



ISCon 2006

International Spine
and Spinal Injuries
Conference

3rd - 5th March, 2006, New Delhi, India

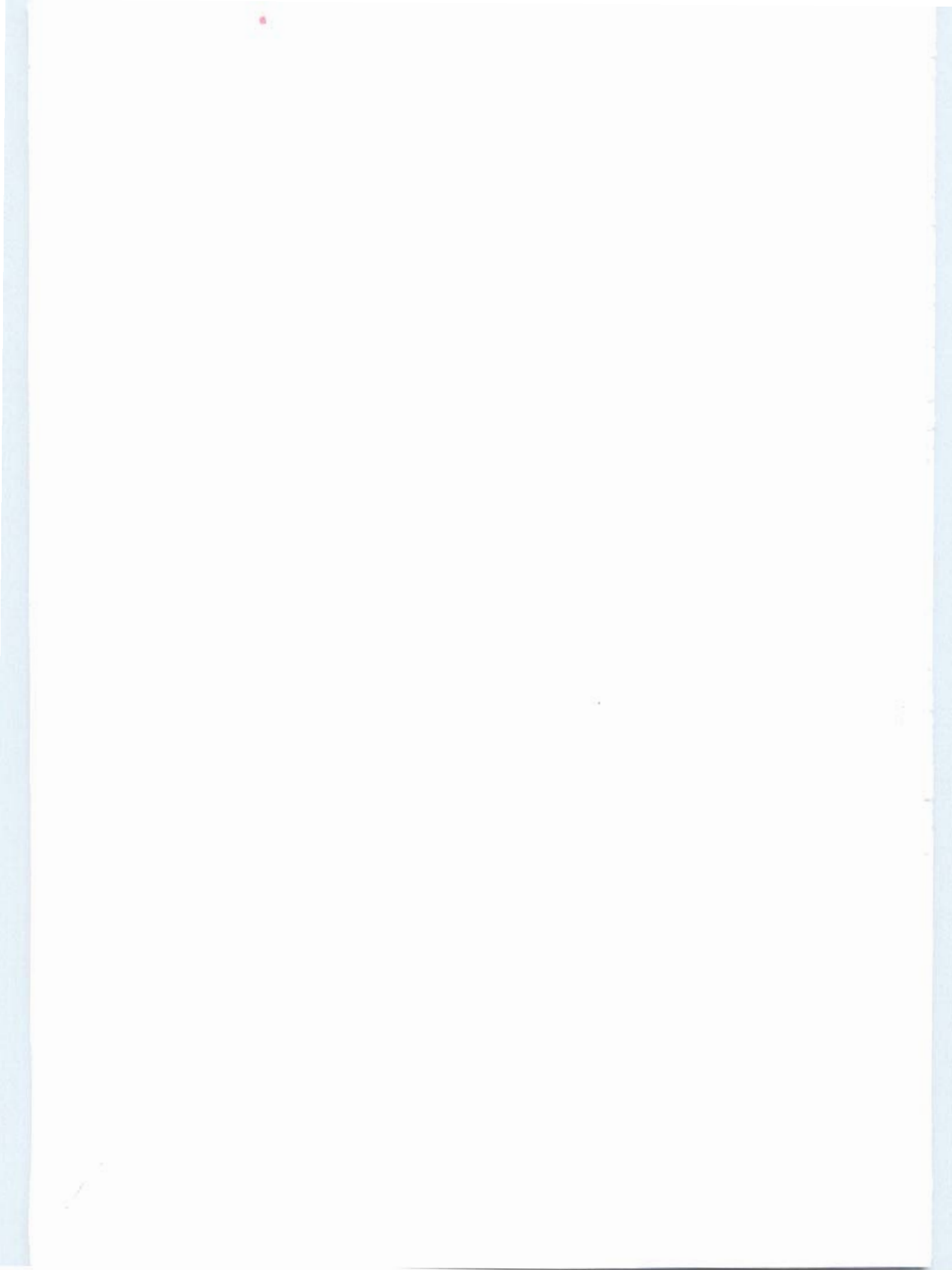
'Dilemmas in Management
of Spinal Injuries & Spine Disorders'

Under the patronage of

ISCOS
International Spinal Cord Society



Souvenir





'Dilemmas in Management of Spinal Injuries & Spine Disorders'

Pre-conference Workshops:

- ❖ 'Infertility after SCI' - 1st March, 2006.
- ❖ 'Advanced Course on Management of Neurogenic Bladder' - 2nd March, 2006.
- ❖ 'Surgical Management of Cervical Spine Ailments' - 1st & 2nd March, 2006.

Main conference - 3rd - 5th March, 2006

Post conference Workshops:

- ❖ 'Management of Tetraplegic Hand' - 6th March, 2006
- ❖ 'Physiotherapy Management of Spinal Cord Injury' - 6th March, 2006.
- ❖ 'Advanced Workshop on Physiotherapy Management of Spinal Cord Injuries' - 6th March, 2006.
- ❖ 'Wheelchair Research & Clinical Practice featuring Wheelchair Skills Training' - 7th March, 2006.

Under the patronage of

ISCOS
International Spinal Cord Society

Delhi Spine Club





MESSAGE

India is fast emerging as the global hub of technology. In the last few years it has made rapid progress in the field of health services. Institutions like Indian Spinal Injuries Centre have been largely responsible for placing India in the forefront in health technology. The achievements of Indian Spinal Injuries Centre are specially remarkable since they have been in a speciality which is often neglected due to the fact that it is the most cost ineffective and technically the most demanding of all specialities.

It is hence most appropriate that Indian Spinal Injuries Centre and Spinal Cord Society are organizing the International Spine and Spinal Injuries Conference (ISSICON) 2006 where more than 450 delegates and faculty members from all over the globe would get together to focus attention on this very challenging problem. I am sure that the deliberations at this conference and the pre and post conference workshops would contribute substantially in the advancement of available technology for spinal injury management and especially help in upgradation of services in the developing countries of the region.

I welcome all the delegates and faculty members and wish the organizers all success in their endeavours.

A handwritten signature in blue ink that reads "Meira Kumar".

Meira Kumar (Smt.)

Minister of Social Justice & Empowerment
Government of India



MESSAGE

The last decade has witnessed a tremendous advancement in technology available to diagnose and manage locomotor and other disabilities. The Ministry of Social Justice and Empowerment, Government of India, has given a strong emphasis on providing services to persons with disabilities.

Indian Spinal Injuries Centre has set an example of provision of high standards of care in this challenging area and also demonstrated the excellent results possible with Government-NGO Co-Operation.

The International Spine and Spinal Injuries Conference (ISSICON) 2006 by providing a forum for discussion for various experts from India and around the world would benefit the large population of people with spinal injuries and other related disabilities.

I welcome all delegates and faculty members and wish the Conference all success in its deliberations.

Smt. Sarita Prasad

Secretary
Ministry of Social Justice & Empowerment



MESSAGE

Indian Spinal Injuries Centre is one of the greatest examples of Indo-Italian Cooperation, born from the dream and the determination of Maj. H.P.S. Alhuwalia along with the will and efforts of the Italian Government, not to forget the skills and professionalism of Italian and Indian Institutions.

The results of our common work are today under everybody's eyes, the quality of the services offered is internationally recognized and the echoes of our collaboration reach far beyond India's borders.

The growth of ISIC is the outcome of the motivation of the people involved, and the friendship that links India and Italy.

It is my privilege today to welcome all the faculty members and the delegates, and to thank all the organizers for making this scientific and academic feast possible.

H. E. Antonio Armellini
Italian Ambassador



MESSAGE

Indian Spinal Injuries Centre is recognized by the Govt. of India as the tertiary level centre for management of spinal injury. After setting up a good service & delivery programme the focus has been on education and research activities. Hence, an Institute of Rehabilitation Sciences has been set up. International Spine and Spinal Injuries Conference (ISSICON) is also one of the main endeavours in this regard. This conference has become recognized for the high standards of the scientific deliberations.

I am sure that the conference and the workshops will help in the professional fraternity from all around the globe, for the benefit of people with spinal injuries.

On behalf of Indian Spinal Injuries Centre, Spinal Cord Society and the organizing committee of International Spine and Spinal Injuries Conference, it is a privilege to extend a very warm welcome to all the delegates and faculty members.

Major HPS Ahluwalia,

Chairman
Indian Spinal Injuries Centre
New Delhi

MESSAGE

"It is indeed a true pleasure to represent the World Spine Society at the ISSICON meeting in Delhi. Health is the worlds most important resource. Spinal health, including injury prevention and treatment, are often under-regarded. It is only through the efforts of the ISSCON and the World Spine Society that the world's health care community keeps abreast of spine health issues. We should be proud of our efforts and accomplishments in this regard. I look forward to the interactions and collaborations that will be renewed and initiated at the ISSCON meeting in Delhi. Together, we can improve the lot of patients with spinal disorders worldwide."

Dr. Edward Benzel

President World Spine Society

W S El Masry FRCS Ed

Consultant Surgeon in Spinal Injuries
Director, Midlands Centre for Spinal Injuries
Chairman, British Association of
Spinal Cord Injury Specialists (BASCIS)
Honorary Secretary, International Spinal Cord Society



MESSAGE

I am delighted to return to New Delhi, India for the ISSICON 2006 meeting. I attended the previous meeting in 2004 and enjoyed a very well organised meeting both scientifically and socially.

The ISSICON meeting is currently one of the most important scientific meetings that the International Spinal Cord Society supports for the dissemination of knowledge, skills and expertise throughout India and beyond.

The programme for the 2006 meeting is very exciting and does not shy away from addressing the dilemmas and controversies of management of the various aspects and effects of spinal injuries.

The National and International faculty that the ISSICON 2006 meeting has attracted is impressive and speaks for the standards and reputation the ISSICON meetings have acquired.

On behalf of the International Spinal Cord Society, I would like to send our very best wishes for the ISSICON 2006 meeting. I also wish to congratulate the organisers on an excellent programme, in particular Dr Chhabra, Major Ahluwalia, Dr Mukherjee, Dr Kame, Dr Katoch and Dr Suman as well as all the speakers and delegates.

W S El Masry FRCS Ed

Consultant Surgeon in Spinal Injuries
Director, Midlands Centre for Spinal Injuries
Chairman, British Association of Spinal Cord Injury Specialists (BASCIS)
Honorary Secretary, International Spinal Cord Society



MESSAGE

The Initiative of ISSICON 2006, International Spine and Spinal Injuries Conference is important. Many years in a row the joint effort of the Indian Spinal Injuries Centre and the Spinal Cord Society Indian Chapter has created scientific gatherings of high level.

This year "Dilemmas in management of spinal injuries & spine disorders" promises again to be an event of quality. The scientific program, the pre- and post conference workshops will permit all members of SC teams to increase their knowledge and improve their performance.

Major steps have been made during the last decade in making the comprehensive management of SCI patients known throughout the world. India has taken a leading role in this.

ISCOS education committee is happy with the development of standards, training and education methods and facilities, recognition of training centres, et al.

It will be a joy and privilege to attend this congress and meet with friends from around the world who share the same dedication and believe, and who move towards the same goal: the ever improvement of the management of patients suffering a spinal cord lesion, their rehabilitation and reintegration into society. Learning is a key, teaching a privilege.

JJ Wyndaele

MD, DSci, PhD, FISCOS, FEBU
Chairman of ISCOS education Committee



MESSAGE

As Chairperson of the Asian Spinal Cord Network (ASCoN) I am delighted that the Indian Spinal Injuries Centre in collaboration with the Spinal Cord Society (Indian Chapter) is hosting ISSICoN 2006, under the patronage of the International Spinal Cord Society (ISCoS). An event like ISSICoN 2006 supports the overall objectives of ASCoN by promoting organisational and human resource development for organisations and people working in spinal cord injury management in the Asia region and by sharing information, ideas and knowledge of best practices in spinal cord injury among ASCoN members. I thank the organisers for their continued efforts to share and disseminate knowledge on the management of spinal injuries through ISSICoN 2006 and similar conferences they have held in the past.

This year's theme focuses on "Dilemmas in Management of Spinal Injuries & Spine Disorders" and throughout the 7-day programme of scientific sessions and workshops there will be many opportunities for delegates to learn from each other and share the latest global developments on such dilemmas and spine disorders. I would also like to thank the organisers for the hard work they have undertaken to put together such an exciting programme and for bringing together experts and professionals of various disciplines from all over the world to discuss and debate these important issues.

I am very happy that during the ISSICoN 2006 we will have the opportunity of launching the ASCoN Guiding Principles on Spinal Cord Injury Management. The process of developing the Guiding Principles was initiated in 2004, using the "White Paper on Spinal Injury Management" presented by Dr H S Chhabra during the 4th ASCoN conference in Kathmandu. Since that time ASCoN members have worked together to formulate and reach consensus on the Guiding Principles applicable to Asian countries.

The Guiding Principles summarize all aspects of spinal injury management and emphasize the importance of prevention programmes. They will be useful for all professionals involved in spinal cord injury management, especially those professionals who are new to the field and for centres which are being established.

I hope that every delegate will gain new insights and knowledge through their active participation at ISSICoN 2006 and return to their workplaces with renewed energy and enthusiasm to work towards improving the lives of persons with spinal cord injuries.

Dr Fazlul Hoque

Chairperson (2006), ASCoN
Vice President, ISCoS (South East Asia)



MESSAGE

Let me congratulate you and Spinal Cord Society (Indian Chapter) on making ISSICON Meeting in New Delhi an important and regular feature in Spine calendar in this part of the world.

The theme for ISSICON 2006 'Dilemmas in Management of Spinal Injuries and Spine disorders' is apt and bound to generate a lot of scientific discussion. I hope we shall be able to resolve few of these dilemmas by the end of the Conference. The Conference along with excellent pre and post Conferences Workshop shall go a long way in disseminating knowledge and in the management of spinal cord injury patients.

On behalf of GCC Pan Arab Orthopaedic Association, Omani people and on behalf of myself I wish ISSICON 2006 all the success.

Dr. Mohammed Darwish
Sr. Consultant (Spine Surgeon)

Maj Gen. (Retd.)

Ian Cardozo, AVSM, SM
Chairman, Rehabilitation Council of India



MESSAGE

I am happy to learn that the Spinal Injury Centre is bringing out a commemorative souvenir on the occasion of their International Conference on the management and treatment of spinal injuries.

The Spinal Injury Centre has done pioneering work in this field and addresses a very important need for persons with disability in India. The quality of service is state of the art and the facilities it provides are of international standards. This generates hope for the disabled and also brings credit to our country.

I take this opportunity to wish the Spinal Injury Centre and all the delegates success in their deliberations at the conference and the best outcomes.

Maj Gen. (Retd.)

Ian Cardozo, AVSM, SM
Chairman, Rehabilitation Council of India



MESSAGE

I welcome all the international and National delegates for this International Spine and Spinal Injuries Conference to be held on March, 2006 in Indian Spinal Injuries Centre Delhi. The deliberation of this Conference will increase our understanding about the complex issues related to spine injury patients.

I wish the Conference a great success.

A handwritten signature in blue ink, appearing to read 'A.K. Mukherjee', written in a cursive style.

A.K. MUKHERJEE

Director General ISIC, New Delhi



MESSAGE

It is very heartening to know that the Spinal Cord Society (Indian Chapter) along with the Indian Spinal Injury Centre, New Delhi is organizing this International Conference centered on Spinal Injuries & other Spinal Disorders ISSICON 2006. The magnitude of the problem of spinal cord injury with its accompanying pathophysiological ,clinical, physical ,psychological, rehabilitative & social impact needs to be addressed in a multi-disciplinary approach & this conference with it's accompanying Pre & Post conference workshops endeavours to do exactly this. The vision & the organizing capacity of the 'think tank' and the organizers of this conference deserve all the accolades. The galaxy of International & National faculty assembled for this meet is a pointer towards this.

I wish the very best to Dr.H.S.Chabra ,his team & ISSICON 2006 and I am looking forward to this meeting & its significant outcome.

Dr. Arvind Jayaswal

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From the Editor's Desk



Even though these have been rapid developments in the field of management of spinal injuries and disorders, there are still probably as many questions unanswered. The long list of controversies in the field only reinforce that a lot still needs to be achieved in order to relieve the suffering of the mammoth population around the globe which suffers from such ailments.

There is a strong need to come to a consensus on various issues related to management of spinal ailments so that the best possible modes of management could be provided. It was with this in mind that the theme of the conference was kept as "DILEMMAS IN MANAGEMENT OF SPINAL INJURIES AND SPINE DISORDERS". Deliberations amongst 57 eminent faculty members from around the globe and 66 from around India would provide an excellent forum for trying to achieve these objectives. The scientific programme has shaped up well and the conference promises to be an academic feast. We hope that the cultural and social events will help in establishing bondages and linkages amongst the fraternity.

As the Organizing Secretary of ISSICON-2006 and the editor of the Souvenir, it is my privilege to thank the whole team of organizing committee of ISSICON and all others who have contributed towards this event.

I would also want to thank International Spinal Cord Society (ISCoS), Asian Spinal Cord Network (ASCoN), the Italian Embassy, The Italian Cooperation, Delhi Spine Club and Rehabilitation Council of India (RCI) for having extended their patronage to the conference.

We seek your wholehearted support in making this endeavor a success. Simultaneously we will strive to live up to your expectations so that we could justify the efforts put in by faculty members and delegates.

Hoping to see you again in the next ISSICON.

With regards

Dr. H.S. Chhabra,

Chief of Spine Service & Addl. Medical Director
Organizing Secretary, ISSICON-2006
Secretary, Spinal Cord Society,
Executive Member, Asian Spinal Cord Networking
Executive Member, Association of Spine Surgeons of India



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LIST OF INTERNATIONAL FACULTY MEMBERS OF ISSICON-2006

1. Mr. Abhay Rao, Orthopaedic & Spine Surgeon, Leeds, UK
2. Prof. Alfredo Gorio, Professor of Pharmacology, Director, Clinical Pharmacology IRCCS Humanities, Dept. Medicine, Surgery and Dentistry, Faculty of Medicine, University of Milan, Italy
3. Dr. Amit Bhandi, Prosthetist & Orthotist, University of Illinois College of Medicine, USA
4. Dr. Amol Karmarkar, Human Engineering Research Laboratories, VA Pittsburgh Healthcare System & University of Pittsburgh, USA
5. Dr. Anand Agarwal, Orthopaedic & Spinal Surgeon, Medway Maritime Hospital, UK
6. Dr. Anbananden Soopramanien, Consultant in Spinal Injuries and Rehabilitation Medicine, Salisbury, UK
7. Dr. (Mrs.) Arundhati Perakash, Staff Clinical Pathologist, Stanford University, USA
8. Dr. Ashwini Sharan, Department of Neurosurgery, Thomas Jefferson University, USA
9. Dr. Avinash G. Patwardhan, Department of Orthopaedic Surgery and Rehabilitation, Loyola University Stritch School of Medicine, USA
10. Dr. Balraj Singhal, Stoke Mandeville Hospital, UK
11. Dr. C Leclercq, Hand Surgeon, Paris, France
12. Dr. Cathy Cooper, Occupational Therapist, Melbourne, Australia
13. Dr. Clifford E. Brubaker, Professor And Dean, School of Health and Rehabilitation Sciences, University of Pittsburgh, USA
14. Cyril Siriwardane, Secretary General, Disability Organisations Joint Front, Sri Lanka
15. Prof. Dajue Wang, Aylesbury Bucks, UK
16. Dr. David Constantine, Co-founder/Executive Officer, Motivation, Brockley Academy, UK
17. Dr. Edward C. Benzel, President, World Spine Society, Cleveland Clinic Spine Institute, USA
18. Ms. Emily Zipfel, University of Pittsburgh, USA
19. Mr. Eric Weerts, Program Coordinator SCI project, Handicap International, Vietnam
20. Dr. Erkan Kaptanoglu, Associate Professor, Department of Neurosurgery, Ankara Numune Education and Training Hospital, Ankara, Turkey
21. Ms. Esha Thapa, SIRC, Nepal
22. Prof. Mohamed A. Maziad, Faculty of Medicine, Ain Shams University, Cairo, Egypt
23. Prof. Vincent R Hentz, Professor, Robert A Chase Hand & Upper Limb Center, Stanford University School of Medicine, USA
24. Dr. Eva Maria Buchholz, Neurosurgeon, Department of Neuro-Orthopaedics, Germany
25. Dr. Fazlul Haque, Consultant Orthopaedic Surgeon, CRP, Bangladesh
26. Mr. Gurpreet Singh, Urologist, UK
27. Dr. Hans Joseph Erli, Trauma Surgeon, Deputy Chair of the Department of Trauma Surgery, Aachen, Germany
28. Dr. Inder Perakash, Professor Urology, P.V.A. Professor Spinal Cord Injuries and Professor PM&R, Stanford & Director Spinal Cord Injuries Center, Palo Alto V.A. Health Care System, USA
29. Dr. Jean Jacques Wyndaele, Chairman, Education Committee - ISCoS, Professor of Urology, Belgium
30. Dr. Jeremy Puhlman, University of Pittsburgh, USA
31. Dr. John F. Ditunno, Professor of Rehabilitation Medicine, Jefferson Medical College, USA
32. Dr. John Steeves, Professor and Director of ICORD, Professor of Zoology, Anatomy, and Surgery, University of British Columbia and Vancouver Hospital, Canada
33. Mr. Jon Pearlman, M.Sc., Graduate Student Researcher, Human Engineering Research Laboratories, VA Pittsburgh Healthcare System, USA
34. Dr. Julio Gallego, Group Director, Spinal Surgeon - Memphis, USA
35. Dr. Kishore Kumar M., Senior Registrar, Muscat, Oman
36. Dr. Lisa Harvey, Senior Lecturer, Northern Clinical School, Rehabilitation Studies Unit, Faculty of Medicine, University of Sydney
37. Dr. Maggie Muldoon, Secretary, Asian Spinal Cord Network.
38. Dr. Mark McCartney, University of Pittsburgh, USA
39. Prof. Dr. med. Manfred Stohrer, Urologist, Germany
40. Prof. Mohamed Darwish, Secretary - PAN Gulf Spine Society.
41. Dr. Patrick Kluger, Chief Spine Surgeon, Stoke Mandeville Hospital, UK
42. Prof. Mohamed Ahmad Maziad, Faculty of Medicine, Ain Shams University, Cairo, Egypt
43. Dr. Richard Schwarz, Clinical Instructor of Surgery, University of British Columbia, Canada
44. Dr. Rory Cooper, Distinguished Professor and FISA/PVA Chair, University of Pittsburgh, USA
45. Prof. Rosemarie Cooper, University of Pittsburgh, USA

47. Dr. Sarjit Singh, Neurologist, West Virginia, USA
48. Dr. Simeon Grossmann, Spine Surgeon, Swiss Paraplegic Centre, Nottwil, Switzerland
49. Dr. Stanley Ducharme, Andrologist, Spinal Injuries Centre, Boston, USA
50. Mr. Stephen Muldoon, John Groom Overseas.
51. Mr. Ujjwal K Debnath, Senior Registrar, Spinal Unit, University Hospital of Wales, UK
52. Mr. Vinay Jasani, Spine Consultant, Stokes on Trent, UK
53. Dr. Vinod Sahgal, Chairman, Deptt. of PMR, the Cleveland Clinical Foundation, USA
54. Dr. W S El Masry Secretary, International Spinal Cord Society (ISCOs), Director, Midlands Centre for Spinal Injuries, UK
55. Ms. Wanda Toso, Psychologist, Italy
56. Dr. Wee Fu Tan, Mediscdh Centrum Alkmaar, Deptt. Neurosurgery, Netherlands
57. Dr. William Sears, Neurosurgeon, North Shore Hospital, Sydney, Australia
58. Dr. Ziad Al-Zoubi, Consultant Orthopaedics & Spine Surgery, General Secretary, PAN Arab Spine Society, Jordan

LIST OF INDIAN FACULTY - ISSICON-2006

1. Dr. A. K. Sahani, Consultant Neurologist ISIC, New Delhi
2. Dr. A.K. Jain, Prof. Of Orthopaedics (UCMS and GTB hospital New Delhi)
3. Dr. A.K. Mukherjee, Director General, Indian Spinal Injuries Centre, New Delhi
4. Dr. A.K. Singh, Neurosurgeon, Director Neurosciences, Fortis Hospital, Noida
5. Dr. A.K. Varma, Head of Department, PMR, Patna
6. Dr. A.N. Malaviya, Consultant Rheumatologist, ISIC, New Delhi
7. Dr. Abhay Nene, Associate Spine Consultant, P D Hinduja National Hospital, Mumbai
8. Dr. Ajay Bhutani, Neurosurgeon, Sir Ganga Ram Hospital, New Delhi
9. Dr. Alok Sharma, HOD of Neurosurgery, SION Hospital, Mumbai
10. Dr. Ambrish Mithal, Endocrinologist, Apollo hospital, New Delhi
11. Prof. Anil Dhal, HOD - Orthopaedics, MAM College, New Delhi
12. Dr. Anil Kumar Gaur, Assistant Director, All India Institute Of Physical Medicine & Rehabilitation, Haji Ali Park, Mahalaxmi, Mumbai-400006
13. Dr. Anita Agarwal, Radiologist, ISIC, New Delhi
14. Dr. Arvind Jayaswal, Professor of Orthopaedics, AIIMS, New Delhi.
15. Dr. Ashish Suri, Neurosurgeon, AIIMS, New Delhi
16. Dr. Atul Bhatnagar, Urologist, Mata Chanan Devi Hospital, New Delhi
17. Dr. B Mohapatra, Jr. Consultant Orthopaedics, ISIC, New Delhi
18. Dr. B.D. Athani, Director, AIIPMR, Mumbai
19. Dr. Bhanu Pant, Consultant Neurologist, Apollo Hospital, New Delhi
20. Dr. (Capt.) Dilip Sinha, Assistant Professor Orthopaedics, Patna Medical College Hospital, Patna
21. Dr. Dinesh Suman, Consultant Urologist, ISIC, New Delhi
22. Dr. G.P. Dureja, Consultant Pain Clinic, Indian Spinal Injuries Centre, Delhi
23. Dr. Geeta Ravindaran, Basic Research Scientist, Reliance Life Sciences, Mumbai
24. Dr. George Joseph, Madras Medical College and University hospital, Chennai
25. Dr. H.C. Goyal, Head Deptt. Of PMR, Safdurjung Hospital, New Delhi
26. Dr. H.N. Bajaj, Sr. Consultant & Spine Surgeon, Indian Spinal Injuries Centre, New Delhi
27. Major HPS Ahluwalia, Chairman, ISIC, New Delhi
28. Dr. H.S. Chhabra, Chief of Spine Service & Addl. Medical Director, Indian Spinal Injuries Centre, New Delhi
29. Dr. (Lt. Col.) H.S. Bhatoe, Consultant Neurosurgeon, Research & Referral (Army Hospital), New Delhi
30. Dr. Harsh Mahajan, Consultant Radiologist, Mahajan Imaging Centre, Green Park, New Delhi
31. Dr. Harsh Jain, Neurosurgeon, Apollo Hospital, Calcutta
32. Major General Ian Cardozo, Chairman, Rehabilitation Council of India, New Delhi
33. Dr. J.P. Singh, Member Secretary, Rehabilitation Council of India, New Delhi
34. Dr. K.V. Menon, Consultant & Head, Orthopaedics & Spine Surgery, AIMS, Kochi
35. Dr. Kalidutta Das, Consultant Orthopaedics, Indian Spinal Injuries Centre, New Delhi
36. Smt. Lalita Thambi, Chief of Nursing, ISIC, New Delhi.
37. Dr. Manoj Sharma, Orthopaedic Surgeon, Jaipur Golden Hospital, New Delhi
38. Dr. Manvir Bhatia, Sr. Consultant Neurology, Chairperson Sleep Medicine, Sir Ganga Ram Hospital, New Delhi
39. Dr. Mouli Madhab Ghatak, Physiatrist, TRA General Hospital, Kolkata
40. Dr. N.P. Gupta, HOD Urology, AIIMS, New Delhi

41. Dr. Navnender Mathur, Head of Deptt. of Physical Medicine and Rehabilitation, SMS Medical College & Hospital, Jaipur
42. Col. P.K. Sahoo, Neurosurgeon, Command Hospital, Pune
43. Dr. P.K. Dave, Director, Rockland Hospital, New Delhi
44. Dr. P.S. Ramani, Senior Consultant, Neuro & Spine Surgeon, Lilavati Hospital & Research Centre, Mumbai
45. Dr. Pankaj Jindal, Pune, India
46. Dr. Pawan Mehta, Urologist, Mata Chanan Devi Hospital, New Delhi
47. Dr. Pradeep Jain, Incharge, Department of Pain Medicine, Sir Ganga Ram Hospital, New Delhi
48. Prof. Prakash Kotwal, AIIMS, New Delhi, India
49. Dr. Prashant Kekre, Consultant Spine & Orthopaedic Surgeon, Sundaram Medical Foundation, Dr. Rangarajan Memorial Hospital, Chennai
50. Dr. R.N. Srivastava, Prof. Of Orthopaedics, King George Medical College, Lucknow
51. Dr. Raghava Dutt Mulukutla, Consultant Orthopaedic & Spine Surgeon, UDAI Clinic, Hyderabad
52. Dr. Raj Bahadur, Head of Unit, Deptt. of Orthopaedics, PGI, Chandigarh
53. Dr. Rajagopalan, St. John's Medical College & Hospital, Bangalore
54. Dr. Rajeev Sood, Urologist, Dr. Ram Manohar Lohia Hospital, New Delhi
55. Dr. Rajendra Prasad, Neurosurgeon, Apollo Hospital, New Delhi
56. Dr. Ram Chaddha, Spine Surgeon, K.J. Somaiya Hospital, Mumbai
57. Dr. Roop Singh, Consultant Orthopaedics, Pt. B.D.Sharma PGIMS, Rohtak, Haryana
58. Dr. S. K. Kame, Sr. Consultant Orthopaedic, Indian Spinal Injuries Centre, New Delhi
59. Dr. S.L. Yadav, Physiatrist, AIIMS, New Delhi
60. Dr. S.M. Tull, Consultant Orthopaedic Surgeon, VIMHANS, New Delhi
61. Dr. S.N. Wadhwa, Urologist, Sir Ganga Ram Hospital, New Delhi
62. Dr. S.S.Sangwan, Director, Pt. B.D. Sharma PGIMS, Rohtak, Haryana.
63. Dr. S.Y. Kothari, Consultant, PMR, Safdarjung Hospital, New Delhi.
64. Dr. Sajjan Hegde, Consultant Orthopaedic Surgeon, Apollo Hospital, Chennai
65. Dr. Sanjay Behari, Neurosurgeon, Sanjay Gandhi Postgraduate Institute of Medical Science, Lucknow, India
66. Dr. Sanjay Wadhwa, Assistant Professor, Deptt. of PMR, AIIMS, New Delhi
67. Dr. Sanjeev Divyadarshi, Spine Fellow, Indian Spinal Injuries Centre, New Delhi
68. Dr. Shakti Srivastava, Hand Surgeon and Incharge Tetraplegic Hand Clinic, ISIC, New Delhi.
68. Smt. Sarita Prasad, Secretary , Ministry of Social Justice & Empowerment, India
69. Dr. Satish Chandra Gore, Kamla Regency, Pune
70. Dr. Satish Rudrappa, Consultant Neurosurgeon, White House Clinic, Bangalore
71. Dr. Saumyajit Basu, Spine Surgeon, Park Clinic & Kothari Medical Center, Kolkata
72. Dr. Shankar Acharya, Consultant Spine Surgeon, Sir Gangaram Hospital, New Delhi
73. Dr. Shailendra Bhattacharya, Chairman of BORRC, Kolkata.
74. Dr. Sharad Shashank Kale, Assistant Professor, Neurosurgery, AIIMS, New Delhi
75. Dr. Sudhir Kapoor, HOD & Consultant Orthopaedic Surgeon, LHMC, New Delhi
76. Dr. Suman Ramesh, Clinical Research Associate, ISIC, New Delhi
77. Dr. Sunil Katoch, Consultant Orthopaedics, Indian Spinal Injuries Centre, New Delhi
78. Dr. Sunita Lamba, Gynecologist, Mata Chanan Devi Hospital, New Delhi
79. Dr. Suranjan Bhattacharji, Physiatrist, Christian Medical College, Vellore
80. Dr. Surya Prakash Rao, Associate Professor & Spinal Surgeon, Nizam's Institute of Medical Sciences, Hyderabad
81. Dr. T.B.S. Buxi, Department of Radiology, Sir Ganga Ram Hospital, New Delhi.
82. Dr. T. K. Shanmughasundaram Consultant Orthopaedic Surgeon, Chennai
83. Dr. Thomas Joseph, Sahai Spinal Injury Rehabilitation Centre, Tamilnadu, India
84. Dr. U. Singh, Professor & Head, Deptt of PMR, AIIMS, New Delhi
85. Dr. V. K. Rajoria, Consultant Neurosurgeon, ISIC, New Delhi
86. Dr. V. T. Ingalhallkar, Consultant & Surgeon for Spinal Affections, Thane, Maharashtra
87. Col. V.S. Madan, Consultant Neuro Surgeon, Sir Gangaram Hospital, New Delhi
88. Dr. V.S. MEHTA , Head of Department of Neurosurgery, AIIMS, New Delhi
89. Dr. Vijay Prakash Sharma, Physiatrist, Lucknow
90. Dr. V. Gupta, New Delhi. India
91. Dr. Vishal Nigam, Spine Fellow, Indian Spinal Injuries Centre, New Delhi
92. Dr. Yash Gulati, Sr. Orthopaedic & Spine Surgeon, Apollo Hospital, New Delhi

Pre-Conference Workshop on

"Infertility after SCI"

Venue: Conference Hall, Indian Spinal Injuries Centre

Date: 1st March 2006

Time: 14:00 hrs. – 17:30 hrs.

	Chairpersons –		
	- Mr. Gurpreet Singh, Urologist, UK	15:15 – 15:35	Management of Erectile Problems Specific for the Neuropaths
	- Dr. Sanjeev Sharma, Chairman, Specialist Training Committee, Liverpool, UK		- Mr. Gurpreet Singh, Urologist, UK
14:00 – 14:08	Anatomy and Physiology of normal and spinal cord injured male genitourinary system	15:35-15:55	Medical & Surgical Management of infertility in Spinal Cord Injured males
	- Dr. Pawan Mehta, Urologist, Mata Chanan Devi Hospital, New Delhi		- Prof. Inder Perakash, Professor Urology, P.V.A. Professor Spinal Cord Injuries and Professor P.M&R, Stanford and Director Spinal Cord Injuries Center, Palo Alto V.A. Health Care System, USA
14:08 – 14:16	Anatomy and Physiology of normal and spinal cord injured female genito urinary system	15:55 – 16:05	Discussion
	- Dr. Sunita Lamba, Gynecologist, Mata Chanan Devi Hospital, New Delhi		Chairpersons –
14:16 – 14:32	When and how to provide fertility counseling		- Prof. Inder Perakash, Professor Urology, P.V.A. Professor Spinal Cord Injuries and Professor P.M&R, Stanford and Director Spinal Cord Injuries Center, Palo Alto V.A. Health Care System, USA
	- Dr. Jean Jacques Wyndaele, Professor of Urology, Rehabilitation Doctor, Belgium		- Dr. Dinesh Suman, Consultant Urologist, ISIC, New Delhi
14:32 – 14:50	Psychosocial aspects of infertility in Spinal Cord Injured and the partner	16:05 – 16:25	Management of infertility, pregnancy and delivery in spinal cord injured females
	- Dr. Stanley Ducharme, Andrologist, Spinal Injuries Centre, Boston, USA		- Mr. Sanjeev Sharma, Chairman, Specialist Training Committee, Liverpool, UK
14:50 – 15:00	Discussion	16:25 – 16:40	Parenting with Spinal Cord Injury
15:00 – 15:15	Tea Break		- Dr. Stanley Ducharme, Andrologist, Spinal Injuries Centre, Boston, USA
	Chairpersons –	16:40 – 16:50	Discussion
	- Dr. Jean Jacques Wyndaele, Chairman, Education Committee – ISCoS, Professor of Urology, Rehabilitation Doctor, Belgium	16:50 – 17:30	Panel Discussion
	- Dr. Stanley Ducharme, Andrologist, Spinal Injuries Centre, Boston, USA		

**Pre-Conference Workshop on
"Surgical Management of Cervical Spine Ailments"
Venue: Auditorium, Indian Spinal Injuries Centre**

Date: 1st & 2nd March' 2006

Time : 0900 – 1800

Date: 1st March' 2006		Date: 2nd March' 2006	
	Time : 0900 – 1800		Time : 0900 – 1800
There will be live demonstration of surgeries from two-operation theaters. Simultaneously there will be talks in the auditorium as mentioned below. The time allotted between the talks will be used to demonstrate the progress made in the surgeries. If need be, the talks will be interrupted on the request of the surgeon for demonstration of any important step.		Chairperson: - Dr. V.T. Ingaihalikar, Dr. Julio Gallego	
	Chairperson: - Dr. Simeon Grossmann, Spine Surgeon, Swiss Paraplegic Centre, Nottwil, Switzerland	9:00 – 9:20	Image Guided C1- C2 Transarticular Screw Fixation - Dr. Ashish Suri, Neurosurgeon, AIIMS, New Delhi
9:10 – 9:30	Clinical Anatomy of Cervical Spine - Dr. B. Mohapatra, Consultant Orthopaedics, ISIC, New Delhi	9:20 – 9:40	Cervical Spine Metastasis - Mr. Ujjwal Debnath, Senior Registrar, Spinal Unit, University Hospital of Wales, UK
9:40 – 10:10	Biomechanics of Cervical Spine [Unexpected End of Formula - Dr. Avinash Patwardhan, Department of Orthopaedic Surgery and Rehabilitation, Loyola University Stritch School of Medicine, USA	9:40 – 10:00	Tubercular Infections of Cervical Spine - Dr. A.K. Jain, Prof. Of Orthopaedic, UCMS, GTB Hospital New Delhi
10:20 – 10:40	Radiological Evaluation of Cervical Spine - Dr. Anita Agarwal, Radiologist, ISIC, New Delhi	10:00 – 10:20	Management of Cervical Spine Deformities - Dr. William Sears, Neurosurgeon, North Shore Hospital, Sydney, Australia
10:45 – 11:05	TEA BREAK	10:20 – 10:40	TEA BREAK Chairperson: - Dr. William Sears, Neurosurgeon, North Shore Hospital, Sydney, Australia - Dr. Sajan Hegde, Consultant Orthopaedic Surgeon, Apollo Hospital, Chennai
	Chairperson: - Dr. Ashwani Sharan, Thomas Jefferson University, Department of Neurosurgery, USA	10:40 – 11:00	Surgical Management of Cervical PIVD – Anterior Discectomy - Dr. V.T. Ingaihalikar, Consultant & Surgeon for Spinal Affections, Ashwini Back Institute, Thane, Maharashtra
11:05 – 11:25	Surgical Approaches to the Cervical Spine - Dr. Sunil Katoch, Consultant Orthopaedics, ISIC, New Delhi	11:00 – 11:20	Advanced Cervical Discectomy and Fusion for Cervical PIVD - Dr. Manoj Sharma, Chairman, Department of Orthopaedics, Jaipur Golden Hospital, New Delhi
11:35 – 11:50	Principles of Anterior Cervical Spine Fixation - Dr. Patrick Kluger, Chief Spine Surgeon, Stoke Mandeville Hospital, UK	11:20 – 11:40	Anterior Cervical Decompression and Fixation in Lower Cervical Spine Injuries - Dr. Simeon Grossmann, Spine Surgeon, Swiss Paraplegic Centre, Nottwil, Switzerland
12:00 – 12:25	Principles of Posterior Cervical Spine Fixation - Dr. Hans Joseph Ertl, Trauma Surgeon, Deputy Chair of the Department of Trauma Surgery, Aachen, Germany	11:40 – 12:00	Cervical Disc Replacement – Video Demonstration - Dr. Wee Fu Tan, Mediscdh Centrum Alkmaar, Deptt. Neurosurgery, Netherlands
12:45 – 13:45	LUNCH	12:00 – 13:00	Hands on Workshop 1
	Chairperson: - Dr. Eva Maria Buchholz, Neurosurgeon, Germany	13:00 – 13:45	LUNCH
14:00 – 14:20	Surgical Management of Odontoid Fractures - Dr. Ashwani Sharan, Department of Neurosurgery, Thomas Jefferson University, USA	13:45 – 14:45	Hands on Workshop 2
14:30 – 14:50	Traumatic Spondylolisthesis of Axis - Mr. Abhay Rao, Orthopaedic & Spine Surgeon, Leeds, UK	14:45 – 15:00	TEA BREAK Chairperson: - Dr. Wee Fu Tan, Mr. Ujjwal Debnath
15:10 – 15:30	TEA BREAK	15:00 – 15:20	Surgical Management of Cervical Spondylotic Myelopathy – Posterior Laminectomy - Dr. H.N. Bajaj, Sr. Consultant & Spine Surgeon, ISIC, New Delhi
	Chairperson: - Dr. H.N. Bajaj, Sr. Consultant & Spine Surgeon, ISIC, New Delhi	15:20 – 15:40	Surgical Management of Cervical Spondylotic Myelopathy – Anterior Decompression - Dr. Sajan Hegde, Consultant Orthopaedic Surgeon, Apollo Hospital, Chennai
15:40 – 16:00	Classification of Lower Cervical Spine Injuries - Dr. Hans Joseph Ertl, Trauma Surgeon, Deputy Chair of the Department of Trauma Surgery, Aachen, Germany	15:40 – 16:00	Complications of Cervical Spine Surgery - Dr. Eva Maria Buchholz, Neurosurgeon, Department of Neuro-Orthopaedics, Germany
16:30 – 16:50	Posterior Cervical Spine Decompression and Fixation in Lower Cervical Spine Injuries - Dr. H.S. Chhabra, Addl. Medical Director, ISIC, New Delhi	16:00 – 17:00	Hands on Workshop 3

**Pre-Conference Workshop on
"Advanced Course on Management of Neurogenic Bladder"
Venue: Conference Hall, Indian Spinal Injuries Centre**

**Date: 2nd March 2006
Time: 9:00 a.m. – 17:00 hrs**

	Chairpersons:		
	- Prof. Inder Perkash, Professor Urology, P.V.A. Professor Spinal Cord Injuries and Professor PM&R, Stanford and Director Spinal Cord Injuries Center, Palo Alto V.A. Health Care System, USA		11:30 – 11:55 Newer drugs in management of Neurogenic bladder
9:00 – 9:15	- Prof. Dr. med. Manfred Stohrer, Urologist, Germany		- Prof. Inder Perkash, Professor Urology, P.V.A. Professor Spinal Cord Injuries and Professor PM&R, Stanford and Director Spinal Cord Injuries Center, Palo Alto V.A. Health Care System, USA
	Anatomy and Physiology of normal and spinal cord injured urinary system		11:55 – 12:15 Indications and protocol for indwelling catheterization as a long-term modality for management of Neurogenic bladder
	- Dr. Atul Bhatnagar, Urologist, Mata Chanan Devi Hospital, New Delhi		- Dr. Dinesh Suman, Consultant Urologist, ISIC, New Delhi
9:15 – 9:40	General overview of Principles of management of Neurogenic Bladder	12:15 – 12:40	Role of Botox therapy in the management of Neurogenic bladder
	- Dr. Vinod Sahgal, Chairman, Department of Rehabilitation Medicine, The Cleveland Clinic Foundation, UK		Prof. Dr. med. Manfred Stohrer, Urologist, Germany
9:40 – 10:00	Management of Neurogenic bladder in spinal shock	12:40 – 13:00	Discussion
	- Mr. W S El Masry, Secretary, International Spinal Cord Society (ISCOs), Director, Midlands Centre for Spinal Injuries, UK	13:00 – 14:00	Lunch
10:00 – 10:20	Urodynamic evaluation		Chairpersons:
	- Mr. Gurpreet Singh, Urologist, UK		- Mr. Gurpreet Singh, Urologist, UK
10:20 – 10:40	Importance of specific tests like bed side ice water test, Bethanechol Hydrochloride test, electrosensation etc. in management of Neurogenic bladder	14:00 – 14:20	Indications for surgery in management of Neurogenic bladder
	- Dr. Jean Jacques Wyndaele, Chairman, Education Committee – ISCoS, Professor of Urology, Rehabilitation Doctor, Belgium		- Dr. N.P. Gupta, Head, Deptt. Of Urology, AIIMS, New Delhi
10:40 – 11:00	Discussion	14:20 – 14:50	General overview of surgical management of Neurogenic bladder (20 minutes)
11:00 – 11:30	Tea Break		- Dr. S.N. Wadhwa, Urologist, Sir Ganga Ram Hospital, New Delhi
	Chairpersons:	14:50 – 15:00	Discussion
	- Dr. Jean Jacques Wyndaele, Mr. WS El Masry	15:00 – 15:30	Panel discussion – challenges in management of Neurogenic bladder in developing countries
		15:30 – 16:00	Tea Break
		16:00 – 17:00	Workshop on Urodynamics / Case Discussions

Layout Session - ISSICON - 2006

Day 1 - Friday, 3rd March 2006

Time	Hall A	Hall B
8:00 - 9:25	I - Anticoagulants And Methylprednisolone In Sci Management	
9:25 - 10:30	II - Acute Management of SCI	III - Craniovertebral And Upper Cervical Disorders
10:30 - 10:50	Break	
10:50 - 12:45	IV - Debate - Conservative Vs Surgical Management Of Spinal Cord Injuries	
12:45 - 13:30	Inauguration Ceremony	
13:30 - 14:15	Break	
14:15 - 16:15	V - Bladder Management	VI - Degenerative Lumbar Spine Disease
16:15 - 16:35	Break	
16:35 - 18:30	VII - Clinical Trials (16:35 - 17:25) VIII - Cellular Therapies (17:25 - 18:30)	IX - Cervical Protrapse Intervertebral Disc And Cervical Degenerative Diseases

Day 2 - Saturday, 4th March 2006

Time	Hall A	Hall B
8:00 - 10:00	X - Plenary Session - Spinal Trauma	
10:00 - 10:30	XI - Spinal Cord Society Oration	
10:30 - 11:00	Break	
11:00 - 13:05	XII - SCS Gold Medal Award For Best Paper Presenters In Surgical Management Of Spinal Ailments	XIII - SCS Gold Medal Award For Best Paper Presenters In Rehabilitation Management Of Spinal Ailments
13:05 - 14:00	Break	
14:00 - 15:00	XIV - Brachial Plexus Injury (14:00 - 14:20) XV - Electrophysiology (14:20 - 15:00)	XVI - Human Resource Development In The Field Of Spinal Injuries In India
15:00 - 16:00	XVII - Surgical Management of Spinal Cord Injuries	XVIII - Prevention of SCI In Developing Countries

16:00 - 16:20	Break	
16:20 - 18:00	XX - Dilemmas In Minimally Invasive Spine Surgery	XXI - Conservative And Rehabilitation Management of Spinal Cord Injury
18:00 - 19:00	5th General Body Meeting of Spinal Cord Society	

Day 3 - Sunday, 5th March 2006

Time	Hall A	Hall B
8:00 - 9:40	XXII - SCS Gold Medal Award For Best Poster Presenters In Rehabilitation Management Of Spinal Ailments (8:00 - 9:20) XXIII - Free Paper Session - Rehabilitation Management Of Spinal Ailments (8:48 - 9:40)	XXIV - Free Paper Session - Surgical Management Of Spinal Ailments (8:00 - 8:48) XXV - SCS Gold Medal Award For Best Poster Presenters In Surgical Management Of Spinal Ailments (8:48 - 9:40)
9:40 - 10:30	XXVI - Best Published Paper Award Session	
10:30 - 11:00	Break	
11:00 - 12:00	XXVII - Plenary Session - Back Pain & Protrapse intervertebral Disc	
12:00 - 13:00	XXVIII - Plenary Session - Pott's Spine	
13:00 - 14:00	Break	
14:00 - 15:00	XXIX - Dilemmas In Psychosocial Rehabilitation	XXX - Dilemmas In Deformity Management
15:00 - 16:00	XXXI - Assistive Technology, Wheelchairs & Reintegration of SCI Into Community	
16:00 - 16:20	Break	
16:20 - 17:45	XXXII - Dilemmas In Management Of Associated Complications In Spinal Cord Injury	XXXIII - Spinal Tumors (16:20 - 16:45) XXXIV - Osteoporosis (16:45 - 17:45)
17:45 - 18:00	Closing Ceremony	

SCIENTIFIC PROGRAMME OF INTERNATIONAL SPINE & SPINAL INJURIES CONFERENCE (ISSICON – 2006)

Venue: HOTEL THE ASHOK, New Delhi

Dates: 3rd to 5th March 2006

Friday, 3rd March 2006

7:00 – 7:55 REGISTRATION

7:55 – 8:00 WELCOME ADDRESS

Session – I

HALL A

8:00 – 9:25 PLENARY SESSION ANTICOAGULANTS & METHYLPREDISOLONE IN SCI MANAGEMENT

Chairpersons –
Dr. John F. Ditunno, Professor of Rehabilitation Medicine, Jefferson Medical College, USA

Dr. (Capt.) Dilip Sinha, Assistant Professor of Orthopaedics, Patna Medical College Hospital, Patna

8:00 – 8:15 ROLE OF ANTICOAGULANTS IN SCI PATIENTS

- Dr. (Mrs.) Arundhati Perkash, Staff Clinical Pathologist, Stanford University, USA

8:15 – 8:25

8:25 – 8:35 DEBATE - ANTICOAGULANT PROPHYLAXIS SHOULD BE GIVEN TO ALL PATIENTS WITH SPINAL CORD INJURY IN INDIA

For – Dr. Harsh Jain, Neurosurgeon, Apollo Hospital, Calcutta

Against – Dr. Navnendra Mathur, Head of Deptt. of Physical Medicine and Rehabilitation, SMS Medical College & Hospital, Jaipur

8:35 – 8:45

8:45 – 9:00

9:00 – 9:15

DEBATE - METHYLPREDNISOLONE SHOULD BE USED IN ALL PATIENTS OF ACUTE SPINAL CORD INJURIES REACHING THE HOSPITAL WITHIN THE STIPULATED TIME

- For – Dr. Alok Sharma, Head, Deptt. of Neurosurgery, SION Hospital, Mumbai

- Against – Dr. Wee Fu Tan, Mediscdh Centrum Alkmaar, Deptt. Neurosurgery, Netherlands

9:15 – 9:25

DISCUSSION

Session – II

HALL A

9:25 – 10:30 ACUTE MANAGEMENT OF SCI

Chairpersons –

- Dr. Anbananden Soopramanien, Consultant in Spinal Injuries and Rehabilitation Medicine, Salisbury, UK

- Dr. Navnendra Mathur, Head of Deptt. of Physical Medicine and Rehabilitation, SMS Medical College & Hospital, Jaipur

9:25 – 9:40

CONTROVERSIES RELATED TO IMMOBILISATION OF SPINE WITH ORTHOSIS AND GADGETS IN ACUTE SPINAL CORD INJURIES

- Dr. Amit Bhandi, Prosthetist & Orthotist, University of Illinois College of Medicine, USA

9:40 – 9:50

SAFETY OF ORAL INTUBATION IN THE CONTEXT OF CERVICAL SPINE INJURY

- Dr. Balraj Singhal, Stoke Mandeville Hospital, UK

9:50 – 10:05

CONTROVERSIES IN IMAGING IN SPINAL INJURIES

- Dr. T.B.S. Buxi, Department of Radiology, Sir Ganga Ram Hospital, New Delhi

10:05 – 10:20

DILEMMAS IN USE OF OUTCOME MEASURES IN SCI PATIENTS

- Dr. S.L. Yadav, Physiatrist, AIIMS, New Delhi

10:20 – 10:30 DISCUSSION

Session – III

HALL B

9:25 – 10:30 CRANIOVERTEBRAL AND UPPER CERVICAL DISORDERS

Chairpersons –

- Dr. Wee Fu Tan, Mediscdh Centrum Alkmaar, Deptt. Neurosurgery, Netherlands

- Dr. A.K. Singh, Neurosurgeon, Fortis Hospital, NOIDA

9:25 – 9:35

CONTROVERSIES IN MANAGEMENT OF ATLANTOAXIAL INSTABILITY

- Dr. Sharad Shashank Kale, Professor, Department of Neurosurgery, AIIMS, New Delhi

9:35 – 9:45

TRANSORAL DECOMPRESSION FOR CRANIOVERTEBRAL OSSEOUS ANOMALIES - PERIOPERATIVE MANAGEMENT DILEMMAS

- Dr. A.K. Singh, Neurosurgeon, Fortis Hospital, NOIDA

9:45 – 9:57

CONTROVERSIES IN MANAGEMENT OF ODONTOID FRACTURES

- Dr. Edward Benzel, President, World Spine Society, Cleveland Clinic Spine Institute, USA

9:57 – 10:09

DILEMMAS IN MANAGEMENT OF RHEUMATOID ARTHRITIS OF CERVICAL SPINE

- Dr. Eva Maria Buchholz, Neurosurgeon, Department of Neuro-Orthopaedics, Germany

10:09 – 10:18

HANGMAN'S FRACTURE – DOES IT NEED TO BE SCREWED?

- Dr. Kishore Kumar M., Senior Registrar, Muscat, Oman

10:18 – 10:30

DISCUSSION

10:30 – 10:50

B R E A K

Session – IV

HALL A

10:50 – 12:45 PLENARY SESSION - Debate - Conservative Vs Surgical Management of Spinal Cord Injuries

Chairpersons –

- Dr. A.K. Mukherjee, Director General, ISIC, New Delhi

Moderator –

- Dr. H. S. Chhabra, Chief of Spine Service, ISIC, New Delhi

10:50 – 11:15

PRESENTATION IN FAVOUR OF SURGICAL MANAGEMENT

- Dr. Edward Benzel, President, World Spine Society, Cleveland Clinic Spine Institute, USA

11:15 – 11:40

PRESENTATION IN FAVOUR OF CONSERVATIVE MANAGEMENT

- Mr. WS El Masry - Secretary, International Spinal Cord Society (ISCoS), Director, Midlands Centre for Spinal Injuries, UK

11:40 – 11:55

PRESENTATION IN FAVOUR OF SURGICAL MANAGEMENT IN INDIAN SCENARIO

- Dr. V. T. Ingalkar, Consultant & Surgeon for Spinal Affections, Thane, Maharashtra

11:55 – 12:10

PRESENTATION IN FAVOUR OF CONSERVATIVE MANAGEMENT IN INDIAN SCENARIO

- Prof. U. Singh, Professor & Head, Deptt of PMR, AIIMS, New Delhi
- 12:10 – 12:14 CONSENSUS STATEMENT OF EARLIER DEBATE BETWEEN Mr. WS El Masry and Dr. Patrick Kluger
 - Dr. Patrick Kluger, Chief Spine Surgeon, Stroke Mandeville Hospital, UK
- 12:14 – 12:24 QUESTIONS FROM THE AUDIENCE
- 12:24 – 12:26 REBUTTAL BY Dr. Edward Benzel, President, World Spine Society, Cleveland Clinic Spine Institute, USA
- 12:26 – 12:28 REBUTTAL BY Mr. WS El Masry, Secretary, International Spinal Cord Society (ISCoS), Director, Midlands Centre for Spinal Injuries, UK
- 12:28 – 12:30 REBUTTAL BY Dr. V. T. Ingalthalikar, Consultant & Surgeon for Spinal Affections, Thane, Maharashtra
- 12:30 – 12:32 REBUTTAL BY Prof. U. Singh, Professor & Head, Deptt of PMR, AIIMS, New Delhi
- 12:32 – 12:45 Panel Discussion -
 - Dr. Edward Benzel
 - Mr. WS El Masry
 - Prof. U. Singh
 - Dr. V. T. Ingalthalikar
 - Dr. Patrick Kluger
 - Dr. Jean Jacques Wyndaele, Chairman, Education Committee – ISCoS, Professor of Urology, Belgium
 - Dr. John F. Ditunno, Professor of Rehabilitation Medicine, Jefferson Medical College, USA
 - Dr. Ashwani Sharan, Department of Neurosurgery, Thomas Jefferson University, USA
 - Dr. Arvind Jayaswal, Professor of Orthopaedics, AIIMS, New Delhi
 - Dr. H N Bajaj, Sr. Consultant & Spine Surgeon, ISIC, New Delhi
 - Dr. Wee Fu Tan, Department of Neurosurgery, Mediscdh Centrum Alkmaar, Netherlands

HALL A

- 12:45 – 13:30 INAUGURATION CEREMONY
- 13:30 – 14:15 B R E A K

Session – V

HALL A

- 14:15 – 16:15 BLADDER MANAGEMENT
Chairpersons –
 - Dr. Jean Jacques Wyndaele, Chairman, Education Committee – ISCoS, Professor of Urology, Belgium
 - Prof. Inder Perkash, Professor Urology, P.V.A. Professor Spinal Cord Injuries and Professor P.M&R, Stanford and Director Spinal Cord Injuries Center, Palo Alto V.A. Health Care System, USA
- 14:15 – 14:25 CONTROVERSIES IN MANAGEMENT OF NEUROGENIC BLADDER DURING SPINAL SHOCK
 - Dr. Vinod Sahgal, Chairman, Deptt. of PMR, the Cleveland Clinical Foundation, USA
- 14:25 – 14:37 DILEMMAS IN EVALUATION OF NEUROGENIC BLADDER
 - Prof. Jean Jacques Wyndaele, Chairman, Education Committee – ISCoS, Professor of Urology, Belgium
- 14:37 – 14:49 DILEMMAS IN MANAGEMENT OF NEUROGENIC BLADDER AFTER SPINAL SHOCK
 - Dr. S.N. Wadhwa, Urologist, Sir Ganga Ram Hospital, New Delhi
- 14:49 – 15:01 CAN WE CUT THE TREATMENT NEEDS OF THE SCI BLADDER TO THE PATIENT NEEDS
 - Mr. Gurpreet Singh, Urologist, UK
- 15:01 – 15:11 DILEMMAS IN MANAGEMENT OF NEUROGENIC BLADDER IN DEVELOPING COUNTRIES
 - Dr. N.P. Gupta, Head-Deptt. Of Urology, AIIMS, New Delhi
- 15:11 – 15:23 CONTROVERSIES IN THE ROLE OF BOTOX IN MANAGEMENT OF NEUROGENIC BLADDER

- 15:23 – 15:35 CONTROVERSIES IN MANAGEMENT OF CONTRACTED BLADDER
 - Prof. Dr. med. Manfred Stohrer, Urologist, Germany
 - Dr. Rajeev Sood, Urologist, Dr. Ram Manohar Lohia Hospital, New Delhi
- 15:35 – 15:45 PSYCHOSOCIAL CONSIDERATIONS IN MANAGEMENT OF SEXUALITY AND FERTILITY
 - Dr. Stanley Ducharme, Andrologist, Spinal Injuries Centre, Boston, USA
- 15:45 – 15:55 CONTROVERSIES IN SEXUALITY AND FERTILITY MANAGEMENT OF SCI
 - Mr. Sanjeev Sharma, Chairman, Specialist Training Committee, Liverpool, UK
- 15:55 – 16:15 DISCUSSION

Session – VI

HALL B

- 14:15 – 16:15 DEGENERATIVE LUMBAR SPINE DISEASE
Chairpersons –
 - Dr. William Sears, Neurosurgeon, North Shore Hospital, Sydney, Australia
 - Dr. Rajender Prasad, Neurosurgeon, Apollo Hospital, New Delhi
- 14:15 – 14:30 CONTROVERSIES IN BIO MECHANICS OF SURGICAL MANAGEMENT OF LUMBAR SEGMENTAL INSTABILITY
 - Dr. Avinash G. Patwardhan, Department of Orthopaedic Surgery and Rehabilitation, Loyola University Stritch School of Medicine, USA Loyola University Stritch School of Medicine
- 14:30 – 14:42 DILEMMAS IN CHOOSING AN APPROPRIATE KIND OF BONE GRAFT / BONE SUBSTITUTE FOR SPINAL FUSION
 - Dr. K.V. Menon, Consultant & Head, Orthopaedics & Spine Surgery,
- 14:42 – 14:54 DILEMMAS IN MANAGEMENT OF DEGENERATIVE SPONDYLOLYSTHESIS
 - Dr. Sajan Hegde, Consultant Orthopaedic Surgeon, Apollo Hospital, Chennai
- 14:54 – 15:06 DILEMMAS IN INDICATIONS FOR SURGERY, INDICATIONS OF FUSION AND EXTENT OF FUSION IN DEGENERATIVE SCOLIOSIS
 - Dr. Saumyajit Basu, Spine Surgeon, Park Clinic & Kothari Medical Center, Kolkata
- 15:06 – 15:18 DILEMMAS IN Management of LUMBAR CANAL STENOSIS
 - Dr. Shankar Acharya, Consultant Spine Surgeon, Sir Ganga Ram Hospital, New Delhi
- 15:18 – 15:30 ROLE OF EPIDURAL STEROIDS IN RELIEVING LEG PAIN IN LUMBAR CANAL STENOSIS
 - Dr. V. T. Ingalthalikar, Consultant & Surgeon for Spinal Affections, Thane, Maharashtra
- 15:30 – 15:42 TOTAL LUMBAR DISC PROSTHESIS - IS IT A BETTER OPTION THAN FUSION
 - Prof. Mohamed Ahmad Maziad, Faculty of Medicine, Ain Shams University, Cairo, Egypt
- 15:42 – 15:54 DILEMMAS IN LUMBOSACRAL FIXATION
 - Dr. Julio Gallego, Group Director, Spinal Surgeon – Memphis, USA
- 15:54 – 16:15 DISCUSSION
- 16:15 – 16:35 BREAK

Session – VII

HALL - A

- 16:35 – 17:25 CLINICAL TRIALS
Chairpersons :
 - W S El Masry, Secretary, International Spinal Cord Society (ISCoS), Director, Midlands Centre for Spinal Injuries, UK

- Dr. Jean Jacques Wyndaele, Chairman, Education Committee – ISCoS, Professor of Urology, Belgium
- 16:35 – 16:55 OUTCOME MEASURES IN SCI TRIALS
 - John F. Ditunno, Professor of Rehabilitation Medicine, Jefferson Medical College, USA
- 16:55 – 17:15 GUIDELINES FOR VALID SCI CLINICAL TRIALS
 - Dr. John Steeves, Professor and Director of ICORD, Professor of Zoology, Anatomy, and Surgery, University of British Columbia and Vancouver Hospital, Canada
- 17:15 – 17:25 Discussion

Session – VIII

HALL - A

- 17:25 – 18:30 CELLULAR THERAPIES
Chairpersons: -
- Dr. John Steeves, Professor and Director of ICORD, Professor of Zoology, Anatomy, and Surgery, University of British Columbia and Vancouver Hospital, Canada
 - Dr. Sarjit Singh, Neurologist, West Virginia, USA
 - 17:25 – 17:40 DILEMMAS IN CELLULAR THERAPY IN LESIONED SPINAL CORD
 - Prof. Alfredo Gorio, Professor of Pharmacology, Director, Clinical Pharmacology IRCCS Humanities, University of Milan, Italy
 - 17:40 – 17:55 SPINAL CORD INJURY REPAIR – Are we ready for human trials?
 - Dr. Erkan Kaptanoglu, Associate Professor, Department of Neurosurgery, Ankara Numune Education and Training Hospital, Ankara, Turkey
 - 17:55 – 18:05 SPINAL CORD INJURY REPAIR - BY TRANSPLANTATION OF OLFACTORY ENSHEATHING CELLS: IMMINENT OR ALREADY HERE?
 - Dr. Suman Ramesh, Clinical Research Associate, ISIC, New Delhi
 - 18:05 – 18:20 SPINAL CORD REPAIR – BIOINFOMATICS BEHIND EVOLUTION
 - Prof. Dajue Wang, China
 - 18:20 – 18:30 Discussion

Session – IX

HALL – B

- 16:35 – 18:30 CERVICAL PROLAPSE INTERVERTEBRAL DISC AND CERVICAL DEGENERATIVE DISEASES
Chairpersons –
- Dr. Eva Maria Buchholz, Neurosurgeon, Germany
 - Prof. Mohamed Ahmad Maziad, Faculty of Medicine, Ain Shams University, Cairo, Egypt
 - 16:35 – 17:15 SURGICAL PROCEDURES OF CHOICE FOR CERVICAL MYELOPATHY
 - 16:35 – 16:47 LAMINECTOMY – WITH LATERAL MASS FIXATION
 - Dr. Raj Bahadur, Head of Unit, Deptt. of Orthopaedics, PGI, Chandigarh
 - 16:47 – 16:59 LAMINOPLASTY
 - Dr. Ajay Bhutani, Neurosurgeon, Sir Ganga Ram Hospital, New Delhi
 - 16:59 – 17:11 ANTERIOR DECOMPRESSION
 - Dr. V.K. Rajoria, Consultant Neurosurgeon, ISIC, New Delhi
 - 17:11 – 17:25 DISCUSSION
 - 17:25 – 18:30 SURGICAL PROCEDURE OF CHOICE FOR CERVICAL PROLAPSE INTERVERTEBRAL DISC
 - 17:25 – 17:35 ANTERIOR ROUTINE DISCECTOMY / MINIMALLY INVASIVE ANTERIOR DISCECTOMY
 - Dr. K. Das, Consultant Orthopaedic Surgeon, ISIC, New Delhi

- 17:35 – 17:45 POSTERIOR FORAMINOTOMY
 - Dr. V. K. Rajoria, Consultant Neurosurgeon, ISIC, New Delhi
- 17:45 – 17:55 DISCECTOMY WITH FUSION
 - Dr. Satish Rudrappa, Consultant Neurosurgeon, White House Clinic, Bangalore
- 17:55 – 18:05 DISCECTOMY WITH FUSION WITH INSTRUMENTATION
 - Dr. Rajendra Prasad, Neurosurgeon, Apollo Hospital, New Delhi
- 18:05 – 18:15 CERVICAL DISC REPLACEMENT
 - Col P.K. Sahoo, Neurosurgeon, Command Hospital, Pune
- 18:15 – 18:30 DISCUSSION

Saturday, 4th March 2006

Session – X

HALL – A

- 8:00 – 10:00 PLENARY SESSION – SPINAL TRAUMA
Chairpersons –
- Dr. Edward Benzel, President, World Spine Society, Cleveland Clinic Spine Institute, USA
 - Dr. Suranjan Bhattacharji, Physiatrist, Christian Medical College, Vellore
 - 08:00 – 08:12 WHEN TO MOBILIZE SPINAL INJURY PATIENTS TREATED CONSERVATIVELY.
 - Dr. Anbananden Soopramanien, Consultant in Spinal Injuries and Rehabilitation Medicine, Salisbury, UK
 - 08:12 – 08:27 METABOLIC MANAGEMENT OF SPINAL CORD INJURIES
 - Prof. Inder Parkash, Professor Urology, P.V.A. Professor Spinal Cord Injuries and Professor PM&R, Stanford And Director Spinal Cord Injuries Center, Palo Alto V.A. Health Care System, USA
 - 08:27 – 08:39 DILEMMAS IN CHOOSING THE IMPLANT FOR FIXATION IN SPINAL INJURED PATIENTS IN A DEVELOPING COUNTRY
 - Dr. Ziad Al-Zoubi, Consultant Orthopaedics & Spine Surgery, General Secretary, PAN Arab Spine Society, Jordan
 - 08:39 – 08:51 IS MORE EXPENSIVE AND TECHNOLOGICALLY ADVANCED INSTRUMENTATION NECESSARILY BETTER ESPECIALLY WHEN IT COMES TO CATERING TO NEEDS OF DEVELOPING COUNTRIES?
 - Dr. Fazlul Haque, Consultant Orthopaedic Surgeon, CRP, Bangladesh
 - 08:51 – 09:06 TIMING OF SURGERY IN SCI
 - Dr. P.S. Ramani, Senior Consultant, Neuro & Spine Surgeon, Lilavati Hospital & Research Centre, Mumbai
 - 09:06 – 09:18 MISCONCEPTIONS IN SEXUALITY IN SPINAL CORD INJURED
 - Prof. Jean Jacques Wyndaele, Chairman, Education Committee – ISCoS, Professor of Urology, Belgium
 - 09:18 – 09:30 REGENERATIVE REHABILITATION
 - Dr. Clifford E. Brubaker, Professor And Dean, School of Health and Rehabilitation Sciences, University of Pittsburgh, USA
 - 09:30 – 09:42 MAPPING OF TRAUMA INCLUDING SPINAL INJURY LOCALLY AND GLOBALLY
 - Dr. A K Mukherjee, Director General, ISIC, New Delhi
 - 09:42 – 10:00 DISCUSSION

Session – XI

HALL A

- 10:00 – 10:30 SPINAL CORD SOCIETY ORATION
Chairperson –
- Dr. A. K. Mukherjee, Director General, ISIC, New Delhi

Moderator –	- Dr. H.S. Chhabra, Chief of Spine Service, ISIC, New Delhi	11:36 - 11:42	TUBERCULOSIS OF THE CRANIO-VERTEBRAL JUNCTION: IS SURGERY NECESSARY?
10:00 – 10:03	INTRODUCTION OF Dr. PATRICK KLUGER - Chief Spine Surgeon, Stoke Mandeville Hospital, UK		- Dr. Sandeep Mohindra, Dr. S.K. Gupta, Dr. B.S. Charma, Dr. Rahul Gupta, Dr. K.K. Mukherjee, R. Chhabra, Dr. V.K. Khosla, Department of Neurosurgery, Post Graduate Institute of Medical Education & Research, Chandigarh
10:03 – 10:28	SPINAL CORD SOCIETY ORATION "SIR LUDWIG GUTTMANN'S PHILOSOPHY OF COMPREHENSIVE CARE FOR THE SPINAL CORD PERSON – IS IT STILL VALID TODAY?"	11:42 - 11:48	TRANSTHORACIC TRANSPLEURAL DECOMPRESSION OF TUBERCULAR DORSAL SPINE – COMPARISON OF OPEN AND THORACOSCOPIC PROCEDURES
	- Dr. Patrick Kluger, Chief Spine Surgeon, Stoke Mandeville Hospital, UK		- Dr. Brijesh Kumar Jain, Dr. Sudhir K. Kapoor, Department of Orthopaedics, Maulana Azad Medical College and Associated Lok Nayak Hospital, New Delhi, New Delhi.
10:28 – 10:30	PRESENTATION OF SPINAL CORD SOCIETY ORATION MOMENTO	11:48 - 11:54	SPINAL TUBERCULOSIS WITH CONCOMITANT SPONDYLOLYSTHESIS CO-EXISTING ENTITIES OR "CAUSE AND EFFECT"
10:30 – 11:00	BREAK		- Dr. Manish Chadha, Lecturer, UCMS & GTB Hospital, New Delhi
Session – XII			
HALL – A			
11:00 – 13:00	SCS GOLD MEDAL AWARD FOR BEST PAPER PRESENTERS in "Surgical Management of Spinal Ailments"	11:54 - 12:00	OSSIFICATION OF LIGAMENTUM FLAVUM IN DORSAL SPINE
Chairpersons –	- Dr. V. T. Ingalthalikar, Consultant & Surgeon for Spinal Affections, Thane, Maharashtra - Dr. Patrick Kluger, Chief Spine Surgeon, Stoke Mandeville Hospital, UK	12:00 - 12:06	POSTERIOR CONVEX WEDGE RESECTION IN THE MANAGEMENT OF ADVANCED CONGENITAL SCOLIOSIS DUE TO HEMIVERTEBRA
Judges –	- Dr. Edward Benzel, President, World Spine Society, Cleveland Clinic Spine Institute, USA - Dr. Wee Fu Tan, Mediscdh Centrum Alkmaar, Deptt. Neurosurgery, Netherlands - Prof. Mohammad Ahmad Maziad, Faculty of Medicine, Ain Shams University, Cairo, Egypt - Dr. William Sears, Neurosurgeon, North Shore Hospital, Sydney, Australia - Dr. Arvind Jayaswal, Professor of Orthopaedics, AIIMS, New Delhi - Dr. Sajan Hegde, Consultant Orthopaedic Surgeon, Apollo Hospital, Chennai - Dr. Eva Maria Buchholz, Neurosurgeon, Department of Neuro-Orthopaedics, Germany	12:06 - 12:18	DISCUSSION
10:50 - 10:56	DELAYED PRESENTATION AND DIAGNOSIS OF CERVICAL SPINE FRACTURES IN PATIENTS WITH LONGSTANDING ANKYLOSING SPONDYLITIS	12:18 - 12:24	Have Cranio-Vertebral Junction Anomalies Been Overlooked as a Cause of Vertebro-basilar Insufficiency?
	- Dr. George Joseph, Dr. M.V. Jigajinni, Dr. R.A. Johnston, Dr. D.B. Allan and Dr. A.N. Mcleam, Orthopaedics, Queen Elizabeth National Spinal Injury Unit, UK		- Dr. Deepak Agarwal, Department of Neurosurgery, AIIMS, New Delhi
10:56 - 11:02	COMPUTER ASSISTED PEDICLE SCREW FIXATION: CLINICAL EXPERIENCE WITH A NEWLY DEVELOPED SOFTWARE	12:24 - 12:30	PEDICLE MORPHOMETRY IN ADOLESCENT IDIOPATHIC SCOLIOSIS AS COMPARED TO UNDEFORMED SPINE
	- Prof. P.S. John, Medical College, Kottayam, Kerala		- Dr. B N Upendra, Dr. Meena Devkant, Dr. Abrar Ahmed, Dr. Buddhadev Choudhary, Dr. Sanjay Sharma, Prof. Arvind Jayaswal, AIIMS, New Delhi
11:02 - 11:08	ASSESSMENT OF PEDICULAR SCREW PLACEMENT – CT BASED EVALUATION OF 741 SCREWS	12:30 - 12:36	OUTCOME OF PULMONARY FUNCTION IN SCOLIOSIS PATIENTS UNDERGOING SURGICAL CORRECTION
	- Mallinath G, Devkant Meena, B.N. Upendra, Abrar Ahmed, BD Choudhary, Prof. A. Jayaswal, AIIMS, New Delhi		- Dr. Ajay Kumar, Dr. Mallinath G., Dr. B.N. Upendra, Dr. Buddhadev Chowdhury, Prof. A. Jayaswal, Dept of Orthopaedics, AIIMS, New Delhi
11:08 - 11:14	COMBINED THORACO-ABDOMINAL APPROACH FOR LOWER DORSAL AND UPPER LUMBAR SPINE FRACTURES	12:36 - 12:42	EFFECTIVENESS OF ANTERIOR DECOMPRESSION AND FUSION IN RELIEVING SYMPTOMS IN CERVICAL MYELOPATHY
	- Dr. Anil Pande, Neurosurgeon, Chennai		- Dr. Sanjeev Divyadarshi, Dr. K. Das, Dr. H.S. Chhabra, ISIC, New Delhi
11:14 - 11:20	Outcome based study of anterior column reconstruction and instrumentation in burst fractures of thoraco-lumbar region	12:42 - 12:48	Early experience with bryan disc arthroplasty
	- Dr. Anil Joshi, Prasoon Shamsbery, B.H. Mahesh, Upendra, Dr. B.D. Chowdhury, Prof. Arvind Jayaswal, AIIMS, New Delhi		- Dr. Vishal Nigam, Dr. Sanjeev Divyadarshi, Dr. K. Das, Dr. H.S. Chhabra, ISIC, New Delhi
11:20 - 11:30	DISCUSSION	12:48 - 12:54	Percutaneous Vertebroplasty – Early review of 44 Cases
11:30 - 11:36	SPINAL HYDATID DISEASE : A CASE SERIES		- Dr. Rupinder Chahal, Consultant Orthopaedics, Sir Ganaga Ram Hospital, New Delhi
		12:54 - 13:06	DISCUSSION
Session – XIII			
HALL – B			
11:00 – 13:00	SCS GOLD MEDAL AWARD FOR PAPER PRESENTERS IN REHABILITATION MANAGEMENT OF SPINAL AILMENTS		
Chairpersons –	- Dr. Jean Jacques Wyndaele, Chairman, Education Committee – ISCoS, Professor of Urology, Belgium - Dr. U. Singh, Professor & Head, Deptt of PMR, AIIMS, New Delhi		
Judges –			

	- Dr. John F. Ditunno, Professor of Rehabilitation Medicine, Jefferson Medical College, USA		PARAPLEGIA – A TESTED MODULAR FIXATION CONCEPT
	- Dr. Vinod Sahgal, Chairman, Department of Rehabilitation Medicine, The Cleveland Clinic Foundation, UK		- Peter Jung, Swiss Paraplegic Centre Notwill, Switzerland
	- Dr. Stanley Ducharme, Andrologist, Spinal Injuries Centre, Boston, USA	12:16 – 12:22	EFFECTIVENESS OF SURFACE SPINAL CORD STIMULATION IN COMBINATION WITH (AGONIST + ANTAGONIST) FOR REDUCTION OF TONE IN SPASTIC MUSCLES (PLANTARFLEXORS)
	- Prof. Inder Perkash, Professor Urology, P.V.A. Professor Spinal Cord Injuries and Professor PM&R Stanford And Director Spinal Cord Injuries Center Palo Alto V.A. Health Care System, USA		- Jaspreet Kaur, A. Arumugan, Narkeesh, Teena Gupta, sardar Bhagwan Singh Post Graduate Institute of Bio Medical Sciences & Research, Balawala, Dehradun
	- Dr. Navnendra Mathur, Deptl. of Physical Medicine and Rehabilitation, SMS Medical College & Hospital, Jaipur	12:22 – 12:28	SURGICAL MANAGEMENT OF PRESSURE ULCERS IN NEUROLOGICAL REHABILITATION SETUP
	- Dr. H.C. Goyal, Head Deptl. Of PMR, Safdurjung Hospital, New Delhi		- Abhishek Srivastava, VIMHANS, Bangalore
10:50 - 10:56	SPINAL INJURIES AND ITS EARLY REHABILITATION DURING NATIONAL DISASTERS	12:28 – 12:34	SPASTICITY IN SPINAL CORD INJURY
	- Dr. Sanjay Keshkar, Dr. A. Equal, Dr. Ratnesh Kumar, National Institute for Orthopaedically Handicapped (NIOH), KOLKATA		- Dr. Shweta Bhandari, SMS Medical Hospital, Jaipur
10:56 - 11:02	METABOLIC CHANGES IN CERVICAL SPINAL CORD INJURY PATIENTS	12:34 – 12:40	HOPE HOSPITAL – AN EXPERIMENT
	- Dr. Ravi Kr. Khandeival, Patna Medical College, Patna		- Dr. (Capt.) Dilip Sinha, Asst Prof. Orthopaedics, Patna Medical College Hospital, Patna
11:02 - 11:08	PRO MEASURES FOR SCI PATIENTS IN INDIAN POPULATION : A COMPARATIVE STUDY	12:40 – 12:46	ROLE OF NEUROTRANSMITTERS IN NEURONAL REGENERATION FOLLOWING SCI – A NEW HOPE
	- Ilanagai Anbarasan, Dr. H.S. Chhabra, Dr. Raghavendra S. Dr. Suman Kishore, ISIC, New Delhi		- Prof. P. S. John, Medical College, Kottayam, Kerala
11:08 – 11:14	WHEN TO MOBILIZE A SPINAL CORD INJURED PATIENT	12:46 - 12:52	ATORVASTATIN MEDIATED NEUROPROTECTION IN SCI
	- Dr. Sudeep Kumar, Dr. (Capt.) D.K. Sinha, Patna Medical College, Patna		- Dr. Ravinder Pannu, Medical University of South Carolina, USA
11:14 – 11:20	EFFECT OF CYCLE ERGOMETER ON GAIT OF INDIVIDUALS WITH SPASTIC PARAPLEGIA	12:52 - 13:05	DISCUSSION
	- Meenakshi Singh, Arora Megha, MPT Student, ISIC, New Delhi	13:05 – 14:00	BREAK
11:20 – 11:30	DISCUSSION	SESSION – XIV	
11:30 – 11:36	TREADMILL TRAINING IN SPINAL CORD INJURED PATIENTS – A NOVEL APPROACH	HALL A	
	- D. Shanmugapriya, Mr. Deepak Kumar Nair, Sri Ramachandra Medical College, Chennai	14:00 - 14:20	BRACHIAL PLEXUS INJURIES
11:36 – 11:42	TO INVESTIGATE IF THERE EXISTS A CORRELATION BETWEEN STANDING BALANCE AND SPEED OF WALKING IN PATIENTS WITH PARAPLEGIA	Chairpersons –	
	- Andrew Babu, Edwin Jepsa Joe, Aejaz Sharief, Asha Susan Thomas, Physical Medicine and Rehabilitation, Christian Medicia College, Vellore		- Dr. Sarjit Singh, Neurologist, West Virginia, USA
11:42 – 11:48	RELAXANT EFFECT OF NICORNADIL ON THE CONTRACTILITY OF ISOLATED HUMAN URINARY BLADDER		- Dr. Manvir Bhatia, Sr. Consultant Neurology, Chairperson Sleep Medicine, Sir Ganga Ram Hospital, New Delhi
	- Jacob George, Atiya R. Farqui, John Mathai, Jacob Peedicayil & Kalpana Ernest, Department of Physical Medicine and Rehabilitation, Pharmacology and Paediatric Surgery, Christian Medical College, Vellore	14:00 – 14:15	CONTROVERSIES IN MANAGEMENT OF BRACHIAL PLEXUS INJURIES
11:48 – 11:54	DETERMINATION OF THE AMBULATORY POTENTIAL IN PATIENTS WITH CHRONIC SPINAL CORD INJURY AS ASSESSED BY LEMS AND WSCI LEVELS AND THEIR EFFECTS ON GLOBAL CHANGE		- Prof. V. S. Mehta, Head of Department of Neurosurgery, AIIMS, New Delhi
	- Dr. Raghavendra S., Dr. H.S. Chhabra, Ilanagai Anbarasan, Suman Kishore, ISIC, New Delhi	14:15 – 14:20	DISCUSSION
11:54 – 12:00	COMPARISON OF PHYSIOLOGICAL EFFICIENCY OF TWO TRICYCLE PROPULSION MECHANISMS - A RANDOMIZED CROSS OVER TRIAL	SESSION – XV	
	- V Sundar Kumar, V.P. Gupta, Amar Jyoti Institute of Physiotherapy, New Delhi	HALL A	
12:00 – 12:10	DISCUSSION	14:20 - 15:00	ELECTROPHYSIOLOGY
12:10 – 12:16	INDIVIDUAL BACK REST PROVISION FOR TRUNK STABILIZATION AFTER HIGH LEVEL LESION	Chairpersons –	
			- Dr. Sarjit Singh, Neurologist, West Virginia, USA
			- Dr. Manvir Bhatia, Sr. Consultant, Clinical Neurophysiology, Chairperson Sleep Medicine, Sir Ganga Ram Hospital, New Delhi
		14:20 – 14:30	EFFICACY AND RELIABILITY OF EVOKED POTENTIAL MONITORING DURING SCOLIOSIS SURGERY
			- Dr. Bhanu Pant, Consultant Neurologist, Apollo Hospital, New Delhi
		14:30 – 14:40	THE ROLE OF ELECTROPHYSIOLOGICAL EXAMINATION IN DIFFERENTIATING BETWEEN LUMBAR SPINAL STENOSIS AND DIABETIC POLYNEUROPATHY.
			- Dr. A.K. Sahani, Consultant Neurologist, ISIC, New Delhi
		14:40 – 14:50	THE ROLE OF ELECTROPHYSIOLOGICAL EXAMINATION IN DIFFERENTIATING BETWEEN CERVICAL ROOT INJURIES AND BRACHIAL PLEXUS INJURIES
			- Dr. Manvir Bhatia, Sr. Consultant, Clinical Neurophysiology, Sir Ganga Ram Hospital, New Delhi
		14:50 – 15:00	Discussion

SESSION - XVI**HALL B**

- 14:00 - 15:00 Human resource development in the field of spinal injuries in India
Chairpersons -
- **Smt. Sarita Prasad, Secretary, Ministry of Social Justice & Empowerment**
- **Major General Ian Cardozo, Chairman, Rehabilitation Council of India, New Delhi**
- 14:00 - 14:10 "HUMAN RESOURCE DEVELOPMENT FOR MEDICAL PERSONNEL IN THE FIELD OF SPINAL INJURIES"
- **Dr. H.C. Goyal, Dept. of Rehabilitation, Safdarjung Hospital, New Delhi**
- 14:10 - 14:20 "HUMAN RESOURCE DEVELOPMENT FOR PARAMEDICAL PERSONNEL IN THE FIELD OF SPINAL INJURIES"
- **Dr. B.D. Athani, Director, All India Institute of Physical Medicine & Rehabilitation, Mumbai**
- 14:20 - 14:30 "HUMAN RESOURCE DEVELOPMENT FOR NURSING PERSONNEL IN THE FIELD OF SPINAL INJURIES"
- **Ms. Lalita Thambi, Chief of Nursing, ISIC, New Delhi**
- 14:30 - 14:40 ROLE OF RCI IN HUMAN RESOURCE DEVELOPMENT FOR SPINAL CORD INJURIES
- **Dr. J.P. Singh, Member Secretary, Rehabilitation Council of India, New Delhi**
- 14:40 - 15:00 Discussion

SESSION - XVII**HALL A**

- 15:00 - 16:00 Surgical Management of SCI
Chairpersons -
- **Dr. Raj Bahadur, Head of Unit. of Orthopaedics, PGI, Chandigarh**
- **Dr. Ashwini Sharan, Department of Neurosurgery, Thomas Jefferson University, USA**
- 15:00 - 15:12 CONTROVERSIES IN MANAGEMENT OF THORACOLUMBAR BURST FRACTURES
- **Dr. H.N. Bajaj, Sr. Consultant & Spine Surgeon, ISIC, New Delhi**
- 15:12 - 15:24 CONTROVERSIES IN MANAGEMENT OF THORACIC SPINE INJURY WITH NEUROLOGY
- **Mr. Ujjwal Debnath, Senior Registrar, Spinal Unit, University Hospital of Wales, UK**
- 15:24 - 15:36 CONTROVERSIES IN MANAGEMENT OF LOWER CERVICAL SPINE INJURIES
- **Dr. Rajagopalan, St. John's Medical College & Hospital, Bangalore**
- 15:36 - 15:48 CONTROVERSIES IN THE MANAGEMENT OF PENETRATING INJURIES OF THE SPINE
- **Dr. Prashant Kekre, Consultant Spine & Orthopaedic Surgeon, Sundaram Medical Foundation, Dr. Rangarajan Memorial Hospital, Chennai**
- 15:48 - 16:00 Discussion

HALL - B

- 15:00 - 16:00 PREVENTION OF SCI IN DEVELOPING COUNTRIES
Chairpersons -
- **Dr. T. K. Shanmugasundaram, Consultant Orthopaedic Surgeon, Chennai**
- **Dr. S.Y. Kothari, Consultant, PMR, Safdarjung Hospital, New Delhi.**
- 15:00 - 15:10 PREVENTION PROGRAMME FOR SPINAL INJURIES - SHOULD IT BE GIVEN MORE FOCUS
- **Dr. T. K. Shanmugasundaram, Consultant Orthopaedic Surgeon, Chennai**
- 15:10 - 15:17 PREVENTION PROGRAMMES FOR SCI - THE NEPAL EXPERIENCE
- **Esha Thapa, SIRC, Nepal**

- 15:17 - 15:24 PREVENTION PROGRAMMES FOR SCI - THE SRI LANKA EXPERIENCE
- **Cyril Siriwardane, Secretary General, Disability Organizations Joint Front, Sri Lanka**
- 15:24 - 15:31 PREVENTION PROGRAMMES FOR SCI - THE BANGLADESH EXPERIENCE
- **Dr. Fazlul Hoque, Consultant Orthopaedic Surgeon, CRP, Bangladesh**
- 15:31 - 15:38 PREVENTION PROGRAMMES FOR SCI - THE VIETNAM EXPERIENCE
- **Mr. Eric Weerts, Program Coordinator SCI project, Handicap International Vietnam,**
- 15:38 - 15:46 SHIP WRECK IN DESERT ! CAMEL RELATED SPINE INJURIES AND ITS PREVENTION - OMAN EXPERIENCE
- **Prof. Mohamed Darwish, Secretary - PAN Gulf Spine Society.**
- 15:46 - 16:00 Discussion
- 16:00 - 16:30 TEA BREAK

Session - XIX**HALL - A**

- 16:20 - 18:00 DILEMMAS IN MINIMALLY INVASIVE SPINE SURGERY
Chairpersons -
- **Dr. Anand Agarwal, General Secretary World society for Endoscopic Navigated and Minimal Invasive Spine Surgery (WENMISS), Orthopaedic & Spinal Surgeon, Medway Maritime Hospital, UK**
- **Dr. Arvind Jayaswal, Professor of Orthopaedics, AIIMS, New Delhi**
- 16:20 - 16:32 ENDOSCOPIC ANTERIOR SPINAL CANAL DECOMPRESSION - DOES IT YIELD EQUIVALENT RESULTS IN SPINAL CANAL CLEARANCE
- **Dr. Hans Joseph Ertl, Trauma Surgeon, Deputy Chair of the Department of Trauma Surgery, Aachen, Germany**
- 16:32 - 16:44 MINIMALLY INVASIVE PROCEDURES OF CERVICAL: ARE THEY EFFECTIVE AND USEFUL?
- **Dr. Ashwini Sharan, Department of Neurosurgery, Thomas Jefferson University, USA**
- 16:44 - 16:56 "DILEMMAS IN MANAGEMENT OF OSTEOPOROTIC FRACTURE? IS MINIMAL INVASIVE KYPHOPLASTY A SOLUTION"
- **Dr. Anand Agarwal, General Secretary, World society for Endoscopic Navigated and Minimal Invasive Spine Surgery (WENMISS), Orthopaedic & Spinal Surgeon, Medway Maritime Hospital, UK**
- 16:56 - 17:08 "VERTEBROPLASTY FOR PATHOLOGICAL FRACTURES OF SPINE"
- **Mr. Abhay Rao, Orthopaedic & Spine Surgeon, Leeds, UK**
- 17:08 - 17:18 TRANSFORAMINAL ENDOSCOPIC DISCECTOMY - IS THERE IS BETTER TECHNIQUE FOR LUMBAR DISCECTOMY
- **Dr. Satish Chandra Gore, Kamla Regency, Pune**
- 17:18 - 17:28 MICRO DISCECTOMY - HAS IT LOST ITS STATUS AS A GOLD STANDARD FOR LUMBAR DISCECTOMY
- **Dr. Yash Gulati, Sr. Orthopaedic & Spine Surgeon, Apollo Hospital, New Delhi**
- 17:28 - 17:38 VIDEO-ASSISTED THORACOSCOPIC DECOMPRESSION OF TUBERCULAR SPONDYLITIS: CLINICAL EVALUATION
- **Dr. Sudhir Kapoor, HOD- Orthopaedics, Lady Harding Medical College, New Delhi**
- 17:38 - 18:00 Discussion

Session – XX

HALL – B

16:20 – 18:00 CONSERVATIVE AND REHABILITATION MANAGEMENT OF SPINAL CORD INJURY

Chairpersons –

- Dr. Vinod Sahgal, Chairman, Department of Rehabilitation Medicine, The Cleveland Clinic Foundation, UK
- Dr. H C Goyal, Prof. & Head Deptt. Of Rehabilitation, Safdarjung Hospital, New Delhi

16:20 – 16:30 CONSERVATIVE MANAGEMENT OF VERTEBRAL FRACTURES IS NOT NON-OPERATIVE MANAGEMENT

- Dr. R.N. Srivastava, Prof. Of Orthopaedics, King George Medical College, Lucknow

16:30 – 16:42 DILEMMAS IN THE MANAGEMENT OF SPINAL INJURIES – A PERSPECTIVE FROM RURAL INDIA

- Dr. Suranjan Bhattacharji, Psychiatrist, Christian Medical College, Vellore

16:42 – 16:50 PROBLEMS AND PERCEPTIONS IN MANAGEMENT OF SPINAL CORD INJURIES IN SOUTH INDIA

- Dr. Thomas Joseph, Sahai Spinal Injury Rehabilitation Centre, Tamil Nadu

16:50 – 17:00 DILEMMAS IN CONSERVATIVE MANAGEMENT OF TETRAPLEGIC HAND

- Dr. C Leclercq, Paris, France

17:00 – 17:10 DILEMMAS IN SURGICAL MANAGEMENT OF TETRAPLEGIC HAND

- Prof. Vincent R Hentz, Professor, Robert A Chase Hand & Upper Limb Center, Stanford University School of Medicine, USA

17:10 – 17:20 DILEMMAS IN TIMING THE DISCHARGE OF THE PATIENT

- Dr. (Capt.) Dilip Sinha, Assistant Professor of Orthopaedics, Patna Medical College Hospital, Patna

17:20 – 17:32 CAN TELEMEDICINE HELP IN MANAGING SPINAL CORD INJURY?

- Dr. Anbananden Soopramanien, Consultant in Spinal Injuries and Rehabilitation Medicine, Salisbury, UK

17:32 – 17:42 ROLE OF CELLULAR THERAPIES IN SCI AND OTHER NEUROLOGICAL DISORDERS

- Dr. Geeta Ravindran, Basic Research Scientist, Reliance Life Sciences, Mumbai

17:42 – 18:00 DISCUSSION

18:00 – 19:00 5th GENERAL BODY MEETING OF SPINAL CORD SOCIETY**Sunday, 5th March 2006**

Session – XXI

HALL - A

8:00– 9:20 SCS GOLD MEDAL AWARD FOR BEST POSTER PRESENTERS IN REHABILITATION MANAGEMENT OF SPINAL AILMENTS

Chairpersons –

- Dr. Anbananden Soopramanien, Consultant in Spinal Injuries and Rehabilitation Medicine, Salisbury, UK
- Dr. Suranjan Bhattacharji, Psychiatrist, Christian Medical College, Vellore

Judges –

- Dr. Jean Jacques Wyndaele, Chairman, Education Committee – ISCoS, Professor of Urology, Belgium
- Prof. Vincent Hentz, Professor, Robert A Chase Hand & Upper Limb Center, Stanford University School of Medicine, UK
- Dr. John Steeves, Professor and Director of ICORD, Professor of Zoology, Anatomy, and Surgery, University of British Columbia and Vancouver Hospital, Canada

- Dr. Sunil Katoch, Consultant Orthopaedics, ISIC, New Delhi
- Dr. S.Y. Kothari, Consultant, PMR, Safdarjung Hospital, New Delhi.
- Dr. Fazlul Hoque, Consultant Orthopaedic Surgeon, CRP, Bangladesh

15 best posters out of the 29 mentioned below will be selected by the judges for presentation in this session based on the quality and content of the displayed posters. The list of selected candidates will be displayed outside the hall at 7:30 a.m. on 5th March 2006.

RM1 - VALIDITY OF ANATOMICAL CALCULATION METHOD IN DETERMINING THE SPINAL LEVEL IN VERTEBRAL FRACTURES – A RETROSPECTIVE STUDY

- M. John Solomon, Deepa S, Shari Babu, Manipal College of Allied Health Sciences, Manipal

RM2 - WHIPLASH ASSOCIATED DISORDERS (GRADE I AND II) – ALTERATION IN MOTOR AND SENSORY PROCESSING IN A REHABILITATION PERSPECTIVE - SYSTEMATIC LITERATURE REVIEW

- Ramakrishnan M., Lecturer, Musculoskeletal & Manipulative Physiotherapy, MCOAHS, MAHE, Manipal, Karnataka

RM3 - EARLY APPROACH FOR FUNCTIONAL RECOVERY IN SPINAL CORD INJURY

- D. Sridhar, Manipal College of Allied Health Sciences, Manipal

RM4 - DO URETHRAL AND BED SORES CULTURES ARE REALLY PREDICTIVE OF FUTURE URINARY INFECTIONS IN SPINAL CORD INJURY PATIENTS

- Dr. Roop Singh, Consultant Orthopaedics, Pt. B.D.Sharma PGIMS, Rohtak, Haryana

RM5 - IDENTIFICATION OF INCIDENCE AND RISK FACTORS IN URINARY INFECTIONS IN SPINAL CORD INJURY PATIENTS

- Dr. Roop Singh, Consultant Orthopaedics, Pt. B.D.Sharma PGIMS, Rohtak, Haryana

RM6 - PHYSIOTHERAPEUTIC MANAGEMENT OF COMPLEX REGIONAL PAIN SYNDROME IN SPINAL CORD INJURIES – A LITERATURE REVIEW

- Dr. Deepak Rohilla, MPT (Ortho), Deptt. of Physiotherapy, Manipal University, Manipal

RM7 - IS DEEP VEIN THROMBOSIS PROPHYLAXIS NECESSARY FOR ACUTE SPINAL CORD INJURY PATIENTS

- Dr. Navin Kumar, SMS Medical College, Jaipur

RM8 - SHOULDER CARE AFTER SPINAL CORD INJURY

- Shruti Thareja, MPT Student, ISIC, New Delhi

RM9 - PRESSURE INJURY PREVENTION IN SPINAL CORD INJURY

- Harris Manova, Dr. Pramod Kumar, Department of Plastic Surgery and Burns

RM10 - AIRWAY CLEARANCE TECHNIQUES IN THE PREVENTION OF PULMONARY COMPLICATIONS IN SPINAL INJURY PATIENTS - A REVIEW

- Richpal, Father Muller Medical College, Mangalore

RM11 - URINARY TRACT INFECTION IN SCI

- Dr. Vishal Nigam, Spine Fellow, ISIC, New Delhi

RM12 - TENS VERSUS VIBRATION THERAPY IN REDUCING SPASTICITY

- Shefali Walia, MPT, ISIC, New Delhi

RM13 - ENERGY EXPENDITURE DURING WHEELCHAIR PROPULSION IN SPORTING PARAPLEGICS

- Palak A. Sheth, Manipal College of Allied Health Sciences, Manipal.

A COMPARATIVE STUDY BETWEEN TWO PROPULSION TECHNIQUES – ARC METHOD AND SINGLE LOOP METHOD

RM14 - COMPARISON OF EFFECT OF LUBRICATING AGENTS USED IN CIC ON URINARY TRACT IN PATIENTS OF SCI.

- Dr. Navita Purohit, SMS Medical College, Jaipur

RM15 - SEXUALITY IN SPINAL CORD INJURY : PROBLEMS AND SOLUTION

- Abhishek Srivastava, VIMHANS, Bangalore

RM16 - STATUS OF SPINAL CORD INJURED PATIENTS IN INDIA

- Dr. V K Pandey, ISIC, New Delhi

RM17 - REALITIES OF REHABILITATION OF PARAPLEGIC IN INDIA

- Dr. (Capt.) Dilip Sinha, Asst Prof. Orthopaedics, Patna Medical College Hospital, Patna

RM18 - CRITICAL APPRAISAL OF LONG TERM REHABILITATIONAL PROBLEMS IN SPINAL CORD INJURY PATIENTS

- Dr. Roop Singh, Consultant Orthopaedics, Pt. B.D.Sharma PGIMS, Rohtak, Haryana

RM19 - MPUT IN CHILDREN WITH SPINA BIFIDA; A CORRELATIONAL STUDY BETWEEN SENSORY PARAMETERS AFFECTING HAND FUNCTION AND FUNCTIONAL HAND DOMINANCE

- Bharati Bhawna, Sahu Kirti Sundar, MPT Student, ISIC New Delhi

RM20 - PILLOW MANOMETER - A NOVEL APPROACH TO TRAINING PUSH UPS CLEARANCE IN PERSONS WITH SPINAL CORD INJURY

- V Sundar Kumar, Mr. G.K. Balaji, Amar Jyoti Institute of Physiotherapy, New Delhi

RM21 - PUSH UP HOLDING TIME : AS A PREDICTION CRITERION TO START TRANSFER TRAINING IN SPINAL CORD INJURY

- D. Sridhar, Manipal College of Allied Health Sciences, Manipal

RM22 - ARM ERGOMETRY TRAINING : EFFECT ON FUNCTIONAL ENDURANCE IN QUADRIPLEGICS

- Shradha Srivastava, ISIC, New Delhi

RM23 - CELL BASED THERAPIES FOR SPINAL CORD INJURY: HOPE OR HYPE? A REVIEW FOR PATIENTS:

- Dr. Suman Kishore, Dr. H.S. Chhabra, Dr. Raghavendra, Ms. Ila Anbarasan, ISIC, New Delhi

RM24 - A PROSPECTIVE, RANDOMIZED, SINGLE BLIND, CONTROLLED STUDY TO ASSESS THE EFFICACY OF SURGICAL VS. CONSERVATIVE TREATMENT, IN ADULT PATIENTS WITH ACUTE SPINAL CORD INJURY

- Ms. Ila Anbarasan, Dr. H.S. Chhabra, Dr. Raghavendra, Dr. Suman Kishore, ISIC, New Delhi

RM25 - EFFECT OF NEURAL MOBILIZATION COMPARED TO TRADITIONAL TREATMENT IN LUMBAR RADICULOPATHY

- Dr. Arumugam Narkeesh, Kaur Jasdeep, Singhal Vipra, Sardar Bhagwan Singh Post Graduate Institute of Bio Medical Sciences & Research, Balawala, Dehradun

RM26 - THE ROLE OF FACET TROPISM IN NON SPECIFIC LOW BACKPAIN AND INTERVERTEBRAL DISC PROLAPSE IN LUMBOSACRAL SPINE

- Dr. Sumit K. Jain, Manipal College of Allied Health Sciences, Manipal

RM27 - A COMPARATIVE STUDY BETWEEN MCKENZIE APPROACH AND TRACTION IN PAIN RELIEF AND FUNCTIONAL OUTCOME IN LOW BACK PAIN

- K. Pugazhendhi, MPT, Department of Therapies and Health Sciences, Faridabad.

RM28 - ALKAPTONURIA WITH LUMBAR DISC HERNIATION

- Dr. B. Mohapatra, Consultant - Orthopaedic, ISIC, New Delhi

RM29 - A COMPARATIVE EVALUATION OF CONSERVATIVE AND OPERATIVE MANAGEMENT OF TRAUMATIC PRAPLEGIA

- Dr. A.N. Mukherjee, Dr. C Dey, A.K. Pai, J.N. Roy, Gen. Hospital Burdwan Medical College & Hospital, West Bengal

8:40 - 9:15 DISCUSSION

Session - XXII

HALL - A

9:20 - 9:40 FREE PAPER SESSION - Rehabilitation Management
Chairpersons -

- Dr. Anbananden Soopramanien, Consultant in Spinal Injuries and Rehabilitation Medicine, Salisbury, UK
- Dr. Suranjan Bhattacharji, Physiatrist, Christian Medical College, Vellore

9:20 - 9:26 CHARACTERISTICS OF SPINAL CORD INJURY PATIENTS ADMITTED TO REHABILITATION HOSPITAL, SRI LANKA

- Dr. Suren Wijesingha, Sri Lanka

9:26 - 9:32 EVOLUTION OF SPINAL INJURY MANAGEMENT AT NEPAL ORTHOPEDIC HOSPITAL

- Dr. Yubraj Kharel, Nepal Orthopaedic Hospital, Nepal.

9:32 - 9:40 COMPARISON OF EFFECT OF LUBRICATING AGENTS USED IN CIC ON URINARY TRACT IN PATIENTS OF SCI

- Dr. Navita Purohit, SMS Medical College, Jaipur

9:33 - 9:40 DISCUSSION

Session - XXIII

HALL - B

8:00 - 8:48 FREE PAPER SESSION - Surgical Management of Spinal Ailments

Chairpersons -

- Mr. Abhay Rao, Orthopaedic & Spine Surgeon, Leeds, UK

- Dr. Shankar Acharya, Consultant Spine Surgeon, Sir Gangaram Hospital, New Delhi

8:00 to 8:06 FAILURE OF SHORT SEGMENT INSTRUMENTATION USING PEDICULAR SCREWS DUE TO RESIDUAL ANTERIOR INSTABILITY IN UNSTABLE THORACOLUMBAR FRACTURES

- Dr. Devdatta Suhas Neogi, Orthopaedics, Goa

8:06 to 8:12 TUMOURS OF SPINE DIAGNOSIS AND MANAGEMENT

- Dr. Samir Dogra, Orthopaedics, Ludhiana, Punjab

8:12 to 8:18 MINIMALLY INVASIVE SPINAL SURGERY - WIDENED INTERLAMINAR APPROACH FOR REMOVAL OF SPINAL INTRADURAL EXTRAMEDULLARY TUMORS

- Dr. Samit Mehta, Neurology, Chennai.

8:18 to 8:24 DYNAMIC STUDY IN PROLAPSED INTERVERTEBRAL DISC ON AXIALLY LOADED MRI

- Dr. Ajay S. Chandanwale, Orthopaedic Surgeon, Bombay

8:24 to 8:30 TRANSPEDICULAR SURGERY FOR DORSOLUMBAR JUNCTION DISC PROLAPSE : ANATOMIC AND BIOCHEMICAL CONSIDERATIONS OF A MINIMALLY INVASIVE APPROACH

- Dr. (Lt. Col.) H.S. Bhatoo, Consultant Neurosurgeon, Research & Referral (Army Hospital), New Delhi

8:30 - 8:36 POST TRAUMATIC PARAPLEGIA WITH DELAYED PRESENTATION - CAN SURGERY PREVENT COMPLICATIONS - RESULT IN 34 CASES

- Dr. Saill Saha, Saha Spine Centre and Fortis, Mohali, Punjab

8:36 to 8:48 Discussion

Session – XXIV

HALL – B

8:48 – 9:40 SCS GOLD MEDAL AWARD FOR BEST POSTER PRESENTERS IN SURGICAL MANAGEMENT OF SPINAL AILMENTS

Chairpersons –

- Mr. Abhay Rao, Orthopaedic & Spine Surgeon, Leeds, UK
- Dr. Shankar Acharya, Consultant Spine Surgeon, Sir Gangaram Hospital, New Delhi

Judges –

- Prof. Mohamed Darwish, Secretary – PAN Gulf Spine Society
- Dr. Hans Joseph Erll, Trauma Surgeon, Deputy Chair of the Department of Trauma Surgery, Germany
- Dr. Ashwini Sharan, Thomas Jefferson University, Department of Neurosurgery, USA
- Mr. Vinay Jasani,
- Dr. Ziad-Al Zoubi, Consultant Orthopaedic & Spinal Surgery, General Secretary, PAN Arab Spinal Society, Jordan
- Dr. H.N. Bajaj, Sr. Consultant & Spine Surgeon, ISIC, New Delhi

10 best posters out of the 19 mentioned below will be selected by the judges for presentation in this session based on the quality and content of the displayed posters. The list of selected candidates will be displayed outside the hall at 7:30 a.m. on 5th March 2006.

SM1 - MANAGEMENT OF BURST FRACTURES OF THE CERVICAL SPINE (POSTER PRESENTATION)

- Dr. Anil Pande, Neurosurgeon, Chennai

SM2 - FRACTURE OF CERVICAL SPINE IN ANKYLOSING SPONDYLITIS

- Dr. Vishal Nigam, Spine Fellow, ISIC, New Delhi

SM3 - DIVERSE FIXATION TECHNIQUES IN TRAUMATIC SPINE

- Dr. Ajay S. Chandanwale, Orthopaedic Surgeon, Bombay

SM4 - POSTERIOR SPINAL FUSION USING H GRAFTING AND TENSION BEND WIRING IN THORACOLUMBAR FUNCTIONAL AND LUMBAR FRACTURE DISLOCATION. A REVIEW OF 3 PERICLIN PATIENTS

- Dr. Roop Singh, Consultant Orthopaedics, Pt. B.D.Sharma PGIMS, Rohtak, Haryana

SM5 - Neurological recovery after anterior decompression for thoracolumbar burst fractures with late presentation

- Dr. Jayanta Pathak, Dr. G. Bhattacharyya, Prof. A.J. Kundu, Dr. S. Bhattacharyya, Dr. S. Banerjee, Niliratan Sircar Medical College & Hospital, Kolkata

SM6 - ROLE OF POSTERIOR LONGITUDINAL LIGAMENT INJURY IN MANAGEMENT OF TRAUMATIC SPINE FRACTURES

- Dr. Ajay S. Chandanwale, Orthopaedic Surgeon, Bombay

SM7 - HARTSHILL RING VS PEDICULAR SCREW FIXATION IN THORACO LUMBAR SCI PATIENTS

- Dr. (Capt.) Dilip Sinha, Asst Prof. Orthopaedics, Patna Medical College Hospital, Patna

SM8 - LATE ANTERIOR DECOMPRESSION FOR THORACIC AND LUMBAR BURST FRACTURES WITH NEUROLOGICAL DEFICIT

- Dr. George Joseph, Dr. Purushothamdas, Dr. Sanjay Dhiran, Dr. Nalli Rmanathan, North Tyneside General Hospital, UK

SM9 - A BRIEF ILLUSTRATED HISTORY OF SURGERY FOR SPINAL INJURY

- Dr. Anil Pande, Neurosurgeon, Chennai

SM10 - CERVICAL OESOPHAGEAL FISTULA FOLLOWING ANTERIOR CERVICAL FIXATION FOR UNSTABLE CERVICAL SPINE INJURY. CASE SURVEY OF FIVE PATIENTS.

- Dr. Apurv J. Acharya, SMS Medical College, Jaipur
- SM11 - MANAGEMENT OF LATE CASE OF TRAUMATIC PARAPLEGIA

- Dr. Rajeev Raman, Department of Orthopaedics, Durdwan Medical College, West Bengal

SM12 - ANDERSON'S LESION

- Dr. Vishal Nigam, Spine Fellow, ISIC, New Delhi

SM13 - OUTCOME OF STAB INJURIES OF THE SPINE – A SINGLE CENTRE EXPERIENCE IN SOUTH INDIA

- Dr. George Joseph, Dr. Nalli R. Uvaraj, Dr. Sriram K. Madras Medical College and University hospital, Chennai

SM14 - TUBERCULOUS SPONDYLITIS OF CERVICAL SPINE - TO OPERATE OR NOT TO OPERATE

- Dr. Sachin Jadhav, Orthopaedic Surgery

SM15 - LUMBAR SPINAL ANGIOLIPOMA – A CASE REPORT

- Dr. Anantharaman C., Grant Medical College, Mumbai

SM16 - OUTCOME OF CERVICAL FUSION BY ALLOGRAFT IN CERVICAL DISK DISEASE

- Dr. Nirmal Chandra Mohapatra, VSS Medical College, Orissa

SM17 - TLIF

- Dr. Vishal Nigam, Dr. Sanjeev Divyadarshi, Dr. K. Das, Dr. H.S. Chhabra, ISIC, New Delhi

SM18 - NEW SOLUTION TO A DIFFICULT PROBLEM

- Dr. Vishal Nigam, Dr. Sanjeev Divyadarshi, Dr. K. Das, Dr. H.S. Chhabra, ISIC, New Delhi

SM19 - MORPHOMETRIC STUDY OF PEDICLE DIMENSIONS IN THORACIC SPINE

- Dr. Ajay S. Chandanwale, Grant Medical College, Mumbai

9:15 – 9:40 DISCUSSION

Session – XXV

HALL - A

9:40 – 10:30 BEST PUBLISHED PAPER AWARD SESSION

Chairpersons –

- Dr. Patrick Kluger, Chief Spine Surgeon, Stoke Mandeville Hospital, UK
- Dr. S K Kame, Sr. Consultant Orthopaedics, ISIC, New Delhi

9:40 – 9:55 SEXUALITY AND WOMEN WITH SPINAL CORD INJURY

- Dr. Roop Singh, Consultant Orthopaedics, Pt. B.D.Sharma PGIMS, Rohtak, Haryana

9:55 – 10:05 Discussion

10:05 – 10:20 PEDIATRIC CONGENITAL ATLANTOAXIAL DISLOCATION: FOCUSING ON THE DIFFERENCES BETWEEN THE FIXED AND MOBILE VARIETIES

- Dr. Sanjay Behari, Neurosurgeon, Sanjay Gandhi Postgraduate Institute of Medical Science, Lucknow, India

10:20 – 10:30 Discussion

10:30 – 11:00 TEA BREAK

Session – XXVI

HALL - A

11:00 – 12:00 PLENARY SESSION – BACK PAIN & PROLAPSE INTERVERTEBRAL DISC

Chairpersons –

	- Dr. P S Ramani, Senior Consultant, Neuro & Spine Surgeon, Lilavati Hospital & Research Centre, Mumbai	14:12 - 14:24	WHETHER SUPPRESSION OF PSYCHOLOGICAL SYMPTOMS BY DRUG THERAPY IS THE OPTIMAL TREATMENT OF SUCH PATIENTS
	- Dr. Fazlul Hoque, Consultant Orthopaedic Surgeon, CRP, Bangladesh		- Dr. Anil Kumar Gaur, Assistant Director, AIPMR, MUMBAI
11:00 - 11:10	DILEMMAS IN CONSERVATIVE MANAGEMENT OF PIVD AND BACK PAIN	14:24 - 14:36	PSYCHOLOGICAL ASSESSMENT AFTER SPINAL CORD INJURIES. CONGRUITIES, COMPLEXITIES AND CONTROVERSIES
	- Dr. Sanjay Wadhwa, Assistant Professor, Deptt. of PMR, AIIMS, New Delhi		- Ms. Wanda Toso, Psychologist
11:10 - 11:20	EPIDURAL STEROIDS FOR MANAGEMENT OF PIVD - DOES IT HAVE A ROLE	14:36 - 14:48	OPTIMAL TIME TO MAKE THE SCI AWARE ABOUT THE LIKELY OUTCOME OF HIS / HER INJURY.
	- Prof. G.P. Dureja, Consultant Pain Clinic, ISIC, New Delhi		- Dr. Sunil Katoch, Consultant Orthopaedics, ISIC, New Delhi
11:20 - 11:30	DILEMMAS IN SURGICAL MANAGEMENT OF PIVD	14:48 - 15:00	Discussion
	- Dr. H.S. Chhabra, Chief of Spine Service, ISIC, New Delhi		
11:30 - 11:40	MINIMALLY INVASIVE SPINE SURGERY - ROLE IN MANAGEMENT OF PIVD		
	- Dr. Arvind Jayaswal, Professor of Orthopaedics, AIIMS, New Delhi		
11:40 - 11:50	DILEMMAS IN MANAGEMENT OF INFLAMMATORY BACK PAIN		
	- Dr. A.N. Malaviya, Consultant Rheumatologist, ISIC, New Delhi		
11:50 - 12:00	DISCUSSION		
Session - XXVII			
HALL - A			
12:00 - 13:00	PLENARY SESSION - POTT'S SPINE		
	Chairpersons -		
	- Dr. S M Tuli, Consultant Orthopaedic Surgeon, VIMHANS, New Delhi		
	- Dr. H.N. Bajaj, Sr. Consultant & Spine Surgeon, ISIC, New Delhi		
12:00 - 12:12	CONTROVERSIES IN ESTABLISHING A DIAGNOSIS AND STARTING TREATMENT IN A PATIENT WITH POSSIBLE POTT'S SPINE	14:10 - 14:20	IS AUTOGENOUS ILIAC CREST GRAFTING MANDATORY IN IDIOPATHIC ADOLESCENT SCOLIOSIS SURGERY ?
	- Dr. S.M. Tuli, Consultant Orthopaedic Surgeon, VIMHANS, New Delhi		- Prof. Mohamed Darwish, Secretary - PAN Gulf Spine Society
12:12 - 12:24	CONTROVERSIES IN MEDICAL MANAGEMENT OF POTT'S SPINE	14:20 - 14:30	CONTROVERSIES IN SURGICAL MANAGEMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS - MANAGEMENT BY POSTERIOR APPROACH
	- Prof. A.K. Jain, UCMS, GTB Hospital New Delhi		- Dr. Raghav Dutt Mulukutla, Consultant Orthopaedic & Spine Surgeon, UDAI Clinic, Hyderabad
12:24 - 12:36	CONTROVERSIES IN SURGICAL MANAGEMENT OF POTT'S SPINE	14:30 - 14:40	CONTROVERSIES IN SURGICAL MANAGEMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS - MANAGEMENT BY ANTERIOR APPROACH
	- Dr. Shankar Acharya, Consultant Spine Surgeon, Sir Gangaram Hospital, New Delhi		- Dr. Arvind Jayaswal, Professor of Orthopaedics, AIIMS, New Delhi
12:36 - 12:48	CONTROVERSIES IN MANAGEMENT OF POST TUBERCULAR KYPHOTIC DEFORMITY	14:40 - 14:50	CONTROVERSIES IN FUSIONS TO PELVIS IN SCOLIOSIS
	- Dr. Sajan Hegde, Consultant Orthopaedic Surgeon, Apollo Hospital, Chennai		- Mr. Vinay Jasani, Spinal Surgeon, consultant, UK
12:48 - 13:00	Discussion	14:50 - 15:00	CONTROVERSIES IN MANAGEMENT OF CONGENITAL SCOLIOSIS
13:00 - 14:00	LUNCH		- Dr. Surya Prakash Rao, Associate Professor & Spinal Surgeon, Nizam's Institute of Medical Sciences, Hyderabad
Session - XXVIII			
HALL - A			
14:00 - 15:00	DILEMMAS IN PSYCHOSOCIAL REHABILITATION	15:00 - 15:10	CONTROVERSIES IN MANAGEMENT OF NEUROMUSCULAR SCOLIOSIS
	Chairpersons -		- Dr. Abhay Nene, Associate Spine Consultant, P D Hinduja National Hospital, Bombay
	- Dr. Stanley Ducharme, Andrologist, Spinal Injuries Centre, Boston, USA	15:10 - 15:20	CONTROVERSIES IN MANAGEMENT OF LOW GRADE SPONDYLOLYSTHESIS
	- Mr. Sanjeev Sharma, Chairman, Specialist Training Committee, Liverpool, UK		- Dr. Ram Chaddha, Spine Surgeon, Prof. of Orthopaedics, K.J. Somaiya Hospital:
14:00 - 14:12	UNDERSTANDING DEPRESSION AFTER SPINAL CORD INJURY	15:20 - 15:35	HIGH GRADE SPONDYLOLYSTHESIS - REDUCTION Vs INSITU FUSION
	- Dr. Stanley Ducharme, Andrologist, Spinal Injuries Centre, Boston, USA		- Dr. William Sears, Neurosurgeon, North Shore Hospital, Sydney, Australia
		15:35 - 15:45	CONTROVERSIES IN SURGICAL CORRECTION OF KYPHOTIC DEFORMITY IN ANKYLOSING SPONDYLITIS
			- Dr. P.K. Dave, Director, Rockland Hospital, New Delhi
		15:45 - 16:00	Discussion
Session - XXX			
HALL - A			
15:00 - 16:00	ASSISTIVE TECHNOLOGY, WHEELCHAIRS & Re-integration of SCI into the Community		

Chairpersons –

- Major HPS Ahluwalia, Chairman, ISIC, New Delhi
- Dr. Rory Cooper, Distinguished Professor and FISA/PVA Chair, University of Pittsburgh, USA

15:00 – 15:12 TECHNOLOGY TO PROMOTE QUALITY OF LIFE FOR PEOPLE – DOES IT NEED TO BE ADAPTED TO LOCAL CONDITIONS?

- Dr. Rory Cooper, Distinguished Professor and FISA/PVA Chair, University of Pittsburgh, USA

15:12 – 15:24 DONATED WHEELCHAIRS: Is any wheelchair better than nothing?

- Dr. David Constantine, Co-founder/Executive Officer, Motivation, Brockley Academy, UK

15:24 – 15:36 CHALLENGES IN REINTEGRATION OF SPINAL INJURED INTO THE COMMUNITY ESPECIALLY IN A DEVELOPING COUNTRY LIKE INDIA

- Dr. S.Y. Kothari, Consultant, PMR, Safdarjung Hospital, New Delhi

15:36 – 16:00 PANEL AND OPEN HOUSE DISCUSSION

- Mr. Shivjit Raghav, Ms. Shivani Gupta, Ms. Komal Kamra, Mr. Nitin Goyal, Ms. Ketna Mehta, Mr. Mohit

16:00 – 16:20 TEA BREAK

Session – XXXI

HALL – A

16:20 – 17:45 DILEMMAS IN MANAGEMENT OF ASSOCIATED COMPLICATIONS IN SPINAL CORD INJURY

Chairpersons –

- Dr. Shalendera Bhattacharyya, Chairman of BORRC, Kolkata
- Dr. Ajit Kumar Varma, Head of Department, PMR, Patna

16:20 – 16:32 HETEROTOPIC OSSIFICATION – CURRENT CONCEPTS AND CONTROVERSIES IN DIAGNOSIS AND MANAGEMENT

- Dr. Vijay Prakash Sharma, Physiatrist, Lucknow

16:32 – 16:44 DILEMMAS IN PREDICTING FAILURE OF FLAP SURGERY ACCORDING TO CONVENTIONALLY ACCEPTED RISK FACTORS

- Dr. Richard Schwarz, Clinical Instructor of Surgery, University of British Columbia, Canada

16:44 – 16:54 ARE PRESSURE ULCERS ALWAYS PREVENTABLE?

- Dr. Mouli Madhab Ghatak, Physiatrist, TRA General Hospital, Kolkata

16:54 – 17:06 PAIN MANAGEMENT IN SPINAL CORD INJURIES – COMPLEXITIES AND CONTROVERSIES

- Dr. Pradeep Jain, Incharge - Department of Pain Medicine, Sir Ganga Ram Hospital, New Delhi

17:06 – 17:16 "CONTRACTURES - CAN THEY BE TREATED AND PREVENTED WITH CONSERVATIVE INTERVENTIONS?"

- Dr. Lisa Harvey, Senior Lecturer, Northern Clinical School, Rehabilitation Studies Unit, Faculty of Medicine, University of Sydney

17:16 – 17:26 COMMONEST CAUSE OF MORTALITY OF SCI IN DEVELOPING COUNTRIES

- Prof. S. S. Sangwan, Director, Pt. B.D.Sharma PGIMS, Rohtak, Haryana

17:26 – 17:45 Discussion

Session – XXXII

HALL B

16:20 – 16:45 SPINAL TUMORS

Chairpersons –

- Dr. Ziad Al-Zoubi, Consultant Orthopaedic & Spinal Surgery, General Secretary, PAN Arab Spinal Society, Jordan
- Dr. Manoj Sharma, Orthopaedic Surgeon, Jaipur Golden Hospital, New Delhi

16:20 – 16:30 CONTROVERSIES IN MANAGEMENT OF PRIMARY SACRAL TUMORS

- Dr. (Lt. Col.) H.S. Bhatia, Consultant Neurosurgeon, Research & Referral (Army Hospital), New Delhi

16:30- 16:40 MANAGEMENT OF SPINAL TUMORS

- Dr. Sharad Shashank Kale, Asst. Professor, Neurosurgery, AIIMS, New Delhi

16:40 – 16:45 Discussion

Session – XXXIII

Hall B

16:45-17:45 OSTEOPOROSIS

Chairperson –

- Dr. Ambrish Mithal, Endocrinologist, Apollo Hospital, New Delhi
- Prof. Mohamed Darwish, Secretary – PAN Gulf Spine Society.

16:45 – 16:55 DILEMMAS IN EVALUATION OF OSTEOPOROSIS

- Dr. Harsh Mahajan, Consultant Radiologist, Mahajan Imaging Centre, New Delhi

16:55 – 17:10 DILEMMAS IN MEDICAL MANAGEMENT OF OSTEOPOROSIS

- Dr. Ambrish Mithal, Endocrinologist, Apollo Hospital, New Delhi

17:10 – 17:20 DILEMMAS IN MANAGEMENT OF MALE OSTEOPOROSIS

- Dr. Sanjeev Divyadarshi, Spine Fellow, ISIC, New Delhi

17:20 – 17:32 DILEMMAS IN FIXATION OF OSTEOPOROTIC SPINE

- Dr. Raghav Dutt Mulukutla, Consultant Orthopaedic & Spine Surgeon, UDAI Clinic, Hyderabad

17:32 – 17:45 Discussion

17:45 – 18:00 CLOSING CEREMONY

**Post-Conference Workshop on
"Physiotherapy Management of People with SCI
– a General Overview"**
Venue: Auditorium, Indian Spinal Injuries Centre

Date: 6th March 2006

Time: 8:30 a.m. – 12:30

Guest Faculty:

- Dr. Lisa Harvey, Physiotherapist, Rehabilitation Studies Unit, Faculty of Medicine, University of Sydney, Australia

8:30 – 9:15 ASIA motor assessments and classifications of SCI - as relevant for a physiotherapist

9:15 – 10:30 implications of different patterns of paralysis for function

10:30 – 10:50 BREAK

10:50 – 12:30 Overview of physiotherapy management of SCI within an evidence-based and motor relearning framework

Post-Conference Workshop on
"Physiotherapy management of people with SCI –
looking at the details"
Venue: Auditorium, Indian Spinal Injuries Centre
Date: 6th March 2006
Time: 1:15 p.m. – 5:30

Guest Faculty:		2:50 – 3:50	Management of contractures – for the critical thinker What does the evidence say-
	- Dr Lisa Harvey, Physiotherapist, Rehabilitation Studies Unit, Faculty of Medicine, University of Sydney, Australia	3:50 – 4:30	The respiratory function and management of people with SCI
1:15 – 2:15	Gait training for people with partial paralysis following SCI	4:30 – 4:40	BREAK
2:15 – 2:30	Using www.physiotherapyexercises.com to generate exercise booklets for patients with SCI	4:40 – 5:30	Mobility training for patients with C6 tetraplegia and T4 paraplegia
2:30-2:50	BREAK		

Post-Conference Workshop on
"Management of the Tetraplegic Hand"
Venue: Conference Hall, Indian Spinal Injuries Centre

Date: 6th March 2006
Time: 9:00 a.m. to 17:00 p.m.

Organized by Stanford-India Hand Surgery Program
A Collaborative Program between
Robert A Chase Hand and Upper Limb Center, Stanford University
And
Indian Spinal Injuries Center, New Delhi

Chairpersons: Dr. V. Sahgal, Dr. P. Kotwal	11:50 - 12:10	Surgical Strategy: Matching Patient and Procedure - (V R Hentz, Stanford, USA)
9:00 - 9:10 Welcome: The iQUEST Project - (S Srivastava, Stanford, USA)	12:10 – 12:30	Moberg Operation - (S Grossmann, Nottwil, Switzerland)
9:10 - 9:35 Approach to the Quadriplegic Hand: Assessment, Planning, and Goals - (C Leclercq, Paris, France)	12:30 – 12:45	Timing of Surgery for Tetraplegic Hand - (A Dhal, New Delhi, India)
9:35 - 10:00 Management techniques: Yesterday, Today, and Tomorrow - (V R Hentz, Stanford, USA)	12:45 – 13:00	Non-Surgical Options available in India for Management of Tetraplegic Hand - (P Kotwal, New Delhi, India)
10:00 – 10:15 Discussion	13:00 – 14:00	Lunch Chairpersons: - Dr. C. Leclercq, Dr. S. Grossmann
10:15 - 10:30 Tea/Coffee Break Chairpersons: - Prof. V R Hentz, Prof. A. Dhal	14:00 – 14:15	Challenges in Management of Tetraplegic Hand in Developing Countries like India - (P Jindal, New Delhi, India)
10:30 - 10:45 Tendon Transfer Surgery in Tetraplegia - An Offer Too Good To Refuse- - (Cathy Cooper, Melbourne, Australia)	14:15 – 14:30	The Future: Challenges and Opportunities - (V Gupta, New Delhi, India)
10:45 - 11:05 Management of Tetraplegic Hand: The Cleveland Experience - (V Sahgal, Cleveland, USA)	14:30 - 15:15	Improving quality of life: The Team Approach - (Panel Discussion, All Faculty)
11:05 - 11:20 Surgical Options: Higher level injuries - (S Srivastava, Stanford, USA)	15:15 - 15:30	Tea/Coffee Break
11:20 – 11:30 Discussion Chairpersons: - Prof. V R Hentz, Dr. P. Jindal	15:30 – 16:45	Patient Case Presentations and Discussions - (ISIC Staff, New Delhi, India and All Faculty)
11:30 - 11:50 Surgical Options: Lower level injuries - (C Leclercq, Paris, France)	16:45 - 17:00	Summary

Workshop on
"Wheelchair Research and Clinical Practice:
Featuring Wheelchair Skills Training"
Venue: Auditorium, Indian Spinal Injuries Centre

Date: 7th March 2006
Time: 9:00 a.m. – 17:00

Guest Faculty:

- **Dr. Rory A. Cooper, Distinguished Professor and FISA/PVA Chair, University of Pittsburgh, School of Health and Rehabilitation Sciences & Department of Rehabilitation Science and Technology, USA**
- **Ms. Emily Zipfel,**
- **Mr. Mark McCartney**
- **Mr. Jonathon Pearlman, Graduate Student Researcher, Human Engineering Research Laboratories, VA Pittsburgh Healthcare System, USA**
- **Prof. Rosemarie Cooper,**
- **Mr. Jeremy Puhlman**
- **Dr. Amol Karmarkar**

- 09:00 – 9:45 Manual Wheelchair Selection, Fitting and Usage: Clinical Practice Guidelines
- 09:45 – 10:30 Pediatric Wheelchair Selection, Fitting, and Usage
- 10:30 – 11:00 Maintenance, Repair, and Manufacture of Wheelchairs
- 11:10 – 11:30 Tea Break
- 11:30 – 12:15 Electric Powered Wheelchairs: Research Applied to Clinical Practice
- 12:15 – 13:00 Pressure Management and Promoting Function through Seating
- 13:00 – 14:00 Lunch

Participants will split into four groups for the skills training and rotate between stations.

14:00 – 14:45	Manual WC's	Power WC's	WC Seating	Mat Assessment
14:45 – 15:30	Power WC's	WC Seating	Mat Assessment	Manual WC's
15:30 – 16:00	Tea Break			
16:00 – 16:45	WC Seating	Mat Assessment	Manual WC's	Power WC's
16:45 – 17:30	Mat Assessment	Manual WC's	Power WC's	WC Seating

Organized by Stanford-India Hand Surgery Program
 A Collaborative Program between
 Robert A Chase Hand and Upper Limb Center, Stanford University
 And
 Indian Spinal Injuries Center, New Delhi

CONTROVERSIES IN THE TREATMENT OF NEUROMUSCULAR SCOLIOSIS

Dr Abhay Nene

Spine Surgeon, P D. Hinduja National Hospital, Bombay

A structural spinal deformity secondary to dynamic neuromuscular imbalance is the challenge that spine surgeons are faced with when dealing with Neuromuscular Scoliosis.

The imbalance of the supportive musculature is usually progressive, and unpredictable, and a surgical intervention at one point in time, is expected to address even future muscular imbalances. This clearly requires enormous planning, experience, insight and attention to each related region during surgical planning. Worsening of the patient's balance post surgery is the apprehension of every surgeon venturing into these corrective operations.

Controversies revolve around the following issues:

1. Anterior or posterior surgery. If both, which one first?
2. Long segment or short segment fusion
3. To include the Pelvis or not
4. If L5-S1 junction is crossed, is there a need for a prophylactic anterior interbody fusion?
5. If associated hip deformity, and/or limb length discrepancy, which one to be addressed first?
6. Modalities of Iliac fixation.

Each of these debates have different answers in different clinical situations, and what works for one need not work for another.

An in depth analysis of the following issues is needed pre surgery:

1. Limb length discrepancy
2. Pelvic obliquity - fixed or mobile
3. Decompensation
4. Flexibility of the spinal deformity
5. Kyphosis
6. L5-S1 'oblique take off'
7. Pulmonary function
8. Ambulatory capacity pre surgery
9. Sitting balance
10. Life expectancy

Surgery is tailored after a thorough scrutiny of all the above put together.

Correct choice and execution of surgery can significantly improve the functioning of these unfortunate patients.

CONTROVERSIES IN SEXUALITY AND INFERTILITY AFTER SCI

Dr Sanjeev Sharma

Northwest Regional Spinal Center, Southport, UK

- SCI brings about sexual dysfunction.
- Affects include changes in sexuality, fertility and parenting domains.
- These changes are worse in men.
- Women have not been studied as well.

Why?

- Limitation of secondary injury more important.
- Rehabilitation of sexuality and fertility might make the primary treatment more difficult.

When?

- Restorative treatment is a slow process and should be a priority.
- Well defined hierarchy of interventions.

Life Expectancy for persons who survive the first year

Age at injury	No. SCI	Motor function at any level	Para	Low Tetra	High Tetra	Ventilator dependent
20	58.2	53.2	45.9	41.4	37.8	23.1
40	39.3	34.7	28.3	24.4	21.5	10.9
60	22.0	18.1	13.3	10.6	8.7	3.0

Marital status at Injury

Single	53%
Married	31%
Divorced	9%
Other	7%

Marital status 5 years post injury

	With SCI	Non SCI
Remain single	88%	65%
Still married	81%	89%

Management Principles

- Restorative treatment needs to be pragmatic and improve quality of life.
- Treatment should promote recovery in a stepwise manner.

Hierarchy for Quality-of Life Improvements

- Bowel and bladder function.
- Sexual function.
- Hand function.
- Breathing

Concerns

- Feeling sexually unattractive.
- Not satisfying a partner.
- Lack of personal satisfaction.
- Loss of interest.

Fertility

- Fertility in women with SCI is either not compromised or can be restored.
- Women with SCI have an excellent outcome during pregnancy.
- There is no contra indication to breast feeding.

Concerns

- SCI affects a man's sexuality both physically and psychologically.
- Men with SCI face changes in sexual activities and relationships.
- SCI also affects a man's ability to biologically father children.

Fertility

- Autonomic dysreflexia.
- Muscle cramps.

Concerns

- Type, level and severity of injury.
- Post injury interval.
- Repeated ejaculations.
- Ejaculation procedure.
- "Rehabilitation process is more efficient when attention is given to reproductive as well as the physical aspects of the disability".
- It is reasonable to assume that most patients can be helped to achieve parenthood".
- SCI patients are desirable.
- They have the opportunity to meet people, fall in love and get married.
- They have the ability to give and receive pleasure.
- Can and do enjoy active sex lives.
- Can be successful parents.

Infertility after SCI

- Epidemiology of infertility in SCI patients.
- Special considerations in spinal cord injuries.
- Medical/Surgical management in SCI males.
- Assisted conception technologies in the management of infertility after SCI.
- Spinal injury in females- Reproductive implications

Epidemiology of infertility in SCI patients

No. of New Injuries per Year (USA year 2000)

Incidence - 40 cases/million pop.
(28-55 / million)

Appx 11,000 cases/yr

Prevalence - Appx 250000 patients.
(225000 - 288000)

UK year 2000

No. of injuries - 666

Total No. of cases - 825

Total no. of New Injuries per Year

- 82% male, 18% female.
- Highest per capita rate of injury occurs between ages 16-30.
- Average age at injury - 33.4
- Median age at injury - 26
- Mode age at injury - 19

Type of Injury

- Incomplete Tetraplegia 34.5%
- Complete Tetraplegia 18.4%
- Incomplete Paraplegia 17.5%
- Complete Paraplegia 23.1%

Life Expectancy for persons who survive

The first 24 hours.

Age at injury	No. SCI	Motor function at any level	Para	Low Tetra	High Tetra	Ventilator Dependent
20	58.2	52.6	45.3	40.9	35.9	16.4
40	39.3	34.1	27.7	23.5	20.0	6.9
60	22.0	17.7	12.8	10.0	7.8	1.4

Life Expectancy for persons who survive

The first year.

Age at injury	No. SCI	Motor function at any level	Para	Low Tetra	High Tetra	Ventilator Dependent
20	58.2	53.2	45.9	41.4	37.8	23.1
40	39.3	34.7	28.3	24.4	21.5	10.9
60	22.0	18.1	13.3	10.6	8.7	3.0

- 31% patients were married at the time of SCI.
- 81% patients married 5 years later.
- 30% patients who were single at the time of SCI would marry within 15 years.

Special considerations in SCI patients

- "Rehabilitation process is more efficient when attention is given to reproductive as well as the physical aspects of the disability".
- It is reasonable to assume that most patients can be helped to achieve parenthood".

Major causes of sub fertility in SCI

- Poor semen quality
- Both sperm motility and morphology have been found to be abnormal.

- Erectile and/or ejaculatory dysfunction.

Causes of poor semen quality

- Alteration in the autonomic nervous system's regulation of normal sperm and seminal plasma.
- SCI causes permanent alteration which remains stable over time.
- Static prostatic fluid.
- Testicular hyperthermia.
- Abnormal testicular histology.
- Changes in hypo-pit-test axis.
- Anti sperm antibodies.
- Bladder management.
- Urinary catheter and lubricants.
- Increased no. of white cells in the semen.
- Retrograde Ejaculation
- Effect of heat and electric current during EEJ.

Other considerations

- Type, level and severity of injury.
- Post injury interval.
- Repeated ejaculations.
- Ejaculation procedure.

Erectile Dysfunction

- Erection (Psychogenic and Reflex) 54 - 82%
- Unassisted pregnancy rate 0 - 5%

Ejaculatory capability

- Ante grade Ejaculation 3-15%
- Complete UMN Lesion 5%
- Complete LMN Lesion 18%
- Incomplete UMN Lesion 32%
- Incomplete LMN Lesion 70%

Sperm Collection Techniques

- Vibrostimulation
- Electro ejaculation
- Hypogastric Nerve Stimulation
- Surgical Sperm Retrieval

Intra Uterine Insemination

- InVitro Fertilization
- Intra Cytoplasmic Sperm Injection
- Gamete Freezing
- Assisted Ejaculation Techniques

Problems

- Sperm collection nearly 100%, but sperm quality variable.
- Semen specimen a mixture of antegrade and retrograde.
- Need for general anaesthesia.
- Troublesome side-effects like autonomic dysreflexia.
- Specimen obtained difficult to quantify and grade.
- There is invariable contamination with urine and white cells.
- Motility is extremely poor.
- Specimen difficult to freeze.
- Intra Uterine Insemination

Indications for IUI

- Good quality semen with assisted ejaculation.
- Preferably without the need of general anaesthesia.
- No significant side effects including autonomic dysreflexia.
- Female partner to be "normal".

Procedure

- Controlled ovarian stimulation.
- Semen collection, preparation and suspension in culture medium.
- Insemination in to the uterine cavity.

- **In Vitro Fertilization**
- IVF is the next logical step in the treatment protocol.
- Fertilization rates were extremely poor.
- There were logistical difficulties of coordination of male and female treatments.
- **Intra Cytoplasmic Sperm Injection**
- ICSI, when introduced, changed the management of Male factor infertility completely including for SCI patients.
- Combination of assisted ejaculation and ICSI improved fertilization rates and therefore the pregnancy rates.

Problems

- Fertilization still not as good as for non SCI patients.
- Embryo quality relatively poor.
- Problems of coordination still present.
- **Surgical Sperm Retrieval Techniques**
- Percutaneous Epididymal Sperm Aspiration (PESA)
- Testicular Sperm Aspiration (TESA)
- Testicular Sperm Extraction (TESE)

Percutaneous Epididymal Sperm Aspiration (PESA) First described in 1994

- Simple blind aspiration with "19" gauge butterfly needle.
- Useful in obstructive azoospermia.
- Success rate of around 50%.

Testicular Sperm Aspiration

- TESA uses needle aspiration technique.
- It can be used in both obstructive and non-obstructive azoospermia.
- It has been successfully used in SCI patients.
- Success rate depends on the cause of azoospermia.

Testicular Sperm Extraction

- TESE developed from the old style testicular biopsy.
- It is essential in non-obstructive azoospermia cases.
- It has been used in SCI patients.

Surgical Sperm Retrieval Techniques

- Since both the gametes in the same laboratory, no problem of coordination.
- Fertilization rates similar to non SCI patients.
- Embryo quality also better than before.

Sperm Cryopreservation

- Sperm can be frozen in the first six months of the illness.
- Once frozen sperm can be used in future.
- Sperm can be frozen even if the patient is not in a relationship.
- HFEA regulations need to be followed.

Conclusions

- Advances in assisted reproductive techniques have opened up newer treatment modalities for SCI patients.
- Treatment is determined by the sperm quality largely.
- Method of semen collection depends on several factors but mainly on the ease of collection and quality of the specimen obtained.
- All SCI patients should be counselled about fertility where appropriate.
- Spinal Cord Injury in women "Reproductive implications"

Spinal Cord Injury in women

- There are fewer injuries in women. (Male: female, 4:1).
- Effect of SCI on reproductive function is far less dramatic.
- These effects are largely internal and less conspicuous, therefore more difficult to study.

Reproductive Implications

- Menstrual Function
- Fertility
- Contraception
- Pregnancy

Menstrual Function

- Amenorrhoea is expected in the acute phase.
- Menstrual Function returns within one year.
- Associated with Hyperprolactinaemia.
- Bone demineralization

Contraception

- Intra uterine contraceptive device.
- Oral contraceptives.
- Barrier methods.
- Others

Fertility

- Except during the acute phase with amenorrhoea, fertility is not affected.
- Absence of periods is not absence of ovulation.

Pregnancy

- Pregnancy generally has an excellent outcome in women with SCI.
- Management should be by a "team".

Pregnancy

- Pre-Conception Counselling
- Medication.
- Renal system review.
- Assessment of skeletal system.
- Pressure sores.
- Blood flow and VTE

Ante-Natal Care

- Pregnancy symptoms.
- Bladder and bowel management.
- Weight gain.

SPECIFIC DIAGNOSTIC TECHNIQUES FOR NEUROLOGIC BLADDER DYSFUNCTION

JJ Wyndaele

Chairman, Education Committee – ISCoS
Prof. of Urology, Belgium

It has become clear that

- Urodynamic tests are very useful in patients with neurologic urinary incontinence
- A combination with EMG and /or imaging adds to the diagnostic possibilities
- Filling rate can influence the outcome of several urodynamic parameters
- Evaluating sensation of filling during CMG is important for the neurological diagnosis and probably for treatment options.

Since the last decades some specific tests have been proposed for the diagnosis of LUT neuropathy. These are evaluated hereafter.

We can recommend to read ICI 2005 report in the book Incontinence which was published recently

Ice water test

The Ice water test was first described by Bors and Blinn¹ for spinal cord injured patients. It is based on the principle that stimulation of mucosal temperature receptors by rapid introduction of 100 ml water at 4°C into the bladder can elicit a spinal reflex contraction of the detrusor, a reflex that is normally inhibited by supraspinal centers. A lesion above the detrusor motor cells interrupts these inhibitory pathways, resulting in manifestation of the reflex, whereas a lesion of the motor cells does not result in reflex contraction. A positive test should therefore theoretically occur in patients with suprasacral lesions, whereas those with spinal sacral lesions and neurologically normal patients should have a negative test. Sphincter spasticity can prevent outflow of the filling fluid. Simultaneous measurement of intravesical pressure permits ruling out false negative tests.

In the more recent literature Geirsson et al² showed in a large cohort study that 97% of patients with complete and 91% of those with incomplete neurologic DOA had a positive or a false negative IWT. The study shows that the IWT is a sensitive test for differentiating lesions from sacral motor nerves and suprasacral lesions with intact sacral motor nerves. It is also a useful parameter for functional subdivision of overactive bladders.

In patients with voiding dysfunction in the absence of LUT inflammation, a positive test is an indicator of a silent or overt neurological disorder.

Geirsson and Fall³ used the ice-water test (IWT), in patients suspected of DSD (cystometry and needle EMG). The authors conclude that the cheap, non-invasive and simple IWT can replace a needle EMG study in certain conditions.

Ishigooka et al⁴ evaluated urinary bladder sensation to ice water instillation in patients with diabetes mellitus and found impairment of ice water perception to be less frequent than that of mechanoreceptor sensation in patients with diabetic cystopathy.

Ronzoni et al⁵ studied ice-water test (IWT) in 148 patients with neurologic bladder dysfunction resulting from a traumatic lesion and in 130 patients with neurologic bladder dysfunction and multiple pathogenic disorders. IWT was positive in 95% of patients affected by complete and in 86% of patients with incomplete medullary lesions. The IWT in patients with lower motor neuron medullary lesions was always negative. The test was used diagnostically in patients with lower motor neuron lesions. In those with upper motor lesions it was used as a rehabilitation method during the spinal shock phase to accelerate the appearance of the micturition reflex. In 9% of patients it was used to induce micturition during cystography. The authors consider IWT as a useful complement to urodynamic examinations in patients with neurological bladder disease.

Chancellor et al⁶ in spinal cord injured (SCI) patients, found that IWT did not contribute to their management because of the insensitivity and nonspecificity.

Summary

- The literature results from IWT show some value in the diagnosis of neurologic bladder and in the differentiation between reflex and areflex neurologic bladders. However studies are contradictory and further studies will have to be done to position this test more clearly in the diagnosis of neurologic urinary incontinence. Meanwhile the test should be interpreted in the light of all data from the diagnostic evaluation. Its use is optional.

Bethanechol supersensitivity test

The Bethanechol test was developed by Lapedes et al⁷ to try to distinguish between a neurologic and a myogenic etiology in the presence of an acontractile bladder. It is based on the observation that after an organ is deprived of its nerve supply, it develops hypersensitivity to the normal excitatory neurotransmitters for that organ. A neurologically intact bladder should have a pressure increase of less than 15 cm H₂O above the control value 10-20 minutes (or when sweating shows reaction on the drug has started) after subcutaneous injection of 5 mg bethanechol, whereas a denervated or decentralized bladder shows a response greater than 15 cm H₂O. The filling rate should be equal in both tests before and after bethanechol to permit comparison. A positive test suggests an interruption in the afferent or efferent peripheral or distal spinal innervation of the bladder. However, the test has been considered not very reliable by some⁸ and reliable by others⁹⁻¹⁰.

Sidi et al¹¹ studied patients with neurologic or nonneurologic detrusor areflexia with the bethanechol supersensitivity test, EMG of the urethral rhabdosphincter and bulbocavernosus reflex latency and found the sensitivity of these tests in detecting neurologic areflexia to be 90, 87.5 and 78.1 per cent, respectively, and the specificity 95.6, 76 and 80 per cent, respectively. When all 3 tests were performed together the combined accuracy approached 100%. They conclude that these combined tests are useful in the diagnosis of patients with equivocal bladder neurologic conditions and in those with subtle neurological lesions.

Wheeler et al¹² found the positive BST not diagnostic of neurologic detrusor areflexia because of the many variables that can influence the test.

In a study of 1990 Wheeler et al¹³ suggest that flow rate, surface electromyography, and bethanechol supersensitivity test can not help differentiate neurologic from non-neurologic detrusor failure. Although not one test can accurately differentiate neurologic from nonneurologic female urinary retention, careful neurourologic evaluation will help guide to more appropriate management.

Summary

- The literature on the value of the bethanechol test for the diagnosis of neurologic pathology is contradictory. Several authors state that a positive bethanechol supersensitivity test (BST) usually indicates neurologic detrusor areflexia. Others are more cautious and position the test as one of many in the global evaluation of neurologic LUT dysfunction. The bethanechol supersensitivity test is an optional test

for differentiation between neurologic and non neurologic detrusor areflexia but the test has its limitations. Its result should be interpreted in the total of diagnostic results.

Electrodiagnostic tests

EMG of Sphincter

- Nordling and Meyhoff¹⁴ used cystometry in combination with urethral and anal sphincter EMG in patients with suspected neurologic bladder dysfunction and found anal sphincter EMG to be highly unreliable in the diagnosis of urethral sphincter dysfunction. Koyanagi et al¹⁵ also found in male patients with SCI, discordant activities between the anal and the external urethral sphincters in 39 per cent. The degree of bladder dysfunction was related more to the degree of dyssynergia of the urethral than the anal sphincter.
- Bauer et al¹⁶ found EMG of the external urethral sphincter helpful in predicting which children with myelodysplasia and ileal conduit would be continent after undiversion and in managing the neurologic bladder postoperatively.
- Fowler et al¹⁷ introduced a technique of recording the EMG activity of striated muscle in the urethral sphincter by using a concentric needle electrode and an oscilloscope with a delay line and trigger. Individual motor units were isolated and measured. Also Vodusek¹⁸ studied individual motor units. Both conclude that quantitative EMG may be a helpful technique in the investigation of patients with disorders of micturition.
- Light et al¹⁹ investigated patients with detrusor areflexia and a high spinal cord lesion with EMG of the pelvic floor muscles, lumbosacral-evoked potential to tibial nerve stimulation, the bulbocavernosus reflex and water cystometry. Of those patients with initial detrusor areflexia evidence was found for a subclinical second lesion involving the lumbosacral arc, which accounted for the acontractile bladder. In the remaining patients who had an intact sacral reflex arc, a detrusor contraction developed after a mean of 16.6 months from the date of injury. They found that the most predictive neurophysiological test was EMG of the pelvic floor.
- Ziemann and Reimers²⁰ found the sphincter EMG the most sensitive technique in the diagnosis of chronic pudendal lesions. However, pure afferent lesions cannot be detected by the sphincter EMG. In this case, the BCR, using unilateral stimulation of the dorsal nerves of the penis, provides the opportunity to distinguish between afferent and efferent lesions of the sacral innervation.
- Fowler²¹ concluded that sphincter electromyography (EMG) has proved to be particularly valuable in identifying patients with parkinsonism who have multiple system atrophy. Tests which examine aspects of nerve conduction velocity have proved to be of lesser value both because such investigations test conduction of nerve fibres rather than levels of innervation, and furthermore examine large myelinated fibre conduction rather than that of the unmyelinated fibres which comprise the autonomic innervation.

Summary

- EMG can be valuable in the diagnosis of patients with neurologic bladder dysfunction.
- EMG of the anal sphincter can be unreliable for the evaluation of LUT function.
- EMG of the urethral sphincter can be recommended as diagnostic method in patients with neurologic LUT dysfunction and neurologic urinary incontinence

EMG of Detrusor muscle

- Has been very little studied in neurologic patients. We have to consider the technique as still experimental and not fit for clinical diagnostics at this time.

Dynamic Bulbocavernosus reflex (BCR)

- Very little data on bulbocavernosus -external sphincter conduction measurement exists in the literature, and this technique thus still has to be considered as experimental.

Nerve conduction study

- Few data are found in the literature on nerve conduction studies for LUT neurologic problems.
- There are some arguments that the technique can be useful in the further differentiation of the nerve deficits in cases in diabetes and spinal cord lesion.

Somatosensory evoked potentials (SSEP)

- Somatosensory evoked potentials can be of use in the further diagnosis of nervous deficits related to LUT dysfunction (Grade C).

Electrosensitivity in the LUT

Measurement of the sensory threshold of the LUT towards electrical stimulation was performed already in the 19th century. After re-introduction of the technique by Markland et al²² several authors have studied its value in neurologic bladder dysfunction.

- Frimodt- Möller²³ described pathological electrosensation in patients with Parkinson's disease, with multiple sclerosis and meningomyelocele. He also found abnormal electrosensation in half of patients with diabetes and generalized sensory neuropathy, but only in 10% of the diabetic patients with a neurologic bladder.
- Kieswetter²⁴ and Powell and Feneley²⁵ demonstrated abnormal electrosensation in patients with neurologic LUT dysfunction.
- Wyndaele²⁶ determined the threshold of sensitivity to electrical stimulation in several parts of the LUT in 436 consecutive patients. In the groups with different patterns of disturbed sensation a higher incidence of neuropathy was found than in the group with a normal sensation. Further neurological investigation revealed abnormal innervation in 29% of patients who lacked electrosensitivity in one or more parts of the LUT but who had shown no previous evidence of neuropathy.
- Electrosensation proved present in many meningomyelocele patients with absent skin sensation and absent reflexes and in many patients with suspected complete spinal cord injury on clinical evaluation²⁷⁻²⁸.
- Standardization is necessary for reproducible results²⁹.

Summary

- Determination of electrosensation in the LUT is valuable to evaluate the afferent innervation.
- Absent electrosensitivity may help to decide on further neurologic tests in patients with LUT dysfunction of unknown cause.
- The determination of electrosensitivity in the LUT can be recommended for evaluation of the afferent innervation in patients with a known neurologic disease and in patients with idiopathic LUT dysfunction if neurologic pathology is suspected.

Sympathetic skin response

Publications by Schurch et al³⁰ and Rodic et al³¹ indicate that sympathetic skin responses seem of value to evaluate the integrity of the LUT related sympathetic function and especially for bladder neck competence, incompetence and dyssynergia. The technique seems promising and the further study of them is recommended for the evaluation of the LUT sympathetic innervation.

References

1. Bors, E.H., Blinn, K.A.: Spinal reflex activity for the vesical mucosa in paraplegic patients. *Arch Neurol Psychiatry* 78: 339; 1957.
2. Gellrsson, G., Fall, M., Lindstrom, S.: The ice-water test--a simple and valuable supplement to routine cystometry. *Br J Urol.* 71:681,1993.
3. Gellrsson, G., Fall, M.: The ice-water test in the diagnosis of detrusor-external sphincter dyssynergia. *Scand J Urol Nephrol*, 29: 457, 1995
4. Ishigooka, M., Hashimoto, T., Hayami, S., Suzuki, Y., Ichianagi, O., Nakada, T.: Thermoreceptor mediated bladder sensation in patients with diabetic cystopathy. *Int Urol Nephrol*, 29: 551, 1997
5. Ronzoni, G., Menchinelli, P., Manca, A., De Giovanni, L.: The ice-water test in the diagnosis and treatment of the neurologic bladder. *Br J Urol*, 79: 698, 1997
6. Chancellor, M. B., Lavelle, J., Ozawa, H., Jung, S.Y., Watanabe, T., Kumon, H.: Ice-water test in the urodynamic evaluation of spinal cord injured patients. *Tech Urol*, 4: 87, 1998
7. Lapidés, J., Friend, C. R., Ajemian, E. P., Reus, W.F.: A new method for diagnosing the neurologic bladder. *Med Bull (Ann Arbor)*, 28: 166, 1962
8. Blaivas, J. G., Labib, K. B., Michalik, S. J., Zayed, A.A.: Failure of bethanechol denervation supersensitivity as a diagnostic aid. *J Urol*, 123: 199, 1980
9. Penders, L.: [The bethanechol test in the diagnosis of neurologic bladder. 60 cases]. *J Urol (Paris)*, 89: 309, 1983

10. Pavlakakis, A. J., Siroky, M. B., Krane, R. J.: Neurologic detrusor areflexia: correlation of perineal electromyography and bethanechol chloride supersensitivity testing. *J Urol*, 129: 1182, 1983
11. Sidi, A. A., Dykstra, D. D., Peng, W.: Bethanechol supersensitivity test, rhabdosphincter electromyography and bulbocavernosus reflex latency in the diagnosis of neurologic detrusor areflexia. *J Urol*, 140: 335, 1988
12. Wheeler, J. S., Jr., Culkin, D. J., Canning, J. R.: Positive bethanechol supersensitivity test in neurologically normal patients. *Urology*, 31: 86, 1988
13. Wheeler, J. S., Jr., Culkin, D. J., Walter, J. S., Flanigan, R.C.: Female urinary retention. *Urology*, 35: 428, 1990
14. Nordling, J., Meyhoff, H. H.: Dissociation of urethral and anal sphincter activity in neurologic bladder dysfunction. *J Urol*, 122: 352, 1979
15. Koyanagi, T., Arikado, K., Takamatsu, T., Tsuji, I.: Experience with electromyography of the external urethral sphincter in spinal cord injury patients. *J Urol*, 127: 272, 1982
- Wyndaele, J. J.: Correlation between clinical neurological data and urodynamic function in spinal cord injured patients. *Spinal Cord*, 35: 213, 1997
16. Bauer, S. B., Colodny, A. H., Hallet, M., Khoshbin, S., Retik, A.B.: Urinary undiversion in myelodysplasia: criteria for selection and predictive value of urodynamic evaluation. *J Urol*, 124: 89, 1980
17. Fowler, C. J., Kirby, R. S., Harrison, M. J., Milroy, E.J., Turner-Warwick, R.: Individual motor unit analysis in the diagnosis of disorders of urethral sphincter innervation. *J Neurol Neurosurg Psychiatry*, 47: 637, 1984
18. Vodusek, D. B.: Individual motor unit analysis in the diagnosis of urethral sphincter innervation. *J Neurol Neurosurg Psychiatry*, 52: 812, 1989
19. Light, J. K., Faganel, J., Beric, A.: Detrusor areflexia in suprasacral spinal cord injuries. *J Urol*, 134: 295, 1985
20. Ziemann, U., Reimers, C. D.: Anal sphincter electromyography, bulbocavernosus reflex and pudendal somatosensory evoked potentials in diagnosis of neurologic lumbosacral lesions with disorders of bladder and large intestine emptying and erectile dysfunction. *Nervenarzt*, 67: 140, 1996
21. Fowler, C. J.: Investigational techniques. *Eur Urol*, 34 Suppl 1: 10, 1998
- Shenot, P. J., Rivas, D. A., Watanabe, T., Chancellor, M.B.: Early predictors of bladder recovery and urodynamics after spinal cord injury. *Neurourol Urodyn*, 17: 25, 1998
22. Markland, C., Chou, S., Swaiman, K. F., Westgate, H.D., Bradley, W.E.: Evaluation of neurologic urinary dysfunction. *Surg Forum*, 16: 504, 1965
23. Frimodt-Moller, C.: A new method for quantitative evaluation of bladder sensibility. *Scand J Urol Nephrol*, 6: Suppl 15:135, 1972
24. Klesswetter, H.: Mucosal sensory threshold of urinary bladder and urethra measured electrically. *Urol Int*, 32: 437, 1977
25. Powell, P. H., Feneley, R. C.: The role of urethral sensation in clinical urology. *Br J Urol*, 52: 539, 1980
26. Wyndaele, J. J.: Is abnormal electrosensitivity in the LUT a sign of neuropathy? *Br J Urol*, 72: 575, 1993
27. Wyndaele, J. J.: Investigation of the afferent nerves of the LUT in patients with 'complete' and 'incomplete' spinal cord injury. *Paraplegia*, 29: 490, 1991
28. Ersoz, M., Akyuz, M.: Bladder-filling sensation in patients with spinal cord injury and the potential for sensation-dependent bladder emptying. *Spinal Cord*, 42: 110, 2004
29. De Wachter, S., Wyndaele, J. J.: Quest for standardisation of electrical sensory testing in the LUT: the influence of technique related factors on bladder electrical thresholds. *Neurourol Urodyn*, 22: 118, 2003
30. Schurch, B., Curt, A., Rossier, A. B.: The value of sympathetic skin response recordings in the assessment of the vesicourethral autonomic nervous dysfunction in spinal cord injured patients. *J Urol*, 157: 2230, 1997
31. Rodic, B., Curt, A., Dietz, V., Schurch, B.: Bladder neck incompetence in patients with spinal cord injury: significance of sympathetic skin response. *J Urol*, 163: 1223, 2000

ROLE OF ANTICOAGULATION IN PATIENTS WITH SCI 30 YEARS OF EXPERIENCE (1975-2005)

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Anticoagulation - Goal

- Preventing thrombo-embolism
- But Avoiding hemorrhage
- SCI Patients Who May Receive Anticoagulation

VTE Prophylaxis

- Post operative:
- Orthopedic Abdominal
- Prolonged immobilization Fractures
- Pressure ulcers
- Pregnancy
- Malignancy

Therapeutic

- Venous thromboembolism

ACUTE PHASE of SCI Incidence With Prophylaxis is 6-30% Initial DVT/PE Associated With

- Extensive trauma
- Multiple fractures
- Surgery
- Unhealed wounds
- Severe infection
- Coagulation Anomalies

Inadequate or early withdrawal of prophylaxis CHRONIC PHASE OF SCI Incidence Without Prophylaxis: 1%

- Most VTE occurring 2 to 5 years post SCI
- Associated with fresh tissue trauma and/ or active inflammation
- Recent surgery including plastic flap repair
- Infections
- Fractures
- Respiratory complications
- Anticoagulation Prophylaxis For DVT Following Acute SCI Current Recommendations

Acute SCI

8 weeks: for uncomplicated complete motor injury

12 weeks: or till ambulatory or till discharge from rehabilitation

Chronic SCI: Reinstitution of prophylactic measures if

- Immobilized for a prolonged period
- Readmitted for medical illnesses or altered medical conditions
- Undergo surgical procedures
- Our Approach To Heparin Anticoagulation

Unstable As Well As Very Low Risk And Stable Patients:

- LD Unf Heparin, SubCut. every 8 hrs,
- Adjusted to (\pm 3 sec) upper limit of ref. range of APTT
- APTT- just before the next injection
- Maximum 25,000 units/day- then IV
- May change to LMWH when stable
- Our Approach To Heparin Anticoagulation

Low risk, stable or difficult to draw blood:

- LMW Heparin (Enoxaparin) 30 mg every 12 hrs
- Anti Xa test- 4 hrs after last injection
- Check again if patient condition changes
- Check level more often in obese, with kidney disease

WARFARIN IS GIVEN

If Patient stable,

Or needs long term anticoagulation

Or sensitive or resistant to heparin:

Warfarin- INR 2-3 gradual increase and withdrawal

Anti-Xa Monitoring Of LMWH

- Anti-Xa activity represents amount of heparin but not antithrombotic efficacy or bleeding risk
- Routine monitoring by anti-Xa assay is not currently indicated. More useful in SCI patients
- Same concentration of heparin may have varying effects in different plasmas and patients
- Comparability between commercial anti-Xa chromogenic assays is poor.
- Anti-Xa assays useful in pregnant women and infants
- Heparin Drug Interactions

Heparin Drug Interactions

Drugs Enhancing Heparin Effect

- Platelet inhibitors:
 - Acetylsalicylic acid, phenylbutazone, ibuprofen, indomethacin, dipyridamole, hydroxychloroquine, dextran, and others. may induce bleeding
- Oral anticoagulants: Heparin may prolong PT
 - -PT at least 5 hrs after last IV dose
 - -24 hours after the last subcutaneous dose.
- Antithrombin III (human) -Concurrent treatment in hereditary antithrombin III deficiency.

Drugs Decreasing Heparin Effect

- Digitalis
- Tetracyclines
- Nicotine
- Antihistamines

Not mixed with Heparin Sodium Injection (precipitate)

- Ciprofloxacin
- Doxorubicin
- Droperidol
- Mitoxantrone
- Heparin Sensitivity

Local Irritation

- Erythema, mild pain, hematoma or ulceration after deep subcutaneous injection

Hypersensitivity

- Generalized hypersensitivity-chills, fever, urticaria, asthma, rhinitis, lacrimation, headache, nausea, vomiting,
- Anaphylactoid reactions including shock are rare
- Itching/ burning, on the plantar site of feet
- Thrombocytopenia- incidence - 0 to 30%. often mild and of no clinical significance, or severe thromboembolic complications such as skin necrosis, gangrene of extremities, myocardial infarction, pulmonary embolism, stroke and possibly death.

Heparin Induced Thrombocytopenia

- 3% patients receiving IV unfractionated heparin for treatment of VTE.
- 0.5% with lesser heparin exposures: prophylactic subcutaneous doses, flushes for arterial catheters, tiny amounts of heparin leaching from coated vascular catheters
- 0.5% with Low-molecular-weight heparin
- Cross reaction between Unf. Hep and LMWH

Thrombocytopenia after heparin in Patients with SCI

- Less than 1% -mild, of no clinical consequence
- Severe thrombocytopenia associated with clinically important thrombosis not seen on our service in last 20 years

Factors Affecting Dose Response of Warfarin

- Poor compliance

- Other medication

Taken simultaneously

- "Over the counter" medications
- Switching between brand name & generic Warfarin
- •Diet content of Vit K-Multivitamin preparations
- •Alcohol
- •Fat malabsorption
- •Liver dysfunction
- •Hypermetabolic state
- **Warfarin-drug Interactions**
- Many drugs interact
- Drugs commonly given to patients with SCI and their interaction with Warfarin (Table -Handout available on request)
- Pharmacist supervision very useful
- Herbal medicine

Warfarin And Diet: Vitamin K

Foods Very Low in Vitamin K

- Starches, breads, fruits, dairy products, meat, fish, poultry, nuts, tofu, fats, sugar.

Low vitamin K foods (less than 40 mcg)

- Artichoke, asparagus, beets, red cabbage, carrots, cauliflower, celery, cilantro, corn, peeled, cucumber, eggplant, green beans, green pepper, mushrooms, onion, parsnip, radish, potato, summer squash, tomato, turnip.

Medium vitamin K foods (100-250 mcg)

- Broccoli, brussels sprouts, endive, green cabbage, chayote, garbanzo beans, lettuce, lentils, liver, mustard greens, parsley, spinach, soy beans, tomato, turnip greens, watercress.

High vitamin K foods (greater than 250 mcg)

- Algae, canola oil, green tea, kale, natto, seaweed, swiss chard, soy bean oil, tea from tonka beans, Green tea, wheat grass powder. Green leafy vegetables, Coriander leaves, Basil,
- Cranberry juice
- Limit salad oil, canola oil, and soy bean oil to 2 tablespoons per day.
- Warfarin Anticoagulation Control In Patients With SCI In Comparison To Able Bodied Ones
- Percentages for SCI lower than in able-bodied population
- Anticoagulation control in able-bodied population (Literature)
- 58% to 66% patients in range
- 57% to 74% of the time INR in range
- Retrospective review of Charts of 25 patients with SCI on Warfarin for DVT or AF (June 1994 to June 1999).
- Data -1year for each SCI patient. INR goal = 2 to 3
- 40% (10) spent 60-75% time in therapeutic control
- 60% (15) patients spent < 50% time in therapeutic control

Self INR Measurement At Home

- Successful in some centers in Able bodied persons
- Tried in SCI- no survey available

SCI Patients: Causes of Failure To Stay In Target INR

- Extremely narrow therapeutic index: Frequent monitoring.
- Hypercoagulable due to venous stasis, immobilization, medical conditions.
- Frequent antibiotics for UTI, infections, pneumonia (interact with anticoagulant)
- Unable to maintain consistent, regular diets.

SCI Patients: Causes of Failure To Stay In Target INR (contd.)

- Limited Laboratory access in this population
- Use of Herbal and or alternative medicines without knowledge of physician
- Consumption of alcohol and substance abuse
- Patients unable to comply with taking medicine regularly - attendant and access issues.
- Reversal Of Oral Anticoagulation A few important points

Life threatening haemorrhage

- Weigh risks of inducing hepatitis and HIV with plasma concentrates,
- Possible thrombotic dangers of correction with vit K1
- Concentrate of factor II, IX, X with factor VII.
- Less severe haemorrhage-hematuria, epistaxis
- Withhold warfarin for 1-2 days, give fresh frozen plasma.

INR of > 6.0

- Stop warfarin. Consider giving FFP irrespective of haemorrhage.

INR of > 4.5 without haemorrhage

- Withdraw warfarin for one or two days and review.
- Unexplained bleeding at therapeutic levels
- Investigate possibility of underlying cause.

Vitamin K1 Administration for Reversal of Elevated INR

- Phytonadione can be withheld in younger patients requiring maintenance Warfarin dose exceeding 50 mg per week.
- Oral vitamin K1 at doses of 2.5 to 5.0 mg minimizes overcorrection.
- Intravenous doses of 0.5 mg usually effective, slow infusion rate < 1 mg/min reduce anaphylaxis risk

Transition OR Bridging the Anticoagulants

- Outpatient procedures - reversal of warfarin
- Inpatients - from heparin to warfarin

Patients receiving both Heparin and Warfarin: draw blood for PT/INR at least

- 5 hours after the last IV bolus dose of heparin, or
- 4 hours after cessation of a continuous IV infusion of heparin
- 24 hours after the last subcutaneous heparin injection.
- Small in the INR (drop of 0.3 to 0.8) may occur when unfractionated heparin D/C

APTT and PT are affected by Heparin and Warfarin

- Initial Warfarin therapy - heparin interference of minimal clinical significance.
- Unfractionated Heparin may affect both PT/INR: patients receiving both heparin and Warfarin should have blood for PT/INR drawn at least:
 - 5 hours after the last IV bolus dose of heparin
 - 4 hours after cessation of continuous IV heparin
 - 24 hours after last subcutaneous heparin injection.
- Warfarin may increase APTT, even in the absence of heparin.

Peri-surgical Anticoagulation For Patients On Long Term Anticoag. : Choices

- Continuing OAC throughout the perioperative period
- Minimalist strategy: withhold warfarin 4 days before procedure restart night of procedure
- Aggressive strategies:

IV heparin or SC low-molecular-weight heparin-no consensus

When To Stop Anticoagulation before Surgery

INR: Returns to normal

Younger --- 3-4days

Older ----- 5 days

When INR is 2 start UF heparin or LMWH

When INR 1.5 or below surgery can be done

- UF heparin: If DVT less than 3 months, OR very high risk Discontinue 2 hrs before surgery
 - LMWH: Discontinue 8-12 hrs before catheterisation by anesthetist Antiplatelet drugs
- Aspirin: stop 5-7 days before
NSAIDS: stop 2-10 hrs before
Cox 2 inhibitors: - no effect

How Long To Give Anticoagulation Post Surgery?

- Orthopedic surgery - for a month after surgery.
- Urology- Not known
- Atrial fibrillation or mechanical valves - individualized risk assessment for stroke.
- INR not to drop <2.0 for those with stroke, peripheral thromboembolism, or VTE within previous month.

- Stop Hep or LMWH 12-24hrs before surgery, start 12-24 hrs after surgery.

Combining Anticoagulants and Anti-platelet Drugs

- Danger of increased bleeding
- Many SCI patients take drugs for pain

NSAIDS, Naproxyn, Acetylsalicylic acid (Aspirin), Ibuprofen, Phenylbutazone, Indomethacin

- Drugs for Stroke-Dipyridamole (persantin) Ticlopidine hydrochloride (Ticlid) Clopidogrel (Plavix)
- Others - Dextran, Hydroxychloroquine
- Alternative pain meds-Acetaminophen, Salsalate
- Herbals -Turmeric, Garlic, others
- Combining Anticoagulants And Antiplatelet Drugs
- Dose adjustments to reduce antiplatelet drugs
- Do not D/C NSAIDS suddenly
- Anti-inflammatory Drug Options While Taking Warfarin
- Non-acetylated salicylate drugs:

Choline magnesium salicylate (Trilisate) salsalate (Disalcid)

- Cox-2 inhibitors: theoretically No effect on platelets and warfarin anticoagulation (2-5mg dose) in healthy but increased PT and bleeding risk in elderly
- Non pharmacological modalities

Graded Compression Elastic Stockings (TED Hose)

- Effective method, relatively easy to use, inexpensive.
- Significantly decrease post-surgical DVT
- When used in combination with low-dose heparin.
- Elderly population may find them difficult to put on independently
- If not applied correctly -can result in circulatory complications.

Intermittent Pneumatic Leg Compression (IPC)

- As effective in preventing DVT as low-dose heparin for moderate-risk, general surgery
- More expensive than low-dose heparin.
- Challenges with application and compliance. (functioning appropriately in 48% patients in the hospital, 33% patients in a nursing home).
- Not a good adjunctive therapy for home care use

Vena Cava Filters In SCI Patients

- Approximately 14% trauma patients not candidates for either IPC or anticoagulation.
- Anticoagulate if one can, as DVT risk high, may be accelerated by filter (Decousus et al. New England Journal of Medicine 1998; 338: 409 -15)
- Acute phase -Temporary IVC preferred
- Postural displacement of IVC in SCI Patients

Determining The Duration of Anticoagulation In Patients With Spinal Cord Injury At Risk For Venous Thrombo-embolism

Optimal Duration of Prophylaxis For DVT/PE??

- There is no fixed period after SCI when the risk ceases to exist.
- Clinical criteria alone (e.g. return of spasticity and wheelchair ambulation) help, but may not indicate absence of risk.
- Risk of DVT after unmonitored D/C- 5% able bodied, 20% SCI
- Discontinue prophylaxis when "clinical + lab tests" indicate

A reasonably decreased degree of risk Duration of Prophylaxis should be Individualized D/C Anticoagulation When

- ✓ Clinical / lab tests indicate satisfactory decrease in risk for venous thrombo-embolism

Determining Duration of Prophylactic Anticoagulation

- Wheelchair ambulation resumed
- Stasis (activity level, post-thrombosis syndrome, Heterotopic ossification, interest in self-care, lifestyle)
- No Inflammation
- Lab tests (D-D, Fibrinogen, ESR) satisfactory
- D-Dimers normal after D/C anticoagulation

Duration of VTE Prophylaxis in SCI Patients will vary according to

- To prevent DVT in acute phase of SCI:
- 3 months: uncomplicated, no past/family h/o VTE
- Monitored : tissue trauma, fractures, infections, metabolic disorders, respiratory deficit, subsequent surgery, VTE (1st episode)

2. To prevent DVT in chronic SCI during high risk periods: Variable

- Surgical procedures
- Prolonged immobilization-pressure sores, fractures
- Medical illnesses or altered medical conditions

Duration of VTE Prophylaxis in SCI Patients Will Vary According To

- After a previous DVT: 3-6 months or monitor;
- Without a provoking cause
- After a reversible cause, Proximal DVT
- Calf vein thrombosis, idiopathic or provoked
- Long term anticoagulation- acute/chronic SCI
- Recurrent DVT, massive PE
- Poor cardiopulmonary reserve
- Severe post-thrombotic syndrome, compressive lesions
- Inherited / acquired thrombophilia with one episode of VTE

Successful Anticoagulation Involves

- Suitable choice of drug
- Close Monitoring (reliable testing systems)
- Pharmacy support and Intervention
- Physician and Patient education - Information on drugs, food and Herbs interaction
- Continual review- Clinical and Lab- one specialized person or clinic understanding the variables in SCI preferable

CONTROVERSIES RELATED TO IMMOBILISATION OF SPINE WITH ORTHOSES IN THORACOLUMBAR TRAUMA

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Orthotic (conservative) management of spine trauma has always been a controversial issue, and has raised numerous questions about its efficacy and acceptance. There have not been many articles or documentation on this issue. In our opinion this issue has not been addressed sufficiently. Specific guidelines are not available to help decide whether surgery or an orthotic device will be more helpful for a certain kind of spine trauma. There have been many incidences where a patient had to go through surgery even though biomechanical/orthotic intervention would have been sufficient enough.

This talk will touch upon various pathologies which can be effectively managed conservatively and will try to bring out points of controversy and address them individually. It will also talk about the various orthoses available for those conditions.

DILEMMAS IN THE USE OF OUTCOME MEASURES IN SPINAL CORD INJURY PATIENTS

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Background: Spinal cord injury is a major insult to one's body resulting in varying consequences from no impairment to complete dependency. Effects of SCI are widespread. It can be seen in the patient's family, workplace as well as in the society. Like any other disease or injury it is important to have some instrument to assess the effectiveness of a treatment program in such patients. By using such an instrument before the initiation of a treatment program and after a certain period of time we can assess the progress of the patient as well as the cost-effectiveness of the program.

There are number of assessment scales developed and modified in different times and place. Most of these scales have one or other limitation. Moreover most of these scales are

developed in western countries. Therefore in our Indian settings their use becomes more difficult.

Scales used: Numerous scales have been used to evaluate SCI patients. These scales may be divided into two different categories.

I. Scales scoring neurological examination findings: Motor function is the primary determinant of overall function following SCI. Therefore; an accurate diagnosis of the level and completeness of SCI and a detailed assessment of neurologic function is essential for prognostication.

1. Frankel scale (1969)¹: Has five grades- A to E. It is based on sensory and motor examination.

Table 1: Frankel scale

Scales		
A	Complete	Motor and sensory function below the segmental level absent.
B	Sensory only	Some sensation present below the lesion but the motor paralysis is complete below that level.
C	Motor useless	Some motor power present below the lesion but of no practical use to the patient.
D	Motor useful	There is some useful motor power present below the level of the lesion.
E	Recovery	Free of neurologic symptoms, that is, no weakness, no sensory loss, and no sphincter disturbances. Abnormal reflexes may be present

1. University of Miami Neuro-Spinal Index (1980)²: It has two subscales, motor and sensory. The motor scale scores zero to five-point scale for 44 muscle groups, resulting in a possible range of scores from zero to 220. Sensory scoring is a three-point scale for pinprick and vibratory sensation in 30 dermatomes on each side of body.
2. Yale scale (1981)³: The motor scale scores zero to five-point scale for 10 selected muscle groups from each side of the body. Sensory function is scored on a zero to two-point scale for superficial pain, position sense, and deep pain.
3. ASIA (American Spinal Injury Association) impairment scale: Modified from Frankel scale. Based on sensory and motor examination. It classifies completeness of the injury.

II. Functional outcome scales: These scales focus on functional skills

1. Barthel index (BI): It has ten ratable patient skill items. Values are assigned to each item (Zero, five points or ten points) based on amount of physical assistance required to perform each task. A BI total score ranges from zero to 100 (Zero: fully dependent, 100: fully independent).
2. Modified Barthel index (MBI): It is modified from the original BI by changing the three step scoring system to five-step system and modified 15-item scale. Maximum possible score remains 100.
3. Functional independence measure (FIM): It was developed to provide uniform assessment of severity of patient disability and medical rehabilitation outcome.
4. Quadriplegic index of function (QIF): It was developed in 1980 to overcome the limitation of BI in sensitivity to document small but significant functional gains made by tetraplegics. It consists of 10 functional categories with a total score of 100. The QIF has been found to be a better indicator of motor recovery than the FIM and is a more sensitive evaluation because it can reflect small gains in function that parallel small strength gains.⁴
5. Spinal cord independence measure (SCIM): It was developed to assess the capacity of the individual patient with a spinal cord lesion to perform daily tasks.⁵ It consists of a 18 individual tasks grouped in three areas of functions with a total scoring range of zero to 100.
6. Walking index for spinal cord injury (WICSI): It was developed to measure more precisely gradation of physical assistance and device required for walking after spinal cord injury in clinical studies.⁶

7. Spinal cord injury functional ambulation inventory (SCI-FAI): It is a functional observational gait assessment instrument developed at the University of Miami that addresses three key domains of walking function in individuals with SCI: gait parameters/ symmetry, assistive device use, and temporal distance measures.⁷

Asia Impairment scale, Functional independence measure (FIM), and Spinal cord independence measure (SCIM) are the most commonly used scales.

ASIA Impairment scale

ASIA (American Spinal Injury Association) impairment scale of SCI has been accepted as the most accurate and reliable instrument for documenting neurologic status following SCI. It requires determination of both motor and sensory levels bilaterally, as well as determination of completeness of injury. Impairment is graded on a five-point scale, which is a modified version of the Frankel scale. Frankel scale was replaced in 1992 by ASIA impairment scale. The scale was revised in 1996 and again in the year 2000. To determine motor level of injury, ten key muscles representing specific spinal levels are tested bilaterally using the standard six-point (zero to five) manual muscle testing (MMT) scale. An individual with no neurologic deficit has an ASIA Motor Score (AMS) of 100 points (50 points each for left and right sides of the body or 50 points each for the bilateral upper extremities and the bilateral lower extremities).

Table 2: Key muscles

Spinal level	Key muscle
C5	Elbow flexors
C6	Wrist Extensors
C7	Elbow extensors
C8	Finger flexors
T1	Finger abductors
L2	Hip flexors
L3	Knee extensors
L4	Ankle dorsiflexors
L5	Long toe extensors
S1	Ankle plantar flexors

Sensory level is determined by testing key points in each of twenty-eight dermatomes on both the right and left sides of the body. Both pinprick and light-touch sensations are tested in each dermatome. Sensory function is scored on a three-point scale (zero to three). The total possible score for each of the sensory modalities is 112 points.

Table 3: ASIA impairment scale

A	Complete	No motor or sensory function is preserved in the sacral segment S4 and S5
B	Incomplete	Sensory but not motor function is preserved below the neurological level and extends through the sacral segment S4 and S5
C	Incomplete	Motor function is preserved below the neurological level, and more than half of the key muscles below the neurological level have a muscle grade less than 3
D	Incomplete	Motor function is preserved below the neurological level, and at least half of the key muscles below the neurological level have a muscle grade 3 or more
E	Normal	Motor and sensory function are normal

Functional independence measure

The FIM was initially developed in 1983-84 for the disabled population in general, not specifically for SCI patients. The FIM is a reliable and valid instrument and is sensitive to functional changes during rehabilitation. Dodds et al assessed FIM with respect to validity and reliability and concluded that FIM had high internal consistency, adequate discriminative capabilities and was good indicator of burden of care.⁸ The FIM consist of 18 items under two groups (motor and cognitive) in six areas. Each of these 18 functions is evaluated using a seven-point scale depending on the level of independence.

Table 4: Scoring scales of FIM

L E V E L S	7 Complete independence (timely, safely)	No Helper
	6 Modified independence (device)	
	Modified Dependence	Helper
	5 Supervision (Subject= 100% +)	
	4 Minimal assistance (Subject= 76% +)	
	3 Moderate assistance (Subject= 50% +)	
	Complete Dependence	
	2 Maximum assistance (Subject=25% +)	
	1 Total assistance (Subject= less than 25%)	

Table 5: FIM

Motor			Cognitive		
Areas	Items	Score	Areas	Items	Score
Self care	Eating		Communication	Comprehension	
	Grooming			Expression	
	Bathing				
	Dressing- upper body		Social cognition	Social interaction	
	Dressing- lower body				
	Toileting				
Sphincter control	Bladder management			Problem solving	
	Bowel management			Memory	
Transfer	Bed, Chair, Wheelchair				
	Toilet				
	Tub, Shower				
Locomotion	Walk/ Wheelchair				
	Stairs				
Motor Subtotal Score			Cognitive Subtotal Score		
Total FIM Score (Motor subtotal + Cognitive subtotal) =					

The scale used assigns to each sub score a value of 1 to 7, which describes the burden of care associated with the individual engaging in each activity. Therefore the minimum total score (i.e.18) denotes maximum dependency and the maximum possible total score (i.e. 126) denotes maximum independency.

Spinal cord independence measure (SCIM): This scale was developed by Catz et al specifically for patients with spinal cord pathology.⁵ they found SCIM more sensitive than FIM to changes in function in spinal cord lesion patients. It consists of 18 individual tasks divided into three areas of function, Self-care (score range 0-20), Respiration and Sphincter management (score range 0-40), and Mobility (score range 0-40). The total score ranges from 0 to100. Some items of the original SCIM have been rephrased to improve the reliability in the newer version SCIM II.

SCIM II scoring system

Self-care: Subtotal score 0 to 20.

1. Feeding (cutting, opening containers, bringing food to mouth, holding cup with fluid) Score range 0 to 4
 2. Bathing (soaping, manipulating water tap, washing)
 - A. Upper body – Score range 0 to 3
 - B. lower body – Score range 0 to 3
 3. Dressing (preparing cloths, dressing undressing)
 - A. Upper body – Score range 0 to 3
 - B. Lower body – Score range 0 to 3
 4. Grooming (washing hands and face, brushing teeth, combing hair, shaving, applying makeup) Score range 0 to 4
- Respiration and Sphincter Management: Subtotal score 0 to 40.
5. Respiration scores given – 0, 2, 4, 6, 8, 10.
 6. Sphincter management – Bladder Scores given – 0, 4, 8, 12, 15.
 7. Sphincter management – Bowel Scores given – 0, 5, 10.
 8. Use of toilet Score range 0 to 5

Mobility: Subtotal score 0 to 40.

Mobility: Room and toilet

9. Mobility in Bed and Action to prevent pressure sores Score range 0 to 6
 10. Transfers: bed- wheelchair (locking wheelchair, lifting footrests, removing and adjusting armrests, transferring, lifting feet) Score range 0 to 2
 11. Transfers: wheelchair- toilet- tub (if uses toilet wheelchair- transfers to and from; if uses regular wheelchair- locking wheelchair, lifting footrests, removing and adjusting armrests, transferring, lifting feet) Score range 0 to 2
- Mobility:** indoors and outdoors
12. Mobility indoors Score range 0 to 8
 13. Mobility for moderate distance (10 – 100 meters) Score range 0 to 8
 14. Mobility outdoors (more than 100 meters) Score range 0 to 8
 15. Stair management Score range 0 to 3
 16. Transfers: wheelchair car (approaching car, locking wheelchair, removing arm and footrests, transferring to and from car, bringing wheelchair into and out of car) Score range 0 to 3

SCIM II is a simple and easy to use. In an analytical study of SCIM II by Itzkovich M et al found some limitations and proposed some modifications for a newer version.⁹ They also concluded that SCIM II is user friendly and superior to the original SCIM and until the future international version is validated, SCIM II is suitable for clinical use despite its flaws.

Conclusion: There are number of scales have been used to describe patients with spinal cord injury. Many authors have studied to compare these scales and found superiority of one scale over the other in different aspects. But the scenario is altogether different in our context. In India most of healthcare delivery institutions are not well equipped as the western ones. Healthcare provider and patient ratio is also very low resulting in lesser quality time available for each patient. Different means of transport facilities, home environment and socio-cultural conditions also have great impact in practicing such available scales. Therefore we encounter some difficulty in using these scales. However, ASIA impairment scale can be used because It is based on clinical examination findings. But, solely on the basis of ASIA scale we cannot comment on the functional achievements over the progress of time during

management of a spinal cord injured patient. This warrants us to have a functional outcome scale either newly developed or modified version of an existing one to suit Indian conditions.

References

1. Frankel HDH, Hancock DO, Hyslop G, Melzak J, Michaelis LS, Ungar GH, Vernon JDS, Walsh JJ. The value of postural reduction in the initial management of closed injuries of the spine with paraplegia and tetraplegia. *Paraplegia* 1969; 7: 179-192.
2. Klose KJ, Green BA, Smith RS, Adkins RH, MacDonald AM. University of Miami Neuro-Spinal Index (UMNI): A quantitative method for determining spinal cord function. *Paraplegia* 1980; 18: 331-336.
3. Chehrizi B, Wanger FC, Collins WF, Freeman DF Jr. A scale for evaluation of spinal cord injury. *Journal of Neurosurgery* 1981; 54(3): 310-315.
4. Yavus N, Tezyurck M, Akyuz M. A comparison of the functional tests in quadriplegia: the quadriplegia index of function and the functional independence measure. *Spinal Cord* 1998; 36: 832-837.
5. Catz A, Itzkovich M, Agranov E, Ring H, Tamir A. SCIM- Spinal Cord Independence Measure: a new disability scale for patients with spinal cord lesions. *Spinal Cord* 1997; 35: 850-856.
6. Ditunno JF, Ditunno PL, Graziani V, et al. Walking index for spinal cord injury (WISCI): an international multicenter validity and reliability study. *Spinal Cord* 2000; 38: 234-243.
7. Field-Fote EC, Fluet GG, Schafer SD, Schneider EM, Smith R, Downey, Ruhl CD. Spinal cord injury functional ambulation inventory (SCI-FAI). *J Rehabil Med* 2001; 33: 177-181.
8. Dodds TA, Martin DP, Stolov WC, Deyo RA. A validation of the functional independence measurement and its performance among rehabilitation inpatients. *Arch Phys Med Rehabil* 1993; 74(5): 531-536.
9. Itzkovich M, Tripolski M, Zellig G et al. Rasch analysis of the Catz-Itzkovich spinal cord independence measure. *Spinal Cord* 2002; 40: 396-407.

HANGMAN'S FRACTURE – DILEMMAS: OMAN PERSPECTIVE

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The question whether to hang a person as capital punishment is a raging controversy dividing the liberal world. The dilemma regarding Hangman's fracture starts from its name - the nomenclature itself. The term Hangman fracture was coined by Schneider in 1965. Despite radiological similarities, the judicial and "civilian derived" Hangman's fractures have different bio-mechanical etiologies and consequently different associated neurological morbidities

The Hangman's fracture or traumatic spondylolisthesis of the axis, is an example of the controversies surrounding the management of temporarily unstable injuries with a high likelihood of healing in a stable manner (Levin, Edward Benzel et al).

In the era of the high velocity cranio cervical injuries Hangman fractures have become prevalent. It is a treacherous injury, the exact incidence is not known. 30% of these injuries are missed. The main reason being lack of clinical suspicion. It forms 4% of cervical spine fractures and 22% of the axis fractures. Luckily the neurological involvement is rare.

The most common location for this injury is the Isthmus or pars interarticularis of C2. The reason being -

1. It is the weakest and thinnest portion of the neural arch
2. It is the junction of two functionally and anatomically

Disparate segments of cervical spine.

The mechanism of modern Hangman fracture includes hyper extension with or without axial loading or distraction, cervical flexion and pure axial loading. Whereas in judicial hanging it is hyperextension and distraction.

There are various classifications of these injuries like quantitative system of Francis, quality system of Effendi and all modified classification of Levin and Edward classification incorporates virtue of the earlier two systems and is more popular and useful in deciding the treatment modality.

This retrospective study from 1996 to 2005 (10 years) was done in Spine Unit, Khoula Hospital, Muscat which is the only Spinal Center in the Sultanate of Oman. Follow up period ranges from 4 months to 10 years. 70 cases were treated during this period, the majority of the cases were (road traffic injury).

One case a diving injury and then arm case of football injury (goal post falling on the neck), camel related accidents (two cases). Male to female ratio was 60:10. Age incidence ranges from 17 - 70 years. The majority of the cases were under 30 years luckily neurology was present in only one case. Associated injury was present in more than 50% of the cases. All cases had x-ray and CT Scan. Patients with neurology and Type IIA and III had MRI scans.

Majority of the cases were Type I followed by Type II. 5 cases of type IIA and one case of Type III. All Cases were put on skull traction (if no head injury) followed by Philadelphia collar/halo vest. One case of Type III fracture had surgical intervention in the form of posterior wiring and fusion after reducing the facet joint. All cases united; there was no case of post treatment neurological worsening. All the isolated cases without neurology have gone to their previous work; all cases had good range of neck movements. One case halo was removed as the patient could not tolerate it. Two cases had pin loosening, one case had hysterical attack during application of halo.

We conclude that from our experience and review of literature which shows union rate of 98.5%, non operative treatment should be the initial treatment of choice for Hangman fracture. Delayed surgical intervention may still be considered for non union in minority of cases. Only in cases of failure of conservative trial, corporative pathology or contra-indication for bracing surgery may be the option.

Surgery can be anterior discectomy C2-C3, bone grafting and ORIF or posterior in the form of C2 transpedicular screw osteosynthesis (theoretically ideal concept) or C2-C3 segmental fixation. Both of which has a steep learning curve and serious complications. If primary surgery is undertaken it is mandatory that an informed consent should be obtained.

DEGENERATIVE SPONDYLOLISTHESIS – DILEMMAS

DR. PRASHANT KEKRE

Consultant Spine Surgeon, Chennai

The most commonly occurring spinal disorder after primary lumbar canal stenosis. This word originates from two latin words spondylos meaning vertebra and ollsthesis meaning slide down or slippery incline. This disorder most frequently presents in the sixth decade and frequently affects the females in the ration of 6: 1. The most often involved segment is L4 L5 as opposed to L5S1 and the frequency of involvement is 9: 1. The basic pathology is failure to restrain shear force at the involved segment. Eg – sacralised or hemi sacralised L5 or severely degenerated L5S1 disc.

There are two types of degenerative spondylolisthesis

- Primary without associated congenital or acquired pathology
- Secondary with associated congenital or acquired pathology

The common modes of presentation are repeated attack of LBP +/- sciatica +/- Neurogenic Claudication. The biomechanical components of the disorder are

1. segmental spinal instability
2. spinal canal stenosis
3. sagittal and coronal plane imbalance

The pathophysiology of the disorder

- DISC DEGENERATION
- ↓
- FACETAL MICRO FRACTURES REMODELLING HYPERTROPHY
- ↓
- FACETAL HORIZONTALISATION CORNOAL ORIENTATION
- ↓
- NO SHEAR RESTRAINT
- ↓
- LOSS OF SAGITTAL BALANCE

The treatment modalities include operative and non operative treatment 90 % of the patients respond to non operative treatment consisting of

- Medication- Nsaid etc

- Immobilization
- Aerobic conditioning – PT/ weight reduction/exercises
- Epidural block / steroid
- Bracing

Failures of adequate non operative treatment will necessitate surgical intervention. In this modality too there is no definitive gold standard and hence various procedures are employed for surgical treatment.

These include

- Decompression
- Decompression + fusion (segmental / selective)
- Instrumentation + decompression
- Instrumentation + decompression + fusion
- "Soft (Dynamic) stabilisation "

The last mentioned modality is an emerging frontier in spinal surgery and needs to be looked at in future

A couple of factors have emerged as those necessitate the surgeon to opt for surgical options.

They are

- Bone density
- Sagittal facets
- Reduced disc space
- Caudal disc degeneration
- Instability – radiographic

In the surgical options the following factors decide the use of instrumentations

Preoperative

- Disc height
- Degree of kyphosis
- Degree of instability
- Degree of listhesis

Intraoperative

- Extent of decompression procedure
- Previous laminectomy
- Adjacent segment disease
- Available bone stock

The couple of examples of instrumented fusion are presented here

I would like to conclude by making the following remarks

- Fairly innocuous disorder
- 80% benefit from non surgical management
- Can lead to complications if proper surgical option not chosen
- Over treatment always a risk

PSYCHOSOCIAL ASPECTS OF INFERTILITY IN SPINAL CORD INJURY AND THE PARTNER

Stanley Ducharme, Ph.D.

Andrologist, Spinal Injuries Centre, Boston, USA

For most couples wishing to have children, the fertilization process is relatively uncomplicated. The man ejaculates the sperm into the vagina during sexual intercourse. The sperm then travels through the woman's cervix, uterus and fallopian tubes where the sperm fertilizes an egg which has been released from the ovary. For men with spinal cord injury however, what might be an uncomplicated and natural process is most often extremely complex and emotionally stressful.

The act of ejaculation and the ability to have children is one of the most perplexing sexual issues facing couples with spinal cord injury (SCI). The etiology of SCI infertility is secondary to the organic pathology affecting the neuromuscular mechanisms controlling the ejaculatory sequence. Anejaculation results from a pathological interruption at any neurological/muscular level of the ejaculatory process.

The vast majority of men with all levels of spinal cord injury experience difficulties in the attempt to have a child through the impregnation of an egg during sexual intercourse. These

problems are often called male related factors are typically associated with erectile dysfunction, ejaculatory dysfunction, poor semen quality or a combination of these factors. Naturally, lack of sexual desire may also be a significant factor that can affect arousal, sexual performance and frequency of sexual contact. Some disturbance or interruption in any of these aspects can lead to reproductive problems.

As a result of these sexual difficulties, men with SCI must often utilize techniques, other than intercourse, to achieve impregnation of the female's egg. These include masturbation, the use of penile vibratory stimulation or the use of a rectal probe, called electroejaculation. Although electroejaculation is the least preferred, it is the most effective with up to an 83% success rate. In general however, any of these techniques can be used to obtain the semen sample.

After obtaining the sample and determining the quality of the semen, the couple can attempt pregnancy with various fertility procedures. These currently available fertility procedures include intra-vaginal insemination, intra-uterine insemination (IUI), in-vitro fertilization (IVF), gamete intrafallopian transfer (GIFT) and intracytoplasmic sperm injection (ICSI).

While men with SCI have a variety of options in obtaining sperm and in fertilizing the egg of their partner, they still face challenges as a result of the effect of the SCI on the quality of the sperm. Research has demonstrated that although men with SCI have normal numbers of sperm, the percentage of motile sperm tends to be lower than men without SCI. In general, men with SCI have been shown to have approximately 20% of motile sperm as compared to 70% in men who are able bodied.

Researchers at the University of Miami have reported in the *Journal of Urology* that sperm motility does not correlate with level of injury, age, time post injury or frequency of ejaculation. In addition, these researchers have noted that men with SCI have fragile sperm who quickly lose their ability to swim. Fortunately however, sperm quality does not decline over the years since the man was injured.

In trying to understand why sperm quality changes after a spinal cord injury, these researchers have ruled out a number of important factors that could potentially influence sperm motility. Several important considerations should be noted:

1. Using a wheelchair, once thought to increase the temperature of the scrotum, does not affect the quality of the sperm. In a similar way, the type of clothing or the type of cushion used has no impact on sperm quality or sperm motility.
2. Methods of bladder management are not the cause of poor sperm quality. However, men who use intermittent catheterizations tend to have better sperm motility and may be the best choice for men who are considering having a child. In addition, urinary tract infections, often seen in men with SCI, are not the cause of low sperm motility. When men are treated with antibiotics, sperm quality does not seem to change significantly.
3. For many years, researchers questioned whether infrequent ejaculations tended to reduce the quality of sperm in this population. Now, that many men are ejaculating more frequently with the assistance of a vibrator, studies have shown the sperm quality does not change depending on regularity of ejaculation. This is the one place where the old saying "Use it or lose it" does not seem to apply.

Although researchers still have much to learn about sperm quality after SCI, they are now turning their attention to biochemical explanations for changes in the sperm quality. Today's studies are looking at how the body stores sperm in the seminal vesicles and how the biochemical make up of the semen (the liquid that carries the sperm) may be toxic to healthy sperm.

In summary what does all this mean for men with spinal cord injury who are thinking about having children? What can be done and what steps should be taken by the couple?

The first step for a couple considering a child is to contact a fertility specialist who has experience with men who have spinal cord injury. Finding such a specialist is often a challenge in itself but specialists do exist and can be very helpful for the man with spinal cord injury and his partner.

Dealing with issues of infertility is a difficult and emotionally draining situation for most couples. This is a time when communication and support for one another is critical. It is not uncommon to experience feelings of depression, anxiety and stress throughout this period. Often these emotional issues can contribute to the difficulties in achieving a pregnancy.

Until more is understood, the reality is that there is little an individual man with SCI can do to improve his sperm quality. Maintaining good health, regular exercise, keeping a healthy diet and reducing secondary complications such as skin and bladder infections are probably the key factors.

For many years, there was a sense of urgency involved in fathering a child after injury. It was believed that quality of sperm decreased in the years after injury. Now, we know sperm can be healthy for many years after an injury. As a result, most researchers now agree that freezing sperm shortly after injury is not indicated. Freezing itself tends to harm the sperm quality and should the man want to have a child in the future, most fertility clinics would prefer a fresh sample that has a greater chance of success.

In general, the quality of sperm obtained from using a vibrator is better than the quality obtained from a rectal probe. As a result, vibratory stimulation is often the first method used in obtaining a sample for possible fertilization. Using a vibrator on a regular basis and ejaculating more frequently will do little to ultimately improve the quality of the sperm sample.

Although men who use intermittent catheterization tend to have better sperm quality, there is no research as of this time to determine whether switching to IC may improve quality or how long it would take to see a change. If the option is available however, young men who are considering having a child might want to discuss this method with their doctor or urologist.

With all the changes and technology currently focused on research of this nature, changes in fertility management are ongoing and rapid. Men with SCI who are interested in having a child should stay current with new developments and in touch with knowledgeable health providers working in this field.

Note: I would like to thank the University of Miami and the Miami Project to Cure Paralysis for information used in this presentation. Readers are encouraged to go to <http://www.scifertility.com> for more information.

OUTCOME MEASURES IN SCI CLINICAL TRIALS

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Galaxy of Outcome Measures: Multiple measures in each Domain

- Impairment
- Functional Capacity
- Activities
- Disability
- Performance
- Quality of Life
- Environmental factors
- Societal roles

Outcome Measures Clinical Care/Investigation Clinical Patient Care. Documents gains in function, to justify the time in the hospital within a rehabilitation program such as the Functional Independence Measure (FIM) in USA. Clinical Investigation Documents gains in motor power, sensation, mobility based on speed, distance, efficiency, functional capacity in standardized environments due to a specific intervention

Purpose

- To focus on outcome measures for clinical trials in the context of domains (NIH-WHO Classifications)
- To examine critically current measures in widespread use & suggest additional measures
- To incorporate several recommendations of the ICCP panel "Outcome measures to be used during SCI clinical trials" Paris Workshop March 2005
- To limit discussion to domains of impairment, functional capacity and disability.
- **International Campaign for Cure of Paralysis (ICCP) Guidelines**
- These Guidelines have been published on the ICCP web site <http://www.icord.org/iccp.html>
- http://www.icord.org/ICCP/ICCP_SCI_Guidelines2.doc
- **ICCP Guidelines: Outcome Measures in SCI trials (Paris- 2005)**
- Two categories of assessment

- "Assessments ...primarily aimed at describing the neurological connectivity of the SC, irrespective of the patient to functionally use those connections"
- "Assessments of patients abilities to function in everyday life. These tests...may be independent of any measured neurological activity"

ICCP Guidelines: Outcome Measures in SCI trials (Paris- 2005)

- Recommended measurement of function and use of WHO International Classification of Functioning, Disability and Health (ICF). "ICF is useful...all clinical researchers are encouraged to become familiar with definitions.."
- This presentation will attempt to translate current NIH language of domains for use in clinical trials to WHO, ICF use of domains

Outcome Measures (1): Impairment Domain (Body Structure WHO-2002)

- Motor/sensory scores (ASIA)
- ASIA Impairment Scale (AIS)
- Neurological level
- Balance (SCILT)
- Quantitative motor
- Quantitative sensory
- SSEP and MEP
- Autonomic function
- Validated in Randomized Clinical Trials (RCT)

Measures of Impairment/Severity

What are the ASIA Standards?

- The gold standard* for clinical classification of the severity of the neurological impairment based on a determination of the
- Level of the injury (motor/sensory, right/left)
- Completeness of the injury (ASIA/Frankel Impairment Scale)
- *Neurosurgery 2002 s21-s29
- A reliable/valid outcome measure(s)** for clinical trials
- Stratification by level/ASIA Impairment Scale
- Change in motor and sensory scores

****ASIA: Reference Manual for International Standards Chicago, IL 2003 p 61-67**

- ICCP recognizes the widespread adoption and practical use of the ASIA Standards. It also recognizes the need for improved quantitative testing.

Towards improved clinical and physiological assessments of recovery in spinal cord injury: a clinical initiative PH Ellaway et al. Spinal Cord (2004) 42, 325-337

- Conventional clinical, neurological assessment;
- Dynamometry for appropriate muscles;
- Motor evoked potential responses to transcranial magnetic stimulation;
- Reflexes in paraspinal muscles;
- Quantitative sensory testing clinical/electrical
- Perceptual threshold;
- Sympathetic skin response.
- Prospective Validity/Response to change of the Walking Scale for Spinal Cord Injury (WISCI) in a Multicenter Randomized Clinical Trial (MRCT). Ditunno, Dobkin ASIA to be presented June 2006
- Results: Correlations were performed to change from baseline to 6 months for the WISCI with LFIM= 0.88 for 110/146; BBS= 0.84 for 111/146; LEMS= 0.60 for 112/146 and FIM= 0.48 for 111/146 subjects. Correlations at 6-months of WISCI level with Time= minus 0.59 for 88/146 and 6-minute walk=0.75 for 93/146 subjects.
- Conclusion: The prospective validity/response to change of the WISCI scale is supported by the significant positive correlations with LFIM, BBS, LEMS, 6-minute walk and a negative correlation with Time in a MRCT. The BBS correlated higher than the LEMS with the WISCI, which has not been previously reported

Outcome Measures (2): Functional Capacity Domain (-WHO 2002)

- Walking Speed (6 min.)
- Walking Distance (50 ft)
- Walking Index for SCI (WISCI)
- Capacity of Upper Extremity (CUE)

- Validated in Randomized Clinical Trials-Dobkin 2006
- **Functional Capacity Measures**
- Measures functions that support the performance (WHO) of self-care and mobility in the environment, BUT are assessed in a standardized environment
- Capabilities of Upper Extremity (CUE) Marino R 1998
- This scale measures reach and grasp, which supports activities such as feeding, dressing etc.
- WISCI – Ditunno 2000, Morganti 2005
- Timed walking tests –van Hedel 2005
- Measures function with or without devices or physical assistance
- Capacity (WHO) : Functional Capacity (NIH)
- Outcome Measures (3): Disability Domain (Performance- WHO 2002)
- * FIM locomotor scale
- * FIM global scale Spinal Cord Independence measure (SCIM)
- * Validated In Randomized Clinical Trials

Disability Measures

- Measures self care and mobility in different physical environments such as the hospital, home, outdoors, cities and rural areas.

Examples are:

Functional Independence Measure (FIM), *Hamilton and Granger 1987*

Spinal Cord Independence Measure (SCIM), *Catz A et al. 1996-2004*

Walking Performance-NOT STANDARDIZED

Domains

- The NIH Domains consists of Impairment, Functional Capacity, Disability and Societal factors.
- The WHO International Classification of Function Domains includes Body Function/Structure, Activity & Participation and Environmental factors.
- The evolution of domains over the past 30 years.

National Center for Medical Rehabilitation Research (NIH-1996)

Pathophysiology	Spinal cord injury
Impairment	Neurological loss
Functional limitation (capacity)	Limitation in arm and leg mobility
Disability	Limitation in self care and mobility
Social limitations	Loss of work, marriage, insurance

International Classification of Functioning, Disability and Health (WHO ICF 2002)

Body function	Impairment	
Body structure	Extent of impairment	Absence of body part etc
Activity and participation	Performance in environment	Capacity limitation with or without limitation
Environmental factors	Barrier or facilitator	

Functional Capacity Measures

- Measure function is a standardized environment, BUT includes devices and/or physical assistance

Examples

- Walking speed, velocity and distance
- Walking Index for Spinal Cord Injury (WISCI)
- Cardiovascular efficiency (Heart rate, PCI, Cardiac output, O₂ consumption)

ICCP Guidelines for Functional Tests

- "Several validated tests of ambulatory performance ... including the Walking Index for Spinal Cord Injury (WISCI) and a number of timed walking tests (Morganti 2005, van Hedel 2005)... a more accurate assessment may be provided by a combination"
- Disability scales such as the FIM and SCIM are "less clear"

A comparison of the Self-selected and Maximal Levels of the Walking Index for Spinal Cord Injury (WISCI) Kim M, Ditunno JF, Burns AS, Marino RJ 2005

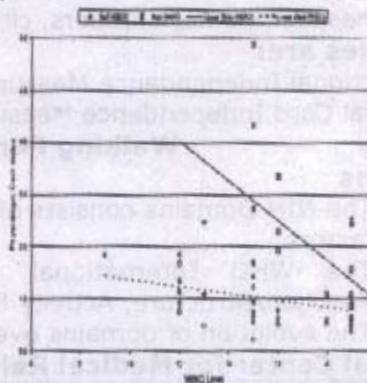
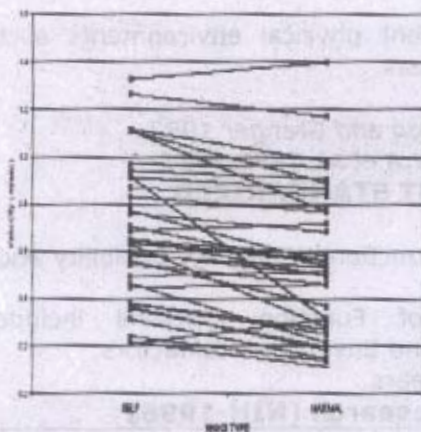
Results:

Subjects were predominantly tetraplegic (28/50), and AIS grade D (45/50). WISCI levels ranged from 6-20. In 36 subjects max-WISCI was higher than self-WISCI. For these subjects, ambulatory velocity for self-WISCI was significantly higher than for max-WISCI, 0.68 vs. 0.56 m/sec ($p < 0.01$). PCI and THBI at self-WISCI were significantly lower than at max-WISCI, 0.99 vs. 1.48 beats/meter ($p < 0.01$), 3.39 vs. 4.75 beats/meter ($p < 0.01$).

Conclusions:

Individuals with chronic SCI are capable of ambulating at multiple levels. Most are able to walk at a higher WISCI level than their usual level, that is, with less use of devices and/or physical assistance. For these individuals, ambulation at self-WISCI appeared to be more efficient as evidenced by greater velocity and lower energy cost. These findings have implications for assessing change in ambulation in clinical trials.

Comparison of self-selected vs maximal WISCI levels for velocity and efficiency



Endpoints (outcomes) need to be focused on what is understood by "IMPROVEMENT"

- What is an improvement in walking??
- Increased speed
- Increased distance
- More efficiency
- Better balance
- Less devices
- Less physical assistance
- Would a "battery" of measures be more valid?

Conclusion

- NIH/IOM language of domains used for outcome measures (OM) translated to WHO International Classification of Function domains.
- ICCP Guidelines for OM use in Clinical Trials cited.
- Specific OM: ASIA Standards, BBS, Timed Walking, WISCI and Disability Scales and others mentioned.
- Functional Capacity (FC) requires standardized environment testing & differs from disability scales. FC is a link from neurological to disability measures.

CLOWARD'S OPERATION FOR CERVICAL SPONDYLOTIC MYELO-RADICULOPATHY: A STUDY OF 245 CONSECUTIVE PATIENTS.

Prof. Rashiduddin Ahmed

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Department of Neurosurgery, BSM Medical University

There are various surgical procedures for dealing with cervical spondylotic myelo-radiculopathy. Soft cervical disc (which can be dealt with by discectomy only) and cervical spondylosis are not exactly the same pathologically and surgically. The surgical pathology is located in the anterior part of the vertebral column, therefore procedures from the back are neither good enough nor surgically sound.

We have used the classical cloward's operation as the most used procedure for decompressing the cord/root and using an autologous bone graft we can have a virtual instant fusion allowing mobilization of the patient immediately. We are giving the appraisal of 245 consecutive patients treated by this operation giving a 76% of good to excellent results. The patients, epidemiology, clinical profile, the surgical procedure and results will be discussed.

We feel this operation gives a simple, minimal invasive surgery but very adequate exposure for decompression by easy & safe removal of offending pathologies resulting in a solid sound fusion using autologous bone graft with the need of simple instruments obviating use of expensive metallic foreign body implantation for fixation.

SPINAL CORD INJURY REPAIR: ARE WE READY FOR HUMAN TRIALS?

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The failure of the adult central nervous system (CNS) to regenerate after injury is a major clinical problem. Despite many years of study, progress toward a cure has been frustratingly slow. For many decades, the inability of the central neurons to regenerate was accepted almost as a "law of nature", and on the clinical level, spinal cord and brain lesions were seen as being irreversible. Much effort has been applied to this field with the goal of understanding the mechanisms of neuronal degeneration and survival and the reasons for the absence of spontaneous axonal regeneration in the CNS compared with the peripheral nervous system (PNS). Although full recovery of function after major SCI is still not a clinical possibility, several recent studies in animals have shown encouraging results.

A variety of new approaches, including application of neurotrophic factors, blocking of growth inhibiting factors, and transplantation of peripheral nerves, Schwann cells, embryonic central nervous tissue, stem cells and olfactory glial cells have indicated that some degree of recovery can occur in adult animals. Combination of these therapies can be more effective in regenerating the spinal cord than individual therapies. Fetal pig stem cells, GM-1, autologous activated macrophages, peripheral nerve grafts (cord-to-cord), peripheral nerve grafts (cord-to-nerve), transplantation of human olfactory ensheathing glia, oscillating electrical fields, human fetal spinal cord, autologous human bone marrow stem cells, anti-nogo-A antibody, human bone marrow stem cells are mostly ongoing clinical phase I trials or they are in the process of planning. A few years ago, substantial repair of SCI was regarded as impossible. Based on the results of recent experiments, the possibility of effective regenerative therapies for human SCI is no longer a speculation but a realistic goal.

CELL BASED THERAPIES FOR SPINAL CORD INJURY: IMMINENT OR ALREADY HERE?

Dr. H.S. Chhabra, Dr. Suman Kishore

Dr. S. Raghavendra, Ms. Ila Anbarasan,

Department of Research, Indian Spinal Injuries Centre, New Delhi

CELL BASED THERAPIES FOR SCI

Spinal cord injury remains the most devastating ailment that can afflict mankind. Dramatic progress over the past two decades, especially in neuro- transplantation techniques and rehabilitation research, has raised the hope of an imminent cure for Spinal cord injury & other neurological disorders.

Cell based approaches to treat spinal cord injury:

- Two fundamental and mutually exclusive approaches
- Regenerative cell therapy (Restitution of white matter long tracts)
- Replacement cell therapy (Neuronal or oligodendrocyte)

Objectives of cell therapy are to achieve:

- Axonal elongation and regrowth through adult CNS
- Restore myelin around spared & primarily demyelinated axons
- Migration of growing axon into CNS parenchyma and co-existence with astrocytes
- Complete integration of the therapeutic cells into the micro-environment of the lesion.

Methods used in Regenerative Cell Therapy in SCI

- Use of peripheral nerve (PN) grafts
- Highly enriched Schwann Cells (SCs) suspensions
- Olfactory ensheathing glial cells
- Activated macrophages
- Use of Oligodendrocyte precursor cells – still being tried in animal models of SCI.

Methods used in Replacement Cell Therapy (Stem Cell Research) in SCI

- Stem cells from Xenografts
- Pig and Murine sources
- Embryonic & Fetal stem cells
- Human fetal spinal cord cells
- Umbilical Cord Blood stem cells
- Adult stem cells
- Autologous marrow stem cells
- Adult neuronal stem cells

Regenerative Cell Therapy Using Peripheral Nerve Grafts

- PN grafts were used to form bypass circuits between functional and nonfunctional motor pools in SCI patients.
- Transplantation of peripheral nerve grafts into the lesion site in SCI patients
- Kao et al, 1985; in >90 patients (most recent in Ecuador)
- Barros et al, Sao Palo, 2003; used sural nerve graft made in combination with FGF and fibrin glue to ensure intimate apposition of PN graft to surfaces of the spinal cord lesion. Patients were evaluated with ASIA, MRI and somatosensory evoked potential assessments.
- Did not find any motor or sensory improvement but spasticity was reduced in patients who underwent the procedure.

Regenerative Cell Therapy Using Schwann Cell Cultures

- To construct neuronal guidance channels between the transected segments in the cord
- To encourage myelination of the spared axons
- Failure to support axonal growth into the astroglial environment were tried to overcome by introducing BDNF expressing SCs and neurotrophin cocktails at the distal end of the lesion.

Regenerative Cell Therapy Using Activated Macrophages

- FDA approved clinical trial
- Open label non-randomized Phase I trial in 1999
- At Erasmus Hospital, Brussels and Craig hospital, Denver
- Phase I has indicated the safety of the procedure
- Phase II has started at Tel Aviv, New York & Denver in 2004
- Preliminary results are yet to be tabled.

Replacement Cell Therapy Using Stem Cells (ESCs) From Xenografts

- Diacrin, Inc (now Gen Vec, inc) in Collaboration with Washington university (St. Louis, MO) and Albany Medical Center (Albany, NY) announced clinical trial in 2001
- Porcine fetal stem cells were transplanted to 6 patients who were 1 year or more post SCI
- Immunological masking of pig cells were used to minimize rejection and long term immunosuppression
- The last patient was scheduled for June 2004 and manuscript for publication was supposed to be ready.
- So far only the safety of the procedure has been established.
- Dr. Dr Fernando Ramirez, (ISCRC), Tijuana, Mexico, injects ESCs obtained from the blue shark after surgical decompression and stabilization of SCI.

Replacement Cell Therapy Using Embryonic Stem Cells From Fetus

- 3 important, now completed and closed, independent trials that focused on safety and feasibility of Intraspinal transplantation of human Fetus Spinal Cord (huFSC) in a small cohort of SCI in
- Gainesville, FL
- Sweden
- Denver, CO

- Russia
- The study in SCI was preceded by a similar clinical trial using human fetal CNS tissue grafts for Parkinson's Disease at Gainesville, FL
- Each of the three centers was focusing on SCI patients with Post Traumatic Syringomyelia (PTS)
- 5 patients were enrolled in Russia and effective obliteration of the cyst was evident from CT and ultrasound images done 7 months post transplant
- Enrollment of patients at Gainesville was aborted by a memorandum passed by FDA in 2000 and hence only 8 patients received transplant

Replacement Cell Therapy Using Embryonic Stem Cells From Fetus

- HuFSCs were obtained from 6-9 week old aborted fetus and minced pieces were transplanted into cysts as 100 microL volume in a 500 microL syringe following myelotomy
- ASIA, MRI and Electrophysiological assessments were done to evaluate the patient after transplantation
- Immunosuppression was started 3-4 days before transplantation and maintained at low doses for about 6 months
- Only safety of the procedure could be established.
- Survival of the graft in host could not be demonstrated and inference about therapeutic efficacy was considered premature though in all the 3 studies long term obliteration of the cyst was accompanied by considerable neurological improvement

Replacement Cell Therapy Using Umbilical Cord Blood Stem Cells

- A team of Korean researchers on 26-11-2004, claimed that they had transplanted multi-potent stem cells from umbilical cord blood to the 37-year-old female patient suffering from a spinal cord injury and she can now walk on her own.
- The team was co-headed by Chosun University professor Song Chang-hun, Seoul National University professor Kang Kyung-sun and Han Hoon, from the Seoul Cord Blood Bank (SCB)
- Song's team look to further test efficiency of the new therapy with four more patients as soon as they get the green light from Chosun University ethics board and the government.
- Song's team plan to report their research to the scientific world within the first half of next year.

Replacement Cell Therapy Using Adult marrow Stem Cells:

- They are appealing for the autologous nature of the transplants and either intravenous or intramedullary route of administration.
- Mechanism of action unclear though neurotrophic and axonal elongation activity has been proposed
- E. Sykova et al, 2004, at Motol Hospital, Prague;
- 9 patients (11 days - 17.5 months post SCI) were given autologous freshly harvested iliac derived MSCs via the vertebral artery using angiogram
- 3 to 6 months evaluation of 6 patients fall under the expected range of physiologic recovery post SCI
- A C6, 41 year old male has improved dramatically from ASIA B to D with concomitant reappearance of motor - evoked potentials.
- Though the analysis is not yet complete, procedural safety has been established.
- A similar clinical trial has been initiated in India at AIIMS.

Replacement Cell Therapy Using Adult Neural Stem Cells :

- Researchers at the UC Irvine Reeve-Irvine Research Center have used adult human neural stem cells to successfully regenerate damaged spinal cord tissue and improve mobility in mice.
- In their study, Brian Cummings, Alleen Anderson and colleagues injected adult human neural stem cells into mice with limited mobility due to spinal cord injuries. These transplanted stem cells differentiated into new oligodendrocyte cells that restored myelin around damaged mouse axons. Additionally, transplanted cells differentiated into new neurons that formed synaptic connections with mouse neurons.
- Till date no clinical trial has been documented in SCI using ANSCs

Evolution Of Olfactory Ensheathing Glial Cell Therapy: Regeneration of axons in SCI:

When a tract is damaged, the cut axons produce local sprouts at the site of injury. (Ramon Y Cajal, 1928; Li & Raisman, 1995)

Myelinated fiber tracts of the adult CNS have a complex and regular arrangement of 3 types of glial cells. (Suzuki & Raisman, 1992)

Even with minimal disturbance to the tract glial framework, the sprouts of regenerating axons do not reenter the distal part of the tract. (Davies et al, 1996)

Evolution of Olfactory Ensheathing Glial Cell Therapy: Regeneration of axons in SCI

To make the damaged tracts favorable for the regeneration of cut adult axons transplantation of the cultured Schwann cells were studied.

(Li & Raisman, 1994,1997; Xu et al 1997)

Schwann cells were found to integrate into the host tract glial structure.

(Brook et al, 1993; Li & Raisman, 1997)

Evolution of Olfactory Ensheathing Glial Cell Therapy: Regeneration of axons in SCI

Schwann cell transplant greatly increased axon sprouting in the corticospinal tract but few sprouts reenter the distal tract.

(Li & Raisman, 1994)

The reluctance of the axon sprouts to leave the Schwann cell environment of the transplant and reenter the glial environment of the distal CST resembles the inability of regenerating cut dorsal root fibers to leave the peripheral nerve/Schwann cell environment of the dorsal roots and reenter the glial environment of the dorsal spinal cord. (Bignami et al, 1984)

Evolution of Olfactory Ensheathing Glial Cell Therapy

Olfactory system provided the opportunity to study the natural mechanism of regeneration and reconnection occurring between PNS & CNS under physiological conditions

The entry point of the olfactory axons into the olfactory bulb is associated with special glial cells, known as Olfactory Ensheathing Cells (OECs).

OECs exists both outside the central nervous system (like Schwann cells) and inside the central nervous system (like astrocytes)

(Blanes, 1898; Raisman, 1985; Valverde & Lopez-Mascaraque, 1991; Ramon-Cueto & Nieto-Sampredo, 1992; Barnett et al, 1993)

Evolution of Olfactory Ensheathing Glial Cell Therapy

OECs permit the growing axons from neurons of the nasal cavity olfactory mucosa to reenter the olfactory bulb and form synapses with second - order neurons.

(Doucette, 1984)

In the olfactory system, the sensory neurons are replaced throughout adult life, and the newly formed axons continually reenter the CNS.

(Moulton, 1974; Barber & Raisman, 1978; Graziadei & Montgraziadei, 1979,1980; Wilson & Raisman, 1981)

(The migrating Schwann cells are inhibited by contact with astrocytes in CNS, inducing in them a reactive hypertrophy. But the migration of OECs is unimpeded by astrocytes and hence axons can easily re-establish connection with the neurons.)

Evolution of Olfactory Ensheathing Glial Cell Therapy: Regeneration of axons in SCI

OECs can be readily grown from rats, a macrosomic species which has highly developed olfactory system.

(Ramon-Cueto & Nieto-Sampredo, 1992; Barnett et al, 1993)

Transplants of cultured OECs mediate reentry of regenerating dorsal root axons into the dorsal spinal gray matter.

(Ramon-Cueto & Nieto-Sampredo, 1994)

Rodent OECs are able to support axonal regrowth when transplanted into experimental models of spinal cord injury.

(Li & Raisman, 1997; Ramon-Cueto & Nieto-Sampredo, In 1994)

Evolution of Olfactory Ensheathing Glial Cell Therapy: Regeneration of axons in SCI

OECs are also able to form myelin sheaths around regenerated or demyelinated axons, thereby permitting rapid saltatory conduction to occur.

(Franklin et al, 1996; Li et al, 1997; Imaizumi et al, 1998; Ramon-Cueto et al, 1998)

Transplantation of the glial cells obtained from the primary olfactory pathways, could achieve structural and functional repair of the adult rat spinal cord similar to those seen with transplantation of cells from olfactory bulb. This was proposed as a model for clinical application.

(Li et al, 1997, 1998; Ramon-Cueto et al, 2000; Raisman et al, 2001; Lu et al, 2002)

The optimal repair potential of transplanted OECs may not be best served by transplanting pure OEC preparation but may instead depend of the presence of other cell types. Hence olfactory biopsy is preferred as it is safe & does not affect the sense of smell.

(Raisman, 2001).

Evolution of Olfactory Ensheathing Glial Cell Therapy: Regeneration of axons in SCI

OECs isolated from resected adult human olfactory bulb, can be grown in tissue culture with high viability and have the ability to form myelin sheaths following transplantation into areas of persistent demyelination in the adult rat CNS.

(Barnett et al, 2000)

(Human olfactory bulbs were collected from donors during surgery where removal was a necessary part of normal surgical procedure, like for tumor, although olfactory bulb was uninvolved in most cases)

Evolution of Olfactory Ensheathing Glial Cell Therapy: Regeneration of axons in SCI

- Transplantation of Olfactory ensheathing cells from nasal olfactory mucosa promote locomotor recovery after delayed transplantation into transected spinal cord in adult rat.
 - (Jike Lu, Alan Mackay-Sim et al, 2001)
- Transplantation of olfactory ensheathing cells in a specific matrix transfer method (patented at NIMR) achieved efficient transfer and retention of transplanted cells in larger open cavities in experimental models of spinal cord injury. These also facilitated restoration of breathing and climbing functions in an experimental model with high cervical level injury.
 - (Li & Raisman, 2003)

Excerpts from "Olfactory ensheathing cells and spinal cord repair" Alan Mackay-Sim, Institute for Cell and Molecular Therapies, Griffith University, Brisbane, Qld, Australia; 2004

- It is 20 years since the first paper was published on the biology of olfactory ensheathing cells.
- In the following 10 years there were 13 research papers on the biology of olfactory ensheathing cells and 3 reviews.
- In the 7 years since 1997 there have been 50 papers published describing olfactory ensheathing cell transplantation, 51 describing the biology of olfactory ensheathing cells and 31 review articles featuring olfactory ensheathing cells, mostly in reference to nervous system repair.

Excerpts from "Olfactory ensheathing cells and spinal cord repair" Alan Mackay-Sim, Institute for Cell and Molecular Therapies, Griffith University, Brisbane, Qld, Australia; 2004

- Olfactory ensheathing cells have been used in a variety of spinal cord repair models including complete transection, hemi section, tract lesion, contusion, and demyelination.
- They have also been transplanted in other nerve repair models including dorsal rhizotomy (Table 2), peripheral nerve transection, and optic nerve repair (Table 3).
- It remains a strong candidate for Neurotransplantation therapy with the vast majority of the 53 published transplant studies reporting positive outcomes.

OEG Cell Therapy: Summary Of Pre-clinical Studies

- Axonal regeneration, myelination and functional recovery including climbing, walking, reaching, and breathing are seen in animal models of SCI.

Sources of OECs

- Olfactory Bulb
- From dead aborted fetus

- From an adult donor

Olfactory Mucosa

- From autologous nasal mucosa

Route of Administration

- Intralesional surgical implantation with / without removal of scar tissue
- Intralesional image guided injections
- Dosage form:
- Direct biopsy tissue from nasal mucosa
- Cell suspensions either of mixed cytology or pure OECs obtained by selective in vitro culture

Significant Clinical Trials Using OEG Cells

- Has gained immense popularity due to low risks involved.
- Stem Cells not yet identified & isolated (hence still a regenerative approach)
- No major ethical issues in adult, autologous OEG cells from nasal mucosa
- Ethical concerns regarding OEG cells obtained from olfactory bulbs of dead aborted fetuses or adult donors.
- Clinical trials are ongoing in China, Portugal, Australia (& UK)
- More than 400 patients have received this treatment
- In China OE cells from aborted fetal olfactory bulbs are used to obtain pure and aseptic OEG cells for preparing a cell culture suspension & transplantation (injection). Transplantation is done following surgical decompression as a separate procedure.
- In Portugal adult autologous OEG tissue obtained from nasal mucosa is implanted directly during surgery.
- In Australia adult autologous OEG tissue obtained from nasal mucosa is implanted as as injectable cell suspension after in vitro culture (Australia)
- In UK, UCL will initiate the safety & efficacy studies in about 10 cases of dorsal nerve root lesions using injectable cell suspensions.

Points in favor of Autologous Olfactory Nasal Mucosa

Autologous source

- No ethical controversies
- Low risk of immunological rejection or GVH reaction.
- Low risk of infections from external source
- Olfactory function is not adversely affected
- Safe, simple and single day procedure

Olfactory Nasal Mucosa

- OECs in form of biopsy material is preferred as they require presence of growth factors & other cells like Schwann cells and meningeal cells for effective neuro-regeneration.
- Easy and safe to obtain.
- Do not require in vitro manipulation prior to implantation thus lowering the risk of infections

Intra-lesional implantation following surgery and scar removal:

- Homing in of the cells will not be an issue as it is placed at the site of lesion
- Direct contact of the transplant with the cut ends of the spinal cord promotes uptake & integration of the graft into the host site.
- Scar removal by itself may promote recovery in SCI which will be an additional benefit to the patient

Phase II Clinical Trial At ISIC, New Delhi

Indian Spinal injuries Center

Tertiary care center with the best available surgical and rehabilitation facilities for the management of SCI patients from India and South Asia

Clinical Trial: Autologous Olfactory Mucosa Transplant in Chronic SCI.

Collaborators: Dr. Carlos Lima & his team from Egas-Moniz Hospital, Lisbon, Portugal.

Study Design: This will be a prospective multi centric non-randomized concurrent control trial to assess the safety and efficacy of adult autologous olfactory mucosa transplant in patients with traumatic spinal cord injury

Study Duration and Dates:

- The study will be conducted over a minimum period of two years.

- The study will be initiated in the 2nd or 3rd quarter of 2006.

Number of Subjects

- A total number of 30 patients will be included in this study.

Autologous olfactory mucosal transplantation in chronic SCI: eligibility criteria

Inclusion Criteria

- Male and female subjects with traumatic spinal cord injury aged between 15 to 40 years and less than 15 years post injury
- The patient must have a traumatic spinal cord injury between the spinal segmental levels C5 and T12
- Must have a complete injury (ASIA-A) or sensory sparing without significant motor sparing below the levels of the injury (ASIA-B)
- For subjects between the age 18 to 35 years the screening MRI / CT / Myelogram scan must show that the length of the damaged area of the spinal cord (lesion) is less than 3 cm for cervical level injuries and 4 cm for thoracic level injuries
- Subjects between the age group 35 to 40 years must have lesion lengths of less than 2 cm for cervical level injuries and 3 cm for thoracic level injuries.

Exclusion Criteria

- Subject whose medical condition requires mechanical ventilation
- Patients with neurological level of injury above C5 and below T12
- Patients with inoperable nasal obstruction(s)
- Patients more than 15 years post-injury
- Lower motor neuron injury, such as those with conus medullaris or cauda equina injuries
- Subjects with pathological fracture
- Spinal Injuries in patients with Ankylosing Spondylitis
- Patients with extremes of age: less than 18 years or more than 40 years
- Patients with preexisting severe medical disease which would effect the outcome like severe diabetes, rheumatoid arthritis
- Patients with Psychological disorders

Autologous Olfactory Mucosal Transplantation in Chronic SCI: Objectives

Primary Objective

- Improvement in the ASIA Classification of at least one grade by 12 months or Change From Baseline In Total Motor Score of ASIA manual motor test

Secondary Objective

- Voluntary movement in additional muscle groups (not included in ASIA exam)
- Walking Index of Spinal Cord Injury (WISCI)
- Modified Ashworth Spasticity scale
- ASIA sensory examination
- EMG / MEP / SSEP
- Urodynamic study
- SCIM
- Psychological evaluation

TABLE SHOWING THE STUDY PROCEDURES AND SCHEDULE OF EVENTS

Autologous Olfactory mucosal Transplantation in Chronic SCI: Purpose of the Clinical Trial

- Conduct of Clinical Trial according to ICH – GCP norms and ICMR guidelines
- The results and potential benefits of the study could be
- Presented for peer review
- Acceptable to the scientific community
- Proper Documentation of SOPs and Study events during the entire period
- Long term rehabilitation of patients
- Long term follow-up of patients
- Standardization of procedures for Clinical trial using cell based formulations in SCI
- Analysis of risk – benefit ratio
- Statistical analysis of significant results.
- Assessment of therapeutic potential of the study approach
- Ultimately for the benefit of the patient either in trial or as treatment

THE DILEMA IN SPINAL INSTRUMENTATION

Dr. Ziad-Al Zoubi

*Consultant Orthopaedic & Spinal Surgery, General Secretary
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Since the Harrington introduced his Rods and hooks for spinal correction or fixation, more than 50 years ago. Many changes in understanding of the biomechanics and pathology of spinal trauma and diseases. All lead to the development of spinal instrumentation. The research work by surgeons and engineers worked very hard to reduce the time of surgery and more successful operations but also raise the cost several times which can't be approached by poor patients or even developing countries

We as surgeons from these countries have to work hard to differentiate between what is necessary to our patients, we have to invent our systems, in our factories to be reasonable for our patients medically and financially.

IS MORE EXPENSIVE AND TECHNICALLY ADVANCED INSTRUMENTATION NECESSARILY BETTER FOR SURGERY OF SPINAL CORD INJURY IN DEVELOPING COUNTRIES?

Dr. Fazlul Hoque, Prof. Rashiduddin Ahmad

Dr. ATM Abdur Razzak

Centre for the Rehabilitation of the Paralyzed (CRP), Bangladesh

Treatment of patients with spinal cord injury (SCI) are time consuming and expensive. From November 2000 to December 2005, 1668 patients with SCI admitted at the centre for the Rehabilitation of the Paralyzed (CRP). Among them 166 (10%) cases underwent for the surgical management and the rest were comprehensive conservative management. Eighty six percent of our non-surgical patients have had very good biological fusion and stable spinal column. The benefit of surgical management of SCI is still controversial. We perform surgeries where there is an obvious indication for decompression of spinal cord and correction of deformity of the spinal column. The implants for spinal surgeries are very expensive and these are imported items. The expensive and technically advanced instrumentation for spinal surgery are beyond the reach of our patients. In developing countries like Bangladesh, people do not have health insurance; they have to pay for implants on their own.

Spinal instrumentation and stabilization of the spinal column definitely helps patient for early mobilization and shorten hospital stay. In Bangladesh the cost of hospital stay for six to eight weeks for immobilization is lesser than the surgical instrumentation. The question whether a technically advanced and expensive instrumentation, only to shorten hospital stay is really necessary? Stabilization of the spinal column will be achieved when there is a biological fusion occurred. Proper alignment and immobilization of the spinal column would also gives biological fusion of the spine. The necessity of instrumentation is to immobilize particular segment of the spinal column for certain period. Immobilization by continuous traction or rest in bed would also provide similar benefit.

In Bangladesh, the cost of spinal instrumentation is bigger than the six weeks long stay in the hospital for immobilization. Spinal instrumentation works as an adjuvant for the musculoskeletal healing process and the correction of spinal deformity. If we can achieve this by bone grafting and or immobilization, it could be a better option of spinal instrumentation in the developing country.

TIMING OF SURGICAL INTERVENTION IN ACUTE SPINAL CORD INJURY

Prof. DR.P.S.RAMANI

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Lilavati Hospital & Research Centre, Mumbai, India

HISTORICAL INTRODUCTION

- 24th Oct 1892 Victor Horsley 6th laminectomy on 20 yrs old boy
- Trauma-paralysis in rt.upper limb;para in lower limbs, dribbling urine.
- By Sept 1893 he had completely recovered

PRINCIPLES OF TREATMENT

- Targeting secondary SCI mechanism to prevent aggravation of primary injury.

MANAGEMENT

- Preventive measures
- Conservative care (last century)
- Pharmacological treatment
 - >MP administered gives modest improvement
 - >Role of surgery (rescent)
 - >Reduction, decompression and fusion

Important : sufficient data is available to promote overall treatment standards.

IMAGING

MRI FINDINGS

n=100

• Cervical	Dorsal	DL	Lumbar	2 Sacrom
• Oedema	5	0	0	0
• Contusion	11	0	11	8
• Transection	13	7	17	0
• Haematomyelia	2	0	1	0
• Normal	13	2	3	7

PRINCIPLES OF MANAGEMENT Surgical

- Reduction
- Early decompression
- Stabilisation
- Rehabilitation

CLASSIFICATION OF EVIDENCE

- Study Design Class of Evidence
- Well-designed and executed
- randomized controlled clinical trials
- Prospective, nonrandomized studies
- Case series; retrospective studies; expert opinion
- (evidence based medicine)

CONSERVATIVE MANAGEMENT

- Past : philosophy of Guttman followed and practised by Frankel (612 pts)
- Postural techniques and bed rest to achieve reduction and spontaneous fusion
- 29% with complete motor and sensory paralysis improved at least 1 grade (gold standard)
- Laminectomy was only surgical procedure
- Today's opinion: Laminectomy without fusion is contraindicated.

ROLE OF SURGERY belief of some

- Early surgery increases the rate of complications
- Many patients critically ill with cardio pulmonary compromise

MODERN SURGERY

- Techniques have advanced tremendously in last 2 decades
- Early Surgery - Safe & efficacious
- No evidence of high complication rate
- Surgery done within 24 hours has lower complication rate.

CONSERVATIVE CARE

- When surgery is indicated conservative care has no place
- 10% worsening in patients with incomplete injury when treated conservatively

TIMING OF SURGERY

US Multicentre study - 1999- (585 pts).

- 23.5% operated within 24 hours
- 40% operated late after 5 days.

COMPARISON NASCIS II

Mortality

- Operative 6.1%
- Conservative 15.2%
- Thrombo embolism:- Higher in operated group.
- Improved outcome in surgical group but no difference between less than 25 hours or more than 200 hours

COMPRESSION OF SPINAL CORD

- Potentially reversible sec. inj.
- Severity of injury in animals depend on Force of compression
Duration
Displacement
Kinetic Energy

Neurological recovery depends on timing of decompression in all animals

REDUCTION OF DISLOCATION

- Early decompression by traction
- Sig. neurological improvement
- Closed reduction:- Useful but be cautious
- 8.1% deterioration (Multicentric study)
- Surgical reduction 75% recovery in patients reduced early (6 hours)

DISLOCATION: This is a common injury. Following reduction of dislocation one must always look for the prolapsed disc compressing the cord and it must be expeditiously removed and interbody fusion performed.

INDICATIONS FOR SURGERY IN SPINAL DISLOCATION.

- Irreducible facet lock
- Instability (Ligamentous injury)
- Deformity > 15 degrees
- Body compression 40% or more
- Subluxation 20% or more

LATE DECOMPRESSION (>4 weeks)

- Surgical procedure produces accelerated neurological recovery
- Late surgery plays an important role in significant neurological recovery

Surgery on be anterior discectomy C2-C3, bone grafting and ORIF or posterior in Me form of d2 transpedicular screw osteostynthesis (theoretically) ideal concept) or C2-C3 segmental fixation Melt of which has a steep learning curve and serious complications. R primary surgery a undertaken it a mandatory that as informed consent should be obtained.

SHIP-WRECK IN DESERT – CAMEL RELATED SPINE INJURIES AND ITS PREVENTION – OMAN PERSPECTIVE

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Dr. Kishore Kumar M

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Camel is a most useful and important companion of the desert dweller. Its habitat has been invaded by the expanding human population. In Arabian Gulf with the desert terrain with population spread out in small pockets. In the absence of mass transport system travel by car is the most common mode of transport.

Camel related road accidents is an important public health issue. Un-fortunately there is not much literature regarding this issue. The crash of the ship of desert (camel) and car can be devastating. Most of the occupants are killed and those who survive have serene injuries in the form of spine injuries.

This study was done in Spine Unit. Khoula Hospital, Muscat which is the only Spine Center for the entire Sultanate of Oman. It looks into incidents of camel related spine injuries, its mechanisms and preventive measure.

ENDOSCOPIC ANTERIOR DECOMPRESSION – DOES IT YIELD THE SAME RESULTS AS OPEN SURGERY

PD Dr. Hans Josef Erli

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Introduction: Endoscopic techniques have been shown to be beneficial in anterior spine surgery of the thoracic and lumbar spine. In treating fractures anterior stabilizations using

systems adapted for minimal invasive application are used as routine treatments in specialised departments. In some cases these systems can be used as stand-alone instrumentations or in combination with posterior internal fixation and anterior grafting, e.g. in highly instable fractures.

Even if endoscopic surgery does not change surgical rationales and if some disadvantages concerning anterior reduction have yet to be mastered, it helps to minimize approach morbidity and improves the visualization in anterior spine procedures. Enhanced visualization is the most striking advantage of endoscopic surgery. Advantages for the endoscope can even be seen in comparison to the microscope. The possibility to use angulated optics (30° as a standard) allows a close-up vision of the operation site, even if a more lateral view is needed. This can be the case for canal clearance from a lateral approach, the standard approach for anterior thoracic and lumbar surgeries. Using endoscopic procedures, the good visualization allows an exact discrimination between spinal cord, healthy vertebral bone and the tissue causing the compression.

Besides the experience in fracture treatment, large series have been operated on with good results, e.g. by ROSENTHAL with thoracic disc herniations (4). The disc fragment causing the compression from anterior can be removed from anterior, thus minimizing the manipulation of the dural sack and avoiding the additional destabilization of the spine by an extended laminectomy. In a similar way, endoscopic anterior decompression can be performed in tumour surgery to decompress the spinal cord from the front.

Surgical Technique: For a standard thoracoscopic procedure we use 4 trocars, one above the operated segment, one 2 intercostal spaces cranially or caudally to the operation site and 2 additional anterior trocars for retractor and suction. These approaches allow a good exposition for mono- or bisegmental procedures with disc resection, corporectomie, vertebral body replacement or instrumentation.

In cases where a spinal decompression is necessary, we open the pleura and clip or coagulate the segmental vessel. In case of a burst fracture we resect the vertebral body and the two adjacent discs using small adapted osteotomes and graspers. The possibility to visualize the operation site on the screen allows a discrimination of the prolapsed bony fragment from the healthy vertebral bone, permitting a safe resection of the intraspinal fragment and decompression of the spinal cord. If only a monosegmental approach is necessary, i.e. in cases of a compression due to a thoracic disc prolaps, we resect the costal head, excise the disc and osteotomize the posterior parts of the adjacent vertebral bodies only to the degree necessary to allow a safe decompression. Again we benefit from the good visualization of the spinal cord.

Results and Discussion: We use endoscopic procedures in spine surgery in our clinic since 2002. Since January 2005 we performed 29 endoscopic anterior surgeries. Most of them were performed to achieve anterior fusion after fracture stabilization. 3 patients were treated for spinal tumours; 2 patients presented with disc pathologies, 1 patient was treated for posterior ligament calcification and compression of the spinal cord.

Complications were one 2-stage rupture of the spleen in a multiple trauma patient immediately after placing the first trocar. Prolonged pleura exudation was seen in several patients but ceased without intervention.

During this period anterior decompression was necessary in 20% of our patients (n = 6) for various pathologies. In all cases we saw an improvement of the neurological situation and/or pain relief. No complications were seen in connection with the canal clearance, in particular no lesions of dura or myelon and no deterioration of the neurological status.

These experiences with endoscopic techniques are approved by other authors. McAFEE emphasizes the improved visualization (2) and the low complication rates (3), ROSENTHAL found a neurological improvement in 27 patients out of 36 with disc related myelopathy (22 recovered fully) (4). In a series of 30 patients BEISSE achieved a canal clearance of 110% postoperatively and reported a neurological improvement in 65% of his patients with incomplete paraplegia (1).

Conclusion: Endoscopic anterior spinal decompression does not only yield comparable results in canal clearance vs. open anterior surgery, moreover it allows for safer surgery due to the improved visualization through the endoscope and the possibility to use angulated optics. The reduction of the surgery related morbidity by the minimized approach leads to a further improvement for the patient.

Reference List

1. Beisse, R. et al. "Surgical technique and results of endoscopic anterior spinal canal decompression." *J.Neurosurg.Spine* 2.2 (2005): 128-36.
2. McAfee, P. C. et al. "Anterior thoracic corpectomy for spinal cord decompression performed endoscopically." *Surg.Laparosc.Endosc.* 5.5 (1995): 339-48.
3. McAfee, P. C. et al. "The incidence of complications in endoscopic anterior thoracolumbar spinal reconstructive surgery. A prospective multicenter study comprising the first 100 consecutive cases." *Spine* 20.14 (1995): 1624-32.
4. Rosenthal, D. and C. A. Dickman. "Thoracoscopic microsurgical excision of herniated thoracic discs." *J.Neurosurg.* 89.2 (1998): 224-35.

RECOMMENDATIONS FOR SURGERY

- Early reduction of # dislocation
- Decompression, reconstruction and fusion to be done early if compression is focal and anterior
- Instability to be treated early
- There is a role for early surgery in central SCI

VERTEBROPLASTY IN THE OSTEOPOROTIC SPINE

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Vertebral compression fractures are common fractures in the elderly individuals living in the western world. The prevalence of fractures has increased sharply in the E.U. over the years.

Economic costs of treating these fractures are likely to cripple the health service. In the E.U, 97,000 hospitalizations per year recorded. This leads to 10-30 day average hospital stay for each individual patient. This adds to the additional cost of treatment with bracing, medication, physical therapy and rehabilitation. Patient information and access to internet knowledge has led to greater awareness amongst the concerned groups to demand advanced technology in early diagnosis and treatment using the latest and the newest measures.

As the affected patients are mostly elderly, biomechanical considerations comes into play: A Decrease in gait velocity b. Change in balance c. Increased muscle fatigue. There is also increased risk of falls and additional fractures.

Management objectives include early diagnosis and treatment. Relief of pain to achieve early mobility and Restoration of anatomy to prevent further fractures. Medical management remains the mainstay of treatment. Bed rest in the acute phase may be necessary but one has to bear in mind that this may lead to exacerbated bone loss. Therefore early mobilization is aided by analgesics including narcotics. Braces may not provide long-term functional improvement but in the short term may prevent postural changes and provide pain relief. Surgical treatment is required in very rare cases that present with neurological deficit where a major spinal stabilization and decompression surgery is needed. Such invasive procedures have a poor outcome in osteopenic bones and in elderly patients. Therefore, the emphasis is shifts to preventative treatment.

Preventative treatment

Vertebroplasty using bone cement was first described in 1984 as treatment for symptomatic vertebral haemangioma. Since then interest has grown and indications have expanded allied with technical developments in delivering the cement. In US, in 2002, approximately 38,000 procedures were performed. This procedure is now increasingly available in UK and rest of the world. The injection of bone cement into a vertebral body under image guidance can be done to a high degree of safety and to gratifying results. The indications have expanded to

- Aim to relieve pain in patients with pathological vertebral bodies
- Haemangioma
- Osteoporotic compression fractures
- Traumatic compression fractures
- Painful vertebral metastases

Complications: FDA studied all procedures between 1999-2003 to find that in 200,000 procedures, there were 58 reported complications. These included, cement leakage into Spinal canal or neural foramen, venous emboli and rare cases, pulmonary cement emboli. Leak of cement is also noted along the segmental vessels which has on occasions lead to

neuralgic pain along the chest wall. The exact incidence of complications is not known but it is generally accepted that the procedure is safe when done under image guidance.

We present our recent experience with the technique and the procedure.

Pediatric congenital atlantoaxial dislocation: differences between the irreducible and reducible varieties.

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The management of congenital atlantoaxial dislocation (AAD) is challenging. The presence of the anomaly in the pediatric age group adds to the dilemma because children usually do not complain of their symptoms until the disease is quite severe. Ossification of the bones of the craniovertebral junction may not be complete till the age of 9 years making radiological diagnosis difficult. The management of irreducible (IRAAD) or reducible AAD (RAAD) is not well delineated. The movement restriction that occurs after posterior fusion in a growing child is of concern and is usually neglected.

It still remains unclear if IRAAD and RAAD represent two extremes of the same spectrum or represent different entities. In this study, in pediatric patients (less than or equal to 16 years), the differences between IRAAD and RAAD with regard to their clinical presentation, radiological features and outcome were analyzed. 96 patients (57 with IAAD, and 39 with RAAD) were graded as: I: no deficits except hyperreflexia or neck pain ($n = 6$); II: minor deficits but independent for daily needs ($n = 25$); grade III: partially dependent ($n = 30$); and, grade IV: totally dependent ($n = 35$). Patients with RAAD underwent direct posterior fusion (PF); those with IAAD, transoral decompression (TOD) and PF. Good outcome included patients with unaided ambulation with improvement in spasticity and weakness, and, those who maintained grade I. Poor outcome included patients with postoperative deterioration or lack of improvement; non-ambulant patients irrespective of neurological improvement at minimum follow up of 3 months; or, a perioperative mortality. In this study, significantly higher incidence of C1 assimilation, C2-3 fusion, asymmetrical occipito-C1-C2 facet joints and basilar invagination were seen with IAAD; and, os odontoideum with RAAD (p value < 0.05). 35 IAAD and 22 RAAD patients had a good outcome; 14 IAAD and 9 RAAD patients had a poor outcome (8 in each category were lost to follow up).

Significantly higher incidence of C1 assimilation, C2-3 fusion, asymmetrical occipito-C1-C2 facet joints and basilar invagination were seen with IAAD; and, os odontoideum with RAAD. It is proposed that these radiological differences are a manifestation of the differences in the genesis of IAAD and RAAD. Since IAAD is usually associated with asymmetrical occipito-C1-C2 facet joints, occipitalised atlas and C2-3 fusion, the condition may be due to an improper segmentation of the occipital and upper cervical sclerotomes. RAAD is usually associated with a well-formed posterior arch of atlas and symmetrical lateral joints. In the latter condition, therefore, C1-2 dislocation may be the result of incompetence of transverse ligaments.

A significantly better outcome was noted in severely myelopathic, completely dependent and nonambulatory patients with IAAD as compared to those with RAAD. This was despite the fact that patients with IAAD had a longer mean duration of symptoms (6.3 ± 2.1 months) as compared to those with RAAD (4.1 ± 3.2 months). They also underwent two operative procedures (TOD and PF) as compared to a single operative procedure in the RAAD group. Consequently, the duration of surgery and the hospital stay in the former group was significantly more than in the latter group. This apparent contradiction may perhaps be explained by the differing mechanisms for the development of myelopathy in patients with IAAD and RAAD.

Patients with IAAD have neurological deficits due to a persistently narrow spinal canal. Myelopathy develops due to the recurrent tenting of the cord against a posteriorly directed odontoid in flexion and extension movements of the neck. Patients with RAAD, however, perhaps deteriorate due to a different mechanism. The repeated backward movement of the odontoid during flexion of the neck (that is relieved on extension) causes cord trauma in these patients. Thus, the amplitude of relative C1-2 movement permits greater energy transfer to the cord in RAAD. In patients with IAAD, the magnitude of the primary injury sustained by the cord may be much less than that in RAAD. Following TOD, patients with IAAD, therefore, improve in neurological deficits due to the establishment of a capacious spinal canal; however, the repeated injury sustained by the cord in patients with RAAD precludes an early recovery especially in patients with severe deficits.

Respiratory compromise formed an important prognostic factor affecting the surgical outcome. In fact, 5 patients could not be weaned off the ventilator following surgery due to a lack of sustained respiratory effort and the existence of sleep apnoea. None of the pediatric patients who underwent an exclusive C1-2 fixation complained of restriction of neck movements; however, all patients with simultaneous occipitocervical stabilization along with subaxial fixation by a contour rod were troubled by their neck movement restriction in the initial months until they had adjusted to this compromise in neck movements by compensatory torso rotation.

IS INFLAMMATORY BACK PAIN BEING MISDIAGNOSED AND UNDERDIAGNOSED IN ROUTINE PRACTICE ? – THERAPEUTIC IMPLICATIONS AND CONSEQUENCES"

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Almost 50% of the patients presenting with musculoskeletal problems complain of low back pain (LBP). Therefore, LBP is one of the commonest health problems at primary health care level. Epidemiologically it is second only to upper respiratory problems in the world. In a large majority (~85%) the pathoanatomical cause cannot be ascertained. Yet, in the majority LBP is non-life-threatening, non-alarming problem that gets better over period of time. Therefore, investigations should be limited for the small minority where the cause of back pain is suspected to be serious systemic autoimmune, infectious or malignant diseases or those with definite neurological deficits

A simplified classification of back pain helps in categorising patients with back pain (Modified from Deyo RA, Weinstein JN. Low Back Pain. *The New England Journal of Medicine* 2001; 344(5):363-370). THREE categories of low-back pain:

1. "Mechanical / non-specific / idiopathic LBP" (> 90% of low-back pains):
 - Commonest, not life-threatening.
2. "Inflammatory" LBP due to spondyloarthritis / ankylosing spondylitis group (~ 5% of cases but SHOULD NOT BE MISSED, fantastic new therapies in early stage of the disease):
 - Less common, non-rheumatologist confuse it with 'mechanical' category, they miss it in early stage.
 - For rheumatologists: easy early clinical diagnosis, fantastic new treatments at early stages.
3. "Sinister" LBP due to tuberculosis (other infections) / neoplasm / severe trauma-mechanical derangement with increasing or persistent severe neurological deficit: Least common (<1-2 % of back pains), a medical emergency, clinical features usually typical, diagnosis NOT difficult.

Unfortunately, many patients with the second category (i.e. inflammatory) LBP suffer from delay in diagnosis mainly because this diagnosis is not even considered in routine clinical practice. It is most unfortunate for, there seems to be a 'therapeutic window' (window of opportunity) in the early stage of inflammatory LBP when therapeutic intervention could have dramatic long-term (? life time) effect. With recent outstanding therapeutic advancements in treating inflammatory spinal disease it would be most unethical to delay the diagnosis of this condition more so because the disease is mainly seen in young persons who have the whole life in front of them. Unfortunately, instead of making an early and quick diagnosis of inflammatory LBP, we have documented 2 different types of mistakes among patients suffering from inflammatory LBP:

1. Inability to differentiate inflammatory LBP from 'non-specific / mechanical / structural' LBP: In early stages of their disease most of these patients were given alternative diagnoses e.g. 'sciatica', 'disc'. They were often subjected to unnecessary investigations of all types (often including invasive procedures) and even surgery. There are studies showing that a significant proportion of patients undergoing spinal surgery for LBP were HLA B27 positive (clearly indicating that the most likely diagnosis in them was early ankylosing spondylitis)!
2. Diagnosing 'TB' and wasting precious time on anti-TB treatment: Large number of patients with inflammatory LBP were given anti-TB drugs (often multiple courses

because 'TB is resistnat'!) mostly based on unproven, un-standardised laboratory investigations (TB ELISA test, TB-PCR test and many more) not recommended by WHO, CDC and condemned even in text books.

A case vignette would illustrate the point (This patient was seen in the joint disease clinic last week):

46 year-old woman bed ridden for the last 2 years.

Problem started ~ 18-20 years ago with low-back pain. She suffered from severe early morning stiffness on getting up in the morning. It would be relieved by physical activity and NSAIDs and aggravated by rest. The problem became chronic and fluctuating in nature with spontaneous improvements and deterioration over the next several months to years. After a few years she developed pain and slowly increasing restriction in the neck as well making it difficult for her to look over the shoulders. By this time she had also started to get fluctuating pain and swelling of the knee joints, elbow joints, wrist joints associated with early morning stiffness.

After suffering for several years and taking treatments from different systems of medicines and different doctors, in 1997 she consulted a major orthopaedic centre with main interest in spinal diseases. An x-ray was done immediately, renal stone was seen, further confirmation of the same was done by doing an IVP. Back pain was attributed to renal stones and advised surgery. She underwent operation for removing renal stones - bilaterally. The back pain got worse after surgery. The ensuing bed rest of a week or so led to markedly increased stiffness in the lower back that rose up to cervical spine. In the last 2 years the disease progression has been rapid and progressive; now she is completely crippled and bed ridden needing help for her personal care because of fixed flexion deformity in the knees and elbows; and a complete 'bamboo spine'.

Interestingly we found that she is loaded with extensive plaque psoriasis that she remembers having for the past several decades! It was not mentioned in any of her medical documents and papers.

Investigations available with her over the years repeatedly showed very high ESR (50s-70s range), high platelets, low haemoglobin, high alkaline phosphatase and all the features of severe systemic inflammatory disease.

Even the earliest X-rays (1997) showed sacroiliitis and osteitis condensans ilii. X-ray hands done in 2000 also showed typical changes of an inflammatory arthritis.

HOW TO CLINICALLY DIAGNOSE INFLAMMATORY LOW-BACK PAIN EARLY?

1. 1. Earliest (Calin - 1977) clinical criteria:

- insidious in onset
- persisting for at least three months
- developing at less than 40 years of age
- being associated with morning stiffness
- showing improvement with exercise

(Calin A, Porta J, Fries JF, Schurman DJ. Clinical history as a screening test for ankylosing spondylitis. JAMA 1977; 237:2613-2614; clinical history may be sensitive (95%) and specific (85%) in the differential diagnosis of ankylosing spondylitis).

2. A reassessment of the clinical history for application as classification and diagnostic criteria (2006):

- Morning stiffness of >30 minutes' duration
- Improvement in back pain with exercise but not with rest
- Awakening because of back pain during the second half of the night only
- Alternating buttock pain

(Rudwaleit M, Metter A, Listing J, Sieper J, Braun J. Inflammatory back pain in ankylosing spondylitis: A reassessment of the clinical history for application as classification and diagnostic criteria. Arthritis Rheum 2006 Jan 30 ;54 (2):569 -578 2006; 54:569-578; sensitivity of 70.3% and a specificity of 81.2% if at least 2 of these 4 parameters were fulfilled (positive likelihood ratio 3.7). If at least 3 of the 4 parameters were fulfilled, the positive likelihood ratio increased to 12.4).

3. Additional help from HLA B27 screening:

- The highest likelihood ratio was obtained for the presence of HLA-B27.
- Combined with at least 2 of the clinical criteria (above) inflammatory back pain can be diagnosed with high degree of sensitivity and specificity at primary care level.

(Sieper J, Rudwaleit M. Early referral recommendations for ankylosing spondylitis (including pre-radiographic and radiographic forms) in primary care. *Ann Rheum Dis* 2005; 64:659-663. An earlier diagnosis of ankylosing spondylitis (AS) is required because there is still a 5-7 year delay between first symptoms and diagnosis, and new effective treatments are available for active disease. Primary care physicians need easy to apply parameters to help them identify patients with suspected AS for onward referral. The best measures found were inflammatory back pain and HLA-B27 positivity; Rudwaleit M, van Der HD, Khan MA, Braun J, Sieper J. How to diagnose axial spondyloarthritis early. *Ann Rheum Dis* 2004; 63:535-543.)

IMPORTANT NOTE: The technique of performing HLA B27 screening is extremely important. Done by the routinely available technique called 'floctometry' the test given wrong results. Many HLA B27 positive patients are reported as 'negative'. Therefore, the technique to be used MUST be single tube PCR-SSP protocol using DNA of the patient.

HOW MRI MAY BE MISLEADING IF NOT USED JUDICIOUSLY:

(Table from Deyo RA, Weinstein JN. Low Back Pain. *The New England Journal of Medicine* 2001; 344(5):363-370)

TABLE 2. REPRESENTATIVE RESULTS OF MAGNETIC RESONANCE IMAGING STUDIES IN ASYMPTOMATIC ADULTS.*

STUDY	SUBJECTS	ANATOMICAL FINDINGS					ANNULAR TEAR
		HERNIATED DISK	BULGING DISK	DEGENERATIVE DISK	STENOSIS	prevalence (%)	
Boden et al. ²⁶	Volunteers <60 yr old	22	54	46	1	NR	
	Volunteers ≥60 yr old	36	79	93	21	NR	
Jensen et al. ²⁷	Volunteers (mean age, 42 yr)	28	52	NR	7	14	
Weishaupt et al. ²⁸	Volunteers (mean age, 35 yr)	40	24	72	NR	33	
Stadnik et al. ²⁹	Patients referred for head or neck imaging (median age, 42 yr)	33	81	72	NR	56	

*NR denotes not reported.

As can be seen, a large proportion of NORMAL persons have extensive anatomical 'abnormalities' in the spine. If not properly taken in the context of the clinical presentation, this would be most misleading.

MRI - still a lot to learn!

MRI can be a very useful method of early diagnosis of inflammatory back pain but these are still early-days and process of standardisation is still not complete (M Bollow M et al. Very early spondyloarthritis: where the inflammation in the sacroiliac joints starts *Annals of the Rheumatic Diseases*. 2005; 64: 1644-1646; Maksymowych WP et al. Spondyloarthritis research Consortium of Canada magnetic resonance imaging index for assessment of sacroiliac joint inflammation in ankylosing spondylitis. *Arthritis Rheum* 2005 Oct 15 ;53 (5):703 -9 2005; 53:703-709). Radiologists MUST undergo specialised training to become competent in reading MRI findings for early diagnosis of inflammatory LBP. Another important point to remember is that not every early case with inflammatory LBP shows sacroiliitis. In fact inflammatory LBP, the leading symptom of ankylosing spondylitis (AS) and undifferentiated axial spondyloarthritis (SpA), precedes the development of radiographic sacroiliitis, sometimes by many years (Rudwaleit M, van Der HD, Khan MA, Braun J, Sieper J. How to diagnose axial spondyloarthritis early. *Ann Rheum Dis* 2004; 63:535-543). It is only much later that typical changes recognizable by radiologists not trained in reading MSK MRI are seen. Under the circumstances a practical imaging algorithm has been suggested by Heuft-Dorenbosch L, et al. (Combining information obtained from MRI and conventional

radiographs in order to detect sacroiliitis in patients with recent-onset inflammatory back pain. Ann Rheum Dis 2005; [ARD Online First, Published on October 11th 2005 as 10.116/ard.2005.044206]. These authors have shown that conventional radiology (CR) can detect structural changes in S-I joints with higher sensitivity than MRI. But inflammation on MRI can be found in a substantial proportion of patients with inflammatory LBP with (yet) normal radiographs. Assessment of structural changes by CR followed by assessment of inflammation on MRI in patients with negative findings gives the highest returns in terms of detecting involvement of the SI joints by imaging in patients with recent onset inflammatory LBP.

[EMG beats MRI for diagnosing low back pain, spinal stenosis. Haig AJ, Tong HC, Yamakawa KSJ, et al. The sensitivity and specificity of electrodiagnostic testing for the clinical syndrome of lumbar spinal stenosis. Spine 2005; 30:2667-2676.]

TAKE-HOME MESSAGE:

1. Inflammatory low-back pain (LBP), the main symptoms of ankylosing spondylitis, is being under-diagnosed or misdiagnosed in a large majority of cases causing unacceptable delay in diagnosis.
2. 'Therapeutic window' or 'Window of opportunity' to modify or completely suppress the disease, is thus lost. It is important to diagnose the disease very early because of the advent of outstanding new therapeutic options for this otherwise crippling, disabling and life-threatening disease.
3. Good clinical history to distinguish inflammatory from non-inflammatory LBP is absolutely mandatory.
4. If inflammatory LBP is suspected screening for the presence of HLA B27 using DNA-technology is most useful.
5. Digital x-ray of S-I joints (to see structural changes) along with MRI to see for subchondral bone oedema - mainly on the iliac side of the joint in certain areas) would further aid the diagnosis.
6. Once diagnosed early initiation of disease modifying drugs including anti-TNF agents would give dramatic control of the disease.

CONTROVERSIES IN ROLE OF BRACING IN ADOLESCENT IDIOPATHIC SCOLIOSIS

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Problems with Scoliosis

- Long term studies show worsening of curves if > 50 degrees at maturity
- Thoracic curves more than 80 degrees associated with shortness of breath and Cor pulmonale and death
- Cosmetic appearance
- Hence operative and non operative treatment aimed to keep curves less than 50 degrees at maturity

History of brace

- Hippocrates used traction and lateral strap localizers
- Blount in 1946 first used Milwaukee brace for non operative of scoliosis
- This brace had metal uprights connected to submandibular molded pad for distracting effect
- Stimulated patient to pull away from contact points thus correcting curve by muscle power
- Standard protocol was full time brace wear for duration of growth for curves between 20 and 45 degrees
- However, poor complaint with it forced Hall and Miller to develop a total contact brace applying pressure over lateral apices, named Boston brace
- Green developed part time brace program for non complaint children, achieving similar control
- Charleston bending brace, Providence and others were developed, especially for night time wear

- They bent patients out of their curves
- They suggested night time wear or eight hours wear as adequate to control curves from progressing

Standard indications for brace wear

RISSER	CURVE	ACTION
0-1	0-20 DEGREES	OBSERVE
0-1	20-40 DEGREE	BRACE
2-3	0-30 DEGREE	OBSERVE
2-3	30-40 DEGREE	BRACE
0-3	40-50 DEGREE	GRAY AREA
0-4	50 OR HIGHER	SURGERY

Compliance

- Different measures of timing of brace wear available
- Pressure activated timer- not effective when loose wear or child bend forward
- London Brace timer- digital clock connected to temperature sensing mechanism, switched on when temperature more than 30 degrees

Controversy - compliance

- Compliance significant factor in achieving successful result
- Recording show even most compliant patients wear brace between 14-19 years
- Studies with part time bracing 12-16 hours do not show inferior results compared to 20 hours regimen
- However a Meta analysis showed best results, with regards to Milwaukee brace, with 23 hours regimen
- But none studies had brace timers to assess actual wear time.
- Might be a patient told to wear brace for 20 or 23 hours actually achieves 14 or 16 hrs, whereas as those recommended 16 hours actually wear it for 10-12 hours
- Most valuable period is first 8 months when compliance will be evident. Also correctibility of curve on brace can be decided by then

Milwaukee - principle

- Originally, it was thought that correction is by effect of brace pressure from pads or traction from brace design and actively from muscle contraction and movement of body away from pads
- Research shows correction generated by passive correction inherent in brace with little contribution from muscle action

Indications for Milwaukee

- All patterns with thoracic curves that has apex at or above T8
- Pads are added according to curve pattern- trapezius pad for high thoracic curve, thoracic pad for thoracic curve, combination of oval and lumbar pad for thoracolumbar curve and a lumbar pad for lumbar curve

If hypokyphosis also present, modifications are needed to prevent increase and maintain correction

Milwaukee brace- contraindications

- Child who has completed growth
- Curve over 45 degrees
- Curve under 25 degrees without documented progression
- True thoracic lordosis
- Nonsupportive family or noncompliant child

Plan of wear

- Full time wear with time out for bathing/ swimming or sports, so worn for 20-22 hrs
- Weaning is begun at end of growth or height, Risser of 4 and in girls, 12-18 months post menarche
- Long term result shows initial improvement, then gradual worsening, so by end of bracing curve is 10-15% better than pre brace curve. At 5 or more years, curve is same as pre brace curve.

Important to remember that comparison is with prebrace curve, and not with what curve would have been without brace treatment

Boston brace- principle

- Provides correction by pad pressure at apex and below

- Centering the pad at apex will only further worsen the deformity
- In brace exercise are emphasized to achieve active correction
- **Charleston bending brace**
- Stretching of concavity appears to play a role
- Reasons for success are not entirely clear, even though there is documented successful outcome

Studies

- A 2005 study from Denmark reviewed literature for studies whose design was a randomized clinical trial, if all patients had an idiopathic scoliosis, if all patients were less than 18 years of age during the intervention, and if the type of intervention was a conservative one.
- Thirteen studies met the final inclusion criteria. The authors conclude that the effectiveness of bracing and exercises is not yet established, but might be promising. They found no evidence of the effectiveness of electrical stimulation.

Effect of brace on respiratory and cardiac function

- A study by Margonato et al in 2005 showed the brace appears to limit maximal exercise performance especially in girls, where it affects the cardiopulmonary efficiency.
- However, Koroviessis et al in 1996 suggested that brace wearing for mild idiopathic scoliosis does not harm adolescent lung function over a 2-year period.

Bracing in SCI

- Mehta et al in 2004 reviewed bracing in children with SCI to prevent scoliosis
- They concluded Bracing of children with SCI before significant curve formation (< 20 degrees) delays the time to surgical correction of the deformity as it progresses. At smaller curves (< 10 degrees), bracing may even prevent the need for surgery. As curve size increases (> or = 20 degrees), bracing seems to play a limited role, because it does not seem to prevent surgery or delay time to surgical correction.

Controversy – principle!!

- Raso et al in 2002 tried to determine if factors other than mechanics are responsible for effectiveness of brace.
- This study showed that the target force levels set for the active pad in braces prescribed for the treatment of AIS vary considerably and that brace applies the desired load 25% of the prescribed time.

Quality of life with bracing

- Ugwonal et al in his study in 2004 concluded that brace wearing did not decrease the QOL of adolescents, compared with their observed counterparts.
- Climent et al in 1999 concluded that braces impaired Quality of life, with maximum effect being from Milwaukee brace

Prevalence of surgery after bracing

- Rogo et al in 2003 published his results of active program of bracing, and found 14% surgery rate, compared to 28% in centers with policies of non intervention
- Similarly Weiss et al in 2003 found 7% surgery rate in braced group as compared to non treated group
- However, Goldberg et al in 2001 concluded that Forty-three of his (28.1%) have undergone surgery. This was not statistically different from the surgery rate reported from an active bracing center.
- Noonan et al in 1996 also questioned whether the natural history of progressive idiopathic scoliosis is truly altered by use of the Milwaukee brace.

Estimating final outcome on bracing

- Landauer et al in 2003 concluded that compliant patients with a high initial correction can expect a final correction of around 7 degrees, while compliant patients with low initial correction may maintain the curve extent when examined at 6 months.

Heuter-Volkman principle and bracing

- Castro in 2004 concluded that Brace application results in immediate positional derotations of the spine in patients with AIS. These positional derotations were maintained only in patients with flexible curves, at final follow-up. Brace treatment was not recommended in patients whose curves did not correct at least 20% in a TLSO.

Effectiveness of Charleston brace

- Gepstein et al in 2002 concluded that surgery was performed in 11.8% and 13.5% of patients in the Charleston and TLSO groups, respectively.
- Trivedi et al in 2001 concluded that 25 of the 42 patients (60%), the brace was successful in preventing progression of the curve (mean follow-up 3.4 years; range 1.1-11.7). Thoracic curves had the same success as thoracolumbar and lumbar curves.

Charleston brace – effectiveness???

- However, Howard et al in 1998 found that the proportion of patients who underwent surgery was 18% with thoracolumbosacral orthosis, 31% with the Charleston brace, and 23% with the Milwaukee brace ($P = 0.26$; chi-square).

Bracing in males

- Karol et al in 2001 found that bracing of male patients with idiopathic scoliosis is ineffective. Curves measuring $>$ or $=30$ degrees are very likely to progress to surgery, especially in immature patients.

Psychological effect in brace

- Sapountzi et al in 2001 concluded that the scoliosis group had a poorer perception of body image in comparison to the control group ($P=0.048$), while boys with scoliosis ($P=0.030$) had a better perception of body image than girls with scoliosis.
- Olafsson et al in 1999, however, concluded that wearing the brace does not affect the self-image of adolescents with Idiopathic scoliosis negatively.

IS ILIAC CREST GRAFTING MANDATORY IN SURGERY OF IDIOPATHIC SCOLIOSIS?

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Having a stable, balanced and fused spine is the goal in surgical correction of Scoliosis. Getting fusion of the instrumented segment with the aid of copious autogenous iliac graft has been a corner stone in the goals of treatment. However harvesting copious graft from teenage iliac bone has its own limitation in the form of quantity of graft, surgical time, blood loss and other complications of graft sites.

Bone substitute is an appealing concept and since time immemorial Orthopedic Surgeons are after an ideal bone substitute which can have all the characteristics of an autogenous bone graft. The limitations with bone substitutes are osteo-induction and osteo-conduction properties, strength, sterilization, chances of transmitting infective agents and cost.

This prospective study was done in Khoula Hospital, Muscat, Oman from September 2001 to May 2002. 20 consecutive patients who underwent posterior corrections for Idiopathic scoliosis using segmental fixation by Euros Titanium Implants, No autogenous iliac crest graft was taken instead Tutoplast graft (human cadaveric) mixed with spinous process of the patient was used as graft. All patients have minimum of three years follow-up.

We had an excellent result, clinically all patients have fused no implant failure, no pain, no infection and no loss of correction.

We conclude that bone substitute can be safely used provided meticulous care is taken to optimize fusion in the form of gentle tissue handling, stability of the construct, good decortication and destruction of facet joints.

Introduction:

Having a stable, balanced and fused spine is the goal in surgical correction of scoliosis copious autogenous graft is an important component in attaining fusion. However harvesting copious graft from teenage iliac bone has its own limitations in the form of quantity of graft, surgical time, blood loss and morbidity from the donor site. Bone substitute is an appealing concept.

Material and Methods:

This prospective study was done in Khoula Hospital, Muscat, which is the Spine Centre for the entire country of the Sultanate of Oman. 20 consecutive patients underwent posterior correction for Idiopathic Scoliosis using segmental fixation by Euros Titanium implants from

September 2001 to May 2002. The follow up period ranges from 5 years to 4½ years. Age of patient ranges from 12 years to 19 years. Only Idiopathic Scoliosis was included in the study. No autogenous iliac crest graft was taken instead Tufoplast graft (allograft human cadaveric) mixed with slivers from spinous process of the patient was used. All patients were mobilized on 3rd post operative day, without any major external brace. All patients had epidural catheter for pain management for 2 days. After that they had oral NSAIDs no opiates or injectable.

Results:

We had excellent results, Clinically all patients have fused, no implant failure, no loss of correction, no infection, no pain, no revision or removal of implants. We were able to mobilize the patient fast with minimal analgesics.

Discussion:

We have come a long way since the discovery of osteo-Induction activity within demineralised bone extract in 1965.

Although autogenous bone is most widely used graft material for spinal fusion and the gold standard against which all other bone graft substitutes are judged but it has disadvantages. The supply of autologous bone graft is limited in addition harvesting autologous bone is associated with rate of major complications 8.6% and rate of minor complication 20.6% (Chapman et al.)

Allergenic bone with variable biological properties is available in many preparations. Demineralised bone matrix acts as an osteoconduction and possibly as an osteoinductive material. Dematerialized bone matrix revascularised quickly. It also is a suitable carrier for autologous bone marrow. Delineable and bone matrix is prepared by standardized process. Demineralised bone matrix is available as freeze dried powder as grains or as gel or paste.

Tufoplast process uses a combination of baths to remove cellular material viruses and prions, resulting in a sterile and anti-genetically inactive bone tissue that is mechanically sound.

Conclusion:

We conclude that bone substitute in the form of allogenic graft can be safely used in place of autogenous iliac crest graft provided meticulous care is taken to optimize fusion in the form of good tissue bonding, stability of the construct, good decortication and destruction of facet joints.

However it is imperative to remember that no bone graft or bone graft substitute permits the surgeon to use less than optimum orthopedic techniques or to deviate from proper surgical principles.

WHETHER SUPPRESSION OF PSYCHOLOGICAL SYMPTOMS BY DRUG THERAPY IS THE OPTIMAL TREATMENT OF SUCH PATIENTS

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ABSTRACT

People with spinal cord injury are more prone to develop psychological symptoms than those without the injury. The physical trauma usually has a big impact on psychology of the patient. The patient passes through various phases of psychological adjustments after the injury. During these phase he usually develops psychological symptoms. The psychological symptoms in some cases reach a level severe enough to require treatment. Drug treatment may be required in some cases but this is not curative. The symptoms in these cases require comprehensive treatment including medications, psychotherapy, counseling, rehabilitation management showing good early results, recreational therapy and family and social support.

Key Words: Spinal cord injury, Psychology, Rehabilitation.

Like other people, the people who have sustained spinal cord injury also have emotions, feelings and thoughts. Though the response of these people to their injuries may vary, we, medical people expect it to be the same or at least to follow a definite pattern. So, the primary care physician may diagnose a sad patient as a depressed one.

When we think of treatment of psychological problems of spinal cord injured patients, we need to be extra careful and try to find out the biological, social and psychological factors that may be responsible for or complicating the injuries.

The early psychological syndromes in spinal cord injured include posttraumatic stress disorders. Stress as we understand is an emotional and behavioral disorder that may lead to intense fear and helplessness. The stress disorders may arise as a direct consequence of the injury or may represent the long-standing features of personality and coping style. A few of these patients may be stressed enough to require drug treatment.

When the patient realizes that he was going to have some permanent impairment and he would not be having same vocational and social life again he becomes depressed and the depression may represent a major depressive disorder. Many primary care physicians just prescribe medication for treatment of depression and leave out an important psychological aspect of treatment. The drug therapy should be considered for those with biological, somatic or mood related symptoms severe enough to disrupt the life of the person and activities of daily living. The physician should look for psychological factors that may contribute to depression. The factors include patient's coping style, grief, previous injuries, cognitive style and any other pre-injury psychological impairment. The role of psychologist and psychotherapist should be kept in mind while assessing the patient and a referral should be made to get the psychosocial interventions for treating depression.

Guidelines developed by a 18-member consortium for spinal cord medicine whose members include APA, The American Spinal Injury Association, and The Paralyzed Veterans of America though recognized that assessing, diagnosing and treating depression in people with spinal cord injury is complicated by biological, psychological and social factors unique to their injuries, they did not emphasize the role of psychotherapy as much as of medication.

The studies have shown that except in severe depressions, and bipolar depression, medication is an option rather than a necessity. The medication does not cure depression; it only helps you to feel better by controlling certain symptoms. The control in symptoms may further pave way for effectiveness of other therapeutic means. But sometimes, the sedative effects of medication may interfere in patient's rehabilitation training. Anti-depressant medication prescription requires special precautions when the patient is already on anti-cholinergics or sympathomimetics for his urinary problems. Care should also be taken while prescribing these medicines as tri-cyclic antidepressants have drug interaction with Baclofen.

Researches have shown that patients with spinal cord injury tend to have lower self-esteem, which leads to lower self worth and less motivation. Persistent low esteem is unhealthy and may lead to long term depression, stagnation of rehabilitation efforts and sometimes even suicide. The role of a physician in caring for patients with low esteem and motivation is to give them hope and maximize their function in their day-to-day life. The patient's therapist sets weekly achievable goals. So that the patient enjoys the success when he achieves them. The therapy sessions are made pleasurable. The recreational activities and games are made part of therapy sessions as well as post therapy time. The feeling of achievement and the recreation therapy lower the stress level of the patient simultaneously improving the self-esteem.

Depression and its symptoms are disabling and therefore must be treated as an obstacle to successful rehabilitation. When cognitive, somatic and affective symptoms of depression are compared, the cognitive aspect has been found to be less amenable to conventional pharmacological interventions.

A study by Fullerton DT and colleagues published in Arch Gen Psychiatry, 1981 Dec. issue, reported that of 30 patients with spinal cord lesions and depressive disorders diagnosed using the schedule of Affective Disorders and Schizophrenia and Research Diagnostic Criteria (RDC), 15 patients had RDC diagnosis before or after their injury. A depressive disorder developed in nine after injury. Eight developed depressive disorders within a month after injury. Out of all these, only one patient received anti-depressants. The remainder recovered without treatment other than rehabilitation program.

Pain is a common complaint in spinal cord injuries. Emotional and cognitive factors may aggravate the pain. Sometimes the pain may be a factitious disorder or even somatoform disorder. So, in addition to medications and surgical treatment these patients require psychological treatment strategies. Post spinal cord injury pain is not a thought or emotion disorder and teaching coping strategies to the patients or dealing with psychological factors may help in reducing if not eliminating the cause of pain.

Many times following SCI, individuals may go through a period of physical and psychological adjustments. Spinal cord injury changes the patients' physical functioning, independence, and sexual, social and vocational role. Interventions with SCI should include

focus on adjustment. Group therapy and peer group interactions have been found quite effective in reducing stress and related disorders and adjusting in a better way.

In Indian circumstances, the family support is a big factor in restricting the development of psychological symptoms. Financial support from insurance companies, social welfare agencies and government do a lot of good to the patient.

So, some SCI patients may not at all need any therapy for their psychological symptoms, others may require drug treatment for relief in their symptoms. The patients, who require drug treatment and some other, need the services of psychologist, counselor and social worker for psychological rehabilitation. Once the patient's psychological symptoms are controlled, his involvement in rehabilitation program increases and as the physical rehabilitation programme shows results the need for the medications reduces.

References

1. Middleton JW, Tate RL, Geraghty TJ. Self-efficacy and spinal cord injury: psychometric properties of a new scale. *Rehabilitation Psychology*. 2003; Nov: 48(4): 281-288.
2. Fullerton DT, Harvey RF, Klein MH, Howell T. Psychiatric disorders in patients with spinal cord injuries. *Arch Gen Psychiatry*. 1981 Dec;38 (12):1369-71
3. Miller, L. (2001). Not just malingering: Syndrome diagnosis in traumatic brain injury litigation. *Neurorehabilitation*, 16, 109-122.
4. Trieschmann R. *Spinal Cord Injuries: Psychological, Social and Vocational Rehabilitation*. 2nd Edition. New York: Demos, 1988.

CONTROVERSIES IN THE MANAGEMENT OF CONGENITAL SCOLIOSIS

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Congenital deformities of the spine are due to the presence of developmental vertebral anomalies, which produce a localized imbalance in the longitudinal growth of the spine. The term congenital is slightly misleading because it implies that the deformity is present at birth but this is not necessarily so. It is the vertebral anomalies, which are present at birth, and the clinical deformity may not become apparent until later childhood when the diagnosis is made radiographically.

Congenital deformities of the spine are relatively uncommon in the west as compared to idiopathic scoliosis. But in some areas in India congenital scoliosis is fairly common. All degrees of severity of curvature are seen at all ages. Some curves do not progress rapidly whereas some deteriorate rapidly. Congenital anomalies of the vertebrae producing a scoliosis, kyphoscoliosis or kyphosis, are potentially serious conditions, which can result in an extremely severe rigid spinal deformity with malalignment of the body and possible spinal cord compression. The frequent challenge in our Patients is that they present late with severe deformity.

These anomalies are either due to failure of formation or segmentation of the vertebral bodies. The type of spinal deformity which develops depends on whether the impaired growth occurs unilaterally, producing a pure scoliosis, or lies anterolaterally or anterior to the transverse axis of vertebral rotation in the sagittal plane, producing a kyphoscoliosis or a pure kyphosis. Congenital kyphosis and kyphoscoliosis are much less common than a congenital scoliosis but potentially more serious because they can, on occasion, lead to spinal cord compression and paraplegia. The reason for this is that a posterior hemivertebra or a posterolateral quadrant hemivertebra are unstable. As the deformity progresses the hemivertebra tends to extrude posteriorly into the spinal canal causing anterior spinal cord compression at the apex of the angular kyphosis.

Defects of formation:

Partial formation of vertebra (hemivertebra) is one of the most common types of congenital scoliosis. Longitudinal growth occurs on the upper and lower surfaces of the hemivertebra, whereas there is an absence of two growth plates on the unformed side. As the growth progresses it acts as an enlarging wedge on one side of the spine resulting in an increasing scoliosis. The location and the extent of segmentation defects in the hemivertebra is crucial in understanding and predicting the progression of the congenital spinal deformity.

Defect of Segmentation:

A unilateral unsegmented bar is the second most common cause of a congenital scoliosis and is due to a unilateral failure of vertebral segmentation affecting two or more vertebrae. The mean length of the bar is usually over three vertebrae. The unsegmented bar does not contain any growth plates and, therefore, does not grow longitudinally, whereas some degree of growth occurs on the opposite side of the spine. The rate of progression and final severity of the scoliosis depends not only on the extent of the bar but more importantly on the growth potential on the convexity which drives the curve. The presence of hemivertebrae on the contralateral side worsens the prognosis.

The prognosis of any given deformity is a product of the disruption of symmetrical growth. A hemivertebra which has growth potential may not change in its configuration during growth. A hemivertebra which is accompanied by a failure of separation on the contralateral side is subject to rapid deformation. A magnetic resonance imaging scan of the spine is essential in all patients before surgical correction of the deformity is attempted using spinal instrumentation. This may reveal the presence of an intra spinal anomaly, such as a diastematomyelia, that could be tethering the cord. A diastematomyelia has been reported in 5 to 20% of patients with a congenital scoliosis and, if the spur is not removed, these patients could develop serious neurological complications due to traction on the spinal cord at the time of correction of the scoliosis. Of the various types of scoliosis, the congenital variety carries the highest risk of neurological complications

Management

The role of bracing is limited, but for control of compensatory curves and maintenance of coronal balance, bracing occasionally has a role.

Surgery

Based on the type of anomaly, age of the patient, Progression of the deformity the decision regarding surgery usually taken. The following surgical options are available.

Early prophylactic treatment (convex growth arrest)

Appropriate biconvex epiphyseodesis so as to balance the spinal growth. If progression is recognized early, convex anterior and posterior epiphyseodesis is effective, but this must be performed early in life (before age 3-5, depending on the deformity) to be effective. There is less neurological risk involved and the patient gets the benefit over a period of time.

In situ fusions (posterior fusions without instrumentation)

There is no correction of the deformity. The idea is to hold the spine and prevent further progression of the deformity. The advantages of posterior fusion without instrumentation are its simplicity, safety, and reliability. Difficulties include cast correction, an increased pseudarthrosis rate, the possibility of late bending, the possibility of crankshaft phenomenon, and the smaller amount of correction possible. Posterior fusion alone generally is used for smaller curves that are expected to progress slowly and curves in which anterior spinal fusion would be quite difficult, such as the cervicothoracic junction.

Posterior fusions with instrumentation

Posterior fusion is done and spinal instrumentation done without correction of deformity. This obviates the need of post operative cast application. The advantage of this being that the secondary curves are usually corrected by the instrumentation. Though the main curve due to the anomaly does not correct much, overall balance of the spine can be achieved by this procedure. The curves should be flexible, and no intraspinal abnormalities should be present. Ideally, kyphosis should not be significant. The goal of this surgery is modest correction and curve control. A wake-up test is mandatory in these patients. The instrumentation is used to increase the fusion rate and as a stabilizing strut, rather than to obtain significant correction.

Anterior release and posterior instrumentation

The main indications for anterior and posterior fusions instead of isolated posterior fusion are to treat sagittal plane problems, to increase the flexibility of the scoliosis by discectomy, and to treat curves with a significant potential for progression. In small children this is done to prevent the crankshaft phenomenon, (to eliminate the anterior physis to prevent bending or torsion of the fusion mass with further growth)

Direct approach to the anomaly

Hemivertebrectomy. Hemivertebra excision usually is reserved for patients with pelvic obliquity or with fixed, lateral translation of the thorax that cannot be corrected by other

means. Hemivertebra excision and fusion should be limited to very few patients. Preventive early fusion is preferable to allowing a curve to progress to the point where hemivertebra excision is indicated. At the lumbosacral area, however, excision of the hemivertebra can improve trunk imbalance. The L3, L4, or lumbosacral level, below the level of the conus medularis, is the safest level at which to excise a hemivertebra. Hemivertebra excision in the thoracic area is most dangerous because this area of the spinal canal is the narrowest and has the least blood supply.

The curves best managed by hemivertebra excision are angular curves in which the hemivertebra is the apex. This technique has been reported mostly in lumbosacral hemivertebrae that produce lateral spinal decompensation in patients for whom no other technique can achieve adequate alignment. Leatherman and Dickson reported serious complications when anterior hemivertebra excision was combined with posterior fusion in one operation. They recommended a two-stage procedure in which the vertebral body is removed through an anterior exposure; then in a second stage the posterior elements are removed and fusion is done. More recently, Bradford et al reported acceptable results with one-stage anterior and posterior hemivertebra resections.

Hemivertebrectomy is being done even in small children with congenital scoliosis at some centers with paediatric instrumentation instead of convex growth arrest procedures. With the latest reports of achieving hemivertebrectomy using posterior approach alone, the indications of this procedure have expanded. By this technique of posterior convex wedge resection (posterior Hemivertebrectomy) both the sagittal and coronal plane deformities can be treated more effectively.

For a given anomaly of congenital scoliosis which type of surgical intervention gives the best results is controversial as most of the procedures have their own advantages and limitations. Age of the patient at the time of presentation and the type and severity of the deformity are the main determining factors. Hemivertebrectomy long considered for lumbosacral hemivertebra is now being performed for even thoracolumbar hemivertebrae.

References

1. Bradford DS, Boachie-Adjei O. One-stage anterior and posterior hemivertebra resection and arthrodesis for congenital scoliosis. *Journal of Bone & Joint Surgery - American Volume* 1990; 72(4): 536-40.
2. Callahan BC, Georgopoulos G, Eilert RE. Hemivertebra excision for congenital scoliosis. *Journal of Pediatric Orthopedics* 1997; 17(1): 96-9.
3. Day GA, Upadhyay SS, Ho EK, Leong JC, Ip M. Pulmonary functions in congenital scoliosis. *Spine* 1994; 19(9): 1027-31.
4. Holte DC, Winter RB, Lonstein JE, Denis F. Excision of hemivertebrae and wedge resection in the treatment of congenital scoliosis. *Journal of Bone & Joint Surgery - American Volume* 1995; 77(2): 159-71.
5. Keller PM, Lindseth RE, DeRosa GP. Progressive congenital scoliosis treatment using a transpedicular anterior and posterior convex hemiepiphyodesis and hemiarthrodesis. A preliminary report. *Spine* 1994; 19(17): 1933-9.
6. King JD, Lowery GL. Results of lumbar hemivertebra excision for congenital scoliosis. *Spine* 1991; 16(7): 778-82.
7. King AG, MacEwen GD, Bose WJ. Transpedicular convex anterior hemiepiphyodesis and posterior arthrodesis for progressive congenital scoliosis. *Spine* 1992; 17(8 Suppl): S291-4.
8. Lazar RD, Hall JE. Simultaneous anterior and posterior hemivertebra excision. *Clinical Orthopaedics & Related Research* 1999(364): 76-84. 2
9. Lonstein JE. Congenital spine deformities: scoliosis, kyphosis, and lordosis. *Orthopedic Clinics of North America* 1999; 30(3): 387-405, viii.
10. McMaster MJ, Ohtsuka K. The natural history of congenital scoliosis. A study of two hundred and fifty-one patients. *Journal of Bone & Joint Surgery -American Volume* 1982; 64(8): 1128-47.
11. McMaster MJ. Congenital scoliosis caused by a unilateral failure of vertebral segmentation with contralateral hemivertebrae. *Spine* 1998; 23(9): 998-1005.
12. Prahinski JR, Polly DW, Jr., McHale KA, Ellenbogen RG. Occult intraspinal anomalies in congenital scoliosis. *Journal of Pediatric Orthopedics* 2000; 20(1): 59-63.
13. Hemivertebra resection by a posterior approach: Innovative operative technique and first results. Ruf M, Harms J. *Spine*. 2002 May 15;27(10):1116-23.

14. Winter RB, Lonstein JE, Denis F, Sta-Ana de la Rosa H. Convex growth arrest for progressive congenital scoliosis due to hemivertebrae. *Journal of Pediatric Orthopedics* 1988; 8(6): 633-8.
15. Winter RB, Lonstein JE. Congenital scoliosis with posterior spinal arthrodesis T2-L3 at age 3 years with 41-year follow-up. A case report. *Spine* 1999; 24(2): 194-7. 3

GLOBAL INSTRUMENTATION & CORRECTION OF LUMBO-SACRAL SPONDYLOLISTHESIS – ANALYSIS OF 60 CASES OVER 10 YEARS.

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INTRODUCTION:

Grade II – III spondylolisthesis of the lumbo-sacral spine have been conventionally treated by decompression with or without interbody fusion with or without reduction over the years with varied results.

The purpose of this study is to compare these conventional modalities with a standard global instrumentation correction fusion technique.

METHODS:

30 patients underwent posterior decompression, trans pedicular screw stabilization, correction & trans foraminal interbody fusion with titanium cages & autograft for mobile grade II – III spondylolisthesis L4-5 or L5-S1, by a single surgical team over the past 10 years.

30 patients underwent posterior decompression without complete correction by using stainless steel rectangles or transpedicular screws in situ, without interbody cages with intertransverse autografting over the past 10 years by the same surgical team.

RESULTS:

Subjective results like patient satisfaction return to activity, level of activity & amelioration of pre-operative symptoms were assessed by feedback forms.

Objective results like radiological correction of the deformity, stability of construct, loading of construct; evidence of fusion & long-term loss of correction was assessed for a minimum of 2 years.

DISCUSSION & CONCLUSION:

Global correction of mobile listhesis as described by the aforementioned standard technique can give uniformly good objective results, which stand the test of time. Poor objective surgical results may have very satisfied patients at times. However we found no poor result in well-corrected instrumented & fused listhesis.

KEY WORDS: listhesis, instrumentation, correction, fusion

DILEMMAS IN PREDICTING COMPLICATIONS FOLLOWING FLAP SURGERY IN SCI PATIENTS

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Background

- SCI patients prone to development of pressure ulcers
- At GPHRC, out of 160 patients admitted [1997-Aug 2005], 92 patients (58%) had ulcers
- 32-40% of patients develop ulcers in acute care (Mawson 1988)
- 30% develop during each 5 years post-discharge (Young and Burns 1981)
- >70% develop at some point (Yarkony 1995)

Length of Stay

- Tend to present late with deep ulcers which significantly prolongs length of stay [Schwarz & Johnson 2004]
- The mean stay for patients with:
- stage four bedsore 32.7 weeks
- stage three 28.9 weeks
- stage two 23.0 weeks
- stage one 17.5 weeks without bedsores 12.3 weeks.
- Flap closure will speed rehab time

- Flap surgery in SCI patients associated with a significant [30-45%] risk of complications [Schryvers et al 2000]

Background

- Presence of pressure sores does not predict rehabilitation outcome (measured by discharge MBI) with good surgical care (Johnson & Schwarz 2003)
- Not the case in the not-too-distant past
- Nepal
- West: 50% mortality (Munro 1940, Freed 1966)
- Need to know factors associated with a poor outcome
- Factors often cited as risk factors are
- age
- presence of concomitant infection
- anaemia
- type and duration of drainage
- Purpose of study is to identify risk factors associated with complication

Methods

- Retrospective review of patients undergoing flap surgery for treatment of bedsores at GPH&RC Jan 1997-Sept 2005
- Age, ASIA score, neurologic level of impairment, haemoglobin, history of UTI, stage and site of ulcer, flap type and surgeon were assessed for an association with complications following flap surgery.
- Data compiled on Epi6, analysis by non-parametric testing

Demographics: patients

- 160 patients admitted on 174 occasions
- Gender
- 100 Male , 60 female
- Age
- Median 35
- [range 8-81 years]

Demographics: patients

- Neurological level of injury
- Cervical 31%
- Thoracic 30%
- Lumbar 37%
- UTI Hx 31%
- Anaemia 27%
- Bedsores 64% had one or more
- bedsore on admission 222 sores in total

Demographics: procedures

- Procedures 247
- Size of sore Median 6cm [range 1-20 cm]=
- Flaps 36 patients 73 flaps

All Stage 3 or 4 ulcers

Flaps

Wound Location

- Ischial 6
- Sacral 17
- Trochanter 47
- Other 6

Drain

- Suction 47
- Rubber 2
- Nil 3

Flap type

- TFL 36
- Gluteal 16
- Post. Thigh 7
- MPA 2

- V-Y 1
- Other 9

TFL

Complications

- 24/73 procedures [33%] had 39 complications
- Dehiscence 10
- Necrosis 11
- Infection 14
- Recurrence 2
- Other 2

Results

No significant association:

- Age
- Sex
- ASIA score
- NLI
- Anemia
- UTI
- Stage of ulcer

Complications by procedure Complications by surgeon Effect of experience on complications

- Surgeon 4
- Early 5/14 (36%) had complications
- Late 2/28 (7%) had complications
- May be institutional or surgeon's experience

Summary

- High rate of complications [33%]
- similar to other studies
- Associations
- Only two factors associated with post operative complications
- Flap type/wound location [p=0.015]
- Operating surgeon [p=0.010]
- For surgeon 4

Evidence of learning curve.

Conclusions

- TFL flaps, while technically straightforward, have a high rate of complications and therefore need to be vigilant as with other flaps
- Often cited factors such as age, anemia and concurrent UTI may not be significant risk factors for flap surgery
- Procedures should be performed by surgeon skilled and experienced in flap surgery in SCI patients
- Need to modify risk factors to reduce complications
- unable to modify site of ulcer
- other risk factors may not be relevant
- ?need to modify operating surgeon
- Skilled and experienced may not be synonymous

COMMON CAUSES OF DEATH IN SCI IN DEVELOPING COUNTRIES

Prof. S.S.Sangwan

Director, PGIMS Rohtak.

Spinal Cord Injuries with paraplegia are increasing day by day on account of increasing no. of speedy vehicles, rash driving and increased no. of road traffic accidents. Usually the younger persons are involved in such injuries between the age of 20-40 years as they are more involved in outside house activities and it is unfortunate that these are most useful and productive years of life.

The aetiology of death in spinal cord injury patients can be divided into early and delayed ones. The early causes of death include respiratory embarrassment particularly in cervical spine and upper dorsal spine injuries. The other early causes include associated chest

injuries, abdomen injuries, head injury and multiple fractures causing haemorrhage and shock. The delayed causes of death in paraplegics include chest infections like pneumonia, atelectasis and static secretions in the lung alveoli due to decreased coughing out efforts of patients due to involvement of intercostal muscles. The other causes are pressure sores, urinary tract infection causing septicemia and deep vein thrombosis causing pulmonary embolism.

Although spinal cord injuries in past have been called as "an ailment not to be treated" but with dedication and enthusiasm, majority of the complications producing death can be minimized.

In this presentation, the over-view of the causes of death in SCI patients in developing countries and their preventive aspects will be discussed.

TENDON TRANSFER SURGERY – AN OFFER TOO GOOD TO REFUSE?

Cathy Cooper (O.T.)

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Austin Health Melbourne Australia*

A devastating loss of physical function is the obvious outcome of Spinal Cord Injury (SCI). Following the completion of an in patient rehabilitation period, a person with tetraplegia must learn to manage and live within the limitations of their paralysis. From this time functional potential is generally set, with little chance of improved motor power or control – at least with complete lesions. People can learn to compensate with tricks and devices but lost range of movement and muscle power limit functional capacity permanently.

Reconstructive surgery stands alone as a positive treatment intervention that can significantly alter parameters such as range and strength of movement and so offer real promise for improved function.

Tendon transfer surgery is not new but as a treatment for SCI is very under utilised. In this discussion two questions need to be addressed:

1. Why do many patients not have tendon transfer surgery
2. Why do many SCI treatment centres not offer this surgery

Patients who had chosen not to pursue surgery were recently surveyed and reported that the most significant factor in this decision was that they "did not want to go back into hospital". They were also reluctant to give up time and independence even in the short term. The other common response was that they "did not want surgery in case it interfered with benefiting from 'the cure'".

The first complaint about returning to hospital is impossible to refute although our outreach program at Austin Health does take the surgeon to the patients living interstate. They operate in local hospitals rather than insist the patient travels long distances away from family and community supports.

The second issue relating to surgery as it may impact on "the cure" is one we can respond to. It comes back to education and reassurance from the practitioner.

Refusing surgery however, begs the question of availability. In Australia for example we have SCI centres in our five major cities – four of these supposedly offering tendon transfer surgery. We are a relatively small (twenty million population) but well resourced nation but in practice, we only achieve approx 25 of these cases per year between us. Of these surgeries, the Melbourne team performs two thirds of the cases. Why Melbourne? The reason is simply that interest and resources have been harnessed here over the last 15yrs so that a dedicated tetraplegic hand surgery program now exists. Success is self-fulfilling and we continue to create demand by a deliberately targeted approach.

The status of reconstructive surgery clearly varies enormously across countries and treatment centres with key determinants being skills, funding and treatment philosophy. A successful program needs surgeons and therapists with the time, expertise and interest to make this work happen and clearly there needs to be adequate funding to support these key staff. The particular philosophy current within individual SCI hospital settings is not so straightforward and often has an historical perspective in terms of treatment emphasis and inherited specialties. The Melbourne model is presented as one approach, which has incorporated surgical intervention as a "mainstream" treatment in tetraplegia. Specific factors for success in developing a reconstructive surgery program are discussed. These include:

- A 'dedicated' staff with more than one surgeon or therapist trained and experienced in the field. This means that the knowledge base does not reside with 'a few good men' whose departure would threaten continuity of the program.
- Siting the program in a rehab setting so there is early contact and that the work is visible to patients in therapy and understood from early on.
- Referrals needs to be automatic and follow up vigorous – if one waits for the patients to enquire about surgery then candidate numbers will remain occasional only.
- Mentoring" is a very valuable tool in negotiating with potential candidates. Patients find recommendations and reports from other patients far more credible than persuasion from staff.
- Measurement of results with pre and post surgery assessment of hand function, ADL status and identified goals of surgery should be standard practice. This offers valuable research material and helps promote outcomes to patients and colleagues.
- Surgery needs to be actively promoted by all of the team so patients are informed early, are ensured access when ready and indeed see it as a natural extension of the rehabilitation process.
- The ideal timeframe for surgery recognises the optimum "window of opportunity" to be within five years of injury. Patients tend to either get "too busy" or habituate to a level of disability. Patients who had chosen not to have surgery have all reported when surveyed that they knew they could have surgery later. However, we know as a fact that the longer patients leave this decision the less likely it is to eventuate.
- Exponential growth will occur as throughput increases. Our experience shows that a successful program feeds itself – the more surgery that is apparent, the more interest is stimulated, demand generated and the more surgery is accepted and valued.

In conclusion, people with tetraplegia deserve to be informed about reconstructive hand surgery and they deserve to have a choice about and access to such treatment. Surgery is not appropriate for every person with tetraplegia and there will always be those who choose not to have surgery but it is "too good an offer to refuse for many".

- We need to network globally to share information and expertise
- We need to network locally to develop regional "centres of excellence" to ensure surgeons are appropriately trained/supervised and that catchment areas are broadened as necessary to improve patient access.
- We need to network within our institutions to ensure physicians encourage surgeons to do these cases and likewise surgeons talk to physicians to ensure they refer appropriate patients for surgery. Every member of the team needs to talk to the patients so they hear a consistent message about the benefits of surgery and so at least consider "an offer too good to refuse".

**LIST OF ABSTRACTS ACCEPTED FOR PRESENTATION IN THE
SESSION ON "SPINAL CORD SOCIETY GOLD MEDAL AWARD FOR
BEST PAPER PRESENTER IN THE FIELD OF SURGICAL
MANAGEMENT OF SPINAL AILMENTS"**

**DELAYED PRESENTATION AND DIAGNOSIS OF CERVICAL SPINE
FRACTURES IN PATIENTS WITH LONGSTANDING ANKYLOSING
SPONDYLITIS**

**G Joseph, M V Jlgajinni, R A Johnston
M H Fraser, D B Allan and A N Mclean**

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Study Design: Prospective Cohort Study

Objective: To evaluate the outcome of late anterior decompression in patients with dorsal and lumbar spinal injuries with neurological deficit.

Summary of background data: Anterior decompression and bone graft stabilisation of the spinal injuries allows direct decompression of the spinal canal and provides favourable environment for neurological and functional recovery. Proponents of both early and delayed decompression have shown favourable results. However, what is unclear is the timing of the surgery. We present our series of spinal injuries with neurological deficit that had late anterior decompression at an average of 7.5 weeks since injury.

Methods: A prospective study of 12 patients with spinal injuries, who had anterior decompression upon a minimum of 4 weeks after the injury. 5 had incomplete and 7 had complete neurological deficit at presentation. The indication for the operation was persistent neurological deficit with retropulsed fragment of bone causing canal compromise.

Results: Improvement was seen only in patients who sustained injury at the lumbar level, with 6 of the 7 patients regaining normal bladder and bowel function after decompression. Posterior or anterior stabilisation may be needed in addition to anterior bone grafting to prevent worsening of the kyphotic angle.

Conclusion: Late anterior decompression of the lumbar spine in patients who had spinal fractures, with incomplete neurological deficit is an effective procedure, which may help neurological recovery, especially of the bowel and bladder function.

Key words: Late anterior decompression, Spinal Injuries, neurological deficit

**COMPUTER ASSISTED PEDICLE SCREW FIXATION: CLINICAL
EXPERIENCE WITH A NEWLY DEVELOPED SOFTWARE**

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We have used software, recently developed at Cochin University of Science and Technology, to perform computer assisted pedicle screw placement in forty pedicles of ten patients with fractured thoracolumbar vertebrae from January 2002 to February 2004. A pre-operative CT scan section at the pedicle level is taken one vertebra above and one below the involved vertebra. The dicom image is converted into a bitmap image and reference lines are drawn through the transverse processes and the spinous processes. The screw trajectory is drawn in the image at the most suitable path of the pedicle. Intraoperatively reference pins are placed exactly at the same areas as the transverse processes and the spinous processes. The intraoperative image is live captured using a camera and is matched with the preoperative image and the awl is advanced into the pedicle corresponding to the screw trajectory in the CT image. Out of forty pedicles instrumented in ten patients using computer assistance, the pedicle wall violation as

demonstrated with 1 mm thin CT scans was less than AMIOT Grade 2. Ideal placement was noted in 80% and clinically insignificant perforation (Grade 2&3) in the rest.

Computer assisted pedicle screw fixation appears to be a good technique for the accurate placement of pedicle screws in fractured vertebrae. Copyright E 2005 John Wiley & Sons, Ltd.

Keywords: computer assisted, pedicle screw fixation, fractured vertebra

**ASSESSMENT OF PEDICULAR SCREW PLACEMENT – CT BASED
EVALUATION OF 741 SCREWS**

Study design: A retrospective, radiological and clinical analysis at thoracic and lumbosacral pedicular screw assessment.

Objective: To assess, pedicular screw placement and associated complications in various spinal disorders.

Methods: A total of 116 patients (741 screws) were evaluated using plain x-rays and CT scan. They were further categorised into scoliosis group (n=24) and non-scoliosis group (n=92). Screw placement was graded as per Rongming Xu et al criterion (1999).

Results: Grade-I misplacement were maximum (18.07% & 17.2% in scoliotic & non scoliotic groups respectively). The medial grade-III perforations with potential for neurological complications was only 2.3% in non-scoliotic & 1.8% in scoliotic patient groups. No major postoperative neurological deficit was seen in any patients except for two with transient paraesthesia in non-scoliotic group which recovered in 2 weeks.

Conclusion: Despite the fears associated with thoracic pedicle screw instrumentation no significant increase in complication rates were observed provided the surgeon is experienced and pays strict attention to details along with good knowledge of pedicle anatomy

COMPUTER ASSISTED PEDICLE SCREW FIXATION: CLINICAL EXPERIENCE WITH A NEWLY DEVELOPED SOFTWARE

Prof. P. R. John

Department of Orthopaedics, Medical College Hospital, Madurai

We have used software recently devised at Cornell University of Science and Technology for computer assisted pedicle screw placement in thoracic spine. The software will track the pedicle screw placement in any section of the thoracic spine. The software will allow the user to take one vertebra above and one below the desired level. The CT scan image is converted into a binary image and reference lines are drawn through the pedicular process and the spinous process. The screw trajectory is defined as the angle at the most anterior part of the pedicle. Intraoperatively reference lines are placed on the same level of the vertebrae processed and the pedicle process. The intraoperative image is then created using a camera and is matched with the preoperative CT image. It is only pedicle instrumented in two patients using computer assisted software well visualized.

Classified with 1 mm thin CT scans was used from AMPT grade 2. From day one was used in 20% and initially pedicle perforation (Grade 2A) in 20%. Computer assisted pedicle screw fixation appears to be a good technique. The software is available in the form of a CD-ROM. Copyright © 2002 John P. R. & John P. R. All rights reserved.

ASSESSMENT OF PEDICULAR SCREW PLACEMENT - CT BASED EVALUATION OF 741 SCREWS

COMBINED THORACOABDOMINAL APPROACH FOR LOWER DORSAL AND UPPER LUMBAR SPINE FRACTURES.

Dr. Anil Pande, Dr. Sanjeev Dhanuka, Dr. Nigel Peter Symss, Dr. K. Sridhar, Dr. M.C. Vasudevan, Dr. Ravi Ramamurthi

Dr. Achanta Lakshmipathi Neurosurgical Centre, Chennai

Anterolateral approach to the lower dorsal and upper lumbar vertebrae is based on the original ventral approach as described by Ito and Hodgson & stock. This approach has the great advantage of facilitating decompression, stabilization and deformity correction through a single incision and surgical exposure. At our institute between the years 2002 to 2006 we have operated on 55 patients with fractures of dorsal and lumbar spine. 45 were males and 10 females. The most common mechanism of injury was road accident (37), followed by fall from height (12), slip from staircase(3) and minimal trauma (2) . 24 of these had no instability, no neurological deficit and had only pain as the presenting feature and were treated conservatively. 30 patients had instability or significant compression of neural structures with deficits and all of them underwent decompression with spinal fusion and stabilization through anterolateral approach in single sitting. 6 patients had fractures involving D2 to D6 vertebrae, 8 had D7-D11 injuries, 10 had D12-L1 injuries and 7 involved L2-L5 levels. 10 required thoraco-abdominal, trans-pleural, retro-peritoneal approach. This involves the sectioning of the diaphragm and provides access to decompress and stabilize the lower dorsal and upper lumbar levels. There were no intraoperative complications and mortality. One patient required post operative ventilation and two had deep vein thrombosis. Meticulous surgical technique, proper patient and approach selection, and the use of the operating microscope can give gratifying results in this difficult problem.

SPINAL HYDATID DISEASE: A CASE SERIES

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Background: Over the past 10 years, 4 cases of spinal hydatid disease (3 men, 1 woman) were diagnosed and treated at our institute, with an average follow-up of 4 years. Hydatid disease of the spine is a rare condition with poor prognosis that presents diagnostic and therapeutic challenges. **Methods:** the patients were evaluated clinically, using the latest imaging modalities available in our institute. Decompressive surgeries were performed and the diagnosis was confirmed by histopathologic examination. All patients received long-term antihelminthic therapy with 400 mg of albendazole 3 times daily for 1 year.

Results: after surgery, all patients improved; however, over time, recurrence and residual disease were observed. Two patients had complete neurologic recovery at follow-up at 2 to 3 years, although there were radiographic signs of recurrence. The other 2 patients did not achieve complete neurologic recovery at follow-up at 2 to 3 years, although there were radiographic signs of despite anterior decompression; they developed recurrent disease and the neurologic status deteriorated to spastic paraplegia. All patients refused further surgeries for recurrences and 2 patients died of complications of paraplegia.

Conclusion: diagnosis was challenging, eradication was difficult, and hydatid disease recurred in all 4 patients. In our experience, morbidity and mortality were high and prognosis was poor.

TUBERCULOSIS OF THE CRANIO-VERTEBRAL JUNCTION: IS SURGERY NECESSARY?

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Object of the study: Tuberculosis of the craniovertebral junction (CVJ) is an uncommon entity and its optimal management remains controversial. In this study, we present the evolution of management protocol of this disease in our institute in the last 3 decades.

Methods: A total of 51 cases of CVJ tuberculosis presenting as atlanto-axial dislocation from 1978 to 2004, were reviewed. The disease was staged from stage I to stage III depending upon the radiological findings. All patients received anti-tubercular treatment (ATT) for 18 months. In the initial period of this study (1978-1986), all patients (n=10)

underwent surgery, usually a posterior fusion. In the 2nd period (1987-1998), patients with less severe disease (stage I and II, n=14) were managed with external rigid immobilization while patients with severe disease (stage III, n=11) underwent either a transoral decompression ± posterior fusion or posterior fusion alone. More recently (1999-2004) all patients (n=16) in all stages (I-III) have been managed without surgery, by a rigid external immobilization.

Results: Except for 2 patients who died (one due to miliary tuberculosis, the other because of acute hydrocephalus), clinical recovery occurred in all. Followup imaging demonstrated radiological healing as well, with regrowth of the destroyed bone.

Conclusions: The mainstay of management of tuberculosis of CVJ is prolonged ATT with a rigid external immobilization. Surgery is not necessary even in patients with advanced stages of disease. Complete clinical and radiological healing occurs in all patients with conservative treatment.

TRANSTHORACIC TRANSPLEURAL DECOMPRESSION OF TUBERCULAR DORSAL SPINE-COMPARISON OF OPEN AND THORACOSCOPIC PROCEDURES.

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MATERIAL AND METHODS: This study was conducted in the department of orthopaedics, Lok Nayak Hospital, New Delhi. it included 20 patients of tuberculosis of dorsal spine from D3 to D10 with early onset paraplegia. In 10 patients open transthoracic decompression was done and in the other 10 patients video assisted thoracoscopic decompression was done. Patients were followed for average period of 24 months. In both groups, patients were assessed and compared for blood loss, duration of surgery, duration of chest tube insertion, intra operative/post operative complications and neurological recovery.

RESULTS: The outcome was favourable in the thoracoscopic group as compared to the open transthoracic group though thoracoscopic procedures require a longer learning Curve.

CONCLUSION: Thus we anticipate a larger role of thoracoscopy for decompression of tubercular dorsal spine.

SPINAL TUBERCULOSIS WITH CONCOMITANT SPONDYLOLISTHESIS: COEXISTING ENTITIES OR 'CAUSE AND EFFECT'?

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Study design: Report of three unusual cases of eoexisting spondylolisthesis and tuberculosis in the same patient.

Objectives: To document the rare occurrence and attempt to postulate the probable reasons for such an association.

Setting: tertiary care teaching hospital in a developing country.

Methods: This communication reports the outcome of three cases where there was spondylolisthesis and spinal tuberculosis in the same patient. The probable reason for such an occurrence is discussed along with a literature review relevant to this topic.

Results: The cases responded favorably to conservative treatment with multiridrugular chemotherapy and spinal braces.

Conclusions: Association of spondylolisthesis and spinal tuberculosis is extremely rare. If the tubercular process is fulminant, spondylolisthesis secondary to destruction of posterior elements by the infective process can occur. Gross destruction of anterior elements secondary to tuberculosis in some patients may place excessive stresses on the posterior elements and may precipitate a spondylolisthesis even if there was no active infection in the infection in the posterior elements. However, there remains a distinct possibility that parts defect may have existed prior to infective pathology.

OSSIFICATION OF LIGAMENTUM FLAVUM IN DORSAL SPINE

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Dr. K.K. Mukherjee, Dr. Kim vahphei, Dr. S.K. Gupta, Dr. V.K. Khosla.**

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Ossification of ligamentum flavum in the thoracic region causing compressive myelopathy among middle aged patients is an uncommon entity. Selective racial involvement and variable clinical presentations, with treatment options are discussed. Five patients of Indian origin are described with relevant review of literature. Radiological and clinical follow-up over a span of 10 years is described. Decompressive laminectomy and excision of the ossified yellow ligament is the commonly performed surgical procedure. A rapid neurological improvement follows the decompression. Persistent spasticity in certain patients is attributed to irreversible changes within the cord. A prolonged follow-up the patients suggest poor long-term prognosis. The disease is thought to be progressive in nature and kyphotic deformities with recurrence of ossified yellow ligament at the same site has been reported. Recurrence of symptoms should be duly investigated and prolonged follow-up is important.

POSTERIOR CONVEX WEDGE RESECTION IN THE MANAGEMENT OF ADVANCED CONGENITAL SCOLIOSIS DUE TO HEMIVERTEBRA

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Congenital scoliosis is identified as a problem of growth imbalance due to congenital anomalies presenting the spinal column. They usually result in kyphosing scoliosis of the spine leading to further deterioration of the spinal alignment. Ideally these are to be treated at a very young age with an appropriate convex epiphyseodesis. But due to lack of awareness we have patients presenting to us with advanced congenital scoliosis. Hemivertebrae often present with segmental kyphotic alignment. Convex wedge resection by means of hemivertebral excision is well established as a safe and effective procedure when treatment is needed. Initially it was conducted by a combined anterior and posterior approach. Recently some authors have indicated that this can be done by a single posterior Transpedicular approach. We present our experience in 10 consecutive cases of advanced congenital scoliosis treated by a posterior extra-cavitary resection of hemivertebra (convex wedge resection) by which both sagittal and coronal deformities have been corrected. By doing this form posterior only approach the morbidity of an additional anterior approach is avoided. We had 2 cases at T-11, 2 cases at T-12, 1 case at L-1, 3 cases at L-2 and 2 cases at L-3. We had good to excellent correction of deformity in both the planes in all the patients.

PEDICLE MORPHOMETRY IN ADOLESCENT IDIOPATHIC SCOLIOSIS AS COMPARED TO UNDEFORMED SPINE

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Introduction: Pedicle screw-rod instrumentation has been shown to give better correction and derotation in Scoliotic spine due to its superior biomechanical strength. Use of pedicle screws in the thoracic spine requires a high degree of technical skill and a sound knowledge of the anatomy of Scoliotic pedicles.

Methods: The study was conducted at the ALL INDIA INSTITUTE OF MEDICAL SCIENCES from Dec 2000 to July 2003. A total of 89 patients admitted at AIIMS having various spinal disorders were subjected to Morphometric analysis using CT scan. 61 patients had localized spinal disorders and 28 had Adolescent Idiopathic scoliosis. In the non-scoliosis group 36 were Males and 25 female and mean age was 33.87yrs (1y-70y). The scoliosis group had 15 males and 13 females with a mean age of 14.5y.

Results: A total of 557 pedicles were assessed in 61 patients and 2,659 pedicle measurements were made in the non scoliosis group and 223 pedicles assessed in the scoliosis group with 1295 measurements. In the non-scoliosis group the transverse pedicle width was smallest at T4, Transverse pedicle angle was least at T12 & the Sagittal pedicle width was greater than the transverse width at all levels except L5. Sagittal/Cephalo-caudal angles were directed cephalad in all the thoracic vertebrae. Depth to anterior cortex along

pedicle axis was minimum at T1 gradually increasing upto T12. In comparison the Scoliotic spine showed the same general trend but had a wider range, denoting significant individual variations. The concave pedicles at all levels were thinner than the convex and were directed more horizontal. Depth to anterior cortex was smaller on the convex side than the concave side as the rotation of the vertebra increased. Wind swipe deformities of the pedicles were observed randomly without any correlation to vertebral rotation or the curve severity.

Conclusion: Pedicle screw instrumentation in severe deformities like scoliosis remains a challenge to every spine surgeon. The scoliotic pedicles, though follows the same morphological pattern as in the undeformed spine, they show significant individual variability. Hence a preoperative CT scan becomes essential to analyze the feasibility and planning of pedicle screw instrumentation in these patients.

HAVE CRANIO VERTEBRAL JUNCTION ANOMALIES BEEN OVERLOOKED AS A CAUSE OF VERTEBRO-BASILAR INSUFFICIENCY.

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Objectives: To correlate symptoms of vertebro-basilar insufficiency (VBI) with the presence of posterior circulation ischemia in patients with congenital cranio-vertebral (CVJ) anomalies, using Technetium 99m ethylene cystine climer single-photon emission tomography (99Tc ECD SPECT)

Methods: Nineteen consecutive patients with congenital CVJ anomalies who were scheduled for combined trans-oral odontoidectomy and occipito-cervical fusion were included in the study. 99Tc ECD brain SPECT and clinical assessment of all patents was done in the preoperative period and at four weeks postoperatively. Patients were preoperatively divided into two groups depending on the clinical findings: 1) Symptomatic group consisting of 12 patients having features suggestive of VBI (Drop attacks, episodic vertigo, visual disturbances and dysarthria). 2) Control group, consisting of seven patients without symptoms of VBI.

Results: SPECT demonstrated decreased cerebellar perfusion in 75% (n=9) of the patients in the symptomatic group compared to 14% (n=1) in the control group preoperatively ($p=0.019$, fischer exact, 2tailed). Following surgery, eight of these patients (88.9%) in the symptomatic group and one in the control group had improvement in cerebellar perfusion. Two patients in the symptomatic group who developed meningitis in the postoperative period had a decreased in cerebellar perfusion on the follow up SPECT SCAN. Clinically, all patients with improvement in cerebellar perfusion had improvement in the symptoms of VBI at one month of follow-up.

Conclusions: A significant number of patients with congenital CVJ anomalies who develop symptoms of VBI, have decreased cerebellar perfusion demonstrated by SPECT.

Rigid internal fixation of the CVJ may alleviate symptoms and improve circulation in some of these patients.

OUTCOME OF PULMONARY FUNCTION IN SCOLIOSIS PATIENTS UNDERGOING SURGICAL CORRECTION

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Introduction: Anterior Scoliosis surgeries are becoming more common with the advent of rigid anterior instrumentation systems and good anaesthetic facilities and ICU care. In patients undergoing anterior surgery the post operative morbidity in relation to pulmonary functions are more commonly seen than in patients undergoing posterior surgery alone. The present study was undertaken to evaluate any relation between anterior or posterior approaches for scoliosis surgery and postoperative pulmonary function.

METHODS: Forty-eight patients with scoliosis undergoing surgical treatment at AIIMS between Jan 2001 to Dec 2004 were evaluated with pulmonary function tests preoperatively, postoperatively at 3 months & one year along with Cobb's angle correction. The mean age was 15.25 years (11y-21y). There were 16 males and 32 female patients. 9 patients had congenital scoliosis, 31 had idiopathic scoliosis, and 8 had scoliosis due to a neuromuscular

disease. The patients were divided into three groups depending upon the surgical procedure. Group 1 comprised 17 patients who had only anterior surgery Group 2, 10 patients who had only posterior spinal arthrodesis without thoracoplasty; and Group 3, 21 patients who had combined anterior and posterior spinal arthrodesis with a rib resection thoracotomy. PFT parameters measured included forced expiratory volume in 1 second [FEV1], Forced vital capacity [FVC] and FEV1/FVC.

RESULTS: The mean preoperative FVC in Group 1 patients was 82.85%, which reduced to 65.57% at 3m follow-up (17.18% Reduction), and increased to 75.42% at 1yr. The FEV1 was at a mean of 84.28% preoperatively and reduced to 66.71 at 3m-post op (17.57% reduction), which increased to 79.28% at 1yr. The FEV1/FVC ratio did not change from preop value since both FVC and FEV1 decreased simultaneously in the postop period. The mean preoperative FVC in Group II patients was 64.8% which decreased to 52.1% at 3 months (12.7% reduction), & recovered to 57.3% at 1year. The FEV1 was at a mean of 67.33% preoperatively and reduced to 48.91%at 3m-post op (18.42% reduction), which increased to 57.08% at 1yr. In group III patients VC decreased from 77.5%to 69.75% at 3 months (7.75% reduction), returned to normal at 1year. The FEV1 was at a mean of 79.5% preoperatively and reduced to 70.5%at 3m-post op (9% reduction), which increased to 76.25% at 1yr. The mean preoperative Cobb's angle was 76.66° (range 50°-122°) which was corrected to 26.16° postoperatively with correction of 65.87%. With Anterior instrumentation we achieved a 73.12% correction and with Posterior instrumentation 67% correction in Cobb's angle. There was no statistically significant correlation between the cobb's angle correction achieved and changes in pulmonary function within one year follow up.

DISCUSSION: The pulmonary functions in patients with scoliosis are affected according to severity of the curve preoperatively i.e. decreases with increasing curve severity as observed in Group II. Posterior approach for surgical correction decreases the post operative PFT minimally which return to baseline values at one year. In the patients undergoing thoracotomy there is significant acute decline in pulmonary function in patients having good preoperative pulmonary reserves as observed in Group I than in patient having already compromised pulmonary reserves preoperatively as observed in Group II. Previous Studies in western population report that Pulmonary functions return to preoperative baseline at 1 year in patients who have posterior instrumented fusion but in patients with anterior releasing procedure for rigid curves, pulmonary function worsen and do not return to preoperative baseline even by 2 years.

CONCLUSIONS: In general the Indian patients follow the same pattern as western patients regarding pulmonary function decline with anterior and posterior scoliosis surgeries. There is no correlation between pulmonary function and correction achieved in Cobb's angle. The study shows that patients with good preoperative pulmonary reserve undergoing thoracotomy may be the patients requiring more of postoperative ventilatory support, as they will have acute decline in their pulmonary reserve.

EFFECTIVENESS OF ANTERIOR DECOMPRESSION AND FUSION IN CERVICAL MYELOPATHY

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Aim: To study the effectiveness of anterior decompression and fusion in different grades of cervical myelopathy and comparing the results with those of posterior decompression. We believed and literatures substantiated the development of late instabilities and kyphotic deformities in un-instrumented laminectomies and laminoplasties for multiple level cervical myelopathy.

Material and Methods: Records of twenty five patients were reviewed who underwent anterior decompression and fusion for cervical myelopathy at Indian Spinal Injury Centre from January 2004 to December 2005.

Operative treatment consisted of anterior discectomy, partial corpectomy or subtotal corpectomy at one or more level followed by placement of autogenous tricortical iliac crest bone graft or titanium cage or hydroxyapatite cage and fixation with anterior cervical locking plate. 20 patients (80%) had spondylosis (cervical disc disease and ligamentum flavum hypertrophy) at one or more level. 4 (16%) had OPLL and 1 patient (4%) had both. Presenting symptoms were sensory complaints in the upper extremity in 22 patients (88%), gross and fine motor disturbances in the upper limbs in 21 patients (84%), gait disturbances

in 18 (72%) patients, upper motor signs in the lower limbs like spasticity and exaggerated reflexes and clonus in all (100%) patients. Spinal cord signal abnormalities on sagittal T2 - weighted MRI were seen in all patients.

Functional outcome were assessed on the basis of Nuricks grading system and a modification of Japanese Orthopedic association Scale. Lateral spine X- Rays were assessed for the maintenance of sagittal alignment and postoperative MRI for the adequacy of decompression. Patients were followed up at 3 months , 6 months and one year after surgery.

Discectomy were performed on an average of 2.4 levels, partial corpectomy done at an average of 1.5 levels subtotal corpectomy was done at an average of 1.8 levels. Tricortical iliac crest graft was used in cases of single or double level discectomies. Titanium cages were used in all those cases which underwent partial corpectomy or subtotal corpectomies. All of them were stabilized with titanium anterior cervical locking plate.

Results: Mean improvement in Nuricks grading was from a mean of 2.5 preoperatively to 1.2 post operatively. Preoperative JOA score of 8 improved to 15 at 6 months followup. Improvement in signal intensity on T2 wighted images were seen in 18 pateints. X ray done postoperatively showed improvement in the sagittal alignment. One patient had developed asymptomatic pseudoarthrosis at the body graft interface.

Discussion: Anterior decompression and fusion is a relatively safe procedure with high rate of neurological recovery, functional improvement, and pain relief in patients who have cervical myelopathy.

EARLY EXPERIENCE WITH BRYAN DISC ARTHROPLASTY

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Although anterior cervical decompression and fusion (ACDF) has been used successfully in the treatment of symptomatic radiculopathy and/or myelopathy, biomechanical studies have reported the deleterious effects of cervical fusion on adjacent level kinematics. Proponents of cervical disc replacement claim that maintenance of motion at the operated level will reduce the incidence of adjacent level degeneration and improve long-term clinical outcomes when compared with ACDF.

The authors prospectively investigated the safety and efficacy of using the Bryan disc for cervical arthroplasty in the treatment of symptomatic cervical radiculopathy or myelopathy.

Eight patients in whom a diagnosis of symptomatic cervical spondylosis with radiculopathy or myelopathy had been established were prospectively treated with complete anterior cervical discectomy and Bryan cervical disc arthroplasty. Overall 4 single- , 2 two-level- and 1 three-level procedures were performed (11 prostheses). Patients underwent preoperative and multiple post operative assessments.

The median age of all patients was 50 years (range 32-56 years). Levels of surgery included six C5-6, two C6-7, two C4-5 and one C3-4. Neck and arm pain as well as disability scores were significantly improved by 3 months. No additional fusion surgeries were necessary at the affected or unaffected levels. Radiography revealed an affected disc motion from 4 to 10 degrees. No surgery- or device-related complications were documented. **CONCLUSIONS:** Analysis of preliminary results involving Bryan arthroplasty indicates significant improvement in pain and functional outcome scores. No spontaneous fusions at the level of surgery or at adjacent levels were noted. Long-term follow-up studies will be necessary before more definitive treatment recommendations can be formulated.

OUTCOME BASED STUDY OF ANTERIOR COLUMN RECONSTRUCTION AND INSTRUMENTATION IN BURST FRACTURES OF THORACO-LUMBAR REGION

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Introduction: Burst fractures typically occur in young population and account for 64%-81% of thoracolumbar fractures. They are associated with acute neurological deficit in 48%-77% of cases & delayed onset deficit in 2%-21% of cases. Spinal fixation without anterior column fixation in 1990s resulted in hardware failure (up to 10-15%) and loss of correction.

Load sharing classification recognized the need for anterior column reconstruction in these fractures.

Study: Ours was a prospective study, carried out from Jan 1999 to June 2003. In this fractures were assessed by load sharing classification and patients with score >6 were treated by anterior column reconstruction with vertical titanium mesh cage & instrumentation. Twenty four patients (two column involvement in 17, three in 7) with an average age of 30-35 years were operated. These patient were followed up clinically, functionally (Donald J. Prolo's scale) & radiologically by CT&MRI. Fusion was assessed using criteria of Kevin et al.

Results: The deformity correction on average was 70% and there was only loss of 4° correction on 2 year follow up. 92.4% achieved fusion and 46% improved neurologically to frankel's Grade D-E. On Prolo's scale, the ratings were fair. 54% achieved complete & modified rehabilitation. There was one implant failure in an osteoporotic individual which needed revision.

Conclusion: Anterior column reconstruction in Burst fractures with significant comminution as shown by load sharing classification, results in maintenance of correction, decrease in hardware failure, earlier rehabilitation & good fusion rates. Vertical titanium mesh cages as a method of anterior column reconstruction in these fractures provide stiff construct, high fusion rates with minimal complications, and also is a good access for anterior decompression of the canal..

PERCUTANEOUS VERTEBROPLASTY: EARLY REVIEW OF 44 CASES

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The term vertebroplasty refers to percutaneous (through the skin) structural reinforcement of the vertebral body using a special cement-like substance called "polymethylmethacrylate acrylic cement" (PMMA). Dr. Galibert initially pioneered this technique in France over a decade ago for the treatment of vertebral lesions (hemangioma). Over the past 21 years the indications have been expanded to include tumors of the spine that spread (e.g. cancer) and osteoporotic vertebral collapse. Despite a small number of studies in the literature and the lack of prospective randomized trials, this procedure has gained increasing acceptance particularly as a therapy to reduce symptoms associated with tumors (e.g. cancer) that have spread to the spine. One of the reasons for this has been the universal experience of prompt relief of pain in approximately 90% of patients treated using this method.

We review our early result in 44 cases, 14 dorsal and 30 lumbar vertebrae, 6 were multiple myeloma, 4 secondary metastasis and 34 osteoporotic collapse, In 16 case 2 vertebrae were used and bipedicular in 14 cases, All available cements were tried including the vertebroplasty cement and commonly used CMW 3, All cases were done under Local anesthesia. There was cement leak into the canal in 2 cases and had to be explored one had complete recovery and other had some recovery. All patients were mobilized same day after the procedure and had good functional outcome as measured by VAS and SF 36. We feel in technically sound hands this is good pain relieving procedure even in patients unfit for major stabilizing procedures or in fact even for general anesthesia.

LIST OF ABSTRACTS ACCEPTED FOR PRESENTATION IN THE SESSION ON "SPINAL CORD SOCIETY GOLD MEDAL AWARD FOR BEST POSTER PRESENTER IN THE FIELD OF SURGICAL MANAGEMENT OF SPINAL AILMENTS"

MANAGEMENT OF BURST FRACTURES OF THE CERVICAL SPINE

**Dr. Anil Pande, Dr. M. Vikram Dr. Nigel Peter Symss,
Dr. K. Sridhar, Dr. M.C. Vasudevan, Dr. Ravi Ramamurthi**
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In the last 10 years 166 cervical median vertebrectomy or corpectomy have been done for various indications at our institute. 76 patients underwent corpectomy for OPLL, 38 patients for fracture dislocations, 19 for caries spine, 24 patients for cervical spondylotic myelopathy, 7 for cerebral body tumors, 2 for sequestered disc prolapse behind the body,

and 1 each for hypertrophic non union, congenital C2-3 dislocation with C4-5 block vertebra. Of the 38 patients who underwent corpectomy for fracture dislocation of the cervical spine, 5 patients had burst fractures of cervical spine. This poster describes the management of one such case of C7 burst fracture. A 25 year old lady was involved in a RTA and admitted in casualty with severe neck pain, weakness and numbness of the medial aspect of the left hand. Two lateral radiographs seen up to c6 were reported normal and the CT scan of the spine showed a C7 burst fracture with retropulsion, MRI showed the same with cord pressure. She underwent a C7 corpectomy and stabilization using iliac crest graft and titanium anterior plating. She was mobilized on the fifth post operative day and had no neurological deficits, neck pain or hoarseness of voice. A ventral approach is ideal as decompression and stabilization are concurrently possible. The use of operative microscope in the drilling of the vertebral body greatly reduces the possibility of inadequate decompression, dural and cord injury and injury to the vertebral arteries. The paper emphasizes the importance of high suspicion for C6 and C7 fractures in patients with normal radiographs which may not visualize C6 and C7 vertebral bodies.

FRACTURE OF CERVICAL SPINE IN ANKYLOSING SPONDYLITIS

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Indian Spinal Injuries Center

Fractures of spine in ankylosing spondylitis require a high needle of suspicion. They may fracture with low velocity trauma and may not be detected on routine radiographs. They have a high level of failure of surgical fixation on account of osteoporosis and long lever arm of fused spine.

A 45 year man had sudden sprain while driving a scooter, followed by weakness in lower and upper limbs. Radiographs revealed fracture C6/7 with out displacement. MRI confirmed the fracture. Patient was put on traction and gradually mobilized on cervical collar. His follow up radiographs showed abundant callus formation and stable spine on flexion/ extension. He proceeded reasonably well on rehabilitation and could achieve balance and transfers despite failure of recovery of neurological power.

This case shows the importance of suspicion of fracture in sudden onset pain in ankylosing spondylitis. Radiographs may fail to reveal the low velocity injury and CT or MRI may be needed for the diagnosis. Surgical fixation is full of complication in these cases and conservative treatment may be a reasonable option as abundant callus formation is seen on healing.

DIVERSE FIXATION TECHNIQUES IN TRAUMATIC SPINE

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60 patients with various levels of injuries of dorso-lumbar spine were operated with different fixation modalities and were followed for a period ranging from 2 months to 2 years in a randomized trial. The purpose of the study was to compare the results of fixation of traumatic dorso-lumbar spine injuries treated by, 1. Pedicle screw and rods, 2. Harrington rod instrumentation, 3. Hartshill fixation. The posterior fusion rate with pedicle screws and rods was greater than Harrington rod fixation and Harrington rod instrumentation was greater than Hartshill fixation. The distraction capability of pedicle screw and rods > Harrington rod fixation > Hartshill fixation > Pedicle screw and rods. In view of our comparison of various fixation modalities, due to less operative time, less blood loss, less dural handling / injuries, more versatility, better rigidity of fixation, better distraction capability, better contouring capability, early post-op mobilization, less complications and morbidity, pedicle screw and rods construct is better than other modalities of fixation for the dorso-lumbar spine fracture.

POSTERIOR SPINAL FUSION USING H-GRAFTING AND TENSION BAND WIRING IN THORACOLUMBAR JUNCTIONAL AND LUMBAR FRACTURE DISLOCATIONS: A REVIEW OF 3 PEDIATRIC PATIENTS.

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Introduction: In children, injuries of the thoracic and lumbar spine are less common than clinical spine injuries. Treatment options for these spinal injuries include symptomatic treatment with reassurance, brace or cast immobilization and spinal fusion with or without decompression. **Material and Methods:** Three patients (2 thoracolumbar junctional and one lumbar) with fracture dislocations of spine were treated primarily by decompression and posterior spinal fusion using H. grafting and tension band wiring of spinous processes. All the injuries were incomplete (2 ASIA B and 1 ASIA C). **Results:** mean age of patients was 11.6 years (range 10-14 years). Average followup was 14 months (range 7-21 months). Spinal fusion was achieved in all the three patients. All the patients improved to ASIA D in subsequent followup and there was no major complication like infection, graft failure and pseudoarthrosis. **Conclusion:** This procedure seems to give good results in pediatric fracture dislocations of the spine in the form of solid, short segmental fusion and neural recovery. It is devoid of major complication and does not need resurgery for implant removal.

TITLE; NEUROLOGICAL RECOVERY AFTER ANTERIOR DECOMPRESSION FOR THORACOLUMBAR BURST FRACTURES WITH LATE PRESENTATION

Dr Jayanta Pathak, Dr G. Bhattacharyya

Prof. A. J. Kundu, Dr. S. Bhattacharyya, Dr. S. Banerjee

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Fifteen patients, admitted with thoracolumbar burst fractures with neurodeficit, were treated by anterior decompression from May 2004 to October 2005. The cases were admitted between two weeks and six weeks after injury. Eight had complete paraplegia on admission (two became incomplete type preoperatively). According to ASIA Impairment Scale (AIS), four were in group B, two in group C, one in group D. On MRI all cases had definite cord compression and none of them were improved during preoperative stay. Cases were treated by anterior decompression between three weeks and eight weeks after injury. Partial corpectomy of involved vertebra and bone grafting done. For stabilisation tricortical iliac crest graft alone in two; upright titanium cage in eight; titanium cage with single rod 'ZETA' construct anterolaterally in one; both posterior short segment 'ZETA' construct & anterior cage in single sitting in four cases used. The cases were followed-up for 3 months to 16 months (average 8.7 months). In three (20%) patients no neurological recovery was seen (AIS A). Three (20%) patients achieved complete motor recovery—two of them had residual urge incontinence and decreased sensation over foot and sole; one achieved complete neurological recovery. Four patients (26.7%) improved to group D; Three (20%) to group C and two (13.3%) to group B. Burst fractures presented late should preferably be decompressed anteriorly. It is difficult to reduce indirectly. In our study 80% cases improved, even three complete paraplegics improved.

ROLE OF POSTERIOR LONGITUDINAL LIGAMENT INJURY IN MANAGEMENT OF TRAUMATIC SPINE FRACTURES

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32 patients of traumatic spine injuries were assessed on MRI and intra-operatively for posterior longitudinal ligament (PLL) intactness. Indirect reduction by ligamentotaxis was successful in those with intact PLL compared with those who had PLL rupture. PLL rupture was significantly more common in flexion distraction, flexion rotation injuries and unstable burst fracture (16 out of 18) compared to pure flexion and axial compression injuries with simple burst fractures (2 out of 14). Percentage of severe spinal cord injury was significantly more in PLL ruptured cases (15 out of 18) compared to PLL intact cases (7 out of 14).

HARTSHILL RING VS PEDICULAR SCREW FIXATION IN THORACO-LUMBER SPINAL CORD INJURY PATIENTS

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Introduction: In our country in average 2000 new cases of spinal cord injury are added every year. Approx. 60% of them are Dorso-Lumbar cord injury. More than half of them are complete injury. Most of them are young and within the age group of 20 to 40 years. They are from villages. They first report to the District Hospitals, but no surgery is done there. Ultimately they are referred to medical colleges. By the time they develop pressure ulcers and other complications. Early stabilisation of spine could help early mobility, reduce the morbidity.

Why stabilisation is not done at District level Hospitals? Spinal fixation is thought to be a difficult and major surgery. The facilities available at District Hospital are supposed to be not sufficient for performing spinal fixation. Can we offer an easy, surgeon and patient friendly instrumentation, which can be done easily with the available facility at District level hospitals?

Which Instrumentation? Pedicular screw and Hartshill ring are the two most commonly used methods for posterior stabilisation. Which one we can propose for our Orthopaedic Surgeons working in District Hospitals with limited facilities, where most of the SCI patients report first?

Material and Method: At PMCH, a comparative study between Pedicular Screw fixation and Hartshill Ring fixation for Dorso-Lumbar cord injury patients was done, in terms of, learning curve of the surgeon, Per / post / late complications, painless early mobility (5th. Post operative day) Capability to tolerate the stress of physiotherapy for training of ADL activities long segment vs. short segment fixation, affordability of patients, anterior fusion Re-appearance of Kyphosis

Alternate Thoraco-lumbar injury cases were offered Spinal Fixation by Hartshill Fixation or Pedicular screw fixation. Choice of implant was as per the trauma. As patient had to purchase the implant he had an option to opt for less costly implant. Every resident was trained for three consecutive surgeries. After that he was given option to do independently. Every surgery was evaluated on selection of implant, placement of implant, per, post and late complications, patients comfort during sitting on 5th. Post operative day and doing physiotherapy for ADL activities

- In Hartshill Ring with sublaminar wiring fixation, a) Kyphosis more than 20-degree was corrected by using a 20 degree pre-bend Ring, b) Usually two vertebrae above and below were included for the stabilization,
- Distraction was achieved by Harrington distracter and then stabilized by Hartshill
- Distal segment was fixed first, which pulled the proximal fragment and corrected the angulation
- c) Inter-facet fusion was done by bone grafting.
- In Pedicular screw fixation was done under image control. Kyphosis was corrected by manipulation. Usually one vertebra above and below was fixed, anterior interbody body grafting was tried from posterior exposure itself.

Patients were allowed to sit by 5th day of surgery, gradual mobilization after 15 days. Extensive physiotherapy after 2 months was practiced

Observation: From 2001 to 2004, 134 cases of DL spine were stabilized.

Alternate patient was proposed for Hartshill fixation or Pedicular Screw fixation. As implants were purchased by patients, Hartshill ring was preferred, being cheaper Hartshill fixation in 106 patients and Pedicular screw fixation in 28 patients

Complications	HR (106)	PS (28)
Wrong placement of implant	11% (12)	28% (8)
Wrong size of implant	8% (9)	14% (4)
Loosening of implant	6% (6)	14% (4)
Failure of implant	3% (3)	8% (2)
Injury to Dura / Neural Tissue	6% (7)	17% (5)

After six months the angle of Kyphosis increased by 15 to 20 degrees in HS group and 10 to 15 degrees in PF group. There was no increase of Kyphosis after maturity of the anterior fusion

Conclusion: Hartshill Ring fixation with sub-laminar wire is cheap, safe, easy available, needs no special instrumentation and tolerate the stress of physiotherapy, semi rigid fixation, can be learned and done easily in District Hospitals. It is no way inferior to any other fixation if done properly

LATE ANTERIOR DECOMPRESSION FOR THORACIC AND LUMBAR BURST FRACTURES WITH NEUROLOGICAL DEFICIT

Dr. George Joseph

Barnsley General Hospital, Barnsley, UK

Study Design: Prospective Cohort Study

Objective: To evaluate the outcome of late anterior decompression in patients with dorsal and lumbar spinal injuries with neurological deficit.

Summary of background data: Anterior decompression and bone graft stabilisation of the spinal injuries allows direct decompression of the spinal canal and provides favourable environment for neurological and functional recovery. Proponents of both early and delayed decompression have shown favourable results. However, what is unclear is the timing of the surgery. We present our series of spinal injuries with neurological deficit that had late anterior decompression at an average of 7.5 weeks since injury.

Methods: A prospective study of 12 patients with spinal injuries, who had anterior decompression upon a minimum of 4 weeks after the injury. 5 had incomplete and 7 had complete neurological deficit at presentation. The indication for the operation was persistent neurological deficit with retropulsed fragment of bone causing canal compromise.

Results: Improvement was seen only in patients who sustained injury at the lumbar level, with 6 of the 7 patients regaining normal bladder and bowel function after decompression. Posterior or anterior stabilisation may be needed in addition to anterior bone grafting to prevent worsening of the kyphotic angle.

Conclusion: Late anterior decompression of the lumbar spine in patients who had spinal fractures, with incomplete neurological deficit is an effective procedure, which may help neurological recovery, especially of the bowel and bladder function.

Key words: Late anterior decompression, Spinal Injuries, neurological deficit

A BRIEF ILLUSTRATED HISTORY OF SURGERY FOR SPINAL INJURY

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Dr. Nigel Peter Symss, Dr. M.C. Vasudevan, Dr. Ravi Ramamurthi

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Trephined skulls with evidence of bone healing have pushed back the dawn of early cranial surgery by many millennia. The vertebrae and spinal segments fossils are exceedingly rare and fully preserved vertebral columns are a near impossibility.

Undoubtedly patients may have survived incomplete spinal surgery, but such fossils are eagerly awaited. Ancient surgical traditions from Indian Sumerian Chinese and Egyptian sources among others, speak about the grave prognosis associated in injuries of the

vertebral column. Srimad Bhagwat Mahapuranam 3500-1800 B.C. is the oldest documentation of spinal traction. Various crude methods of reduction of fracture dislocation and immobilization were practiced, like use of a scamnum, (a rack like traction device) and succession. Paulus of Aegine in the seventh century used the procedure of scamnum and an external wooden fixation device to secure the reduction of the spine. He also suggested laminectomy for removing pressure from the spinal cord which was put into practice by Ambrose Pare, a sixteenth century French surgeon, who first managed "Luxation of the spine" and removed bone splinters from the spinal cord and devised the thoracolumbosacral orthosis. In 1814, Hayward reported on a laminectomy done by a british surgeon, H.J. cline and this case was used as an argument against surgery for spinal trauma for many years. Sir William Macewen (1848-1924) proved that bone is the product of osteoblasts and the osteotomes that he designed are still being used very much unchanged today. In 1911 fred albee and russel hibbs were the pioneers in spinal fusion techniques. The greatest spinal surgeon of all was Charles A Elsberg who in 1916 wrote the class "The diagnosis and treatment of the surgical Disease of the spinal cord and its membranes". Walter Dandy contributed greatly and in 1929 published 2 cases of herniated lumbar discs treated surgically. He greatly accelerated the development of spinal surgery by his development of air myelography. In 1934. Dr. Ito reported an extraperitoneal approach to the lumbar spine and introduced a ventral interbody fusion technique. In 1956 Hodgson and stock approached thoracic spine by a thoracotomy, thereby facilitating decompression and fusion in a single surgery. The great British orthopedic surgeon sir. Frank W. holdsworth laid the foundation for the classification and treatment of sub axial cervical spine fractures. The first truly affective internal fixation was devised by paul Harrington. Sir ludwick guttman the british neurosurgeon established in 1944 the stoke Mandeville hospital and began the modern era in the management of the spinal surgery. The paper seeks to highlight the contributions of the great orthopedic and neurological surgeons in the management of spinal injury.

CERVICAL OESOPHAGEAL FISTULA FOLLOWING ANTERIOR CERVICAL FIXATION FOR UNSTABLE CERVICAL SPINE INJURY, CASE SERIES OF 5 PATIENTS.

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B. J. Medical College & Civil Hospital Ahmedabad

Introduction: Cervical Oesophageal Fistula is known iatrogenic complication following anterior cervical spine surgery, however increased incidence is noted after era of anterior cervical plate fixation surgery at our place. This is retrospective study of challenges regarding diagnosis, further complications, conservative and operative management in quadriplegic patients with review of literature guiding for preventive and management measures of this disastrous problem particularly important for spine surgeons in learning curve. **Materials and Methods:** Over last 7 years 5 patients (3 males & 2 females) with traumatic unstable cervical spine with quadriplegia operated for anterior decompression and cervical fusion stabilized with titanium anterior cervical static locking plates who developed post operative oesophageal fistula were referred to us with diagnostic and management problems. More than routine problems of quadriplegia issues were further complicated by respiratory problems of tracheostomy, mediastinal leak, lung collapse, persistent or recurrent infection and abscess, plate perforating into oesophagus and nutritional problems. Diagnosis was suspected by experience of typical clinical picture and confirmed by barium swallow examination showing leakage of contrast medium through oesophagus. Mainstays of initial conservative treatment were prolonged Ryle's tube and nutritional management and sensitive antibiotics. If required patients were operated for abscess drainage, implant removal and debridement, fistula closure and oesophageal repair over next 1 year.

Results: During period of average 1 year follow-up 3 patients could be survived successfully out of all complications (1 conservatively, 2 operated). 2 patients died of complications (1 conservatively, 1 operated). **Conclusion:** Morbidity and mortality were high due to delayed presentation and diagnosis, very high rate of further life-threatening complications and challenging management. Utmost care is required to prevent and treat this disastrous complication with bad prognosis. **Key-words:** Cervical Iatrogenic, Complications, Plate fixation, Oesophageal fistula, Management.

MANAGEMENT OF LATE CASES OF TRAUMATIC PARAPLEGIA BURDWAN PROTOCOL:

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Dr. Rajeev Raman (P.G.T)

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Spinal trauma may incapacitate a patient grossly: As per standard teaching operation should be carried out as soon as possible –(1). The main contribution to indirect reduction of vertebral body fracture are fibres of posterior annulus and is effective if surgery is performed within 4 days-(2).

Object: We often get the patient very late. Also we are over burden with patient ; we serve seven districts of west Bengal and part of Jharkhand and Bihar (Table 1). We have to develop our own plan of management of traumatic paraplegia.

Materials and Methods: From 2000 to 2005 we had 50 patients of traumatic paraplegia. Mechanism of trauma, age distribution, time of presentation and level of fracture is shown in table I eight patients with frankel 4 grade were managed by conservative method with bedrest, back and bladder / bowel care followed by long Taylor spinal brace. Out of remaining 42 patients with Frankels' grade 1 or 2, 38 were operated decompression, stabilization (6 by H.Rod, 10 by steffe plate and 22 by ZETA Rod) and bone grafting (utilizing bone removed during decompression). Rest four patients, who showed progressive neurological improvement were treated conservatively.

Result: Operative group showed significant improvement in 33 patients (upto frankels 'grade 3 or 4). Neurological improvement started in most of the patients within first week. There were no improvement in two patients and insignificant in 3 (wheel chair life). There were bladder incontinence in two patient only.

Other four patients with paresis managed conservatively because of steady improvement, recovered almost completely except foot drop in 2 and rt quadriceps weakness in one.

Discussion: This protocol is not at part standard management plan of traumatic paraplegia by posterior approach which is relatively earlier. But our presentation shows that it works

Conclusion: even late operation of traumatic paraplegia in selected cases by post. Approach gives predictable neurological improvement.

ANDERSSON'S LESION

Dr. Vishal Nigam, Dr H. S. Chhabra

Indian Spinal Injuries Centre, New Delhi

A 35-year-old woman with a 15 years history of Ankylosing Spondylitis presented with increasing pain in her back. On palpation, a small knuckle was palpable at the level of D11/ D12. There was no muscular paresis and no sensory loss or loss of tendon reflexes. Blood culture showed no growth. On x-ray films, the intervertebral space between D11 and D12 was reduced, and the adjacent margins of the vertebrae appeared sclerotic. Magnetic resonance imaging was carried out. It showed reduced signal intensity on T1 weighted images in lower D11 and upper D12 vertebral bodies, and in the D11/12 disc itself. On T2 weighted images, there was increased signal intensity in the corresponding area. Diagnosis of pseudoarthrosis was made and pedicle screw fixation with bone grafting was done. Follow up radiographs showed healing and improvement of pain.

OUTCOME OF STAB INJURIES OF THE SPINE – A SINGLE CENTRE EXPERIENCE IN SOUTH INDIA

Dr. George Joseph,

Nalll Ramanathan UVARAJ, Krishnaswamy Sriram

Barnsley General Hospital, Barnsley, UK

Stab injuries to the spine are rare and their outcomes are usually favourable, but outcomes may vary between individuals depending on the site and the mode of injury.

This is a retrospective study of spinal stab injuries admitted to the spinal injuries unit at Madras Medical college, Chennai, India between 1988 and 1999. We reviewed the circumstances of injury, presentation, imaging and outcome.

We identified 11 patients, 9 males and 2 females with mean age of 26 years. There were 9 cord and 2 cauda equina injuries. 7 of the 9 surviving patients had complete injuries at

presentation and did not show any improvement in neurological function. Fractures were also identified in 4 patients. CT and MRI were more appropriate in identifying bone and cord injuries respectively. The outcome of spinal stab injuries are unpredictable and they carry a worse prognosis if there is a complete cord injury at presentation.

TUBERCULOUS SPONDYLITIS OF CERVICAL SPINE – TO OPERATE OF NOT TO OPERATE.

Dr. Sachin Jadhav

Dr. Ajay S. Chandanwale, Dr. Neetin Mahajan

Grant Medical College Mumbai

A Study of 30 cases of tuberculosis of cervical and cervico-dorsal spine was carried out of which 9 were children; one out of 9 children was operated while 17 out of 21 adults were operated. There was total recovery in 6 operated cases, partial recovery in 2, no recovery in 1, transient worsening in 1. C5-C6 level was commonly affected. Conservative treatment is the primary procedure in children who have extensive exudative involvement, good healing power and very rarely cord compression. Posterior decompression for anterior cord compression is useless and hazardous.

LUMBAR SPINAL ANGIOLIPOMA: A CASE REPORT

Dr. Anantharaman C

Dr. Ajay S. Chandanwale, Dr. Sunil Bhosale

Grant Medical College Mumbai

The author reports a case of ventral extradural angioliipoma in a 38 years old male in L4-5 region with the simultaneous occurrence of L4-5 and L5 S1 disc prolapse. MRI showed the L4-5 and L5-S1 disc bulge but does not delineate the angioliipoma because the tumor was small and its intensity matches with epidural fat. Angioliipoma was diagnosed on histopathological examination from specimen collected at the time of the disectomy procedure.

OUTCOME OF CERVICAL FUSION BY ALLOGRAFT IN CERVICAL DISK DISEASE.

Dr. Nirmal Chandra Mohapatra, Dr. D.K. Panda

VSS Medical College Orissa

INTRODUCTION: Cervical disk disease is a common cause of neck pain and disability. Discectomy with or without fusion are necessary if conservative therapy fails and neurological affection persists. While autograft is gold standard for fusion, allograft is commonly used because of graft site complications.

Aim of Study: Outcome of cervical discectomy and fusion using allograft by Cloward's method. **Material & method:** 182 patients (24-79yrs) having cervical disk disease with radiculopathy undergone cervical discectomy and Cloward's fusion using allograft (Grafton, Osteotech) and followed up for 2-8 yrs.

Results: Average hospital stay was 1.5 days. At 3 months, 83% have excellent and good results using Odome's criteria. Arthrodesis was successful in 89.6% and 85% patients were satisfied with the results which reduced to 76% in last examination. In last questionnaire, 24% complained pain which interfered with ADL. 16% developed adjacent level disease and were operated for. While sagittal alignment was minimally affected, kyphosis increased by about 1.4 degree.

Discussion & Conclusion: Cloward's method of fusion is ideal of cervical disk disease as it removes all disks, osteophytes and posterior longitudinal ligament. Zdeblik 95%, Sapiro 100%, and Brown et al 94% found satisfactory union with allograft. There was little correlation between radiological union and clinical symptoms. However graft collapse may lead to kyphosis and late recurrence may compromise the result.

TLIF

Dr. Vishal Nigam, Dr. H. S. Chhabra

Indian Spinal Injuries Centre, New Delhi

Fusion of lumbar spine is indicated in mechanical low back pain. Procedures commonly done are Intertransverse fusion, Anterior Interbody fusion, Posterior Interbody fusion and Transforaminal interbody fusion. Intertransverse fusion is a simple procedure but results in

literature support a high rate of pseudoarthrosis. Anterior interbody fusion is associated with increased morbidity during surgical approach and second procedure for stable immobilization by pedicle screws. Intraoperative difficulties faced during PLIF include need for retraction of dura, resulting in transient neurological deterioration as well as increased incidence of dural leaks. TLIF has been a simple procedure, with no such intraoperative complications, better decompression of canal and literature results to support a low rate of pseudoarthrosis. Ten such cases were done between April 2005 and October 2005 for mechanical instability in lumbar / lumbosacral spine. Mean age of patients was 62 years, and male to female ratio was 4:1. Mean operative time was only 76 minutes (range 60-110 minutes). Mean operative blood loss was only 230 ml (range 150- 300 ml), and mean drain output was 50 ml. No intraoperative or postoperative blood transfusions were needed. Patients were mobilized next postoperative day with support. No complications were recorded in this group, and most patients could be discharged by 2nd postoperative day. This study showed TLIF to be a short, safe and reliable procedure for achieving lumbar spine fusion, with extensive literature to support.

NEW SOLUTION TO A DIFFICULT PROBLEM

Dr. Vishal Nigam, Dr. H.S. Chhabra

Indian Spinal Injuries Centre, New Delhi

Study Design: A case report

Objectives: To report a rare presentation of Presacral abscess presenting as cauda equina syndrome, and to report an easy approach for its drainage.

Setting: Department of Spinal Surgery, Indian Spinal Injuries Centre, Vasant Kunj, Delhi, INDIA

Methods: Presacral region is one of the difficult regions for drainage of abscess as the approaches described for it carry a lot of morbidity. Transpedicular approach is described for the drainage of presacral abscess. Further, tuberculous abscess as a cause of cauda equina syndrome is reported.

Result: Patient had complete neurological recovery within weeks of drainage of abscess.

Conclusions: Transpedicular drainage of presacral abscess is a safer option for recently developed neurological deficit. Late presentation may need anterior approach, which is associated with increased morbidity

MORPHOMETRIC STUDY OF PEDICLE DIMENSIONS IN THORACIC SPINE

Dr. Ajay S. Chandanwale

Dr. Sunil Bhosale, Dr. Shashikant, N. Nawale

Grant Medical College Mumbai

Screw fixation of the vertebral pedicles for vertebral injuries is a time honored method of management. Decision making about the correct size of the pedicular screw is an important aspect of such surgery because over sized screws might result in neurological injuries. Over the last 40 years, many studies have been done mostly in western and south east asian population to study the morphology of vertebrae and still fewer studies have been performed in Indian population. The present study is an observational study to analyse the morphometry of pedicles from T1 to T12. 45 volunteers of age 20_60 years were studied out of which 27 were males and 18 females. Both x rays and CT scans used to study the morphometric parameters. The parameters calculated were transverse pedicle diameter, vertical pedicle diameter, horizontal angle and anteroposterior angle. The transverse pedicle diameter is the most important as regards in placement of pedicular screw. It varied from 4-7 mm at T3 to T11 level highest being at T1(7.8-9). The vertical diameter gradually increased from T1 (6.8-9.2mm) to T12 (16.4-22mm). The horizontal angle decreased from T1 to T12 level. There was no significant difference between the measurements of males and females for all parameters. It is concluded that both X-ray and CT scan should be used for assessing the morphometry of dorsal vertebrae pedicle preoperatively to decide proper pedicle screw size. After comparing the results with previous studies, it is suggested to use 4-5 mm size pedicle screw in Indian population in dorsal spine and to avoid any untoward complication, an image intensifier should be used while inserting pedicle screws.

LIST OF ABSTRACTS ACCEPTED FOR PRESENTATION IN THE FREE PAPER SESSION ON "SURGICAL MANAGEMENT OF SPINAL AILMENTS"

FAILURE OF SHORT SEGMENT INSTRUMENTATION USING PEDICULAR SCREWS DUE TO RESIDUAL ANTERIOR INSTABILITY IN THORACOLUMBAR FRACTURES

Dr. Devdatta Suhas Neogi, Dr. Puttakemparaju K. V., Prof. B. S. Jayakrisina Reddy

Department of Orthopedics, Medical College Goa

Despite the widespread acceptance of pedicle screw system in the treatment of Thoracolumbar fractures its effectiveness and safety is under constant criticism due to complications attributable to this system. This retrospective study of pedicle screw fixations in 25 unstable thoracolumbar fractures treated by short segment instrumentation in between 2000 to 2009 using Steffe(17) and Zeta (8) instrumentation. Screw placement was using intraoperative fluoroscopy Posterior or posterolateral fusing done in 22 patients and PLIF in 3. Mean patient age was 35.4 years. Preoperative kyphotic angle ranged from 6 to 28deg and anterior vertebral body height (AVBH) 51%. Duration of follow up was 3 to 6 years. Follow up lost in 3 pts and 1 patient expired. 13 patients had solid posterior fusion, 3 patients had pseudarthrosis. Arthrodesis was questionable in 5 symptomatic patients. Complications seen included 3 dural tears, 2 screw misplacements, 1 superficial infection, 1 deep infection, 2 screw breakage, 1 screw pullout, 2 temporary foot drops, 1 GI bleeding, 3 nonunions, 12 residual anterior instability, 2 late neurological deficits. Radiographic assessment in lateral plane demonstrated mean restoration of kyphosis angle from average 20deg preop to 6deg postop which increased to average 10deg at latest follow up, likewise AVBH also decreased by about 5% between 1 yr to latest follow up. The problem of screw and posterior mass secondary to untreated anterior instability. Posterior fusion may alone may be insufficient in unstable fractures and anterior fusion may be necessary in these fractures.

Key words: Thoracolumbar fractures, Pedicle screw system.

TUMORS OF SPINE AND THEIR MANAGEMENT

Dr. Samir Dogra, Dr. A. Bhabri, Dr. R. Bhargava, Dr. Manmohan, Dr. Sandeep

Oswal cancer hospital Ludhiana

Primary tumors of spine are common in children and young adults while metastatic lesions of spine predominate in middle and old age.

Material and methods This study has been done in 50 patients of tumors of spine. Out of these 35 patients were of secondaries and 15 were primary tumors of spine. Metastatic patients were 20 Ca Breast, 10 Ca Prostate, 8 Ca Thyroid, 3 Ca kidney and 4 were with unknown primary.

Aims of study Aim of treatment was to relieve pain and mobilize patients as soon as possible and to improve neurological function when possible.

Discussion For surgery we selected class 4 and class 5 categories as described by Harrington for malignant tumors and all cases of neurological dysfunction in case of benign tumors. Surgical treatment consisted of excision of tumor by curettage and bone grafting, vertebrectomy, corpectomy and stabilisation was done with DCP, Stephe. Pedicle screws, Hartshell, Cage etc. RT was given to all patients to decrease oedema and to induce bone sclerosis and formation in metastatic patients.

Results All patients were on follow up one month for first three months and then three monthly for two years and then after six months. They were evaluated clinically and radiologically and results were calculated as per musculoskeletal tumor society score criteria for pain and Frankel grading for neurological improvement. More than 45% had good results 30% had average results 15% had fair and 10% poor results. Early detection and early treatment with stable fixation is the key to success

MINIMALLY INVASIVE SPINAL SURGERY – WIDENED INTERLAMINAR APPROACH FOR REMOVAL OF SPINAL INTRADURAL EXTRAMEDULLARY TUMORS

Dr. Samit Mehta

Apollo Hospital, Chennai

AIM: Minimally invasive removal of spinal intradural extramedullary tumors - Our experience.

Introduction: Spinal intradural extramedullary tumors have generally removed by single level or multilevel laminectomy with midline dural incision. Rare cases of delayed post operative kyphosis and spinal instability may be reduced by unilateral microsurgery, causing minimum damage to ligaments and joints.

Methods: 16 symptomatic patients with laterally placed intradural extramedullary tumors less than or equal to 3 cm were operated on between 2002-2005. There were 11 men and 5 women. Surgery was performed in the prone position with the unilateral approach, sparing the joint and the ligamentum interspinosum. With a small paramedial dural incision the tumour was removed using microsurgical techniques. Water-tight dural closure was done with 5-0 or 6-0 (prolene/silk)

Results: All the patients were mobilized on day 1 and discharged on day 3. Static and dynamic plain radiograph films showed that none of them had kyphosis and/or instability six months postoperatively. Neurological results were good.

CONCLUSION: Minimally invasive surgery is a better alternative in form of less tissue damage, blood loss, healing time, early mobilization, reduced hospital stay, reduced expenses and no delayed spinal deformity.

DYNAMIC STUDY IN PROLAPSED INTERVERTEBRAL DISC ON AXIALLY LOADED MRI

Dr. Ajay s. chandanwale

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Discrepancy between the symptoms reported in patients and findings on MRI arises because of lumbar flexion in supine position assumed for a routine MRI that increases canal dimensions. Axial loaded MRI simulates the physiological stress on the spine and a comparative study of 50 patients between loaded and plain MRI yielded the following alignment and morphological changes on axial loaded MRI. 1. increased lumbar lordosis by 4.38 degree with maximum in L4-5 (2.22) and L3-4 disc (2.06). 2. Decreased lumbar height by 4 mm. 3. Decreased sacro-horizontal angle by 3.7 degrees. 4. Increased disc prolapse at L1-2 by 0.16mm, L2-3 by 0.22mm, L3-4 by 0.66mm, L4-5 by 1.58 mm, L5-S1 by 1.26mm.

TRANSPEDICULAR SURGERY FOR DORSOLUMBAR JUNCTION DISC PROLAPSE: ANATOMIC AND BIOMECHANICAL CONSIDERATIONS OF A MINIMALLY INVASIVE APPROACH

Dr. H. S. Bhatoo

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The dorsal spine is the least affected region of the spine for intervertebral disc prolapse. The majority of cases of thoracic disc prolapse affect the lower dorsal spine, probably due to the increased mobility of that region. The dorsolumbar junction (DLJ) comprises D10 to L1 together with the intervening discs. Over a period using a transpedicular approach in thirty-patients. There were eight cases of D10/D11 disc prolapse, ten of D11/D12, and twelve of D12/L1 prolapse. Two patients had more than 1 level involvement. Back ache was the predominant symptom in patients with DLJ disc prolapse, seen in 92% of cases. Presentation was in the form of conus/cauda equina syndrome with D11, D12 and L1 radiculopathy. All the patients were evaluated by MRI. Disc prolapse was a distinct neurological improvement in all patients after surgery, pain relief being the most prominent feature. The dorsolumbar region differs from the dorsal spine and the mobile lumbar region. These differences account for the higher incidence of disc prolapse in the region as compared to the dorsal spine cranial to D10. The transpedicular approach appears to be most suitable for discectomy for DLJ disc prolapse. The approach is minimally invasive considering the size of the incision, minimal

bone removal and avoidance of vital structures. Postoperative pain is minimal and ambulation can be begun within 24 hours of surgery.

POST TRAUMATIC PARAPLEGIA WITH DELAYED PRESENTATION- CAN SURGERY PREVENT COMPLICATIONS- RESULT IN 34 CASES

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Lack of facility in timely transporting of patients with spinal injury with paraplegia often associated with delayed presentation to a proper tertiary care centre. The situation is further worsened with limited speciality centre in our country coupled with falling prey to the so called quacks wasting important early window of treatment. 34 patients who presented to us with delayed presentation of 2 week to 2 years with traumatic paraplegia between 2000 to 2005 were treated with decompression and stabilization surgery. Patient beyond 2 years and with severe deformity and other morbid conditions fore casting high post operative complication rates and patients presenting early were excluded from the study. Surgery was performed with an aim to early rehabilitation with remote possibility of preventing neurological deterioration. Patients were followed up in term of neurological improvement on ASIA criteria. Result of minimum follow-up of 6 months and maximum of 3 years is available. Of total of 34 cases 9 patients completely recovered, 11 patients had incomplete recovery but still useful recovery, 14 patients did not recover neurologically. There was no operation related complications. Since late presentation in this type of spine problem is very common this can be considered as an open page and addition of experiences will help formulating a revised strategy in this matter.

Keywords: Traumatic paraplegia -presented late-surgery- preventing complication-result.

LIST OF ABSTRACTS ACCEPTED FOR PRESENTATION IN THE SESSION ON SPINAL CORD SOCIETY GOLD MEDAL AWARD FOR BEST PAPER PRESENTER IN THE FIELD OF REHABILITATION MANAGEMENT OF SPINAL AILMENTS

SPINAL INJURIES & ITS EARLY REHABILITATION DURING NATURAL DISASTER. (OUR EXPERIENCE OF TSUNAMI (A &N) AND EARTHQUAKE (J&K)-2004-05

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In India, due to rapid industrialization & urbanization without concomitant development of the infrastructure, trauma is rapidly spreading like an epidemic in cities. Road traffic accidents, wars, growing threat of terrorism, episodes of arsons & riots only add to this problem. It is further compounded by disaster situations whether natural (flood, cyclone, earthquake, Tsunami etc.) or manmade (railway & air crash disaster). Collectively they all contribute their shade and the number goes to alarming proportions. Every day 3000 people die, 30,000 people are seriously injured while moderate & mild traumas are innumerable. Among traumas, spinal injuries are also not uncommon. Since the beginning of 21st Century our country has witnessed so many natural calamities. Flood & cyclone are two common calamities of our country, but in recent past Gujarat earthquake (Jan 2001) then Tsunami (Dec. 2004) and now again earthquake of Kashmir has led our country 20 years back. In such kind of disaster is healthy, if adequate care in the form of early rehabilitation (aids/appliances) is provided to them at right time, the victim can again become the useful member of society and will have normal life span. In this concern we would like to share our experience & views on spinal trauma and role of early rehabilitation during disaster, based on study conducted during Tsunami (A &N) and earthquake (J&K) 2005.

METABOLIC CHANGES IN CERVICAL SPINAL CORD INJURY PATIENTS – AN OBSERVATION

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Patna Medical College

Introduction:

Cervical cord injuries (C.C.I.) are the most serious injuries. Most of these injuries are managed conservatively.

Care of C.C.I patients are over shadowed by various known medical and surgical problems including pulmonary, gastrointestinal, urinary and skin complications. Management of these well established complications are well documented. Other than these complications there are other complications which are not common but are life threatening, if not recognized early and treated appropriately. Electrolyte imbalance is one such not so well recognized complication. It needs early identification and proper management. If C.C.I. patients are management in intensive care unit under strict monitoring, the biochemical and metabolic alterations are easily recognized and managed accordingly.

But in developing countries where SCI patients are treated along with routine trauma cases, CCI patients are not treated in ICU and as such electrolyte monitoring is not done as a routine procedure.

After we lost few CCI patients without any evidence of common complications, we planned to access the electrolyte balance as a routine procedure because all these patients had become listless, mentally confused, and had loss of appetite and distention of abdomen.

Material and method:

The present study was conducted in the spinal cord injury ward. In CCI patients Weekly serum electrolytes assessment was done and clinical correlation was tried.

Observations:

Days Since injury	Hypokalemia Number of patients	Hyperkalemia Number of patients	Hyponatremia Number of patients	Hypernatrimia Number of patients	Total
7 th		6	4	3	13
14 th	6	2	6	2	16
21 st	9	4	6	1	20
28 th	11	5	6		21
35 th	12	4	8		24
42 nd	16	2	7		25

Discussion:

Hypervolemic hyponatremia found in early days of injury is probably due to secretion of aldosterone and anti-diuretic hormone in response to stress. Causes of Hypokalemic alkalosis found in 3rd -5th wks are multifactorial. They were probably due to parental nutrition for a long time, continuous nasogastric aspiration, laxative abuse & repeated enema, and accumulation of secretion due to reduced intestinal motility.

All the institutions dealing with cervical cord injury must keep electrolyte imbalance in mind while planning for management.

Key Words: Cervical Spine Injury, Metabolic Changes

PRO MEASURES FOR SCI PATIENTS IN INDIAN POPULATION:

A COMPARATIVE STUDY

Ms. Ilanagai Anbarasan, Dr. H. S. Chhabra

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INTRODUCTION: Spinal cord injury is one of the most disabling conditions which have a severe impact on physical, psychological and socio-economic status of the patients. The rehabilitation process of such patients is highly expensive as well as time consuming. After such Rehabilitation it becomes imperative to know how the patient perceives his changes. In this study we have tried to find out the correlation between the reported (subjective) and observed (objective) measures to assess the functional efficacy of Rehabilitation in terms of goals achieved.

METHOD: The subjects were 30 patients with spinal cord injury who had undergone rehabilitation. They were asked to fill the Person Related Outcome Proforma (ISCIS) by themselves and Spinal Cord Independence Measure (SCIM) scale was filled by physical therapist observing them in all the task of SCIM for duration of 60 days. Data analysis was done with a suitable statistical tool. A significant level of $p < 0.05$ was found.

CONCLUSION: The Primary motive for this study was the need to measure and monitor the effectiveness of rehabilitation for SCL patients in an accurate manner. Although the objective measures prove that the patient had completed their rehabilitation, it does not measure the perceiving capability of the patient in their daily life. Hence PRO can supplement the objective measure in monitoring the outcome of Rehabilitation in SCI patients.

WHEN TO MOBILIZE A SPINAL CORD INJURED PATIENT

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INTRODUCTION: Mobilization is the most important issue in the whole management of a spinal cord injured patient. All the patients who has undergone surgery for stabilisation can be mobilised within few weeks. But a spinal cord injured patient who is not undergoing any operative intervention is supposed to be kept confined to the bed for at least 4 to 6 weeks. The purpose of confinement is to allow time for healing of the injured vertebrae and the soft tissues around it and thus avoiding further neurological damage. Most of our patients are managed non operatively because of various factors for example - late presentation, being medically unfit, improper facility for spinal surgery etc. prolonged confinement in the bed, leads to avoidable complications like depression, bed sores, pulmonary complications, economic loss, and loss of faith in the treating surgeon. Above all it leads to prolonged bed occupancy, which in any setup heralds a separate cascade of problems. We wanted to find out earliest time of mobilisation for surgically unstabilised spine. Material and method- in sci ward p.m.c.h., patna, a study was done to find out the time window for neurological recovery. We found out that if there is no neurological recovery 3 weeks, there is little chace of further recovery. Basing on this assumption we selected 20 such patients who had shown no recovery (complete lesion) we started mobilizing them. A paraplegic was allowed to use a wheel chair and a tetraplegic was allowed to sit with support with their orthosis on. Their neurological status and was reviewed every week for 3 weeks. They were allowed to go to gym for stabilising vasomotor controll and guarded physiotherapy. Observation- it was observed that none of our patients showed any deterioration either neurologically or radiologically. Conclusion- sci patients with unstabilised spine can be mobilised for training of adl after three weeks .they must use their external braces.this increases their feeling of well being and prevent many complications.

EFFECT OF CYCLE ERGOMETER ON GAIT OF INDIVIDUALS WITH SPASTIC PARAPLEGIA

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Indian Spinal Injuries Centre, New Delhi

BACKGROUND: spasticity, commonly seen in patients with thoracic spinal cord injury, is a major hindrance in gait rehabilitation. Passive leg cycling has been shown to improve musculoskeletal systems.

PURPOSE: To evaluate the effectiveness of passive leg cycling at different velocities on gait outcome of subjects with spastic paraplegia.

SETTING: Rehab department, Indian Spinal Injuries Center, New Delhi.

SUBJECTS: Ten subjects with incomplete thoracic (T4- T9) spinal cord injury.

METHOD: Two groups (A & B) were formed. Group A underwent cycling for 40 min at 30 rev/min. Group B underwent cycling for 40 min with increasing intensities every 10 min finally reaching to 50 rev/min. Gait Analysis was performed before and after the exercise component in both the groups.

OUTCOME MEASURES: Cadence, Stride length, Velocity and Step Width were recorded using ink-footprint record and ambulation time.

RESULT: There was an overall improvement in gait quality of Group B as reflected by positive changes in Stride length, Velocity and Cadence. Group A showed no such change.

CONCLUSION: These results suggest that change in velocity during passive leg cycling induce significant reduction in spasticity and hence achievement of a functional gait.

KEY WORDS: Passive cycle, Spasticity, Paraplegia, Gait.

TREADMILL TRAINING IN SPINAL CORD INJURED PATIENTS

A NOVEL APPROACH

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MAJOR BARRIER to early gait training of patients with incomplete spinal cord injury (SCI) is their inability to stand or walk independently. A newly developed gait training strategies uses a harness system that supports a percentage of a patients body weight, thereby unloading the lower extremities while the patient is being trained to walk on a treadmill. Studies suggests that retraining gait body weight support (BWS) leads to more successful recovery of ambulation with respect to over ground walking speed and endurance, functional balance, and lower limb motor recovery. It also reduces the amount of physical assistance required to walk. Our presentation will explain this new approach of gait training in spinal cord injured patients with a specific focus on its physiological base, suggested training protocol and its effectiveness based on the recent published research.

TO INVESTIGATE IF THERE EXISTS A CORRELATION BETWEEN STANDING BALANCE AND SPEED OF WALKING IN PATIENTS WITH PARAPLEGIA

Andrew Babu, Edwin Jega Joe, Aejaz Sharief, Asha Susan Thomas

Physiotherapists, Christian Medical College, Dr. Ida Scudder Road.

Purpose of the study: To investigate if there exists a correlation between standing balance and speed of walking in patients with paraplegia T9 complete to T12 complete

Material: Berg's Balance scale, Rigid Measuring scale, stopwatch.

Method: A prospective randomized clinical trial to investigate the correlation between standing balance and speed of walking in patients with paraplegia T9 complete to T12 complete was done in rehabilitation institute, Christian Medical College. The study was carried out on patients who have completed their rehabilitation. The patients underwent balance testing using Berg's balance scale and the speed of walking (Initial speed on level ground in meters per minute) by stopwatch.

Results: Sixteen patients were included in the clinical trial. The results were analyzed statistically using the Fisher exact test (two sided).

Conclusion: The study highlighted that there was no significant correlation between balance and speed of walking. Therefore it can be conclude that a better balance need not ensure a better speed of walking.

RELAXANT EFFECT OF NICORANDIL ON THE CONTRACTILITY OF ISOLATED HUMAN URINARY BLADDER

Jacob George, Atiya R. Faruqui, John Mathai

Jacob Peedicayil, Kalpana Ernest

Christian Medical College, Vellore, India

OBJECTIVES: To determine whether nicorandil relaxes the detrusor muscle of the isolated human urinary bladder

MATERIALS AND METHODS: Ten strips of detrusor muscle obtained from 10 paediatric patients who underwent surgery on the urinary bladder were made to contract with 80 mM KCl before and after incubation with four concentrations (100 μ M, 200 μ M, 400 μ M and 800 μ M) of nicorandil. The ability of 10 μ M glibenclamide to reverse the effect of 800 μ M nicorandil on KCl - induced detrusor muscle contraction was also studied. Contractility of the detrusor was estimated by the maximal height of contraction and the area under the curve (AUC) due to contraction.

RESULTS: Nicorandil significantly reduced the mean height of contraction and mean AUC due to contraction of the detrusor muscle strips caused by the administration of KCl. Glibenclamide reversed the relaxant effect of the 800 μ M concentration of nicorandil.

CONCLUSION: Nicorandil significantly relaxes the detrusor muscle of the isolated human urinary bladder. It may hence be useful in clinical conditions involving the urinary bladder that require detrusor muscle relaxation.

Key Words: Contractility; Isolated Human Urinary Bladder; Nicorandil

DETERMINATION OF THE AMBULATORY POTENTIAL IN PATIENTS WITH CHRONIC SPINAL CORD INJURY AS ASSESSED BY LEMS AND WISCI LEVELS AND THEIR EFFECTS ON GLOBAL CHANGE.

**Dr. Raghavendra, S, Dr. H. S. Chhabra
Ilanagal Anbarasan, Dr. Suman Kishore
Indian Spinal Injuries Centre, New Delhi**

Introduction: Determination of the potential for ambulation is an important issue in the management and rehabilitation of patients with Spinal cord Injuries. A direct relationship has been found between motor power in the lower limbs and walking ability. Walking Index for Spinal Cord Injury (WISCI) was developed to measure ambulatory capacity of the patients with SCI, which incorporates gradation of physical assistance and devices required for walking. Our prospective and longitudinal study correlates the Lower Extremity Motor Scores (LEMS) and walking status as assessed by WISCI and that by Spinal Cord Independence Measure (SCIM), and ASIA impairment scale grades.

Materials and Methods: 15 patients with chronic and incomplete spinal cord injury (\geq 12 months duration), with ASIA grades C and D, were evaluated periodically at monthly intervals for six months. In a supervised setting, the subjects ambulated at their maximum WISCI levels. Statistical Analysis was conducted using Spearman's correlation coefficient.

Results: No change in WISCI levels was observed in 7/15 of our patients. There was significant positive correlation between the WISCI levels and the LEMS and AIS grades of the patients in each of the patient visits. Though, the total SCIM scores do not correlate consistently with the WISCI levels, the mobility component of the SCIM (Max=24) correlates well with WISCI levels. There was a good correlation between the LEMS and the time required for the ambulation during WISCI assessment.

Conclusion: WISCI can be incorporated in routine evaluation of the patients with SCI to evaluate the ambulatory potential along with the evaluation of motor scores and the AIS grades. Furthermore, it can serve as a guide to rehabilitation personnel in predicting the potential for ambulation and realistic goal planning in therapy.

COMPARISON OF PHYSIOLOGICAL EFFICIENCY OF TWO TRICYCLE PROPULSION MECHANISMS - A RANDOMIZED CROSSOVER TRIAL

**V. Sundar Kumar, V P Gupta
AIIMS, New Delhi**

Addressing people with disabilities with regard to fulfilling their long distance locomotion needs is a major challenge for clinicians working with them. In India and other developing nations, long distance out door ambulation is generally achieved with the use of tricycles as opposed to wheelchairs due to the limitations of the later. The propulsive force that powers the tricycles is exerted via an arm crank rhythm. Currently two systems are commonly used. Front Wheel Drive (FWD) tricycle and Rear Wheel Drive (RWD) tricycle, the propulsive forces of which are applied through front and rear wheels respectively. Efficiency of a system is an important aspect to be considered while prescribing mobility devices for persons with disabilities. The purpose of this study was to compare the physiological efficacy of these two types of tricycles using the following variables (i) Physiological Cost Index, (ii) Rate of perceived exertion (RPE). Physically active male samples participated in a cross over design and were tested pre to post on heart rate, distance, Speed of propulsion and rate of perceived exertion. For a two-tailed experimental hypothesis, level of significance was set at $p < 0.05$. ExHR, average speed of propulsion, PCI and RPE were compared using paired t-test. ExHR, PCI and RPE were significantly lower for RWD tricycle. The free-chosen speed was not significantly different between the two groups.

INDIVIDUAL BACK REST PROVISION FOR TRUNK STABILISATION AFTER HIGH-LEVEL LESION PARAPLEGIA A TESTED MODULAR FIXATION CONCEPT

Peter Jung (CPO)

Orthotec Nottwil AG Switzerland

The following lecture describes the development and manufacture of modular backrest orthosis by means of a stabilisation systems for patients following high level spinal cord injury.

Because of absent or insufficient trunk stability, patients with high level spinal cord injury are no longer able to independently stabilise their upper body in the wheelchair. Standard marketed systems seldom provide inadequate pressure sore prophylaxis where simultaneous stabilisation, straightening and correction of the upper body is concerned. In co-operation with occupational therapy and physiotherapy departments of the Swiss Paraplegic Centre Nottwil, customised backrest orthosis modelled from a plaster casts are manufactured by Orthotec Nottwil AG, by means of a modular system which offer optimal precision in fitting, are cosmetically inconspicuous and may easily be removed at any time to facilitate wheelchair transport.

The physiological properties are presented in preconsultation.

EFFECTIVENESS OF SURFACE SPINAL CORD STIMULATION IN COMBINATION WITH (AGONIST + ANTAGONIST) FOR REDUCTION OF TONE IN SPASTIC MUSCLES (PLANTAFLEXORS)

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Sardar Bhagwan Singh Post Graduate Institute of Bio Medical Sciences & Research, Balawala, Dehradun

PURPOSE OF STUDY: To quantify the effectiveness of electrical stimulation based on recurrent inhibition in decreasing plantar flexors spasticity.

MATERIAL & METHODS: 12-sample males/females age group between 45 – 70 years, who fulfilled the inclusion criteria were included in the study. In this study, two groups were included. **Group I:** Patient received electrical stimulation for 1 hour through surface electrodes applied to skin in T – 12 and L – 1 area with stimulation to antagonist of spastic muscle. **Group II** Patient receive electrical stimulation for 1 hour through surface electrode applied to skin in T – 12 and L – 1 area with alternate stimulation of agonist and then antagonist of spastic muscles. Both group received 5 sessions for 1 hour/session. The records were measured on day 1 i.e. (MAS + SS + TAHS) then treatment by (TENS + ES) and then again post treatment readings were measured on day 5.

RESULT: ANOVA was applied within the Group I and Group II for all the three scales and the value of F for Group I was 0.384 ($P > 0.05$)* and F for Group II was 7.4 ($P < 0.05$)*. Then the t test was applied between the mean difference of Group I and Group II for all the three scales and the t values for SS was 0.877 ($P > 0.05$)*, MAS was 2.01 ($P < 0.05$)* and TNH was 0 ($P > 0.05$)*.

CONCLUSION: The study suggests that MAS is a sensitive tool in the measurement of Spasticity. Further, the combine stimulation of both the agonist and the antagonist is effective in reduction of spasticity.

KEYWORDS: TENS, Modified Ashworth Scale (MAS), Tardieu and Held's Quantitative Evaluation (TAHS), Synkinetic Scale (SS), Spasticity, Electrical stimulation (ES)

SURGICAL MANAGEMENT OF PRESSURE ULCERS IN NEUROLOGICAL REHABILITATION SET UP

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Background: Pressure ulcer is one of the most common and dreaded complications encountered in neurological rehabilitation. They interfere with activities of daily living and ambulation, increase morbidity, length of stay, frequency of secondary complication and cost of management.

Objective: to study the epidemiological profile and role of surgical intervention in management of pressure ulcers.

Study Design: Audit of surgeries done for pressure ulcers between 1st January to 31st December 2005, in the department of neurological rehabilitation at NIMHANS, Bangalore.

Set-up: Patients undergoing neuro rehabilitation who developed grade III-IV pressure ulcers and require surgical repair.

Results: surgical intervention was carried out in 24 patients (M-18, F-6) between age group of 10 to 45 years. Spinal cord was the most common site of lesion for the primary diagnosis in 16 patients. There were total 39 pressure ulcers (Stage III-12, and stage IV-27). Site of ulcer was gluteal and trochantric - 20, sacral - 12, ischial - 3, and ankle & foot - 4. Predisposing factors were bed bound status, loss of sensation, altered sensation and urinary fistula. Surgical procedures carried out were debridement - 3, split skin grafting - 18 and flap mobilization and closure - 18. Postoperative complications were graft failure - 1 and flap failure - 2 due to growth of MRSA.

Conclusion: the surgical procedures performed are simple and can be performed by rehabilitation specialist. Timely surgical interventions are necessary for cost effective rehabilitation program.

SPASTICITY IN SPINAL CORD INJURY A PRELIMINARY REPORT

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Spasticity is a motor disorder characterized by a velocity dependent increase in tonic stretch reflexes (muscle tone) with exaggerated tendon jerks, resulting from hyperexcitability of the stretch reflex, as one component of the upper motor neurone syndrome.

In the department of physical medicine and rehabilitation, a longitudinal study is being carried out to study prevalence of spasticity in spinal cord injury patients admitted from January 2000 to October 2005.

During this period 1258 patients were taken care off, Out of these 693 patients were having cervical injury and 565 were of thoracolumbar injuries. Majority of these patients were male of age group 21-40 years in both types of injury. 19% of thoracolumbar injuries and 50% of cervical injuries developed spasticity.

In the cervical spine injury, incomplete cord lesions and lower vertebral level were major groups in spastic patients whereas complete cord lesion and upper thoracic vertebral level out rated the other thoracolumbar injured patients. Spasticity appeared within first year of injury in 95% and 88% of affected individuals in cervical and thoracolumbar injuries respectively.

Thus, spasticity is a common sequelae after spinal cord injury.

HOPE HOSPITAL - AN EXPERIMENT

DR (Capt.) D.K. SINHA

Hope Hospital, Patna

Spinal Cord Injury is a vast problem for a vast country like India. It needs multidisciplinary specialized hospitals. What should be structure of these hospitals?

Do we need Apex institutions only?

Apex institutions can give quality management to spinal cord injury patients. Patients are to be referred from different corners of the country. These well-furnished hospitals with well-trained staffs will be capable to treat many patients at one time. These hospitals need lots of resources and take longer time to build.

But in our country where most of the patients are from villages, can we opt for multiple district level Mini hospitals which will need lesser resources, lesser man power. As they will be nearer to villages, they can start the treatment at the earliest. But will they be capable to provide basic complication free treatment. Will these small spinal cord injury hospitals prove to be viable? With what minimum staff it can serve its purpose? Within its limited resources can it provide a positive environment to the patients? Can these

Small hospitals create a demand in the society?

We basically have no data or set models to follow for these smaller spinal cord injury hospitals.

HOPE Hospital is an experiment to find out these answers.

HOPE Hospital is a self financed, 30 bedded acute and rehabilitation care hospital for Spinal Cord Injury Patients. Hope Hospital deals with all aspects, e.g. first aid, spinal surgery, acute care, surgery for pressure sores, bladder bowel complications, training of relatives under one roof. There are provisions for physiotherapy, occupational therapy and gymnasium. This Hospital is wheelchair friendly. Patient can drive wheelchair from the entry point to top floor.

At the time of discharge, the poor patients are given free medicine or wheel chairs or materials of daily use. The appliances (splints) are supplied at a concessional cost.

HOPE HOSPITAL brings a ray of hope to these paralyzed victims.

ROLE OF NEUROTRANSMITTERS IN NEURONAL REGENERATION FOLLOWING SPINAL CORD INJURY- A NEW HOPE

Prof. P. S. John

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Dr.C.S.Poulose Ph D

Dept of biotechnology, CUSAT, Cochin

INTRODUCTION: Spinal cord injury is a new and promising field with the recent understanding of neuronal network re-establishment. In this basic research with animal study we are trying to demonstrate the role of neurotransmitters in neuronal regeneration following spinal cord trans-section. In this animal experiment, recovery of lower limb monoplegia was observed following supplementation of a combination of neurotransmitters.

BACKGROUND: Traumatic spinal cord injury is a significant cause of morbidity and mortality even in the modern era. The importance of this injury lies in the fact that a considerable number of young adults between 15 to 35 years are affected. It is an accepted fact that following spinal cord injury, significant reorganization of sensory- motor pathways occur caudal to the lesion. Restoration of locomotor function after damage to the spinal cord is an enormously challenging problem. The major difficulty is that the axons of damaged neurons do not regenerate in the spinal cord under normal conditions.

Hundreds of therapeutic options are described in literature. But none shows any convincing results. The prospects of successful clinical trials of neuroprotective and neurorestorative interventions for patients with acute spinal cord injury depends on preclinical animal models of injury and repair that reflect human conditions. In this study we are trying to demonstrate the potential of various neurotransmitters to regenerate or remyelinate axons and to incorporate new neuronal cells into the milieu of traumatic spinal cord injury for a better functional outcome.

MATERIALS AND METHODS: We conducted our study in male Wistar rats bred in the animal house of the department of Biotechnology of Cochin University for Science and Technology (CUSAT). 30 rats were used for the study with 15 as the test group and the rest 15 as the control group.

Under ether anaesthesia, a midline vertical incision of around 5cm long at the thoracolumbar junction was used to expose the spinal cord at D 13 level. Rat has 13 pairs of ribs and 13 thoracic vertebral bodies and the spinal cord ends only at the level of L3. Under the magnifying loupe, spinal cord hemitranssection was done and immediate lower limb monoplegia was observed. Fine silastic tube (American silastic ups gr.1) about 15 cm long attached to a reservoir at one end was selected. The free end of the tube was kept over the site of injury of the spinal cord and anchored there safe with muscle sutures. The rubber reservoir was kept under the skin on one side of the midline and skin sutured on top of it. Local application of Neosporin powder was used as post-operative antibiotics.

The test group and the control groups were kept in separate cages and labeled. For the test group, a combination of neurotransmitters in a specified dose was injected into the reservoir buried under the skin twice daily from 3rd to 7th day. Normal saline was injected in the control group.

OBSERVATIONS: Dramatic improvements were noticed in the sensory, locomotor recovery and bowel and bladder control of the rats in the test group treated with neurotransmitter combination. There was no improvement in the condition of rats in the control group treated with normal saline. All the rats in the test group regained bowel and bladder control by the end of one week. The sensory recovery was assessed by noticing the withdrawal response to painful stimuli. The test group regained sensory recovery by the end

of two weeks. The motor recovery was judged using the reward seeking locomotor test. The test was performed by observing the time taken for the rat to reach the food kept at a distance of one meter after an overnight fast. The motor recovery was complete in the test group at the end of three weeks.

The rats were sacrificed at the end of three months to look for the histological evidence of spinal cord continuity and neuronal regeneration. The sections at the site of old spinal cord transection showed neuronal continuity in the test group. There was lot of scar tissue and loss of continuity in the control group when examined under the microscope.

CONCLUSION: The early results of our study on spinal cord regeneration in rats with spinal cord injury, when treated with a combination of neurotransmitters are highly rewarding and calls for further research. **A study of similar nature has never been reported in literature so far.** The early results of our study are very encouraging and there is definite clinical recovery as well as histological evidence of neuronal regeneration following spinal transection. We are planning to continue the study in higher mammals before human trials.

ATORVASTATIN-MEDIATED NEUROPROTECTION IN SCI

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Avtar K. Singh, Inderjit Singh, Ernest Barbosa
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This study investigates whether statins when given 'post-trauma' can act rapidly enough to provide neuroprotection in spinal cord injury (SCI) and delineates the mechanism of action. Atorvastatin was given hours (2, 4 or 6 h) post-injury. AT-treated rats demonstrated near-normal recovery of locomotor function 3 weeks post-injury with BBB scores in the range of 17-18 (on a scale of 0-paralyzed to 21-normal). However, placebo (VHC)-treated animals averaged at 7 and did not progress beyond this stage. Neuroprotection by AT was evident even 48 h to 72 h postinjury wherein the AT-treated rats had higher BBB scores when compared to the VHC-treated ones. AT prevented SCI-induced blood-spinal cord barrier (BSCB) disruption through an isoprenoid-dependent preservation of tight junctions. This was achieved by inhibition of injury induced MMP9 gene expression which further attenuated pivotal SCI-induced neurodegenerative events such as myelin/axonal degeneration and neuronal apoptosis (that cause functional loss). In summary, acute atorvastatin treatment post-injury reduces the extent of secondary damage and subsequent functional loss. To the best of our knowledge, this is the first study demonstrating rapid neuroprotective effects of atorvastatin in an *in vivo* model of SCI. In the present scenario, with the lack of any available effective therapy for SCI-patients, this study might be a turning point as it underscores the efficacy of AT as a potential therapeutic agent to attenuate neurodegeneration and enhance functional recovery following SCI in humans.

Spinal cord injury (SCI) victimizes active individuals-most often young adults subjecting them to lifelong disability. Methylprednisolone in the treatment of acute spinal cord injury has become more and more questioned and the hunt for a cure is still on. The therapeutic approaches being sought at present must fulfill two major roles: neuroprotection and regeneration/remyelination. Prevalent therapeutic options have seen anti-inflammatory approaches combined with stem cell transplantation and grafting, however, the translation into the clinical setting has been limited so far (Lu et al., 2004; Pearse et al., 2004; Cao et al., 2005).

Functional loss post-SCI is multi-factorial, being initiated by the mechanical damage and disruption of the blood-spinal cord barrier (BSCB) leading to secondary (early/delayed) inflammatory injury (Hsu and Dimitrijevic, 1990; Bartholdi and Schwab, 1995; Hayashi et al., 2000). There is growing evidence that stabilization of the barrier early post-injury promotes functional recovery emphasizing the development of therapeutic strategies that will stabilize the barrier and limit early inflammation in the SCI-patient. Disruption of BSCB results in infiltration of polymorphonuclear neurotrophils (PMNS) (Taoka and Okajima, 1998), endothelial activation and injury leading to vascular permeability (Hsu et al., 1985; Pan et al., 1999) with accumulation of transcripts of pro-inflammatory cytokines such as TNF- α , IL-1 β and inducible nitric oxide synthase (iNOS) (Dawson et al., 1993a; Wang et al., 1996; Bartholdi and Schwab, 1997; Hayashi et al., 2000; Bareyre and Schwab, 2003). Disruption of BSCB post-SCI is implicated in abnormal vascular permeability (Rosenberg et al., 1994; Rosenberg et al., 1995; Mun-Bryce and Rosenberg, 1998) associated with hemorrhagic injury (Rosenberg et al., 1994) and inflammation (Mun-Bryce and Rosenberg, 1998) exposing intact

neuronal cells to potentially damaging molecules and contributing to neuronal death, gliosis, axonal degeneration, and demyelination, leading to functional impairment (Noble and Wrathall, 1987; Schlosshauer, 1993; Popovich et al., 1996b; Popovich and Jones, 2003). Proteinases, in particular matrix metalloproteinases (MMPs), have an established link to disruption of the BSCB, inflammation, and tissue injury (Rosenberg et al., 1994; Rosenberg et al., 1995; Rosenberg et al., 1996; Rosenberg and Navratil, 1997; Mun-Bryce and Rosenberg, 1998; Yong et al., 2001). Specifically, inhibition of the early increase of MMP 9 following ischemia (Rosenberg et al., 1996; Romanic et al., 1998) or SCI (Noble et al., 2002) reduces the infarct size (Romanic et al., 1998) and improves locomotor function post-SCI (Noble et al., 2002). Previous reports from our laboratory and others have documented the anti-oxidant, antitumor, and anti-inflammatory activities of HMG-CoA reductase inhibitor-statsins (Pahan et al., 1997; Weitz-Schmidt, 2002; Pannu et al., 2004; Pannu et al., 2005). The remyelinating potential of this drug was suggested when lovastatin protected CNS myelinating cells (oligodendrocyte precursors) in an animal model of multiple sclerosis (MS) (Paintlia et al., 2005). Furthermore, a human clinical trial for MS, suggests the clinical feasibility of using statins for treating neurodegenerative conditions (Vollmer et al., 2004). This report is a novel exemplification of the effectiveness of post-SCI short-term atorvastatin treatment that effectively attenuates acute injury.

Key words: Statins, spinal cord injury, endothelium, neurodegeneration, recovery.

LIST OF ABSTRACTS ACCEPTED FOR POSTER IN THE SESSION ON "SPINAL CORD SOCIETY GOLD MEDAL AWARD FOR BEST POSTER PRESENTER IN THE FIELD OF REHABILITATION MANAGEMENT OF SPINAL AILMENTS"

VALIDITY OF ANATOMICAL CALCULATION METHOD IN DETERMINING THE SPINAL LEVEL IN VERTEBRAL FRACTURES- A RETROSPECTIVE STUDY

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Purpose: To evaluate the predictive validity of the anatomical calculation method to determine the spinal segment involved in cases with vertebral fracture.

Materials and Methods: Patients who had sustained a spinal cord injury following vertebral fracture and was admitted in Kasturba Hospital, Manipal between the periods of 2002 January to 2005 July were identified. Their data for level of vertebral fracture and neurological spinal level was identified from medical record section. 109 subjects were identified who had a single vertebral fracture above L2 level causing spinal compression of which seven were excluded due to inconclusive data. The data collected was compared with the anatomical calculation method that predicts the spinal level. The data was analyzed for positive predictive value to determine the predictive validity using SPSS software package.

Results: The PPV for cervical was 45%, PPV for upper thoracic was 40%, PPV for T7-T9 was 20%, PPV for T10 was 16%, PPV for T11 was 27%, PPV for T12 was 15% and PPV for L1 was 11%.

Conclusion: The results suggest that even though the positive predictive value is higher in cervical and upper thoracic compared to the lower segments, it is still not a valid method to determine the spinal segment involved in cases with vertebral fracture.

Keywords: vertebral fractures, spinal level, anatomical calculation method

WHIPLASH ASSOCIATED DISORDERS (GRADE I AND II) – ALTERATION IN MOTOR AND SENSORY PROCESSING IN A REHABILITATION PERSPECTIVE – SYSTEMATIC LITERATURE REVIEW

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Objective: To identify, review and collate the evidence from the available literature on the motor and sensory deficits in whiplash injury patients. (Quebec Task Force(QTF) – grade I & II)

METHODOLOGY: Quantitative studies that investigated the motor and sensory and deficits in grade I & II whiplash injury patients. Literature database (Search Strategy) Medline, Pubmedcentral, CINAHL, Proquest, EBSCO, Pedro), literature search engine (DOAJ, Science direct, Black-well synergy) and Internet search engine (Google) were searched for relevant articles.

ALTERATION IN MOTOR FUNCTION: Several studies demonstrate Altered patterns of cervical muscle recruitment in whiplash injury patients. Studies demonstrated that there is an increase in superficial neck muscle activity (SCM) at the lower stages of the **Cranio Cervical Flexion Test (CCFT)** which indicates indirectly the weakness of deep cervical muscles This altered muscle recruitment patterns persisted to 6 months in all whiplash patients, even in those patients who reported full recovery. In addition to cervical muscle altered recruitment pattern, there is alteration in shoulder girdle musculature. **Kinaesthetic disturbances- greater Joint Repositioning Errors (JPE)** also occurred soon after injury. Groups with severe to moderate symptoms demonstrated joint position errors of 4.5degrees, which was greater than control group. Impaired postural control as manifested by greater errors in joint positioning may be one of the reasons for frequently reported symptoms of dizziness and unsteadiness. Studies demonstrated that there is a decreased **Range of Motion (ROM)** in all directions in the whiplash injury patients when compared to controls.

ALTERATION IN SENSORY FUNCTION :

Several studies demonstrate widespread mechanical (decreased pressure pain threshold) and thermal hyperalgesia as well as heightened responses to the brachial plexus provocation test (BPPT) in WAD irrespective of symptom intensity.

Conclusion: This review will give an overview of alteration in motor and sensory processing in whiplash injury patients such that, those deficits can be identified and managed in the rehabilitation program in order prevent chronic pain in whiplash injury patients.

Key words: Cranio cervical flexion test, Joint position sense, hyperalgesia

EARLY APPROACH FOR FUNCTIONAL RECOVERY IN SPINAL CORD INJURY

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This case study outlines early interventional approach in cervical level (C5-C6) of a 45-year-old male with incomplete injury. He was brought to the hospital immediately on the same day with history of fall from the height, necessary medical management as done and treated conservatively for the spine injury and referred to Occupational therapy there on. Treatment program was aimed with unique strategies with mobilization, bracing, splinting, Functional Electrical Stimulation and emphasis functional recovery with utmost care of spinal injury sequel dysfunction. Occupational therapy was continued for 2 months regularly for two sessions in a day frequently reassessment were made on every month and patient showed apparent improvement in motor and sensory, simultaneously along with function focused on Activities of Daily Living and early vocational simulation and leisure pursuits. Patients showed better improvement through consecutive assessments for 8 weeks, 12 weeks, 16 weeks, the patient's functional level has improved to is maximal and start walking with out support and performing his Basic Activities of Daily Living with maximum sensory and motor recovery. The result were found much appreciating that, delayed mobilization may delay the early functional recovery in activities of daily living, school task, vocational and Leisure pursuits.

and early approach may enhance early functional independence in the high level spinal cord injury to the fullest need of the clients.

DO URETHRAL AND BED SORES CULTURES ARE REALLY PREDICTIVE OF FUTURE URINARY INFECTIONS IN SPINAL CORD INJURY PATIENTS

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Introduction: Spinal Cord Injury (SCI) patients with neurogenic bladder dysfunction often suffer from symptomatic urinary tract infections (UTI). They require indwelling or clear intermittent catheterization (CIC) for bladder drainage and may suffer from associated complications like bed sores. Aim: To investigate the colonization of the distal urethra, bed sores and bladder in SCI, and to examine the association among bacteriuria, colonization of the distal urethra and bed sores. **Material and Methods:** A total of 42 patients with SCI (15 females and 27 males) were studied. Weekly cultures were taken from distal urethra, urine and bed sores (if present) for 3 weeks. Standard laboratory methods were used to culture the specimens urine. **Results:** E. coli were the predominantly isolated organisms from the urethral and urine cultures. Pseudomonas was colonized more in male patients with bed sores. There was concordance between simultaneous urethral and urine cultures concerning the microorganism cultured especially in male patients; and also between urethral cultures collected 1 week before were evaluated in patients with later on positive urine cultures. There was no significant correlation between bed sore and urine cultures. In female patients, a poor correlation was found between urethral and urine cultures. **Conclusion:** Our study shows that the urethral colonization can be predictive of future urinary infection in males patients with SCI, however, no such correlation is seen in females. Bed sore colonization is not significantly predictive of urinary infections in both sexes.

IDENTIFICATION OF INCIDENCE AND RISK FACTORS IN URINARY INFECTIONS IN SPINAL CORD INJURY PATIENTS.

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Introduction: Even though the mortality due to urinary tract complication has decreased dramatically during the last decade in individuals with spinal cord lesion injury (SCI), urinary tract infection (UTI) still cause significant morbidity in this population. We identified the incidence and risk factors associated UTI in SCI patients. **Material and Method:** A total of 480 patients with SCI (350 male and 130 females) were studied during 1995 to 2004 and obtained certain data, including demographic characteristic, associated factors, methods of urinary drainage, bladder type, urological complications and predisposing factors of each infection episode. **Results:** There were 182 patients with cervical SCIs and 298 with thoracic and lumbar SCIs. The incidence of urinary tract infection was expressed as number of episodes per 100 patients daily or person - days. The overall incidence of urinary tract infection was 1.70, while for male indwelling, condom, crede maneuver, females and normal voiding rate was 3.02, 2.0, 1.20, 0.80 and 0.06, respectively. E.coli was predominantly isolated from cultures, followed by Klebsiella and pseudomonas. Most of the times there were multi drug resistant. Indwelling catheters were the most common mode of bladder drainage. The risk factors associated with UTI were indwelling catheters, improper hygiene repeated catheterisation, extensive bed sores and complete dependence. **Conclusion:** The diagnosis of structural and/or functional risk factors is essential in order to plan optimal urological management in individuals with SCI. For prevention of UTI, general cleanliness and local hygiene, catheter free status and treatment of structural risk factors should be encouraged. Treatment of UTI should be in accordance with antimicrobial susceptibility test and these should not be used for prophylactic purpose.

PHYSIOTHERAPEUTIC MANAGEMENT OF COMPLEX REGIONAL PAIN SYNDROME IN SPINAL CORD INJURIES A LITERATURE REVIEW

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OBJECTIVE: To review the studies conducted on complex regional pain syndrome (CRPS) in spinal cord injuries (SCI), signs, symptoms, examination, the diagnostic criteria, differential diagnosis, pathological process, physiotherapeutic approach, principles and management **METHODOLOGY:**

SEARCH STRATEGY: Pubmed, Proquest, CINAHL databases & Journals available at MAHE health science library were used. Out of 824 articles most relevant 60 were selected, studied and reviewed.

KEYWORDS: RSD in SCI, CRPS in SCI, physiotherapy in RSD, physiotherapy in CRPS.

DISCUSSION: Patients suffering from SCI often present with a pain syndrome. In total, 65.5% of them have chronic pain which itself constitutes a major impediment to rehabilitation. Physiotherapist are challenged to treat SCI patients who are suspected or diagnosed to have CRPS, which has to be handled with different approach owing to different mechanism, disproportionate pain, allodynia, hyperalgesia and a seemingly impenetrable block to the movement. This paper intends to provide a new outlook and awareness among the clinicians and physiotherapists about CRPS as a cause of pain in SCI patients leading to early recognition and effective treatment.

CONCLUSION: The treatment of CRPS in the past and present, has led to much controversy and debate because no single treatment produces predictable results in every patient. However all medical, surgical, and physiotherapeutic interventions have the sole goal of maximally rehabilitating the patient. Physiotherapy forms one of the mainstays of CRPS treatment

IS DEEP VEIN THROMBOSIS PROPHYLAXIS NECESSARY FOR ACUTE SPINAL CORD INJURY PATIENTS.

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Deep vein Thrombosis (DVT) is one of the most common complication of acute spinal cord injury (SCI) due to loss of muscle pump, stasis, endothelial cell injury and hyperoagulability. The incidence of DVT ranges from 0% to 100% as per various studies and they recommend different prophylactic regimes.

297 cases of acute SCI admitted in Department of physical medicine and rehabilitation, S.M.S. Medical College from 1st March 2004 to 31st November 2005 were evaluated to find out the role of prophylactic heparin for DVT in acute SCI. The SCI cases were randomized and divided into 2 groups:

- Heparin group- 166 patients received prophylactic 5000 IU SC q12h of unfractionated low dose heparin (ULDH).
- Control group- 131 patients did not receive prophylactic ULDH.

Physical therapy measures (gentle massage & range of motion exercises) were advised in both groups. Their calf girths and temperatures were measured daily and any significant change noted. Color Doppler ultrasound was done at initial admission in all cases and in first follow up at 3 months to diagnose DVT.

There were 3 cases of DVT each in control and heparin group. The incidence of DVT is 6 out of 297 patients (2.0%). In heparin group, it is 3 out of 166 patients (1.8%) and in control group, 3 out of 131 (2.3%).

Thus, incidence of DVT in acute SCI in our study is less as compared to majority of the studies from abroad and there is no much significant difference in incidence of DVT in heparin and control group.

SHOULDER CARE AFTER SPINAL CORD INJURY

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In general, persons with spinal cord injuries have joint pains as a common complaint. Under this category, shoulder, the most achy joint, has related problems after the spinal injury. Recent research indicates as many as 30-70% of SCI population has new or chronic shoulder pain. Following most injuries arms need their own job and they also serve as 'surrogate legs'-transferring wheelchair, may be even pedaling hand cycle. During these activities abnormal biomechanical demand is placed on the joint, which can lead to pain. There could be some other causes of pain which include neuropathic/ central pain, impingement, cuff tear, subluxation / dislocation, trauma etc. Wheelchair use is a major predictor and aggravator of painful shoulders. Especially when propelling the wheelchair on uneven terrains, out doors. Other predictors of pain are transferring mechanics, weight-shifting ways, driving a vehicle or sports activities. It is very important for patient to know- 'Why am I getting this pain?' It can affect rehabilitation as lifting and transferring activities become difficult, wheelchair propulsion becomes inefficient and there is development of pressure areas. An effective rehabilitation includes teaching a patient -*identifying his pain, prevention and self-management techniques*. As a physiotherapist we help patient dealing with such problems by explaining them the cause of pain and the benefits of exercises in preventing and treating their pain. Causes of shoulder pain, its impact on functional activities of patients, assessment and treatment by means of physical therapy and certain self managing skills would be examined in this presentation. In addition a clinical case study investigating the effectiveness of physiotherapeutic interventions will be described. You have to remember that shoulder are your legs now, they don't have to be a pain.

Key Words: Spinal cord injury, physiotherapy, altered biomechanics

PRESSURE INJURY PREVENTION IN SPINAL CORD INJURY

Mr. Harris Manova, Dr.Pramod Kumar

Introduction: Pressure injuries are trauma caused by impounding forces either by shearing or compression from object in reference to skin. In spinal injuries, due to immobilization syndrome (i.e. inability to move actively the insulted part) the pressure in the tissue will rise at point of contact with reference to duration, causing skin break down, thus leading to pressure trauma. To Control there are many devices to control pressure injuries and management technique's to handle pressure injuries, among them one is what we have assisted with surgeon in designing the device. In spinal cord injury, in specific it was and is difficult to treat a case with the wound; surgically and therapeutically, so we started an adjunctive pressure-relieving device in along with surgical management to relieve the pressure.

Methodology: All case were taken only from plastic surgery department with pressure injury grade from one to two in Special dressing and the graded foam cut and designed as per patient contoured in department of occupational therapy. All patient wound were measured and carve out was done in basic calibrated sponge and that sponge was buffed down in desired shape. It is very simple technique but very effective to control this; it works on weight relieving and weight distribution principle.

Results: The program starts from day one, we see the point where pressure injuries can happen and mark it, then graded foam is taken and contoured according to the shape of the body with pressure relief point cavity in. After completing the pattern we place around the marked area to relief pressure insults. On observation and follow up these made device were giving better results

Conclusion: With proper care these device gives a strong signal that ready made device becomes least effective than the contour made one's.

AIRWAY CLEARANCE TECHNIQUES IN THE PREVENTION OF PULMONARY COMPLICATIONS IN SPINAL INJURY PATIENTS – A REVIEW

Richpal

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Background: The major cause for morbidity and Mortality in the spinal cord injury (SCI) subjects is respiratory complications. According to Van Burn et al (1994) the rate of incidence of respiratory complications in SCI suits are ranging from 36% to 86%. The incidence of respiratory complications is determined by a number of factors, which includes denervation of the intercostals, abdominal and accessory muscles and in some cases partial or total loss of diaphragmatic function; results in restrictive respiratory impairment and compromised airway clearance, increasing the risk of atelectasis and pneumonia. The main aim of interventions in the prevention of respiratory complications in SCI is to promote oxygenation, prevent hypoxia, and to optimize lung function (Stevens et al). Numerous techniques are being used to achieve these aims which techniques and lung expansion techniques. Objectives: to find out the efficacy of various techniques in preventing and reducing pulmonary complications in SI subjects through a wide literature search. To select appropriate technique on the basis of available evidence method: A systematic literature search on the efficacy of airway clearance techniques in the prevention and management electronic data bases up to March 2005 including MEDLINE, OVID, CINAHL and Pedro, cross reference were also included.

Results: 35 articles were retrieved and analysed. Different techniques were used in these studies to prevent and treat the respiratory complications.

Conclusion: In the recent past newer techniques are included in the management of respiratory complications which may be effective than the traditional techniques. The cost effectiveness should be considered in selection of these techniques.

We will be discussing in detail about the techniques in the management of respiratory complications especially airway clearance techniques with the available evidence.

URINARY TRACT INFECTION IN SPINAL CORD INJURY

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Paraplegics and tetraplegics depend on clean intermittent catheterization (CIC) for emptying their urinary bladder. One of the main complications is urinary tract infection. However, most of them do not have sensations, and do not have access to diagnostic investigations at home. Attempt was made to find out symptoms that these patients have which raises their suspicion of urinary tract infection, and helps them seek investigations and advise. Seventy three patients were interviewed between August 2005 and October 2005, and were questioned about symptoms that forced them to suspect urinary tract infection and seek medical help. Only those patients were included who had infection confirmed on culture. It was found that only 48 patients (65%) had fever with chills and rigors, most commonly thought to be associated with infection. Sixteen patients (22%) had increase in spasticity of lower limbs, twelve patients (16%) noticed sediments in their urine in urobag, twelve (16%) had severe headache, twelve (16%) had increase sweating and fifty four patients (74%) had suprapubic pain. Other common presentations were fever without chills and rigors (19%), Hematuria (12%), facial flushing (12%), Piloerection (10%) and tachycardia (5%). Hence, patients should be made aware of number of presentations that urinary tract infection can present with, so that they can seek medical advice timely.

TENS VERSUS VIBRATION THERAPY IN REDUCING SPASTICITY:

A COMPARITIVE STUDY

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Symptoms of spasticity are often experienced by individuals with spinal cord injury (SCI) following a period of spinal shock. Spasticity has the potential to negatively influence quality of life (QOL) through restricting activities of daily living (ADL), inhibiting effective walking

and self-care, causing pain, fatigue, disturbing sleep, compromising safety, contributing to the development of contractures, pressure ulcers, infections, negative self-image, complicating the role of the caretaker, and impeding rehabilitation efforts. Taking into consideration the potential harmful effects associated with spasticity, emphasis should be shifted towards its non-pharmacological management, AIM of the study is to compare the effect of TENS versus vibration therapy to reduce spasticity in spinal cord injury patients. Thirty SCI patients were divided into 3 groups and matched for age, gender, injury time, Ashworth scores, oral baclofen intake, ASIA, and FIM scores. Study group A received passive range of motion, oral baclofen, and 10 min of TENS. The study group B received passive range of motion, oral baclofen, and 10 min of vibration therapy. The control group received passive range of motion exercise twice a day and oral baclofen only.

Total duration of therapy: 4 weeks

Outcome Measures: modified Ashworth Scale, Dep Tendon Reflex Score.

ENERGY EXPENDITURE DURING WHEELCHAIR PROPULSION IN PARAPLEGICS: A COMPARATIVE STUDY BETWEEN TWO PROPULSION TECHNIQUES ARC METHOD AND SINGLE LOOP METHOD

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Purpose: To compare the Efficiency of Two Wheelchair Propulsion Techniques in terms of Energy Expenditure

Material and Methods: Paraplegic patients from the Armed Forces residing in the Paraplegic Rehabilitation Centre for Armed Forces in Kirkee, Pune have been identified as subjects. Thirteen subjects who were previously trained for different Wheelchair Propulsion Techniques were evaluated. These Patients were analyzed on a standard corridor of 35.85m. The Patients were asked to propel wheelchair according to the Arc Method first for between five to eight minutes at their normal propulsion speed. The Patient should have a rest period of at least fifteen minutes before wheelchair propulsion; the Resting Heart Rate (RHR) is measured at the beginning of the wheelchair propulsion and the Post Exercise Heart Rate (PEHR) is measured immediately after the Patient stops to propel. The Pulse rate has been measured by Palpitation Method which was also used for the second propulsion technique. The Physiological Cost Index (PCI) is calculated to determine the energy expenditure of both techniques.

Result: Student T-test is used to evaluate the data obtained. A 'p' value of 0.236 is obtained which is of no significance.

Conclusion: Although Single Loop method is more biomechanically efficient, according to review of Literature, there is no significant difference in the energy expenditure of these two Wheelchair Propulsion Techniques.

COMPARISON OF EFFECT OF LUBRICATING AGENTS USED IN CIC ON URINARY TRACT IN PATIENTS OF SCI

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201 patients of spinal cord injury admitted in department of Physical Medicine and Rehabilitation, SMS hospital Jaipur from February 2004 to October 2005 were studied. Out of these 117 were paraplegics and 84 were quadriplegics with 162 males and 39 females, mostly in Asia grade A (75%). All the patients managed their bladder by CIC. Two groups were made-

Group A used coconut oil (CO) (101) and

Group B used Liquid Paraffin (L.P) (100).

Both the groups were compared on following parameters:

1. Urine routine examination (Bacteriuria, Leucocytes, RBC, Pus cells)
2. Urine culture
3. USG-KUB
4. Serum urea and creatinine
5. Cystoscopy.

It was found that during 1st stay both groups had sterile urine. All the parameters of urine stated above increased in subsequent follow-ups but more in-group A. E-coll was the most common bacteria colonizing the bladder in both the groups in follow-ups.

No significant abnormality was found sonographically in both the groups except vesical stone (9%), in-group A and renal stone (8.33%) in group B

Urea Creatinine was found with-in normal limits in both groups during first stay as well as consecutive follow-ups.

Urothelial changes (14.29%), flakes (28.5%) and sludge (35%) were more common in group A where-as stone (23%) were found in group B

We conclude that both lubricants are cost effective and freely available but liquid paraffin is safer, relatively inert and comparatively less harmful on urinary tract than coconut oil.

SEXUALITY IN SPINAL CORD INJURY: PROBLEMS AND

SOLUTIONS

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Spinal Cord injury may affect the way the person views himself as a sexual person. Sexual responses are altered after injury depending upon the integrity of the nervous system. A multidisciplinary team is needed for proper evaluation and management of sexual problems. Sexual health care program should begin early and should be need based. Process of Assessment and Recommendation for sexual satisfaction (PARSS Model) s a good example o follow, is based on minimizing sexual dysfunction and maximizing sexual satisfaction counseling is the first and most important step of the program. Multiple problems are encountered in resuming the sexual activity - difficulty in positioning, pain , spasticity and contractures interfering with positioning, bladder and bowel problems, sexually transmitted diseases, contraception and fertility issues, and autonomic dys-reflexia. Sexual activity should be resumed in familiar surroundings at a comfortable room temperature. Feelings should be discussed with partner and needs to be communicated to each other. Alternate positioning is recommended for engaging in sexual activity. Bladder bowel problems require proper evaluation and advice. Autonomic dys-reflexia is a life threatening complication and should be avoided by taking proper precautions. Persons with spinal cord injury can still continue to have a fulfilling relationship. It requires willingness, communication, experimentation, and patience. Keep an open mind and sexual activity is limited only by imagination.

STATUS OF SPINAL CORD INJURED PATIENTS IN INDIA

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Management of spinal cord injured patient is an integral part of trauma care. There is need to congregate these patients early in spinal units where dedicated expert and facilities exists for better outcome of treatment and rehabilitation.

The objective of this study therefore, is to find out the various factors responsible for a delay in presentation of spinal injury patients to the specialized spinal trauma units as well as to promote improved quality of care of the spinal trauma patients by highlighting the deficiencies in Indian set-up.

This is a study of traumatic spinal cord injured patients admitted and managed at Indian spinal injuries center, New Delhi between august 2005 and December 2005.

A questionnaire was provided regarding their age, sex mode of injury delay in presentation to Indian spinal injuries centre, cause for the delay in presentation to Indian spinal injuries centre, mode of transportation to the first encountered hospital, and treatment they received before coming to the Indian spinal injuries center and the feedback data was analysed.

Data was analysed from the study of 60 patients and it was found that 85% of the spinal cord injured patients were males. Mean age group was 34 years (range 13-56 years). It was found that twenty nine (48.33%) of the spinal injuries occurred due to fall from height: There was an average of 45 days (range 0-188 days) of delay in presentation and

every time the cause for the delay was unawareness on part of patients and /or doctors regarding specialized spinal units. In thirty eight (62.5%) cases mode of transportation of the spinal cord injured patients to the first encountered hospital was by their own conveyance and in forty nine (81.66%) cases the attendants of the patients or the transporting authority did not have any idea about precautions essential for transportation of spinal cord injured patients to prevent neurological deterioration. Seventeen (28.33%) patients were given injection solumedrol at initially encountered hospital and thirty six (60%) patients were given rest and conservative treatment at initially encountered hospital.

Results were analysed and suggestions are made to update the deficiencies prevailing in the Indian set up for improved care and management of spinal cord injured patients.

REALITIES OF REHABILITATION OF PARAPLEGIC IN INDIA

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Introduction: In a spinal cord injury victim as there is fracture to vertebra, except few centers, the first aid and acute care is provided by the orthopaedic surgeons only. The quality of life of spinal cord injury depends on the quality of treatment given in first 6 to 8 weeks after injury. As such as it stands today, in our country, Orthopaedic surgeons are the initiators of the rehabilitation of Spinal Cord Injury patients.

The development of the concept of rehabilitation of paraplegic in India is the story of development of rehabilitation medicine in India. In true sense of Rehabilitation, it must ensure total integration of the patient to the pre-injury phase- physically, mentally and socially. How far we have reached?

Who should treat the SCI patients?

SCI patients should be treated either by Spinal Cord Injury specialists or by team with a team leader who may be Orthopaedic Surgeon, Neuro surgeon or the Psychiatrist. In our country the SCI patients are received by Orthopaedic Surgeons (80%), Neuro surgeons (10%), and Psychiatrists (15%).

Where the spinal cord injury patents should be admitted? The SCI patients should be admitted in tailor made hospital which should be capable to admit fresh patients, can provide acute medical care, including stabilization of spine, can manage all complication and also train for ADL

Where the spinal cord injury patents are admitted? Except two hospitals tailored made for spinal cord injury patient, *Indian Spinal Injury Center, New Delhi* and *Hope Hospital, Patna*, the patients are cared in medical colleges where the Acute medical care, rehabilitation care and complication care is done by different departments who treat them with their routine patients

Treatment of Complications: If the patient has more than one complication it takes long time to decide under which specialty he will go first. His complications deteriorate by the time the treatment of one complication starts.

When the rehabilitation process should start? In spinal cord injury patients, rehabilitation does should start along with acute care. In our country, as their care is divided under different heads, rehabilitation process falters.

Management of chronic Care -

Rehabilitation of Bladder and Bowel

Except for few conscious centers, intermittent self catheterization is not a routine practice. Indwelling catheter, compression evacuation and distention overflow is still practiced. All of them are harbinger of chronic UTI, hydronephrosis and renal failure

Flexor Spasms

Baclofen epidural pump is costly, unaffordable by average SCI patients.

Sexual Rehabilitation and Parenthood

Paraplegics are still struggling to receive the basic rehabilitation. Very few patients demand for parenthood and sexual rehabilitation. But as the care is gradually improving there will be more paraplegics demanding the sexual rehabilitation.

Achievement of the mobility

In villages, from where most of the patient comes, the road does not exist, or roads are not wheelchair friendly. Architectural obstructions are in plenty. The wheel chairs are costly. Only few can afford motorized wheelchair.

Awareness of the society

Other than some sporadic efforts of some institutions, very little is being done for developing awareness of the society. We have either failed to make our buildings roads, transport accessible to paraplegics or our effort could not make them truly accessible.

Efforts of NGO - Nearly non-existent.

What we should do?

In Medical Colleges: It should be mandatory to segregate all the patients of SCI in a special ward where all specialties concerned, should visit. All medical Colleges should follow the Patna Medical College Model where the attendants are educated on identification, safe carriage, basic nursing care, identification of complication, spread the concept of prevention of SCI, accessibility of roads, houses and remodeling of architectural barriers etc.

In Districts: Mini SCI hospitals manned by a Doctor trained in SCI care and the attendants trained through Patna Model, practiced in local Medical colleges.

Block level: Satellite SCI center - run by train attendants.

Govt' Level: A definite awareness programme should be run by government agencies along with knowledge for Family welfare, child care, Immunization and other programs.

Govt should give incentive to NGOs working in the field of Rehabilitation of SCI victims

Govt should run *special scheme for re-employment and financial rehabilitation schemes for family members* of SCI patients, who can neither leave the disabled SCI patient alone at home, unattended, nor earn sufficient money to look after him and the family.

Industry level: Special jobs with facilities should be created where Paraplegics can access and work independently. Mobility aids should be made available at a subsidized rate.

Social level: Every one of us should create an awareness to prevent SCI.

A spinal Cord Injury patient may have a non functioning body but have an alert and functioning brain. We should find means to utilize it.

The reality of status of rehabilitation of paraplegics in India is that, today though, we are capable to dream for full rehabilitation of a SCI patient but it will need sincere desire to get up and change the dream to reality.

CRITICAL APPRAISAL OF LONG TERM REHABILITATIONAL PROBLEMS IN SPINAL CORD INJURY PATIENTS

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Introduction: Spinal cord Injury (SCI) affects all aspects of a patient's life, including physical, behavioural, psychological and social. A prospective study is ongoing in our institute with an aim to assess the long term rehabilitational problems faced by SCI patients and to incorporate specific strategies targeted to minimize these. **Material & Methods:** A study specific questionnaire has been designed to assess physical, neurological, psycho-neurogenic and psycho-social rehabilitation difficulties faced by SCI patients. Thirty patients (21 males, 9 females) with SCI duration more than 6 months were interviewed to know about various rehabilitational problems. Specific suggestions and interventions were incorporated, accordingly to ameliorate those problems. The effects of these were observed after 6 months. **Results:** main rehabilitational problems faced were as follow: Physical: Bed sores and UTI; Neurogenic: spasticity, bladder dysfunction and neuropathic pain; Psychogenic: No specific; Psychosocial: Poor quality of life; Sexual dysfunctions and excessive burden on family. Majority of the patients found usefulness of various specific strategies incorporated during rehabilitation in further follow-ups. **Conclusion:** With increase in quality of care post injury, life expectancy has increased in SCI patients. These patients are going to face rehabilitational problems during community reintegration. Therefore, for positive community reintegration of such patients, goal of rehabilitation should be to limit such problems and to assist them in process of optimizing function and quality of life.

MPUT IN CHILDREN WITH SPINA BIFIDA: A CORRELATIONAL STUDY BETWEEN SENSORY PARAMETERS AFFECTING HAND FUNCTION AND FUNCTIONAL HAND DOMINANCE.

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BACKGROUND: The "Moberg picking-up test" (MPUT) is a measure for assessment of functional status of hand. Stereognosis, Two point discrimination, Position sense, Kinesthesia are the various sensory parameters which can affect hand function and functional hand dominance. Previous studies showed that in spine bifida sensory parameters are affected.

PURPOSE OF THE STUDY 1. To find out the difference between various sensory parameters in Spina bifida. 2. To co-relate those sensory parameters with hand function. 3. To find out functional hand dominance in relationship with sensory parameters and hand function.

MATERIALS AND METHOD 30 subjects (15 Spina Bifida and 15 normal children, age 5 to 10 years) both male and female were taken. Subjects were divided in 2 groups. Two point discrimination by Vernier caliper, Stereognosis by 12 objects, Position sense, Kinesthesia and functional hand dominance were checked in both the groups. MPUT was done for the assessment of hand function. **DATA ANALYSIS** The data were analyzed using ANOVA and Pearson correlation coefficient. **RESULT** There was significant difference found between various sensory parameters. Positive correlation was found between sensation, hand function and functional hand dominance. **DISCUSSION AND CONCLUSION** Hand function plays a role in skill acquisition and fine motor activities. The fine hand function depends on mobility, strength and stability but even more on the ability of the fingers to feel what they are holding and how they are holding. The management protocol for the Spina bifida hand should look after Sensory training for complete Rehabilitation.

KEY WORDS: Moberg's pick up test (MPUT), Spina Bifida, Sensation, Hand function, Functional hand dominance,

PILLOW MANOMETER – A NOVEL APPROACH TO TRAINING PUSH-UPS CLEARANCE IN PERSONS WITH SPINAL CORD INJURY

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Sitting Push-ups is an essential activity for a person with spinal cord injury for pressure relief and transfer activities. The person requires achieving adequate push-ups clearance and good endurance to become functionally independent, which makes training push-ups an integral part of physical therapy program. Training a simple task like this can actually be a challenge for tetraplegics and high thoracic paraplegics, especially if they have co-morbid obesity. In this paper, we discuss a novel method to train push-ups clearance using the principal of pressure bio-feedback through a case study. The method is simple, cost effective and yet can be used to train/teach sitting push-ups and improve endurance of muscles. It can also be used to evaluate and monitor progress in an objective manner.

PUSH UP HOLDING TIME: AS A PREDICTION CRITERION TO START THE TRANSFER TRAINING THE SPINAL CORD INJURY

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Mobility and transfers were primary enabling functional outcomes in spinal cord injury (paraplegics). This shows early functional ability of person from fully dependable state, which gives maximum satisfaction to the client's progress. The push up holding time can be used as prediction criteria, when to start the transfer training program besides the upper extremities strength. Push up holding time and side transfer, adequate surface clearance for better transfer abilities in spinal cord injury at the initial stage. The study focused, how much the push up holding time, that normals(s) will do as compared to SCI and how to cope these deficits. And survey was done on normals and these scores were compared with the spinal

cord injury patient and showed much difference, and also give broad vision that, the push holding time can be used as guidelines to start the transfer training program in those groups. The results were excellent with the base line criteria of push up holding time in spinal cord injury clients and helps the therapist to focus appropriate methods to start the required program to the felt need of the clients and make an achievable goal in interventional plan. This poster displays the important feature, how to examine, compare the difference, when to start the transfer training programs in spinal cord injury and also provide ideas for further managements.

ARM ERGOMETRY TRAINING : EFFECT ON FUNCTIONAL ENDURANCE IN QUADRIPLEGICS

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Cardiopulmonary changes are commonly seen in patients of spinal cord injury owing to prolonged duration of inactivity. Arm cycle ergometry has been shown to be an effective mode of cardiopulmonary training for individuals with spinal injuries.

Arm cycle ergometry training results in an increased maximal oxygen uptake, exercise-induced bradycardia, and increased physical work capacity. Whether improvements in cardiopulmonary function parallel improvements in functional endurance, however, is unknown. The aim of this study is to see the effect of arm ergometry training on functional endurance in quadriplegics. The experimental group performed 30 min of arm cycle ergometry, for 3 weeks along with conventional rehabilitation exercises. The control group however received only conventional rehabilitation exercises.

Outcome measures: Borg's perceived exertion scale, heart rate and blood pressure. The improvements in functional endurance should assist the individual in completing activities of school, work, recreation, and daily living.

CELL BASED THERAPIES FOR SPINAL CORD INJURY: HOPE OR HYPE? A REVIEW FOR PATIENTS

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Objective: Review of general and scientific information reported on cell based therapies for spinal cord injury in general media and scientific journals to advise patients regarding participation in clinical research trials.

Methodology:

6. Search Strategy:

• General

National, International newspapers and Magazines, various SCI & Community care websites.

• Scientific

Journals and articles accessible through Medline, Google, Stem cell research websites & Institutional websites.

7. Key Words: Stem cell research, Spinal cord injury, olfactory ensheathing cells, neuroregeneration, embryonic / adult stem cells,

Discussion: Spinal cord injury is the most devastating ailment that can afflict mankind. Lack of physiological repair mechanisms in CNS in regeneration and functional replacement of injured neurons has stressed the need for replacement therapies.

Over decades, regenerative and reconstructive strategies including embryonic / adult stem cells / tissues, Schwann cells, genetically modified fibroblasts, bone stromal cells and olfactory ensheathing cells have been studied as repair strategy in animal models.

Partial structural and / functional repair of the injured spinal cord using stem cells and olfactory ensheathing cells have been reported.

Conclusion: Embryonic / Adult stem cells and olfactory ensheathing cells might represent the ideal cell source for cell replacement therapy.

EVALUATION OF SURGICAL VS CONSERVATIVE MANAGEMENT IN ADULT PATIENTS WITH ACUTE SPINAL CORD INJURY.

Dr. H. S. Chhabra, Ms. Ilanagai Anbarasan

Dr. S. Raghavendra, Dr. Suman Kishore

Indian Spinal Injuries Centre, New Delhi

PRIMARY AIM

Evaluation of the effect of conservative Vs surgical management on ASIA total motor score at week 24 and 48 in acute spinal cord injury.

SECONDARY AIMS: Determine the effect of surgical vs. conservative treatment on

- Length of stay in hospital,
- Secondary complications
- Pain at fracture site - McGill Pain Questionnaire
- Deformity at fracture site - radiography
- Psychological outcome
- Voluntary movement in muscle groups not included in ASIA exam
- Modified Ashworth spasticity scale
- ASIA sensory examination
- Spinal Cord Independence Measure (SCIM)
- Walking Index of Spinal Cord Injury (WISCI)
- Patient Reported Outcomes (PRO):
 - International Spinal Cord Injury Scale (ISCIS)
 - EQ-5D

STUDY DESIGN: A Prospective, Randomized, Single blind, Controlled study would be conducted at Indian Spinal Injuries Centre from March 2006. Subjects aged between 18 to 16 years of age with Neurological level of injury between C5 and D10 would be enrolled after obtaining informed consent. They would be randomly assigned in a 1: 1 fashion to the Conservative or Surgical group.

DISCUSSION: The role of surgery in acute spinal cord injury is still a matter of debate. As no conclusive evidence in favor of either surgical or conservative management could be established, an attempt is made to study their effects on ASIA Motor and other Neurological assessments in acute spinal cord injury.

EFFECT OF NEURAL MOBILIZATION COMPARED TO TRADITIONAL TREATMENT IN LUMBAR RADICULOPATHY

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Sardar Bhagwan Singh Post Graduate Institute of Bio Medical Sciences & Research,
Balawala, Dehradun

PURPOSE OF STUDY: To compare the nerve mobilization with traditional treatment in Radiculopathy.

MATERIAL & METHODS: 20 subjects were divided into 2 groups. Each group consisted of 10 subjects both males/females. **Group I** (GI) treated with traditional treatment i.e. Lumbar Traction, Interferential therapy, Spinal exercises. **Group II** (GII) Treated with neural mobilization only. Patients VAS was recorded on within 48 hrs, after 48 hrs and after 7th session.

RESULT: Paired T-Test was applied between the mean difference of Group I and Group II after 1 session i.e. within 48 hrs. T-value was 4.44 ($p < 0.05$)*, after 48 hrs. 3.00 ($p < 0.05$)* and 7th session 5.65 ($p < 0.05$) *

CONCLUSION: In initial 48 hrs, the reduction in pain is more evident after traditional treatment than neural mobilization. The efficacy of neural mobilization is seen after 7th session. Hence, it may be quite safe and effective to use neural mobilization after 48 hrs of the treatment.

Keywords: Radiculopathy, Lumbar Traction, Interferential Therapy, Spinal Exercises, Neural Mobilization, Visual Analogue (VAS)

THE ROLE OF FACET TROPISM IN NON SPECIFIC LOW BACK PAIN & INTERVERTEBRAL DISC PROLAPSE IN LUMBOSACRAL SPINE

Dr. Sumit K. Jain, Prof. S. P. Mohanty

Kasturba Medical College & Hospital, Manipal

STUDY DESIGN: The association of asymmetry of lumbar facets and low back pain was studied in (a) 30 patients with nonspecific backpain (b) 30 proven cases of intervertebral disc prolapse and (c) 30 healthy individuals.

AIMS AND OBJECTIVES: To evaluate the role of Zygapophyseal joints as a primary cause of low backpain in young individuals and its role in disc prolapse.

INTRODUCTION: Recently the role of abnormalities of Zygapophyseal joints of the spine as a cause of low backpain is being recognized. This may be due to altered mechanism of spinal motion segment instability and abnormal stress on the annulus fibrosus due to facet tropism could lead to disc prolapse.

METHODS AND MATERIALS: All the subjects had a CT scan using Heithoff's technique. The facet angles of each segment were measured by Cyron and Hutton's method.

RESULT: Although facet tropism was present in normal subjects, it was encountered far more frequently in patients with non specific backache and disc prolapse. It was seen that lateral disc prolapse occurred more frequently in patients with facet tropism and the prolapse tended to occur more frequently on the side whose facet angle was lower. The results suggest that there is an association between facet tropism and backpain.

CONCLUSION: Facet tropism may be one of the causes of backpain on account of altered mechanism of the spinal motion segment. The association of facet tropism and lateral disc herniation needs to be investigated further before attributing a causal relationship.

KEY WORDS: Facet tropism, low backpain, disc prolapse.

A COMPARATIVE STUDY BETWEEN MCKENZIE APPROACH AND TRACTION IN PAIN RELIEF & FUNCTIONAL OUTCOME TO LOW BACK PAIN

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Department of Therapies and Health Sciences, Faridabad

PURPOSE: To compare pain relief and functional out come with Mckenzie's approach and lumbar traction in subjects with low back pain due to mechanical causes materials: Visual analogue scale (VAS), Oswestry disability index (ODI). **METHODS:** 19 subjects irrespective of age & sex were randomly grouped into Group "A" and "B". Gr. A received McKenzie's exercise and Gr. B received mechanical traction therapy. Evaluation was done on 0th, 3rd, 5th and 7th day of treatment. Physical examination of lumbar spine consisting of a series of repeated end range spinal movements based on McKenzie's approach was done. **RESULTS:** students 't' test between the groups and paired 't' test within the group. Comparison of mean scores of functional out come using (ODI) AT Day-1, Day3, Day5 and Day7, between Gr. A and Gr. B. showed no statistically significant difference. Comparison of mean scores of VAS at Day 1, Day 3, Day 5, and Day 7 between Gr. A and Gr. B, showed no statistically significant difference.

CONCLUSION: It can be concluded that both Mckenzie's approach and lumbar traction have positive effects on mechanical low back pain subjects in terms of pain relief and functional outcome.

ALKAPTONURIA WITH LUMBAR DISC HERNIATION

Dr. B. Mohapatra

Indian Spinal Injuries Centre, New Delhi

Introduction: Alkaptonuria is a rare metabolic disorder first described by garrad. The incidence is 1:250000; frequently seen in Czechoslovakia by the deposition of oxidized homogentisic acid in fibrous and cartilaginous tissues, with dark urine, (H.aciduria), distinctive cutaneous pigmentation (ochronosis) and arthritis.

Material and method

- 28 years male.
- Complaints of severe low backache with radiation to right gluteal region and lower limb, unable to walk or stand due to pain.

- No history of trauma / fever / weight loss / loss of appetite.
- The pain did not respond to bed rest and medication.

Investigation: X-ray - lumbo sacral spine - showed features of spondylosis in lumbar spine with reduced disc space at L5-S1 and L3-4. Osteophyte at multiple levels were also seen.

MRI - L.S. spine - central intervertebral disc extrusion noted at L5-S1 causing compression of both lateral neural canals.

Treatment: Planned for disectomy of L5-S1 level.

Per operative findings: Disc removed was jet black the colour. Near total disc removal done with posterior lumbar interbody fusion.

Disc was sent for histopathology study, culture for bacteria and fungus, radiometric culture and sensitivity for T.B. and PCR for TB.

Post operatively: History for darkening of urine on standing was positive.

Screening test for alkaptonuria and porphyria were done. Benedict agent and silver nitrate solutions turned brown. No other clinical features of alkaptonuria was found.

Results: The symptoms of the patient disappeared after surgery and he was made to walk with a walker without any discomfort.

Discussion: Spine involvement is commonly seen in alkaptonuria in the form of spondylosis and canal stenosis, but it can also present as intervertebral disc prolapse. In patients with no other signs of alkaptonuria / ochronosis, early detection of the disease is important to treat involvement of other systems like cardio vascular system (involvement of aortic and mitral valves and large blood vessels). Patients with alkaptonuria, intake of phenylalanine and tyrosine should be restricted. Ascorbic acid should be taken as prophylaxis.

A COMPARATIVE EVALUATION OF CONSERVATIVE AND OPERATIVE MANAGEMENT OF TRAUMATIC PARAPLEGIA

Dr. A. N. Mukherjee

JN Roy General Hospital, Kolkata

Objective: Our aim was to compare the final outcome of conservative and operative treatment of traumatic paraplegia.

The patients and methods 13 patients having paraplegia following dorsolumbar spinal injury who showed progressive neurological improvement were treated conservatively as per PATNA PROTOCOL 25 patients with paraplegia following dorsolumbar spinal injury of three to seven weeks duration were selected for operative decompression and posterior spinal stabilization with postero-lateral iliac crest grafting. The cases were evaluated pre and post operatively by X ray and CT scan.

Results: The cases were evaluated since 1999 Jan to 2005 Dec. On the basis of Frankel grading, the patients of operative group showed some neurological recovery, bladder function was variable.

Eleven of thirteen patients treated conservatively had significant improvement with good bladder function.

Discussion and conclusion: Patients presenting late but having progressive neurological improvement can be managed conservatively as per PATNA PROTOCOL and provided equivalent or sometimes better result as per neurological status concerned.

LIST OF ABSTRACTS ACCEPTED FOR PRESENTATION IN THE FREE PAPER SESSION ON REHABILITATION MANAGEMENT OF SPINAL AILMENTS

EVOLUTION OF SPINAL SURGERY AT NEPAL ORTHOPAEDIC HOSPITAL

Dr. Yubaraj Kharel

Nepal Orthopaedic Hospital, Kathmandu Nepal

Seven years young Nepal Orthopaedic Hospital started with 2 surgeons with 2 medical officers in 1998 has gone through different phases of evolution in Orthopaedic Surgery. During its initial days removing of Luque rods and Wires was the "Spine Surgery" the

hospital. After Luque instrumentation with sublaminar wiring was done in few cases also. Many of the spinally injured patients were treated conservatively.

Since one year, we are performing spine surgery on a regular basis. So far 20 patients have undergone posterior instrumentation with Pedicle screws for Thoracolumbar trauma, 5 patients have undergone open lumbar, discectomies, and Decompressive laminectomy for LCS and two patients of cervical injury were treated with halo vest immobilization. Among them one had undergone posterior instrumentation with wiring and grafting.

Though posterior spinal surgery is a regular procedure at NOH, it is only a step forward in the field of spine. We are still in learning curve.

A COMPARATIVE EVALUATION OF CONSERVATIVE AND OPERATIVE MANAGEMENT OF TRAUMATIC PARALYSIS

Dr. A. R. Mukherjee

JW Roy General Hospital, Kolkata

Objective: Our aim was to compare the final outcome of conservative and operative

management of traumatic paraplegia.

The series and methods: 13 patients having paraplegia following thoracic spine injury who showed progressive neurological improvement were treated conservatively. 22 patients with paraplegia following thoracic spine injury, of whom 10 were treated with postoperative decompression and postoperative laminectomy were selected for operative decompression and postoperative laminectomy. The cases were evaluated by and for

neurological recovery and LT score.

Results: The cases were evaluated since 1993 Jan to 2005 Dec. Of the total of 35 patients, the patients of operative group showed some neurological recovery. The functional recovery was variable.

Conclusion: Paraplegia treated conservatively had significant improvement in

paraplegia.

Discussion and conclusion: Patients presenting late but having progressive

paraplegia, improvement can be managed conservatively as per PATM PROTOCOL and

postoperative laminectomy as per neurological status.

LIST OF ABSTRACTS ACCEPTED FOR PRESENTATION IN THE FREE PAPER SESSION ON REHABILITATION MANAGEMENT OF SPINAL DISEASES

EVOLUTION OF SPINAL SURGERY AT NEPAL ORTHOPAEDIC HOSPITAL

Dr. Yashraj Khatiwada

Nepal Orthopaedic Hospital, Kathmandu, Nepal

Spinal surgery in Nepal Orthopaedic Hospital started with 2 surgeons with 2 months of training in 1998. It has gone through different phases of evolution in Orthopaedic Hospital. During the last 10 years, the use of Luque rods and wires was the mainstay of spinal surgery.

SPINAL CORD SOCIETY (Indian Chapter)

Membership Form

Name (Prof./Dr./Mr./Ms.)

.....

Qualification.....

Designation

Experience in the field of Spinal Injuries / Spine

.....

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Secretary - Spinal Cord Society

Indian Spinal Injuries Centre

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Spinal Cord Society has been registered to serve as a national coordinating, correlating & advisory non profit making body for the study of all problems concerning the causation & prevention of traumatic & non traumatic lesions spine & spinal cord. For further details write to the secretary at the address mentioned above.

TEAR HEAR

SPINAL CORD SOCIETY

SPINAL CORD SOCIETY
(Indian Chapter)

Aims & Objectives

- Serve as a national body for promoting Academics, Education & Research in the field of Spinal Injury.
- Provide an exchange amongst the members and other individuals through publications, Seminars, Conferences, Workshops and other activities.

Membership

- Full Members: Doctors involved in the treatment of Spinal Cord Lesions.
- Associate Members: Para-medical personnel and medical student.

Membership Fee

- **Full Member**
 - Life Membership Rs. 500/-
 - One Year Membership Rs. 200/- per annum.
- **Associate Member**
 - Life Membership Rs. 300/-
 - One Year Membership Rs. 150/- per annum.

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Maj. HPS Ahluwalia, Chairman, ISIC,

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SPINAL CORD SOCIETY (Indian Chapter)

Fellowship / Observership Form

To
The President
Spinal Cord Society

Sir,

I Dr.....would like to apply for a fellowship / observership
in spine surgery at the Indian Spinal Injuries Centre for a period of six / twelve weeks from
.....to My special areas of interest are..... I am
enclosing my CV for your kind consideration. I am a member of the spinal cord society and my
registration number is

Thanking you,
With regards,

Name & Mailing address

TEAR HERE

SPINAL CORD SOCIETY
(Indian Chapter)
Fellowship / Observership Form

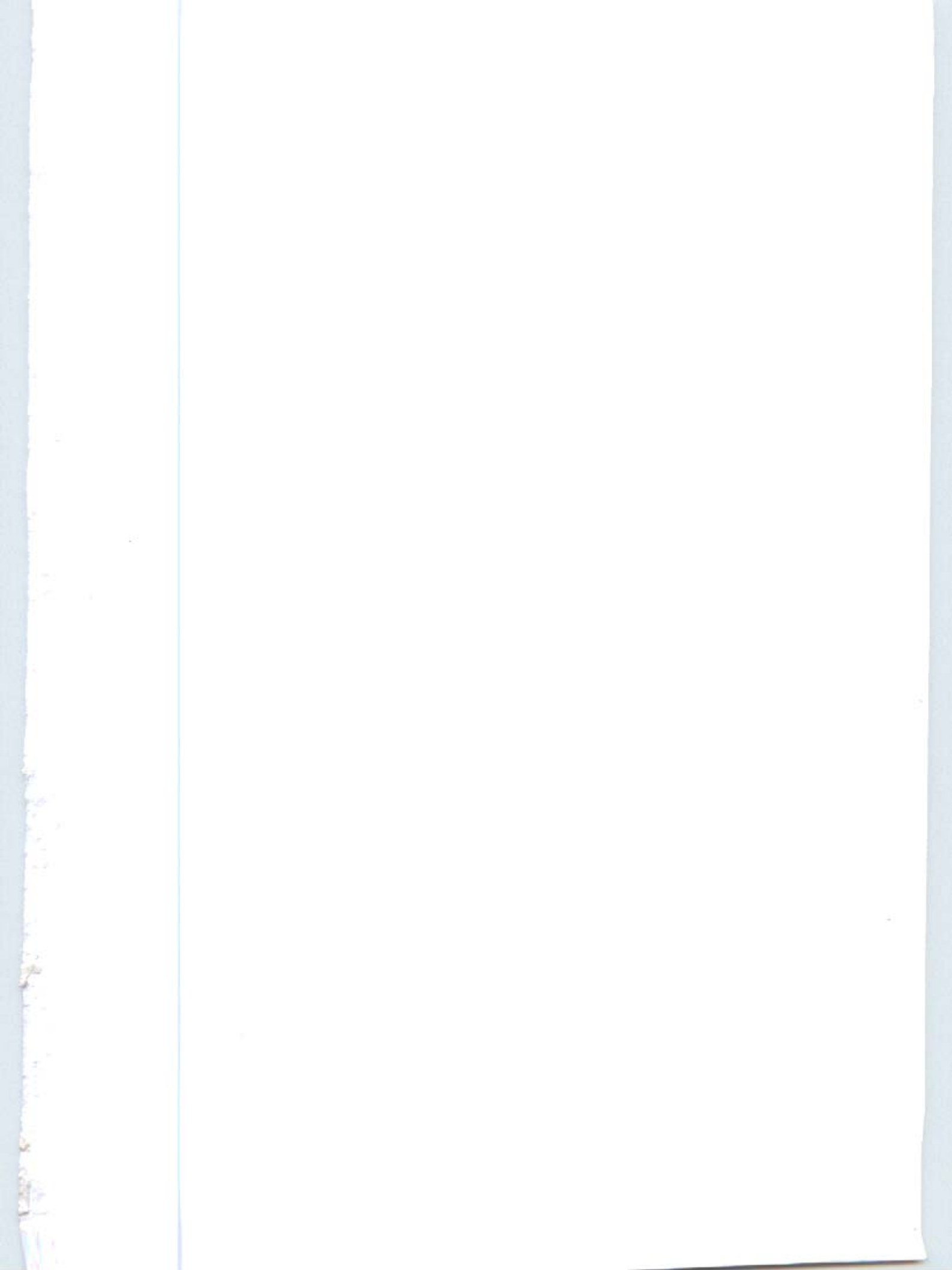
The Fellowship
is for 12 months

Word this to copy to a fellow member
to the Society at the Indian Spinal Cord Society for a period of 12 months
My special area of interest is
to be considered for CV for your kind consideration. In a number of the spinal cord society

Secretary - Society

Dr. S. S. S. S.

Dr. S. S. S. S.



Conference Organizer:

Indian Spinal Injuries Centre (ISIS) is recognized internationally as a premier institute in the field of Medical Care and Rehabilitation of Spinal Cord Injuries. It is India's first fully equipped hospital for the people with severe Spinal Orthopaedic problems and Neuromuscular Disorders. It has the largest Rehabilitation Department in Asia and the only Hydrotherapy unit of its kind in India. It treats patients not only from India but abroad as well. A non-profit venture, it provides care to the most neglected segment of society.

Set up in 1997 in collaboration with the Italian Government, ISIC is situated in Vasant Kunj, virtually next to the airport, spread over an area of 15 acres and is surrounded by lush greens. Here the most advanced scientific tools for diagnosis and treatment join an uplifting ambience that uses greenery, natural light and barrier free space (for wheelchair users) to keep patient's spirit bright.



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