radiographs, particularly for the determination of tibial component loosening. However, further work is clearly necessary to validate these results. If the radiographs suddenly become more sensitive, it may be that the presence of a radiolucent line is no longer as important as we all thought it was.

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Foot & Ankle

X-ref ***For other Roundups in this issue that cross-reference with Foot & Ankle see:*** *Trauma Roundup 2; Research Roundup 3.*

Calcaneal fracture fixation: should we consider a less invasive approach? X-ref

The treatment of calcaneal fractures continues to be a controversial issue in both trauma, and foot and ankle, surgical fields. The controversy stretches from initial indications through to the operative technique and post-operative care. Most, however, would agree that wound breakdown and infection are among the most devastating of complications following calcaneal fracture fixation surgery, and that patients with even the most severe injuries do poorest with surgery if complications arise. In an attempt to minimise these risks, many trauma surgeons now utilise limited incision approaches and arthroscopic-assisted methods to fix certain subtypes of calcaneal fractures. A pair of interesting papers shed some more light on this technique. In a retrospective case series of 39 displaced calcaneal fractures, a group from **Winston-Salem, North Carolina (USA)** reported their experience of a consecutive retrospective series of patients treated using a limited sinus tarsi incision with subsequent plate fixation.[1] Outcomes were assessed in terms of complication incidence, visual analogue pain scores and joint reduction (assessed using pre- and post-surgical CT scanning). Data for the study were obtained through retrospective chart and radiographic review. Post-operative CT scanning demonstrated that the articular reduction of the subtalar joint was impressively within 2 mm of anatomic in 91% of cases. However, even this limited approach was not without its complications, with two cases of superficial wound dehiscence, and deep infection requiring subsequent surgery seen in one case, giving around an 8% infection rate. The authors themselves conclude that surgery using this approach results in acceptable fracture reduction with low rates of complications. Whether restoration of anatomy using this technique confers a clinical advantage in the longer term remains unanswered. In a much smaller but comparative series from **Kangar (Malaysia)** and **Vancouver, British Columbia (Canada)**, the authors report a comparison of open reduction and internal fixation with plates (n = 12) with an arthroscopic-assisted method of percutaneous screw fixation (n = 15).[2] The authors report their outcomes at a minimum one-year follow-up using the American Orthopaedic Foot and Ankle Society (AOFAS) Hindfoot and SF-36 scores. In addition, a range of secondary outcome measures are reported including radiographic data. At final follow-up, both groups had strikingly similar outcome scores, and radiographic parameters were also no different. Interestingly, the percutaneous screw fixation patients had a significantly shorter delay to surgery, shorter hospital stay and faster return to work than the open reduction internal fixation patients. This potentially offers a health economic advantage, although clearly a much larger randomised study would be needed to establish this. Given the continued interest in this topic, the debate on the best management of calcaneal fractures will most probably continue long into the future.

Synchronous osteochondral defect and ankle fractures: a common phenomenon? X-ref

Fractures around the ankle are one of the most common injuries seen in the fracture clinic. Osteochondral defects are rarely diagnosed, although occult lesions are probably more common than widely thought. A previous systematic review has shown that up to 20% of patients do not achieve a good functional result after surgical treatment, and one potential explanation for this is the presence of treated or untreated osteochondral defects. In this prospective study from **Amsterdam (The Netherlands)**, the team set out to assess the value of CT scans to detect these otherwise occult osteochondral lesions.[3] They designed their study as a prospective cohort series, and hypothesise that the presence of an osteochondral defect occurring at the time of injury may be a cause for unsatisfactory long-term outcome in some patients. The authors report the results of CT scans obtained on 100 fractured ankles, all performed post-operatively. The chief message of this simple paper is to describe the incidence of osteochondral lesions in their cohort, which is 10% in this series. They have also attempted to investigate an association with ankle fracture type and propose that clinical outcome at one year may be prejudiced by the presence of such a lesion. Although the authors were able to establish that all of these lesions were talar in nature and associated with pronation injuries, that is about as far as they reached. Although 100 fractured ankles is a fair number, there are just ten osteochondral defects in a range of injury patterns, making any form of further analysis difficult. The authors accept that there are a number of methodological limitations in this paper,

however, here at *360* we would tend to agree with them – there is certainly the possibility that osteochondral defects are responsible for some of the poor outcomes seen in ankle fractures. A larger study is clearly the order of the day here.

Systemic inflammatory markers in Charcot osteoarthropathy X-ref

■ The diagnosis of Charcot osteoarthropathy in the foot and ankle is often challenging. The diagnosis is frequently difficult to discern, and is therefore commonly delayed. Even in experienced hands, the distinction between the equally common cases of diabetic soft-tissue infection or osteomyelitis can be tricky, especially in the presence of an elevation in systemic inflammatory markers. Investigators in **Zurich (Switzerland)** set out to establish the useful thresholds for inflammatory markers in proven Charcot osteoarthropathy.[4] Their large retrospective cohort study reports the clinical evolution of 42 patients, all with isolated Charcot osteoarthropathy. The study focuses on the presence or absence of elevated inflammatory markers C-reactive protein, white cell count and erythrocyte sedimentation rate (CRP, WCC, ESR) in an attempt to establish if these can be used as an aid in the diagnosis and staging of Charcot. To the credit of the authors, an extensive set of sensible exclusion criteria were used in an attempt to exclude patients with any additional causes for elevated systemic inflammatory markers. The definitive 'gold standard' diagnosis of Charcot was made using radiographs and MRI scans taken in the context of a patient's known eventual clinical course. Elevated inflammatory markers were frequently seen in cases of acute phase Charcot osteoarthropathy in this study population. Furthermore, there was a significant difference between the levels of all three markers in the acute phase (Eichenholtz stages 0 and 1) and the subacute/chronic phase (Eichenholtz stages 2 and 3). On the basis of their findings, the authors conclude that elevated inflammatory markers can frequently be present in the acute phase of Charcot osteoarthropathy in a diabetic patient, and as such they are not useful to distinguish between infection and Charcot changes. This paper underlines the particularly important observation that raised inflammatory markers do not rule out Charcot and, particularly in the early stages when radiographic changes may be minimal or absent, the diagnosis should always be considered. Perhaps even more interestingly, in the early stages measurement of inflammatory markers may be helpful as an indicator of progression through the stages of the condition.

The fibular nail as an alternative to open reduction and internal fixation in the elderly X-ref

■ Open reduction and internal fixation of the distal fibula with a lag screw and one-third tubular plate is commonplace in current orthopaedic practice and taught as the standard of care to every registrar or resident attending an AO course. Discretion, however, can often be the better part of valour, and unstable ankle fractures in elderly osteoporotic patients where there is poor skin and soft-tissue envelope are more commonly complicated by infection and metalwork failure. The fibular nail has been gaining popularity in recent years and these two current papers both examine the possible advantages of minimal incision surgery with fixation of the fibula using an intramedullary nail. Could this technique reduce the risk of infection and wound complications while still maintaining an accurate anatomical reduction of the ankle mortise and subsequent satisfactory functional results? In a prospective randomised controlled trial from Tim White and his team in **Edinburgh (UK)**, the end result of a programme of research into the fibular nail is reported.[5] In their prospective randomised controlled trial, fibular nailing was compared with open reduction and internal fixation (ORIF) in patients over 65 years of age. Outcomes were reported in terms of functional scores (Olerud and Molander), complication rates and a direct health costs health economic analysis. The study reports the outcomes of a total of 100 patients who were recruited into the study. Their results showed that there was no significant difference between each group in terms of functional outcomes, making both interventions equally effective. However, there was a significantly higher rate of complications in terms of wound infection in the ORIF group compared with the nailing group. The nail was also deemed to be more cost effective per patient (£91 cheaper) than ORIF on the basis of their economic analysis. In a second paper from **Vancouver, British Columbia (Canada)** and **Edinburgh (UK)**, the use of the fibular nail in diabetic patients is examined in a retrospective cohort study reported from these two centres.[6] A series of 24 patients with type 1 and type 2 diabetes, and with Weber B or C ankle fractures, were recruited into the study. All underwent fixation with the fibular nail using a percutaneous technique. The study reports the rate of lateral wound breakdown in their cohort as 16.7% (four patients). Of these, two cases (8.3%) were treated for infection of which one patient (4.2%) required re-operation. There were a further three patients requiring re-operation for removal of hardware. The results suggest that in diabetic patients with Weber B or C unstable ankle fractures, the fibular nail has favourable functional outcomes and although the authors report low rates of complications, these are comparable with or higher than some reported outcomes in many traditional ORIF studies. However, there was a very low reported rate of re-operation. This technique therefore may be considered a safe and effective alternative to standard ORIF of unstable ankle fractures in the diabetic population. Accepting that the sample size is relatively small, the authors recommend a larger prospective study in order to support this conclusion.

Influence of hindfoot malalignment on hallux valgus operative outcomes

■ Recurrence of hallux valgus following surgical intervention has long been regarded as a difficult problem to predict and even harder to prevent. A range of studies have identified a limited collection of well recognised factors for recurrence including hypermobility of the first ray, skeletal immaturity, inflammatory arthropathies and neuropathy. However, the suggested association of hallux valgus with pes planus and hindfoot valgus deformities is perhaps much more controversial, and there is certainly no consensus in the literature. A study by a group from **Barcelona (Spain)** have attempted to shed some much needed light on this poorly understood potential association in their outcomes study of 207 patients.[7] This multicentre prospective observational study was set up specifically to examine the association between hindfoot valgus and hallux valgus operative outcomes with well-established radiological markers. The study team used a single follow-up at two years to assess for the influence of hindfoot valgus angle on recurrence rates in operatively treated hallux valgus. The outcomes

reported included the American Orthopaedic Foot and Ankle Society (AOFAS), SF-36 score and hallux valgus and intermetatarsal angles. There was no association between poorer clinical or radiological outcomes and the hindfoot valgus angle at two years' follow-up. The rate of recurrence of forefoot deformity was equivalent in this study, regardless of the pre-operative hindfoot alignment and, perhaps most importantly in this series, all patients with symptomatic deformity (i.e. from tibialis posterior dysfunction) or secondary risk factors such as neuropathy and inflammatory arthropathy were excluded. The results of this case series really do challenge the commonly held belief that the physiological planovalgus foot predisposes surgical hallux valgus candidates to a poorer outcome and a higher chance of recurrence.

Peroneus brevis under the spotlight X-ref

Treatment of the torn peroneus brevis is an area in which evidence for current practice is 'barebones', despite the faith patients and surgeons alike have in these treatments. In 1998, Brodsky et al published what is still the 'gold standard' algorithm used by many to manage this difficult problem, and this work has guided treatment of this pathology ever since.[8] For a peroneus brevis tear involving more than 50% of the tendon, the current recommended treatment is to tenodese the peroneus brevis to the peroneus longus. However, there are few studies, basic science or otherwise, to support this – what exactly are the biomechanical consequences? A straightforward cadaveric study conducted in **Santiago (Chile)** and Duke University, **Durham, North Carolina (USA)** seeks to address this question using strain gauge-based tension transducers inserted into both longus and brevis tendons.[8,9] The investigators used the tension transducers to measure tension in the tendons after both tenodesis and allograft semitendinosus reconstruction. Their surprising results would suggest that the tenodesis defunctions the distal peroneus brevis stump by up to 90% of its pre-tenodesis physiological tension, with results of course depending on foot position. The results of allograft reconstruction were closer to physiological tension in all foot positions. These data raise the question of defunctioning the primary dynamic evertor of the foot during this procedure; therefore, should tendon graft reconstruction be considered the gold standard for this pathology? Clearly in this case, a clinical study with a head-to-head comparison is required. Our clinical experience (like many others) here at *360* has been of success with the clinical results of peroneal tendon debridement and tenodesis. If better clinical functional results could be achieved with allograft tendon, that would be an excellent development.

The blade plate may not be the solution in difficult hindfeet

The angle blade plate has something of a reputation as a 'get out of jail free' card. Despite the technical difficulties of the surgery, the high levels of torsional stability, angular stable design and ability to add large amounts of compression have made it the device of choice in experienced hands for failed fracture fixations, nonunions and failed fusions in almost any area of the body. In the foot and ankle, it has found application through a posterior approach as a suitable device to revise an ankle fusion. Largely a result of the rarity of the indication, the outcomes of angle blade plate (ABP) revision of ankle arthrodesis through a posterior approach are not reported adequately in the literature, and we were delighted to see this large series of 42 patients reported by surgeons in **Salt Lake City, Utah (USA)** utilising the posterior approach and application of the ABP.[10] The authors report their study as a retrospective case series with all patients requiring a posterior insertion of an ABP for revision of a previous fusion, either for adjacent joint disease or failure of fusion through malunion or nonunion. The authors were able to report the outcomes of 40 patients at final follow-up (minimum of one year) who had had a median of two prior ankle procedures. The authors recorded demographics, diagnoses, complications and further surgery for all patients in the study up to a minimum of 14 months and a mean 48-month follow-up. There was a relatively high rate of delayed union or nonunion, with 72% of patients progressing to sound union in a year, and in addition there was a 70% serious complication rate. While these figures are poorer than those reported in the literature for other salvage techniques, it should be considered in context with the complexity of this patient group. That said, these results are far from outstanding, and this series serves to underline the complexity of the ABP as a technique and the significant complications that can be associated with its use.

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