BEST SURGICAL PODIUM PRESENTATION AT BRITSPINE 2014

"A Northern Ireland retrospective review of lumbar fusion: efficacy of intrathecal vs epidural administered anaesthesia on post-operative pain"

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Introduction
In Northern Ireland Lumbar fusion surgery is performed under general anaesthetic. In addition to midline and Wiltse approach practices vary for intraoperative anaesthetic administration. We identified 3 groups of patients who received: (A) intrathecal diamorphine (B) epidural diamorphine (C) no diamorphine.

Objectives
To compare pain control, for the first 48 hours post-operatively, in patients undergoing lumbar spinal fusion.

Methods
A retrospective review of all patients undergoing elective lumbar spine fusion over a one-year period between October 2012 - 2013. All consecutive patients undergoing lumbar fusion were identified and case notes were reviewed to identify intra-operative analgesic regimen, peri-operative analgesic requirements, pain scores and length of stay.

Results
66 consecutive patients. 54 % were female. Average age of 52 (29–84), average BMI 30.5 (24-37.3), average length of stay was 6.6 days (2-28 days). 11.5 % had a Wiltse approach with the remaining cases being done via a direct posterior approach. 12 % of surgeons administered local anaesthetic prior to skin incision with 46% of surgeons infusing local anaesthetic locally at the end of surgery. Intra-operatively, (A) 42% of patients received 500 ug Diamorphine intrathecally, (B) 19% received 5mg Diamorphine into the epidural space and (C) 39% of patients did not receive diamorphine. There was no significant difference between the time of patients' first pain trigger and the use of intrathecal or epidural diamorphine. The use of intraoperative diamorphine did not alter postoperative analgesic requirements. The overall pain scores for patients receiving intrathecal diamorphine were initially lower than those patients receiving epidural diamorphine, however this was not associated with lower post-operative analgesic requirements, in the first 48 hours.

Conclusions
The use of intraoperative intrathecal or epidural diamorphine does not appear to significantly alter the postoperative analgesic management of patients undergoing spinal fusion. Those patients undergoing fusion through a Wiltse approach have lower pain scores.

BEST NON-SURGICAL PODIUM PRESENTATION AT BRITSPINE 2014

"A systematic review of interventions for preventing and treating low-back and/or pelvic pain during pregnancy"

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Purpose
To assess the effects of interventions for preventing and treating LBP and/or pelvic pain during pregnancy.

Methods
The Cochrane Pregnancy and Childbirth and Back Review Groups' Trials Registers were searched to July 2012 for randomized controlled trials (RCTs) of any intervention. The review authors independently assessed risk of bias and extracted data. The quality of the evidence was assessed using criteria outlined by the GRADE Working Group.

Results
Twenty-six RCTs (N = 4093) were included. The quality of the evidence for LBP interventions was either low or very low. Exercise, in general, significantly reduced pain (six RCTs, N = 543), disability (two RCTs, N = 146) and sick leave (one RCT, N = 241); however, there was no difference in either pain relief or functional improvement between two types of pelvic support belt, or between osteopathic manipulation (OMT), usual care, or sham ultrasound. There was moderate-quality evidence that acupuncture significantly reduced evening pelvic pain better than stabilizing exercises, and low-quality evidence that acupuncture was significantly better than sham for improving evening pelvic pain and function, but not average pain. For lumbo-pelvic pain, low-quality evidence suggested that exercise significantly reduced sick leave (two RCTs, N = 1062) and when combined with manual therapy and education, improved pain and function; acupuncture improved these outcomes more than usual care or physiotherapy, particularly if started at 26- rather than 20-weeks' gestation, as did OMT. There were conflicting results for prevention of pelvic or lumbopelvic pain. Adverse events were minor and transient.

Discussion
Despite the addition of 18 new trials to this review, the quality of evidence on this topic has not improved since 2007; no outcomes were supported by high-, and only three by moderate-quality evidence. Clinical heterogeneity of population, interventions, comparisons and outcome measures precluded most meta-analyses.

BEST SURGICAL POSTER PRESENTATION AT BRITSPINE 2014

"Impact of Elite Sports Participation on Active Cervical Spine Range of Motion in Men"

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Purpose

High achievement in sport associates with specialisation, intense training and performance. This can be the perfect environment for repetitive, cumulative relatively minor injury which can result in altered functional capacity [1]. Active cervical range of motion (ACROM) assessment is a non-invasive, simple and reliable way to study altered function in the cervical spine of elite sportsmen [2].

Methods

ACROM in flexion/extension was recorded from elite athletes: (Professional Ice Hockey and Rugby Union, UK collegiate American football and international swimmers) using the method of Lark & McCarthy [1]. ACROM of players was compared to that from age and sex matched active (control) subjects.

Results

Table 1	Flex	Ext	Tot	Flex:ext
Control	54 ± 9	77 ± 3	131 ± 21	0.7 ± 0.1
American Football	55 ± 8	66 ± 7	121 ± 15	0.8 ± 0.2
Ice Hockey	52 ±13	68 ±15	119 ± 21	0.8 ± 0.3
Rugby Forwards	46 ± 3*	43 ± 9*	89 ± 12*	1.1 ± 0.1*
Swimmers	66 ± 10	69 ± 8	136 ± 12	1.1 ± 0.2*

Table 1

ACROM (flexion, extension and total) presented with proportion of flexion compared to extension for each group: reported as degrees (mean ± 1 Standard deviation: *= $p<0.05$ compared to controls).

Conclusions

Rugby union players have the lowest extension and flexion with swimmers not appearing to be affected; however the ratio indicates a more central positioning in the neutral head position.

References

1. Lark SD, McCarthy PW. Cervical range of motion and proprioception in rugby players versus non-rugby players. Journal of Sport Sciences 2007, 25: 887 – 89.
2. Youdas JW, Garrett TR, Suman VJ, Bogard CL, Hallman HO, Carey JR. Normal Range of Motion of the Cervical Spine: An Initial Goniometric Study. Physical Therapy 1992, 72:770-780.

BEST POSTER PRESENTATION AT BRITSPINE 2014

"Inducing bone production in the degenerate intervertebral disc: an alternative to invasive fusion procedures?"

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Purpose

Recent research has focussed on the development of biological repair strategies for the degenerate intervertebral disc (IVD), but little attention has been given to developing a technique for inducing bone formation within the disc. Fusion procedures have been described as the 'gold standard' treatment for back pain associated with IVD degeneration, but these are invasive, painful and expensive. This study aimed to determine if cells in degenerate discs could be directed towards osteogenesis and so have the potential to drive a biological fusion in situ.

Methods

Human IVD cells and bone marrow mesenchymal stem cells (MSCs) were isolated from disc herniation or back pain patients (IVD n=45, MSC n=4) and assessed for stem cell markers by flow cytometry (positive for CD73, 90 and 105 and negative for CD14, 19, 31, 34, 45 and HLA-DR) and sections of disc tissue were immunohistochemically stained for progenitor cell markers. Cells were grown in monolayer for 21 days in 'osteogenic' medium (including 100nM dexamethasone, 10nm ß-glycerophosphate and 50µM L-ascorbic acid-2-phosphate) or with the addition of 1,25 dihydroxyvitamin D3 (0.1, 1 or 10nM). Calcification was assessed by production of alkaline phosphatase.

Results

The MSCs and IVD cells had typical stem cell markers, demonstrated both with flow cytometry and immunohistochemistry. In addition, the cultured IVD cells differentiated and produced mineralised matrix, when grown with either osteogenic medium or vitamin D3 (in a dose dependent manner), though not to the extent of the MSCs.

Conclusion

This study indicates that a stem cell population is present within degenerate IVDs and is capable of differentiating along an osteogenic lineage. Further investigation is required to determine the optimal method of inducing bone formation by the degenerate IVD cells, but these results are encouraging for the development of a biological fusion technique in the future.

BEST PRESENTATION BY A SURGICAL TRAINEE AT BRITSPINE 2014

"Validation of the Oswestry Spinal Risk Index"

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Purpose

The purpose of this study was to validate the recently published Oswestry Spinal Risk Index Score (OSRI) in an external population, to predict survival in patients with Metastatic Spinal Cord Compression (MSCC).

Methods

We analysed the data of 100 patients undergoing surgical intervention for MSCC at a tertiary unit and recorded the primary tumour pathology and Karnofsky Performance Status to calculate the OSRI.

Results

Logistic regression models and survival plots were applied to the data in accordance with the original paper. Lower OSRI scores predicted greater survival. The OSRI score predicted survival accurately in 74% of cases (p=0.004). Conclusions Our study has found that the OSRI is a significant predictor of survival at levels similar to those of the original authors and is a useful and simple tool in aiding complex decision making in patients presenting with MSCC.

BEST PRESENTATION BY A NON-SURGICAL HEALTHCARE PROFESSIONAL AT BRITSPINE 2014

"Spinal fusion is associated with increased adjacent segment disc degeneration but without influence on clinical outcome. Results of a combined long-term follow-up from 4 RCTs"

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Purpose
There is ongoing debate as to whether adjacent segment disc degeneration results from the increased mechanical stress of fusion. We analysed long term follow-up (LTFU) data from four randomized controlled trials of operative versus non-operative treatment for chronic low back pain to examine the influence of spinal fusion on adjacent segment disc space height as an indicator of disc degeneration at LTFU.

Methods
Plain standing lateral radiographs were taken at 13±4 years follow-up in 229/464 (49%) patients randomized to surgery and 140/303 (46%) to non-operative care. Disc space height and posteroanterior displacement were measured for each lumbar segment using a validated computer-assisted distortion compensated roentgen analysis (DCRA) technique. Values were reported in units of standard deviations (SDs) above or below age and gender-adjusted normal values. Patient-rated outcomes included the Oswestry Disability Index and pain scales.

Results
Radiographs were usable in 355/369 (96%) patients (259 fusion and 96 non-operative treatment). Both treatment groups showed significantly lower values for disc space height of the adjacent segment compared with norms. There was a significant difference between treatment groups for the disc space height of the cranial adjacent segment (in both as-treated and intention-to-treat analyses). The mean treatment effect of fusion on adjacent segment disc space height was -0.44 SDs (95% CI, -0.77 to -0.11; p=0.01; as-treated analysis); there was no group difference for posteroanterior displacement (0.18 SDs (95% CI, -0.28 to 0.64, p=0.45)). Adjacent level disc space height and posteroanterior displacement were not correlated with Oswestry or pain scores at LTFU (r=0.010-0.05; p>0.33).

Conclusion
Fusion was associated with lower disc space height at the adjacent segment after an average of 13 years follow-up. However, the reduced disc space height had no influence on patient self-rated outcomes (pain or disability).

PRESENTATION JUDGED TO BE THE MOST INNOVATIVE AT BRITSPINE 2014

"Self-organising biomimetic collagen/nano-HA/GaG scaffold for spinal fusion"

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Purpose

Degenerative conditions of the spine are common throughout the world, leading to chronic and often severe back pain. Spinal fusion often has a role to play in treatment, but can be associated with complications such as pseudoarthrosis and donor site pain in cases where an autograft is used, therefore driving the search for alternative treatments. We are studying the recapitulation of the extracellular matrix of normal bone using an osteoconductive scaffold together with osteoinductive agents, in an attempt to develop a novel targeted therapy for use in degenerative and age-related vertebral conditions.

Methods

A biomimetic strategy was employed to fabricate a collagen/hydroxyapatite/glycosaminoglycan scaffold. This was characterised using scanning electron microscopy (SEM), atomic force microscopy (AFM) dynamic scanning calorimetry (DSC), micro-CT, multiphoton spectroscopy and mechanical testing. Scaffolds were seeded with human mesenchymal stem cells (hMSCs). Proliferation assays and quantitative gene expression (using RT-PCR) were performed to study stem cell growth and osteoblastic differentiation (levels of BMP-2, RUNX2, osteocalcin).

Results

A self-organising collagen/nano-hydroxyapatite/GAG scaffold was fabricated and micro-CT and SEM confirmed a heterogeneous, porous structure with a mean pore diameter of 150-200µm. Viable hMSCs were visualised within the scaffold and RT-PCR showed an increase in expression of markers of osteogenesis. The denaturation temperature of the scaffold was 52degreesC, therefore above that of body temperature, reflecting potential protection from proteolytic enzymes.

Conclusion

We have successfully synthesised a novel collagen-based scaffold using a biomimetic strategy. This is biocompatible and promotes bone formation. Further studies, including in vivo work, are required to assess the clinical utility of this scaffold.

PRESIDENT'S PRIZE FOR OUTSTANDING SCIENTIFIC CONTRIBUTION AT BRITSPINE 2014

"Spinal deformities in muccopolysaccharidosis type 1 (Hurler's) patients in the era of Bone Marrow Transplant"

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Purpose

There is a paucity of literature regarding spinal deformities in Mucopolysaccharidoses type 1(MPS1) Hurler's syndrome patients. A gibbus has been commonly associated wit MPS1 and suggestion that its presence in less than one year of age is pathognomonic. We analysed the Irish population of Hurler's to evaluate the incidence and delineate radiological parameters in the era of Bone Marrow Transplant (BMT).

Methods

Between 1989 and 2013 we retrospectively analysed 51 MPS1 patients. Lateral whole spine x-rays were reviewed. Thoracic(T5-T12) kyphosis, lumbar(L1-S1) lordosis Cobb angles and angles at the gibbus was measured. Cervical spine pathology incidence was noted.

Results

51% male and 49% female patients. Average age at review was 12.65 years. Mean age of radiological evidence of a spinal pathology was 7months. Documented incidence was 94%. Mean levels of first recorded gibbus was 10months most commonly at L1 followed by L2. Mean cobb at gibbus 56degrees. Mean thoracic kyphosis 14degrees. Mean lumbar lordosis 32 degrees. Cervical subluxation was present in only 1 but 28% had hypoplasia of the odontoid. 5 required casting or brace. 3 patients had growing rods inserted and 1 went on to final posterior spinal fusion. Mortality was 23%(mean age of 17months).

Conclusion

An overwhelming majority have a gibbus often diagnosed radiographically before the age of one . Orthopaedic intervention maybe be required when there is progressively worsening gibbus kyphosis of >40 degrees for improvement of quality of life due to increasing life expectancy in the era of BMT.