

complications were more common when fusion was combined with decompression; however, repeated surgery was more common in patients undergoing decompression alone. This study shows that treatments are probably equally effective in managing this common condition. The authors note that fusion was more common in younger patients with more back-predominant pain, but at present it seems that both treatment options are fair game.

### Magnetic resonance spectroscopy and disc pain

■ The painful disc is a large problem for the spinal community. There are no agreed diagnostic tests and, although many surgeons and patients have had much success with a range of treatments, there remains much controversy over the best treatments, the benefit of these treatments, and who is best placed to diagnose the problem in the first place. Magnetic resonance spectroscopy (MRS) is a modification of MRI that allows the radiologist to see the metabolic activity of neural and other tissue. This is gaining some traction as a potentially interesting modality for diagnosing the painful disc. In this study from **Chesterfield, Missouri (USA)**, a group of investigators has sought to assess the utility of this technique in identifying painful discs, in an attempt to predict potential surgical outcomes.<sup>6</sup> In what is actually a fairly large study, given that each disc level was assessed, the authors sought to establish which levels were painful. Using an MRS protocol to define specific structural and biochemical features, 623 discs in 139 patients were scanned. Following this, 75 patients then went on to have surgical treatment for their perceived discogenic back pain, the outcomes of which were clinically assessed based on the results

of the MRS investigation. When compared with provocative discography as the benchmark, MRS showed a total accuracy of up to 93%. When discs that showed a high signal on MRS were surgically treated, surgical success was thought, subjectively, to have been achieved in 97% of cases, compared with 57% in those with a negative MRS scan. In this series, MRS seems to be a very useful tool in the diagnosis of low back pain, and an adjunct to the counselling of patients preoperatively. Its introduction might be hampered by technological considerations, but perhaps this is a discussion to be had with our radiological colleagues.

### Pathological compression fracture and vertebroplasty/kyphoplasty X-ref

■ Malignancy of the spine can manifest itself in many different forms. One of the more common forms is the pathological fracture, which is prone to nonunion, instability, and progression, and which needs stabilization to facilitate either analgesia or subsequent oncological therapy. An option open to the spinal surgeon is either vertebroplasty or kyphoplasty that avoids the insertion of metalwork in the presence of diseased bone, often in systemically unwell patients. However, the relative effectiveness and safety of these options is not clear, despite multiple studies in the literature. Fortunately, a group from **Middelfart (Denmark)** have taken it upon themselves to conduct a systematic review looking at these factors and the impact of these treatments when used to manage malignant pathological vertebral fractures, using the visual analogue score for pain, Oswestry disability index (ODI), and Karnofsky Performance Score.<sup>7</sup> The review found that there were similar improvements in pain with both kyphoplasty and vertebroplasty. ODI improved by a greater amount with

vertebroplasty over kyphoplasty; however, cement leakage was more common in vertebroplasty. The authors note that within the 3426 patients included in the study, systemic complications occurred in only 43. Overall, both treatments seem to be safe and effective for these specific injuries. With the safety profile being good, it is a treatment that we can consider offering our patients as part of their wider multidisciplinary care.

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## Trauma

**X-ref** For other Roundups in this issue that cross-reference with Trauma see: **Foot & Ankle Roundups 2 & 3; Wrist & Hand Roundups 1, 2 & 5; Children's orthopaedics Roundups 4, 5 & 7; Research Roundup 3.**

### Medial plate in high shear femoral neck fracture

■ It is no secret that the fracture (Pauwels) angle in a pertrochanteric and femoral neck fracture significantly affects the biomechanical environment of the fracture. When loaded, high Pauwels

angle fractures suffer from significant shear forces that must be resisted by any implants inserted, usually in a very mechanically unfavourable way. This accounts for the poor outcomes when fixing these fractures. Despite many attempts to improve things, there has been little progress for the past 50 years and these fractures still suffer from high failure rates. More recently, there has been a small but consistent argument that placement of a medial plate would allow for neutralization of the shear forces and, consequently, sounder fixation. Despite this slight shift in practice in some centres, there is

very little published evidence. A group of authors from **Rio de Janeiro (Brazil)** have set the ball in play by reporting this biomechanical study, which sought to establish the mechanical role of a medial buttress plate for Pauwels type III femoral neck fractures.<sup>1</sup> The investigators simulated Pauwels fractures in the femoral neck in synthetic bone, fixed with either two parallel cannulated screws or with a transverse neck screw. The comparison fixation was as before, but with the addition of the medial calcar plate. The testing model was of cyclical axial loading to failure. This study shows that

the addition of a medial buttress plate results in a mechanically superior construction for Pauwels type III fractures when compared with multiple cannulated screws alone. Although sometimes technically difficult to achieve, and likely to introduce problems in terms of both the approach and the preservation of the blood supply, this is clearly an option in difficult fractures.

### Sacroiliac screws versus plates for sacral fractures

■ The standard of care for sacroiliac (SI) stabilization has become routine for patients with pelvic injuries and SI joint involvement, with the advent of reliable techniques for placement of transiliac sacral screws helping to achieve stabilization of disrupted joints, sacral fractures, and medial iliac wing fractures. An alternative that is now not so commonly used is that of plate placement. There are some advantages to the plate option, as multiple screws can be used. Moreover, there are also some significant advantages in terms of fixation in osteoporotic bone, but this is at the cost of a much larger open approach. This surgical team from **Hebei (China)** have resolved some of these problems with their minimally invasive adjustable plate approach for treatment of Zone II sacral fractures.<sup>2</sup> The authors report a comparative prospective series of patients treated over a seven-year period, all of whom were treated with either method. The focus of this clinical comparative case series was the outcome of fracture healing and radiological reduction, with fracture displacement, intraoperative details, and complications also reported. The series consisted of 31 SI screws and 39 treated with a minimally invasive adjustable plate. The authors report no overall differences in the important operative metrics, including operative time and blood loss. In this series, all of the fractures were healed within a four-month period and there were no reported differences in average healing time. What was different (although not statistically significant) was the reported differences in complication rates, with the SI screws somewhat surprisingly suffering a 16% risk of complications, where just 5% in the plate group faced the same complications risk. It is tricky to say much about outcomes or complication rates in this series, due to the small number of patients and the usual caveats associated with selection biases in retrospective case-controlled series. However, this study team has demonstrated that there is still a role for plate fixation, and that minimally invasive plate fixation is potentially effective and safe. Little more than this can be said due to the methodological flaws and small sample size.



### Silver trauma and return to independence

■ Increasingly, the incidence and treatment of 'silver trauma' has become a focal point, with the beginnings of implementation of guidelines in several countries aiming to streamline care in line with the hip fracture population. The study from **Baltimore, Maryland (USA)**, however, suggests that the comparisons being made with hip fracture in the older high-energy trauma patient *versus* the hip fracture population may be misleading.<sup>3</sup> The authors presented what they considered to be the first study to look into high-energy geriatric trauma, and found that the population was markedly different to that with low energy fractures. The authors identified 2682 patients from their database over a ten-year period, who were all over 65 years old with traumatic injuries. Of this population, there were 70% who were considered high-energy, probably reflecting the catchment for a North American level 1 trauma centre. The authors found that the high-energy trauma population was younger than the hip fracture population (69 years *vs* 76 years), had an equivalent male to female ratios, and had less comorbidities. The high-energy injuries group had longer inpatient episodes and a higher incidence of intensive care unit usage. Perhaps the most interesting findings presented here were those drawn from the post-discharge data. Over three-quarters of this population remained living independently; two-thirds did not require a walking aid and were ambulatory outdoors. These are significant findings, particularly when considering interventions and resource planning. The expectation from this population appears to be significantly different to that of the hip fracture population, and this may need to be considered alongside best practice guidance with regard to silver trauma, rather than simply extending the hip fracture measures.

### Hip fracture in the younger patient

■ Younger patients with hip fractures are divided into two groups: young patients where arthroplasty would not be ideal, and middle-aged patients where a total hip arthroplasty is a reasonable option. The guidelines issued by the National Institute for Health and Care Excellence (NICE), among others, increasingly recommend total joint arthroplasty for more active patients with hip fractures, and this is increasingly represented in the registries, such as the National Hip Fracture Database (NHFD). The putative advantages have been well documented. Authors from **Providence, Rhode Island (USA)** examined the use of hip arthroplasty compared with internal fixation on one of the North American databases.<sup>4</sup> As would be expected, the numbers presented here were much smaller than the English numbers in the NHFD, but they documented a similar trend to that seen on the NHFD, in that over the 13-year period there was an increase in the use of arthroplasty in the 45 to 64 year cohort from 5.3% to 22.3%. Interestingly, there was also an associated increased direct healthcare cost. The procedural costs were higher, but so too was length of stay with those receiving fixation staying, on average, one day less. However, these patients tended to be younger, and a stepwise increase in the use of arthroplasty was noted as the age bracket increased in five-year increments. The study figures suggest that relatively low-volume centres are inputting to the database, so it would be interesting to see if these trends remain when interrogating the NHFD data.

### Does the medial malleolus always need to be fixed?

■ On first glance, it would seem that this paper from authors based in **Edinburgh (UK)** suggests that we may no longer need to fix medial malleolar fractures.<sup>5</sup> Like all papers, however, the devil is in the details. The authors report a retrospective review of 342 patients over a nine-year period, with 247 included in the final analysis. Their headline result was that in a fifth of cases they reviewed, the medial malleolus was not fixed. This was down to surgeon preference rather than any selective or randomization process. The criteria for no operative management were an anatomical or near anatomical reduction following fixation of the fibular fracture with a fibular nail. The nonoperative approach was used more often in older patients in the cohort and there was a higher number of avulsion type fractures. Revision rates were similar in both sets, with 6% in the fixed group and 7% of the nonoperative group eventually coming for further

surgery. The predominant reasons for listing the patients for fixation in the nonoperative group were poor control or loss of control of the fibular fracture. Reoperations for symptomatic metalwork or infection were then required in a further 10% of those fixed. From these results, it appears that if the medial malleolus looks well reduced following lateral stabilization, particularly where some type of protibial fixation is employed, then it may be safe to leave it and avoid at least 10% of the potential complications. Whether there is any benefit to removing the prominent hardware is another question entirely.

### Delayed or nonunions: a simpler approach

■ The treatment of delayed unions or nonunions continues to trouble many orthopaedic services. The total costs associated with follow-up in some cases, and extensive revision surgery in others, is a real problem. In almost every service across the world, any patient with a persistent fracture line will not be discharged, but will either be entered into a long-term follow-up protocol including costly radiology investigations or, on occasion, receive significant and costly operative intervention. This group in **Oxford (UK)** have published an interesting approach when referred for consideration of treatment of a nonunion or presumed pending nonunion.<sup>6</sup> Typical costs of conventional approaches have been well described and range from £8000 to £30000 per case. The Oxford group propose identifying the fracture plane and then inserting 3.5 mm or 4.5 mm screws across the fracture, as perpendicular as possible, through stab incisions on a day-case basis. They presented a cohort of 33 cases over a nine-year period, all of whom would have otherwise been listed for some form of more invasive revision or augmentative surgery, and achieved successful union in 91% of cases. The cases were heterogeneous, but femoral and tibial fractures predominated and they may have already had some additional interventions. That said, the fact that over 90% succeeded after a very simple day-case procedure suggests that this is a technique worth considering, and it will be interesting to see if other centres adopt this procedure and produce similar results. The rationale for their success is that the insertion of several screws across the fracture plane may reduce shear forces at the fracture site. It may, of course, also be that there is some benefit from simply passing the drill over the fracture, as is routinely done in many centres for nonunion either through ‘pepper potting’, decorticating, or opening the canal during larger surgery.

### Can we study fixation the distal femoral fracture?

■ This feasibility trial from **Oxford (UK)** is further evidence of the maturity of an evidence-based and sound methodological approach to evaluating clinical effectiveness in orthopaedics.<sup>7</sup> Feasibility studies are often dismissed as lacking in value as they do not give a final ‘answer’. However, there are many benefits to undertaking a feasibility study in many orthopaedic conditions – both the rare and common. The feasibility trial reported here unfortunately demonstrates that, for some sorts of conditions, there is too much inherent bias within surgeons’ skills and expertise to enable level 1 evidence to be obtained. The authors designed a feasibility study and process evaluation of intramedullary fixation of the distal femur versus lateral locking plate fixation. The feasibility study was designed as a two-arm parallel group trial in adults, with outcomes reported including recruitment rate and completion rate of the Euro-QoL (EQ)-5D-5L at four months postrandomization. Baseline characteristics, disability rating index, quality-of-life scores, measurements of social support and self-efficacy, resource use, and radiological assessments were also collected. The views of patients and staff were collected during interviews. The main reason for not progressing to a full study was the recruitment and retention data. There were 23 of 82 eligible patients recruited (nail, 11; plate, 12) giving a recruitment rate estimate as 0.42 participants per centre-month. Although potentially deliverable on that sort of recruitment rate, this trial was further challenged by very low data completeness, with just over 60% completion of the primary outcome measure at the four-month primary outcome. The authors cite lack of surgeon equipoise and confidence using both interventions as their reason for not progressing with a full trial in the current form. This outcome is perhaps not surprising, as orthopaedic surgery is not a simple intervention and there are many contributing factors to enable surgeons to get the most out of the equipment they use. Some innovative approaches may, of course, be of use here, such as a cluster randomized design.

### Do we need an operation in the distal radius at all?

■ Although there are larger trials of this question in the offing, this small randomized controlled trial from **Amsterdam (The Netherlands)** is worthy of mention.<sup>8</sup> In the light of a reasonable number of randomized trials asking if it matters how the distal radius is fixed, minds have naturally turned to a further question: if a fracture of

the distal radius is reducible, does it need fixing at all? These investigators designed and undertook a small multicentre randomized controlled trial of 92 patients, all presenting with an acceptably reduced extra-articular distal radial fracture. Patients were randomized to open reduction and volar plate fixation or plaster immobilization. The primary outcome was function as measured with the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire after 12 months. At all follow-up timepoints (one, three, and six weeks and at three, six, and 12 months), operatively treated patients had significantly better functional outcomes (lower DASH scores) than patients treated nonoperatively (all *p* values < 0.05). Rather worryingly, 42% of participants allocated to nonoperative management in this trial had a subsequent surgical procedure. This consisted of 12 patients who had secondary fracture redisplacement within six weeks and six patients who had a symptomatic malunion treated with corrective osteotomy. The investigators concluded that open reduction and volar plate fixation should be considered for patients with extra-articular distal radius fractures, because it results in better functional outcomes after 12 months compared with nonoperative treatment.

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