care unit from February to March 2013.

Results:

A total of 115 patients (97 men and 18 women) with a mean age of 47.3 years (range 17-86) were enrolled in this survey. The mean time since injury was 47.3 years (range 4-576 months). Sixty-eight patients had motor complete lesions and 47 had motor incomplete lesions. Neurological levels of injury were 43 cervical, 60 thoracic, 11 lumbosacral and 1 unknown.

From this survey, bowel function, management of constipation and fecal incontinence were enumerated as follows; Awareness of the need to defecate: normal 17%, indirect 49%, none 34%. Defecation method and bowel care procedures (main): normal defecation 28%, straining 4%, digital stimulation 3%, suppositories 4%, digital evacuation 10%, mini enema 36%, enema 14%, colostomy 1%. Average time required for defecation: 0-30min 48%, 31-60min 27%, more than 60min 26%. Frequency of defecation: once daily 17%, not daily but more than twice every week 38%, twice every week 31%, once every week 15%. Frequency of fecal incontinence: once or more than once per week 16%, less than once per month 10%, never 74%. Medication affecting bowel function/constipating agents: no 47%, anticholinergics 53%. Oral laxatives: no 34%, any laxatives 66%.

Conclusion:

IBBSD was useful for collecting data and evaluating management of neurogenic bowel dysfunction in Japanese SCI patients.

Keywords: Spinal cord injury, neurogenic bowel dysfunction, constipation

P-166

Bowel functions in spinal cord injury patients

Nfusun Toraman, Tuncay Çakır, R.nur Sarier, Adem Bilgili

Antalya Education and Research Hospital, Antalya, Turkey

Objective:

Bowel problems occur in most of the spinal cord injury (SCI) patients and constipation is the most common complaint. We aimed to diagnose constipation in SCI patients and to determine the aspects of constipation

Materials-Methods:

Computer records of 192 patients who had diagnostic code G82 and G82.2 and treated in Antalya Education and Research Hospital on 2012 year were evaluated. 44 of them who were literate, and volunteer filled the Knowles Eccersley Scott Symptom Score (KESS) questionnaire. The patients grouped according to the complaint of constipation (group I=suffered from constipation; group II=did not suffer from constipation). Constipation was defined as two or fewer bowel movements per week, or the use of aids such as laxatives, manual evacuation or enemas.

Results:

There were 24 patients (3 women, 21 men, 40.1±14.8 years) in Group I, and 20 patients (4 women, 16 men, 36.4±13 years) in Group II. Significant differences were not found between the groups according to the age, disease duration, functional independence measure scores, aetiology, frankel classification, neurological level as defined higher T12, and lower L1. 50% of patients in Group I and 25% of patients in Group II were in grade AIS A. KEES score was 10.9±4.5 in the patients suffered from constipation and 3.5±2.8 in the patients ($p<=.05$). 67% of patients in Group I and 75% of patients in Group II did not use any methods to encourage the movement of stool through the bowel. The most frequent defecation sensation was abdominal pain and fullness in both of the groups as in the past.

Conclusion:

When returning to the community SCI individuals should understand their bowel management needs and have an established bowel routine. The first point to consider is the individual's bowel habit prior to injury and also existing condition prone to constipation.

Keywords: Spinal cord injury, bowel management, constipation

P-167

Psychological features and sexual variables in men with and without spinal cord injury

Lina Di Lucente¹, Merirosi Benevento¹, Federica Ricci², Sara Simonelli¹, Martina Addari¹, Letizia Laurenza¹, Karin Simeoni¹, Giorgio Scivoletto¹, Marco Molinari¹

¹IRCCS Fondazione S. Lucia, Rome, Italy

²Azienda Ospedaliera Universitaria S. Andrea, Rome, Italy

Objective:

the aim of this study is to evaluate differences and correlations between psychological features (anxiety, depression, self esteem, extraversion) in men with and without spinal cord injury (SCI); to evaluate if psychological status improve sexual variables (sex-appeal, orgasm, masturbation, sexual intercourses with disabled people, preliminaries, sexual intercourse with and without usual partner, sexual intercourse frequency). Finally to evaluate the effects of psycho-sexual rehabilitation in the samples compared.

Materials-Methods:

129 subjects enrolled (65 men with and 64 men without SCI), average aged 40.06, SD± 18.2. They underwent to clinical evaluation to asses neurological and sexual-uological status with psychological history.

Standardized tests including CBA STAI X 2 sheet 3 for anxiety, CBA-QD sheet 8 for depression, self esteem and extraversion tests (CBA sheet 5 scale E) were administered together with a Psycho-Uro-Sexual Questionnaire. Student's T test to compare the psychological status between the subjects with SCI). Pearson's correlation to examine the relationship between the various variables of sexual life and the psychological status of the women with SCI.

Results:

men with SCI show significant higher values of anxiety and depression and lower values of extroversion and self-esteem compared to men without SCI. They also show several different sexual habitus. However in the SCI group, Pearson's analysis did not revealed any relationship between psychological status and sexual variables.

Conclusion:

this study shows no significant relationships between sexual and psychological variables; however psychological features describing a negative psychological status are statistically significant in subjects with SCI. Maybe that's why they have an important increasing in sexual intercourse with unusual partner compared to people without SCI. Probably in subjects with SCI within four months, there are other variables that can influence psychosexual status (i.e. disease insight and the independence in daily life activities). This factor reserved other studies.

Keywords: Spinal cord injury, sexual habits, psychological features

P-168

Sexual function in female patients with spinal cord injury

Nalan Yağmur Çivici, Ümüt Güzelküçük, Bilge Yılmaz, Kamil Yazıcıoğlu, Arif Kenan Tan

Department Of Physical Medicine And Rehabilitation, Turkish Armed Forces Rehabilitation Center, Gülhane Military Medical Academy, Ankara, Turkey

Objective:

To determine the perception of sexuality, sexual function disorders and the effects of quality of life of sexual problems in female patients with spinal cord injury (SCI) in Turkish population.

Materials-Methods:

This study group was between the ages of 18-58 years, sexually active patients before the spinal cord injury, female SCI patients were included. The control group was consisted of healthy women. Neurological levels T10 and above, T11-L2, conus, and cauda were classified in three sub-groups. SCI and healthy women were evaluated with TAF Rehabilitation Center Sexual Rehabilitation Evaluation Form in Women with SCI, Female Sexual Function Index and Satisfaction With Life Scale.

Results:

50 SCI and 50 healthy women was included into the study. 46 patients before the injury and 40 patients after the injury had sexual intercourse experience respectively. The decrease in sexual arousal and sexual intercourse was statistically significant ($p=0,000$) in after injury group than before the injury group. Sexual interest and importance given to sexuality were significantly lower in before the injury group than the control group ($p < 0.05$). After SCI, based on the need to share intimacy, sexual activity ratio was 84%. In patients with a sense of the genitals, level of arousal was a greater than those without ($p = 0.002$). Lack of orgasm and sexual desire after the injury was the major problems experienced in sexual intercourse and was significantly increased after the SCI ($p < 0.05$).

Conclusion:

In this study we found that SCI female patients has a significant deterioration in sexual function, and it also impaires quality of life.

Keywords: Sexuality, sexual dysfunction, spinal cord injury

P-169

Cardiovascular risk factors in SCI patients: Frequency and associated conditions

Belma Füsün Köseoğlu, Vildan Binay Safer, Öznur Öken, Sinem Akselim

Ankara Physical Medicine and Rehabilitation Training and Research Hospital, Ankara, Turkey

Objective:

Cardiovascular disease increases after SCI due to risk factors such as physical inactivity; obesity; abnormal lipid profile and diabetes.

The aim of the study was to determine frequency and related conditions of the risk factors for cardiovascular dysfunctions in SCI patients.

Materials-Methods:

This was a retrospective study of patients with traumatic SCI admitted to inpatient rehabilitation department of Ankara PM&R Training and Research Hospital between 1 January 2007 and 31 December 2012.

A total of 115 SCI patients (83 M,32 F) were recruited in this study.

Level of injury, lipid levels, blood pressure, electrocardiogram(ECG), echocardiography, blood glyucose abnormalities (BGA), exercise capacity (VO2max) were recorded from patients' medical records.

Results:

Mean age was 34.8 ± 14.1 (16-72) years and mean time since onset of the SCI was 3.8 ± 4.4 (1-27.8)years.

The 86 (74.8%) patients have dislipidemia in at least one lipid parameters.

Hypertension(HT) was found in 10 (8.7%) patients and BGA and diabetes were present in 15(13%) SCI survivors.

ECG abnormalities were recorded in 13 (11.3%) patients.

Blood pressure level was positively correlated with level of injury ($r:0.232, p:0.013$) and duration of SCI ($r:0.272, p:0.003$)

BGA and exercise capacity are found to be negatively correlated, while BGA - age ($r:0.348, p: 0.000$) and BMI are positively correlated ($r:0.270, p:0.01$).

ECG abnormalities were significantly more common in tetraplegic patient than paraplegic patients ($r:-0.262, p:0.005$).

When lipid profile and related factors were investigated, total cholesterol (TC)and low-density lipoprotein (LDL) level were found to be correlated with injury level ($r:0.243, p:0.01$; $r:0.236, p:0.015$, respectively) and age ($r:0.318, p: 0.001$) whereas high density lipoprotein level(HDL) was correlated with ambulation status ($r:0.213, p:0.028$).

Conclusion:

Our SCI patients have a high percent of cardiovascular risk factors. Systematic evaluation, modification and treatment of these risk factors should be considered since coronary heart disease accounts for approximately 20% of deaths in SCI population.

Keywords: C Cardiovascular risk factors, spinal cord injury

P-170

Patient descriptors and risk factors for cardiovascular disease after spinal cord injury

Peter Flank¹, Martin Fahlström¹, Richard Levi¹, Kerstin Wahman², Mark S Nash³, John E Lewis⁴, Carina Boström⁵

¹Department of Physical Medicine and Rehabilitation, Rehabilitation Medicine, Umeå University, Umeå, Sweden

²Department of Neurobiology, Care Sciences and Society, Division of Neurodegeneration, Section Neurorehabilitation, Karolinska Institutet and Rehab Station Stockholm/Spinalis R&D Unit, Stockholm, Sweden

³Departments of Neurological Surgery and Rehabilitation Medicine, The Miami Project to Cure Paralysis; Department of Rehabilitation Medicine, University of Miami Miller School of Medicine, Miami, FL

⁴Department of Psychiatry & Behavioral Sciences, The Miami Project to Cure Paralysis, University of Miami Miller School of Medicine, Miami, FL

⁵Division of physiotherapy, Department of Neurobiology, care sciences and society, Karolinska Institutet, Stockholm, Sweden

Objective:

To investigate the correlation between patient descriptors (physical activity, smoking, education level, civil status), self-reported physical activity and cardiovascular risk factors in a wheelchair-dependent paraplegic population.

Materials-Methods:

134 individuals, age range 18-79 years, with chronic (>1 year) post-traumatic paraplegia.

Cardiovascular disease risk factors (hypertension, fasting blood glucose, DXA, anthropometric data, socioeconomic factors and a blood lipid panel) were analyzed and related to patient descriptors.

Results:

For the study group as a whole, the mean physical activity level was about one hour per week with moderate/vigorous training and daily physical activity respectively. Only about 20% of subjects had a physical activity level exceeding 30 minutes per day. No correlation was seen between patient descriptors, physical activity level and cardiovascular risk factors. Men had significantly higher systolic and diastolic blood pressure than women, lower HDL, higher LDL/HDL quota, and higher TG.

Conclusion:

Based on the results of this study, it is doubtful whether general recommendations for physical activity as CVD prevention are applicable to wheelchair-dependent persons with SCI.

Keywords: Physical activity, socioeconomic

P-171

Cardiopulmonary (DYS) function among time: A thoracal spinal cord injury profile

Nilufer Kutay Ordu Gokkaya, Ebru Alemdaroglu, Fusun Koseoglu

Ankara Physical Medicine and Rehabilitation Education and Research Hospital, Ankara, Turkey

Cardiopulmonary dysfunction accounts for the largest portion of morbidity and mortality after SCI. Ventilatory failure, atelectasis, pneumonia, pulmonary edema, orthostatic hypotension, cardiac arrhythmias were the most common early where as chronic restrictive and obstructive pulmonary dysfunctions, cardiac arrhythmias, hypertension, coronary artery disease were the latest complications. The cardiopulmonary changes that occur following SCI are related to the extent and completeness of the neurologic impairment and duration of illness. We, here, represented a 22 years aged patient with T4 level of SCI due to a car accident. After his first inpatient rehabilitation program, he was diagnosed T4-ASIA A. As a part of his rehabilitation program, we performed pulmonary function (PF) and cardiopulmonary exercise test (CPET), and the test revealed medium restrictive pulmonary dysfunction, weakness of respiratory muscles and pulmonary limitation to exercise. After 2 years, we hospitalized him to deal with his chronic back pain. He was diagnosed T4 ASIA A, with spared sensory area to the T8. He also complained of his dyspnea during exercising. We evaluated cardiopulmonary system, and performed PF and CPET. The test revealed medium level of restrictive pulmonary dysfunction, peripheral limitation to exercise. His respiratory muscle weakness was got better. After 6 years of his first visit, we hospitalized him to evaluate neurogenic bladder. He had no change about the neurological level, but he was complaining about his palpitations. We evaluated his cardiopulmonary system, and performed PF and CPET. The test revealed mild level of restrictive pulmonary dysfunction and peripheral limitation to exercise. This case report showed that cardiopulmonary function should be evaluated during the rehabilitation programs as a routine evaluation, to better address the cardiopulmonary and peripheral symptoms. Our case might have taken into account that cardiopulmonary function must not always go downhill from its earliest condition with every passing year.

Keywords: Spinal cord injury, cardiopulmonary function, CPET

P-172

The incidence and characteristics of heterotopic ossification in patients with spinal cord injury

Belgin Erhan, Berrin Gündüz, Meltem Vural, Ebru Yılmaz Yalçinkaya, Fatih Kahraman, Özlem Şatır

Istanbul Physical Medicine and Rehabilitation Training and Research Hospital, Istanbul, Turkey

Objective:

Heterotopic ossification (HO) is a frequent complication in patients with spinal cord injury (SCI). It may limit the functional status of the patient and increase the morbidity. Our aim was to analyze the characteristics of SCI patients with HO and the risk factors associated with HO formation.

Materials-Methods:

Hospital records of the inpatient SCI patients, treated between 2011 - 2012 at our hospital, were analyzed and the ones with HO development were identified. The demographic and clinical characteristics (neurological level and severity of injury according to ASIA/ISCoS Standards and ASIA Impairment Scale (AIS) of the patients, HO localization, presence of spasticity and serum alkaline phosphatase levels were evaluated, descriptive statistics were used to analyze the results.

Results:

Three hundred fifty five SCI patients' data were investigated and forty (11%) of them (77.5%, men and 22.5% women) were found to have HO. The mean age was 40.85 ± 17.40 years; the median duration of the injury was 24 months. 42.5 % of the patients were tetraplegic, 57.5 % were paraplegic. Half of the patients had complete (AIS A n: 20) injury. Thirty two patients were traumatic and 8 were non-traumatic in etiology. The knee and hip joints were the most frequently affected joints (47.5% and 42.5% respectively). Spasticity was found in 34 patients (85%).

Conclusion:

The incidence and localization of HO in this group were in correlation with the published reports. However unlike previous reports HO was more frequent in paraplegic patients. The identification of characteristics of the SCI patients and risk factors associated with HO can help to reduce the incidence.

Keywords: Spinal cord injury, heterotopic ossification, incidence

P-173

Ultrasonographic imaging for early and correct diagnosis of heterotopic ossification: Significance of physiatrist

Hande Ece Oz¹, Sevcan Ugur¹, Nesrin Sen¹, Nehir Samancı Karaman¹, Levent Ozcakar²

¹Department of Physical Medicine and Rehabilitation, Akdeniz University School of Medicine, Antalya, Turkey

²Department of Physical Medicine and Rehabilitation, Hacettepe University School of Medicine, Ankara, Turkey

Heterotopic ossification (HO) is a condition characterized with mature lamellar bone formation in the periarticular soft tissue and may accompany different kind of diseases. Early diagnosis of HO is important to prevent possible disabilities in the long term. In this case we report a HO patient whose HO couldn't diagnosed radiologically but the clinicians examined the patient by ultrason(US) in the respect of clinical signs and symptoms.

Nineteen year old man with incomplete tetraparesis (C7,ASIA-B) was hospitalized for rehabilitation. Two weeks later he complained of pain, increased heat and redness on his right upper thigh. His hip's range of motion was normal. His pelvic X-ray and venous doppler ultrasonography (US) didn't show any pathological formation. US of the patient's hip showed fluid like collections started from the distal edge of iliopsoas muscle and extended to middle of the thigh and that image considered as abscess or hematoma. The simultaneous pelvic magnetic resonance imaging showed loss of muscle integrity and increased fluid intensity in the right iliopsoas and that image was interpreted as retroperitoneal hemorrhage or hematoma. The defined area assessed by the interventional radiology to exclude hematoma or hemorrhage, but there was not any material obtained. One week later patient was evaluated during a course program for learning musculoskeletal US. We detected hyper echogenic calcific areas shading cortical bone of femur. Subsequently we repeated pelvic X-ray and detected increased density in the periarticular tissue.

We want to emphasize these two points in this Case: even in radiologically negative period US has a significant role for early and correct diagnosis of HO. The other point which is just as impressive as the first one is how much important a physiatrist who has full knowledge of the patient's clinical signs and symptoms and at the same time is experienced about US examination.

Keywords: Heterotopic ossification, ultrasonographic imaging

P-174

Autonomic dysreflexia: a misdiagnosed syndrome in emergency departments of general hospitals

Christina Anastasia G Rapti¹, Dimitrios I Dimitrelas², George J Mantzouranis², Stavros V Balasis¹, Marianna D Fragaki¹, Anastasios A Athanassopoulos³, Elias Ch Panagiotopoulos⁴

¹Spinal Cord Injury Rehabilitation Department, Medical University of Patras, Greece

²General Medicine Training Department, Medical University of Patras, Greece

³Urodynamic Urology Unit, Medical University of Patras, Greece

⁴Orthopedic Department, Medical University of Patras, Greece

Objective:

The Health Ministry in Greece works towards the adoption of a triage system for emergency admissions at hospital. It is a system with no special guidelines for patients with spinal cord injury (SCI). Autonomic dysreflexia (AD) is a potentially life-threatening condition if not diagnosed and treated promptly. The aim of this study is to highlight the need to inform health care providers in general hospitals of Greece concerning AD.

Material-Methods:

We asked 33 nurses and 104 doctors to answer a brief questionnaire concerning a hypothetical admission of a patient with tetraplegia and symptoms of AD in the emergency department (ED). The participants were asked which would be the first thing to do.

Results:

Twenty-nine participants (21%) refused to answer the questionnaire. The 68.0% of nurses answered that they directly give instructions to lie down the patient and monitor vital signs until the doctor on duty comes. The 42.2% of doctors answered that they monitor vital signs and ask for an urgent brain CT. Eighty two out of 108 (75.9%) of participants answered incorrectly ($p<0.05$) and 73 out of 108 (67.6%) mentioned no knowledge at all for AD. The 92.6% of participants believe that it would be useful for the SCI patients to carry with them an AD emergency card, i.e. a card with a few words about this particular syndrome, instructions for emergency treatment, patient's history, and contact telephone of the Rehabilitation department which is responsible for the follow up of this patient.

Conclusion:

Our results do not differ much from other countries as other authors refer similar results, even in hospitals with spinal cord units. The management of AD in ED of a general hospital in Greece can be improved through education of health care providers and incorporation of strategies such as the use of AD emergency card.

Keywords: Spinal cord injury, autonomic dysreflexia, tetraplegia

P-175

The prevalence of vitamin D deficiency in spinal cord injuries patients: An analysis of risk factors contributing to hypovitaminosis D

Samford Wong¹, Irina Gainullina¹, Veronica Moore¹, Allison Graham¹, Alastair Forbes²

¹National Spinal Injuries Centre, Stoke Mandeville Hospital, Aylesbury UK

²Centre for Gastroenterology and Clinical Nutrition, University College London, London, UK

Objective:

To 1) assess 25-hydroxyvitamin D (vitamin D) status in patients with spinal cord injury (SCI) and; 2) assess the characteristics of vitamin D deficient patients.

Design: Serum concentration of vitamin D were measured in 172 adult SCI patients admitted to a British SCI centre over 3 seasons (March 2012-November 2012).

Materials-Methods:

Baseline demographic and clinical data included age, cause and onset of SCI, body mass index (BMI) and use of vitamin D supplements; malnutrition risk was scored using the "spinal nutrition screening tool".

Results:

One hundred and seventy-two SCI patients (mean age: 49.1 years; 26.2% female; mean BMI: 24.0; 59.3% tetraplegic; 34.6% traumatic SCI) were studied during March 2012 to May 2012. Almost all (92.4%) SCI patients had serum vitamin D concentration ≤ 80 nmol/L (insufficiency), 63.4% had serum vitamin D ≤ 50 nmol/L (deficiency) and 13.4% had serum vitamin D concentration < 25 nmol/L. Vitamin D insufficiency (25-OHD level between 51-80 nmol/L) occurred in 50 (29.1%) of patients. Hypovitaminosis D was associated with onset of injury: < 6 months from SCI vs > 6 month SCI (?2: 5.112, $p=0.024$); level of SCI (tetra- / para-plegia) (?2: 13.175, $p<0.001$) and use of vitamin D supplements (?2: 6.615, $p=0.01$) but not associated with gender (?2: 0.299, $p=0.585$); age (?2: 0.181, $p=0.671$); ethnicity (white / non-white) (?2: 0.244, $p=0.621$) and undernutrition risk (?2: 0.466, $p=0.495$). Hypovitaminosis D was found to be less common in summer when compare to winter and Autumn, (54.5%, 65%, 66.6%).

Conclusion:

The present study shows hypovitaminosis D is common. A malnutrition risk screening tool could not detect this micronutrient deficiency. Strategies for systematic screening and treatment of hypovitaminosis D need to be refined and implemented. Further study of vitamin D supplementation and body composition in SCI patients is warranted.

Keywords: Vitamin D deficiency; spinal cord injury

P-176

Managing obesity after spinal cord injury (SCI): An international, multicentre, cross-sectional study of knowledge, attitudes and practices among medical staff working in SCI centres

Samford Wong¹, Alastair Forbes², Joost Van Middendorp³, Maurizio Belci¹

¹National Spinal Injuries Centre, Stoke Mandeville Hospital, Aylesbury, UK

²Centre for Gastroenterology and Clinical Nutrition, University College London, London, UK

³Stoke Mandeville Spinal Foundation, Stoke Mandeville Hospital, Aylesbury, UK

Objective:

To 1) examine the opinion of medical staff working in the spinal cord injury (SCI) centres; 2) evaluate their knowledge, attitudes and practices towards obesity prevention and management and; 3) report the number of dietitians working in SCI-centres.

Materials-Methods:

A thirty-seven item questionnaire was sent to 24 SCI centres (896 beds) in the UK, the Netherlands, Belgium and Croatia during July 2012 – October 2012.

Results:

Eighteen SCI-centres (75%) (60 medical staff: 29 (48.3%) consultants) returned the questionnaires for analysis. All respondents stated that they have an interest in obesity treatment but only 2.3% of respondents received training in obesity management. Whilst the majority of respondents reported that they are confident in dealing with overweight (74.5%) and obese (66.1%) SCI adults, less than half (44.1%) are confident in treating overweight / obese SCI children. This study also demonstrated areas of concern such as lack of nationally adopted guidelines and training provision. There were 19.5 whole-time equivalent (WTE) dietitians recorded, this is equivalent to 45.8 beds per WTE dietitians (range 10 – 140). European SCI-centres' dietitians have a significantly higher dietetic resources than UK SCI centres' dietitians (beds per WTE dietitian: 30.4 vs 78.2, $p=0.045$).

Conclusion:

Medical staff showed a reasonable level of interest in participating in obesity prevention and management. Given the high prevalence of obesity after SCI^{1,2}, it would be a good opportunity for better practise if SCI medical staff were supported with appropriate training and the concerns of their concern such development of clinical guidelines and dietetic provision were adequately addressed.

Keywords: Obesity management; survey; SCI medical staff

P-177

Lean tissue, fat tissue and bone mineral content of the lower extremities in people with spinal cord injury

Berna Celik, Kadriye Ones, Nurdan Paker, Ayse Nur Bardak, Belgin Erhan, Berrin Gunduz, Derya Soy Bugdayci, Halil Harman

Department of Physical Medicine and Rehabilitation, Istanbul Physical Medicine Rehabilitation Training Hospital, Istanbul Turkey

Objective:

The aim of this study was to evaluate the body composition, including lean tissue, fat tissue and bone mineral content of the lower extremities and its correlation with time since injury in people with spinal cord injury (SCI) retrospectively.

Materials-Methods:

Eighty-six people with SCI with a mean age and standard deviation of 40.02 ± 13.32 years (min-max, 18-71) were included in the study. A full physical examination was performed. Lean tissue mass (grams), fat tissue mass (grams), and bone mineral content (grams) of both lower extremities were obtained from the total body scans evaluated by using dual-energy X-ray absorptiometry (Lunar DPX-PRO).

Results:

Lean tissue mass, fat tissue mass, and bone mineral content for right and left lower extremities were $3661,05 \pm 1521,70$; $3603,56 \pm 1557,69$; $6142,14 \pm 1414,82$; $6160,22 \pm 1446,38$; $456,03 \pm 124,99$; $457,17 \pm 125,85$ grams, respectively. A significant negative correlation was found between the lean tissue mass and bone mineral content of both lower extremities with time since injury (R lean tissue $p=0.001$, $r=-0.365$; L lean tissue $p=0.000$, $r=-0.441$; R bone mineral content $p=0.028$, $r=-0.249$; L bone mineral content $p=0.000$, $r=-0.443$).

Conclusion:

Time since injury seems to have a tight correlation with lower extremity soft and bone tissue composition in this study. As time since injury increases, lean tissue and bone mineral content decreases.

Keywords: Bone mineral content, lean tissue mass, spinal cord injury

P-178

Osteoporosis in Spinal Cord Injury (SCI): Twigs and twine break thy bones!!!

Siddeshwar Patil, Joy Roychowdhury, Aheed Osman, Naveen Kumar, Prof.w El Masry

Midland Centre for Spinal Injuries, Oswestry, UK

Introduction:

Regional bone loss in patients with spinal cord injury is well documented in literature. Osteoporosis in SCI on a large population at one centre using same Dual-energy x-ray absorption (DEXA) machine and with similar calibrations have not been reported, to our knowledge.

Methods:

Retrospective study of 118 SCI patients. Bone mineral density assessed in relation to age(in years), grouped as G1 (0-30); GII (31-50); GIII (>=51), time since injury and severity of lesion. DEXA scan was used to measure the bone mineral density. It was assumed that the premorbid bone mineral density of the hips and spine were equal. Frankel grade used for classification and included only A, B and C grade.

Results:

Over 50% of the patients showed little to no decrease in spinal bone density when compared to the reference range. The mean spinal bone density of 1.09g/cm² was similar in GIII and G1 with a gain over the reference range. The Z-scores increased with age in spine.

The mean bone density in the hips was reduced by 22% in G1; 21% in GII and GIII (>=51).

Only 45 of the patients used standing frame regularly.

The complete and incomplete hips versus time reveal no difference between changes of bone density. Both show equal continual loss of bone density. The spine bone density showed an increasing trend with time.

There was 1 each of hip fracture and sacral insufficiency fracture in the study group.

Conclusion:

The bone mineral density in the spine was either maintained or was increased in relation to the timing of the injury. Patient education and probably standing along with attention to issue of osteoporosis are factors in low incidence of hip fractures. A prospective study would allow for accuracy of prophylaxis of standing and pharmacotherapy.

Keywords: Osteoporosis, DEXA scan, spinal cord injury

P-179

Treatment outcome of Teriparatide for osteoporotic vertebral fracture of thoracolumbar spine

Osahiko Tsuji, Yuto Ogawa, Hiroshi Shimosawa, Yukihiko Obara, Toshie Sasaki, Takao Kodama

Saitama Social Insurance Hospital, Department of Orthopaedic Surgery, Japan

Objective:

To evaluate our treatment strategy for thoracolumbar vertebral fractures using teriparatide combined with hard corset.

Background:

Associated with increasing elderly populations in Japan, numbers of patient with vertebral fractures due to osteoporosis also increase. In particular, the cases with thoracolumbar fracture (TLFx) are considerably difficult to obtain the bone union and retain the collapse of vertebra.

Materials-Methods:

We reviewed 38 patients of TLFxs (59 fractured vertebrae), treated conservatively by hard corset and teriparatide injection between 2010-2011 in our hospital, and followed at least over 6 months. The investigated items were as follows; fresh/old fracture, the presence of pseudarthrosis, the modification of bone metabolism markers, X-ray analyses, and functional recovery assessed by our original grading score (grade I: unable to live daily life due to low back pain (LBP), II: marked limitation, III: slight limitation, IV: no limitation of daily life due to LBP).

Results:

Of 59 vertebrae of TLFxs, distribution of fractures are as follows; 6 cases at Th11 (3 fresh, 3 old fractures), 19 cases at Th12 (4 fresh, 13 old, and 2 pseudarthrosis), 21 cases at L1 (6 fresh, 7 old, and 8 pseudarthrosis), and 12 cases at L2 level (6 fresh, 6 old). The all blood markers of bone metabolism (NTX, BAP, ucOC) were elevated in all cases at 6 months post-therapy. On X-ray, all fresh fractures obtained bone union without more than 10 % progression of vertebral collapse on lateral view. Concerned with pseudarthrosis cases diagnosed at initial visit on our hospital, 8 cases showed better functional recovery and bone formation on X-ray analyses (even several cases accomplished the bone union within the vertebral cleft). However, 3 cases of pseudoarthrosis could not obtain functional recovery and osteoplastic changes on X-ray.

Conclusion:

For the fresh cases of TLFx, teriparatide was effective to prevent pseudoarthrosis.

Keywords: Teriparatide, thoracolumbar spine fracture, osteoporosis

P-180

Co-regulation of bone remodelling and energy metabolism in spinal cord injured (SCI) patients

Jillian Clark¹, Ruth Marshall¹, Margaret Wilkinson², Roderick Clifton Bligh²

¹South Australian Spinal Cord Injury Research Centre, Adelaide, South Australia

²PALMS Endocrine Laboratories, St Leonards, NSW, Australia

Background:

The bone lacuno-canalicular Haversian complex harbours a microcosmic endocrine system comprised of an osteocytic (OY) network. This OY network senses and communicates requirements for bone (re)modelling and mineral homeostasis. Evidence now suggests that OYs have a major influence on fat mass elicited via VitD and phosphate regulatory hormones indicative of "cross-talk" between the bone endocrine system and energy metabolism.

Objective:

i) To determine the impact of osteocyte-derived proteins on energy metabolism following spinal cord injury.

Materials-Methods:

Fasting blood samples were obtained at weeks three, 12 and 26 from patients presenting with acute SCI and submitted for ELISA analysis of osteocyte-expressed proteins sclerostin (SCL-Kainos, Japan), fibroblast growth factor-23 (FGF23-Biomedica Gruppe, Wein). Commercial assays examined 25D, 1,25(OH)2D3, phosphate (Pi), ionised calcium (iCa2+), osteocalcin (OCN), lipids (LDL/HDL/cholesterol) and glucose.

Results:

Samples were obtained from nine male patients (21-52, 31±11 years, 3 tetraplegic, 3 AIS A) and nine healthy, male individuals (21-56, 36±13 years, P>0.05). Serum FGF23 (SCI 72.9±24.5; CON 55.3±20.3 pg.ml⁻¹; P=0.02); SCL (SCI 36±14.4; CON 27.7±3.9 pM; P=0.03), Pi (SCI 1.39±0.22; CON 1.17±0.11 mmol.L⁻¹; P=0.002) and OCN (SCI 8.6±4.6; CON 5.3±3.5 ug.L⁻¹; P=0.04) levels significantly were increased in patients when data were pooled. For patients relationships between Vit D regulatory hormones and hormones that influence energy metabolism were significant (FGF23 vs. OCN r=0.58; P=0.01; 1,25(OH)2D3 vs. glucose r=-0.51; P=0.02). Again for patients serum SCL levels positively related to cholesterol and glucose (r= 0.86; P<0.0001; r=0.70; P<0.0001).

Conclusion:

The data suggest that energy metabolism is regulated in response to stimuli that lead to alterations in bone mass. The results provide a starting point to investigate the pleiotropic effects of the bone endocrine system in spinal cord injury.

Keywords: Osteocytes, bone endocrine, energy metabolism

P-181

Patterns of hepatic dysfunction following acute spinal cord injury (SCI)

Siddeshwar Patil, Joy Roychowdhury, Naveen Kumar, Anita Suthanthira Singh, Ajay Boppana, Aheed Osman, Prof.w. El Masry(i)

Midland Centre for Spinal Injuries, Oswestry, UK

Objective:

Trauma including SCI induces Systemic Inflammatory response (SIR) which can contribute to a high incidence of secondary organ complications. Liver is important in initiation and propagation of SIR. In its most extreme form the SIR can lead to acute respiratory distress or even multi-organ dysfunction.

We aimed to study the patterns and severity of liver dysfunction using liver function tests.

Materials-Methods:

Retrospective study of liver function tests of previously healthy patients with acute spinal cord lesions from C1 to L1 with no abdominal trauma. The study period was between January 2012 and December 2012.

Demographic details, injury details, past medical history, drug history, alcohol intake and smoking history noted. We used medical case notes, blood results from general practitioner, referring hospital and our centre.

We excluded patients with abdominal trauma, neurologically intact, known history of excessive alcohol, on disease modifying drugs.

Results:

A total of 39 patients fit the criteria and were included in the study. The alanine transaminase (ALT) rose in 22 of the 39 (56%) patients. The mean and median days of onset of elevated ALT were 26 days and 12 days respectively. The pattern most commonly encountered was that of hepato-cellular injury with 18 of the 39(46%) presenting with isolated or predominant elevations of trans-aminase. The next common presentation was that of Cholestatic picture in 6 of the 39 (15.3%) having markedly elevated bilirubin levels at 4 days after trauma. The alkaline phosphatase(ALP) was elevated in 9 of the 39 (23%) patients.

The mean and median days to normalization after trauma were 67 and 64

Conclusion:

The hepatocellular pattern of liver dysfunction is most commonly seen. As ALT elevations were not 3x4 times normal upper limit, we can assume that these elevations are probably due to injury.

The liver dysfunction and injury occur briefly after SCI.

Keywords: Liver dysfunction; spinal cord injury

P-182

Incidence of metabolic syndrome in patients with spinal cord injury

Seda Ozcan, Belgin Erhan, Berrin Gündüz, Hulya Arslan

Istanbul Physical Therapy and Rehabilitation Training Hospital, Istanbul, Turkey

Objective:

Cardiovascular complications are well known complications of the spinal cord injury to be related with the survival. One of the most important indicators of the cardiovascular risk is metabolic syndrome which has an increasing prevalence among the normal population. The purpose of our study is to determine the prevalence of metabolic syndrome in patients with spinal cord injury.

Materials-Methods:

100 patients who was rehabilitated in inpatient clinic or followed in outpatient visits enrolled to this study. All patients had at least 8 weeks of injury duration, age older than 18 years, terminated the spinal shock duration. Demographic information, duration of injury, neurologic classification, anthropometric measurements, blood pressure, biochemical test results, % trunk fat ratio were recorded.

Metabolic syndrome was classified according to NCEP-ATP III criteria. Functional ability was measured with functional independence measurement (FIM); ambulation level was measured with walking Index for Spinal Cord Injury (WISCI).

Results:

Thirty seven patients were female and 63 were male with a mean age of 41, 02± 13, 64(18-80). Median duration of injury was 36 months (min 2-max 240).

Metabolic syndrome prevalence was %42. The factors related with metabolic syndrome were age and duration of injury. Metabolic syndrome was less frequent in women and tetraplegics compared to men and paraplegics (respectively %32 vs. %48; %14 vs. %50).

Neurologic classification, being complete or incomplete, FIM, WISCI scores and BMI were not related factors with metabolic syndrome

Conclusion:

As metabolic syndrome is more frequent among patients with spinal cord injury we suggest that metabolic syndrome must be taken into consideration specially in patients with older age and longer duration of injury.

Keywords: Spinal cord injury, metabolic syndrome

P-183

Multi-resistant bacteria and spinal cord injury (SCI); An insight into practices throughout Europe

Gunilla Ahren, Jane Horsewell

European Spinal Cord Injury Federation, Nottwil, Switzerland

Objective:

The burden of infections due to methicillin-resistant *Staphylococcus aureus* (MRSA) is increasing worldwide. Similarly, problems with bacteria in the bowel that produce extended spectrum betalactamases (ESBL) with resistance to third generations cephalosporins or those with carbapenemases or other resistance genes causing carbapenem-resistant enterobacteriaceae (CRE) are growing at an alarming rate. The SCI population has a higher risk of contracting (and, thus, spreading) these bacteria than the population in general. This can adversely affect their possibility to receive an optimal rehabilitation and sustain comprehensive SCI management.

Aims:

The aims of this study are

- 1) to investigate the level of awareness at the Spinal Cord Injury Units (SCIU) in Europe to deal with the increasing problems of multi-resistant bacteria and to assess if it has any bearing on rehabilitation for persons with Spinal Cord Injury (SCI).
- 2) to formulate a report or statement with recommendations in this area from the European Spinal Cord Injury Federation (ESCIF).

The ultimate goal is to educate persons with SCI on how to behave in connection to MRSA and ESBLcarba. Similarly, the study will contribute to a raised level of awareness among SCI professionals. The information gained will be useful worldwide.

Materials-Methods:

Web-based survey comprising two questionnaires on MRSA and ESBLcarba. The respondents are the chief physicians and/or the head of the nursing personnel at the SCiUs. The survey has been sent to 105 units in 17 countries throughout Europe

Results and Conclusion:

At this stage there is no possibility to report any results or draw any conclusion since the survey is still on-going. The presentation will focus upon the information gathered from SCiUs throughout Europe and the recommendations from ESCIF.

Keywords: Spinal cord injury, methicillin-resistant *Staphylococcus aureus* (MRSA), carbapenem-resistant enterobacteriaceae (CRE)

P-184

Sputum microbial characteristics and chest radiograph findings in spinal cord injured (SCI) patients

Siddeshwar Patil, Naveen Kumar, Joy Roychowdhury, Aheed Osman, Prof W El Masry

Midland Centre for Spinal Injuries, Oswestry, UK

Introduction:

Pneumonia is well recognised as a cause of morbidity and mortality in SCI individuals. It is a common complication following SCI and affects the respiratory function. This is due to impaired mechanics of respiration, resultant inability to clear secretions, bacterial colonization and development of pneumonia.

The etiologic agents responsible for pneumonia in immunocompromised (SCI) patients are often different from those found in immunocompetent patients. The distinctive difference in the bacterial flora is a challenge for management with right choice of antibiotics. It is important to diagnose early.

Method:

Retrospective analysis of all sputum cultures, sensitivities and chest radiographs between January 2011 and December 2012 of all symptomatic patients with an acute SCI.

Results:

There were 119 sputum specimens from 38 patients. 62% specimens had positive growth with 35% Staph Aureus, 25.6% coliforms, 13.5% pseudomonas, 7% haemophilus influenza, 5% each of proteus and beta hemolytic streptococcus group B and 3% of Yersinia species.

Coliforms and pseudomonas were resistant to multiple antibiotics.

There were a total of 60 chest radiographs done and 42 of these had positive findings with majority noted to have consolidation consistent with pneumonia. However nearly 43% of those with positive radiographic finding did not have any growth on culture. Similarly over 61% of those with no evidence of pneumonia on chest radiograph had a positive growth on sputum culture.

Conclusion:

In our study, Gram negative bacteria appeared to be the most common organism causing pneumonia in acute symptomatic SCI patients. There was poor correlation between radiograph and sputum culture findings. A high index of clinical suspicion and early commencement of appropriate antimicrobial therapy is important. There may be scope for further studies to develop a possible severity scoring system.

Keywords: Sputum, spinal cord injury, pneumonia

P-185

Traumatic chylothorax in spinal cord injury complicating inpatient rehabilitation: Case presentation

Siddeshwar Patil, Joy Roychowdhury, Naveen Kumar, Aheed Osman, Prof W El Masry

Midland Centre for Spinal Injuries, Oswestry, UK

Traumatic chylothorax complicating inpatient rehabilitation has been reported mostly in American papers. The first traumatic chylothorax was described by Quinke in 1875 and Lampson in 1948 performed the first thoracic duct ligation. After malignancy, traumatic and surgical injuries to the upper abdomen and chest are the leading causes of chylothorax.

We present the case of a patient with traumatic spinal cord injury from a high speed motor vehicle accident (MVA). Pleural effusion was detected with a diagnosis of chylothorax. Chylothorax was treated with chest drainage. He required ventilation and was weaned with a tracheotomy. On referral to our centre, neurological examination revealed incomplete paraplegia, brachial plexus injury & dysphonia due to vocal cord paresis. He was reviewed by ENT Surgeons and advised conservative management.

The inpatient rehabilitation stay was complicated by recurrent episodes of respiratory compromise requiring further period of invasive ventilation, extensive chest physiotherapy and intravenous antibiotics for ensuing secondary chest infections

Although Speech and Language Therapy(SALT) assessment did not reveal obvious risk of aspiration, there was anxiety on the patient's part and he stopped taking oral feed. A DVD Fluroscopy swallow assessment indicated minimal pooling and no frank risk of aspiration. He then underwent a PEG insertion and low fat feed commenced. This improved his general condition and participation in rehabilitation activities. He then gradually commenced on soft diet orally by the time he was discharged.

This is a rare example of chylothorax with spinal cord injury resulting from MVA. Although long and protracted, conservative management of chylothorax is possible. Surgical intervention has been well documented in the literature. Management strategies to minimize the complicated inpatient rehabilitation needs to be studied further.

Keywords: Chest injury, spinal cord injury, chylothorax

P-186

Phantom limbs in a central cord syndrome without dislocation nor fractures

Mikio Sumida

Aijinkai Rehabilitation Hospital, Japan

After a bicycle accident, a 60-year-old woman suffered an incomplete SCI(level C4;AIS C, Central cord syndrome) without dislocation nor fracture.

From the first week after injury, she experienced a phantom duplication of both upper limbs on the belly that lasted 8 months. Phantom limbs were not related to painful sensation. UEMS and LEMS was initially 12, 20, and at discharge 24,40. Total touch and pin prick scores were initially at 42 and 60 respectively and recovered at 86 and 96.FIM score was initially motor 13, cognitive 31 and at discharge motor 44, cognitive 35.

Somatosensory evoked potentials were at 2 months admission abolished for median nerve and 6 and 9 months follow up recording revealed an improvement of all somatosensory evoked potentials.

The size and vividness of phantom limbs reduced during the course of rehabilitation recovery originating at the upper arms.

Conclusion:

The reports of phantom limbs in SCI and the protocol of treatment were very rare. In order to recognize the course of recovery of neural network in SCI, we should take care of the patient complaints and the precise follow up study.

Keywords: Phantom limbs, central cord syndrome, SCI

P-187

Post-traumatic syrinx resolution in a SCI patient by avoiding heavy weight lifting and Valsalva manoeuvres

Eughan De Burca, Fadel Derry

Stoke Mandeville Hospital, Aylesbury, UK

Objective:

Resolution of a post-traumatic spinal cord syrinx in a spinal cord injured (SCI) patient with simple lifestyle modifications only.

Materials-Methods:

Syringomyelia is a potentially serious complication of SCI. Symptomatic syringomyelia is reported in 1 – 9% of SCI population, however MRI evidence of syringomyelia may be found in up to 28% of patients post injury. The cavity may extend above or below the level of the injury. The mechanism of post-traumatic syrinx formation and propagation is not well understood. It is thought that a spinal cord cyst, once formed, may enlarge due to CSF hydrodynamic changes. Manoeuvres that increase venous pressure may force CSF into the cyst, leading to propagation. Such manoeuvres include Valsalva manoeuvres, lifting heavy weights, coughing, straining, sneezing and bearing down.

Results:

A 46-year-old female sustained a T4 SCI complete ASIA [A] in a horse riding accident in April 2009. She underwent surgical fixation and was discharged home after three months of rehabilitation. Routine MRI spine in August 2009 showed no evidence of syrinx. An altered signal between T2 – T4 suggestive of myelomalacia was noted. Follow-up MRI in October 2010 showed a large syrinx extending from the injury site (T4) to the medulla oblongata. Clinically, she reported no new weakness or sensory changes in her upper limbs. On examination; muscle power was 5/5 in all upper limbs' muscles. It was noted that the patient started weight training after discharge. A conservative approach was adopted. The patient was advised to avoid Valsalva manoeuvres and heavy weight lifting. Repeat MRI in March 2012 showed almost complete resolution of the syrinx, with the upper limit at T1 level. She remained asymptomatic.

Conclusion:

Lifestyle modification by avoiding heavy weight lifting is a simple but potentially effective method for regression of asymptomatic post-traumatic spinal cord syrinx.

Keywords: Syrinx, valsalva, resolution

P-188

Incidence, presentation and outcomes of Syringomyelia in spinal injury patients

Henry Prakash Magimairaj, Bobeena Rachel Chandy, Ramasamy Pankajam Hariharan, Pradeep Thumbikat, Nazakat Hussain, Mathew Kandangalil

The Princess Royal Spinal Injury and Neurorehabilitation Center, Sheffield Teaching Hospitals, Northern general Hospital, S5 7AU United Kingdom

Objective:

To determine the, incidence, clinical presentation, management and outcomes of syringomyelia, in spinal injury patients

Materials-Methods:

Review of records and radiological images of 2,461 Spinal injury patients admitted and followed up in the clinic, from January 2008 to 2012 December.

Results:

Retrospective analysis of 2, 461 spinal injury patient records and radiological imaging revealed 30 patients (1.21%) who were diagnosed to have and established syringomyelia. Post traumatic spinal injury lesions were more prone for syrinx formation (83.33%) as compared to other lesions. ASIA A lesions (86.60%) had highest incidence. Upper thoracic level lesions (40.0%) had highest incidence followed by lower cervical (26.66%), thoraco dorsal (20%) and upper cervical lesions (13.33%) respectively. Incidence of syringomyelia was twice as common in patients with surgical decompression and instrumentation (30%) of spine as compared to decompression of spine alone (16.66%). Onset of new sensory symptoms (33.33%) was more often the reason for MR imaging as compared to autonomic or motor symptoms. Two patients had spontaneous partial resolution of their syrinx without any intervention. Surgical intervention for decompression of syrinx was carried out on nine of the patient. Six patients had syringopleural shunting and in three patients, syringosubarachnoid shunting was carried out. Of these six patients (66.66%) had resolution of their ongoing sensory symptoms.

Conclusion:

The incidence of syringomyelia in spinal injury patients from our center was 1.21%. In more that half of the cases, diagnosis of syringomyelia was an incidental finding, without any new neurological symptoms. Higher incidence was noted in thoracic levels with complete cord lesions. Surgical decompression of the syrinx helped in resolution of ongoing sensory symptoms in 66.66% of patients. Spontaneous resolution was seen in two individuals.

Keywords: Syringomyelia, ASIA classification

P-189

Silent post traumatic syringomyelia and syringobulbia

Giorgio Scivoletto¹, Letizia Laurenza¹, Federica Tamburella², Marco Molinari¹

¹Spinal Cord Unit, IRCCS Fondazione S. Lucia, Rome, Italy

²Clinical and Research Movement Analysis (CaRMA) Lab, Rome, Italy

Post traumatic syringomyelia is the development of a cavitation within the spinal cord after a vertebral lesion. We report a case of silent post traumatic syringomyelia with syringobulbia.

A 36 years-old woman suffered a T6 vertebral fracture with spinal cord injury in 2002, resulting in a AIS grade A paraplegia. The patient underwent non surgical treatment with immobilisation for 6 months. After the accident the patient developed pain in the C7-C8 territories without sensory or movement deficits. The patient underwent rehabilitation resulting in complete wheelchair independence with return to a full social and vocational life. She performed agonistic sport activity for a long time. A few months prior to the Magnetic Resonance (MRI) examination she developed neck and left shoulder pain. MRI of the thoracic and cervical spine showed a large cavitation involving the cord beneath T6 and the medulla. Septations were present both at the spinal cord and medulla levels. The MRI also showed the presence of severe kiphosis at T6 level together with spinal cord compression.

The neurological examination showed the pre-existing picture of complete paraplegia. The sensory examination of the dermatomes beneath the lesion level did not show any sensory loss with the exception of a slight heat and pain sensation deficit in the left C8 dermatome. Tricipital jerk was reduced on the left arm. Cranial nerves examination did not show any deficit and the patient did not refer of cardiac and respiratory problems.

Surgical intervention was excluded because of the presence of septations which make it difficult a shunting procedure and because of the high risk of bleeding with cavity enlargement and acute cardio-respiratory insufficiency. The symptoms disappeared with a short course treatment with non steroid anti inflammatory drugs and muscle-relaxants.

Keywords: Spinal cord injury, post-traumatic syringomyelia

P-190

Effects of repetitive transcranial magnetic stimulations (rTMS) on pain response in spinal cord injured (SCI) patients with chronic neuropathic pain – Pilot study

Jeehyun Yoo, Yong Geol Kwon

Inje University Ilsanpaik Hospital, South Korea

By using rTMS on control of neuropathic pain after SCI, stimulations frequency protocol is different among each study, and there was no consensus in effective stimulation frequency. Therefore, we compared two different stimulation frequencies of rTMS for controlling neuropathic pain in two SCI patients.

Case 1:

A 45-year-old man who was diagnosed with incomplete tetraplegia in 2009 had a neurological level of C4. At baseline, his mean intensity of at-level and below-level neuropathic pain were Visual Analogue Scale (VAS) 6 each. Most severe pain was at VAS 1, with 45 points in Beck Depression Inventory (BDI) score. By using Magstim 200? (Magstim, Whiteland, UK), we stimulated motor cortex. Ten treatment sessions were given and performed for 5 days. In each, stimulations were delivered at a frequency of 20Hz for 10 seconds, an inter-train interval of 50 seconds, and an intensity equal to 80% of the resting motor threshold. After rTMS, the mean intensity of pain slightly decreased to VAS 5, but most severe pain was still VAS 10.

Case 2:

A 42 year-old man who was diagnosed with incomplete tetraplegia in 2007 showed a neurologic level of C3. At baseline, his mean intensity of at-level and below-level neuropathic pain were VAS 6 and most severe pain was at VAS 8. BDI score was 27 points. The same method as that of Case 1 was used, but 10Hz stimulation frequency was applied. VAS score of mean and most severe pain did not change after 5-days rTMS

Conclusion:

This pilot study evaluated only the acute effects of rTMS through two cases. It would be difficult to conclude effectiveness of rTMS for chronic neuropathic pain of the SCI patients. In the follow-up study, we will monitor a larger number of patients for longer to better determine the more effective stimulation frequency.

Keywords: Neuropathic pain, repetitive transcranial magnetic stimulation

P-191

Neuropathic pain characteristics of patients with spinal cord injury in a public rehabilitation hospital

Aylin Sari

Istanbul Erenkoy Physical Treatment and Rehabilitation Hospital, Istanbul, Turkey

Objective:

The objective of the present study is to investigate neuropathic pain characteristics of patients with spinal cord injuries (SCI) in a public rehabilitation hospital.

Materials-Methods:

For this purpose 30 patients of SCI were selected by simple random sampling method. Demographic and clinical characteristics of patients were recorded. The patients were classified according to ASIA/ISCoS 2011 International Neurologic Examination and Classification Standards. Visual Analog Scale (VAS) was used to measure the severity of pain and DN4 was used to describe neuropathic pain.

Results:

The mean age of patients was 39.07 ± 15.71 years. Out of the 30 patients (24 male and 6 female) 6 were paraplegic and 24 were tetraplegic. In all, 9 patients had complete and 21 had incomplete injuries. The mean VAS score was 5.63 ± 2.47 and the mean DN4 score was 6.33 ± 2.04 . A significant correlation was observed between VAS and neuropathic pain scores. Burning, tingling, pins and needles were the most frequently described signs.

Conclusion:

Neuropathic pain is a common and important problem that affects the physical, functional, psychosocial status and quality of life in patients with SCI. Treatment of neuropathic pain with early diagnosis is an important component of patient management with SCI.

Keywords: Neuropathic pain, spinal cord injury

P-192

Neuropathic pain in patients with spinal cord injury

Sevgi Ikbali Afsar, Sacide Nur Saracgil Cosar, Oya Umit Yemisci, Nuri Cetin, Nigar Gurbuz, Aysegul Dogan

Department of Physical and Rehabilitation Medicine, Baskent University, Faculty of Medicine, Ankara, Turkey

Objective:

The aims of this study were to determine the prevalence of neuropathic pain in patients with spinal cord injury (SCI) during rehabilitation and follow-up, and to examine the relationship between neuropathic pain and the demographic and clinical characteristics of the patients.

Materials-Methods:

The medical records of 93 patients who were admitted to our inpatient rehabilitation hospital with a diagnosis of SCI were evaluated. Patients with neuropathic pain were contacted by telephone after discharge and questioned whether the pain continued and whether they were on any medication.

Results:

The mean age was 38.73 ± 15 years. Thirty-two percent of the group were women. Based on neurological levels, 28 (30%) patients were tetraplegic, 49 (53%) were paraplegic and 15 (16%) had conus-cauda equina injury. Sixty-four patients had complete lesions (69%), and 28 patients had incomplete lesions (The American Spinal Injury Association Impairment Scale (AIS) grade B-D)

Neuropathic pain were present in 49 (53%) and absent in 44 (47%) patients during their hospital stay. While a statistically significant difference was found between the groups in terms of gender, there was no such difference for mean age, etiological factors, AIS grade at discharge and lesion level ($p=0.021$, $p=0.151$, $p=0.368$, $p=0.340$, $p=0.686$).

During follow-up, the pain continued in 36 (39%) patients and had resolved in 10 (11%) patients. The daily living activities were affected in 23 (55%) patients. When we questioned the treatment in the neuropathic pain group, 8 (22%) of the patients did not take any medication for neuropathic pain while 28 (78%) were on related medication.

Conclusion:

Taking into account that neuropathic pain is an important factor that affects daily living activities, SCI patients should be evaluated in detail to determine the characteristic of any pain, and the medical treatment prescribed to the patient should be closely monitored.

Keywords: Neuropathic pain, rehabilitation, spinal cord injury

P-193

Effects of chronic pain on function, life satisfaction, depression and sleep among patients with traumatic spinal cord injury

Özlem Çelik Avluk¹, Eda Gürçay¹, Ahmet Gürhan Gürçay², Özgür Zeliha Karaahmet¹, Uğur Tamkan¹, Aytül Çakıcı¹

¹Clinic of Physical Medicine and Rehabilitation, Dışkapı Education and Research Training Hospital, Ankara, Turkey

²Brain and Nervous Surgery Clinic, Atatürk Education and Research Training Hospital, Ankara, Turkey

Objective:

The main objectives of this cross-sectional study were 1) to examine chronic pain using the Multidimensional Pain Inventory-Spinal Cord Injury (MPI-SCI) version and 2) to determine pain-induced interference with functional status, life satisfaction, depression, and sleep quality among patients with SCI.

Materials-Methods:

Forty-four patients with traumatic SCI, aged ≥ 18 years, who had pain continuing for ≥ 6 months and were hospitalized in the physical therapy and rehabilitation clinic, were included in this cross-sectional study. Chronic pain intensity, functional status, life satisfaction, depression, and sleep quality were assessed according to the MPI-SCI, Functional Independence Measure (FIM), Satisfaction with Life Scale (SWLS), Hamilton Depression Scale (HAM-D), and Pittsburg Severity Questionnaire Inventory (PSQI), respectively.

Results:

'Pain Severity' correlated well with HAM-D ($r=0.459$, $p=0.002$) and PSQI ($r=0.312$, $p=0.039$); 'Affective Distress' showed correlation with FIM inversely ($r=-0.335$, $p=0.026$) and with HAM-D positively ($r=0.353$, $p=0.019$); and 'Pain Severity' was strongly associated with 'Life Interference' ($p<0.002$) and HAM-D ($p<0.040$).

Conclusion:

We identified a strong interrelationship between SCI-related pain severity and depression. Hence, comprehensive pain examination and management strategies including psychosocial interventions should be given particular consideration to address the critical issue of chronic pain in individuals with SCI.

Keywords: Pain, spinal cord injury, depression

P-194

Spinal cord injury: Screening for anxiety and depression

Aram Mashoof Fard, Chalil Vinod, Surendra Bandi, Karen Sparke

Duke of Cornwall Spinal Treatment Centre, Slaisbury Foundation Trust, Salisbury, UK

Objective:

This study is designed to identify the prevalence and risk factors for developing anxiety or depressive symptoms in patients with newly established Spinal Cord Injury. It also examines how appropriately and timely these patients are screened for these symptoms.

Materials-Methods:

This retrospective study reviews 104 patients admitted to the Duke of Cornwall Spinal Treatment Centre in Salisbury, UK, from August 2010 to end of July 2011. This included 84 males (mean age 48 years, SD 17.9 years), and 20 females (mean age 46.2 years, SD 18.7 years). Hospital Anxiety and Depression Scale has been used as the screening tool in this study. Minitab version 15 and Binary Logistic Regression test was used to analyse the data.

Results:

39.4% of patients had symptoms of either anxiety or depression or both. Abnormal level of anxiety has been reported in almost one third (30.8%) of patients in this study and approximately one fifth of patients have been at risk of depressive disorders. This study shows a meaningful (p value 0.02, Odds Ratio 1.99) correlation between discharge destinations and anxiety or Depression scores prior to discharge. Patients being discharged to their home had lower scores of anxiety or depression. It also shows a meaningful and significant correlation (p value 0.009, Odds ratio 0.28) between marital status and anxiety scores prior to discharge. The likelihood of developing depressive symptoms was significantly associated with time since injury (p value 0.007, Odds ratio 1.01).

Conclusion:

Several criticisms about, the inappropriateness of using generally standardised rating scales in spinal cord-injured populations, highlights the need for the use of rating scales that are specifically developed to measure psychological well-being of these patients. This study significantly highlights the lack of standardised approach and guidelines in timely and appropriately assessing psychological well-being of the patients with spinal cord injury.

Keywords: Spinal cord injury, anxiety, depression

P-195

The expectations and depression, hopelessness and self-efficacy levels of patients with spinal cord injury

Mehmet Mustafa Açıl¹, Canan Çelik², Halil Uçan³, Nilüfer Kutay Ordu Gökkaya², Cebirail Kısa³

¹Department of Physical Medicine and Rehabilitation, Yerkoy National Hospital, Yerkoy, Turkey

²Department of Physical Medicine and Rehabilitation, Ankara Physical Therapy and Rehabilitation Education and Research Hospital, Ankara, Turkey

³Department of Psychiatry, Ankara Numune Education and Research Hospital, Ankara, Turkey

Objective:

Spinal Cord Injury (SCI) causes significant changes in the rest of life of patients. These changes brings with its physical, psychosocial and economical problems. Psychological problems influence the attendance of patients to rehabilitation programme and may decrease the success of this programme. The aim of our study is to determine the expectations of patients with SCI; and to determine the depression, hopelessness and self-efficacy levels of patients.

Materials-Methods:

The patient group of our study was composed of 50 inpatients with SCI were included in rehabilitation programme at Ankara Physical Medicine and Rehabilitation Education and Research Hospital between April 2011- August 2011, whereas 50 healthy participants constituted the control group. In order to evaluate the expectations and the levels of depression, hopelessness and self-efficacy of participants, Questionnaire Form, Beck Depression Inventory, Beck Hopelessness Scale and General Self-Efficacy Scale were applied; respectively.

Results:

The most commonly notified states disturbing the patients were "urinary and bowel incontinence"(98%), "being not able to walk" (96%) and "being not able to fulfil responsibilities on other people"(88%); respectively. Statistically significant difference was determined between groups in depressive affect determined by Beck Depression Inventory points ($p<0,05$). Mean points of patients group in Beck Hopelessness Scale was $11,3\pm4,39$, whereas it was $5,96\pm4,92$ in control group, and this difference was statistically significant ($p<0,05$). Mean points of patient group and control group in General Self-Efficacy Scale were $52,52\pm5,38$ and $60,18\pm6,90$; respectively; and this difference was also statistically significant ($p<0,05$).

Conclusion:

These results make us think that rehabilitation programme for neurogenic bladder and bowel, and psychological support is as important as rehabilitative strategies directed to regain the functional abilities. Hopelessness, depression and decreased self-efficacy are seen more commonly in patients with SCI than normal population, and these problems may influence the rehabilitation process negatively when remained untreated. The expectations of patients are important in determining the rehabilitation goals. Depression, hopelessness and decreased self-efficacy have to be considered in rehabilitation process, and the patients should be supported in these matters.

Keywords: Spinal cord injury, depression, self-efficacy

P-196

Fatigue in spinal cord injured patients

Selcen Çiçek, Aydan Kurtaran, Elif Yalçın, Müfit Akyüz

Ankara Physical Medicine and Rehabilitation Training and Research Hospital of Ministry of Health, Ankara, Turkey

Objective:

Fatigue has negative effects on physical and mental health during life. In this study our aim is to determine the prevalence of fatigue in spinal cord injured population and to examine the factors effect fatigue.

Materials-Methods:

Seventy five subjects more than one year after traumatic spinal cord injury (SCI) (average 43.7 months) and a group of 75 able-bodied controls with similar sex ratio, age, and level of education were included in the study. The fatigue severity, quality of life and functional independence were measured with 36-Item Short-Form Health Survey (SF-36), Fatigue Severity Scale (FSS), IOWA Fatigue Scale (IFS) and Functional Independence Measure (FIM). We have been still carrying out this preliminary study.

Results:

Of 75 patients; 72% paraplegia and 28% tetraplegia, 24 % female, 76% male, 54.7% married, 32% single and 13,3% divorced, 28% of lesion with servical, 45% thoracal, 12% lumbar, of the causes of SCI 41.3% was traffic accident. As expected patients with SCI were found to have lowered Physical Component Summary(PCS) score (subgroup of SF-36) compared with control group but mental component summary (MCS) score (subgroup of SF-36) is not significantly different from control group. Factors such as age, education, completeness and level of lesion, side effects of medications were not associated with increased fatigue levels but only spasticity was the statistically significant predictor of a higher FSS scores in the SCI patients ($p>0.05$).

Conclusion:

Fatigue is a serious problem for patients with SCI. More studies are needed to evaluate the factors effect fatigue and strategies need to be designed to reduce fatigue.

Keywords: Fatigue, Spinal cord injury

P-197

Falls in the patients with spinal cord injury in the inpatient unit of a rehabilitation hospital

Nurdan Paker, Ayşe Nur Bardak, Belgin Erhan, Berrin Gündüz, Derya Buğdaycı, Berna Çelik, Kadriye Öneş, Dilber Akbaş, Feride Sabırlı

Istanbul Physical Rehabilitation & Medicine Training Hospital, Istanbul, Turkey

Objective:

The aim of this study was to investigate the frequency of the falls in the patients with spinal cord injury in the inpatient unit of a rehabilitation hospital.

Materials-Methods:

Twenty-seven patients with spinal cord injury in the inpatient unit of İstanbul Physical Medicine and Rehabilitation Training Hospital were included in this study. All patients were evaluated at the admission to the hospital. They were educated by the experienced rehabilitation nurses about the falls and related factors. A fall diary was kept by the patients. The features of falls were recorded if a fall occurs. Spinal cord injury measurement version III was used for the evaluation of self care and mobility.

Results:

Seven (22.2 %) of the patients were women. Mean age was 37.7 (15-69) yaers. Sixteen (59.3 %) of the patients were married. Mean body mass index was 25.4 (16-39) kg/cm². Mean duration of injury was 25.4 (5-96) months. Nine (33.3 %) patients had cervical injury. The injury severity was American Spinal Cord Injury Impairment Scale (AIS) A for 12 patients. SCIM-III total score was 55.1 (13-87). Only one patient had a fall. Injury level and severity was T6 AIS A. Fall has been occurred when he was sitting in the bath tube. He had a fall history in the last 6 months.

Conclusion:

As a result, 3.7 % of the patients with spinal cord injury in the inpatient unit under a strict control against falling, had a fall. Previous falls are important in term of future falls.

Keywords: Spinal cord injury, falls

P-198

Surgical treatment of long term complication after SCI

Federica Guerra, Rita Capirossi, Gaia Musumeci, Gioacchino Anselmi, Jacopo Bonavita

Montecatone Rehabilitation Institute of Imola, Bologna, Italy

Objective:

To evaluate the clinical long term complications in patients with spinal cord injury which lead to surgery, matching them with the type of lesion, age, distance from the acute event.

Materials-Methods:

We included data of 187 patients admitted to Montecatone Rehabilitation Institute since January 2008 and December 2012 who went to surgery for complications after SCI.

Results:

Of the 187 patients 51 underwent to reconstructive surgery of pressure sores, 2 to debridement of scar after tracheostomy, 12 to functional upper limb surgery, 10 to functional lower limb surgery, 27 to orthopaedic surgery (15 surgical resections of heterotopic ossification), 23 to urologic surgery, 46 to insertion/replacement/removal of intrathecal baclofen pump, 2 to insertion of intrathecal morphine pump, 2 to implant/replacement of analgesic spinal cord neurostimulator, 3 to neurosurgery and 10 to general surgery.

Conclusion:

Long-term complications after spinal cord injury which lead to surgery are frequent. Data from literature show that the most common complications in post-acute SCI are pressure ulcers, spasticity, urological and orthopaedic complications; higher prevalence among paraplegics with a complete and post-traumatic SCI. In our report there was a prevalence of paraplegic ASIA A patients, with an average age of 40 yrs old, at 8,5 yrs (3-20 yrs) from the acute event.

Keywords: Surgical treatment, long term complication, spinal cord injury

P-199

Audit of Complications in New SCI Admissions

Kaythi Latt, Bakul Soni

North West Regional Spinal Injury Unit, Southport, PR8 6PN, UK

Objective:

Spinal cord injured patients should be referred to spinal injury centre early. It is well recognised that failing to observe this established principle leads to such patients developing increasing number of preventable complications. These complications have adverse impact on desired outcome.

Materials-Methods:

A detailed case notes review was carried out in all new admissions between January to December 2011. A record review involved 73 new admissions to this centre.

Results:

94.5% (69/73) patients were referred from non-specialised units in UK. There are now 3 major trauma centres in this geographical area with anticipated early referrals. In present detailed review findings showed,

- 42.5% bowel problems
- 31.5% skin problems
- 30% respiratory complications
- 6.9% with ileostomy/colostomy
- 5.5% with joint contractures

Additionally noted, 5.5% had cardiac pacemaker implanted and 31.5% were on moderate to high dose of opiates. We wish to point out that above stated are variance to normally expected SCI centre practice.

Conclusion:

This review is useful in recommending early referral and transfer of spinal cord injured patients to spinal injury centres. This practice will help in reducing if not avoiding these preventable complications. We also observed that patients with these complications had less than desirable outcome of rehabilitation including longer length of stay in hospital.

Keywords: Spinal cord injury; UK centre; early, delayed, late admissions; medical complications; length of stay

P-200

The ultrasonographic assessment of abdominal muscles in individuals with spinal cord injuries

Elif Yalçın, Mufit Akyuz, Aydan Kurtaran, Neslihan Bilge Ozer

Ankara Physical Medicine and Rehabilitation Training and Research Hospital, Ankara, Turkey

Objective:

To date, limited attention has been paid to the abdominal muscles in spinal cord injury patients, due to the accessibility limitation to visual observation and palpation for clinical examination of the abdominal muscles. Ultrasound imaging could provide a noninvasive method of assesment of abdominal muscles. To the best of our knowledge ultrasonographically no research has been surveyed on the thickness of the abdominal muscles and the relation between the thickness of these muscles with functional reach test in spinal cord injury patients.

Materials-Methods:

The isolated thickness of the abdominal muscles (rectus abdominis, external oblique, internal oblique, and transversus abdominis muscles) were evaluated using high frequency ultrasound in 20 individuals with complete thoracic spinal cord injury and 20 healthy individuals in our physical medicine and rehabilitation clinic. Also FRT (Functional Reach Test) was assessed in spinal cord injury group. Written informed consent was obtained from all participants. Ultrasonic images were taken three times at each body site in each subject and mean results were calculated.

Results:

The results of this study indicated that four of the abdominal muscle thicknesses was significantly thinner in individuals with spinal cord injury compared to healthy individuals ($p<0.01$). Additionally no correlation was found between the tickness of the abdominal muscles and the FRT results

Conclusion:

Atrophy of the muscles below the lesion level has been previously mentioned. Even the abdominal muscles have a role in trunk control, in contrast to our expectations, we couldn't find a correlation between the thickness of the abdominal muscles and the functional reach tets results. In further studies the activity of the abdominal muscles during various activities could be examined. We believe ultrasonography offers merit as an assesment tool for abdominal muscles assesment in spinal cord injury patients that further studies should corroborate.

Keywords: Abdominal muscles thickness, ultrasonography, spinal cord injury

P-201

Reappearance of sympathetic skin response below complete spinal cord injury- A case report

Hatice Kumru, Jesus Benito, Eloy Opisso, Joan Vidal

Institut Guttmann, Institut Universitari de Neurorehabilitació adscrit a la UAB, 08916 Badalona – Barcelona, Spain;
University Autònoma de Barcelona, 08193 Bellaterra (Cerdanyola del Vallès), Spain

Background:

It has been hypothesized that the spinal cord isolated from the brain stem could not generate an SSR, which indicated that supraspinal connections are necessary for the SSR. Here, for a first time, we reported a patient with complete spinal cord injury who showed reappearance of SSR below lesion after 6 months following SCI.

Methods:

A twenty-four year old male patient after traffic accident with complete spinal cord injury at thoracic 9 level was admitted to hospital at third day following SCI. Motor (MEP) and somato-sensory evoked potentials (SSEPs) have been recorded in the lower extremities. SSRs recorded in the right hand, in the feet and perineum by electrical stimulus on suborbitalis nerve (SON) and pudendal nerve (PN) after 15 days, 1, 3, 6 and 10 months following SCI.

Results:

He had sustained clinical complete spinal cord injury. MEPs and SSEPs were absent. The SON stimulation induced SSRs in the hand without any SSRs in the feet, neither in the perineum at any time of neurophysiological evaluation point. The PN stimulation did not induce any SSRs in any recorded area till 6 months following SCI. In six and 10 months following SCI, SSRs were reappeared with the PN stimulation in the feet and perineum, but not in the right hand.

Conclusion:

Even after a complete lesion, spinal cord isolated from brainstem could generate a SSR below the lesion.

Keywords: Sympathetic skin response, complete spinal cord injury

P-202

Cervical myelopathy in athetoid or dystonic cerebral palsy

Myung Seok Park¹, Du Hwan Kim², Duk Hyun Sung¹

¹Department of Physical and Rehabilitation Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, South Korea

²Department of Rehabilitation Medicine, Dongsan Medical Center, Keimyung University School of Medicine, Daegu, South Korea

Objective:

The early onset of degenerative cervical lesions has been well described in patients suffering from athetoid or dystonic cerebral palsy (ADCP) and can result in cervical myelopathy (CM). But, the diagnosis and treatment are delayed and disrupted by the abnormal movement. In this study, we were implemented to evaluate the symptoms, the radiologic findings, and the effect of medical or surgical management on CM with ADCP.

Materials-Methods:

A retrospective study was implemented to include 30 patients suffering from ADCP. We reviewed the clinical and neurodiagnostic findings, surgical managements and outcomes. And we made a comparison between ADCP with CM and ADCP without secondary neurologic deficit. We used the Japanese Orthopaedic Association (JOA) score modified by Haro for evaluation original, preoperative and postoperative functional impact of cervical myelopathy in athetoid cerebral palsy.

Results:

Among the 30 patients, 21 (70%) patients had CM. The mean age of patients at the first time of visit to hospital was 40.57 years old. The mean duration between the onset and the diagnosis of CM was 3.07 years (0-10 years). Cervical spine MRI study revealed high signal lesion of spinal cord and smallest diameter of the spinal dural canal on the C3/4 level, predominantly. Among the 21 patients with CM, 12 (57%) patients were managed surgically for both limb weakness, paresthesia and vesico-sphinteric dysfunction. Most patients had no change of JOA score. Two patients improved for motor function of lower extremity (mean JOA score 1.5 points) and two patients decreased of bladder function (mean JOA score 1.5 points).

Conclusion:

CM with ADCP patients are younger and involved level is in the upper cervical segments. The functional status after surgical management is not significant change according to the JOA score.

Keywords: Cervical myelopathy, athetoid cerebral palsy, dystonic cerebral palsy

P-203

Congenital spinal cord dysfunction - A case report

Sofia Galvão Bento, Monica Bettencourt Dias, Filipe Bettencourt Oliveira, Maria Ana Vasconcelos,
Virgínia Craveiro Reis, Isabel Lopes Batalha

Centro de Medicina de Reabilitação de Alcoitão, Cascais, Portugal

Introduction:

There are multiple etiologies for pediatric spinal cord dysfunction. These include congenital primary causes such as spina bifida or vascular events occurring during pregnancy and secondary ones, such as ligamentous laxity in genetic syndromes. Among acquired causes there is trauma at birth or later in life, vascular events or infectious/autoimmune disorders.

The rehabilitation principles are similar for these disorders although there are some features that distinguish the pediatric SCI from the adult one.

Case report:

We report a case of 7-year-old female child with congenital spinal cord dysfunction probably due to vascular etiology. She was admitted to Centro de Medicina de Reabilitação de Alcoitão at 1 month of age, due to global hypotonia and was integrated in a rehabilitation program with physiotherapy and occupational therapy. On magnetic resonance imaging (MRI) at 1 year of age, it was observed "an extreme segmentar atrophy of medullary axis on medullary segment between C6 and D2".

Actually she presents with complete tetraplegia, neurologic level by C6, sphincters dysfunction, restrictive respiratory syndrome, scoliosis and right hip dislocation. She is in a clean intermittent catheterization regime and does BIPAP support during the night with better response to effort.

Functionally she is able to make bimanual activities on a table and accesses the computer with the thumb, index fingers and trackball. She drives independently her wheelchair, eats by herself (prepared food), needs help to dress and in hygiene and to transfer with a board. She has no learning problems, although she has special needs concerning writing and mobility.

Conclusion:

This is a rare condition, without an established treatment, with an uncertain prognosis. The early integration in a comprehensive rehabilitation program is crucial to minimize the disadvantages of the impairments and to promote a better quality of life and socialization.

Keywords: Congenital spinal cord dysfunction, pediatric rehabilitation

P-204

Patients with Chiari malformation Type I presenting with tetraplegia: A case report

Ozgur Zeliha Karaahmet¹, Gulsah Karatas¹, Ibrahim Gundogdu¹, Bihter Akinoglu¹, Bora Gurur², Aytul Cakci¹

¹Physical Medicine And Rehabilitation Department, Diskapi Yildirim Beyazit Education And Research Hospital, Ankara, Türkiye

²Neurosurgery Department, Diskapi Yildirim Beyazit Education And Research Hospital, Ankara, Türkiye

Objective:

To describe our experience with acute onset of neurological deficits in a patient subsequently diagnosed as Chiari malformation type-1 (CM-I).

Background:

Four types of Chiari malformations are described as the displacement of the posterior cranial fossa structures into the spinal canal. Type I malformation is the most common type and consists of a downward displacement of the cerebellar tonsils. Neurologic symptoms may not develop until adolescence or adult life. The symptoms are consisted of increased intracranial pressure, mainly headache, progressive cerebellar ataxia, progressive spastic tetraparesis. Surgical treatment is recommended for patients with progressive neurological signs.

Case:

A 41 years old male with known diagnosis of CM-I was admitted to neurosurgery department with acute onset of paraparesis and imbalance without any history of trauma. Magnetic resonance imaging of the cervical spine revealed 12 mm herniation of cerebellar tonsils, C1-2 fusion defects, basilar invagination and hydrocephalus. Posterior occipitocervical decompression, with posterior spinal fusion and venticuloperitoneal shunt placement were performed. He was admitted to rehabilitation clinic at postoperative 18th day for post-operative tetraparesis. Neurological examination revealed that the upper extremity muscle strength was 3/5, lower extremity muscle strength was 2/5, total motor score was 46 and voluntary anal contraction and anal sensation were positive, sensory level C2 as defined incomplete AIS C. Functional Independence Measure (FIM) was 43. Following comprehensive inpatient rehabilitation program, patient's functional status improved to better as whole independence in the areas of self-care and mobility as scored by the FIM that was reached at the level of 116 within three months.

Conclusion:

There had been only few case reports of CM-I presenting with neurological deficits including tetraparesis. Once diagnosed, early surgical management and early rehabilitation is mandatory for good outcome.

Keywords: Chiari malformation Type I, rehabilitation, spinal cord injury

P-205

Does cerebrospinal fluid cell count and biochemistry vary due to spinal cord injury? A case report

Ibrahim Gündoğdu, Eda Gürçay, Fatma Aytül Çakıcı

Department of Physical Therapy and Rehabilitation, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey

Objective:

Describing a rare condition

Case:

We present a 32-year-old man with fracture–dislocation at C4–C5 accompanied by bilateral hemo-pneumothorax resulting from a motor vehicle accident. After spinal column stabilization with an anterior approach and chest tubes-tracheotomy procedures, the patient with C4 AIS A was followed in an intensive care unit with full mechanical ventilator support. When drainage volumes decreased below 50 cc throughout the 24 hours, chest tubes were removed. During weaning trials, the patient developed a fever of 38.90C. On account of culture tests (blood, urine, stool and tracheal aspirate) were all negative; lumbar puncture was performed at first month to analyze cerebrospinal fluid (CSF), the most important laboratory test for diagnosing meningitis. CSF profile revealed a white blood cell (WBC) count of 15 per mm³, glucose: 56 mg/dL, protein: 113 mg/dL and culture was negative. Despite a slight increase in WBC count and protein level as a pathological finding patient did not show clinical signs of meningitis and we thought this clinical picture may concordant with SCI rather than aseptic meningitis. As the source of infection, pneumonia was treated but patient died as a result of recurrent pneumonia and sepsis in the second month.

Conclusion:

Changes in CSF cell count and biochemistry consistent with aseptic meningitis have been noted following SCI. It is hypothesized that SCI may cause bleeding into the CSF coupled with an inflammatory response, resulting in increased WBC count and protein levels especially in the first week. Elevations more than 1 week after injury do occur but are uncommon. LP should be part of the septic workup of SCI patients just as it would be for any other population if meningitis is a consideration but one should take into account that CSF cell count and protein levels may vary due to spinal cord injury itself.

Keywords: Cerebrospinal fluid, meningitis, spinal cord injuries

P-206

A story of trauma over the life-course: A case presentation

Tara Jeji

Ontario Neurotrauma Foundation, Toronto, Canada

Purpose:

To examine trauma themes in the narrative of SG, 50 years old African American (AA) women, who incurred spinal cord injury (SCI) while serving a 23 ½ year prison sentence in a Michigan correctional facility.

Method:

Case study; Qualitative analysis of interview transcript.

Findings:

SG was raised in a self-described “dysfunctional” two-parent family. She suffered many physical and emotional traumas before and after her conviction and imprisonment on murder charges, including childhood incest and rape, homelessness, teenage pregnancy and motherhood, and spinal cord injury. She did not get any medical or family attention while being victimized leading her to accept it and adapt to it as “a way” of living life. SG has experienced continuous trauma from her childhood to adult life. SG has not been able to cope with her personal circumstances. It has been very difficult for her to develop trusting and close relationship with her family and others. Along with her personal issues being a convict has made it very difficult for her to live and participate in community life.

Conclusion:

This case study illustrates complex socio-cultural context minority women with disability being a victim of trauma and no proper medical intervention leads to build and perpetuate improper defense mechanism jeopardizing individual’s entire life-course.

Keywords: Trauma, lifecourse and spinal cord injury

P-207

Recurrent dysphagia after recurrent surgery in diffuse idiopathic skeletal hyperostosis

Ilker Fatih Sari, Sibel Ünsal Delialioğlu, Sumru Özel

Ankara Physical Medicine and Rehabilitation Education and Research Hospital, Ankara, Turkey

Introduction:

DISH is characterized with calcification and ossification of soft tissues, especially enthesitis points, ligaments and joint capsule. An association has been made with obesity, type 2 diabetes, gout, dyslipidemia, hypertension, hyperinsulinemia, and other features of metabolic syndrome. In the cervical spine DISH may give rise to dysphagia or cervical myelopathy. Association with ossification of the posterior longitudinal ligament can result in myelopathy and even quadriplegia. Surgical interventions may rarely be necessary for complications such as osteophytic dysphagia or spinal stenosis.

Case:

A 62 year old man complained of increased dysphagia, stiffness in neck and weakness of upper extremity since 1,5 years.

In physical examination his neck motions was restricted and there was weakness in bilateral shoulder flexion, extension, abduction, adduction, rotation and weakness in right elbow flexion, extension and left elbow flexion. Bilateral brachial, brachioradial reflexes were reduced. He does not have any systemic disease and does not use any drug. Laboratory findings were normal. Computed tomography scan at the level of C4-5, hypopharynx and larynx dumped by intensive new bone formation at the corners the corpus vertebrae. The finding of x-rays are new bone formation to bridge cervical corpus vertebra. And these ossifications cause to compression of air column level of the C4-5 cervical spine. The patient was operated 3 times because of dysphagia and weakness of upper extremity..

Discussion:

DISH may cause dysphagia because of many factors. These are direct mechanical compression of great anterior osteophyte, compression of small osteophyte to the narrow esophagus at the level of cricoid cartilage, periesophageal inflammation caused by irritation of osteophyte, cricopharyngeal spasm and esophageal spasm because of painful osteophyte. Firstly level of the C5-6 than C4-5 cervical spine is the most common level which cause dysphagia. In our patient despite repeated surgery the symptoms repeated 2-3 months after surgery.

Keywords: Diffuse idiopathic skeletal hyperostosis, dysphagia, weakness in the upper extremity

P-208

Cauda equina syndrome mimicking spinal cord injury in a child following gunshot injury: A case report

Ibrahim Gündoğdu, Nihal Tezel, Eda Gürçay, Zeliha Özgür Karaahmet, Ece Ünlü, Erhan Arif Öztürk, Fatma Aytül Çakıcı

Department of Physical Therapy and Rehabilitation, Ministry of Health Ankara Diskapi Yıldırım Beyazıt Training and Research Hospital, Ankara, Turkey

Objective:

To describe a rare case

Case:

A nine-year-old boy with a history of gunshot injury was admitted to our clinic following abdominal explorative operation (right nephrectomy and left kidney parenchyma, inferior vena cava, liver repairs) and after 29 days of acute care hospitalization. Due to stability of vertebrate fracture and hemorrhagic shock, orthopedic surgery had not been indicated. Sensory examination showed marked diminution of light touch and pin prick in the perianal areas. Neurological examination revealed no motor function at lower extremities along with an atrophy, decreased patellar reflexes and rectal tone, and absence of anal cutaneous-bulbocavernosus and achilles reflexes. Lumbar MRI demonstrated stabile fractures of L1- L2 and edema of cauda equina. Urodynamic evaluation indicated neurogenic bladder with an over-active detrusor, CIC and anticholinergic treatment started with close follow-up of renal functions. By the end of inpatient rehabilitation at third month his neurological course showed improvement higher than expected, he could walk with walker and unilateral long leg brace. In this context, electrophysiological examination was planned and the findings confirmed the diagnosis of incomplete CES/conus medullaris without findings of critical illness polyneuropathy. Three years later, all motor functions of lower extremities improved except ankle-great toe dorsi-plantarflexors (L4-5,S1) and he was able to walk independently with AFO's but no change was occurred in bladder function.

Conclusion:

The initial clinical picture and the level of spine injury associated with gunshot wounds are remarkable prognostic factors for outcomes. The unique neurological anatomy at the L1 level where the distal spinal cord, conus medullaris and cauda equina coexist makes it difficult to differentiate incomplete SCI from cauda-conus lesions. We conclude that lack of lower extremity motor function possibly resulted from prolonged ICU immobilization and clinicians should be keep in mind that this critical level of injury may demonstrate different clinical presentations.

Keywords: Cauda equina syndrome, spinal cord injuries

P-209

Total hip replacement in spinal cord injury: A special consideration

Shiv Lal Yadav, Sanjeev Kumar Sharma, L. Susheel Singh, U. Singh

Department of Physical Medicine & Rehabilitation, All India Institute of Medical Sciences, New Delhi India

A 27 year old young male, diagnosed case of transverse myelitis sequelae paraplegia with neurogenic bowel and bladder with grade 3 spasticity, became ambulatory with walker after rehabilitative interventions. He complained of right inguinal pain which on investigating was found avascular necrosis(AVN) right hip and had to undergo total right hip replacement. He was again followed up in PMR OPD and made ambulatory with bilateral axillary crutches and KAFO. This case report discusses potential causes of AVN hip and impact of unilateral total hip replacement on functional outcomes in spinal cord injury patients following rehabilitative interventions.

Keywords: Avascular necrosis, THR, spinal cord injury

P-210

Evaluation of the long term results of functional surgery of the upper limbs in tetraplegic individuals

Thierry Albert¹, Serdar Kocer¹, Audrey Carles¹, Patricia Vincenti¹, Laurence Floris¹, Blandine Gomet¹, Marie Annick Lemouel¹, Caroline Leclercq²

¹Centre de Readaptation de Coubert, France

²Clinique Jouvelet Paris, France

Introduction:

The tetraplegic patients who received a program of upper limb functional surgery followed by appropriate rehabilitation improve their prehensile capacities, and activities of daily living. But very few studies have evaluated the results in the long term.

Objective:

To evaluate the outcomes of rehabilitative surgery of the upper limbs after a minimum of five years

Method:

All tetraplegic patients having undergone rehabilitative surgery of the upper limbs more than five years ago at our centre were called in for reevaluation

Evaluation focuses on:

1. Evaluation: standard analytic measurements of the upper limb: range of motion, muscle strength (BMRC), and sensory evaluation
3. Assessment of different types of prehension
4. Functional independence:
- 5 Patient's satisfaction: VAS, and a satisfaction questionnaire

Results:

68 patients underwent surgery, 36 responded and 25 agreed to participate (70% of those who responded), that were evaluated by two different methods.

In the group of 13 patients "reviewed" the majority of patients improved analytical and functional remains at a distance with a great satisfaction. There are two cases of secondary syringomyelia occurred in which the benefit is more limited in the long term.

In the group of 12 patients who were accepted to be interviewed that functional outcomes are worse in 5 patients but the degree of satisfaction remains high on average. We find again a case of syringomyelia

Conclusion:

Initial results show that patients who are stable in terms neurological keep the long term performance of gripping and functional independence equivalent to those obtained early. Patients are very satisfied with the long-term outcome and would recommend this surgery in a similar case. In three cases of syringomyelia results were not maintained, which demonstrates the need to track this complication.

Keywords: Tetraplegia, upper limb functional surgery, long term results

P-211

Tendon transfers in tetraplegic patients to improve elbow extension: Our clinical experience

Mehmet Alp¹, Belgin Erhan², Berrin Gunduz²

¹Manus Hand Group, Istanbul, Turkey

²Istanbul Physical Medicine Rehabilitation Training Hospital, Istanbul, Turkey

Aim:

Active elbow extension is important for reaching overhead against gravity, doing push-ups or transfers and during ambulation or sitting. It improves function in daily activities for the tetraplegic patient and helps to improve quality of life.

Tendon transfers are best options to restore function of elbow extension in tetraplegic patients above C7 level. Posterior deltoid and biceps muscles are the most frequently used muscles. Superiority of the two methods are controversial.

Our aim is share our clinical experience in tendon transfers for elbow extension in our tetraplegic cases.

Methods:

Between 2007-2012, 9 tendon transfers were done in six patients to restore elbow extension. All patients were examined and discussed in the tetraplegic upper extremity follow-up clinic for operation. Posterior deltoid was transferred to triceps in 3 patients and biceps was transferred to triceps in 6 patients. Patient satisfaction and functional gains in patient perspective were recorded.

Results:

When the satisfaction and functional gains were assessed after the 4th patient (after 3 deltoid, 4 biceps transfers) biceps transfers were found to be more effective and more functional compared to posterior deltoid transfer. This result was taken into consideration and biceps was chosen for transfer in the last two cases.

Conclusion:

According to our clinical experience of 9 tendon transfers the patients were more satisfied with biceps transfer due to easier rehabilitation, earlier functional gains and enhanced functional capacity. Disadvantage of the posterior deltoid muscle transfer was the difficulty in reeducation of muscle, more time and effort needed to gain function.

Keywords: Tetraplegia, tendon transfer, elbow extension

P-212

Satisfaction with upper limb surgery in individuals with tetraplegia

Diana Sigrist Nix, Angelika Lusser Gantzert, Sibylle Coglianese, Sabrina Koch Borner, Renate Kurmann, Michael Baumberger, Angela Frotzler

Occupational Therapy, Swiss Paraplegic Centre, Nottwil, Switzerland

Improvement in hand function has a high priority for our tetraplegic patients and is an important factor in the improvement of life quality (Anderson 2004). The purpose of hand function surgery is to enhance the function of the remaining voluntary controllable muscles of the upper extremities as well as to improve independence, ability to work and life quality (Gohritz, et al 2007). According to Fournier and Mick (1999) satisfaction is defined by whether expectations or wishes were met or respectively not met.

Methods:

A retrospective survey from patient charts at the Swiss Paraplegic Centre between 2011 until now was performed. All patients with cervical SCI (lesion level between C4 and C8, AIS A-D) were eligible. Data from the COPM to assess patient-perceived outcome and data of the Grasp and Release Test to evaluate the hand function pre and post-surgery were extracted.

Results:

Six women (mean age: 45.9±14.7 years, mean time since injury: 3.1±1.5 years) and 16 men (mean age: 43.0±15.6, time since injury: 7.2±7.6 years) were included in the data survey. 15 Out of 22 patients already underwent upper limb surgery. COPM analysis revealed a significant increase in the most important individual problem with regard to patients satisfaction (pre-surgery 3.1±3.0 vs post-surgery 7.4±3.4; p=0.028). Regarding COPM and patients performance two out of five individual problems improved significantly post-surgery (p<0.05). Within the GRT, patients performance in the wooden slat-test and the key pinch test improved significantly from 10.9±8.2 to 14.5±8.4 (p=0.046) and from 4.8±5.5 to 8.8±9.2 (p=0.028), respectively.

Conclusion:

Assessed patients showed an improvement of their prioritized problems after upper limb surgery. Performance and satisfaction preoperative was equal for patients with and without surgery. The grasping ability improved also significantly in several GRT-tests. Patients have different level of lesion and therefore need different operations; this must be take in to account.

Keywords: Spinal cord injury, upper limb surgery, satisfaction

P-213

Type 1 Arnold Chiari Malformation misdiagnosed as spinocerebellar ataxia: A case report

Canan Celik, Asli Gencay Can

Sevket Yilmaz Education and Research Hospital, Bursa, Turkey

Type 1 Arnold Chiari Malformation (ACM) is a congenital disease characterized by herniation of cerebellar tonsils into the spinal canal. Presenting symptoms are headache, neck pain, ataxia, nistagmus, dysphagia due to the compression of craniovertebral junction. We aimed to present a woman with neck pain and ataxia who had previously been diagnosed with spinocerebellar ataxia. A 51-year-old woman was referred to our clinic with progressive neck pain, dizziness and tingling in the hands for 4 years. The neck pain was exacerbated by movement and not relieved by analgesics. She had difficulties in performing activities of daily living. The patient had received a diagnosis of spinocerebellar ataxia and unsuccessfully treated with piracetam and vitamin E. On physical examination, cervical spine anterior and lateral flexion were slightly restricted and painful. In the upper extremities, the strength was grade 5/5 in the proximal muscles but 4/5 in the distal muscles. The lower extremity muscle strength was 5/5. Hypoesthesia to light touch was observed in left C7-8 dermatomes. Pinprick and temperature sensations were normal. Deep tendon reflexes were hyperactive. Pathological reflexes were absent. She had no gag reflex. She had cerebellar symptoms such as dysarthria, dysmetria, nistagmus and dysdiadochokinesia. The Romberg test was positive with eyes closed. There was no significant abnormality on brain MRI and cervical MRI 4 years ago. Because of progressive symptoms, brain MRI and cervical MRI were reperfomed. They showed herniation of cerebellar tonsils 9 mm below the foramen magnum. There was also hyperintensity within the upper cervical spinal cord in T2-weighted cervical MRI. Based on these findings, the patient was diagnosed to have type 1 ACM. Posterior fossa decompression was preferred by neurosurgeons. The symptoms of ACM are nonspecific, but progressive resulting in the need for surgery. Once identified, early surgical management leads to excellent outcomes.

Keywords: Arnold Chiari Malformation, ataxia, neck pain

P-214

Spinal cord infarction due to cocaine abuse

Giorgio Scivoletto¹, Letizia Laurenza¹, Federica Tamburella², Alessandro Clemenzi³, Marco Molinari¹

¹Spinal Cord Unit, IRCCS Fondazione S. Lucia, Rome, Italy

²Clinical and Research Movement Analysis (CaRMA) Lab, Rome, Italy

³IRCCS Fondazione S. Lucia, Rome, Italy

Spinal cord infarction due to cocaine use is a rare spinal cord disease. Here we describe the case of a 27 year-old man who developed cervical pain followed by upper and lower limbs weakness and urinary retention 2 days after recreational use of cocaine. In the acute care unit he was submitted to laboratory investigations, including thrombophilia and vasculitic screen, chest radiography, echocardiography that were normal. Laboratory investigations on serum and cerebrospinal fluid for infections, malignancies, malabsorption and systemic autoimmune disorders were normal to. Emergency brain computed tomography and magnetic resonance imaging (MRI) were negative. Cervical spinal MRI obtained 2 days later showed a spinal lesion compatible with acute ischaemia with "pencil-like" hyperintensity in the anterior spinal artery territory. An EMG/ENG examination did not show nerve lesion signs. A MEP study of the lower limbs showed an absence of evoked motor response to cortical stimulation and cervical (100% output), while the lumbar stimulation evoked a normal motor response.

At admission in our department the patient had an incomplete (AIS D) tetraplegia with C6 level and more severe impairment of the right side. The patient had an indwelling catheter and was severely dependent in the daily life activities. He was unable to stand and walk. After 2 months of rehabilitation he showed a marked neurological and functional improvement. At present he shows an AIS D tetraplegia with C7 level. He is completely independent in the daily life activities and is able to stand and walk in the parallel bars (WISCI 5). The indwelling catheter was removed and the patients is practicing clean intermittent catheterization.

Cocaine induced ischaemic myelopathy is a rare form of ischaemic myelopathy, but should be considered and ruled out in the differential diagnosis of any acute non-traumatic myelopathy, especially in young patients.

Keywords: Spinal cord infarction; cocaine

P-215

Central nervous system damage at different levels due to heroin addiction: Case report

Aydan Kurtaran, Elif Yalcin, Ilknur Aksu, Burcu Onder, Barin Selcuk, Vedat Bicici, Mufit Akyuz

Ankara Physical Medicine and Rehabilitation Training and Research Hospital, Ankara, Turkey

The overdose usage of heroin causes a wide range of neurological complications like epileptic seizures or polineuropathies whereby stroke or transvers myelitis are rarely observed. The reasons of acute ischemia in heroin users are vazospasm, vasculitis, hypersensitivity reaction and embolia.

This case report describes a 22 years old men using heroin for a long time and the reasons of suddenly developed breathing problem and motor weakness as well as other complications caused by long term usage of heroin in accordance with the literature.

The patient was hospitalized twice in our rehabilitation clinic. At the first stay he was using wheelchair and required moderate support for the daily activities. The electromyographic evaluation relieved a generalized axonal polyneuropathy, meanwhile the cervical MRI defined a myelomalacia on the anterior side of C6-C7. The second stay in our hospital was 1.5 years later for the treatment of the general spasticity in the lower extremities. At discharge he was able to walk independently with foot-up bilaterally and one caned and mildly dependent to another person for the daily life activities.

Chronically usage of heroin was determined as a risk factor when we evaluated the personal and the family's history for defining the etiology of the neurological pathologies. Both neurologic pathologies described above due to chronically usage of heroin are seen very rarely. This case describes these rarely seen complications in the same patient which complicates the diagnosis and treatment of the patient.

Keywords: Addiction, damage, nervous system

P-216

How recruiting to more than one acute clinical trial in SCI affects recruitment, withdrawal and other trial processes: The COSAQ experience

Marnie Graco¹, Rachel Schembri¹, Doug J Brown², Janette Alexander², Melinda Millard², David J Berlowitz¹

¹Institute for Breathing and Sleep, Melbourne, Australia

²Spinal Research Institute, Melbourne, Australia

Spinal Cord Injury (SCI) is a relatively rare event and multicentre trials are commonly required to achieve clinically relevant and sufficiently powered sample sizes. Anecdotally, concerns are expressed for participants, units and the integrity of the research around the potential consequences of multiple trials "competing" for the same participants. However, there is little literature which examines this in SCI.

Objective:

To use process data from the multicentre COSAQ (Continuous Positive Airway Pressure for Obstructive Sleep Apnoea in Quadriplegia) study to determine whether recruiting to more than one clinical trial has adverse consequences on recruitment rates and patient withdrawal rates.

Materials - Methods:

The number of concurrent clinical trials that recruited patients with acute, traumatic, quadriplegia since COSAQ commenced was determined for each of the 10 sites and data was dichotomised for sites recruiting to one versus two or more trials. Comparisons were made examining the proportion of eligible patients recruited and the proportion of patient-initiated withdrawals.

Results:

928 patients have been screened for COSAQ, 190 consented and 79 randomised across Australia, the UK, Canada and New Zealand. Four sites recruited to COSAQ only, two recruited to an average of two trials, two recruited to three, and two recruited to four studies concurrently.

No significant difference in recruitment rates (67% (95%CI 57-76) vs 54% (48-61)) or patient-initiated withdrawals (6% (2-16) vs 6% (3-13)) was observed in the sites recruiting to one versus more than one study.

Conclusion:

Using the COSAQ trial as an example, recruiting to more than one clinical trial in acute SCI does not appear to impact significantly on recruitment or participant withdrawal rates.

Keywords: Competitive recruitment, acute spinal cord injury, clinical trials

P-217

The experiences of persons with spinal cord injuries

Herman Willemse

Nelson Mandela Metropolitan University, South Africa

Census estimates in 2010 indicated that 6,3% South Africans aged 5 years and older are currently classified as disabled in five of the nine provinces in the country. The national figure for 2005 was 5%, with the figure for females (6,5%) slightly higher than that for males (6,1%). In the Nelson Mandela Bay Municipal area, Port Elizabeth, South Africa – the geographical area in which this research study was undertaken - persons with spinal cord injuries have many challenges to face due to the shortcomings the existing resource for health care delivery in the post-discharge phase.

Objective:

The research objectives identified for the study were: (i) To explore and describe the lived experiences of persons with spinal cord injuries. (ii) to explore and describe the lived experiences of the significant others of persons with spinal cord injuries; and iii) to develop a strategy to guide the professional nurse and the health care team in facilitating the health care of persons with spinal cord injuries.

Method:

The study was qualitative, exploratory, descriptive, and contextual, and based on a case study method of inquiry.

Results:

The researcher in his discussions and quest to address the issue of renewed resilience in spinal cord injured persons towards finding purpose and re-establishing meaning in their lives, focused on their psychological, spiritual and social health.

Conclusion:

Through this study, valuable insight was gained with regard to experiences of both persons with spinal cord injuries and that of their significant others. Recommendations were made for nursing practice, nursing education and nursing research.

Keywords: Strategy, renewed resilience, re-established meaning

P-218

Proteomic analysis of ligamentum flavum

Yuichiro Goda¹, Nori Sato¹, Takako Taniguchi², Yoichiro Takata¹, Hirofumi Kosaka¹, Toshinori Sakai¹, Kosaku Higashino¹, Koichi Sairyo¹, Shinsuke Katoh¹, Hisaaki Taniguchi², Natsuo Yasui¹

¹Department of Orthopedics, The University of Tokushima, Tokushima, Japan

²Division of Disease Proteomics, Institute for Enzyme Research, The University of Tokushima, Tokushima, Japan

Objective:

The lumbar spinal canal stenosis (LCS) is the common lumbar disorder in the aged population. Hypertrophy of ligamentum flavum is one of the main factors of the LCS but the patho-mechanism of hypertrophy has not been clarified yet. The purpose of the present study is to analyze the global change in the protein components of ligamentum flavum with hypertrophy in the LCS patients.

Materials-Methods:

The ligamentum flavum samples were obtained from patients at the time of operation for LCS or LDH. One group was ligamentum flavum with hypertrophy from LCS patients. The LCS patients were 80 (A), 74 (B), and 59 (C) years old. All of them were male. The other group was that without hypertrophy from LDH patients. The LDH patients were 17 (D) year-old male and 22 (E), 30 (F) year-old female. Samples were axially cut into 1- μ m slices. They were treated with CNBr and digested with various enzymes. The LC/MS/MS analysis has been performed.

Results:

In the LCS group, the contents of elastin were (A)14%, (B)38%, (C)50%, and the contents of collagen were (A)77%, (B)56%, (C)40%. In the LDH group, the contents of elastin were (D)57%, (E)66%, (F)57%, and the contents of collagen were (D)35%, (E)18%, (F)33%. The contents of elastin in LCS group were lower than those in LDH group and the contents of collagen in LCS group were higher than those in LDH group. We could identify the various types of collagens. In various types of collagens LCS group tended to be higher than LDH group.

Conclusion:

Since elastin contributes to the elasticity (softness) of the tissue, the decrease of elastin in ligamentum flavum with hypertrophy affects not only the thickness of the tissue, but also the softness of that. These results may explain, at least in part, the cause of the LCS.

Keywords: Proteomic analysis, ligamentum flavum, LC/MS/MS

P-219

Confounding factors in a patient with SCIWORA: A case report

Ebru Umay, Ibrahim Gündoğdu, Fatma Aytül Çakıcı

Department of Physical Therapy and Rehabilitation, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey

Background:

Spinal cord injury without radiographic abnormality (involving the cervical spine) is a syndrome of spinal cord injury without any evidence of vertebral fracture or bony misalignment, as evidenced by plain computed tomography (CT) or magnetic resonance imaging (MRI).

Case:

85-year-old male patient with a medical history of diabetes mellitus, hypertension, colon cancer and prostate cancer cured with chemotherapy and transurethral prostatectomy, presented with loss of strength and sensation in the upper and lower extremities, after a falling from stairs. Single neurological level was C3 AIS C and cervical MRI revealed only a hyperintensity in the spinal cord (contusion). Therefore the patient was diagnosed as SCIWORA. Neurological examination of the bilateral upper and lower extremities showed; glove and sock style hypoaesthesia, loss of proprioception, hypoactive deep tendon reflexes, and normal superficial reflexes. Pathological reflexes were negative. Bulbocavernosus reflex, superficial and deep anal sensation and voluntary anal contraction were normal. Patient had only urgency incontinence but no fecal incontinence. Hyper-active detrusor and reduced bladder capacity were observed in urodynamic study.

Upon detailed questioning, a three-year history of sensorimotor axonal degeneration of upper and lower extremities due to colon cancer chemotherapeutic drug use and urge incontinence learned which was not mentioned before. After 3 weeks of rehabilitation program including clean intermittent catheterization and anticholinergic treatment, a significant improvement in muscle strength was observed in the proximal upper and lower extremities but there was no progress in the distal extremities.

Conclusion:

In conclusion, neurological symptoms range from transient paraesthesia to tetraplegia in patients with SCIWORA and without taking detailed medical history and careful neurological examination of the case; weakness in distal extremities owing to sensorimotor polyneuropathy and urinary incontinence probably due to previous disease and/or surgery may have led to misdiagnosis.

Keywords: Spinal cord contusion, spinal cord injury, sensory-motor neuropathy

P-220

A rare cause of sciatica: Sacral chordoma

Sule Sahin Onat, Sibel Unsal Delialioğlu, Cem Hatipoğlu

Physical Therapy Education and Research Hospital, Ankara, Turkey

Introduction:

Chordoma is a slow-growing, locally invasive, rare malignant tumor of the spine. Chordomas are usually located in the sacrum.

Case:

A sixty year old male patient was admitted with low back and right leg pain since two months. There were no complaints of trauma, fever, weight loss, night pain, urinary and fecal incontinence, neurogenic claudication. Valsalva maneuver was positive. There was radicular pain, straight leg lift test was positive and sciatic nerve vallex points were sensitive. There was hypoesthesia at S1 dermatom. Laboratory, radiography were normal. On MRI, an expansile, septated lesion was seen on the right portion of the S1 vertebral body, which extended to the pedicle and protruded into the spinal canal posteriorly. The mass lesion was predominantly hyperintense on T1-weighted images (T1W) with hyperintense septa, and it was hyperintense on T2W. After contrast administration, periphery of the lesion and the septa were enhanced. S1 nerve roots were both compressed from medially secondary to the extension of the lesion from the vertebral body. Tumor resection was made at S1 vertebra corpus. It was reported as chordoma after histopathological examination. MRG repeated as the patients complaints continued after resection. On S1 vertebra corpus and right sacral side there was a 3x6x2.5cm mass which was heterogen hyperintense on T2W, hypointense on T1W and heterogen contrasting after gadolinium. It was local recurred. The severity of patients symptoms decreased minimally after the physical therapy and pregabalin treatments.

Discussion:

Chordomas clinic changes due to the localization. As the symptoms are nonspecific, computerized tomography and MRG fail to imagine the distal part of the S2 vertebra, diagnosis often delays. Although the diagnosis was early in our case as it was at S1 vertebra and patients presentation was with sciatica, subtotal resection was insufficient. There was local recurrences and radiotherapy treatment was applied.

Keywords: Sciatica, sacral chordoma

P-221

Proven ways to break your neck diving this summer

Herndon Murray

Shepherd Center, Atlanta, GA, USA

As a part of the Injury Prevention programs of ISCoS and Shepherd Center, we are focusing on Diving Injury SCI and its prevention. We are using the model of patient interviews describing how they were injured and photos showing the circumstances in a message of "don't do what I did."

There are descriptions of diving injuries in swimming pools, rivers, lakes, and at the beaches.

The pictures and patient descriptions are currently being used in Shepherd's Injury Prevention Program.

Keywords: SCI injury prevention

P-222

Complete resolution of a case of calcific tendinitis of the longus colli with conservative treatment

Fumitake Tezuka¹, Toshinori Sakai¹, Yoichiro Takata¹, Kosaku Higashino¹, Shinsuke Katoh¹, Koichi Sairyo²

¹Department of Orthopedics, Institute of Health Biosciences, The University of Tokushima Graduate School, Tokushima, Japan

²Department of Orthopedics, Teikyo University Mizonokuchi Hospital, Tokyo, Japan

Acute calcific tendinitis of the longus colli is a self-limiting inflammatory condition caused by calcium hydroxyapatite deposition in the longus colli tendon. Although the literature contains several case reports describing its radiological presentation, few reports provide detailed chronological accounts through symptomatic and radiologic resolution. In this report, we described in detail the symptoms as well as radiological findings, including plain X-ray, computed tomography (CT), and magnetic resonance imaging (MRI).

A 59-year-old woman presented with severe neck pain and stiffness of a few days duration as well as moderate discomfort when swallowing. Neck pain was induced by extension and reduced by flexion. Range of motion (ROM) of the cervical spine was extremely limited. Her vital signs were within normal limits. Lateral radiographs of the cervical spine revealed a large calcium deposit anterior to the C1-C2 joint and swelling of the prevertebral soft tissue from C1 to C5. CT scans and MRI of the neck showed fluid in the retropharyngeal gap. A diagnosis of acute calcific tendinitis of the longus colli was made, and a soft collar and non-steroidal anti-inflammatory drug were prescribed, without antibiotics. Two weeks later, neck pain, dysphagia, and ROM limitation were all reduced, and plain X-ray films taken at the 3 weeks after presentation revealed reduced retropharyngeal soft-tissue swelling and almost complete disappearance of the amorphous calcification anterior to C1-C2. At 4 months after presentation, the calcium deposit and all of the abovementioned symptoms had resolved completely.

Although this disease is comparatively rare, physicians should keep it in mind when a patient presents with acute severe neck pain. In addition, differential diagnosis should rule out acute purulent diseases such as retropharyngeal abscess and pyrogenic spondylitis, trauma, and neoplastic disease.

Keywords: Calcific tendinitis of the longus colli, conservative treatment