

ROUNDUP³⁶⁰

Spine

For other Roundups in this issue that cross-reference with Spine see: [Trauma Roundup 6](#); and [Research Roundups 1, 5 and 6](#).

Surgeon outcomes: a hot potato!

■ In what is possibly one of the more controversial papers we have seen this year, researchers in **Cleveland (USA)** set out to establish patient outcome data based on who performed the surgery, rather than how it was performed or who the patient was.¹ The study team set out to establish if there is a relationship between primary specialty of training and outcomes in spinal surgery. Using elective spinal fusion and laminectomy as a representative study cohort, the research team used the American College of Surgeons National Surgical Quality Improvement Project database which consists of 50 361 patients, of whom 33 235 were operated on by a neurosurgeon. In an attempt to establish any differences in outcome based on primary specialty training (neurosurgical or orthopaedic), the study team propensity-matched 17 126 patients who underwent surgery with an orthopaedic surgeon to 17 126 patients who underwent surgery with a neurosurgical surgeon. As with all database-based studies, the outcome measures are limited to data actually recorded on the database, meaning that outcomes were assessed as transfusion requirements, length of stay and complications. The orthopaedic surgical cohort appeared on the face of it to have higher rates

of complications, transfusions and required ongoing care on discharge. However, after propensity matching, many of these differences disappeared, suggesting the orthopaedic cohort were either more complex patients, or had higher pre-operative comorbidities. However, there was still double the chance of requiring a post-operative transfusion and slightly higher odds for increased length of stay although no higher complication rates in this cohort. Although there were no differences found in the outcomes, once propensity matching had been undertaken there were some marked differences in the surgical cohorts, with a higher rate of complications and transfusion in the orthopaedic cohorts.

Complications and scoliosis surgery

x-ref **Children's orthopaedics**

■ Adolescent idiopathic scoliosis is a common indication for spinal surgery in children and although commonly performed, complications - when they arise - can be catastrophic. There is little known about the risk factors associated with complications or the necessity for readmission or further surgery. Researchers in **New Haven (USA)** examined their cohort of 733 patients, all aged 11 to 18 and undergoing posterior spinal fusion with instrumentation for adolescent idiopathic scoliosis.² Outcome data were extracted from the American College of Surgeons National Surgical Quality Improvement Program® (ACS NSQIP®) Pediatric database, and complications

were classified as 'adverse events' or 'severe adverse events'. The overall complication rate was relatively low, with 6% of patients experiencing a complication of some form, 3.7% experiencing adverse events and 2.6% serious adverse events. There was a strong association between increased BMI and complications (OR 3.31), with extended surgical instrumentation (greater than 13 levels) also associated with increased length of stay, as was operative times of more than six hours. Re-admission rates were low at around 1% and most commonly for surgical site infection. Given the high level of disability and morbidity associated with complications following scoliosis surgery, this paper underlines the importance of the management of obesity prior to undertaking extended and complex surgery in adolescents.

Is sequestrectomy enough in lumbar disc prolapse?

■ Researchers in **London (UK)** have reviewed the literature surrounding lumbar discectomy.³ There is some division in thought as to the best way to manage patients who have a lumbar disc prolapse. Where the traditional approach has been removal of the sequestered fragment and decompression of the disc, there is a counter view that removal of the sequestered fragment will resolve the symptoms and that clearance of the intervertebral space is not required. The study team undertook a systematic review with the aim of establishing if there were any differences in outcomes which they

defined as patient-reported levels of radicular pain and reherniation rates. The review team were able to identify seven publications that fulfilled their inclusion criteria and were level II evidence or above and a follow-up rate of 75% or greater. The systematic review evaluation of outcomes established that there were no differences in overall outcomes with VAS scores of 5.6 to 6.5 in the microdiscectomy group and 5.5 to 6.6 in the sequestrectomy group. The reherniation rate was comparable between the microdiscectomy (2.3% to 11.8%) and sequestrectomy (2% to 12.5%) groups. Although not completely bullet proof, this review nicely summarises the comparison between these two competing philosophies. Currently at least, there does not appear to be a massive amount to choose from between the two approaches, with comparable recurrence rates we would tend to agree with the authors that, as things stand, the choice of sequestrectomy alone is appropriate, particularly if there is little in the way of breach to the posterior fibrous ring.

Predicting outcomes in lumbar disc herniation

■ In an interesting take on secondary analysis from randomised controlled trials, investigators from **Dartmouth (USA)** have undertaken an assessment of predictive factors for outcomes in both operated and non-operative treatment of lumbar spine disc herniation.⁴ There are few studies such as this where predictors of outcome have been assessed within the

setting of a randomised controlled trial and we commend the authors for the quality of their study design. The study in question is SPORT (Spine Patient Outcomes Research Trial) which has spawned a large number of papers, including this one which is reported eight years after the initial study. The researchers included 501 patients from 13 different clinical sites who were randomised using a block randomisation system to either surgical or non-operative treatment of their lumbar disc prolapse. All patients were symptomatic for at least six weeks prior to presentation and of the 501 randomised to an intervention, 309 were available at eight years of follow-up. A second cohort of patients who declined inclusion in the study were recruited to an observational group; of these, 469 of 743 patients were available at eight years of follow-up. There was significant crossover in the study groups, with only 60% of patients randomised to surgery actually having undergone surgery, and 50% of those managed initially non-operatively requiring subsequent operation. The study itself used primary outcome measures of the SF-36 and Oswestry Disability Index. This analysis was undertaken using all collected potential predictors of long-term outcomes including demographic factors, herniation location, psychological symptoms/depression, work status, duration of symptoms and smoking. The outcomes of the SPORT trial overall were that an intention-to-treat analysis demonstrated no differences between the groups (hardly surprising given the high crossover rates), where an as-treated analysis demonstrated significant advantage for surgery in all primary outcome measures. In terms of comorbidities, patients who had a history of smoking, other joint conditions or depression had poorer overall outcomes irrespective of treatment allocation although surgery had a similar treatment effect. In those patients who suffer with visible sequestered fragments on an MRI scan, a longer duration of symptoms (longer than

six months) and high levels of lower back pain did particularly well with surgery, as opposed to conservative treatment, and a larger treatment effect was seen.

Sympathectomy has a direct effect on the dorsal root ganglion

x-ref Research

■ In an innovative animal model-based research study, a basic science team in **Sapporo (Japan)** set out to establish if sympathectomy had the ability to alter animal pain behaviours and the electrical properties of the dorsal root ganglia.⁵ The research team used a Sprague-Dawley rat model of lumbar nerve root constriction. The rats were treated in three groups: in one, the left L5 nerve root was ligated to the radiculopathy model; in a further group, the nerve root ligation plus sympathectomy was undertaken; and in the control group no procedures were performed. Outcomes were assessed using behavioural analysis and mechanical and thermal stimulation. Subsequently, the excitability of the dorsal root ganglia was measured by a whole-cell patch clamp method. The behavioural analysis was fairly conclusive, with the sympathectomy attenuating the allodynia and thermal hyperalgesia seen in the lumbar root constriction model. Perhaps most interestingly, the electrophysiological analysis suggested that in the nerve root constriction model, hyper-excitability of the single dorsal root ganglion cells was seen, with a prolonged action potential associated with a lower threshold current alongside a depolarised resting potential and more depolarising frequency. All of these changes were attenuated in the sympathectomy group. The



role for sympathectomy in persistent radicular-type pain is far from clear, however, this study certainly supports the potential for sympathectomy as a therapy in patients in whom there is no other treatment option and also suggests a plausible mechanism of action for this to work. More studies are definitely warranted here – a plausible treatment for intractable radicular pain would be welcome.

Distal extensions of fusion in adolescent idiopathic scoliosis

■ The precise levels of fusion and how patients fare with adolescent idiopathic scoliosis (AIS) is very much undecided. While most centres now routinely agree that a posterior instrumentation with a pedicle screw construct is best for treating AIS, the levels and numbers of instrumented levels are still very much up for debate. Spinal surgeons in **Edinburgh (UK)** set out to establish if extension beyond the limit of the curve (i.e. to include the proximal and distal end vertebrae) was preferable or not in the treatment of scoliosis.⁶ They included in their cohort study a group of 72 patients, all treated for AIS with a posterior spinal fusion using unilateral convex segment pedicle screw technique. Outcomes were assessed in all cases using the Scoliosis Research Society outcome questionnaire pre- and two years post-operatively. There were 53 patients who underwent limited fusion (not beyond the proximal and distal end vertebrae) and 19 who underwent extension distally beyond the caudal limit vertebrae. Across the group an excellent correction of 80% (45% to 100%) was achieved and there were differences in five radiographic pre-operative parameters, which were noted between the groups (as would be expected

in a selective cohort series where there is an element of selection bias). Slightly confusingly, the research team decided to produce a regression model based on these parameters to decide if a distal extension was required in the scoliosis correction – they were able to do this with 81% accuracy. Where this methodology falls down significantly, is that it is simply a model predicting what the treating surgeons did, not describing which patients required distal extension. While the authors state that their equation reliably selects which patients require distal extension, in fact it predicts which patients in their series would have had a distal extension, not if it were required. What the authors have been able to reliably state is that functional outcome scores are not prejudiced in the duration of their study by the inclusion of a longer posterior spinal fusion.

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