there appears to be no relapse of infection, no need for re-operation, and perhaps better survival. These findings are more in keeping with those seen in infected nonunions and fracture fixations than in arthroplasty. What appears to be clear is that an infected unstable spine is more of a problem than an infected stabilised spine.

Teriparatide and union in lumbar fusion X-ref

■ It is miserable to see a patient who has undergone a fusion procedure for lumbar spine-related pathology using either a posterior lumbar interbody fusion (PLIF) or a transforaminal lumbar interbody fusion (TLIF) approach which fails to fuse, often leaving the patient with ongoing pain and sometimes even instability. Teriparatide (a recombinant form of parathormone including just the first 34 nucleotides which are the bioactive form) is starting to find relatively wide application in patient groups with recalcitrant fractures or difficult-to-treat osteoporosis. Despite promising early results in treatment of nonunions, particularly those very difficult-to-treat bisphosphonate-associated fractures, there are few objective studies into efficacy. We were delighted, therefore, to read this paper from **Yamanashi, Japan** testing the efficacy of teriparatide as an adjunctive treatment when undertaking TLIF or PLIF in degenerative lumbar spine diseases as an adjunct to increase fusion rates.[7] The authors have designed and reported a randomised controlled trial with the primary endpoint of radiological fusion rates. In the end, 66 patients were randomised to either standard care, no teriparatide, or weekly teriparatide administered subcutaneously from the first week post-operatively to six months. All patients in the study were women over the age of 50 years with a bone mineral density (BMD) of < 80% and secondary outcome measures included the clinical evaluation, neurological symptoms and two patient-reported outcomes (Japanese Orthopaedic Association Back Pain Evaluation Questionnaire and the Oswestry Disability Index). By four months post-operatively, bone fusion in the two central CT slices was significantly higher in the teriparatide arm compared with the control arm in the intention-to-treat analysis, and was significantly higher at six months in the per-protocol analysis. There were no differences in functional scores, and no apparent differences in complications. It certainly appears that the use of teriparatide is a positive in this small study and increases bony union rates. However, without a significant difference in satisfaction rates, the cynical among us would argue that simply treating the radiograph, rather than the patient, is all that it can currently be said to be doing. There is clearly enough here to warrant a properly powered health economic study.

Cognitive decline and osteoporotic fracture

■ Fragility fractures are of course the next major treatment problem in global orthopaedics. In fact, here at *360*, we would go as far as to say that, along with obesity and antibiotic resistance, fragility fracture and frailty represent the major healthcare challenge of the next century. There are numerous points at which these frail older patients come into contact with healthcare providers, and we are becoming more and more cognisant that the major problem is not the fragility fracture but the frailty. Investigators from **Osaka (Japan)** have investigated the effects of vertebral fracture and the association with cognitive decline.[8] They collated information on 339 serial patients over the age of 65 years, all presenting with osteoporotic vertebral fractures, with a recent (two-month) history of back pain. Cognitive function was evaluated using the mini-mental state examination. Interestingly, the authors established that, in their sample of 339 patients (58 men and 281 women), cognitive decline was observed in 7.7% of them at the six-month follow-up. They observed that there was an association with delayed union (OR 4.7) and reduction in ability to perform ADLs. While this is an interesting observation, the conclusion the authors come to is curious. Rather than recognising an association, they go on to hypothesise that surgical treatment of the fragility fracture may halt the cognitive decline. This is in itself an odd assertion, and one we are somewhat at a loss to explain. It would seem to us at *360* that perhaps the observation that vertebral fractures are associated with a risk of cognitive decline and that use of appropriate fragility frailty screening and interventions would perhaps be most appropriate.

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Trauma

***X-ref** For other Roundups in this issue that cross-reference with Trauma see: Foot & Ankle Roundups 1, 3 and 7; Hand & Wrist Roundup 6; Shoulder & Elbow Roundups 1, 2, 3 and 4; Oncology Roundup 1; Children's orthopaedics Roundup 1.*

Does ultrasound enhance fracture healing? X-ref

■ Anything that speeds up bone healing will be welcomed by patients and orthopaedic surgeons alike. The prospect of a simple device that offers a potentially believable mechanism to improve bone healing through piezoelectric forces has, to a certain extent, captured the imagination of surgeons and patients. A group from **Canada, Norway** and **Switzerland** have undertaken a new systematic review of the low-intensity pulsed ultrasound devices (LIPUS), and, given the 26 randomised studies of LIPUS which the authors were able to identify and include in their study, quite clearly this systematic review is long overdue.[1] The authors included

studies that tested LIPUS against sham or no device. Across the whole group, there was a moderate risk of bias, and a range of outcomes were reported. The LIPUS appeared to have a non-significant later return to work time, and no difference in risk for subsequent operations or number of subsequent operations (although in both cases favoured LIPUS with a relative risk of 0.80). The four best trials available had a low risk of bias and evaluated tibial and clavicle fractures, and the authors undertook a separate analysis to include only these trials. When these were included, LIPUS did not reduce time to full weight bearing, pain at four to six weeks, and days to union. The bottom line here is that, based on moderate to high quality evidence from studies in patients with fresh fracture, LIPUS does not improve outcomes important to patients and probably has no effect on radiological bone healing. The applicability to other types of fracture or osteotomy is open to debate.

A confusing result from another big clavicle study X-ref

■ We are continuing to see reports of clavicle fracture studies as the Pandora's box of the clavicle - opened by Mike McKee and the Toronto group, they are still causing us problems in deciding just what to do with them! As more and more studies are published with increasingly conflicting results, it seems that a meta-analysis is now required here. The latest study to report is from **The Netherlands** and is another multicentre randomised controlled trial comparing plate fixation and non-operative treatment for displaced mid-shaft clavicular fractures.[2] This study used the primary outcome measure of nonunion, rather than functional scores, so potentially does add something to the current evidence base. Secondary outcomes included functional outcomes (Constant Shoulder Score, Disabilities of the Arm, Shoulder and Hand (DASH) score, and the Visual Analogue Scale (VAS)) and, finally, cosmetic results and general health status were assessed. The authors of this study were able to enrol 160 patients, randomise them to either operative or non-operative treatment for their displaced midshaft clavicle fracture and report their outcomes. There was a significant difference in nonunion rates (23.1% *vs* 2.4%), however, only 12.9% of these required nonunion surgery. This is set against the reported rates of secondary intervention of 27.4% in the operative arm (with around 11% of these for reasons other than elective plate removal). There were no differences in any of the collated shoulder performance outcomes between the two groups. The problem here is the selection of outcome measure. The authors have a somewhat confused reporting style. There isn't really any doubt that nonunion rates are higher following non-operative management and they have reinforced this. However, the patients who are primarily operated on have a considerably higher rate of re-operation than the nonunion rate in this series. With broadly similar outcomes clinically, this paper highlights to us here at *360* that clavicle fracture surgery should not be undertaken lightly, especially given the high complication rates.

Patellar dislocation: not so innocent X-ref

■ A common presentation to fracture clinics is the patellar dislocation, and for the most part these are treated expectantly with vastus medialis oblique (VMO) exercises and splintage if necessary. It is rare for primary operative intervention to be undertaken unless an osteochondral defect is present, although there are a number of described operations. We are delighted here at *360* to see some attention paid to this important, common and yet under-researched condition. Surgeons from **Rochester, Minnesota (USA)** asked the simple question: does a patellar dislocation result in secondary arthritis in the knee?[3] The authors of this prognostic study evaluated the outcomes of 609 patients who underwent a lateral dislocation of the patella and matched them to an age- and sex-matched cohort of patients who had not had a dislocation. The patients were followed up for a minimum of ten years, and the primary outcome of the study was cumulative incidence of arthritis rates. The study population had 58 patients (9.5%) who were diagnosed with arthritis and had had a previous patellar dislocation. This incidence was higher at five years (1.2% *vs* 0%), ten years (2.7% *vs* 0%), 15 years (8.1% *vs* 1.3%), 20 years (14.8% *vs* 2.9%) and 25 years (48.9% *vs* 8.3%). The findings of this study are striking and also somewhat shocking. Dislocation of the patella is considered a minor injury, and the majority of surgeons treat this expectantly. Perhaps we should be more proactive at arranging MRI scanning and treating any underlying pathology at the time of index injury.

FAITH in hip fixation X-ref

■ The Fixation using Alternative Implants of the Treatment of Hip Fractures (FAITH) study has garnered some publicity recently and is one of the few orthopaedic studies to be published in *The Lancet*. The study is a multicentre randomised controlled trial, which, although multinational, was run by the **Canadian Orthopaedic Trauma Society (COTS)**.[4] COTS have been publishing more and more interesting and important trials over the past few years and this study is no exception. The study team recruited 1108 patients from 81 clinical centres in eight countries, all of whom were over the age of 50 years and had a low-energy hip fracture requiring fixation. Patients were randomised to either cancellous screw fixation or dynamic hip screw (DHS), with the primary outcome measure of re-operation within 24 months. Perhaps surprisingly, the study took six years to recruit, an accrual rate of just 1.7 patients per centre/year over the course of the study. There was no difference in the primary outcome measure of re-operation at the two-year point, with 20% of the DHS group and 22% of the cancellous screw group requiring revision fixation. Nor was there any difference in the medical-related adverse events, however, avascular necrosis was twice as likely (9% *vs* 5%) in the DHS group. Given the size of the study and the relatively common event rates, this is likely to be a true finding. The subgroup analysis also seemed to suggest that certain groups of patients did better with a DHS, specifically those who were smokers or those with a displaced femoral neck fracture. Given the overall lack of difference in re-operation rates, the two interventions can be said to be equivalent in the strictest sense. However, the side-effect profile is clearly somewhat different and, in patients at higher risk of avascular necrosis, perhaps the multiple cannulated hip screws would be the more prudent choice. This seems likely to be due to the larger reamer and tendency for the femoral head to rotate on insertion of the DHS screw.

Uncemented hemiarthroplasty gives more complications in hip fracture X-ref

■ In the second high quality randomised controlled trial reported in the past couple of months surrounding treatment of patients with a hip fracture, investigators from **Delft (The Netherlands)** have reported a small trial designed to investigate the potential benefits or otherwise of both types of fixation in hip hemiarthroplasty.[5] While selection of fixation method is a matter of preference in hip arthroplasty surgery, there are some significant potential

drawbacks to both cemented and uncemented hemiarthroplasty in the context of the hip fracture patient. Uncemented stems may not fit the 'stovepipe' older fragility fracture of the femur well, risking high rates of early loosening, and the initial impaction carries with it a not insignificant risk of femoral fracture. The cemented option, however, carries with it a different risk profile, and specifically the risk of embolus and death when cementing the femoral canal. To date, the Cochrane reviews have been equivocal, however, most published data concern very much outdated prostheses, with the majority concerning the Thompson's and Austin Moore prostheses. This well conducted randomised controlled trial reports the outcomes of 201 patients, all over the age of 70 years, managed with either a cemented or uncemented prosthesis of a contemporary type. The patients were reported at one year of follow-up, and outcomes reported included complications, operation time, functional outcome (measured by the Timed Up and Go (TUG) test and the Groningen Activity Restriction Scale (GARS)) and mid-thigh pain. Secondary outcome measures included health-related quality of life measures. It is always somewhat difficult to know what to make of studies that report so many dual primary outcome measures. It seems unlikely that all of these measures have been adequately dealt with in the power calculation, and, as such, there is a risk of type II errors in interpretation. This study reported a higher rate of local complications in the uncemented group, with an odds ratio of 3.3 for early complications. Surprisingly, there was no difference in operative time or functional outcomes (TUG 12.8 *vs* 13.9). Post-operative periprosthetic fracture is a recognised complication of uncemented hip arthroplasty, and although the authors of this study perhaps could have done a better job in some aspects of their design (the group sizes were unequal and the study is likely to be significantly underpowered), it does serve to underline the problems of periprosthetic fracture in this elderly and frail population.

Older patients with the distal humerus X-ref

The supracondylar distal humeral fracture in the elderly is one of the most challenging fractures to treat, and is fraught with difficulties in decision making, patient selection and technical. Currently, there is little in the way of evidence to support the three competing strategies of conservative management, fixation and arthroplasty in these populations. Most surgeons who regularly treat these patients would tend to agree that avoiding complications is the name of the game. We were delighted to see this large study of patients from **Washington DC (USA)** which aims to establish which patients do well with either open reduction and internal fixation (ORIF) or total elbow arthroplasty (TEA).[6] The patient cohort was retrospectively identified using the National Surgical Quality Improvement Program for both ORIF and TEA performed for distal humeral fractures, and, despite a nine-year study period, there were only 216 ORIF and 65 TEA cases available for review. A range of potential risk factors for complications, along with any recorded complications occurring within 30 days of the index procedure, was also recorded. There did not appear to be any real differences in the adverse events examined between the two groups, with the most common complication being post-operative haemorrhage which occurred in 8% of the cohort. The patients had a higher complication rate with a higher American Society of Anesthesiologists (ASA) grade. However, there was no association between any of the recorded pre-surgical variables and the complication rates. Certainly, in terms of 'codeable' complications and outcomes, there appears to be not a lot to choose between ORIF and TEA. However, as we all know, these kinds of database studies only tell one side of the story. There are no health economic data presented in this study and no outcomes data so it isn't possible to establish if there are any potential functional differences or longer-term complications (such as periprosthetic fracture, loosening or elbow stiffness) that differ between the two groups.

Femoral shortening and outcomes in hip fracture

In a retrospective cohort study, these authors from **Zerifin (Israel)** assessed the incidence of proximal femoral shortening.[7] A recognised and relatively common complication, femoral shortening is linked to the design of sliding hip fixation devices (cephalomedullary nails and sliding hip screws) and is an intended design feature to improve the rates of union following a hip fracture. However, shortening of the hip with the associated loss of femoral offset and length may have significant effects on patient outcomes. These authors designed their study to assess the shortening associated with femoral nails and any effect this may have on patient outcomes. The findings of this study are based on the reported outcomes of 48 consecutive patients, all with intertrochanteric fractures treated with the Gamma3 cephalomedullary nail. The post-operative films were assessed to establish the abductor lever arm (femoral offset), femoral height and overall shortening. There was overall shortening seen in 60% of patients (n = 29), with abductor lever arm loss in 38% (n = 18) of cases. On average, around 7 mm of overall shortening was seen with 4.5 mm of offset loss and 5.5 mm of femoral height loss. This loss of femoral length was associated with increased risk of fixation failure and decreased ability to walk.

Return to work following road traffic crash X-ref

Return to work (RTW) is the final and preferred outcome following a road traffic collision for all healthcare providers, doctors and (the majority of) patients. One of the difficulties is that patients don't always return to work, and the outcomes are somewhat variable, with patients with apparently similar injury patterns having very different experiences in returning to work. These authors from **Brisbane (Australia)** studied the factors that can predict which individuals will not return to work following injuries sustained from a road traffic collision.[8] The study describes the outcomes of 194 claimants, and their details were compiled using the UQ SuPPORT cohort. Patients' outcomes were assessed at six months following injury using a variety of physical and mental health component scores, and RTW was determined at up to two years of follow-up. At the final two-year follow-up, 78% of participants had returned to work. The study team collated a range of potential univariate predictors of RTW which included being the driver or passenger, having a prior or current psychiatric diagnosis, high disability level, low mental or physical quality of life, predicted non-recovery, high pain, low function, high expectations of pain persistency, low expectations about RTW, elevated depression or anxiety. In order to establish which of these were confounding, the authors undertook a multivariable logistic regression analysis which resulted in two predictors, significant disability level and expectations about RTW. Overall, these results appear to be representative of findings in other systems, with around 3:4 patients returning to work by two years, and those patients who are likely to have difficulty can be identified early on. The promising findings here are that expectations can be managed early, and intervention to adjust expectations about RTW is likely to have a positive effect.

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Oncology

Bone sarcoma in children, adolescents, and young adults X-ref

■ It is rare that a child with an orthopaedic tumour actually presents to an oncology service. In fact, the majority present either to a fracture clinic following an incidental injury and continuing tumour-related pain or to the paediatric service following an outpatient referral. Given the rarity of these diagnoses and the rapidly changing field that is paediatric orthopaedic oncology, it can be difficult to know what to do with the patient at first consultation (beyond the obvious referral to a tumour centre) and, for both the patient and the orthopaedic surgeon, this can be a real challenge. We would encourage any surgeon who is involved in a general orthopaedic practice, or those seeing paediatric or paediatric trauma patients, to spend a little time reading this review from **Tampa, Florida (USA)**.[1] The authors concisely reach a consensus as to what represents current best practice in a difficult and rapidly changing field.

Denosumab: for how long? X-ref

■ The orthopaedic world has been buzzing with reports of denosumab - "the wonder drug" - and its remarkable efficacy in the treatment of giant cell tumours of bone (GCTB). The giant cell tumour relies on activation of the RANK receptor via its ligand (RANKL) and denosumab is a RANKL inhibitor. It has been so remarkably effective in metastatic and unresectable lesions that, for many, this has become the 'go-to' treatment with exceptional tumour kill rates. Patients are managed with a short 'treatment' course for the first four weeks, and then a long-term once-monthly suppression regime. The difficulty, of course, is that although the efficacy against the giant cell tumour is well documented, the drug has not been in use for long enough to establish whether there is a long-term cytotoxic profile. Although denosumab is certainly a useful addition to the armoury, it seems to have raised as many questions as it has answered. Surgical oncologists in **Bologna (Italy)** have reported their outcomes from a series of 97 patients, all of whom were treated with long-term denosumab.[2] In 43 cases, the surgical team achieved resection of the tumour with a subsequent denosumab treatment course of 12 months (6 to 45). However, 54 patients had unresectable giant cell tumours and, as such, were treated with denosumab alone. Of this more advanced disease cohort, around a quarter presented with lung metastases, a third had a primary spinal tumour on diagnosis and, perhaps unsurprisingly given they were all unresectable, around two thirds were relapses following previous surgery. In this group, patients had an average of 54 months (9 to 115) of denosumab treatment. As one would expect, there was a clinical response in all cases taking denosumab, however, when discontinued around 40% of patients suffered tumour progression. This is in line with data from other series, and highlights the often long-term requirement for this drug. There were relatively few side effects, with denosumab being, in general, well tolerated. There were six patients who developed osteonecrosis of the mandible, and around 10% of long-term treatment patients experienced peripheral neuropathy and a cutaneous rash, both of which are recognised complications. Perhaps most reassuringly, there were only two cases each of hypophosphataemia and atypical femoral fractures. These authors have conclusively shown that prolonged treatment with denosumab yields sustained activity in GCTB, including pain reduction and radiological disease control, and has a mild toxicity profile. They recommend careful and strict monitoring of patients who need prolonged treatment because of the dose-dependent toxicity observed.

Articular surface and curettage for epiphyseal chondroblastoma? X-ref

■ In an interesting study from **Buenos Aires (Argentina)** researchers ask the question: what happens to the articular cartilage following aggressive intralesional curettage?[3] Although there is much written on the treatment of epiphyseal tumours, it all concerns revision and relapse rates. There is surprisingly little literature that addresses the long-term sequelae in terms of joint degeneration and functional outcomes after aggressive intralesional curettage. These authors identified 53 patients, all treated with aggressive intralesional surgery for their primary diagnosis of epiphyseal chondroblastoma. The initial cohort of 53 patients were evaluated at a final follow-up of 77 months, and outcomes assessed were joint complications. There were 26 local complications seen in 22 patients, of which the most common was degenerative change in the joint (77%; n = 20/26 complications), although four patients suffered local tumour recurrence. Other complications reported in this series include acute fracture and infection. Overall, the authors report a somewhat disappointing 74% joint survival at ten years (90% at five years), although this did vary by joint, with proximal femoral tumours only reaching survivals of 44% at five years. The authors conclude that osteoarthritis was a frequent complication of aggressive curettage of epiphyseal chondroblastoma, and tumours located in the proximal femur appeared to be at particular risk of secondary osteoarthritis and prosthetic replacement. As chondroblastoma is a tumour which disproportionately affects younger patients, the patient and surgeon should be aware that arthroplasty at a young age is a potential outcome for treatment of proximal femoral chondroblastomas. This cohort was actually slightly under-representative in terms of skeletally immature patients, where surgery may result in growth arrest. It is likely that this underestimates this important