



of complications for many patients who do not wish to undergo/are unsuitable for surgery. However, the effect is variable, with some patients benefitting greatly, and some barely benefitting at all. Authors in **Seattle (USA)** hoped to shed some light on exactly which patients will benefit from epidural steroids using a randomised controlled trial as their platform. The study population consisted of 400 patients randomised to either epidural with lidocaine alone or epidural with lidocaine and corticosteroid, in 16 centres across the US. All patients had symptoms of moderate or severe leg pain and central lumbar spinal stenosis. Outcomes were assessed with a pain scale and the Roland-Morris Disability Questionnaire (RMDQ).⁶ The authors collated data on 21 potential predictors of benefit and used covariant analysis to explore which were linked to any of the six outcome measures. The only variable that appeared in this study to have any bearing on prediction of outcome was the ED-5D score, with patients who rated their quality of life as 'poor'

benefitting more than those who did not. There were some predictors of a good outcome in both groups – but surprisingly nothing else was predictive of a beneficial effect of steroids.

Back pain following lumbar discectomy

■ In an unusual methodology, surgeons in **Nashville (USA)** undertook a systematic review and longitudinal study in their attempt to establish who gets long-term back pain following lumbar disc decompression. Whilst we intrinsically don't like this kind of mixed methodology study here at 360, there is a valuable message in this paper. The review team were able to identify 90 studies including the outcomes of 21 180 patients reported at least six months following decompression for an isolated lumbar disc prolapse. To this the results of their own 103 patients were added as a prospective outcomes cohort, using a range of PROMs measures. The systematic review suggested high levels of reported secondary back and leg pain, with studies reporting between a 3% and 36% incidence of both at 1- or 2-year follow-up, although rates



of reoperation were much lower, at between 0% and 13%.⁷ The prospective portion of this study found similar results, with their patients reporting worsening of either lower back pain or disability in 26% of patients by two years. This study serves to underline the ongoing disability suffered by many patients following a prolapsed lumbar disc.

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Trauma

For other Roundups in this issue that cross-reference with Trauma see:

Foot & Ankle Roundup 1, 2; Wrist & Hand Roundup 4, 5; Shoulder & Elbow Roundup 4, 7; Spine Roundup 1, 2; Paeds Roundup 2, 3, 4, 6, 8; Research Roundup 2, 3, 4.

PCA not the best in resuscitation

x-ref Research

■ The provision of adequate and optimal pain management can be tricky at the best of times, but in the emergency department and particularly the resus room, it can be incredibly challenging to provide adequate analgesia. One potential solution is to use patient-controlled analgesia (PCA) which has an excellent track record in the provision of

peri-operative analgesia in elective and emergency surgical care. A research team in **Plymouth (UK)** set out to determine if PCA has a role to play in controlling pain following traumatic injury in the emergency department. They carefully designed a randomised controlled trial of 200 participants, undertaken across five hospitals. Patients were included if presenting to the emergency room with traumatic injury requiring admission, and for which intravenous opioid analgesia was required for pain control. Patients were randomised to either a PCA or nurse-managed, titrated analgesia. Outcomes were assessed using hourly pain scores, with the primary outcome measuring the

area under the curve. Secondary outcomes included total morphine use, satisfaction, sleep period and hospital length of stay.¹ Perhaps surprisingly, there was no difference in the primary outcome measure between patients, with the PCA group faring marginally better (AUC 44.0 vs 47.2) but with no statistically significant difference. Interestingly, the PCA group used significantly more morphine (443 mg vs 27.2 mg) but there were no significant differences in satisfaction rates.

Impact of trauma centre care

■ The maturation of the trauma networks continues and the latest figures in the UK from the Trauma Audit Research Network (TARN) show a 50% improvement in mortality

over the past three years in the UK. In other areas of the world, networks are more mature, but arranged in different manners. One of the surprising things about trauma networks is that our understanding of which patients benefit, and why, leaves something to be desired. If we could understand why there is such a profound survival benefit, we may even be able to improve on these figures. A collaboration between **San Francisco (USA)** and **Seattle (USA)** has shed some light on what is achievable in the field of pelvic and acetabular fractures within the setting of a trauma network. This registry-type study concerns the outcomes of patients managed both within (18 centres) and without



(51 centres) Level I trauma centres. The dataset contained complete data on 829 adult trauma patients with a pelvic ring or acetabular fracture. Follow-up was completed to a year following presentation and the primary outcome measure used here was death.² The results of this study are fairly compelling and demonstrated a significant reduction in relative risk of death by as much as 0.10 for management within a Level I centre hospital. At one year of follow-up, pelvic fracture mortality risk reduction continued to be significantly better at 0.71 (95% CI, 0.14 to 0.91) - another piece of evidence to suggest that in trauma care, at least, 'bigger is truly better'.

Quality of life after a hip fracture

The fragility fracture cohort that makes up hip fractures is notoriously difficult to study. Given the high rates of delirium (reported elsewhere this issue) and high dependency levels, very little is actually known about quality of life following a hip fracture. Due to large numbers of patients, and little interest in subsequent interventions, follow-up of hip fracture patients is often limited, due to numbers and the real difficulty a trip to the outpatient department represents for these frail patients. In one of the first large-scale studies into outcomes in this cohort, researchers in **Coventry (UK)** utilised the EQ-5D questionnaire to quantify both the quality of life decline caused by fracture, and what the magnitude of the subsequent recovery was. Their study followed a serial cohort of patients for a year following hip fracture, and established that, following fracture, there was a significant worsening of function, estimated at 0.22 disability-adjusted life years



in the first year after fracture. This effect on quality of life is equivalent to the development of a serious neurological condition such as Parkinson's disease or multiple sclerosis. However, they also observed a significant recovery during the first year although function remained significantly lower than pre-injury, regardless of age group or cognitive impairment.³ The Warwick Hip

Trauma Evaluation (WHITE) study is ongoing, and with the development of a research network across the UK aimed at quantifying and documenting the outcomes of hip fracture, the most exciting bit of this work is yet to come, as the

study team have started to embed multiple trials into the cohort, giving a powerful research infrastructure to look more closely at this rarely studied group.

Recovery and severity of injury: open tibial fractures in the spotlight

Some of the most devastating injuries seen in orthopaedics is the array of open tibial fractures; the soft-tissue envelope being poor and the energy required can render these devastating injuries life changing. While there is a wide spectrum of disease severities, and it would seem reasonable to assume that the more severe grades of open tibial fracture will recover at a slower rate, there isn't really any evidence to support this widely held assertion. Investigators in **London (UK)** have quantified the rate of return to mobility by using an objective longitudinal assessment of functional recovery. Although a small study of just 20 patients, the research team utilised a mobility sensor to provide objective evidence of the rate and nature of their recovery. The patients were reviewed at three-month intervals

and their mobility graded with the Hamlyn Mobility Score.⁴ In general, walking quality improved for all patients over a 12-month period, but the capacity to walk as determined by a six-minute walking test reached a maximum during the first six months. Quite neatly, and easy to remember, recovery duration was correlated by grade of fracture in three-month intervals per grade. Most of the recovery was complete in grade I fractures by three months, grade II by six months and grade III by nine months. Of course, generalisations from small studies like this should be treated with caution, but it is an interesting study nonetheless.

Assessment of the triplane fracture

x-ref Paeds, Foot & Ankle

The triplane injury is a moderately complex partial articular fracture, and as with many other peri-articular fractures, obtaining a CT scan has become more and more routine. Researchers in **Cincinnati (USA)** wanted to establish if this practice had any impact on the classification and decision making in the management of triplane injuries, which is generally understood to make the fracture look more severe than from plain radiographs alone. Using a series of 25 paediatric triplane injuries, two radiologists and three orthopaedic surgeons reviewed the cases and made a judgement about fracture type, displacement and need for an operation. This was done on two occasions, both with and without the use of the CT scan imaging. The whole process was repeated a month later to calculate the intra- and inter-observer correlation coefficients.⁵ The majority of results are perhaps not that surprising, with a poor inter-rater reliability for classification from radiographs ($\kappa = 0.31$), which improves with the addition of CT scanning. Triplane fractures by their nature are complex in any case and this study confirmed a 27% increase in the decision to operate after fractures were evaluated with CT rather than plain film

alone. Furthermore, in two-fifths of cases, the size of displacement was much underestimated and the orientation or number of screws used was changed on the basis of the CT information.

Signs of an unstable paediatric pelvis

x-ref Paeds

Decision making in paediatric pelvic fractures is complex to say the least. In addition to the difficulties of physeal fractures and separation, most pelvic surgeons do not specialise in paediatrics. One of the advantages of centralised care that the modern trauma networks offer is a concentration of experience of even rare injuries.⁶ We were delighted to read this report from **Hannover (Germany)** describing a particularly unstable paediatric pelvic fracture pattern. This describes an unusual fracture pattern where the hemipelvis detaches through the symphysis and SI joint, leaving the posterior iliac apophysis behind stably attached to the axial skeleton, giving a characteristic crescentic appearance. The authors describe this pattern based on their review of a series of 33 children with pelvic fractures, eight of whom had the 'crescentic' pattern. Other differences in fracture pattern seen include the separation of the pelvis through symphysis and SI joints, where bony failure was more common in older children.

Safe insertion of SI screws: are two views required?

The insertion of a percutaneous sacroiliac screw retains an element of mystique which pelvic surgeons are happy to perpetuate, when in reality the safe insertion of a radiologically guided SI screw is little trickier than the insertion of a locking bolt. Some surgeons rely only on a combination of inlet and outlet views, while others prefer to start with a lateral projection of the sacrum before switching to the angled views. This cadaveric and dry bone study from **Ankara (Turkey)** goes further and proposes that two



angles of inlet are required. The team designed a cadaveric study using six complete pelvic rings and eight complete sacra. They used the C-arm in 5° increments on both oblique views to establish which images are required to accurately determine the position of the K-wires within the sacrum. The main message of this paper was that the inlet view relies on a crisp outline of the sacrum in order to assess the anterior and posterior borders of the sacrum for screw insertion. The paper recognises that the sacrum is trapezoidal, and, as such, one cannot see both a crisp anterior and posterior border simultaneously.⁷ Two angles are therefore recommended by the authors of this study. This would seem to complicate matters, and in the clinical experience of the trauma gurus, here at 360 HQ, a crisp anterior border with the screw positioned anteriorly is sufficient – the best path for the screw, given the trapezoidal shape of the sacrum and the orientation of the SI joints, appears parallel to the anterior cortex. The answer to the question posed by the authors appears likely to be no.

Post-operative delirium under the spotlight

x-ref Hip

■ There has been increased focus on the more comprehensive parts of hip fracture care in recent years. Following on from the practicalities of optimising care pathways, attention has shifted to other important areas such as post-operative delirium. Researchers in **Toronto (Canada)** have reported their study focusing on the impact of post-operative delirium from a healthcare provider perspective. Their study reports the outcomes of 242 patients, all over the age of 65, presenting with a fractured neck of femur over a calendar year. The research team conducted a prospective assessment of their mental status using the confusion assessment method, and in addition collated a range of demographic and

other factors in an attempt to establish the risk factors for post-operative delirium. A surprising 48% of the patients had scores suggestive of post-operative delirium. It is known that patients with a NOF fracture are a fragile group and susceptible to delirium, but the incidence presented here really is quite staggering. There were a number of factors that appeared to be causally related (although it is difficult to know which is the index factor) such as increased length of stay and care-episode cost.⁸ In this single institution, treating just 242 hip fractures a year, the excess healthcare costs associated with delirium were nearly \$1 million Canadian dollars – no wonder dementia and delirium are high on the agendas of both healthcare providers and research funders.

Psychological effects of fractures

x-ref Research

■ Orthopaedic surgeons can sometimes be a little one-sided in their assessment of outcome measures. It is unusual to see papers assessing the effects of trauma and injuries on patients' mental health. We were interested to see this paper from **Gyeonggi-do (South Korea)** which aims to establish the incidence and effects of post-traumatic stress disorder following long bone fractures. The study cohort consisted of 148 patients, all military recruits, presenting with a long bone fracture to the same Level I trauma centre. Each patient completed a post-traumatic stress disorder (PTSD) questionnaire. Remarkably, 27% of patients fulfilled the criteria for PTSD, with risk factors revealed by multivariate regression including lower extremity fractures, multiple fractures and higher pain scores.⁹ There is an obvious confounder in this study, in that it includes data from military recruits, and injuries in military service have their own psychological issues surrounding circumstances and

catastrophising thought patterns. A similar study in civilian blunt trauma is really called for here.

K-wires cost effective in DRAFFT

x-ref Hand

■ The DRAFFT study from the UK trauma collaborative led by Matt Costa in **Oxford (UK)** has caused a bit of a stir on both sides of the Atlantic. While it is important to remember it only applies to fractures that are reducible closed, this large scale multicentre RCT did not side in favour of the locking plate option in the initial report. The cost-effectiveness analysis of the study has been published this month in *The Bone & Joint Journal*, and we were delighted to see the findings. While clinical outcomes are one thing, it is the health economics that healthcare commissioners and insurers wait for. In cases like this where marginal clinical benefit is seen with one intervention, it is rarely likely that there will be a health economic benefit. Undeterred, however, the research team undertook a comprehensive health economic analysis of their findings. The study itself concerned the outcomes of 460 patients randomised to either volar locking plate or K-wires following their reducible distal radius fracture. There was a small difference reported in QALYs gained for locking plate fixation, but with an additional mean cost of £714 for the plate. The outcomes in terms of incremental cost-effectiveness ratio (ICER) are suggestive of an excessive £89 322 per QALY gained with the plate.¹⁰ This formalises the conclusions that most have jumped to with the clinical reports of the study: use of K-wires has a health economic advantage given the comparable clinical results. Bad news for implant companies, good news for tax payers!

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