



## IRISH SPINE SOCIETY'S ANNUAL CONFERENCE



MEETING AGENDA & BOOK OF ABSTRACTS

# MANAGING RISK IN SPINE CARE

13<sup>th</sup> OCTOBER 2018 | 08.30 ~ 17.30

CHEYNE THEATRE, ROYAL COLLEGE OF SURGEONS IN IRELAND

CPD ACCREDITED



**President Irish Spine Society:**  
**Professor John P. McCabe**

**Secretary Irish Spine Society:**  
**Mr Joseph Butler**

**Email:** [info@irishspinesociety.ie](mailto:info@irishspinesociety.ie)

[www.irishspinesociety.ie](http://www.irishspinesociety.ie)

**Conference Organiser:**  
**Go West Conference & Event Management**

# AGENDA

<b>08.30</b>	<b>Registration, Ground Floor</b>
<b>09.00</b>	<b>Welcome from Prof John McCabe, President, Irish Spine Society &amp; Mr Joseph Butler, Secretary, Irish Spine Society</b>
<b>09.05</b>	<b>Morning Session - Free Papers</b>
<b>1.1</b>	<b>NRS20: Combined Back and Leg Pain Score: A Simple and Effective Assessment of Adult Spinal Deformity</b>
	<b>DT Cawley</b> , D Larrieu, T Fujishiro, D Kieser, L Boissiere, E Acaroglu, A Alanay, F Kleinstuck, F Pellisé, FS Perez-Grueso, JM Vital, O Gille, I Obeid, European Spinal Study Group Institut de la Colonne Vertébrale, Spine Unit 1, Bordeaux University Hospital, France
<b>1.2</b>	<b>Can We Predict Pedicle Dimensions in Adolescent Idiopathic Scoliosis - A Morphometric Analysis of Transverse Process and Ipsilateral Pedicle</b>
	G Reddy <sup>1</sup> , M Mohamed <sup>1</sup> , J Alsousou <sup>1,2</sup> , J Trivedi <sup>1</sup> , C Bruce <sup>1</sup> , N Davidson <sup>1</sup> , <b>S Munigangaiah</b> <sup>1</sup> <sup>1</sup> Alder Hey Children's Hospital NHS Foundation Trust, Liverpool L14 5AB, UK <sup>2</sup> University of Liverpool, Liverpool L69 3BX
<b>1.3</b>	<b>Use of a Novel Corrective Device for Correction of Deformities in Adolescent Idiopathic Scoliosis</b>
	<b>I Feeley</b> <sup>1,2</sup> , A Hughes <sup>1,2</sup> , N Cassidy <sup>1,2</sup> , C Green <sup>1,2</sup> <sup>1</sup> Cappagh National Orthopaedic Hospital, Ireland <sup>2</sup> Children's University Hospital, Temple St, Dublin, Ireland
<b>1.4</b>	<b>The Establishment of an Acute Radiculopathy Pathway in the West of Ireland</b>
	<b>DM Dalton</b> <sup>1</sup> , H Elkhwad <sup>1</sup> , S O'Connor <sup>2</sup> , N De Burca <sup>2</sup> , A Devitt <sup>1</sup> , F Byrne <sup>1</sup> <sup>1</sup> Department of Orthopaedic Surgery, Galway University Hospitals <sup>2</sup> Department of Physiotherapy, Galway University Hospitals
<b>1.5</b>	<b>Sarcopenia as a Primary Cause of Lower Back Pain and Screening for Sarcopenia in the Secondary Prevention of Lower Back Pain</b>
	<b>D Gibbons</b> <sup>1</sup> , DP Ahern <sup>2</sup> , A Curley <sup>3</sup> , JS Butler <sup>4</sup> <sup>1</sup> School of Medicine, Trinity College Dublin <sup>2</sup> Trinity Centre for Bioengineering, Trinity College Dublin <sup>3</sup> Clinical Specialist Physiotherapist, Tallaght University Hospital <sup>4</sup> Consultant Spinal Surgeon, Mater Misericordiae University Hospital, Tallaght University Hospital

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<b>1.6</b>	<b>Optimising Navigation Guided Spine Surgery through a Lean Principles Approach</b>
	<b>DT Cawley</b> , V Rajamani, M Cawley, D Bhagawati, S Selvadurai, A Gibson, S Molloy Dept of Spinal Surgery, RNOH Stanmore, Brockley Hill, Stanmore HA7 4LP, UK
<b>1.7</b>	<b>Intra-operative Imaging for Spinal Level Localisation in Lumbar Surgery</b>
	<b>M Dablouk</b> , J Sajjad, G Kaar, C Lim, M O'Sullivan Department of Neurosurgery, Cork University Hospital, Wilton, Cork, Ireland
<b>1.8</b>	<b>To Determine the Quality of C-Spine Screening Radiology in Trauma Patients in Ireland</b>
	<b>DM Dalton</b> , G Hennelly, JP McCabe Department of Orthopaedic Surgery, Galway University Hospitals
<b>1.9</b>	<b>Managing Risk – Introducing the O-Arm to an Irish Spinal Unit</b>
	<b>AJ Hughes</b> , M Dodds, M Timlin, N Cassidy, S Morris, K Synnott, JS. Butler Department of Orthopaedic Surgery, Mater Misericordiae University Hospital, Dublin
<b>1.10</b>	<b>Occipitocervical Fusion – An Epidemiological Drift Experienced in an Irish Tertiary Spinal Referral Centre: 20 Years Follow Up Study</b>
	N Tarazi, <b>S Munigangaiah</b> , AT Devitt, JP McCabe Department of Trauma and Orthopaedics, Galway University Hospital Galway, Ireland
<b>09.55</b>	<i>Questions &amp; Answers</i>
<b>10.15</b>	<b>Presenter: Mr David O'Brien</b> , Consultant Neurosurgeon, Beaumont Hospital, Dublin, Ireland
	<i>Presentation: Syringomyelia Management</i>
<b>10.30</b>	<i>Questions &amp; Answers</i>
<b>10.40</b>	<b>Tea/Coffee &amp; Trade Exhibition, Exam Hall, First Floor</b>
<b>11.10</b>	<b>Presenter: Ms Aisling Brennan</b> , Physiotherapist, Tallaght Hospital, Dublin
	<i>National MSK Triage: Update and Future Directions</i>
<b>11.20</b>	<b>Presenter: Mr. Arjun Sebastian</b> , MD, Assistant Professor of Orthopedic Surgery, Assistant Professor of Neurosurgery, Mayo Clinic, Rochester, MN, USA
	<i>Presentation: Malpractice in Spine Surgery</i>
<b>11.35</b>	<b>Presenter: Mr. Scott C. Wagner</b> , MD, Spine Surgeon, Department of Orthopaedic Surgery, Walter Reed National Military Medical Center, Bethesda, Maryland, USA
	<i>Presentation: Complex Spine Surgery in the Elderly Population: Pearls and Pitfalls</i>
<b>11.50</b>	<i>Question &amp; Answers</i>
<b>12.10</b>	<i>President's Address: Professor John P. McCabe</i> , Personal Professor Orthopaedic and Spine Surgery, Galway University Hospitals, Bon Secours Hospital Galway, National University of Ireland, Galway
<b>12.25</b>	<b>Working Lunch &amp; Trade Exhibition, Exam Hall, First Floor</b>

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<b>13.25</b>	<b>Presenter: Mr. Patrick Morrissey, MD</b> , Assistant Professor of Orthopaedic Surgery, Naval Medical Centre, San Diego, CA, USA
	<i>Presentation: Treatment of the Military Athlete with Degenerative Spinal Pathology</i>
<b>13.40</b>	<b>Presenter: Ms Marie Elaine Grant</b> , Specialist Membership of the Irish Society of Chartered Physiotherapists, Physiotherapist to the International Olympic Committee
	<i>Presentation: Risk Management of Athletic Low Back Pain</i>
<b>13.55</b>	<i>Question &amp; Answers</i>
<b>14.15</b>	<b>Afternoon Session - Free Papers</b>
<b>2.1</b>	<b>Surgery for Spinal Metastasis in an Irish Tertiary Referral Centre over an 8 Year Period</b>
	<b>FJ McCabe<sup>1</sup></b> , M Jadaan <sup>2</sup> , F Byrne <sup>2</sup> , A Devitt <sup>2</sup> , JP McCabe <sup>2</sup> <sup>1</sup> Discipline of Surgery, School of Medicine, NUI Galway <sup>2</sup> Spine Service, Department of Trauma & Orthopaedics, Galway University Hospitals
<b>2.2</b>	<b>Spinal Tumour Surgery - A Single Centre Experience</b>
	<b>J Sajjad</b> , J Lord, C Marks, G Kaar, MGJ O'Sullivan Department of Neurosurgery, Cork University Hospital, Ireland
<b>2.3</b>	<b>RUNX2, the Master Regulator of Bone Metastasis?</b>
	<b>FJ McCabe<sup>1</sup></b> , D Courtney <sup>1</sup> , M Jadaan <sup>2</sup> , JP McCabe <sup>2</sup> , MJ Kerin <sup>1</sup> <sup>1</sup> Department of Surgery, Lambe Institute for Translational Research, NUI Galway <sup>2</sup> Spine Service, Department of Trauma & Orthopaedics, Galway University Hospitals
<b>2.4</b>	<b>Hyaluronic Acid Based Hydrogels for the Treatment of Intervertebral Disc Degeneration: a Rat Tail Model</b>
	<b>D Tiernan<sup>2</sup></b> , IL Isa <sup>2</sup> , A Devitt <sup>1,2</sup> , A Srivastava <sup>2</sup> , A Pandit <sup>2</sup> <sup>1</sup> Department of Orthopaedics, Galway University Hospital <sup>2</sup> National University of Ireland, Galway
<b>2.5</b>	<b>Management of Osteoporotic Vertebral Fractures in Irish Hospitals</b>
	M Mc Gowan, C Gallagher, <b>E Hughes</b> , M Fitzgerald, C Cunningham University College Dublin, School of Public Health, Physiotherapy and Sports Science, Belfield
<b>2.6</b>	<b>What is the Perfect Pathway to Enhance Patient Care in the Management of Osteoporotic Thoracolumbar Fractures?</b>
	<b>P Ferreira<sup>1</sup></b> , N Darwish <sup>2</sup> <sup>1</sup> Belfast Health and Social Care Trust
<b>2.7</b>	<b>The Effect of the Erector Spinae Plane Block on Post-Operative Opioid Consumption in Patients Undergoing Lumbar Spine Decompression Surgery: A Comparative Pilot Study</b>
	<b>M Elhadi</b> , J McDonnell, JP McCabe Department of Orthopaedic Surgery, Bon Secours Health System Galway, National University of Ireland, Galway.

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<b>2.8</b>	<b>Using Ultrasound Scans to Measure Longitudinal Growth of Magnetically Controlled Growing Rods</b>
	M Mohamed <sup>1</sup> , J Alsousou <sup>1,2</sup> , M De'Matas, <b>S Munigangaiah<sup>1</sup></b> , J Trivedi <sup>1</sup> , C Bruce <sup>1</sup> , N Davidson <sup>1</sup> <sup>1</sup> Alder Hey Children's Hospital NHS Foundation Trust, Liverpool L14 5AB, UK <sup>2</sup> University of Liverpool, Liverpool L69 3BX, UK
<b>2.9</b>	<b>Operative Management of Perinatal Lumbar Disc Herniation and Cauda Equina Syndrome: A Case Series</b>
	<b>DP Ahern<sup>1</sup></b> , D Gibbons <sup>2</sup> , M Dodds <sup>1</sup> , M Timlin <sup>1</sup> , N Cassidy <sup>1</sup> , S Morris <sup>1</sup> , K Synnott <sup>1</sup> , JS Butler <sup>1,2</sup> <sup>1</sup> National Spinal Injuries Units, Department of Trauma & Orthopaedic Surgery, Mater Misericordiae University Hospital, Dublin, Ireland <sup>2</sup> Spine Service, Department of Trauma & Orthopaedic Surgery, Tallaght University Hospital, Dublin, Ireland
<b>2.10</b>	<b>Thoracolumbar Junctional Fractures and the Rock Climbing Wall: A Case Series</b>
	<b>R-S Lynham</b> , M Timlin National Spinal Injuries Unit, Mater Misericordiae University Hospital Dublin
<b>15.10</b>	<i>Questions &amp; Answers</i>
<b>15.30</b>	<b>Tea/Coffee, Posters &amp; Exhibition, Exam Hall, First Floor</b>
<b>16.00</b>	<b>Presenter: Mr. David Kaye</b> , MD, Assistant Professor of Orthopaedic and Neurological Surgery at Thomas Jefferson University Hospital, The Rothman Institute, Philadelphia, PA, USA  <i>Presentation: Perioperative Management of Dysphagia after Cervical Spine Surgery</i>
<b>16.15</b>	<b>Presenter: Dr Christopher Kepler</b> , Associate Professor, Rothman Institute & Thomas Jefferson University, Philadelphia, PA, USA  <i>Presentation: Management of Intraoperative and Postoperative Neurologic Deficits</i>
<b>16.30</b>	<b>Presenter: Professor Ciaran Bolger</b> , Consultant Neurosurgeon, Beaumont Hospital, Dublin  <i>Presentation: Managing Risk with Neurophysiological Monitoring?</i>
<b>16.45</b>	<i>Questions &amp; Answers</i>
<b>17.15</b>	<b>Closing Remarks</b>
<b>17.30</b>	<b>Conference Ends</b>



IRISH SPINE SOCIETY'S ANNUAL CONFERENCE

**FREE PAPERS**

**FREE PAPERS**



**MORNING  
SESSION**

**09.05~09.55**

## 1.1

### **NRS20: Combined Back and Leg Pain Score: A Simple and Effective Assessment of Adult Spinal Deformity**

**DT Cawley**, D Larrieu, T Fujishiro, D Kieser, L Boissiere, E Acaroglu, A Alanay, F Kleinstuck, F Pellisé, FS Perez-Grueso, JM Vital, O Gille, I Obeid, European Spinal Study Group

Institut de la Colonne Vertébrale, Spine Unit 1, Bordeaux University Hospital, France

#### **Study Design**

Multicenter, prospective study of consecutive adult spinal deformity (ASD) patients.

#### **Conclusion**

To evaluate back and leg pain as a combined score in ASD and compare their relative and cumulative correlations with health-related quality of life (HRQOL) and sagittal parameters.

#### **Summary of Background Data**

Pain and disability are commonly reported in patients with ASD. This can affect their back, their legs or both. ASD-associated pain has been correlated with numerous HRQOL scores and radiological parameters.

#### **Methods**

Preoperative pain intensity was assessed with a Numerical Rating Scale (NRS) for individual back and leg pain as well as a combined score, NRS20 (0–20, back plus leg pain). This yielded a range of static measures in all patients with ASD with differing burdens of disease. Linear regression analysis was performed to calculate the correlation between pain and HRQOL scores (Scoliosis Research Society 22, 36-Item Short Form Health Survey Physical Component Summary, 36-Item Short Form Health Survey Mental Component Summary, Core Outcome Measures Index, and Oswestry Disability Index), and radiological spinopelvic parameters (sagittal and coronal planes).

#### **Results**

A total of 1309 patients were included in this study. A combined score (NRS20) was better correlated with HRQOL ( $P < 0.01$  for all) and sagittal parameters ( $P < 0.01$  for all) than individual back or leg pain scores. Evaluation of the relative contributions of back and leg pain

demonstrate a higher correlation with HRQOL scores for back pain and a higher correlation with sagittal parameters for leg pain. The distribution of NRS20 pain scores demonstrated three clear patterns of pain: back pain only, moderate back pain with varying mild-moderate leg pain, and severe equivalent back and leg pain. Similar values were noted for nonoperative and operative patients.

#### **Conclusion**

The distribution and intensity of pain and its correlations with clinical and radiological parameters provide insight into the pathogenesis of ASD. A combined score has a simple yet valuable contribution to the assessment of symptoms in ASD.

## 1.2

### **Can We Predict Pedicle Dimensions in Adolescent Idiopathic Scoliosis - A Morphometric Analysis of Transverse Process and Ipsilateral Pedicle**

G Reddy<sup>1</sup>, M Mohamed<sup>1</sup>, J Alsousou<sup>1,2</sup>, J Trivedi<sup>1</sup>, C Bruce<sup>1</sup>, N Davidson<sup>1</sup>, **S Munigangaiah<sup>1</sup>**

<sup>1</sup> Alder Hey Children's Hospital NHS Foundation Trust, E Prescott Road, Liverpool, UK L14 5AB

<sup>2</sup> University of Liverpool, Liverpool L69 3BX

#### **Introduction**

In Adolescent Idiopathic Scoliosis (AIS) the pedicle sizes dramatically vary in dimensions and are not possible to visualise dimensions of pedicle during the posterior approach to the spine. We hypothesise we can use the transverse process intraoperatively as guide to predict pedicle size and as a result the size of pedicle screw.

#### **Material and Methods**

This retrospective review was carried out of all patients diagnosed with AIS at our institution over the last 2 years (186 patients) and 6 patients were identified who have had preoperative Computer Tomography Scans (CT). The apical vertebra was determined and 3 vertebral levels cranial and caudal to this were identified. The transverse process width (TPW) and height (TPH), pedicle width (PW) and height (PH) on the concave side were measured from agreed reference points.



## Results

6 patients were included in this study, 4 females and 2 males with an average age of 14 (13 - 16) years. The average Cobb angle was 79 (67 - 91) degrees. 42 vertebral levels measurements showed TPW  $16.57 \pm 4.61$ , TPH  $10.81 \pm 1.42$ , PH  $8.24 \pm 2.27$  and PW  $5.27 \pm 2.45$ . There was no significance correlation between TPH and PH (p 0.359) or TPH and PW (p 0.412). Spearman's rank analysis demonstrated a significant negative correlation between TPW PH (p 0.01) and TPW PW (p 0.02). The ratios of TPW/TPW=8.2/0.18 and PH/TPW=12.2/0.2 were evident.

## Conclusion

Width of the transverse process of thoracic spine in AIS can predict pedicle height and pedicle width (pedicle dimensions). This can help surgeon intraoperatively predict pedicle dimensions and aid selecting suitable levels of instrumentation.

# 1.3

## Use of a Novel Corrective Device for Correction of Deformities in Adolescent Idiopathic Scoliosis

I Feeley<sup>1,2</sup>, A Hughes<sup>1,2</sup>, N Cassidy<sup>1,2</sup>, C Green<sup>1,2</sup>

<sup>1</sup> Cappagh National Orthopaedic Hospital, Ireland

<sup>2</sup> Children's University Hospital, Temple St, Dublin, Ireland

## Background

Adolescent idiopathic scoliosis (AIS), with an incidence of 3%, is a common deformity. Correction of severe curvature of the deformity has attracted much investigation to achieve safe, reproducible Results. We present our experience with a novel device for the correction of deformities across a spectrum of curve types, the Rod link reducer. This system allows direct visualisation of a mass derotation to achieve deformity correction.

## Methods

Prospective cohort study of patients with severe AIS treated in our institution during 2017 with major TL/L curves. Pre and post operative Cobb angles and coronal balance; operative time; estimated blood loss, fusion levels and screw density were recorded. Our Results were split between those with a Lenke A/B classification

and Lenke C, with a goal of correction of curve in the former and achieving good coronal balance with a preservation of distal motion segments in the latter.

## Results

There were 31 patients enrolled in our series. Within the Lenke A/B group, there were 18 patients, achieving a mean correction of 56% (SD 10%) and a correction of a mean coronal balance of 14.5mm (SD 12.5mm) of C7 from the CSVL to 10.9 mm (SD 10.6mm). our screw density was 1.3 screws (SD 0.1) per vertebrae fused. Our operative time was 185 minutes (SD 38 mins). Average recorded blood loss was 721 mls (SD 289). In our Lenke C cohort, preoperative and post-operative mean Cobb angle (SD) were 73.3 (13.4) and 33.8 (11.9) respectively, with an average correction of 54% (SD 11%). The mean (SD) operative time was 03:35 (SD 00:35). Fusion levels were over a mean of 12.1 (SD 1.7) vertebrae, with a screw density of 1.3 (SD 0.1) per level. Mean intraoperative blood loss was 829mls (SD 355). No patient received an allogenic blood transfusion. There were no adverse neurological events in this patient cohort.

## Conclusions

The link rod system allows for excellent correction of spinal deformity and a short operative time.

## Level of Evidence

IV: Case series

# 1.4

## The Establishment of an Acute Radiculopathy Pathway in the West of Ireland

Dalton DM<sup>1</sup>, Elkhwad H<sup>1</sup>, O'Connor S<sup>2</sup>, De Burca N<sup>2</sup>, Devitt A<sup>1</sup>, Byrne F<sup>1</sup>

<sup>1</sup> Department of Orthopaedic Surgery, Galway University Hospitals

<sup>2</sup> Department of Physiotherapy, Galway University Hospitals

The aim of the study was to assess the performance of a new referral pathway for patients with acute radiculopathy. The new pathway was developed as part of a Quality Improvement Programme and gradually introduced from January to July 2018.

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Inclusion criteria for referral to the pathway were unilateral leg pain of sciatic origin with Conclusion weakness. A proforma was developed and education evenings were held for local GPs. New pathway referrals and spine referrals received from 1st January 2018 were assessed and appropriate patients were offered an early appointment at a combined musculoskeletal triage/spine clinic.

Key performance indicators were waiting time to clinical appointment and time to intervention for new patients and patients already on waiting list. Frequency of intervention was also measured.

There were 22 patients identified through the look back as suitable for the pathway. They were reviewed at a mean of 127 days from referral. There were 59 new referrals deemed suitable for the pathway based on the information contained in the referral letter. This cohort of patients were seen at a median of 46 days. The leg pain had settled in 10 patients, 12 patients had a transforaminal nerve block and 3 patients had surgical decompression. Waiting time for a patient seen in a MSK or spine clinic not on the radiculopathy pathway remains unchanged at 18-21 months.

The pathway succeeded in identifying and offering a timely orthopaedic intervention to radiculopathy patients without negatively impacting on waiting times for other patients.

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## 1.5

### Sarcopenia as a Primary Cause of Lower Back Pain and Screening for Sarcopenia in the Secondary Prevention of Lower Back Pain

**Gibbons, D.**<sup>1</sup>, Ahern, D.P.<sup>2</sup>, Curley, A.<sup>3</sup>, Butler, J.S.<sup>4</sup>

<sup>1</sup>School of Medicine, Trinity College Dublin

<sup>2</sup>Trinity Centre for Bioengineering, Trinity College Dublin

<sup>3</sup>Clinical Specialist Physiotherapist, Tallaght University Hospital

<sup>4</sup>Consultant Spinal Surgeon, Mater Misericordiae University Hospital, Tallaght University Hospital

#### Background

The life time prevalence of Lower Back

Pain (LBP) is estimated to be 60-70% in industrialised countries. In the United States, 17 million people over the age of 65 experience at least one episode of LBP per year while 6 million people report a decreased quality of life. There is a growing interest in sarcopenia (lower skeletal muscle mass) as the primary cause of LBP while screening for sarcopenia could potentially prevent the development of LBP.

A systematic review by Ranger *et al* reported on the importance of the 4 paraspinal muscles to LBP concluding that a reduced cross sectional area of multifundus is associated with, and predictive of, LBP. Sarcopenia is associated with decreased physical activity in those with LBP secondary to lumbar spinal stenosis.

#### Clinical Importance

The importance of identifying sarcopenia particularly in the elderly is twofold. Firstly, sarcopenia has been shown to be a primary cause of LBP, therefore, interventions such as physiotherapy may be of benefit. Secondly, sarcopenia screening in the elderly with subsequent implementation of prophylactic targeted physiotherapy may be a potential strategy for preventing new onset back pain. Sarcopenia can be identified with clinical examination (such as hand grip strength or sit stand tests) and radiologic investigations (computed tomography (CT) and magnetic resonance imaging (MRI)).

#### Conclusion

With an ever increasing elderly population, identifying sarcopenia as either a primary or secondary cause of LBP could provide a simple and effective method of reducing lower back pain in the future.

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## 1.6

### Optimising Navigation Guided Spine Surgery through a Lean Principles Approach

**DT Cawley**, V Rajamani, M Cawley, D Bhagawati, S Selvadurai, A Gibson, S Molloy

Dept of Spinal Surgery, RNOH Stanmore, Brockley Hill, Stanmore HA7 4LP, UK

#### Study Design

**Case Study Conclusion:** To optimize intra-operative 3D navigation (ION) through

application of lean principles for adolescent idiopathic scoliosis (AIS) surgery.

## Summary of Background Data

ION is a useful adjunct to safely achieving high accuracy in spinal surgery, but poor workflow is one of the biggest impedances to its widespread uptake. The technical demands on ION for AIS are higher than for other more established indications. Lean principles have been applied to industry and to healthcare with positive effects. While ensuring optimal instrumentation accuracy and patient safety, the ION was evaluated during its implementation for AIS surgery to enhance the workflow of this technique.

## Methods

The first 20 AIS patients for ION were analysed and consistently adapted to generate an optimal process for use with ION.

## Results

The greatest gains in productivity were from avoiding repeat intra-operative scans (248 mins, 288 mGycm from two scans v 180mins, 232mGycm from a single scan). Optimising accuracy was the biggest factor influencing this which was reliant on incremental changes to operative set-up and technique.

## Conclusion

The Introduction of a new technique such as ION for spinal surgery in AIS is augmented and optimised through the use of lean principles, making this valuable technical adjunct a welcome facility in the theatre environment. Data and stakeholder analysis identified a reproducible technique for utilising ION for AIS surgery, with measures to reduce operative time and radiation exposure.

# 1.7

## Intra-operative Imaging for Spinal Level Localisation in Lumbar Surgery

**Mohamed Dablouk**, Jahangir Sajjad, George Kaar, Chris Lim, Michael O'Sullivan

Department of Neurosurgery, Cork University Hospital, Wilton, Cork, Ireland

## Study Design

Retrospective review of the practice of 3

surgeons in a single centre during a 1-year period.

## Objectives

We aimed to investigate our adherence to the Society of British Neurological Surgeons (SBNS) guidelines regarding intra-operative imaging during lumbar surgery and to determine if this has any impact on length of surgery or complications rates, in particular rates of wrong-level surgery.

## Background

The SBNS recommends three x-rays for intra-operative spinal localisation - one prior to incision, the second after exposure of the laminae and before the commencement of decompression, and the third at the end of the operation. At our centre, surgeon A performs x-rays 1 and 3 routinely, and x-ray 2 in cases where the anatomy is uncertain, surgeon B performs x-ray 2 only, and the practice of surgeon C varies depending on the complexity of cases.

## Methods

We reviewed the surgical logbooks of 3 consultant neurosurgeons in our centre for the 1-year period between October 2015 and October 2016. Our study included 301 patients who had undergone lumbar decompression or discectomy.

## Results

There were no cases of wrong-level surgery. The incorrect spinal level was initially exposed in 13 cases (4.3%). 10 of these had x-ray 2 only, 1 had x-ray 1, 1 had x-rays 1 and 2, and 1 had all 3 x-rays. 8 of these cases were performed by surgeon B, four by surgeon C and 1 by surgeon A. The median duration of surgery was 80 minutes for lumbar decompression and 67.5 minutes for lumbar discectomy. The median duration of surgery in patients in whom the wrong level was initially exposed was 85 minutes for lumbar decompression and 80 minutes for lumbar discectomy.

## Conclusion

Performing the 3 recommended x-rays may increase the identification of wrong-level exposures and may reduce the length of surgery.

## 1.8

### To Determine the Quality of C-Spine Screening Radiology in Trauma Patients in Ireland

**Dalton DM**, Hennelly G, McCabe JP

<sup>1</sup>Department of Orthopaedic Surgery, Galway University Hospitals

The aim of the study is to determine the adequacy of cervical spine imaging in the emergency department (ED) in 6 hospitals in Ireland.

Fifty consecutive cervical spine radiographs requested by ED in 2 spine centres (University Hospital Galway, The Mater Hospital), 2 hospitals with on-site orthopaedic services (Kerry General Hospital, Sligo General Hospital) and 2 hospitals with no on site spine/orthopaedic services (Cavan General Hospital, Wexford General Hospital). Images were reviewed for adequacy and further imaging investigations were noted. Adequacy was defined as an AP, Lateral and PEG views. The C7/T1 junction must be visible.

Three hundred patients were identified through radiological databases. 57% (172/300) images were adequate based on the initial 3 views – 57% in spine centres, 63% in orthopaedic centres and 52% in non-spine, non-orthopaedic centres. A further 33 were adequate after swimmers views were performed. 23 patients who had inadequate films had higher order imaging in the acute phase (<6 weeks). 20 of the patients who had further imaging had CT alone, 2 had CT and MRI and 1 patient had MRI alone. 80/100 patients in the spine centres had adequate imaging. 74/100 patients in the orthopaedic only centres and 74/100 patients in the non-orthopaedic, non-spine centres had adequate imaging.

The adequacy of imaging is currently 74% in non-spine centres and 80% in spine centres. The spine centres did not perform better based on the basic 3 views alone but did when further imaging is taken into consideration. This suggests that the presence of a spine team makes it more likely that higher imaging is requested when initial radiographs are inadequate although our Results are not statistically significant ( $p=0.315$ ).

## 1.9

### Managing Risk – Introducing the O-Arm to an Irish Spinal Unit

**Andrew J. Hughes**, Michael Dodds, Marcus Timlin, Noelle Cassidy, Seamus Morris, Keith Synnott, Joseph S. Butler

Department of Orthopaedic Surgery, Mater Misericordiae University Hospital, Dublin

#### Introduction

The O-Arm (Medtronic, Minnesota) is a computed tomography based cone beam intraoperative imaging modality that produces a 360° scanning arc. Navigated pedicle screw insertion has been proposed as a more accurate and efficient spinal instrumentation technique when compared with freehand and fluoroscopic Methods, with less radiation exposure to the surgeons and theatre staff.

#### Methods

Navigated spinal surgery was introduced to the above spinal unit using a trial O-Arm, courtesy of Medtronic. Introductory issues, surgical learning curve, benefits and risks were analysed throughout the case series. Feedback was sought from the consultant spine surgeons, nursing staff and radiographers postoperatively. The unit's experience with the O-Arm was compiled.

#### Results

11 consecutive cases were performed using intraoperative 3-dimensional imaging, consisting of spinal trauma, metastatic tumour stabilisation and deformity correction. Pedicle screws were navigated whilst instrumenting the cervical, thoracic and lumbar spines, including percutaneously. Staff training, theatre set-up, O-Arm positioning, image quality, 2-dimensional fluoroscopy, 3-dimensional imaging, surgical technique, prior surgeon experience, surgical efficiency, operative time, pedicle screw accuracy and complications encountered, including medial canal breach, and the need for revision screw placement, were identified.

#### Conclusion

Introducing new technologies to a spinal unit carries risk in the introductory period. Surgical technique, efficiency and accuracy have effects on the safety of navigation using the O-Arm throughout the inevitable learning curve.

Means to mitigating risk in the early period are paramount to performing safe surgery and achieving satisfactory outcomes for our patients.

## 1.10

### **Occipitocervical Fusion – An Epidemiological Drift Experienced in an Irish Tertiary Spinal Referral Centre: 20 Years Follow Up Study**

N Tarazi, **S Munigangaiah**, AT Devitt, JP McCabe

Department of Trauma and Orthopaedics,  
Galway University Hospital, Galway, Ireland

#### **Background**

Occipitocervical disease is common in the elderly population, and is on the rise due to an increasingly aging population.

#### **Methods**

We retrospectively reviewed all patients who underwent occipitocervical fusion in our institution over a 20 year period (1996-2016) at a tertiary spinal referral centre. Patients were divided in 2 groups. Group A included all patient who underwent OCF in the first decade between 1996 and 2005. Group B was all patients who underwent OCF in the second decade between 2006 and 2016.

#### **Results**

A total of 23 patients underwent occipitocervical fusion between 1996 until 2016 at our institution. Instability secondary to Rheumatoid arthritis was the leading factor in group A, responsible for 43 percent of cases. In group B, trauma was the leading burden accounting for 44 percent of the cases (7 patients). In contrast to Group A however, only 19 % of OCFs occurred secondary to RA in this group (3 patients). Our fusion rate was 96 percent with a survival rate of 67 percent.

#### **Conclusion**

We noticed a clear epidemiological drift in the cervical spine pathologies requiring OCF during the first and second decade of study period with an increase in prevalence of pathological fractures secondary to metastatic disease. In addition, a drop in rheumatoid cervical disease requiring OCF has been noted.







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## 2.1

### Surgery for Spinal Metastasis in an Irish Tertiary Referral Centre over an 8 Year Period

**FJ McCabe<sup>1</sup>**, M Jadaan<sup>2</sup>, F Byrne<sup>2</sup>, A Devitt<sup>2</sup>, JP McCabe<sup>2</sup>

<sup>1</sup>: Discipline of Surgery, School of Medicine, NUI Galway

<sup>2</sup>: Spine Service, Department of Trauma & Orthopaedics, Galway University Hospitals

#### Introduction

Bone is the 3rd most common site of metastatic cancer, of which the spine is the most frequently involved. With increases in cancer prevalence and survivability, coupled with safer surgical techniques, surgical intervention for spinal metastases is expected to rise. However, these patients are poorly understood, especially in an Irish context. In the first cohort study of spinal metastasis in Ireland, we examine the characteristics of those undergoing surgery for spinal metastasis, including primary types and 1 year post-operative survival.

#### Methods

Retrospective data was gathered on all cases of spinal metastases treated surgically in University Hospital Galway from 1<sup>st</sup> January 2010 to 1<sup>st</sup> of January 2018. These included patients treated surgically with biopsy-proven or MDT consensus malignancy to the spine, Primary spinal tumours and local invasion to the spine were excluded. Data was analysed using SPSS statistical software.

#### Results

196 patients with spinal metastasis were treated surgically in University Hospital Galway from 1<sup>st</sup> January 2010 – 1<sup>st</sup> January 2018. Operations per year increased from 20 per year average in 2010-11 to 29 per year in 2016-17. 54% were male and mean age at surgery was 63 years (SD:12). The most common primary types were breast, myeloma, lung, prostate and renal. Most patients (90%) had a single operation. The 1 year post-operative survival rate was 49%.

#### Conclusion

This study describes the patient and disease characteristics of those undergoing surgical intervention for spinal metastasis. We also show the clinical burden of these patients in our hospital, a tertiary referral centre for medical

oncology, radiation oncology and spine surgery. Given this burden and near 50% 1 year survival following surgery, further research is essential to determine the most suitable candidates for surgery and optimise their outcomes.

## 2.2

### Spinal Tumour Surgery - A Single Centre Experience

**J Sajjad**, J Lord, C Marks, G Kaar, MGJ O'Sullivan

Department of Neurosurgery, Cork University Hospital, Ireland

#### Objective

We report a single centre experience of spinal tumour surgery with an emphasis on epidemiology in 1.6 million population and operative complications.

#### Design

A retrospective audit from 2004 to 2017.

#### Subjects

162 procedures were performed on 139 patients. Male to female ratio was 1:1. The age range was 11 to 83 years.

#### Methods

A neuropathology database was filtered for spinal tumours and patients' medical notes were reviewed retrospectively to collect data.

#### Results

23% (n=37) cases were for glial tumours, 20% (n=33) were schwannoma, 15% (n=24) were meningioma, 13% (n=21) were cysts including dermoid cysts. Metastatic lesions and vascular tumour cases were 6% each, whereas lymphoma and lipoma cases were 4% each. 86 (53%) patients underwent complete resection, 67 (41%) patients underwent debulking, whereas, 9 (6%) patients had biopsy only. 5 (3%) patients had motor weakness postoperatively, whereas the incidence of CSF leak, infection, urinary retention was 0.6% each.

#### Conclusions

The complication rate compares favourably with published literature.



## 2.3

**RUNX2, the Master Regulator of Bone Metastasis?**

**FJ McCabe<sup>1</sup>**, D Courtney<sup>1</sup>, M Jadaan<sup>2</sup>, JP McCabe<sup>2</sup>, MJ Kerin<sup>1</sup>

<sup>1</sup> Department of Surgery, Lambe Institute for Translational Research, NUI Galway

<sup>2</sup> Spine Service, Department of Trauma & Orthopaedics, Galway University Hospitals

**Introduction**

After the lung and liver, the skeleton is the most frequent site of metastasis. Within this, the spine is the major site. Breast primaries account for the second most cases of spinal metastases. However, little is understood about the molecular basis of metastasis to bone.

RUNX2, a bone-specific transcription factor, has been widely proposed as the key regulator of bone metastasis, including of breast cancer. To date however, expression levels of RUNX2 in human tumour cells has been unclear. Our aim was to determine the expression of RUNX2 in primary breast tumours that eventually spread to bone, compared to those that did not.

**Methods**

Primary breast tumours were collected and differentiated into two groups; those from patients that did develop bone metastases, and those from patients that did not. RNA was extracted from these tissues and RUNX2 gene expression analysis was accomplished via RT-PCR. Statistical analysis was performed using Minitab software.

**Results**

27 breast tumours that metastasised to bone, and 20 that did not, achieved adequate RNA concentrations for gene expression analysis. There was no significant difference in RUNX2 expression between those cancers that spread to bone versus those that did not ( $p=0.47$ ). Furthermore, there was no association between RUNX2 expression and tumour size ( $p=0.383$ ), tumour grade ( $p=0.518$ ), histological subtype ( $p=0.603$ ), presentation with metastatic disease ( $p=0.482$ ).

**Conclusion**

In this study, we have determined that RUNX2 is not expressed at higher levels in primary breast cancers that spread to bone. Having established that RUNX2 is not upregulated at the primary

site, we can now advance to comparison of RUNX2 levels in metastatic bone tumours versus breast primaries. This will shed further light on the aetiology and molecular basis of spinal metastasis.

## 2.4

**Hyaluronic Acid Based Hydrogels for the Treatment of Intervertebral Disc Degeneration: a Rat Tail Model**

**Tiernan D<sup>1,2</sup>**, Isa IL<sup>2</sup>, Devitt A<sup>1,2</sup>, Srivastava A<sup>2</sup>, Pandit A<sup>2</sup>

<sup>1</sup>Department of Orthopaedics, Galway University Hospital, Newcastle Road, Galway, Ireland

<sup>2</sup>National University of Ireland, Galway, Newcastle Road, Galway, Ireland

**Introduction**

Intervertebral Disc (IVD) Degeneration is a major cause of lower back with a high degree of morbidity and financial burden. Current treatment modalities consisting of conservative or surgical measures only offer symptomatic relief. Degenerated discs are deficient in proteoglycans and water leading to decreased loading strength and disc height. We believe that implantation Hyaluronic Acid (HA), the backbone for Aggrecan formation, into the Annular Fibrosis (AF) of the IVD will increase the proteoglycan concentration of the disc and its water content.

**Methods**

An implantable HA hydrogel was assembled from Sodium Hyaluronate after cross-linking with 4-arm PEG with amine end-groups. 24 Sprague-Dawley rats were used. The three IVD's of the rat-tail (Co4/5, 5/6, 6/7) were identified under by fluoroscopy and surgically exposed. There was three arms to the study, untreated disc (control), the second had a window of AF excised and a HA hydrogel was implanted (treatment) and the third had the AF window excised but no treatment (sham). There were three time points (7, 28 and 70 days), after which the rats had their IVD height analysed and the animals were sacrificed with the discs analysed for histology and immunohistochemistry.

**Results**

Disc heights in the treated discs were maintained ( $p=0.0002$ ). Histological analysis

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showed a return to the normal environment of the IVD ( $P < 0.0001$ ). MMP3 a matrix turnover gene was down-regulated in the treatment group in relation to the injured group at week ten ( $P < 0.05$ ) and there was an initial increase in BMP-2 in the injured groups in week one ( $P < 0.01$ ).

## Conclusion

Implantation of HA hydrogel helps impede IVD degeneration with restoration of disc height and histological grade of the IVD. There was a down-regulation of MMP-3, in the treated discs compared to the injured. HA hydrogels may provide a useful treatment in the IVD degeneration.

## 2.5

### Management of Osteoporotic Vertebral Fractures in Irish Hospitals

Mark Mc Gowan, Claire Gallagher, **Elaine Hughes**, Michelle Fitzgerald, Caitriona Cunningham

University College Dublin, School of Public Health, Physiotherapy and Sports Science, Belfield

#### Background

Osteoporotic vertebral fracture incidence is increasing with consensus on best clinical management lacking<sup>1,2</sup>.

#### Aim

To explore orthopaedic and physiotherapy (PT) management of stable OVF in acute Irish hospitals.

#### Methods

- i. Survey of Orthopaedic specialist registrars (SpRs) at a national training day.
- ii. Online survey of Physiotherapists working with OVF inpatients at the sixteen trauma hospitals.
- iii. Descriptive statistics using SPSS for analysis.

#### Results

86% (47/55) response from orthopaedic SpRs (15 hospital sites), with 42 Physiotherapy surveys from all targeted hospitals. SpRs (71%) and PTs (57%) reported no written guidance or protocol for OVF management at their site

with PTs either 'unsure' (31%) or reporting no fracture liaison service (39%).

78.7% of SpRs report patients should have a comprehensive inpatient MDT assessment, but referral patterns are inconsistent. Spinal bracing (SpRs 79%; PTs 95%) is commonly prescribed with SpRs reporting 'pain management' (85%) and PTs 'concerns about fracture' stability (85%) as the main indications. PTs reported prescribing exercise for patients with OVF (73%), with the focus on mobility (78%). 68% of SpRs reported not prescribing anti-resorptive bone medications during inpatient phase despite 87.3% believing such tjsi should occur prior to hospital discharge. 68.1% of the SpRs reported that bone health and fracture risk management should not be coordinated and delivered by orthopaedic doctors. 51% of PTs found OVFs more challenging to manage than other fractures, with 59% reporting inadequate literature to support clinical decision making.

## Conclusion

Management of OVFs is not standardised with enhancement of practice required.

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## Ethical Approval

Ethical approval was granted from the University College Dublin Human Research Ethics Committee.

## 2.6

### What is the Perfect Pathway to Enhance Patient Care in the Management of Osteoporotic Thoracolumbar Fractures?

**Dr Pedro Ferreira**<sup>1</sup>, Mr. Nagy Darwish<sup>2</sup>

<sup>1</sup> CT2 General Surgery, Belfast Health and Social Care Trust

<sup>2</sup> Spinal Surgery Consultant, Belfast Health and Social Care Trust



## Introduction

Osteoporotic thoracolumbar fractures are very common, especially in an increasingly older population (~40% prevalence).

The current pathway is that these patients are referred to a spinal surgery specialist and, if treated conservatively, have a follow-up 4-6 weeks later. This generally requires an ambulance trip, which is often long since the whole N. Ireland population is covered by a single spinal centre.

## Aim

We propose that treatment can be done locally and only referred to specialist care in case of concern.

## Methods

Retrospective study of all new referrals seen in the spinal clinics at the Royal Victoria hospital between October 2017 and March 2018 - 395 patients.

The segmental kyphotic angle was compared between imaging at diagnosis and in clinic.

We've excluded patients: younger than 65yo; with neoplastic/metastatic fractures; with associated myopathy/neuropathy; whose clinic letter was not typed (n=2).

N = 109 patients

## Results

20% discharged at 1st encounter. Spinal bracing was appropriate for 45% but no patients were offered surgical intervention. The mean segmental kyphotic angle increased 5.25°.

## Discussion

There was an increase in the mean segmental kyphotic angle but with minimal significance.

Surgical intervention was not deemed necessary for any of the patients, being analgesia (including bracing for comfort) and physiotherapy the treatment modalities of choice.

We believe this patient group can be managed locally and only referred to a specialist clinic if meeting defined criteria. This should be less cumbersome for all involved.

# 2.7

## The Effect of the Erector Spinae Plane Block on Post-Operative Opioid Consumption in Patients Undergoing Lumbar Spine Decompression Surgery: A Comparative Pilot Study

**M Elhadi**, J McDonnell, J P McCabe

Department of Orthopaedic Surgery, Bon Secours Health System Galway, National University of Ireland, Galway

## Background

The Erector Spinae Plane (ESP) Block involves local anaesthetic injection into the fascial plane, deep to the erector spinae muscle. This safe and simple technique blocks the dorsal and ventral rami of the spinal nerves(1) and has been shown to be effective in the management of pain after lumbar spine surgery(2).

## Aims

To compare post-operative total opioid consumption (TOC) in patients who have undergone lumbar spine surgery with an ESP block versus patients who did not.

## Methods

A retrospective comparative study was conducted on 30 patients. All patients underwent either single level or two-level lumbar spine decompression surgery. Group A(n=11, 7 males, 4 females) consisted of patients who had bilateral US-guided ESP block whereas Group B(n=19, 11 males, 8 females) did not. There was no significant difference between the characteristics of patients in each group. Opioid medication that was administered in the post-operative period was converted to the morphine equivalent dose and then summated to calculate the TOC per patient. SPSS software was used for statistical analysis and a Mann-Whitney U test was conducted to test for statistical significance.

## Results

The median TOC in group A was 171mg (IQR 104-296mg). Group B had a median of 320mg (IQR-208-394mg). There was a statistically significant difference between the two groups (U=158, P=0.021).

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## Conclusion

The preliminary data presented is part of an ongoing study that has demonstrated the potential of the ESP block in reducing postoperative opioid consumption. This has encouraged us to continue utilizing the ESP block in the management of pain post-lumbar spine surgery.

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## 2.8

### Using Ultrasound Scans to Measure Longitudinal Growth of Magnetically Controlled Growing Rods

M Mohamed<sup>1</sup>, J Alsousou<sup>1,2</sup>, M De'Matas, **S Munigangaiah**<sup>1</sup>, J Trivedi<sup>1</sup>, C Bruce<sup>1</sup>, N Davidson<sup>1</sup>

<sup>1</sup> Alder Hey Children's Hospital NHS Foundation Trust, E Prescott Road, Liverpool, UK L14 5AB

<sup>2</sup> University of Liverpool, Liverpool L69 3BX

## Introduction

Magnetically controlled growing rods (MCGR) are used in the management of early onset scoliosis. Unlike traditional growing rod spinal system the theoretical advantage is the fact that the extension of the rod can be conducted in clinic environment without the need for repeat surgery. This requires repeated radiographs to assess rod extension increasing patient's ionizing radiation exposure. Ultrasound may offer a safe non-invasive alternative. Purpose of this study was to investigate ultrasonography measurement of rod extension and compare it to radiographic assessment.

## Material and Methods

This is a retrospective review of all the patients who have had MCGR at Alder Hey children's hospital. Standardised method was used to assess rod extension using ultrasonography and radiographs. Inter and intra-observer assessment was performed. Patients were reviewed every 3 months

up to 30 months. Magnetically controlled extension was undertaken at each follow up followed by ultrasonography and radiographic measurement.

## Results

30 patients (16 females and 14 males) with average age of 7.6 years (4-12) underwent MCGR surgery. 6 patients excluded (1 fractured rod, 1 infection, 4 did not have radiographs to compare). Linear regression analysis showed perfect fit between radiographic and ultrasonic measurements at each time ( $R^2$  0.723). The two measurements distribution was not different ( $p$  0.001).

## Conclusion

Ultrasonography is comparable to radiographs in the assessment of magnetic rod extension and can be used instead to reduce the exposure to ionizing radiation. We use ultrasonography every 3 months to assess rod extension and only get radiographs every 9 months for assessment of overall spinal alignment.

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## 2.9

### Operative Management of Perinatal Lumbar Disc Herniation and Cauda Equina Syndrome: A Case Series

**Daniel P Ahern**<sup>1</sup>, Denys Gibbons<sup>2</sup>, Michael Dodds<sup>1</sup>, Marcus Timlin<sup>1</sup>, Noelle Cassidy<sup>1</sup>, Seamus Morris<sup>1</sup>, Keith Synnott<sup>1</sup>, Joseph S Butler<sup>1,2</sup>

<sup>1</sup>National Spinal Injuries Units, Department of Trauma & Orthopaedic Surgery, Mater Misericordiae University Hospital, Dublin, Ireland

<sup>2</sup>Spine Service, Department of Trauma & Orthopaedic Surgery, Tallaght University Hospital, Dublin, Ireland

## Introduction

Symptomatic lumbar disc herniation is a rare cause of lower back pain in pregnancy. Cauda equina syndrome, which may result from a herniated lumbar disc, is one of the few spinal emergencies with potentially devastating neurological sequelae. Perinatal lumbar discectomy for symptomatic lumbar disc herniation or cauda equina syndrome is a rare clinical scenario due to the rarity of this

presentation combined with the infrequent rate of non-obstetric surgery in the pregnant population. This case series outlines the surgical management of this clinical scenario at a national tertiary referral centre over a 10-year period.

## Methods

A retrospective review of all females who underwent discectomy / decompression for lumbar disc herniation or cauda equina syndrome in the perinatal period at a national tertiary referral centre for spine surgery over a 10-year period between January 2008 to December 2017.

## Findings

There are 6 cases of perinatal lumbar disc herniation or cauda equina syndrome requiring surgical intervention. 2 cases occurred in the 1st trimester, 1 in the 2nd trimester, 1 in the 3rd trimester and 2 in the early postpartum period. All patients were successfully managed with surgical decompressive procedures and recovered well in the postoperative period without complication.

## Conclusions

The principles of management and indications for surgical intervention remain the same in the pregnant and non-pregnant populations, although treatment options are complicated by the desire to avoid risk to the developing foetus. Surgical intervention is safe to both mother and baby in the perinatal period and if performed promptly is associated with an excellent functional outcome.

## 2.10

### Thoracolumbar Junctional Fractures and the Rock Climbing Wall: A Case Series

**Ms Rosanne-Sara Lynham, Mr Marcus Timlin**

National Spinal Injuries Unit, Mater Misericordiae University Hospital Dublin

Extreme sports have never been so popular nor the access to partake so widespread. It has been estimated that more than 2 million Europeans routinely go rock climbing with more than half of those using an indoor wall for training/practice.<sup>1</sup> Given this level of interest, and the evident psychological benefits from extreme

sports this number is only set to rise.<sup>2</sup>

This popularity however comes with great personal risks, trauma in extreme sports have often been linked with specific injuries, and the morbidity of these activities is unexpectedly high.<sup>3,4</sup> In particular the traumatic spinal injuries from falls are often complex and leave a patient with life-changing disabilities.<sup>5,6,7</sup>

We in the National Spinal Injuries Unit have noticed an anecdotal increased in the number of referrals of these injuries, in particular those from an indoor rock-wall and so set out to evaluate if a pathognomonic injury pattern existed in this cohort.

In the six months from February 2018 to August 2018 a total of 9 indoor rock wall climbing injuries were noted. All sustained a fall of greater than 10 feet and of the 9, 8 patients (88.8%) sustained a thoracolumbar junctional fracture, T10-L1.

Though the numbers in this case series are not statistically significant the injury pattern is worthy of being highlighted. We would hope that this fracture pattern may become more highly recognised as a potentially differential diagnosis in this patient cohort.

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