

**X-ref** For other Roundups in this issue that cross-reference with Hip & Pelvis see: *Knee Roundup 6; Foot & Ankle Roundups 2 and 8; Wrist & Hand Roundups 6 and 7; Shoulder & Elbow Roundups 2 and 6; Children's orthopaedics Roundups 3 and 6.*

## Driving and plaster: finally solved? X-Ref

■ We are so often asked by patients about whether it is safe to drive after a plaster has been applied. It is of course a question that is much studied, but there is no clear-cut answer. As such, the sensible surgeon will not assume responsibility but will suggest the patient must decide for themselves and be responsible for that potentially life-damaging decision. However, there is some guidance already in the literature, and one paper in particular this month piqued the interest of the editorial team, here at 360, by actually measuring patients' control of a car under driving test conditions, rather than using the usual car simulator reaction time model. Researchers from **Fort Sam, Texas (USA)** set up a driving test and compared driving performance in 20 subjects treated with four different types of immobilisation: short arm thumb spica cast; short arm wrist cast; short arm thumb spica splint; and short arm wrist splint on each arm.<sup>1</sup> The drivers wore a randomly assigned cast on each of ten runs through a closed, cone-marked driving course with outcomes assessed by a certified driving instructor (pass/fail scoring), number of cones hit, run time, and subject-perceived driving difficulty (1 to 10 analogue scoring). The bottom line is that only the left short arm wrist splint seemed not to affect performance; the thumb spica casts in each arm increased perceived driving difficulty and crucially increased the risk of loss of control such that the authors do not recommend driving while wearing these.

## Do plates damage tendons?

■ For most, the nagging doubt associated with distal radial fracture fixation is ever present. In some cases the indications are clear, however, in others where the patient could be managed either way, the evidence does not really support plate fixation as enthusiastically as the surgeons who are undertaking it. One of those nagging doubts that just won't go away is concern about tendinopathies. Whenever we operate, we put patients in harm's way and distal radial fracture fixation with a plate is known to cause tendon attrition, through both the plate and the proud screws. The issue, of course, in working out the risk: benefit balance is knowing the risk, one that is perhaps higher than we realise. A group in **Ottawa (Canada)** undertook a systematic review and meta-analysis of the literature in an attempt to establish on a broader scale what the risks of tendon complications are with plate fixation of the distal radius.<sup>2</sup> The authors reviewed the literature and were able to include 46 studies in their analysis reporting the outcomes of 6278 patients. Of these, 6.8% had a tendon-related problem - either rupture or tenosynovitis. Perhaps most interestingly, the risk of rupture itself did not vary, with volar and dorsal plating at 1.5% and 1.7%, respectively. What did differ was the incidence of tenosynovitis at 4.5% and 7.5%, respectively. These authors ably remind us of the risk of tendon injury even when using contemporary plates. We must ensure our patients are fully consented for this risk and we must operate with consummate skill using plates of optimal design.

## Prediction tools for estimating the risk of osteoporotic fractures

■ In the days of 'big data', risk profiling is becoming more and more commonplace in healthcare

provision, with screening often risk factor-based. Osteoporosis, surprisingly, is perhaps the most advanced area of medicine in this regard, with three widely utilised prediction tools for the risk of osteoporotic fractures: QFracture, FRAX and Garvan. Although these tools have been extensively used, there is little in the way of validation for their results. With treatment decisions founded on population-based risks applied to an individual, it is important to validate these tools externally. The authors of this study from **Tel Aviv (Israel)** conducted a retrospective study to establish the validity of these population medicine-based tools.<sup>3</sup> These authors undertook a study of 1 054 815 patients from a health economic national dataset. The outcomes of osteoporotic fracture (including hip fracture) were extracted from the electronic database for fractures occurring between 2010 and 2014. The actual incidence rates were compared with the probabilities predicted for the whole population in 2010. Using receiver operating curves to assess the accuracy of each measure to predict hip fracture (overall incidence 2.7%), the area under the curve was 82.7% for QFracture, 81.5% for FRAX and 77.8% for Garvan. The results for major fracture (overall incidence 7.7%) were 71.2% for QFracture and 71.4% for FRAX. In this population, all of the tools underestimated fracture risk but performed comparably with each other. There appeared to be no advantages to use of the more complex QFracture score over the simpler FRAX, with each having a similar diagnostic ability.

## Anatomical plating for distal humeral fractures X-ref

■ These authors from **Murnau (Germany)** have revisited the now tried and tested topic of distal humeral plating systems and their biomechanical considerations.<sup>4</sup>

The two competing concepts of 90:90 and parallel plating are well described in the literature and, like all 'competing' theories, there are indications for each in clinical practice. What has moved on a lot in recent years are the plates with which fixation is achieved, with the development of newer polyaxial systems and the refining of plating systems. These investigators took a timely look at the biomechanical properties of six different mono-axial and polyaxial distal humeral plating systems, all with an anatomical plate design. The aim of the biomechanical tests was to examine differences regarding system stiffness, median fatigue limit and failure mechanisms. Although manufacturer-specific, there are some potentially useful take home messages from a generic design perspective. The parallel plating systems were generally stiffer than the 90:90 configurations, and the common mechanism of failure in the 90:90 systems was fatigue fracture of the posterolateral plate. The parallel plating systems failed more through screw fracture than through plate failure. In general, the variable angle systems were not as biomechanically sound as the fixed-angle locking plates, although the systems were felt by these investigators to be 'sufficiently' stable. Clinically, when applying these very stiff constructs, it is essential to ensure that the patients have well reduced fractures with compression applied across the fracture gaps; application of stiff locking constructs without appropriate compression is a quick route to failure.

## Complications in comprehensive hip fracture care X-ref

■ Everything has changed about hip fracture care. No longer are these patients brushed aside for surgery in the wee hours of the morning by the most junior (and



tired!) surgical teams. Integrated care pathways abound, a whole new specialty of orthogeriatrics has grown up around the medical management of these patients, there are tariff incentives and nationally mapped dashboards for care in many countries of the world and things just keep on getting better. However, there are still complications, and perhaps one of the most valuable next steps in hip fracture care is to identify who is at risk of these complications and take measures to intervene before they happen. The authors of this succinct study from **Almelo-Hengelo (The Netherlands)** look at the care of 452 patients, with the aim of establishing the incidence of, and risk factors for, complication development in elderly patients with a hip fracture following integrated orthogeriatric treatment.<sup>5</sup> All patients in the study were aged over 70 years and were treated at a single centre over a 30-month period, and although a small centre for hip fracture care, the team had initiated a modern orthogeriatric care model for these patients. The authors collated a range of pre-operative data including the ASA scores, age and medical comorbidities. The complication rates in this series were shockingly high at 49.6%, and it is difficult to know if this is reflective of every system but we just aren't aware, or if the authors have a particular practice with significantly physiologically compromised patients. Either way, the risk factors for complication would appear to be relevant to all surgeons and

physicians undertaking the care of patients with hip fractures. These authors have established that important risk factors for a complicated course were increasing age, poor medical condition, delirium risk and VMS Frailty score. As the population ages and, at the same time, older patients are becoming more and more active, we are starting to see a split in the hip fracture populations. It is no longer the case that all of these patients are frail and expecting to live in a nursing home. The developments in hip fracture care of late have improved the mortality figures (in this series it was just 3.8%) across all patients with these diagnoses. Perhaps one of the most important next steps in continuing this development will be the use of tailored pathways to identify early those patients who are at risk of medical and surgical complications and who may do better with increased medical input over and above the 'orthogeriatric' model combined with consultant surgeon-led care.

#### **Approaching that calcaneal fracture X-ref**

■ On occasion, the calcaneal fracture defies even the finest of surgeons. The outcomes of calcaneal fractures in studies are not defined by the successes, but are dominated by the failures. The outcome of an infected calcaneal fracture is so poor that the benefit gained by fixation compared with conservative treatments is dwarfed. This causes some confusion in the literature and is one of the reasons why, although patients do appear to benefit in a range of well defined indications from treatment, this is not always borne out by the literature. The poor outcome associated with soft-tissue complications is one of the reasons why there has been renewed interest in the sinus tarsi approach which, in contrast to the extended lateral approach, provides a potential for lower complication rates and therefore improvement in the long-term outcomes. There

have been plenty of studies on the two approaches, however, there is yet to be a clinical consensus based on this literature, and we were delighted to see the publication of a well performed meta-analysis from **Guangzhou (China)** investigating the potential benefits of one approach over another.<sup>6</sup> The authors used widely accepted methodology to evaluate the seven studies (two RCTs and five case series) that were included in the meta-analysis. The pooled data revealed a lower rate of wound complications in the sinus tarsi approach group, with no differences to be found in the functional scores or radiographic outcomes between the two groups. Based on the results of this meta-analysis, it certainly appears that the adoption of the sinus tarsi approach as the workhorse for calcaneal fractures will result in an improved complication profile while still potentially maintaining the benefits associated with operative reduction and fixation of these difficult fractures.

#### **Embolisation not always bad for infection?**

■ Interventional radiology has been a bit of a revelation in terms of the easy management of catastrophic arterial haemorrhage. In major centres, the provision of 24/7 interventional radiology has improved survival rates from arterial haemorrhage particularly in and around the pelvis. That said, it only treats arterial haemorrhage effectively, and on occasion interventional radiologists are tempted to undertake 'non-selective' embolisation which, by its very nature, renders large volumes of muscle ischaemic and sometimes even the overlying skin. Unsurprisingly, the subsequent management with extensive operative approaches is often complicated by infection. There is little hard and fast data, and the range of fracture patterns, embolisation patterns and surgical approaches makes it difficult to establish exactly what complication rates could be expected following

pelvic embolisation. Taking a rather pragmatic view on the whole thing, surgeons in **Seattle, Washington (USA)** aimed to evaluate the impact of pelvic embolisation on the post-operative infection rate after acetabular fracture fixation.<sup>7</sup> The authors report a series of 72 patients, all of whom had been treated with the unit's standard pelvic resuscitation protocol. All patients had acetabular fractures and, of the 72 initial patients, 25 eventually underwent embolisation, 16 underwent angiography without embolisation and 31 did not undergo angiography. The results were not suggestive of a markedly higher rate of infection in the embolisation group; in fact, the highest infection rate was in the angiography without embolisation group ( $n = 5/16, 31\%$ ), higher than the embolisation group ( $n = 2/25, 8\%$ ), and favourable when compared with the background rate of 9% in the no-angiography group. This cohort certainly illustrates that pelvic embolisation can be undertaken safely, especially when as part of a wider treatment strategy. Interpreting retrospective results like these from selected series can be difficult, nevertheless, in some diagnoses it is the only way to ascertain the benefits and complications of established emergency procedures. We would comment here at 360 that non-selective embolisation should be undertaken with caution in patients requiring a posterior approach to fix their acetabular fractures. However, clearly in patients suffering severe haemorrhage, embolisation should not be withheld.

#### **Clinical evidence for the RIA? X-ref**

■ The addition of the reamer irrigator aspirator (RIA) to the inventory of the majority of trauma centre theatre suites happened without the development of an evidence base to support its use. The concept itself seemed attractive, with a potential safety aspect associated with the collection of endosteal

tissue rather than forcing it into the systemic circulation. However, perhaps more importantly for major centres, it offered an effective potential treatment for endosteal osteomyelitis and a ready source of bone graft. The company often cite the lower endosteal pressures as a safety argument for the use of RIA in standard intramedullary nailing. However, until now there has been no evidence to either refute or deny this claim. We were delighted to see this randomised controlled trial from **Toronto (Canada)**, reporting the outcomes in terms of emboli detectable on transoesophageal echocardiogram (TOE) during reaming of the endosteal canal.<sup>8</sup> The study team recruited 22 patients to

the study who were all monitored via TOE during their surgery. Eleven were randomised to the RIA group and 11 to standard reaming. The main outcome measures reported were the duration, size, and severity of emboli during canal instrumentation. The authors reported what they termed a “modest reduction” in the total emboli score in the RIA group when compared with standard of care (5.30 vs 4.05) and during nail insertion (SR 5.09 vs 4.25). However, although statistically significant, the authors were not able to correlate these changes in emboli score to any meaningful physiologic parameters and, as such, it seems likely that this was not clinically significant.

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## Oncology

### Osteosarcoma follow-up: chest radiograph or CT?

■ Nothing, as they say, spoils results like follow-up. One area where follow-up is a potential hot potato is in osteosarcoma where it really is important. A team from **Bologna (Italy)** present their series of patients from the Rizzoli Institute treated over a 23-year period, with the results flying in the face of the recent work.<sup>1</sup> The authors pose the question, ‘does intensive follow-up lead to earlier diagnosis of metastases and therefore better outcomes?’. Their study included patients with lung metastases as their first pattern of recurrence for inclusion in the study, and the authors compared those followed up with CT with those followed up with plain radiography. The authors set out to establish what the ‘treatment effect’ was of CT in terms of long-term disease-free survival. They report the outcomes of 215 patients, with chest radiographs detecting lung metastasis in 100 patients, and CT detecting in 112, with three being diagnosed on symptomatic presentation. At

odds with some recent work, these authors established that those patients followed up with a plain radiograph protocol had a 60% complete remission rate, while those in the CT scanning group achieved an 88% complete remission rate. It is easy to see how CT scanning and the attendant earlier diagnosis should lead to a better outcome and this was reflected in the five-year overall survival rates of 35% for the radiograph group and 60% in the CT group. While this would seem to be a ‘no brainer’, chest CT scans do have a significant radiation exposure and, in younger patients particularly, there is a risk of induced tumours. This, coupled with the conflicting results, makes us wonder whether a large randomised controlled trial of follow-up protocols might be appropriate.

### Limb salvage or amputation in osteosarcoma

■ A question that one would hope to have an answer to by now is the one of limb salvage versus amputation in patients presenting with osteosarcoma of the lower limb. Although we had high hopes for

### this meta-analysis from **Jiaying (China), on closer inspection**

we have some reservations.<sup>2</sup> On the surface, this is a convincing paper that sets out to undertake a meta-analysis of randomised trials comparing amputation to limb salvage surgery (LSS) in osteosarcoma. The authors were able to identify ten studies reporting the outcomes of 1343 patients, all with osteosarcoma treated with LSS or amputation. The review team were able to establish that LSS was as safe as amputation in this meta-analysis, however, we are concerned that, given the differences in five-year survival (in favour of the limb salvage), the patient cohorts may not quite have been a matched series. We are always concerned when there appears to be a significant difference in baseline characteristics, as found here, which may not have been adequately accounted for in the meta-analysis.

### Extraskeletal osteosarcoma: chemotherapy of likely benefit

■ Treatment of rare tumours is always somewhat difficult: with

little reliable data, the surgical team and oncologist are often using ‘best guess’ treatment based on a few case series, or perhaps sporadic experience of their own coupled with experience with similar tumours. This can be the case with extraskeletal osteosarcoma (ESOS), a high-grade mesenchymal tumour consisting of osteoblastic, chondroblastic and fibroblastic cells that produce osteoid, neoplastic bone or chondroid matrix. Patients usually suffer a clinically aggressive course and there is little data up to this point upon which to base treatment decisions. This paper from the **European Musculoskeletal Oncology Society** far outstrips previous studies in that it reports the outcomes of 266 of these rare lesions, and, due to the number of included patients, the authors were also able to comment on factors that might influence outcomes.<sup>3</sup> The research network was able to identify 274 patients between 1981 and 2014 with a diagnosis of ESOS across the 16 centres, of which 266 were included in the study. The overall five-year survival rate