be difficult to achieve, leaving the patient at risk of recurrence. These surgeons in **Seoul (South Korea)** report their experience of treating septic arthritis using a predominantly closed suction drainage method.[7] The surgical team performed a fairly aggressive debridement on 68 patients, combined with arthrotomy and irrigation. A suction drain was placed in the glenohumeral joint and left in place for an average of 24 days at a constant negative pressure of 15 cm H_2O. This strategy appeared to be rather successful with a reported cure rate (in combination with around five weeks of antibiotics) of 98%. The authors conclude that their approach provides reliable eradication of the infected joint with little in the way of recurrence. Nonetheless, we would inject a note of caution; nearly four weeks of closed suction drainage isn't without its morbidity, and the presence of a drain in the joint for that period may well accelerate any future arthritic change. Slightly less enthusiastically than the authors, we would perhaps recommend this as a reasonable option for patients in whom traditional methods have failed as it certainly does appear to have an excellent outcome here in terms of clearance of the primary septic arthritis.

Depression hinders outcomes in total shoulder arthroplasty

There doesn't seem to be much in the way of positive news for the depressed with regard to their health outcomes. Surgeons at NYU Hospital for Joint Diseases, **New York (USA)** conducted a study to explore the link between depression and outcomes in total shoulder arthroplasty (TSA).[8] The study team used the US National Inpatient Sample to identify 224 060 patients undergoing elective TSA. There was a pre-existing incidence of depression of 12.4% in those patients, which was associated with significant independent risks for post-operative complications, including delirium (OR 2.29), anaemia (OR 1.65), infection (OR 2.09) and discharge to an alternate location (OR 1.65). Due to the large sample size, all of these observations were of course highly significant. It is interesting that this incidence of pre-operative depression is associated with poorer post-operative results in the selected outcome measures that were used in this study. Whilst the study of course only establishes an associative link, rather than a causation, there is a clear message here: patients with depression are at higher risk of complications, and perhaps this should be taken into consideration when making treatment decisions.

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Spine

X-ref ***For other Roundups in this issue that cross-reference with Spine see:*** *Trauma Roundup 2.*

High expectations improve lumbar disc herniation treatment

Any orthopaedic surgeon will be more than familiar with the difficulties of managing overly high expectations for treatment, and will know that investing time in doing so will likely yield a more satisfied patient. Nowhere does this apply more than for patients with spinal pathology, where expectations are all and functional overlay common. In this work from **Dartmouth, New Hampshire (USA)**, of the 1244 patients enrolled in both arms of SPORT, 1168 patients provided expectation data and had lumbar intervertebral disc herniation. These patients' outcomes were analysed to see what influence the patients' expectations had on back pain, function and disability score following surgical or non-operative treatment.[1] The outcome of interest (expectations) was assessed on 5 point scales (equating to a percentage) of expected symptomatic and functional improvements. The outcomes of this study themselves are slightly unexpected. Patients with low expectations of surgical outcomes did poorly, regardless of the treatment modality offered. Those patients with high expectations of an improvement with surgical treatment yielded not only better outcomes overall following surgery, but better outcomes in non-operative treatment as well. Those with a higher expectation of non-operative treatments fared better with non-operative care, but no better than those with low expectations with regards to surgical outcomes. It seems unlikely that surgeons would be comfortable counseling our patients that they would do well with surgery then offering non-operative treatments, but this work does show that managing expectations are as much a part of spinal treatment as surgery or physical therapy.

Should we remove spinal hardware after trauma? X-ref

Some procedures in trauma involve the routine removal of hardware (think Lisfranc plates or in some cases, diastasis screws) but the role of hardware removal in maximising recovery following trauma in the spine has been poorly investigated. In a retrospective cohort study of 137 consecutive adult patients in **Zurich (Switzerland)**, posterior instrumentation was electively removed from patients who had previous post-traumatic spinal fixation.[2] Only instrumentation (clearly not cages) was routinely removed once spinal fusion had been confirmed by CT scan. Outcomes were assessed using pain scales and the fingertip-to-floor distance (FFD). Both pain and FFD was significantly improved after hardware removal by 0.5 on a numerical pain score and 7 cm respectively. No significant change in reduction or Cobb angles was seen on radiographs. Rather worryingly however, 9% of patients that had posterior fixation alone showed a wound dehiscence following removal, and 8% patients showed delayed wound healing, with 3% needing revision as a result. Whilst there are some clear indications for hardware removal and a range of practices exist, the indications for elective hardware removal

still remain unclear. This study left vertebral cages in place, and so we don't know if the size of cage or its indication for insertion might impact the outcomes of posterior instrumentation removal. In light of this study, we can say with reasonable certainty that flexibility is improved and pain is reduced, though whether this outweighs the risks of the procedure is debatable.

The discogram – not a benign procedure?

Lumbar discography, which involves the injection of fluid under pressure into an intervertebral disc, is performed as a provocative test to diagnose discogenic pain. It is a controversial procedure, and the results are somewhat subjective to interpret. Previous studies have demonstrated a lack of validity, poor sensitivity and specificity, with the American Pain Society recommending against its use. Despite this, many clinicians continue to use it, and those who do so regularly argue that the ability to distinguish a painful disc and other potential pain sources provides valuable information that cannot be gleaned in any other way. There have been some somewhat concerning reports of accelerated disc degeneration on MRI following discography, in subjects without low back pain, when compared to controls. This latest study from the same group in **New York (USA)** assesses these same cohorts ten years later.[3] The study reports the outcomes of 75 patients without lower back pain who underwent discography injections, and a matched group of similar patients also without low back pain who did not undergo the discogram either. The cohorts were followed up to ten years following the discogram and outcomes assessed included imaging outcomes and intervention rates in the lumbar spine. As is always expected with studies of this type, there was significant attrition throughout the timecourse of the study and 57 discogram patients and 51 controls completed the ten-year follow-up visit. There was a marked difference in intervention rates in the discogram group when compared to the controls. The discogram patients underwent 16 lumbar spinal surgical interventions, compared to four in the control group. In addition, the incidence of CT and MRI evaluations, doctors' visits for lumbar spine pain and reported work loss and episodes of lumbar spine pain were all higher in the discogram group. Although proponents of discography will doubtless point out the obvious flaws in this study, there are some clearly important take home messages here, and discography should not be considered a benign procedure.

Bone marrow oedema does predict pain in degenerative scoliosis

Just like every other branch of musculoskeletal surgery, spinal surgeons are facing increasing challenges from the ageing population. Increased life expectancy, coupled with higher quality of life expectations is somewhat of a clinical challenge when faced with the increasing prevalence of degenerative scoliosis. However, despite the increasing frequency and clear health and social care burden associated with adult degenerative scoliosis, the cause of back pain is unclear. Bone marrow oedema has been associated with pain in joint disease (and is commonly associated with pain following trauma, such as that seen with a 'bone bruise'), and so not unreasonably authors from **Hiroshima (Japan)** set out to evaluate if the appearance of endplate oedema on MRI scanning is associated with pain in adult degenerative scoliosis.[4] One hundred and twenty patients all with lumbar degenerative scoliosis were reported in the study. Patients underwent MRI imaging and clinical palpation to determine any point tenderness and were divided into two groups – those with low back pain and those without. Importantly, patients who had had symptom alleviation with facet joint anaesthetic injections were excluded. The results were clear: bone marrow oedema was present in 96.9% of patients with low back pain, compared to 37.5% of patients without pain. The authors were also able to establish that the oedema was seen on the concave side more than the convex side of the curve - where loading is greater. Perhaps even more convincingly, the signal intensity of the oedema was strongly correlated with the severity of back pain and the location of point tenderness. For the clinician faced with a severe and generally degenerate spine, identifying a focal pain source in a spine with widespread degenerative changes offers the possibility of localised intervention. This leads on nicely to this group's next study – targeted therapy for degenerative scoliosis.

Targeted therapy for low back pain in elderly degenerative lumbar scoliosis

With major deformities and often widespread disease present in patients who are not suitable for extensive surgical intervention, the prospect of targeted therapy is a very attractive one. The treatment options for degenerative scoliosis are therefore significantly problematic. Non-operative measures offer poor pain relief and little change in function; anaesthetic injections provide only temporary or partial symptom relief and patients are often significantly limited in their everyday activities, sometimes to the extent that independent living can become a challenge. Whilst instrumented arthrodesis with decompression can achieve good outcomes, the risk of complications from such extensive surgery in a fragile patient population is high. With this is mind, Fujimoto's group in **Hiroshima (Japan)** has developed a novel, targeted therapy termed intervertebral-vacuum polymethyl methacrylate (PMMA) cement injection (PIPI).[5] This approach involves injecting discs directly with PMMA cement in patients with back pain, adjacent bone marrow oedema on MRI and concordant physical findings, in a similar manner to vertebroplasty or kyphoplasty but into the disc space itself. The authors report the outcomes of over 150 patients, 109 who underwent targeted PMMA injection and 53 who were managed with non-operative treatment. The results of the selective therapy are impressive, with significant improvements in VAS pain scores (55 point improvement *vs* two point improvement). The intervention group also reported significantly greater improvements in the ODI scores, both at one month and two years post-procedure. So given the remarkable improvements seen, how did the authors explain this from a simple intervention? Their proposed mechanisms include a thermoablative effect, the cement acting as a shock absorber and the suppression of inflammatory cytokines. Before we all start injecting intervertebral discs with cement, clearly more work is needed. This is a novel procedure with short follow-up from a single centre, and further studies are warranted; however this represents a new approach to an old problem, and both papers appear to contain honest and frank reporting.

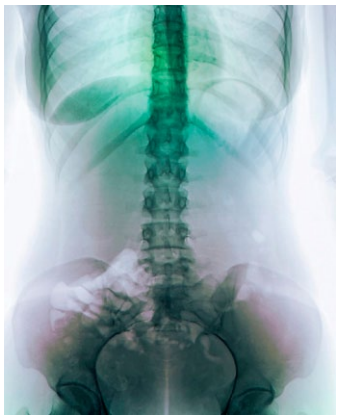
To inject or not to inject: the facet joints

All practicing spinal surgeons will use injections to steer diagnoses, offer therapy, and sometimes see a patient over the most painful part of a spontaneously improving natural history. Facet joint injections are something we at *360* have seen used, and used ourselves many times, however just how good are they? If we accept that every injection is placed accurately, then the systematic review from **Warwick (UK)**[6] makes interesting reading. The authors have conducted an extensive systematic review with a narrative analysis looking at six RCTs comparing corticosteroid facet joint injections with either sham injections or conservative treatments for the management of low back pain. The paper confidently describes

a thorough search strategy, and uncovers six relevant papers to be included in its analysis. The included studies are however of dubious quality, and certainly leave something to be desired. The authors note that only one study finds a benefit to injections at six months when compared to a treatment that is known to worsen symptoms in low back pain, negating its validity. The remainder show that our well-meaning injections, whilst not doing any harm, are also not actually doing any good. This review shows that the evidence supporting therapeutic facet joint injections is still not there. Whether this is a problem with diagnosing the pain generator, or a misunderstanding of the pathology, remains to be seen but if this treatment is to continue to feature in our armamentarium, a good RCT will need to emerge. For the time being, the search should continue to employ other treatments in managing facet joint degeneration.

Is fusion essential in laminectomy?

■ It is not quite clear where the benefits in lumbar spine decompression and fusion lie in degenerate spondylolisthesis. Whilst it is clearly an effective treatment, is this the result of the decompression alone or is the fusion an essential part of the procedure. There are some significant potential benefits to undertaking decompression alone as it would maintain the flexibility of an already degenerate and stiff lumbar spine, however the fusion element may maintain the decompression more effectively. A research team from the Alan L. and Jacqueline B. Stuart Spine Research Center, **Burlington, Massachusetts (USA)** have investigated the two approaches using a randomised controlled trial methodology.[7] Their study published in



the *New England Journal of Medicine* concerns the efficacy of treatment for grade I lumbar spondylolisthesis. The investigators were able to recruit a total of 66 patients randomised to either decompression and instrumented fusion or decompression alone. Clinical results were assessed using the SF-36 score at two years of follow-up, in addition to secondary outcome measures of the Oswestry Disability Index and measures of hospital stay, intra-operative complications and length of stay. A total of 66 patients (mean age, 67 years; 80% women) underwent randomisation. The rate of follow-up was 89% at one year, 86% at two years, and 68% at four years. The fusion group had a greater increase in SF-36 physical component summary scores at two years after surgery than the decompression-alone group did (15.2 *vs* 9.5. The increases in the SF-36 physical component summary scores, with the fusion group remaining greater than those in the decompression-alone group at three and four years. With respect to reductions in disability related to back pain, the changes in the Oswestry Disability Index scores at two years after surgery did not differ significantly between the study groups (-17.9 in the decompression-alone group and -26.3 in the fusion group). More blood loss and longer hospital stays occurred in the fusion group than in the decompression-alone group. The cumulative rate of reoperation was 14% in the fusion group and 34% in the decompression-alone group. This study revealed that the clinical outcome of the addition of lumbar spinal fusion to laminectomy for patients with grade I spondylolisthesis was superior to decompression alone on the SF-36 physical component score at two, three and four years post-surgery. However, there was no benefit in the Oswestry Disability Index. There were significantly lower rates of reintervention in the fusion group (14% *vs* 34%). Although the spinal fusion adds to the total health economic costs, the improved and sustained improvements in combination with a reduced reintervention rate offset the additional costs.

Predicting revision risk following adult spinal deformity surgery

■ Predicting complications following surgical procedures is only really of interest if the risk factors identifiable are either modifiable, or suggest that specific groups of patients could be managed in a different way in order to reduce the complications. We were interested in this paper from **New York (USA)** which attempts to establish what factors drive the need for revision procedures when treating adult spinal deformity.[8] The study team reports the outcomes of 243 patients, all of whom had undergone deformity surgery for adult acquired spinal deformity. Of these, 16.5% went on to have a subsequent revision procedure. The authors cast their net wide for potential predictors of revision surgery with total body mass and pre-operative deformity increasing the risk of revision. The use of greater diameter rods and BMP-2 reduced the risk of revision surgery. There are however some caveats, of course, to these findings. It does seem that the common thread is that more is more – BMP-2 improves fusion mass (although this can bring with it its own problems), heavier patients with greater deformities apply more mechanical load to the construct. So the take home message appears to be that mechanical instability is associated with revision surgery.

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