

# ROUNDUP<sup>360</sup>

## Foot & Ankle

*For other Roundups in this issue that cross-reference with Foot & Ankle see: [Hip Roundup 3](#).*

### Maisonneuve fractures in the long term

■ The Maisonneuve fracture (pronation-external rotation fracture of the proximal fibula with associated medial ligament rupture and diastasis) is a relatively common but poorly studied fracture. Often missed initially in accident and emergency, these injuries are traditionally treated with syndesmosis screws (or other forms of stabilisation) to restore the ankle mortice and retain anatomical reduction. Noting that there is little literature at all concerning the long-term outcomes of such injuries, researchers in **Amsterdam (The Netherlands)** set out to establish the long-term results of such an injury. They designed a retrospective case series (Level IV evidence) with follow-up to a whopping 21 years post injury. In a well-rounded study design, the research team assessed outcomes using patient-reported (the Foot and Ankle Ability Measure (FAAM)) and physician-reported (AOFAS hind foot score) outcomes, as well as assessing prognostic factors and the incidence of depression and osteoarthritis development (assessed with the van Dijk and Takakura scales). The study population of 48 patients all sustained pronation-external rotation injuries with high fibular fractures and were predominantly of the Maisonneuve type. Follow-up was to a mean of 21 years and, amazingly, 92% of patients (n = 44) achieved a good or excellent

result on the AOFAS score which was mirrored in the FAAM score (90% good or excellent). There was a much higher rate of radiographic than symptomatic arthritis observed. While half of patients had radiographic evidence of osteoarthritis, only two patients underwent subsequent hind foot fusion. Further analysis with multivariate statistics revealed that other outcomes (variation in ankle outcome scores, depression, range of movement and requirement for subsequent surgery) were dependent on pain, however, the authors were unable to identify any determinants of pain.<sup>1</sup> This represents perhaps the longest outcome study of any series evaluating the consequences of the Maisonneuve fracture. Like many studies evaluating the outcomes of ankle fractures, these researchers have identified very high rates of post-traumatic osteoarthritic changes, but astoundingly many of those recorded with advanced osteoarthritic changes were asymptomatic. The puzzle of injury, degeneration and symptomatology continues.

### Not all gastrocnemius lengthening equal

■ Correction of an equinus deformity requires complex and often difficult decision making. Not only do decisions revolve around who should be operated on, but also which operation will be best. Despite the plethora of described operations, the exact anatomical implications of each operation are slightly more opaque. Researchers in **Melbourne (Australia)** designed

and conducted a cadaveric study to establish precisely which structures are divided and what the biomechanical consequences are of the most commonly described gastrocnemius-soleus complex releases (Baumann, Strayer, Vulpius, Baker, Hoke, and White). The study was structured as a randomised controlled trial with soft cadaveric specimens randomised to a treatment option and the measured dorsiflexion force measured with a torque dynamometer, while the lengthening of the complex was directly recorded by measuring the gap in the fascia. The investigators established that with the Baumann and Strayer procedures it was possible to perform a selective and differential lengthening, allowing the surgeon to lengthen the gastrocnemius and soleus by different amounts. However, there was a limit to the maximal lengthening achievable with these techniques. Procedures performed on the conjoined tendon (Vulpius and Baker's procedures) were stable, allowing for greater lengthening, however, it was impossible to achieve a selective lengthening. The Hoke and White procedures were the least attractive, offering large potential for lengthening but a stable construct could not be achieved.<sup>2</sup> The authors conclude that "clinical trials are needed to determine whether these differences are of clinical importance. It may be appropriate for surgeons to select a procedure involving the zone best suited to the clinical needs of a specific patient." Given the great

differences established between procedures that are sometimes considered interchangeable, a pause for thought is certainly required here.

### Those pesky os fibulare

■ Normal variants can cause significant difficulties, particularly after an injury. The os fibulare is a common normal variant occurring in up to 1% of paediatric patients. While often misdiagnosed as an avulsion fracture in accident and emergency, there are a group of patients who develop post-traumatic symptomatic os fibulare which may be indicative of a significant ankle ligamentous injury. There is a paucity of data in the literature surrounding the treatment outcomes of this symptomatic subgroup. Surgeons in **Greenville (USA)** have recently shared their experience of treating such injuries. They present a large series of 23 patients with pain and chronic ankle instability associated with a symptomatic os fibulare. The authors are at pains to distinguish this group of patients with persistent symptoms associated with an os fibulare and instability from a 'sprain' with an incidental os fibulare. They describe the long-term outcomes of 23 patients all presenting with persistent pain, ankle instability and tenderness over the os fibulare. The patients all underwent a trial of conservative treatment and had imaging studies (a mixture of stress radiographs and MRI scans) suggestive of instability. The surgical team undertook excision of osseous fragments and combined this with

anatomic ligament reconstruction (ATFL reconstruction and a modified Broström procedure). Patients were all children (mean age 10.4; 8 to 13) at the time of injury and underwent surgery an average of three years later. By nearly five years post-operatively, patients had achieved near normal pre-injury function (with all but one patient achieving pre-injury recreational level) and a mean AOFAS score of 91.4 (87 to 98). These patients represent a tricky group to treat and this paper represents the best evidence of which we are aware. The combination of excision of symptomatic fragments (including the os fibulare if required) and reconstruction of the ligament is for now the gold standard.<sup>3</sup>

#### **First tarsometatarsal arthrosis unpicked: is a Lapidus required?**

■ The first ray continues to cause much debate, and none quite as divisive as hallux valgus surgery in the presence of metatarsus primus varus (MTP). Some surgeons argue that with hypermobility at the first MTP, addressing the deformity distally (with a bunion procedure) does not treat the underlying problem and consequently a first MTP fusion (Lapidus procedure) is also required. A research team in **The Hague (The Netherlands)** set out to answer this philosophical change of opinion with a well conducted randomised controlled trial (RCT). The study team enrolled and randomised 101 feet in 87 patients to treatment with either a Hohmann procedure (closing wedge osteotomy and bunionectomy distally) or a Lapidus procedure (first MTP arthrodesis). Their study is reported here to nearly ten years of follow-up and is designed to compare patients with a range of both clinical and radiological outcomes. This study did not reach a significant difference in any of the outcome measures, and the authors even included a subgroup analysis involving patients with clinically hypermobile first rays which also demonstrated no differences. While subgroup analysis is

not strictly allowed in well powered RCTs, it does add some information when taken in context. This study supports both treatments as equally effective.<sup>4</sup> Given that the distal procedure avoids fusion of an otherwise uninvolved joint, it certainly seems to us to be the most attractive of the two comparable options.

#### **Juvenile osteochondral lesions**

■ Osteochondral lesions continue to be a tricky issue to deal with, and for a relatively rare condition there is a surprising amount of research effort being ploughed into improving what can be a dismal outcome. Researchers in **Edina (USA)** have been investigating the role for application of particulated juvenile cartilage for symptomatic osteochondral defects of the ankle. The study team presented a retrospective cohort series describing the follow-up of 24 ankles treated in 23 patients. Patients had an average age of 35 years at the time of surgery. The majority of the patient cohort (n = 14) had failed previous intervention. Patients presented with extremely large osteochondral defects averaging 125 mm<sup>2</sup> and they were all full thickness lesions. As this was not a controlled study, nine patients (38%) had an additional procedure and nine (38%) had more than one additional procedure. The authors were able to report their outcomes to just over one year of follow-up. By a year, the results were surprisingly good with nearly 80% reporting a good or excellent result and a mean AOFAS score of 85, despite the presence of residual pain (VAS score mean 24 mm).<sup>5</sup> These results, while not outstanding, do represent a favourable outcome in patients with difficult to treat lesions who are known to have very poor results. We would, however, inject a slight note of caution; with one confirmed

case of graft delamination, already longer follow-up is going to be essential in the evaluation of this novel technique.

#### **Calcanei and infections**

■ The calcaneus is becoming the most commonly randomised bone in orthopaedic traumatology (second only, perhaps, to the distal radius), but despite this, there is still little consensus of opinion concerning the best treatment method. The probable reason for this is that any benefit conferred by open reduction and internal fixation (ORIF) is likely offset by a limited number of poor outcomes prejudiced by infection. However, risk of infection is unlikely to be linear between patients and, as with all operative interventions, knowing how to 'pick your winners' is likely to improve outcomes, perhaps even more so than meticulous surgical technique. The surgical team in **Shanghai (China)** have performed an impressive retrospective analysis of a total of 490 fractured calcanei in order to help them pick their winners. The patients were operated on over a seven-year period and the end point of infection was used for the study. Data on a large range of identifiable potential risk factors were collected on all patients, and thorough univariate and multivariate analyses undertaken to establish risk factors for infection. The Chinese surgeons had a surprisingly high wound complication rate of 17.8% (n = 87) and a range of risk factors were identified as increasing the risk of infection with their regression model. Odds ratios for infection were 5.59 (CI 1.55 to 21.7) for smoking; 6.23 (CI 1.37 to 28.31) for diabetes; and 5.44 (CI 2.02 to 14.64) for increasing Sanders fracture type. Surgical factors identified as increasing the risk of infection were the number of residents present (OR 4.54, CI 1.46 to 14.12), surgical time (OR 2.3, CI 1.79 to



2.94), estimated blood loss (OR 1.02, CI 1.01 to 1.04) and in excess of ten people in the operating theatre during surgery (OR 2.30, CI 1.79 to 2.94). Tourniquet use was the only protective factor (OR 0.02) and was associated with a decreased risk of wound complication.<sup>6</sup> While none of the risk factors identified in this study will be surprising to surgeons who do large amounts of calcaneal fracture surgery, or even foot surgery, this is to our knowledge the best characterisation of the problem and identification of risk factors in a large patient population.

#### **Clinical outcomes of Weber B ankle fractures**

■ The outcome of supination-external rotation ankle fractures (Weber B) is not completely clear. There is a lack of consensus in the literature as to which patients are best treated in which manner. The lack of current agreement extends to consensus regarding which patient, injury pattern, and treatment are most strongly linked to clinical outcome. The effect of joint surface congruity is relatively poorly studied and again is a contentious point in these injuries. Researchers from **New York (USA)** have studied this effect with a prospective database study including post-operative CT scans to assess final joint congruity. The researchers assessed ankle congruity, taking articular step-off or surface gap (due to marginal impaction) of 2 mm as their threshold for a congruent ankle joint. The demographic, injury and treatment variables of each group were similar and there were no obvious differences the investigators could find between them. Startlingly, the incongruous group had significantly poorer FAOS outcomes with regards to symptoms, pain and activities of daily living. There were no differences in the observed range of movement between the two groups. In a large cohort study of a homogeneous injury group, it does appear that achieving articular congruity is a determinant of outcome.<sup>7</sup> Here at 360 it seems to us that the argument

continues unabated: is congruity or stability more important? Do we need to operate at all? This study certainly adds some information in favour of anatomical reduction and is one of the few studies to adequately assess reduction post-operatively using CT scanning. We wait with baited breath for the report of the AIM study which will answer some of these questions in a large multicentre randomised controlled trial.

### Rheumatologists have no impact on ankle rheumatoid arthritis

■ Researchers in **Pirkanmaa (Finland)** set out to establish what impact, if any, the effects of improved medical management of rheumatoid arthritis (RA) patients have had over the past 20 years on the rates of both arthrodesis and replacement of rheumatoid ankles. They devised a population study to establish if there was any impact on

the number or type of hind foot procedures being performed in rheumatoid patients over a 13-year period. Using the Finnish national database, the study authors investigated the rates of primary ankle arthrodesis and total ankle replacements in patients with RA. The study covers the Finnish population between 1997 and 2010, with incidence rates calculated against national population statistics. During the study period, 593 primary ankle arthrodesis and 318 total ankle replacements were performed in Finland in rheumatoid patients. The incidence of ankle joint arthrodesis was highest in 1997 to 1998 (2.4/10(5)) and steadily declined across the study period.<sup>8</sup> There was a slight increase in rates of ankle arthroplasty, and allowing for expected variation the authors were unable to find a change in overall incidence of fusion and replacement over the 13-year period of this study.

They did note, however, that fusion appears to be becoming a less popular option in favour of replacement. It is difficult to draw firm conclusions given the low incidence of both operations in a relatively small national population study. However, the complete decline in hind foot surgery that one might expect with better medical management of rheumatoid arthritis has not been seen.

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