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## Trauma

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

### Antibiotic prophylaxis and removal of metalwork X-ref

■ Seldom, here at 360, do we see a randomized trial about a topic that we weren't expecting but nevertheless wanted to read. This randomized trial from **Amsterdam (The Netherlands)** was designed to answer the question, are antibiotics required for removal of fracture metalwork? The investigators performed a multicentre, double-blinded, randomized clinical trial designed to determine whether antibiotics affect the incidence of infection following removal of metalwork. Patients recruited to the trial were randomized to either a single preoperative intravenous dose of 1000 mg of cefazolin or 0.9% sodium chloride. The authors report the outcomes of 500 patients recruited to the trial, 228 in the cefazolin group, and 242 in the saline group. They designed the study to report the primary outcome of surgical site infection within 30 days, as measured by the criteria from the US Centers for Disease Control and Prevention. The study followed up the patients

to six months for final follow-up, and excluded patients with any of the following: active infection or fistula, antibiotic treatment, reimplantation of osteosynthesis material in the same session, allergy to cephalosporins, known kidney disease, immunosuppressant use, or pregnancy. Overall, 66 patients developed a surgical-site infection (14.0%): 30 patients (13.2%) in the cefazolin group versus 36 in the saline group (14.9%) (absolute risk difference was -1.7, which was not significant). This study showed that, in patients undergoing surgery for removal of orthopaedic implants used for treatment of fractures below the knee, a single preoperative dose of intravenous cefazolin does not reduce the risk of surgical-site infection within 30 days of implant removal.

### Locking plate fixation versus intramedullary nail fixation: the UK FixDT randomized clinical trial

■ In what has been a bumper month for clinically relevant randomized trials, a multicentre team of investigators led by **Coventry (United Kingdom)** report the UK Fixation of Distal Tibia Fractures (UK FixDT) randomized trial, for which 321 patients with a closed, displaced, extra-articular fracture of the distal tibia were recruited.<sup>2</sup> Patients were randomly allocated to be treated

with either an intramedullary nailing (n=161 patients) or a locking plate (n=160 patients). The study was designed to assess the impact of fixation type on patient disability and also to undertake a cost-effectiveness analysis at a six-month final follow-up. The overall primary outcome measure was the Disability Rating Index (DRI) at six months. The exclusion criteria for this study included open fractures, fractures involving the ankle joint, contraindication to nailing, or inability to complete questionnaires. The authors established no statistically significant difference in the DRI score between groups at six months (mean score, 29.8 in the nail group vs 33.8 in the plate group; adjusted difference, 4.0). However, there was a statistically significant difference in the DRI score at three months in favour of nail fixation (44.2 in the nail group vs 52.6 in the plate group). There were no statistically significant differences in complications, not even in the number of postoperative infections (9% in the nail group vs 13% in the plate group). Further surgery was more common in the plate group at 12 months (8% in nail group vs 12% in plate group). The investigators concluded that neither nail fixation nor locking-plate fixation resulted in superior disability status at six months. The results of this study are similar to those reported by Vallier et al in 2011.<sup>3</sup> They randomized 104 extra-articular distal tibial shaft

fractures to intramedullary nailing or medial plate fixation. Their main outcome measures were malunion, nonunion, infection, and secondary operations. They found that the rates of infection, nonunion, and secondary procedures were similar between the two treatment groups.

### Staged prone/supine fixation of tibial plateau fractures X-ref

■ High-energy tibial plateau fractures have been much in focus in recent years. The popularization of the posteromedial approach to the knee and plating from the back has allowed fixation of posterior plateau fractures that were previously considered 'unfixable'. While, in isolation, these posterior shear fractures are nearly always fixed with the patient prone, there is still some debate surrounding the indications for a 'front and back' fixation, and the results are far from clear. In a timely multicentre retrospective study, these authors from **New York, New York (USA)** described a staged surgical protocol for treatment of patients presenting with high-energy multicolumnar tibial plateau fractures with significant posterior articular surface involvement.<sup>4</sup> The authors describe their staged approach for these fractures and support it with some clinical data. Their surgical tactic is to start with the patient prone, allowing



a posterior exposure and fixation through a Lobenhoffer approach. They then undertook a supine repositioning of the patient and performed the second fixation through an anterior approach. The authors present 28 cases undertaken at three centres over an 11-year period. Outcomes were assessed using the Knee Injury and Osteoarthritis Outcome Score (KIOOS) and included radiological outcomes of union and complications. Overall, the radiological reductions were satisfactory in 82% of patients, with less than 2 mm 'step-off', and all patients had acceptable sagittal and coronal alignment. Just over 1:5 patients also needed a posterior lateral column plate; however, none required an extensile exposure modification. In 12 cases, the surgery needed to be staged due to the extent of anterior soft-tissue injury. The knee range of movement averaged 123° (ranging from 2° of extension to 125° flexion). The mean KIOOS was 78/100, and patients achieved a composite 123° of movement. There were three patients who developed a surgical-site infection, with two requiring irrigation and debridement. Although the clinical scores were good on average, 18% of patients experienced radiographic post-traumatic arthrosis.

### Nail angle and native neck-shaft angle: an inconvenient truth X-ref

■ People come in a range of shapes and sizes, as anyone who has ever passed a K-wire for a hip fracture will be well aware. Try as they might,

implant companies cannot quite get that angle right – it varies between 125° and 140° in the majority of patients. It has previously been said that the only important metric in pertrochanteric fractures is the tip-apex distance (TAD); however, these authors from **Rochester, Minnesota (USA)** ask if the geometry of the implant's neck-shaft angle might in itself impact on the eventual reduction in terms of varus-valgus alignment.<sup>5</sup> The authors undertook a simple retrospective comparative study to explore whether the patients' fixed outcomes were affected by the neck-shaft angle of the implant. The essential study findings were that if a patient is fixed with a nail angle less than their native neck-shaft angle, the reduction was likely to be compromised, usually with a varus reduction. This did not translate into a higher cut-out rate, however, nor was a varus reduction or poor reduction associated with a higher cut-out rate. It appears that, although the neck-shaft angle affects the eventual reduction of the hip, the TAD still reigns supreme in predicting cut-out of cephalomedullary nails and dynamic hip screws.

### Diabetes and fracture healing

■ In a systematic review, a team from **Toronto (Canada)** have set out to determine the evidence basis for bone healing following fracture in diabetes.<sup>6</sup> Nearly every resident or registrar the world over is taught that diabetics have a fracture healing time around twice that of non-diabetic patients. However, the evidence basis for this statement is not entirely clear, and nor is whether, in fact, diabetics have a higher rate of adverse healing outcomes. The authors undertook a thorough systematic review using all of the recognized indexing systems (PubMed, MEDLINE, CINAHL and Embase), then extracted patient demographics and classified adverse healing outcomes into nonunion, malunion, delayed union, infection, and reoperation. These were then pooled and estimates of odds ratios

for each adverse event in diabetic and non-diabetic patients were calculated. The authors found that diabetes significantly increases rates of malunion, infection, and reoperation in patients with surgically treated lower-limb fractures. In addition, when only peripheral lower-limb fractures (i.e. below the knee) were examined, diabetes significantly increased the rates of nonunion.

### What determines health-related quality of life after hip fracture?

■ These authors from **Hamilton (Canada)** have undertaken an important study with the aim of identifying the baseline factors associated with physical health-related quality of life (HRQL) in patients after a femoral neck fracture.<sup>7</sup> Although often thought of as a rather dry topic, understanding outcome measures is key to establishing the interventions that will improve them. This is a secondary report of the Fixation Using Alternative Implants for the Treatment of Hip Fractures (FAITH) trial. The authors utilize the same 12-Item Short-Form Health Survey (SF-12), Western Ontario and McMaster Universities Arthritis Index (WOMAC), and EuroQoL-5D (EQ-5D) scores that were collated as part of the original trial over a two-year period. A range of demographic and injury factors were examined using a multilevel mixed model, and were used to establish which factors most likely drive baseline health-related quality of life. In short, the authors identified several baseline factors associated with lower health-related quality of life. These are: older age, female gender, higher body mass index (BMI), American Society of Anesthesiologists (ASA) class III (vs class I), and sustaining a displaced fracture.

### Is lesser trochanter profile the key to judging femoral rotation?

■ Femoral rotation is a surprisingly easy thing to get wrong. Patients

have different rotational profiles throughout their lower limbs, variations in femoral neck anteversion, femoral torsion, and tibial torsion are not uncommon, and rotation in the hind foot is complicated by the effect of arch collapse in some patients. Of course, this can make judging rotation, particularly when on a traction table, very tricky. There are a range of 'aids' used by the experienced surgeon, from the patellar position and epicondylar axis through to radiological markers, such as the lesser trochanter profile. As the lesser trochanter is a posterior structure, its prominence gives an idea of rotation of the proximal femur. These authors from **Salt Lake City, Utah (USA)** attempted to determine whether there was merit to this approach.<sup>8</sup> Their study was designed both to identify the normal rotational profiles in the adult population and to establish whether any variation profile was associated with changes in femoral rotation. The study population consisted of 155 consecutive patients (72% female and 28% male) with a mean age of 32 years. All had a CT scanogram of the hip area available. Femoral rotation was established using CT scanogram measurements, and the lesser trochanter profile (distance from the tip of the lesser trochanter to the medial cortex of the femur) was measured on weight-bearing anteroposterior (AP) radiographs. The authors determined that mean femoral rotation was 10.9° of anteversion, which did not differ substantially by size. Male patients, however, had a lower mean rotation than female patients by around 2° (9.4° vs 11.5°). With regard to the lesser trochanter profile, this was 6.6 mm on average, with almost no left:right variation. However, the profile was markedly larger in men than in women (8.3 mm vs 5.9 mm). The authors were able to support their assertion that femoral rotation did relate to the lesser trochanter profile, and increasing profile was associated with increasing amounts of femoral anteversion. The authors

concluded that the lesser trochanter profile can determine the position of the femur in both anteversion and retroversion, supporting its use as a method to restore pre-injury femoral rotation after fracture fixation.

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# Oncology

**X-ref** For other Roundups in this issue that cross-reference with *Oncology* see: *Children's orthopaedics Roundup 3*.

## New American Joint Committee on Cancer: change for change's sake, or does it really help?

■ The American Joint Committee on Cancer (AJCC) publishes the definitive description of cancer staging, and, with the eighth edition, there have been some significant changes to the staging algorithm for soft-tissue sarcoma (STS) in the limbs or trunk. This essentially boils down to the inclusion of two additional T (size) classifications and the grouping together of lymph node metastasis (LNM) with distant metastasis as stage IV disease. There is some significant debate as to whether this represents change for the sake of change, or whether these changes improve the performance of the staging system, and two timely papers have been published on this topic. The first, from **Nashville, Tennessee (USA)**, utilizes the Surveillance, Epidemiology, and End Results (SEER) database and undertakes an analysis of the 21 396 adult patients on the database with an STS of the limb or trunk.<sup>1</sup> This was with the aim of establishing if the new tumour size classification had

a positive effect on disease-specific survival. The author used a flexible, non-linear Cox proportional hazard regression model utilizing restricted cubic splines and fractional polynomials. The comprehensive statistical approach based on real patient registry data of over 20 000 patients is somewhat difficult to argue with when a prognostic score is being tested. Sadly, despite all the work that has gone into the eighth edition of the AJCC, the author concludes that "The AJCC 8th edition staging system for STS is no better than the previous 7th edition", and goes on to use his extensive analysis to propose an alternative staging system based on histological grade, tumour size, and anatomic depth, which, across the SEER data set, showed significantly higher predictive accuracy, with higher model concordance than either AJCC staging system. A second interesting analysis of the new system from a research team in **Houston, Texas (USA)** went on to establish the potential benefit of the AJCC eighth edition compared with the seventh edition.<sup>2</sup> This team used a similarly large data set from the National Cancer Database (NCDB) to evaluate the comparative prognostic power of the new system when compared with the seventh edition. A data extract of 26 144 patients who were suitable for inclusion in

the study from the NCDB between 2004 and 2013 was undertaken. The authors used overall survival using Kaplan–Meier and Cox proportional hazard models. The use of the T<sub>3</sub> and T<sub>4</sub> categories in the eighth edition resulted in an increased number overall of patients classified as stage III (5120 IIIA (19.6%) and 4280 as IIIB (16.4%) vs 7882 (30.1%) previously). This was matched by a small increase in the number of patients classified as stage IV (2776 (10.6%) vs 2565 (9.8%)). These authors established that the AJCC eighth edition far more accurately stratified overall survival in patients with large, high-grade tumours (T<sub>3/4</sub>) compared with those patients with T<sub>2</sub> tumours, and provided a more accurate risk assessment than the previous version. So, taken together, these two helpful articles suggest that the use of the eighth edition of the AJCC system is more accurate than the previous seventh edition but there is still some way to go in improving the overall accuracy of the system for STS patients.

## Chondrosarcoma survival under the spotlight

■ Although treatment is confined essentially to specialist tumour practice, we would draw readers' attention to three related articles that attempt to shed some light on the

art and science of predicting survival in chondrosarcoma. The first article, from **Shanghai (China)**, asks whether a nomogram can be used to predict the overall cancer-specific survival in chondrosarcoma.<sup>3</sup> Nomograms offer a number of benefits over traditional survival prediction methods, in that they are a simple way in which to estimate non-linear survivals. The authors again utilized the Surveillance, Epidemiology, and End Results (SEER) database. A total of 1034 patients with grade II or III chondrosarcomas were used as the study cohort, of whom 919 patients had complete follow-up to a year. The authors utilized the X-tile method to determine optimal cut-offs and multivariate analyses were utilized to include factors independently predicting three- and five-year cancer-specific survival in the nomograms. The now familiar method of using training and validation cohorts (each of 517 patients) was employed. The authors used six independent prognostic factors to generate nomograms that can be easily used by providers in the office: age, histologic subtype, tumour grade, operative amenability, tumour size, and the presence or absence of metastases. These nomograms were tested with internal and external validation, and were found to be an effective predictor of overall and cancer-specific