

ROUNDUP³⁶⁰

Spine

Japanese neck disability index

■ Following the lead of their arthroplasty colleagues (or perhaps the other way round), this month's 360 sees the second report of validation of a Japanese version of an outcome measure. This time it is the neck disability index (NDI). Outcome scores are notorious for their difficulty in application to different cultures and nations, and must be separately validated, often with modified questions for each nation. Major outcome scores such as the SF-36 have versions for the majority of different nations, whereas less widely used scores do not. It is encouraging to see two Japanese-specific scores in this edition of 360. The NDI is a patient reported outcome measure (PROM) aimed specifically at assessment of neck pain. The investigators from **Tokyo (Japan)** designed a validation exercise for the Japanese version of the NDI (JNDI). The researchers undertook two interval surveys of 130 patients known to have symptoms of neck pain, radiculopathy or myelopathy. The questionnaires were administered at eight-week intervals. In addition to the JNDI, a modified version with more accurate translation, the Japanese Orthopaedic Association Cervical Myelopathy Evaluation Questionnaire, SF-36, and an anxiety and depression index were collected to give measures of validity. At interval examination the patient global impression of change (PGIC) was used to establish actual change. These measures were used to assess

the internal consistency, criterion validity, discrimination validity and reliability. The investigators found both the JNDI and the modified version to have high concordance in all domains. There was a higher correlation with reported numbness and mental health domains of the quality of life scores with the modified JNDI, and the effect sizes were 0.6 for both scores.¹ The investigators have effectively demonstrated the validity, reliability and internal consistency of the JNDI score, in both its original and modified forms, for the Japanese population with a range of neck and upper limb symptoms.

Adjacent segment degeneration is a genuine problem

■ A concern with any orthopaedic procedure is the effect of changing the biomechanics, with the potential to cause subsequent symptoms in previously unaffected joints. This is particularly an issue with spinal instrumentation where the stiffening of one segment can result in adjacent segment disease (ASD). The incidence and disease burden of ASD are widely reported in the literature, but only in a large number of small trials, an ideal situation for a meta-analysis. A study team in **Nantong City (China)** performed a meta-analysis of available studies in the literature with the aim of identifying the incidence of, risks for, and implications of, adjacent segment disease. The research team used MedLine to identify 95 studies reporting the results of 34 716 patients for inclusion.

They used a pooled analysis and a random effects model to perform the meta-analysis. The researchers found the incidence of reported ASD varied from 4.8% to 92.2% with a pooled incidence of 1:3 (29.3%, 95% CI 22.7% to 35.8%). The prevalence seen on radiographs varied by spinal segment (32.8% cervical, 26.6% lumbar) although the disease burden was much lower with between 6.3% (cervical) and 8.5% (lumbar) of clinically symptomatic disease. The research group noted the reported radiological incidence increased with time (21.8% < 2 years *versus* 37.4% > 5 years), but not symptomatically, with – curiously – a lower rate of symptomatic segments at five years than two (6.5% *versus* 3.2%).² It is startling to us here at 360 that this is the first meta-analysis of such data, given the large number of reports in the literature, the wide variance in incidence between reports, and the relative frequency of symptomatic adjacent segment degeneration.

Sacroiliac loads determined by limb length discrepancy

■ The increasing complexity of computer modeling is allowing surgeons to delve ever more closely into the biomechanical workings of the human body in health and disease. Originally the domain of tribologists and implant designers, we are seeing (and welcoming) more and more finite element analysis models of musculoskeletal disease. Although certain assumptions are made, the ability to accurately model the interaction between musculo-

skeletal tissues can give an in-depth knowledge of the disease process which previously has been impossible. Researchers in **Toledo (USA)** have done just this and seized the opportunity to apply relatively new technology to the problem of limb length discrepancy. They used a finite element analysis model to examine the effect of leg length discrepancy on loads across the sacroiliac joints. The investigators varied the leg length discrepancy in the model between 1 cm and 3 cm, and calculated the loads and peak stresses across the joints. The variation in loads and peak stresses was found to progressively increase with increasing leg length discrepancy. As limb length discrepancy appears to give rise to biomechanical increased stresses at the sacroiliac joint, it can be assumed that addressing the leg length discrepancy should resolve subsequent symptoms. The authors recommend addressing the discrepancy early to help address the problem.³ This study certainly raises an interesting issue as to when one should intervene with leg length discrepancy. The majority of orthopaedic surgeons would accept a discrepancy of up to 2 cm without intervening, but perhaps for those that are symptomatic we should offer simple treatments such as a shoe raise.

Epidural steroid does not improve outcome in lumbar disc herniation

■ One of the most controversial aspects of spinal surgery is the use of lumbar epidurals and

nerve root blocks to treat lumbar disc herniation, or radicular type symptoms. There are precious few randomised controlled trials in spinal surgery, and we were pleased to see this subgroup analysis of the Spine Patient Outcomes Research Trial (SPORT). Researchers from **Philadelphia (USA)** performed a subgroup analysis of the SPORT which was a prospective randomised controlled multicentre study evaluating operative *versus* non-operative treatment of lumbar intervertebral disc herniation. The authors addressed the question of epidural injections with two outcome measures, that of crossover from one study group to the other, and patient outcomes. This subgroup analysis included 154 patients who had received a lumbar epidural steroid injection (LES) in the first three months of the study and 453 patients who had not. The research team reported a significant difference in the preference for surgery between the two groups (19% in those who had had a steroid *versus* 56% in those who had not), but there was no difference in outcome measures at 4-year final follow-up. There was also a significant difference in crossover rates with 41% of patients without a LES crossing from surgery to non-operative, as opposed to 12% of patients who did not receive a LES.⁴ It is important to remember when reading subgroup analysis (Level II evidence) that the study was not powered for the endpoint being examined, and the conclusions drawn must be treated with this in mind. Strictly, the valid conclusions of this study are that LES reduces the patient preference for surgery, and may have no long-term effect on outcome. That said, the authors here present some of the strongest evidence on the topic in the literature, and it supports LES as a short-term pain adjunct only.

Spondylodiscitis in infancy

■ A surgical team from **Edinburgh (UK)** report on a case

of thoracic spondylodiscitis following infantile pneumonia in an eight-week-old boy. The report highlights a delay in diagnosis resulting in complete destruction of T4/5 vertebral bodies and intervertebral discs. The resultant paraspinal abscess extended into the mediastinum and epidural space. In this case the acute abscess was treated successfully with antibiotics and at six months the infant underwent a fusion *in situ* to prevent kyphosis. By five years' follow-up the child was asymptomatic and had sound bony fusion across the affected levels.⁵ The authors highlight that this can be a fatal condition in which diagnosis is often delayed due to lack of awareness in the paediatric medical community. The authors advise an early orthopaedic consultation and the consideration of spondylodiscitis in all infants with systemic symptoms.

Total pedicle screws the best option

■ With the ongoing evolution of fixation in spinal surgery there are more fixation options than high quality studies describing them. Scoliosis is perhaps the most demanding biomechanically, putting great stress on the eventual construct. There is little data to support the use of total pedicle screw (TPS) fixation over hybrid systems or vice versa. Hybrid fixation (HF) offers the potential benefits of more flexible fixation and lower implant costs, whereas TPS fixation has the potential for more powerful instrumentation. Researchers in **Turku (Finland)** conducted a comparative case-matched study of prospectively collated data (Level II evidence). The researchers compared clinical and radiological



outcomes in addition to quality-of-life scores between case-matched patients undergoing TPS fixation and HF. Their study included 66 patients, 33 in each group, followed up to a minimum of two years. There were no significant differences in age (TPS 14.7, HF 15.8) or pre-operative major curve magnitude (TPS 81°, HF 87°) between the two groups. However, at a minimum of two years' follow-up the TPS had significantly outperformed the HF in curve correction (post-operative 20° *versus* 33°; correction 75% TPS *versus* 59% HF). The total operating time was also significantly shorter in the TPS group (6.04 hours *versus* 7.45 hours),

and so consequently was intra-operative blood loss (3760 ml *versus* 1785 ml).⁶ We here at 360 applaud the authors for a well-designed and conclusive study concerning the relative risks and benefits of hybrid *versus* TPS fixation. The authors provide ample evidence of superior outcome, lower blood loss and shorter operative times associated with use of TPS fixation, which justifies, in our opinion, the continued use of the TPS strategy in spite of increased implant costs.

Iliac crest autograft complications

■ In a second report of a subgroup analysis of the Spine Patient Outcomes Research Trial (SPORT) included in this month's 360, investigators from **Philadelphia (USA)** sought to answer the long-running argument about the use of autologous iliac crest. Protagonists argue that the better biocompatibility, osteoinductive and conductive properties of autologous iliac crest graft outweigh the potential complications associated with

harvesting of the graft. The counter argument is that modern bone graft substitutes are equally efficacious and avoid the increased complications associated with harvest. The research team hypothesised that there would be no difference between approaches in their cohort of surgically managed patients. They included patients enrolled in the spondylolisthesis arm of the SPORT trial who underwent a lumbar spine fusion. This pragmatic trial allowed surgeon preference on fusion method, and consequently 108 patients had fusion assisted with iliac crest autograft (ICG) and 246 without. There were no differences in the baseline characteristics between the two groups, although there was a significantly higher number of multi-level fusions in the ICG group (32% *versus* 21%) and fusion of the L5/S1 level (37% *versus* 26%). Although the intra-operative time was higher in the ICG group (in excess of 33 minutes) this will in part have been accounted for by the increased number of multilevel fusions. The research team found no significant differences in the main study outcome measures of complications, re-operation rates, SF-36, Oswestry Disability Index, Stenosis Bothersome Index or Low Back Pain Bothersome index.⁷ Although based on a randomised controlled trial cohort of patients, this report really concerns a prospective cohort study with no randomisation or matching (Level III evidence), although it does contain extremely useful data. The authors conclude that both treatment strategies appear to produce equivalent results and suggest the choice of which to use should be based on surgeon preference on a case by case basis.

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