ROUNDUP360

Spine

x-ref *For other roundups in this issue that cross-reference with Spine see: Trauma roundup 1; Children's orthopaedics.*

Spinal pedicle screws in paediatric patients x-ref

Pedicle screws have become the standard of care in the majority of spinal instrumented procedures in the adult. However, in the growing spine things are not quite so straightforward. With pedicle screws widely used in adolescent patients, researchers in **Osaka (Japan)** ask if there is enough evidence to support their use in children and juveniles under the age of ten.[1] The research team undertook a retrospective study examining the use of pedicle screws in spinal corrective surgery undertaken at a single institution. In a slightly unusual methodology, the research team performed a 'by screw' analysis. Their research cohort included 5054 pedicle screws across a wide range of ages. They were able to report the outcomes of 31 patients (176 screws) under five years, 68 patients (659 screws) aged five to ten years, and 234 patients (4219 screws) in the 10 to 15 year age group. Patients were followed up to between three months and nine years (mean over three years), and across the group there was a 0.14% (n = 7/5054) complication rate by screw or 2% incidence by patient, however, none of these was associated with neurological compromise. There was no significant difference between pedicle screw-associated rates of complication between any of the age groups. However, there was a higher complication rate associated with the use of 'growth friendly' constructs usually seen in the five to ten year age group. It does appear that based on these data, spinal pedicle screws can be safely used in the paediatric spine across the whole age group without risking an increase in screw-associated complications.

Improving diagnosis in lumbar spine stenosis

Despite the frequency and severity of clinical symptoms associated with lumbar spinal stenosis, the diagnosis can be hard to reach with significant overlay in symptoms between hip and/or knee osteoarthritis, and vascular claudication patients are often mistakenly referred by their family doctor. In some cases patients may also receive arthroplasty surgery for incidentally arthritic joints before eventually being referred on for a spinal opinion. Diagnostic support tools can be used in situations such as this and there are a number of tools, including the self-reported history questionnaire (SSHQ) and developmental clinical diagnosis support tool (ST), that have been validated to aid in this tricky diagnosis. Researchers in **Chiba (Japan)** set out to establish if diagnostic support tools for lumbar spinal stenosis (LSS) were in widespread use across Japan.[2] They wanted to establish what the awareness rates and utilisation rates of these diagnostic support tools were in Japan, including general practitioners, specialist general practitioners and hospital orthopaedic specialists. Their results are, not surprisingly, poor, with less than 30% of GPs aware of the existence of both tools when compared with around 70% of specialists being aware of at least one of the tools. Utilisation rates were again low, with less than 50% of all doctors who were aware of these tools reporting their regular use. Although the usefulness of validated diagnostic questionnaires in the hospital or specialist setting is very much a matter of debate, they are well recognised for use in the community medicine setting where reaching an accurate diagnosis can be a challenge. Results from this nationwide survey suggest that accuracy of diagnosis and therefore quality of patient care could be significantly improved through administration of these tools.

Back pain all in the head?

Usually when scientific articles are alluding to the origin of back pain, researchers often turn to depressive indexes or psychological profiling in an attempt to identify 'non-organic' causes of back pain. Researchers in **Komagane (Japan)**, in an impressive research paper, have actually set out to establish if some lumbar back pain really is all in the head.[3] Using a cohort of patients with back pain without structural abnormality, this innovative paper used functional neuroimaging to image cerebral and cerebellar blood flow to infer alteration in plastic, pathophysiological changes in the brain. The research team compared functional imaging between patients with and without structural abnormalities in 14 matched patients. The 'no abnormality' group had no, or only minor, structural abnormality evident on MRI and met the criteria for a classification of "pain disorder". All patients were assessed in the same manner using brain SPECT imaging. The researchers demonstrated significantly reduced blood flow in the bilateral prefrontal cortex of the frontal lobe and increased blood flow in the bilateral posterior lobe of the cerebellum in the 'no abnormality' group, demonstrating that there is likely to be plastic pathophysiological change associated with chronic low back pain. In turn, this suggests that it is the dysfunction of the prefrontal cortex that leads to the appearance of unconscious pain behaviour which would also explain the cerebellar changes.

Brace three patients, save one scoliosis operation

Scoliosis bracing is a widely practiced but controversial treatment. With difficulties associated with compliance and concerns over the efficacy of the treatment, surgeons are not universal in their support for bracing and many do not brace at all. There have been some recent data to suggest a strong dose response effect of scoliosis bracing and surgeons from **Dallas (USA)** set out to establish what the numbers needed to treat adolescent idiopathic scoliosis were in a prospective therapeutic study (Level II evidence).[4] The surgical team enrolled 126 patients, all with a diagnosis of adolescent idiopathic scoliosis. Inclusion criteria were Cobb angles between 25° and 45° and Risser stage ≤ 2. The majority of patients

(100) completed the study and were fitted with a Boston brace (with a heat sensor to measure brace wear). Bracing was ineffective in preventing surgery in those who did not wear it. However, in compliant patients, the number needed to treat to avoid surgical intervention was three. Given the significant complications associated with scoliosis surgery and the relative success of bracing in compliant groups, we certainly believe this study adds strong evidence to the argument for bracing in these cases.

Pedicle screws more often misplaced than one would think

■ While the occurrence of misplaced pedicle screws is well known, the rate of placement of screws outside of the pedicle has been variably reported. What has not been established is what the chances are of asymptomatic screw placement near a vital organ. Surgeons in **New York (USA)** set out to establish what the incidence of pedicle screws in the vicinity of intra-abdominal or intra-thoracic organs and structures is.[5] The research team evaluated the position of around 2132 pedicle screws in 101 patients, all of whom had undergone posterior instrumentation for spinal deformity. The research team reviewed all of the post-operative axial CT scans to determine the proximity of the screws to the great vessels and viscera. Based on these results, the team classified screws as 'at risk' or 'not at risk'. The team identified an 'at risk' screw as being present in 25% of patients, and 40 individual screws were at risk. The most commonly endangered structure was the aorta (31 screws) followed by a smattering of other structures including the subclavian artery and oesophagus. With regards to the screws endangering the aorta, all of them were in the thoracic spine and, surprisingly, around 50% of those were in patients with normal pedicle anatomy and morphology. While this finding is of clinical significance and surgeons should clearly be meticulous with their technique, obtaining a post-operative CT scan is clearly of value in picking up misplaced screws. However, the authors have not been able to help us interpret these scans. What we would really like to know is what causes an asymptomatic 'at risk' screw to become a symptomatic one. That would allow for re-operation in a carefully selected high risk cohort.

Incidental dural tears usually no problem

■ Although a universally feared complication during lumbar discectomy, it is odd that surprisingly little is known about the outcome of incidental isolated dural tears during lumbar decompression. Surgeons in **Nagano (Japan)** set out to examine the outcomes of these incidental dural tears in a prospective outcome study.[6] The research team designed a prospective longitudinal follow-up study of 555 consecutive patients, all of whom had undergone micro-endoscopic lumbar decompressive surgery. There was around a 5% incidence rate of dural tears (n = 28/555) in a fairly typical cohort of patients (mean age 48 years; 18 to 89). The likelihood of dural tears increases with age and when undertaking a bilateral decompression through a unilateral approach. In terms of outcomes, both the torn and untorn groups recovered well according to the Oswestry disability index and there were no significant differences between the groups. The Japanese Orthopaedic Association score, however, did suggest a difference with poorer clinical outcomes and performance in those with a tear (77.7% vs 87.6%). The complications were not major in the tear group, with the majority managed with treatment of low CSF pressure and only a few direct dural repairs were required. All patients underwent routine MRI six months following surgery, and there was a higher rate of recurrence or residual disc herniation which seems likely to be reflective of a failure of adequate disc decompression following the tear. However, there were no cases of revision surgery required by final follow-up. This paper nicely reflects clinical practice in that although a dural tear can be a major complication, if managed promptly with repair if required is seldom a problem. In this series of over 500 patients, revision surgery for complications of dural tear was never required.

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