

X-ref For other Roundups in this issue that cross-reference with Trauma see: Sports Roundup 5; Wrist & Hand Roundup 3; Shoulder & Elbow Roundups 1 & 4; Children's orthopaedics Roundups 5 & 7.

Hoping to reduce the Hoffa X-ref

■ Coronal plane fractures of the knee include Hoffa fractures and their variants. The posterior condylar shear fracture first described by Hoffa is a rare but much discussed fracture pattern. These partial articular fractures are not too difficult to fix, usually being amenable to a couple of headless compression screws; however, they are somewhat difficult to approach and reduce. The large muscle groups crossing the knee, combined with the fracture orientation, usually result in a posterior displacement with considerable displacing shear forces. It is critical, therefore, to get a decent exposure to aid in the reduction of the fragment. These authors from **Chiang Mai (Thailand)** have undertaken a worthwhile cadaveric study to establish what the optimal approach is to reduce these fractures and hold them with screws.¹ The authors aimed to compare the size of the Hoffa fragment and the suitability of different approaches to reduce and fix the fracture. They undertook surgery on 20 fresh cadavers and evaluated the four most commonly used approaches: the medial parapatellar approach (MPPA), direct medial approach (DMA), lateral parapatellar approach (LPPA), and posterolateral approach (PLA). The authors undertook each approach on all 20 knees, and then marked out the length and depth of the posterior condyle. These lines were then used to establish 'lines of sight' to see which sizes of Hoffa fracture would be visible from each exposure. In this relatively simple study, the authors go on to give some guidance that is easy to remember. The parapatellar approaches should not be used if a medial fragment is less than 18% of the anteroposterior diameter of the condyle or 10% of lateral condyle, as the fragment cannot be visualized. However, when the fragment sizes increase to 28% medially or 20% laterally then the parapatellar approaches should be used.

Bisphosphonate fractures and the 95° angled blade plate X-ref

■ The bisphosphonate epidemic that dominated orthopaedic literature in the early 2000s never quite came to fruition, with the incidence of atypical femoral fractures remaining thankfully low. However,

the difficulties identified early on in treating these fractures have turned out to be entirely true. The bisphosphonates reduce the rate of bone remodelling both through a direct effect on the osteoclast and through incorporation into the bisphosphonate crystal. This reduced bone turnover is what is thought to lead to the classic beaking on the tension side of the subtrochanteric area and, eventually, stress fracture due to an uncoupling of osteoblastic and osteoclastic activity and a failure of remodelling. When remodelling has failed, it is natural to expect that bone healing will be inhibited. Previous series have demonstrated a high failure rate for surgical stabilization of atypical femoral fractures. One of the oldest and most reliable treatments for failed subtrochanteric osteosynthesis is the 95° angled blade plate. Despite the technical difficulties associated with siting the blade accurately, this has the advantage of superb rotational control and the ability to generate large amounts of compression. This series from **Seoul (South Korea)** reports the outcomes of 14 patients, all with failed fixation of their subtrochanteric fractures associated with bisphosphonates.² Helpfully, the study group of 14 patients was compared with 21 subtrochanteric nonunions in patients not taking bisphosphonates. All patients underwent refixation with an angle blade plate. Outcomes reported included time to union, complication rates, and final functional outcomes (Harris Hip Score and Sanders functional rating). There was nothing to choose between the success rates, with both groups having an 85% overall success rate at a mean follow-up of just over 30 months. As would be expected, there were no mean differences in the Harris Hip Scores (83 vs 87) or Sanders rating (78% excellent vs 81%). The authors concluded that this implant is an effective fixation modality for nonunion of atypical subtrochanteric fractures. The results reported here fit with other small clinical series, and would suggest that salvage of a bisphosphonate-associated nonunion can be achieved with the angle blade plate and a similar outcome and side-effect profile seen to regular nonunions.

Inflatable bone tamp for that hard-to-reach corner? X-ref

■ Tibial plateau fractures pose a range of challenges related to the soft tissue, biomechanics, and approach. There are parts of the plateau that are hard to reach and fix due to either the overlying soft tissues (usually meniscus) or surrounding neurovascular structures. Reduction

of the posterior-lateral corner is one such area. Surgeons in **Wenzhou (China)** have reported a small series of 26 patients presenting with depressed or split-depressed posterolateral tibial plateau fracture.³ The focus of their investigation was to assess the safety and efficacy of an innovative arthroscopic-assisted inflatable tamp reduction technique. This was then augmented with calcium phosphate cement. The authors report excellent reduction of the joint surface on arthroscopy and no cases of > 5 mm of subsidence in the follow-up period or valgus deviation, even with weight-bearing radiographs, which demonstrated almost complete cement resorption at three months following surgery. The authors conclude that their technique provides for "reduction of depressed and split-depressed posterolateral tibial plateau fractures". While this certainly fits with the presented results, the patients treated here, if the reduction were visible arthroscopically, do not represent the more difficult end of the plateau fracture spectrum. The patients who represent significant challenges are those in whom the fracture lines cannot be properly assessed arthroscopically, as the affected plateau sits under the meniscus.

Medical costs of delayed hip fracture surgery X-ref

■ Here at 360, we are delighted to report on this paper from **Toronto (Canada)**, which asks a slightly different question to the one we are used to seeing surrounding hip fracture delays.⁴ The now-commonplace mortality/morbidity analysis is usually disappointing, insofar as it does not seem to yield the expected disadvantages of delaying hip fracture surgery, leaving us to justify prioritization of these patients on humanitarian grounds. However, the authors of this paper took a different tack and investigated the health economic effect of delaying such surgery. They report a registry-based, propensity-matched cohort study for patients treated over a six-year period in Ontario, Canada. A differences-in-differences approach was used to calculate the health economic costings for patients who underwent hip fracture surgery either within or outside of the 24-hour period. The total health costs in the year prior to the hip fracture were subtracted from the total costs for the year following the hip fracture (the first difference). This is a useful method in this population with a large comorbidity load, as it allows for the impact on total health costs to be

estimated. The authors then went on to compare this with the same difference (second difference) in a propensity-matched cohort of patients who did not have hip fracture surgery within 24 hours. The differences between these were then reported along with the difference in postoperative length of stay. The authors were able to include over 42 000 patients from 72 hospitals and 522 surgeons in their analysis. The overall cost of the hip fracture itself was \$39 497 per person, with a difference in one-year medical costs of \$2638 favouring the early surgery group. This was also reflected in an increased postoperative length of stay of 0.6 days longer. Despite the potential for selection biases with those patients undergoing earlier surgery, the use of a large registry and propensity matching combined with a difference-in-difference approach to the analysis gives the most reliable estimate possible with this kind of retrospective data. This is one of the first studies to quantify the costs of delay to hip fracture care.

Another hip fracture problem: capacity and length of stay X-ref

■ In a complementary study, researchers in **Phoenix, Arizona (USA)** set out to look at the effects of delays to hip fracture care in terms of postoperative length of stay and outcomes.⁵ Set against a background of increasing demand, centralization of services, and diminishing resources, the provision of care for hip fractures continues to test trauma operating provision in most centres. In the UK, the BOAST (British Orthopaedic Association Standards for Trauma) and NICE (The National Institute for Health and Care Excellence) guidelines recommend operating within 36 hours and remuneration through the best practice tariff incentivizes, and remains dependent on achieving this. Despite service optimization and focus, there remains a significant variation in attaining this target nationally and even within regions of the UK. To date, no convincing driver has been published in terms of improved clinical outcomes, although this is largely held to be the case, particularly in relation to one-year mortality. England's best practice tariff was unique, in that it successfully amalgamated economic and clinically relevant drivers to optimize care. This paper adds further weight to discussions of capacity in health services that struggle with bed provision with their analysis of 17 459 patients from a well-known North American database (the American College of Surgeons National Surgical Quality Improvement Program database). In terms of 30-day outcome assessment, the authors of this series report length of stay, as well as readmission, reoperation, complication, and mortality rates. Overall, the cohort included 4107

patients (23.5%) who were operated on within the first 24 hours of their care episode, 8740 patients (50.1%) who were operated on between 24 and 48 hours, and 4612 patients (26.4%) who were operated on more than 48 hours after admission. Although the delay to provision of operative intervention did improve length of stay, those patients in the longer-delay groups did not suffer from an excess of complications. While there was a trend to increased mortality in those delayed, more convincingly, it showed an association between later surgery and longer stay. The latter was not subject to the same multivariate analysis as mortality in this study. However, accepting the message of the study would mean that there is likely to be not only a loss of revenue in terms of best practice tariff in the UK, but also a further financial penalty with additional bed days. This paper will be helpful in reinvigorating executive discussions, keeping pressure on early operation as an important driver clinically and administratively. It would be interesting to identify whether this trend is mirrored in the UK's respected National Hip Fracture Database (NHFD).



The posterior malleolus: more frequent than we think? X-ref

■ Interest in the posterior malleolus in the setting of ankle fracture has been seeing a resurgence in recent years. The improved understanding of the anatomy and function of the syndesmosis in ankle fractures has tended to increase focus on the posterior syndesmosis and its insertion into the posterior malleolus. This has led to various clinical reviews and opinion pieces surrounding the increase in fixation of the posterior malleolus, and, in particular, the increasing propensity to undertake open reduction and internal fixation. If a posterior malleolar fracture has increasing importance in an ankle fracture, then it stands to reason that it also does in the tibial shaft, where fractures are known to often include the posterior malleolus. This small study from **Newark, New Jersey (USA)** adds some important pieces of information to the puzzle in light of recent changes

in emphasis in the clinical management of ankle fractures, which might well also apply to tibial fractures.⁶ The authors reviewed the CT scans of 26 patients, all admitted with spiral fractures of the distal tibial shaft. In a relatively simple investigation, the authors established that over 90% of these patients had a posterior malleolar fracture line, of which only 50% had been visible on the preoperative radiographs. The authors point out that the reported literature on displacement of undetected posterior malleolar fractures suggests that displacement associated with tibial shaft fractures treated with an intramedullary nail can be over 30%. Further, they assessed the morphology of the posterior malleolar fracture lines; simply using an anteroposterior lateral screw would only address a fraction of these, as there was considerable variation in the fracture morphology. They seem to provide a convincing answer to the recurring debate in morning trauma meetings as to the merits of CT scanning these fractures, with the clear recommendation being that the further imaging confirms the 50% not visible on the radiographs and confirms the morphology, allowing more precise planning of intervention.

Epidemiology and incidence of tibia fractures in the Swedish Fracture Register

■ Whether it is for a research proposal, a paper, or reflection on practice, this epidemiological study originating in **Gothenburg (Sweden)** will prove very useful.⁷ As fracture registries are starting to come to maturity, they are beginning to generate a number of publications and are offering insights in epidemiology, interventions, and outcomes in the same way that joint registry papers have done over the past few years. This paper offers an epidemiological insight into tibial fractures. The message was distilled from the data on 1371 tibial fractures registered in the Swedish Fracture Registry between 2011 and 2015. The authors used this comprehensive platform to update previous papers, which mainly originated from Edinburgh. Within this cohort, there were 712 proximal fractures, 417 diaphyseal fractures, and 242 distal tibia fractures. The population incidence in Sweden over the four-year period of the study was 51.7 per 100 000 a year, varying significantly by location (proximal 26.9, diaphyseal 15.7, distal 9.1). Many of the demographics follow similar trends to other fractures, such as the finding that tibial shaft fractures predominate in the younger, male cohort while the frequency of metaphyseal fractures increases with age. The authors draw attention to some of the details, such as two-thirds of proximal fractures being single-column injuries. It would be interesting to profile this, for

example, against the use of pre-contoured locking plates that have many strengths but are poor in true buttress mode required for these injuries. While many column inches are given to the 17% open fractures, simple falls remain the most commonly reported mechanism in this series for both metaphyseal and diaphyseal fractures. This may explain an incidence of these fractures that still hovers at just over 15%, despite health and safety and road traffic improvements. While not a new concept, the study provides an updated and comprehensive insight into fractures of the tibia.

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