3rd EUROSPINE Spring Speciality Meeting

Trauma and Emergency Spine Surgery – Past, Present and Future
12–13 May 2016 • Park Inn by Radisson, Kraków, Poland

FINAL PROGRAMME

www.eurospinemeeting.com
www.eurospine-spring.com
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Contact Information

Organisation and Exhibition
Conventus
Congressmanagement & Marketing GmbH
Ms. Nadia Al-Hamadi
Carl-Pulfrich-Strasse 1
07745 Jena, Germany
Phone +49 3641 31 16-315
Fax +49 3641 31 16 243
eurospine@conventus.de

Administrative und Scientific Secretariat
EUROSPINE, the Spine Society of Europe
c/o Ms. Judith Reichert Schild
Seefeldstrasse 16
8610 Uster-Zürich, Switzerland
Phone +41 44 994 14 04
Fax +41 44 994 14 03
info@eurospine.org

Membership
Ms. Conny Schmutzer
Mobile +43 699 11 72 73 76
schmutzer@eurospine.org

Marketing
Ms. Anna Faber
Mobile +49 151 46 50 26 29
faber@eurospine.org

Education
Ms. Letizia Lamartina
Mobile +41 78 638 75 22
lamartina@eurospine.org
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Dear colleagues and friends,

Welcome, we are really happy that you are here for this specialist trauma spine meeting in this beautiful city of Kraków.

It is a unique and intimate, more personal event than our larger Annual Meeting. We have quality time for discussion related to the programme contents which include abstracts, key notes, debates and case discussions. English may not be your first language but that applies to most of us, so please, we want to hear your voice and opinions.

There is a unique flavour to EUROSPINE, the health care environment is different to other parts of the world. We are a growing and developing organisation reflected in our expanding membership and activities. This meeting in Kraków builds on our portfolio of resources available for members. The emphasis here is on networking for you. We would love you to come to the dinner on the Thursday which is a fun event in the historic city.

Discussion and interaction is when we learn most, and we want you to have take-home knowledge, skills and attitude that enhance your professional practice.

Kraków is a cracking venue for this cracking meeting!

Philip J. Sell
Host

Thomas R. Blattert
Co-host
Room Overview

Address
Park Inn by Radisson Kraków Hotel
ul. Monte Cassino 2
30-337 Kraków, Poland
www.parkinn.com

Plenary Hall and Speakers’ Preview Centre (Alfa)
Industry
Check-In
Catering

1  DePuy Synthes (Zuchwil/CH)
2  Globus Medical, Inc (Audubon/US)
3  VP Valeant Sp. z o. o. Sp. J. (Warsaw/PL)
Scientific Programme

Overview
**Programme Overview**

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<td>Welcome</td>
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<td><strong>09:15–10:15</strong></td>
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<td>Cervical Spine</td>
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<td><strong>10:15–10:45</strong></td>
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<tr>
<td>Case Based Podium Discussion</td>
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<td>Upper Cervical Spine Trauma</td>
<td>Spine Trauma in Elderlies</td>
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<td><strong>12:30–14:00</strong></td>
<td><strong>12:30–14:00</strong></td>
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<tr>
<td>Lunch Workshop</td>
<td>Lunch Break</td>
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<td><strong>14:00–15:30</strong></td>
<td><strong>14:00–16:00</strong></td>
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<tr>
<td>Acute Trauma Care</td>
<td>Osteoporotic Burst Fractures</td>
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<td><strong>16:00–17:30</strong></td>
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<td>Key Lectures</td>
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<td><strong>from 20:00</strong></td>
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<tr>
<td>Official Congress Dinner</td>
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**Notes:**
- QuickFires are scheduled for pages 16 and 17.
- Key Lectures are scheduled for page 13.
- Osteoporotic Burst Fractures are scheduled for page 19.
- Official Congress Dinner details are not provided.
Scientific Programme

Thursday, 12 May 2016
Thursday, 12 May 2016

09:00–09:15  ■ Welcome and Introduction
Room: Alfa
Chairs: Michael Ogon, Vienna, Austria; Philip J. Sell, Leicester, UK

09:00  ■ Welcome and introduction to EUROSPINE
Michael Ogon, EUROSPINE President
Vienna, Austria

09:07  ■ A brief history of spinal trauma
Philip J. Sell, Meeting Host
Leicester, UK

09:15–10:15  ■ Cervical Spine
Room: Alfa
Chairs: Michael Ogon, Vienna, Austria; Philip J. Sell, Leicester, UK

1  ■ CERVICAL SPINE CLEARANCE – STATES-OF-THE-ART
Dennis E. Dominguez, Michaël Moeri, Guillaume Racloz
Geneva University Hospitals, Geneva, Switzerland

2  ■ ODONTOID SYNCHONDROSIS FRACTURE IN CHILDREN – REPORT OF 6 CASES WITH SPECIAL REFERENCE TO PARTIAL ODONTOIDECTOMY IN AN IRREDUCIBLE ATLANTOAXIAL DISLOCATION
Abolfazl Rahimizadeh, Reza Mollahousaini, Abdol Hadi Daneshi
Pars Advanced & Minimally Invasive Research Centre, Affiliated to Iran University of Medical Sciences, Tehran, Iran

3  ■ COMPARISON OF FUSION RATES BETWEEN ROD-BASED LAMINAR CLAW HOOK AND POSTERIOR CERVICAL SCREW CONSTRUCTS IN TYPE II ODONTOID FRACTURES
Andrzej Maciejczak, Wolan-Nieroda Andzelina, Katarzyna Jablonska-Sudol
Rzeszow University, Neurosurgery Tarnow, Poland

4  ■ COMPARISON OF FUSION RATES BETWEEN ROD-BASED LAMINAR CLAW HOOK AND POSTERIOR CERVICAL SCREW CONSTRUCTS IN TYPE II ODONTOID FRACTURES — SURGICAL REPAIR OPTIONS OF TYPE II DENS FRACTURES IN ELDERLY PATIENTS BASED ON THE LITERATURE REVIEW AND OWN CASES
Wojciech Glinkowski
Baby Jesus Clinical Hospital, Department of Orthopaedics and Traumatology of Locomotor System (Spine Unit); Medical University of Warsaw, Department of Medical Informatics and Telemedicine, Warsaw, Poland
5 MINIMAL INVASIVE LAG SCREW OSTEOSYNTHESIS FOR HANGMAN’S FRACTURES
Jan-Philip Zeden, Dirk Thomas Pillich, Henry Werner Siegfried Schroeder
Jan-Uwe Müller
Greifswald University Hospital, Clinic and Polyclinic for Neurosurgery, Greifswald, Germany

6 CLINICAL ACCURACY OF AN INTRAOPERATIVE 3D CT-BASED NAVIGATION SYSTEM (O-ARM) ASSISTED CERVICAL PEDICLE SCREW PLACEMENT
Nobuyuki Shimokawa
Department of Neurosurgery, Tsukazaki Hospital, Himji City, Japan

10:15–10:45  Case Based Podium Discussion • Cervical Trauma – Jumped Facets
Room: Alfa

   - Case presentation
     Matti Scholz, Frankfurt, Germany

   - Evidence
     Zdenek Klezl, Derby, UK

   - Case solution
     Matti Scholz, Frankfurt, Germany

   - Discussion

10:45–11:15  COFFEE BREAK IN THE EXHIBITION AREA

11:15–12:30  Upper Cervical Spine Trauma
Room: Alfa
Chairs: Stavros Stavridis, Thessaloniki, Greece; Everard Munting, Biez, Belgium

11:15  Anatomy and imaging of vertebral artery
Alberto Zerbi, Milan, Italy

11:30  Keynote Lecture • Vertebral artery injury
Thomas R. Blattert, Schwarzach, Germany

11:55  Atlas fractures – Case based podium discussion
Case presentation
Matti Scholz, Frankfurt, Germany

   - Evidence
     Zdenek Klezl, Derby, UK

   - Case solution
     Matti Scholz, Frankfurt, Germany

   - Discussion
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<tr>
<th>Time</th>
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<tr>
<td>12:00–14:00</td>
<td><strong>EuSSAB Meeting</strong></td>
<td>Room: Gamma&lt;br&gt;Christoph Siepe, Member Council Chair and EuSSAB Representatives (upon invitation only)</td>
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<td>12:30–14:00</td>
<td><strong>Industry Lunch Workshop</strong></td>
<td>Room: Alfa&lt;br&gt;see page 22</td>
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<td>14:00–15:30</td>
<td><strong>Trauma Care</strong></td>
<td>Room: Alfa&lt;br&gt;Chairs: Charles Greenough, Middlesbrough, UK&lt;br&gt;Andrzej Maciejczak, Tarnow, Poland</td>
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<td></td>
<td>Measurement of blood flow and spinal decompression</td>
<td>Marios Papadopoulos, London, UK</td>
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<td>14:30–15:30</td>
<td><strong>Acute Trauma Care</strong></td>
<td>7 THE TIMING OF SURGERY IN ACUTE SPINAL CORD INJURY – SURVEY STUDY&lt;br&gt;Grzegorz Miekisiak, Wojciech Szymanski, Pawel Jarmuzek, Dariusz Latka&lt;br&gt;Department of Neurosurgery, Specialist Medical Centre, Polanica-Zdroj, Poland</td>
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<td>8 A DELAY OF LESS THAN 7 H BETWEEN INJURY AND SURGICAL DECOMPRESSION REPRESENTS THE BEST THEORETICAL CUT-POINT FOR SIGNIFICANT NEUROLOGIC RECOVERY IN PATIENTS WITH TRAUMATIC CERVICAL SCI&lt;br&gt;Marko Jug, Nataša Kejžar, Miloši Vesel, Matej Cimerman, Fajko F. Bajrovič&lt;br&gt;Department of Traumatology, UMC Ljubljana, Slovenia</td>
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<td>9 TURNING ADVERSITY IN OPPORTUNITY&lt;br&gt;Philip J. Sell&lt;br&gt;University Hospitals of Leicester, UK</td>
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<td>10 VERTEBRAL FRACTURES HEALING ASSESSMENT METHODS – THE REVIEW&lt;br&gt;Wojciech Glinkowski, Jerzy Narloch&lt;br&gt;Baby Jesus Clinical Hospital, Spine Unit, Department of Orthopaedics and Traumatology, Warsaw, Poland&lt;br&gt;Chair and Department of Orthopaedics and Traumatology of Locomotor System, Centre of Excellence “TeleOrto”, Medical University of Warsaw, Baby Jesus Clinical Hospital, Warsaw, Poland</td>
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<td>11 VERTEBRAL COLUMN FRACTURE TREATMENT IN CHILDREN AND ADOLESCENTS&lt;br&gt;Aleksander Szwed, Maciej Koban, Tadeusz Bilnicki&lt;br&gt;Pomeranian Medical University in Szczecin, Poland</td>
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<td>Discussion</td>
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<td>15:30–16:00</td>
<td><strong>COFFEE BREAK IN EXHIBITION AREA</strong></td>
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<td>16:00–17:30</td>
<td><strong>Key Lectures</strong></td>
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<td>Room: Alfa</td>
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<td>Chair: Philip J. Sell, Leicester, UK</td>
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<tr>
<td>16:00</td>
<td><strong>A cord injury, the vital early care</strong></td>
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<td></td>
<td>Charles Greenough, Middlesborough, UK</td>
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<td></td>
<td>Discussion</td>
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<tr>
<td>16:30</td>
<td><strong>Autologous bulbar olfactory ensheathing cells... Something to consider in very specific cases?</strong></td>
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<td>17:10</td>
<td><strong>The natural history of cord injury and the challenge of improving on natural history</strong></td>
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<td>17:30</td>
<td><strong>Conclusion</strong></td>
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<td>20:00</td>
<td><strong>Official Congress Dinner</strong></td>
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EUROSPINE Membership

The brightest minds in spine are members of EUROSPINE.

We welcome all spine related disciplines and professionals. Solving the challenges we are facing in spinal matters requires a multidisciplinary effort, and EUROSPINE is a place for all of today’s spine professionals.

Above all, EUROSPINE is its members!

Membership Benefits:

- Significantly reduced registration fee for EUROSPINE Meetings
- Reduced registration fee for the EUROSPINE TFR Courses
- Reduced registration fee for the European Spine Course Diploma
- Exclusive early access to webcasts
- Access to research grants
- Subscription to the European Spine Journal (print & online)
- Eligibility to become a faculty member in EUROSPINE’s educational activities
- Committee work with option for active members to become committee chair and become a member of the ExCom
- Full voting rights at the General Assembly
- Option to participate in Spine Tango and access to Patient Line
- Access to EUROSPINE’s member lounge at the Annual Meeting
- and so much more ...

What’s MY benefit?

- Annual Meeting: – EUR 380*
  Spring Meeting: – EUR 250*
- – EUR 200
- Module 1: – EUR 100
  Module 2-5: EUR 200 (ea.)
- always on top
- up to EUR 100,000 p.a.
- beyond price
- endless networking opportunities
  I get a say!

Total: ... this is priceless for only EUR 140 per year!

*based on regular registration fee, the monetary benefit for onsite registration may vary

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100% membership benefits
50% annual fees (EUR 70)

Apply now www.eurospine.org/membership
Scientific Programme

Friday, 13 May 2016
Friday, 13 May 2016

09:00–09:45  QuickFires
Room: Alfa
Chairs: Marco Teli, Liverpool, UK; Marios Papadopoulos, London, UK

- QF1 GUILLAIN-BARRE SYNDROME FOLLOWING SPINAL FUSION FOR THORACIC VERTEBRAL FRACTURE
  Dong Wuk Son
  Pusan National University Yangsan Hospital, South Korea

- QF2 UNSTABLE CERVICAL SPINE INJURY IN PATIENT WITH NEGATIVE CT SPINE: CASE REPORT
  Ashraf Dower, Johnny Efendy, Renata Abraszko
  Department of Neurosurgery, Liverpool Hospital, Sydney, Australia

- QF3 ANTERIOR VERSUS POSTERIOR APPROACH IN TREATMENT OF UNILATERAL CERVICAL DISLOCATIONS
  Marek Paciak, Adam Pala, Micha Biaek
  Wojewódzki Szpital Chirurgii Urazowej, Piekary Slaskie, Poland

- QF4 A “TWITTER TIP” SIMPLE AID TO SPINE FUSION BONE GRAFTING IN LESS THAN 90 WORDS
  Philip J. Sell
  University Hospitals of Leicester, UK

- QF5 DIFFERENCE BETWEEN MINOR TRAUMATIC AND NON-TRAUMATIC OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURES
  Daisuke Umebayashi, Yu Yamamoto, Yasuhiro Nakajima, Masahito Hara
  Inazawa Municipal hospital, Inazawa, Japan

- QF6 COMPLICATIONS AND OUTCOME OF PATIENTS WITH LIVER CIRRHOSIS (CHILD-PUGH STAGES B & C) AFTER SPINAL INSTRUMENTATION
  Ramazan Dalkilic, Christian Ewald, Rolf Kalff
  University Hospital of Jena, Germany

- QF7 ANTERIOR LUMBAR DISCECTOMY AND FUSION IN ACUTE INCOMPLETE CAUDA EQUINA SYNDROME
  Yma Markmann, Andrew Clarke
  Royal Devon and Exeter Hospital, Exeter, UK

- Discussion
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<td>QuickFire Debates</td>
<td>Room: Alfa</td>
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<tr>
<td>09:45</td>
<td>QuickFire Debate 1</td>
<td>TREATMENT OF THORACO-LUMBAR A3/A4 FRACTURES WITHOUT NEUROLOGY</td>
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<td></td>
<td>Leader</td>
<td>Charles Greenough</td>
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<td>Pro</td>
<td>Wojciech Glinkowski</td>
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<td>Contra</td>
<td>Grzegorz Miekisiak</td>
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<td>Vote</td>
<td>I always operate</td>
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<td>10:15</td>
<td>QuickFire Debate 2</td>
<td>FUSION IN THORACO-LUMBAR A3/A4 FRACTURES WITHOUT NEUROLOGY</td>
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<td>Leader</td>
<td>Frank Kandziora</td>
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<td>Pro</td>
<td>Charles Greenough</td>
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<td>Philip J. Sell</td>
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<td></td>
<td>Vote</td>
<td>I always fuse</td>
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<td>10:30</td>
<td>QuickFire Debate 3</td>
<td>IMPLANT REMOVAL IN THORACO-LUMBAR A3/A4 FRACTURES WITHOUT NEUROLOGY</td>
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<td>Leader</td>
<td>Marco Teli</td>
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<td>Stavros Stavridis</td>
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<td>Philip J. Sell</td>
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<td>10:45–11:15</td>
<td>COFFEE BREAK IN THE EXHIBITION AREA</td>
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<td>11:15–12:30</td>
<td>Spine Trauma in Elderlies</td>
<td>Room: Alfa</td>
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<td>Chairs</td>
<td>Frank Kandziora, Frankfurt, Germany; Tomasz Potaczek, Zakopane, Poland</td>
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<td>Osteoporotic fractures (Spine Tango data)</td>
<td>Everard Munting, Biez, Belgium</td>
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<tr>
<td>11:30–12:30</td>
<td>Aging/Navigation</td>
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|          | 13 SPINAL TRANSPEDICULAR INSTRUMENTATION WITH PMMA AUGMENTATION OF FRACTURED VERTEBRA AS THE EQUIVALENT OF COMBINED ANTERIOR POSTERIOR 360 INSTRUMENTATION | Wojciech Glinkowski  
Baby Jesus Clinical Hospital, Department of Orthopaedics and Traumatology of Locomotor System (Spine Unit); Medical University of Warsaw, Department of Medical Informatics and Telemedicine, Warsaw, Poland |
|          | 14 DOUBLE BALLOON VERTEBRAL KYPHOPLASTY (BKP) – A NEW TECHNOLOGY FOR EXTENDED INDICATIONS IN VERTEBRAL FRACTURE TREATMENT | Frank Hertel, Ardian Hana, Nitish Vidal Guinness, Christophe Berthold, Wolfram Schrecklinger  
National Service of Neurosurgery, Centre Hospital of Luxembourg, Luxembourg Joline Company, Hechingen, Germany |
15 DOES THE QUANTITY OF CEMENT LEAK INTO THE DISC FOLLOWING BALLOON KYPHOPLASTY INFLUENCE THE PROGRESSION OF DEGENERATIVE DISC DISEASE AND THE OCCURRENCE OF ADJACENT VERTEBRAL FRACTURES?
Bakur Jamjoom, Sanjay Patel, Raj Bommireddy, Zdenek Klezl
Department of Trauma and Orthopaedics Royal Derby Hospital, Derby, UK

16 RECENT SPINAL SURGERY USING NAVIGATION SYSTEM FOR SPINAL INJURY
Nobuyuki Shimokawa
Spine Centre, Tsukazaki Hospital, Himeji, Japan

17 NAVIGATION-ASSISTED SURGERY FOR OSTEOPOROTIC INSUFFICIENCY FRACTURES OF THE SACRUM – TECHNICAL NOTE AND OWN RESULTS
Thomas R. Blattert, Horst Balling
Orthopaedic Clinic Schwarzach, Germany

18 OUTCOME OF TREATMENT OF COCCYDYNIA
Donald Buchanan, Jonathan Spilsbury
Royal Orthopaedic Hospital, Birmingham, UK

12:30–14:00 LUNCH BREAK IN THE EXHIBITION AREA
| 14:00–15:50 | **Osteoporotic Burst Fractures**  
*Room: Alfa*  
*Chairs: Thomas R. Blattert, Schwarzach, Germany*  
*Wojciech Glinkowski, Warsaw, Poland* |
| --- | --- |
| **14:00** | The state of the art and the pitfalls of radiology in osteoporotic vertebral fractures  
*Alberto Zerbi, Milan, Italy*  
*15 mins, 5 discussions* |
| **14:20** | At what age does the use of cement in spine trauma become reasonable or accepted practice?  
*Open Discussion*  
*All Faculty* |
| **14:30** | Osteoporotic burst fractures – An unsolved problem?  
*Thomas R. Blattert, Schwarzach, Germany*  
*Case presentation* |
| **14:50** | Expert opinions on how to solve this case:  
Marco Teli  
*Treat it conservatively*  
Tomasz Potaczek  
*I do cement augmentation/plasty technique*  
Frank Kandziora  
*I do MISS instrumented surgery*  
Everard Munting  
*I do open instrumented surgery*  
*Case solution*  
*Discussion* |
| **15:30** | Keynote Lecture • Treatment of Osteoporotic Vertebral Body Fractures  
*Thomas R. Blattert, Schwarzach, Germany* |
| **15:50** | Reflection • Did we learn something?  
*Phillip J. Sell, Leicester, UK*  
*End/Adjourn* |
### Future Events

**Education Week 2016**  
13-17 June 2016  
Strasbourg, France  
*Possible Discounts: 10% for 2 Modules and 15% for 3 Modules*

**Basic Biomechanics / Biomechanical Methods for Experimental Research of the Musculoskeletal System 2016**  
19-22 July 2016  
Ulm, Germany

**Advanced Courses 2016**  
19-21 September 2016  
Strasbourg, France

**EUROSPINE 2016**  
5-7 October 2016  
Berlin, Germany

**TFR Research Course 2017**  
13-17 March 2017  
Istanbul, Turkey

**Basic Biomechanics / Biomechanical Methods for Experimental Research of the Musculoskeletal System 2017**  
18-22 July 2017  
Ulm, Germany

**EUROSPINE 2017**  
11-13 October 2017  
Dublin, Ireland

**TFR Research Course 2018**  
19-23 March 2018  
Munich, Germany

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Sponsors & Exhibitors

Industry Workshop
Programme Industry Workshop

DePuy Synthes sponsored Lunch Symposium

How to handle Complications in Spinal Trauma Surgery

Agenda
- Approach complications in the anterior C-spine
- Dura lesions – When do we need to repair?
- Major bleeding during anterior lumbar reconstruction
- Implant complications in the osteoporotic spine
- Discussion

Moderator/Chairperson
Frank Kandziora
Frankfurt, Germany

Invited Faculty
Zdenek Klezl, Derby, UK
Everard Munting, Biez, Belgium
Matti Scholz, Frankfurt, Germany

Lunch will be provided within the plenary hall (room Alfa).
General Information
Registration and Congress Information

Registration Opening Times
The check-in is located in the foyer (first floor) and will be open during the following hours:

- Thursday, 12 May 2016: 07:30–17:30
- Friday, 13 May 2016: 07:30–16:00

Registration Fees

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<td>EUROSPINE Members</td>
<td>250 EUR</td>
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Official Congress Dinner
(see further information on p. 27)
- Late, until 11 May 2016: 80 EUR
- Onsite, from 12 May 2016: 90 EUR

Participants’ Registration Fee includes
- Admission to all scientific sessions
- Admission to the workshops organised by industrial partners
- Congress materials (programme, name badge, abstract publication, congress bag, lanyard)
- Access to the exhibition
- Coffee breaks

Payment
Please note that all onsite payments need to be made in cash (Euro=EUR) or by credit card (VISA, Mastercard, American Express will be accepted). Unfortunately, we cannot accept traveller cheques, other credit cards, euro cheques or other currencies. There is no possibility to exchange currency at the congress venue.

Registration Counters

- **QUICK CHECK-IN REGISTRATION** is for participants who have registered and paid in advance. Please have a print-out of the final information e-mail at hand when approaching the desk.
- **ONSITE REGISTRATION** is for participants who have not pre-registered and/or paid. Please note that congress materials are subject to availability to participants who are registering and paying their fees onsite.

EXHIBITORS can pick up their staff badges at the check-in.

Name Badges
Participants will receive their name badge when collecting their congress documents. Please wear your name badge during all congress events, including the networking activities.

Admission to scientific sessions is restricted to participants wearing their badges. Exhibitors are entitled to attend the scientific sessions with 2 registered staff members, including their own company’s workshop.

Please note: Participants who misplace their badge need to pay for a new one.

Name Badge Codes:

- M: EUROSPINE Member
- NM: Non-Member
- EXH: Exhibitor
- S: Staff
CME Points and Certificate of Attendance
CME points are assigned to participants per day. To collect your CME points for your certificate you need to use the self-scanning stations located next to the registration counter and **SCAN THE BARCODE on your name badge**, each day. Your certificate will be available for download via a personal link which the organisers will send you via e-mail directly after the congress.

The scientific programme of the EUROSPINE Spring Speciality Meeting has been accredited a maximum of 11 European CME credits (ECMEC) by the European Accreditation Council for Continuing Medical Education (EACCME).

Catering
Coffee, tea and biscuits/fruit will be served in the foyer during official coffee breaks. Industry workshops are planned during which catering will be offered to the participants.

Congress Language
The official congress language is English. No simultaneous translation will be provided.

EUROSPINE Booth
EUROSPINE staff will be available onsite at the EUROSPINE booth in the foyer.

**Booth opening hours:**

- **Thursday, 12 May 2016** 08:45–17:30
- **Friday, 13 May 2016** 08:45–16:00

Exhibition
The exhibitors are awaiting you at their booths during the following hours:

- **Thursday, 12 May 2016** 08:45–17:30
- **Friday, 13 May 2016** 08:45–16:00

Internet
WiFi is available free of charge to all participants within the meeting area.
Network: Park Inn Conference
Password: SSM2016

Congress Staff
The Conventus team will be at your service at the registration counters and the lecture halls. Do not hesitate to approach them with queries, they will gladly assist you. They are recognisable by a Conventus name badge.

![Kraków main market](image_url)
Useful Country Information

**Currency**
The currency used in Kraków and in the rest of Poland is złoty. One euro is about 4.2 złoty. Money can be exchanged at exchange bureaus and banks. Banks usually charge a commission, and the exchange rate is less profitable. When exchanging money in an exchange bureau, pay attention to the exchange rates. You may also compare them with other offices or with the rates published at www.nbp.pl. The 24h CFS Currency Exchange Office is located at the intersection of the Pawia Street and Worcella Street, in front of Galleria Krakówska mall.

**Cloakroom**
Coatracks will be available in the back of the lecture hall. No liability will be taken for lost or stolen items.

**Electricity**
Electricity in Poland is 230 V, 50 Hz AC. Plug sockets are round with two round-pin sockets. Therefore, if you are coming from the US, UK or Ireland you are definitely going to need a plug converter.

**Insurance**
Participants are advised to arrange health and accident insurance prior to travelling to the congress. The organiser will not assume any responsibility for accidents, losses or damages, as well as for delays or modifications in the programme, caused by unforeseen circumstances.

No claims for the indemnification from the organisers shall arise for contractors or participants in case of cancellation, for any reason, of the entire congress.

**Language**
Polish is the official language in Kraków. English and German are also widely spoken.

**Liability**
Conventus Congressmanagement & Marketing GmbH shall act as mediator only and cannot be held responsible for any loss incurred or any damage inflicted on persons or objects irrespective of whatsoever cause. The liability for transport and other service companies shall not be affected by the above. Only written agreements shall be valid. The place for jurisdiction shall be Jena (Germany).

**Medical Care**
Foreign visitors from the European Union enjoy the same benefits as Poland’s residents covered by the country’s universal health insurance when they can present either the E111 form issued in their respective countries or European Health Insurance Card (EHIC) or a replacement certificate. Other foreigners are expected to pay for health care and medical procedures as well as dental treatments.

**Mobile Phones**
Please set your mobile phones and any other mobile devices on silent mode in the session rooms.

**Opening Hours**
Most of Kraków’s downtown shops remain open until 19:00 and beyond on weekdays, while some grocery stores trade round the clock. Most stores sell also on Sundays, usually until 15:00. Most shopping centres in Kraków stay open between 10:00 and 22:00. Most branches open at 09:00 or 10:00 and close at 18:00 or 19:00 on workdays.
Post Office
The main post office is a building of the Polish Post and is located at Westerplatte 20. Opening hours are:

<table>
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<tr>
<th>Days</th>
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<tr>
<td>Monday–Friday</td>
<td>07:30–20:30</td>
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<tr>
<td>Saturday</td>
<td>08:00–14:00</td>
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Tax
Value Added Tax (VAT) is included in the price of almost every product and service you purchase in Poland. You can get VAT refunds when you leave the country, if you are a resident from outside the EU.

Telephones
The international phone code for Poland is +48 and Kraków +48 12.

Time
Kraków is located in the Central European Time Zone (CET) which is one hour ahead of Greenwich Mean Time (GMT).

Tipping
Tipping is not obligatory, you can tip whoever you want to show that the service was good. The average tip is around 10–15% of the cheque.

Tourist Offices
Visitors to Kraków can pick and choose from the city’s various tourist offices. They are run either by the Kraków municipality’s official Festival Bureau or by private businesses or by tourist organisations.

Visa Requirements
EU citizens may live and work free of any immigration controls. South Africans need a visa for tourist visits. Nationals of Australia, New Zealand, Canada and the US do not, provided their stay is shorter than 3 months. For further information, please go to the following page: www.msz.gov.pl/en/travel_to_poland/visa/visa.

Weather
Kraków has a maritime climate with warm summers and cool winters. Due to the proximity to the Tatra Mountains, there are often mild winds causing temperatures to rise rapidly and even in winter reach up to 20°C. Please check www.weather.com for up-to-date weather forecasts in Kraków.

Networking Programme

Official Congress Dinner
Restauracja Wierzynek – a very special venue that takes you on a culinary journey in time through Polish customs and traditions. As one of the oldest restaurants in Europe it is a place that breathes the historical tradition and royal history of Kraków. We invite you to join a memorable evening in a cosy atmosphere to enjoy a sit-down meal with colleagues and friends in the very heart of Kraków.

Date: Thursday, 12 May 2016
Time: from 20:00
Location: Restauracja Wierzynek
Rynek Główny 16, Kraków
Fee: 80 EUR/90 EUR
Meeting point: 18:40 at the check-in
Venue and Mobility in Kraków

Venue
Park Inn by Radisson Kraków Hotel
ul. Monte Cassino 2
30-337 Kraków, Poland
www.parkinn.com

How to get to the Congress Venue
By plane: The Star Alliance member airlines are pleased to be appointed as the Official Airline Network for EUROSPINE Spring Speciality Meeting 2016. To obtain the Star Alliance Conventions Plus discounts please use the Conventions Plus online booking tool via www.eurospine-spring.com.

STAR ALLIANCE

By train: Train station offering hourly service to nearby cities (Distance to venue: 3 km).

By car: Please use the following address:
Park Inn by Radisson Kraków Hotel
ul. Monte Cassino 2
30-337 Kraków, Poland

Parking: The hotel provides underground parking for 72 cars, 5 zloty per hour/max, 50 zloty per day. Additionally, exterior parking spaces are available.

By Metro/Tram/Bus: While Kraków has no underground metro system it does have an integrated bus and tram system which runs from 05:00–23:00, with night trams and buses continuing less frequently after these times. Check timetables and network maps online at mpk.Krakow.pl (which has English functionality). You can purchase tickets from the mobile phone/cell phone and at ticket machines (also in English) at major stops.

The tram numbers 52, 18, 19 take you in 15 minutes to the centre and back to the hotel. Please get off at the station “Most Grunwaldzki” (congress centre).

Walking: You are in 10 minutes walking distance from the Wawel Castle (1.3 km) located in the old city centre of Kraków. The ICE Congress centre (200 m), and the beautiful Vistula River (850 m) lie enroute to the centre.
Chairs and Speakers
List of Invited Faculty

<table>
<thead>
<tr>
<th>Last Name, First Name</th>
<th>City</th>
<th>Country</th>
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<tbody>
<tr>
<td>Blattert, Thomas R.</td>
<td>Schwarzach</td>
<td>Germany</td>
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<tr>
<td>El Masri, Wagih S.</td>
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<td>Glinkowski, Wojciech</td>
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<tr>
<td>Greenough, Charles</td>
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<td>Potaczek, Tomasz</td>
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<td>Scholz, Matti</td>
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<td>Sell, Philip J.</td>
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<tr>
<td>Zerbi, Alberto</td>
<td>Milan</td>
<td>Italy</td>
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Guidelines for Chairs and Speakers

Speakers’ Preview Centre
The speakers’ preview centre is located in room Alfa (plenary hall). Staff and appropriate equipment will be available for you to arrange and preview your presentation. The centre will be open during the following hours:

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<tr>
<th>Date</th>
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<tr>
<td>Thursday, 12 May 2016</td>
<td>07:30–16:30</td>
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<tr>
<td>Friday, 13 May 2016</td>
<td>07:30–16:00</td>
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Please note that only digital material will be accepted for oral presentations. Presentation file(s) must be uploaded at least 60 minutes prior to the beginning of the corresponding session.

In case of early morning sessions, please upload your presentation the day before or send it to eurospine@conventus.de. Our professional staff will be glad to assist you in case of any technical problems. The preview technicians will check the presentation for compatibility and take care of the upload to the congress network.

The preview technicians will advise the speakers on the use of the presentation equipment and AV set-up in the lecture halls. Visiting the speakers’ preview centre will ensure that your presentation will run as smoothly as possible.

We kindly ask for your understanding that due to space and time limitation at the speakers’ preview centre presentations should be prepared and edited before submission. Thank you for bringing your presentations in a final format, ready to upload!

Please note that the use of own notebooks and presentation equipment is not allowed. There are two options to deliver your presentation material:

1) Send your presentation prior to the meeting until 4 May 2016, 16:00 (CET+1) to eurospine@conventus.de.
2) Provide your presentation onsite and hand it in to the speakers’ preview centre staff not later than 60 minutes before the beginning of your session. Please check in even if you have already uploaded your presentation prior to the meeting.
3) Audio-visual Requirements for Speakers
Speakers are required to adapt their audio-visual material to the technical equipment provided at the congress venue to ensure a smooth running of all sessions.

Presentation upload: Please read the guidelines and technical specifications below carefully!

Onsite presentation upload procedure:
- Check-in at the preview centre
- Log into an available computer and upload your presentation
- Presentations can be checked in presenter mode and edited onsite

General Information
Chairpersons are allocated to each session, responsible for introducing the speakers, controlling the timing of the sessions and moderating the discussion.

Timing of Session
In order to keep the sessions according to schedule and allow questions from the audience it is very important to keep the presentations within the allotted time: Your slides will fade automatically after the allotted time, there is a stopwatch running for your control.
In this respect we strongly recommend that speakers ensure that their presentation does not exceed the allotted time as we expect the chairperson to strictly adhere to the timetable.

Oral Presentation:
5 min plus 3 min discussion/change
QuickFire presentation:
2 min plus 2 min discussion/change

Conflict of Interest
EUROSPINE is committed to avoid potential conflicts of interest: Any financial relationship between the speaker/chairperson and a company manufacturing or distributing a product must be disclosed and openly shared.
Conflicts of interest need to be disclosed for each author on the second slide. Presentations which do not follow this prerequisite cannot be shown. During the presentation/discussion open advertisement or unfair and/or unsupported information for products/organisations/business should be avoided. Commercial logos or photographs should not be used (other than in the designated industry workshops).

Technical and Formal Specifications
1) Note: The preview centre and network to the lecture hall support PowerPoint presentations version Microsoft Windows 7 and Microsoft Office 2010 only. If you are using other software like Prezi, Keynote or similar, please contact the organising secretariat at least two weeks prior to the event.
2) Please note that only single projection will be available.
3) If you wish to show web pages use screen shots within your PowerPoint presentation. Do not include live links to the internet into your presentation.
4) Electronic presentations for sessions will be projected on screens using a PIP system.
Abstracts
Cervical spine (C-spine) injury can result in serious neurological impairment leading to disability and poor health-related quality of life (HRQL). Many variations exist in the clearance of C-spine injuries during blunt trauma. Currently, there is no consensus despite the different recommendations and guidelines. However, it is well acknowledged that the unnecessary wear of the neck collar leads to side effects. At the same time, an inadequate collar clearance can lead to secondary spine injuries and high-level morbidity.

This review aims to outline the most relevant literature around C-spine clearance in blunt trauma, with the particular aim to develop a clear algorithm, which would be both easy to use in the ED and reliable, thus minimizing the risk of missed C-spine injuries.

We proceeded to a pubmed search using the terms “cervical, spine, injury, clearance” from 2000 to 2015. We selected articles containing relevant information to answer the three most common questions face a suspicion of C-spine injury in blunt trauma patients in ED. When should we remove the C-collar and who needs a radiological assessment? What kind of imaging should we request? How to clear obtunded patients?

We highlighted two major decision rules which are mainly used to select patient who need radiographic evaluation and those who can be cleared: the Canadian C-Spine Rule (CCR) and the National Emergency X-Radiography Utilization Study (NEXUS). Adequate C-spine xray C-spine and seem to fail the identification of 55.5% of clinically significant fractures. The combination of clinical examination and MultiPlanar Reconstruction (MPR) CT is enough to exclude significant injury in 99.9% of patient. In obtunded patient a negative MPR CT alone could not assure the absence of injury and depending on the situation MRI could be obtained. However, MRI does not provide additional clinically relevant information in awake patient. Based on the latest scientific evidence, we developed an algorithm for the C-spine clearance adapted to an University Hospital’s situation. The high sensitivity of the CCR prevents missing a C-spine injury while limiting the amount of unnecessary radiologic examinations. After MPR CT we can safety exclude the great majority of cervical spine injuries and it allows the C-collar clearance, whilst avoiding secondary spine injuries. Its use in the emergency department allows a time efficient and cost effective management of blunt trauma patient with potential cervical injury.
2
ODONTOID SYNCHONDROSIS FRACTURE IN CHILDREN – REPORT OF 6 CASES WITH SPECIAL REFERENCE TO PARTIAL ODONTOIDECTOMY IN AN IRREDUCIBLE ATLANTOAXIAL DISLOCATION
Abolfazl Rahimizadeh, Reza Mollahousaini, Abdul Hadi Daneshi
Pars Advanced & Minimally Invasive Research Centre, Affiliated to Iran University of Medical Sciences, Tehran, Iran

PURPOSE: To report six new cases of synchondrosis odontoid fracture with displacement where four were diagnosed early and two with delay. The fracture could be reduced with hyperextension with traction in four and open reduction in the other two.

BACKGROUND HISTORY: Fractures of the odontoid process are among the most common cervical injuries in preschool children, occurring at an average age of 4 years. However, these injuries are infrequently reported in the literature. The reports are mostly confined to one or two cases. These are actually physeal injuries of the basilar synchondrosis between the odontoid process and the body of the axis. However, the odontoid process is angulated anteriorly in majority. Reduction by hyperextension or by cranial traction followed by rigid immobilization results in a high rate of union, in a minority, either suffering irreducible atlantoaxial dislocation, in those with severely angulated odontoid malunion, and in missed cases surgery is warranted.

MATERIAL AND METHOD: Three boys and three girls at the age of 3 to 6 years with odontoid synchondrosis fracture are presented. Four were admitted shortly after injury and the other two, around 4 months after injury. Three of the acute cases were managed with immobilization in halo after reduction. The other acute one, a non-compliant child, underwent primary C1-C2 fixation. Both neglected ones were associated with irreducible atlantoaxial dislocation. One of these two, with odontoid non-union was reduced with facet releasing followed by a new reduction maneuver with polyester bands. The last one with malunited odontoid fracture could be reduced only after partial odontoidectomy via posterior only approach. Followed by C1-C2 fixation.

RESULT: All 6 patients recovered and fusion could be achieved.

CONCLUSION: Where majority of acute synchondrosis odontoid fractures heal with external immobilization. Primary surgery has been advocated by some to obviate the need for long-term immobilization. The real challenge is in neglected one with account a small proportion of the fractures with fracture angulation more than 30 degree or significant odontoid displacement which require posterior C1-C2 fixation after alignment. In addition, neglected ones with chronic IAAD require more challenging surgery, varying from facet release, odontoidectomy and atlantoaxial stabilization depending of the subtype of IAAD. We will describe a new formulation protocol for management of irreducible atlantoaxial dislocation with classification to three sub-types. This classification will facilitate preoperative decision-making. Furthermore, we will show demonstrative odontoidectomy via posterior only approach which is not done before.

3
COMPARISON OF FUSION RATES BETWEEN ROD-BASED LAMINAR CLAW HOOK AND POSTERIOR CERVICAL SCREW CONSTRUCTS IN TYPE II ODONTOID FRACTURES
Andrzej Maciejczak, Wolan-Nieroda Andzelina, Katarzyna Jablonska-Sudol
Rzeszow University, Neurosurgery Tarnow, Poland

BACKGROUND: This study was aimed (i) to compare the fusion rates of rod-based laminar claw hook constructs to that of posterior C1/C2 screw constructs in odontoid fractures, and (ii) to evaluate any complications associated with claw hook/rod constructs. To our knowledge, no study in contemporary literature has presented the effects of using modern rod-based laminar claw hooks for treating odontoid
fractures. Unlike laminar clamps from the 1980’s, contemporary laminar hook-rod instrumentation systems provide far more effective immobilisation of the cervical spine and allows for building reliable frame-like constructs similar to cervical screw-rod systems.

METHODS: A retrospective review of a series of 167 consecutive odontoid fractures from a single-institution was conducted between 2002–2012. The series includes: 43 cases managed conservatively and 131 surgically (odontoid screw - 88, Magerl technique - 8, Harms technique - 4, selective C1/C2 rod-based laminar claw hook - 23, combination of laminar hook/lateral mass screws - 7). Available for final assessment were 30 cases treated using posterior atlantoaxial fusion, 12 using C1/C2 posterior screws (control group), and 18 with rod-based laminar claw hooks (study group). Hooks were mounted bilaterally in a claw manner on each individual lamina and were rigidly fixed to perpendicular rods with a transverse connector whenever feasible. The minimum follow-up period was one year. Bony union was determined using computed tomography (CT) scan, while stability at the fusion site was assessed using dynamic radiograms. Fusion rates were also compared among the remained surgical constructs and conservative management in geriatric and non-geriatric patients.

RESULTS: The study group had an overall fusion rate of 89% (non-geriatric 93% while geriatric subgroup 75%) with a 100% stability rate at the fusion site in all cases. In the control group fusion rate was 100%. There were no major complications in both control and study groups. Four minor complications, three in the control and one in the study group, were noted in 3 patients. Fusion rate for odontoid screw was 86%, and 85% in conservative group (mainly Type III fx).

CONCLUSION: Preliminary results of this study suggest that laminar claw hook-rod systems are useful alternatives to posterior screw techniques. Moreover, the fusion rate in non-geriatric patients is comparable to that of posterior screws. Importantly, they are devoid of the disadvantages and complications posed by screw constructs. Further studies are necessary to confirm these promising results.

4

SURGICAL REPAIR OPTIONS OF TYPE II DENS FRACTURES IN ELDERLY PATIENTS BASED ON THE LITERATURE REVIEW AND OWN CASES

Wojciech Glinkowski

Baby Jesus Clinical Hospital, Department of Orthopaedics and Traumatology of Locomotor System (Spine Unit); Medical University of Warsaw; Department of Medical Informatics and Telemedicine, Warsaw, Poland

Dens fractures are common cervical injuries in advanced aged patients. The literature shows that mortality rate is high, and, therefore, treatment options should be well-considered in this high-risk group. Posterior and anterior approaches are considered as equivalently successful. The presented study was undertaken to review the treatment methods based on the analysis of the clinical results of surgically treated elderly patients with type II dens fractures. Data of 3 patients (1 female, two males) over 70 years treated from September to December 2015 were recorded. Clinical and radiological parameters were obtained including the type of fracture, associated cervical and other injuries, comorbidities, symptoms, neurological condition, surgical strategy, postoperative course and complications. Patients were in a good neurological condition before surgery (ASIA E or D). In both cases, surgery was performed at an early stage after trauma (within five days). Minimally invasive ventral screw fixation, modified Harms and Magerl techniques were used. No worsening of neurological functions immediately after the operation was seen. The complication was observed in the minimally invasively anterior screw fixation case. Screw migration through the posterior pharynx occurred. The screw passed through the digestive tract. The second surgery with modified Harms technique was successful. The author reviews the literature on the techniques used for type II dens fracture. The modified Harms
technique considers posterior arch screw and lateral mass fixation, both screws through the C2 arch and lateral mass screws. Magerl technique seems to be relatively quick. However, it may require additional small incisions for percutaneous screw passage to achieve steep angle fixation in a case of the small posterior incision. Anterior screw fixation in the osteoporotic bone may require cement augmentation to prevent screw loosening and migration.

Type II dens fractures are a common fracture of elderly patients. Surgical treatment can significantly improve the quality of life in elderly patients who have suffered a fracture of the dens. The one of three surgical techniques should be individually selected for the particular cases.

5

MINIMAL INVASIVE LAG SCREW OSTEOSYNTHESIS FOR HANGMAN’S FRACTURES
Jan-Philip Zeden, Dirk Thomas Pillich, Henry Werner Siegfried Schroeder, Jan-Uwe Müller
Greifswald University Hospital, Clinic and Polyclinic for Neurosurgery, Greifswald, Germany

The management of displaced Hangman’s fractures is predominantly conservative. A large number of clinical studies have proven the success of conservative therapy. Surgical treatment is reserved for cases that are considered unstable and for cases in which conservative treatment is not feasible. It is indicated secondary to absence of bony fusion and pseudarthrosis.

The fusion rates of surgically treated Hangman’s fractures are high, mainly at 100%. By contrast, the external immobilization in patients with unstable fractures assessed in representative case series have a rate of treatment failure in a frequency of about 30%.

We present a case series of 15 patients who were treated with a minimally invasive, 3D fluoroscopically guided and neuronavigated dorsal lag screw osteosynthesis. 11 patients with isolated Hangman’s fracture, 2 patients with combination of Hangman’s fracture and odontoid fracture with combined anterior and posterior lag screw osteosynthesis.

In the case series no nonunion was observed. In all patients with a complete follow-up, a bony fusion, an intact vertebral alignment and no deformity could be detected by CT after 3 months. In the series there was one dissection of the vertebral artery diagnosed in the postoperative CT angiography requiring treatment, with a possible association with the surgical procedure.

Mobility preserving osteosynthesis by pars interarticularis lag screws is associated with low perioperative morbidity. Other advantages of the minimally invasive surgical treatment are good fragment approximation, reduced duration of hospitalization, a shortened treatment period and a better quality of life by avoiding external stabilization.

The benefits are offset by the risk of complications such as the injury of the vertebral arteries. The surgical technique is not applicable for L + E III injuries, due to the lesion of the capsular structures of the facet joints.

Further development and evaluation of the surgical technique compared to conservative and alternative operational procedures are deemed necessary.
CLINICAL ACCURACY OF AN INTRAOPERATIVE 3D CT-BASED NAVIGATION SYSTEM (O-ARM) ASSISTED CERVICAL PEDICLE SCREW PLACEMENT

Nobuyuki Shimokawa
Department of Neurosurgery, Tsukazaki Hospital, Himji City, Japan

OBJECT: The authors performed a retrospective clinical study to evaluate the feasibility and accuracy of cervical pedicle screw (CPS) placement using an intraoperative 3D CT-based navigation system (O-arm). Recently CPSs were inserted percutaneously using cannulated CPS system with O-arm (CA).

METHODS: The study involved 128 consecutive patients underwent posterior stabilization of the cervical spine between 2007 and 2015. 89 patients (453 screws) were treated using preoperative 3D CT-based navigation system (PR), whereas 39 patients (310 screws) were treated using O-arm (OA). Screw positions were classified into four grades based on the pedicle wall perforations observed on postoperative CT.

RESULTS: The prevalence of perforations in the PR group was 6.4% (29 screws): 423 (93.6%), 14 (3.1%), 12 (2.7%), 3 (0.6%) for Grade 0 (no perforation), Grade 1 (perforation <2 mm), Grade 2 (perforations ≥ 2 mm but < 4 mm), Grade 3 (perforation ≥ 4 mm), respectively. In the OA group, the prevalence of perforations was 4.2% (6 screws): 138 (95.8%), 5 (3.5%), 1 (0.7%), 0 (0%) for Grades 0, 1, 2, 3 respectively. In the CA group, the prevalence of perforations was 1.8% (3 screws): 163 (98.2%), 2 (1.2%), 0 (0%), 1 (0.6%), respectively. Neural or vascular complications closely associated with CPS placement were not encountered in the present study.

CONCLUSIONS: O-arm can improve the accuracy of CPS insertion, grade 2 and 3 in particular. Although severe CPS malposition causes injury to the vital structure, O-arm and modified techniques can reduce the risk of a malposition of CPS and provide increased safety.

TRAUMA CARE

THE TIMING OF SURGERY IN ACUTE SPINAL CORD INJURY – SURVEY STUDY

Grzegorz Miekisiak, Wojciech Szymanski, Pawel Jarmuzek, Dariusz Latka
Department of Neurosurgery, Specialist Medical Centre, Polanica-Zdroj, Poland

PURPOSE: One of the greatest controversies of modern spinal surgery is the timing of surgical treatment in the acute spinal cord injury (SCI). To this day, despite several attempts clinical studies have not provided data of sufficient quality to make strong recommendations. We conducted a survey among spinal surgeons on their view on the topic.

METHODS: The questionnaire comprised of five clinical scenarios was distributed among 250 spinal surgeons, members of the Polish Society of Spinal Surgery. There were four possible time frames to choose from in each case, including an option of nonoperative treatment. The scenarios were two cases of complete SCIs (ASIA A), two incomplete SCI (ASIA B and C) and one was posttraumatic cauda equina syndrome. One hundred and ten (44 %) responded, and data from 110 were included in the study. In this group there were 65 neurosurgeons 45 orthopedic surgeons, either board certified or in training.

RESULTS: Although majority of respondents favored immediate surgical treatment, the overall agreement among raters was very low (Kappa = 0.1406, 95% CI = 0.1337 to 0.1475). There was a full agreement in case of the CES and near random distribution of answers in one of the complete SCI cases. Neurosurgeons were more likely to pursue immediate surgical treatment (p<0.005). The older surgeons (aged 45+) were more likely to operate within 6 hours but the difference was not surgically significant.

CONCLUSIONS: The survey shows that there is a great need for comprehensive recommendations concerning the surgical treatment of SCI. For this purpose, new scientific evidence of sufficient quality should be produced as the existing data is scarce.
We recently showed that patients with cervical traumatic spinal cord injury (tSCI) who undergo surgical decompression (SD) and instrumented fusion within 8 h after injury have superior neurological outcomes than patients who undergo SD 8-24 h after injury, without any increase in the rate of adverse effects. Here we used the ROC (receiver operating characteristic) curves to visualize the quality of the time from injury to SD with respect to the neurological improvement of at least 2 AIS grades and to determine the best theoretical cut-off point for this classifier in the same group of patients. Only patients with the American Spinal Injury Association (ASIA) Impairment Scale (AIS) grades of A through C and with MRI-confirmed spinal cord compression were enrolled. The primary outcome was the change in AIS grade at the 6-month follow-up. Of the 48 enrolled patients, 42 patients concluded the study. AUC (area under the curve) was equal to 0.76 with 95% confidence interval (0.57, 0.94), and Youden index suggested that the best cut-off point for neurologic recovery of at least 2 AIS grades is a delay between injury and SD of less than 7 h. Sensitivity and specificity at that point were 0.75 and 0.7 respectively. There were 22 patients decompressed in the first 7 h after injury; 3 patients with SD at 3 h, 6 patients with SD at 4 h, 4 patients with SD at 5 h, 5 patients with SD at 6 h and 4 patients with SD at 7 h after injury. The 95% CI showed that the classifier did statistically significantly better than random classification. Our results support the view that the timing of SD within 24 h is associated with neurological improvement and suggest a delay between injury and SD of less than 7 h as the best theoretical cut-off point for neurologic recovery of at least 2 AIS grades in patients with tSCI.

A cervical fracture in the presence of ankylosing spondylitis can be catastrophic and challenging to treat. The challenges of the disease can distract clinicians from the opportunity to safely correct a pre-existing spinal deformity. Two cases of fracture in Bekhterev's disease or Marie-Strümpell disease are presented where the pre fracture loss of forward vision was corrected as a result of the fracture treatment with a gratifying improvement in patient outcome and deformity.

The proper fracture healing assessment methodology is demanded after vertebral compression fractures. The assessment may predict a risk of delayed union or nonunion of these fractures. The most frequently compressive fractures of vertebral bodies are osteoporotic (OVCF). The bone regeneration occurs in the vertebral body. The patient and the clinician should know when the fracture is united to let the
patient return to previous activities. Clinicians expect a union from at least nine weeks from injury. However, the decision concerning patient’s mobilization is dependent on imaging confirmation. Usually, plain radiographs are used for the identification of callus that can be challenging and inconclusive for vertebral bodies. The earliest observed change is blurring of the fracture borders. Sclerosis follows, as a first sign of osteogenic activity.

The study was based on the literature search reviewing existing papers concerning assessment of vertebral fracture healing. Imaging modalities and techniques focused on the healing prognosis and diagnosis of union vs. non-union were reviewed. Analysis of the literature suggests that plain radiographs remain a standard for clinical vertebral fracture assessment both at admission and follow-up. Radiographs are difficult to set the final endpoint of vertebral body healing. Their ability to identify non-union is based on the existence of intervertebral cleft and the type of deformation. T1-weighted images predict non-union in diffuse intensity pattern; T2- weighted in confined high and diffuse low-intensity patterns. High-resolution thin- slice CT images allow depiction of trabecular and cortical morphology and provide a quantitative assessment of fracture healing. Some studies presented the comparison of CT vs. MRI or combination of both. Usually, the fracture union is imaged with MRI in difficult cases, using CT as the gold standard.

The assessment of the VCF fracture healing should focus on features observed on images and their time sequence. The PMMA or other augmenting substance make the vertebral body regeneration assessment obsolete. The healing requires a radiological assessment. MRI correlates well with CT in identifying vertebral fracture union and non-union. Problematic or inconclusive cases in radiographic assessment of vertebral body fracture healing require routine MRI and CT.

VERTEBRAL COLUMN FRACTURE TREATMENT IN CHILDREN AND ADOLESCENTS

Aleksander Szwed, Maciej Koban, Tadeusz Bilnicki
Pomeranian Medical University in Szczecin, Poland

Vertebral column fracture is rare injury among paediatric patients. The morphology and the location of fracture differs due to the age of the patient. Proper diagnostic procedures, especially radiological and proper treatment reduce negative effects of the injury.

In the Paediatric Orthopaedic Surgery and Traumatology Department of the Pomeranian University in Szczecin there were 42 patients treated due to vertebral column fracture or luxation. Patients’ age varied from 6 to 18-years old (mean 15,3 years old). We treated 3 patients up to 9-years old, 39 - were 10-years old and older. 28 patients were treated surgically and 14 underwent conservative treatment. There were permanent neurologic deficits observed in 3 cases. The most frequent cause of the injury noted was fall from height.

In 7 patients fractures of vertebral column occured in politrauma syndrome. 3 patients underwent treatment due to fracture in cervical part of vertebral column, 18 - in thoracic part, 21 - in lumbar section. 10 patients suffered from multiple fracture of vertebral column.

In this study we present vertebral fracture experience of Paediatric Orthopaedic Surgery and Traumatology Department of the Pomeranian University in Szczecin. In this publications we evaluate management of the injury. There are pointed out potential difficulties in diagnostic process and causes of failures in vertebral column fractures treatment in children and adolescents.
AGING/NAVIGATION

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SPINAL TRANSPEDICULAR INSTRUMENTATION WITH PMMA AUGMENTATION OF FRACTURED VERTEBRA AS THE EQUIVALENT OF COMBINED ANTERIOR-POSTERIOR 360 INSTRUMENTATION

Wojciech Glinkowski

Baby Jesus Clinical Hospital, Department of Orthopaedics and Traumatology of Locomotor System (Spine Unit); Medical University of Warsaw, Department of Medical Informatics and Telemedicine, Warsaw, Poland

The posterior and the combined anterior-posterior approach is considered for the management of thoracolumbar burst fractures. The combined anterior-posterior approach may deliver higher kyphotic correction and improvement of vertebral height (sagittal index). However, the combined anterior-posterior approach may lead to more blood loss, longer surgery time and a possible higher complication rate. The aim of this study was to present the advantages of posterior spinal instrumentation with bone cement augmentation of fractured vertebra for treating thoracolumbar burst fractures in cases severe osteoporosis to mimick the combined anterior-posterior approach.

From June 2013 to Dec, 2015 ten postmenopausal and myeloma related osteoporotic fracture cases were included to this study. Single or more vertebral burst/compression fractures were treated using posterior spinal instrumentation with bone cement augmentation of fractured vertebra. Percutaneous short segment fixation was performed at one level above, one level below the fractured vertebra. Bone cement-augmented or non augmented screws were used. Fractured and collapsed vertebra was bone cement-augmented with kyphoplasty, ballooning stent placement or vertebroplasty if the spontaneous reduction occurred on the operating table by positioning only. Clinical results, radiological parameters, and related complications were assessed postoperatively and 6 months after surgery.

No significant neurological deterioration or complications occurred in the study group. The mean pain score and Oswestry Disability Score v 2.1a. None of the patients complained of pain worsening during the 6 months following the surgery. Mean kyphotic angle was improved significantly after spinal fixation. Kyphotic angle improvements were maintained at 6 months after surgery.

No patient sustained adjacent fractures after bone cement-augmented percutaneous short segment fixation during the follow-up period. Asymptomatic cement leakage into the paravertebral area was observed infrequently.

The combined bone cement-augmentation of the fractured vertebra with percutaneous transpedicular spinal fixation can be an effective and safe procedure for osteoporotic thoracolumbar burst fractures. Bone cement augmentation may mimick the combined anterior-posterior approach for spinal fixation using a percutaneous system for the management of selected thoracolumbar burst fractures accompanied by severe osteoporosis.
INTRODUCTION: BKP is an established treatment for vertebral fractures (VF) since 2 decades. However, there are some restrictions for conventional BKP and the main indications are within the type A 1 group of VF along the AO classification. In strongly deformed fractures (such as vertebrae planae), the inflation of a conventional balloon can lead to a burst oft he vertebral body (lengthening and broadening). Furthermore, the extention of a single balloon in patients with fractured posterior vertebral body walls may lead to a compression oft he spinal canal or restrict the vertebral remodelling to a minimum.

METHOD: In the new double balloon technology, each balloon on a single catheter can be inflated separately. In our presentation, we ill ho wand demonstrate the technology by individual case film reconstructions.

RESULTS: Within 2 years, we treated 37 patients (46 vertebrae) with type A1.1, 1.3, 2.2, 3.1, 3.2, 3.3 and B1 fractures in the dorsolumbar spine (27 osteoporotic, 10 traumatic) with the double balloon technology. Mean age of patients 59.8 years (18–84).

CONCLUSION: The double balloon is a safe technology for both, standard, as well as extended indications of VF in the dorsolumbar spine. It offers additional treatment possibilities for fractures otherwise not treatable by BKP. Randomized controlled trials comparing the double balloon to standard procedures are highly recommended.

INTRODUCTION: Balloon kyphoplasty can be complicated by cement leak into the disc space but its consequences have not been adequately examined. In this study we aim to establish whether the quantity of cement leak into the disc space has any influence on the progression of degeneration of the affected disc and whether this increases the incidence of adjacent vertebral fracture.

METHODS: Images taken during balloon kyphoplasty between 1/10/2006 to 31/05/2014 at our hospital were reviewed. Out of 316 procedures, we identified 32 affected in 26 patients. The quantity of cement leak was graded as I: minimal/cloud, II: 20%, III: 20-40% and IV: >40% of the disc space. The degenerative changes in the affected discs were assessed at presentation and follow up using the Mimura radiographic and Puertas MRI grading systems. We compared low grade (I) to the mid/high grade (II-IV) leaks using a chi squared test. We also reviewed both imaging modalities for adjacent vertebral fractures.

RESULTS: Follow up radiograph and MRI assessments ranged 6-50 (median 18) and 6-48 (median 21) months respectively. The mid/high grade leaks (II-IV) were associated with significantly more radiographic score changes (P=0.04295) than the low (I). This was not the case for the MRI score changes, with equal numbers in each group. Two adjacent vertebral fractures were also detected in each group.

CONCLUSION: Our findings suggest that mid/high grade (II-IV) cement leaks cause an increase in the progression of disc degeneration when assessed by radiographs, but not MRIs.
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RECENT SPINAL SURGERY USING NAVIGATION SYSTEM FOR SPINAL INJURY
Nobuyuki Shimokawa
Spine Centre, Tsukazaki Hospital, Himeji, Japan

Significant progress has been made in image-guided surgery (IGS) using a computer navigation system over the last few decades. IGS can be effectively applied to spinal instrumentation surgery. In this review article, we focus our attention on the feasibility and safety of current IGS techniques for traumatic spinal injury. IGS spinal fixation with or without minimally invasive surgery (MIS) techniques such as percutaneous screw placement, balloon kyphoplasty (BKP), or vertebroplasty (VP) was accomplished in 80 patients with traumatic spinal injury between 2007 and 2015. The injured vertebral levels included the following: cervical spine, 41; thoracic spine, 22; and lumbar spine, 17. Neurological condition before and after surgery was assessed using the American Spinal Injury Association Impairment Scale (AIS). A total of 419 pedicles, lateral mass, or laminar screws were placed and 399 screws (95.2%) were found to be placed correctly based on postoperative CT scan. Although 20 screws (4.8%) were found to be unexpectedly placed incorrectly, no neural or vascular complications closely associated with screw placement were encountered. Neurological outcomes appeared to be acceptable or successful based on the AIS. IGS is a promising technique that can improve the accuracy of screw placement and reduce potential injury to critical neurovascular structures. The integration of MIS and IGS has proved feasible and safe in the treatment of traumatic spinal injury, although a thorough knowledge of surgical anatomy, spinal biomechanics, and basic technique remain the most essential aspects for successful surgery.

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NAVIGATION-ASSISTED SURGERY FOR OSTEOPOROTIC INSUFFICIENCY FRACTURES OF THE SACRUM:
TECHNICAL NOTE AND OWN RESULTS
Thomas R. Blattert, Horst Balling
Orthopaedic Clinic Schwarzach, Germany

PURPOSE: Navigation-assisted screw fixation for osteoporotic insufficiency fractures of the sacrum is a new, technically demanding procedure requiring surgical skills and experience. The purpose of this work is to describe the technique of navigation-assisted screw fixation (NSF) for osteoporotic sacral fractures and to compare the results to those of NSF with additional sacroplasty (SP).

METHODS: From 02/2011-12/2015, all osteoporotic sacral fractures indicating surgical therapy were treated using navigation-assistance in form of NSF (I) or NSF+SP (II). SP was performed only in absence of transforaminal fractures. Primary efficacy outcome was post-surgical pain relief determined by visual analog scale (VAS). Secondary efficacy outcomes were procedural accuracy controlled by intra-operative O-arm visualization of screw/cement positions, and duration of surgery. Primary safety outcomes were procedure-related major complications indicating revision surgery.

RESULTS: Seventy-one osteoporotic sacral fractures in 36 consecutive patients were surgically treated (NSF: n=43, NSF+SP: n=28). Eleven fractures occurred unilaterally in S1, 50 fractures were found to be bilateral in S1, 10 fractures were bilateral in S2. Additional anterior pelvic ring fractures were found in 9 cases of NSF, and 10 cases of NSF+SP (p=0.18). Pre-surgical pain-levels decreased until dismissal on average by 4.2 (I) and 5.2 (II) VAS-points, respectively (p=0.098). All 77 screws were located within safe sacral corridors (accuracy 100%). Cement-extrusions into neuroforamina were not observed after SP. Surgical time was 88±33 minutes (I) and 114±28 minutes (II), respectively (p=0.016). Revision surgeries for malplaced screws, bone cement extrusion or neurological damage were not indicated. In one case (2.8%), subfascial hematoma had to be evacuated after NSF.
CONCLUSIONS: The study demonstrates the feasibility and safety of navigation-assisted treatment for osteoporotic sacral insufficiency fractures. Additional sacroplasty led to significantly prolonged operative time without relevant impact on pain relief. Primary safety outcomes were similar in both groups.

OUTCOME OF TREATMENT OF COCCYDYnia
Donald Buchanan, Jonathan Spilsbury
Royal Orthopaedic Hospital, Birmingham, UK

INTRODUCTION: The results of treatment of coccydynia are variable. Recent reports show good results following coccygectomy. We evaluated our results following treatment of patients with coccydynia.

METHODS: The audit was registered with the clinical governance department. Casenotes and images of patients with coccydynia who were treated between May 2006 and April 2015 were reviewed. Data was entered on an excel spreadsheet for analysis.

RESULTS: There were 48 patients (6 males and 42 females). The mean age was 45.9 (13.4 to 69.6) years. The duration of symptoms was 42.7 (6 to 216) months. Patient who had a good response to MUA and injection and had a hypermobile, arthritic, deformed coccyx were considered for coccygectomy. Twenty patients improved and required no further treatment, 20 had transient improvement and later had coccygectomy, eight were discharged to the pain clinic.

The mean age of the patients who had coccygectomy was 46.2 (22.1 to 64.6) years. The mean duration of symptoms was 63.5 (3 to 120) months. Seven patients reported previous injuries such as a fall, 1 patient had a traumatic vaginal delivery, 12 cases were atraumatic in origin. All but 1 of the patients had a good response to MUA and injection prior to surgery (1 patient had a defunctioning colostomy several years before but had a good response to coccygeal injection). Manipulation under anaesthesia revealed a mobile coccyx in 11 patients, mobile and crepitant in 3, mobile and subluxed posteriorly in 1, anteverted in 1, no MUA findings were recorded in 3, MUA was not done in 1. Fourteen patients (70%) had good or excellent pain relief. Five (25%) had partial pain relief, one of these required a repeat coccygeal injection, one wound exploration for infection and three were referred to the pain clinic. One of the patients with a poor outcome complained of a painful scar and another complained that the sacrum was prominent. The outcome was not documented in one patient (5%).

There were 3 wound infections, one of these required wound exploration, the other 2 were treated with antibiotics and settled in less than 2 weeks. Mean follow up was 26.9 (7 to 62) months.

DISCUSSION: This is a single surgeon series. Good results are consistent with published literature. Use of a favourable response to injection, presence of a hypermobile coccyx, deformity and crepitus help to define criteria for surgery. Use of an outcome scoring system would help in assessment of outcome.
QUICKFIRES

QF1
GUILAIN-BARRE SYNDROME FOLLOWING SPINAL FUSION FOR THORACIC VERTEBRAL FRACTURE
Jun Seok Lee
Pusan National University Yangsan Hospital, South Korea

Guillain-Barre syndrome (GBS) is symmetric, rapidly progressive polyneuropathy of unknown cause that has been described most frequently after non-specific viral infection. There have been very few reports in the literature of GBS after spinal surgery. We present a unique case of GBS following spinal fusion for thoracic vertebral fracture. The aim of this report is to illustrate the importance of early neurological assessment and determining the exact cause of a new neurological deficit that occurs after an operation.

A fifty-year-old man was referred to our emergency room because of paraplegia after traffic accident. Computed tomography showed the burst fracture with dislocation on T12 and near complete obstruction of spinal canal. Emergent operation of spinal canal decompression and spinal fusion was performed after steroid mega dose therapy. Paraplegia was not improved after operation. However, general patient’s condition was improved.

He complained of prickly pain 8 days after operation. There was no specific finding in abdominal cavity. Following a day, He noted the numbness in both hands and chest discomfort. Results of examinations were normal. In spite of careful observation with supportive care, he complained of the progression of dyspnea. Grade IV motor weakness on both upper extremities and bilateral facial palsy were detected 10 days after operation. His clinical course suggests acute inflammatory demyelinating peripheral neuropathy, Brain and cervical spinal imaging study revealed no abnormal lesions on CNS. Cerebrospinal fluid analysis (CSFA) was not performed because of postoperative back wound and low reliability of CSFA from injury of spinal cord and dura matter. Nerve conduction studies showed slowing conduction velocity, prolonged terminal latencies and conduction block in the median and ulnar nerves. The results of nerve conduction velocity highly suggested of GBS. Human immunoglobulin was infused. Motor power of both upper extremities were improved.

We report a unique case of GBS following spinal fusion for thoracic vertebral fracture. This case reinforces the need for neurosurgeons to maintain awareness of this potentially reversible condition, GBS, that may arise after spinal operation.

QF2
UNSTABLE CERVICAL SPINE INJURY IN PATIENT WITH NEGATIVE CT SPINE – CASE REPORT
Ashraf Dower, Johnny Efendy, Renata Abramsko
Department of Neurosurgery, Liverpool Hospital, Sydney, Australia

INTRODUCTION: Missed cervical spine injuries (CSI) are a preventable morbidity in blunt trauma patients with approximately 5-10% of associated neurological deterioration occurring during the emergency department (ED) admission.1 We report on a trauma patient whose cervical spine was cleared with a normal CT cervical spine (CT-CS) however an unstable CSI was detected on follow-up.

CASE REPORT: A 62-year-old male driver involved in a low speed MVA was brought in by ambulance to our ED. During assessment he was placed in a cervical collar for immobilisation, and a secondary survey only revealed midline tenderness at the C1-3 region. He was otherwise alert, oriented and neurologically intact, with no other distracting injuries. A CT-CS revealed no acute cervical spine fractures or malalignment and was deemed to be stable. The patient was clinically cleared and the cervical collar was removed on discharge.
At 6 weeks’ follow-up he presented to neurosurgical follow-up complaining of intermittent paraesthesia and numbness in his upper extremities. An MRI cervical spine (MR-CS) was performed which revealed injury to the posterior longitudinal ligament, and associated subluxation at the C5/6 level. A C5/6 ACDF and 3 level posterior lateral mass fusion (C4/5, C5/6, C6/7) was performed. The patient had no residual neurological signs/symptoms at 2 weeks’ follow-up.

DISCUSSION: The clearance of a blunt trauma patient with a negative CT-CS that has persistent neck pain on lateral flexion, or midline tenderness is a rare but critical situation and existing protocols are based on a poor evidence base. The EAST practice management guidelines for cervical spine clearance suggest either continuing the cervical collar for an extended period of time, removal of the collar after a negative flexion/extension (F/E) film, or finally the removal of the collar after a negative MR-CS. However, prolonged cervical collar use may have deleterious effects and a recent comprehensive systematic review of the available data on F/E films in the setting of blunt trauma patients concluded they offered very little useful information.

Whilst earlier studies have not demonstrated any clinically significant injuries picked up on MR-CS in the setting of a negative CT-CS, a recent study suggests that 2.8% of patients may have unstable injuries detectable on MRI.

CONCLUSION: Our case outlines the utility of MR-CS in an alert and neurologically intact trauma patient with a negative CT-CS.

QF3
ANTERIOR VERSUS POSTERIOR APPROACH IN TREATMENT OF UNILATERAL CERVICAL DISLOCATIONS
Marek Paciak, Adam Pala, Micha Biaek
Wojewódzki Szpital Chirurgii Urazowej, Piekary l skie, Poland

Unilateral dislocations are less common that bilateral ones and have fewer neurological complication. Therefore this injury is often underestimated. But if misdiagnosed or treated conservatively for too long, displaced interlocked facet could be finally irreducible in some instances with persistent neck and radicular pain as a result of failed treatment. Skull traction as initial treatment not always leads to reduction. Manual reduction in general anesthesia could be performed with caution before surgery. But this means could be insufficient because unilateral dislocation is more difficult to reduce than bilateral one. Therefore, posterior approach offers possibility to directly unblock displaced facet sometimes first after partial facet resection. Authors prefer anterior approach as offering possibility od anterior spinal cord decompression and solid interbody and anterior fusion. But in some cases posterior approach as first choice with or without subsequent anterior decompression is advisable. Analysis of treatment of 94 cases with respect to clinical symptoms and imaging findings results in formulating an authors own algorithm of treatment of unilateral cervical dislocations with qualification to anterior, posterior or combined approach.

QF4
A “TWITTER TIP” SIMPLE AID TO SPINE FUSION BONE GRAFTING IN LESS THAN 90 WORDS
Philip J. Sell
University Hospitals of Leicester, UK

Morselised bone graft can be awkward to place in posterior spinal fusion surgery. It is particularly frustrating if small fragments of graft fall into a previously decompressed canal and require extraction. A simple quick and cheap method of safe delivery of autologous or autogenous is to utilise a standard 5 ml or 10 ml syringe after removal of the nozzle. The graft and applicator can be prepared for administration by the scrub nurse practitioner. This ‘quick tip’ reduces bone fragments within the spinal canal. It also enables quantification of the graft volume.
QF5
DIFFERENCE BETWEEN MINOR TRAUMATIC AND NON-TRAUMATIC OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURES
Daisuke Umebayashi, Yu Yamamoto, Yasuhiro Nakajima, Masahito Hara
Inazawa Municipal hospital, Inazawa, Japan

Population aging is continuing in all over the world, especially in Japan. Therefore, osteoporotic-related fractures has become an increasingly common problem. Osteoporotic vertebral compression fractures (OVCF) occur with or without minor trauma. However, the difference in the clinical course of minor trauma-oriented OVCF and non-traumatic OVCF has not been clarified. Furthermore, there is no consensus as to whether minor trauma-oriented OVCF or non-traumatic OVCF is the optimal candidate for percutaneous vertebroplasty (PVP). In this study, we describe the results of a retrospective study designed to evaluate the difference of two types of OVCF. Patients over 65 years with acute OVCF and hospitalized for severe back pain were enrolled. Major trauma including fall off injury and traffic accident were excluded. The primary outcome was pain relief which is recognized as the ability to ambulate. Bone mineral density was used to analyze the extent of osteoporosis. As a result, patients were divided into four groups, minor trauma-oriented OVCF with or without PVP, non-traumatic OVCF with or without PVP. Here, comparing these four groups, we report the characteristics of these groups and the optimal treatment for each group.

QF6
COMPLICATIONS AND OUTCOME OF PATIENTS WITH LIVER CIRRHOSIS (CHILD-PUGH STAGES B & C) AFTER SPINAL INSTRUMENTATION
Ramazan Dalkilic, Christian Ewald, Rolf Kalff
University Hospital of Jena, Germany

OBJECTIVE: With this study we want to share our experience and outcome with patients with liver cirrhosis Child-Pugh stages B and C after instrumented spine surgery. We already know that patients with cirrhosis (Child-Pugh B & C) are high-risk patients due to their coagulation problems, higher infection risk, as well as osteopenia.
METHOD: Between 2006 and 2013 we have operated on 12 patients with liver cirrhosis (Child-Pugh B & C) and spinal fractures (spontaneous and traumatic). All these patient underwent instrumented spinal surgery. This retrospective study is based on the patients’ conditions, intra- and postoperative complications, and the patient outcome scores.
RESULTS: The study group comprised 12 cirrhotic patients (9 males and 3 females). The average age was 59 years (±26). The average length of stay was 36 days (±27). 3 (25%) patients were admitted with neurological deficits with hypoaesthesia, 3 (75%) patients were admitted with thoracolumbar pain. One patient was stabilised with wire cerclage due to dens fracture, 6 patients underwent dorsoventral instrumentation, and in 5 patients we performed only posterior fusion due to thoracic and lumbar vertebral body fractures. 5 (41.6%) patients experienced postoperative material dislocation. One of these patient suffered postoperative paraparesis and 4 (33.3%) of this group had to be re-operated on due to postoperative epidural bleeding.
4 of the patients had postoperative wound infections (33.3%) and one of them became septic. Postoperative pain reduction was achieved in only two patients. 6 of the cohort required up-titration of their pain medication postoperatively and one patient had permanent paraparesis. One patient died postoperatively due to drastically deranged coagulation. The overall complication rate was about 83.3%.
CONCLUSION: In our experience, in most of patients with liver cirrhosis (Child-Pugh stages B & C) we were unable to improve the neurological or pain situation with spinal instrumentation. The risk of neurological complications and infections are markedly higher in patients with cirrhosis. These patients require in-depth and individualised evaluation before undergoing spine surgery with instrumentation.
Is anterior lumbar disectomy and fusion (ALDF) in cases of recurrent lumbar disc herniation with previous performed posterior decompressive surgery an acceptable emergency procedure? This case report studies three patients that underwent emergency anterior lumbar disectomy and fusion. All three patients suffered from acute incomplete cauda equina syndrome due to a re-recurrent disc herniation. Recovery and outcome was very good in all of the patients and leads to the conclusion that ALDF is indeed a legitimate surgical option in the urgent treatment of acute cauda equina syndrome cases that meet specific criteria including recurrent disc herniation with previous posterior revision surgery.
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