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## Foot & Ankle

**X-ref** For other Roundups in this issue that cross-reference with *Foot & Ankle* see: *Hip & Pelvis Roundups 2 & 7; Knee Roundup 3; Research Roundup 1.*

### How should we fix the Lisfranc fracture dislocation? X-ref

■ The optimal fixation technique for the Lisfranc fracture dislocation remains unclear. It is a universally accepted goal of treatment to achieve surgical stabilization of these injuries by anatomical reduction and stabilization of the disrupted tarsometatarsal joints (TMTJs). To achieve this, some surgeons prefer a bridge plating technique across the TMTJs, whilst others use a transarticular screw for joint stabilization, or undertake a primary fusion. Bridge plating has become increasingly popular over recent years. The benefit of minimizing additional joint surface damage that occurs when using transarticular screws is appealing to many, as is the perceived ability to achieve better reduction, particularly maintaining length. However, although there is biomechanical data supporting the use of dorsal plating methods, there is limited information available to compare the surgical outcome of dorsal plating and screws. In this retrospective study from **Melbourne (Australia)**, a total of 108 patients who underwent Lisfranc fracture open reduction internal fixation (ORIF) were grouped by fixation method and compared

in functional outcome (American Orthopaedic Foot and Ankle Society (AOFAS) and Manchester-Oxford Foot Questionnaire (MOX-FQ) score) and radiological outcome (analysis of anatomical reduction).<sup>1</sup> Of the cohort, 38 patients underwent transarticular screw fixation, 45 underwent dorsal bridge plating, and 25 underwent a combination technique of both methods. The demographics of the groups were comparable, apart from there being a greater percentage of open fractures in the bridge-plating group, along with a shorter mean follow-up. All patients were from the same institution. The variation in fixation technique was primarily due to surgeon choice, although this was also reflective of a change in practice in the department as the technology, as well as the evidence for differing fixation techniques, evolved. In measuring the primary functional outcome, dorsal bridge plating was statistically superior to both other groups. Good or anatomical reduction was achieved in 82% of the bridge-plating group, 68% of the screw group, and 56% of the combination group. This was not significant. There was a gradual loss of quality of reduction over time in all groups, which was greater in the screw and combination groups compared with the plate groups (24% vs 11%), although this did not reach statistical significance. Overall, whilst

this study has certain design flaws, it does increase our knowledge about treatment outcomes for Lisfranc injuries. This is especially helpful given the lack of good evidence available to guide our treatment choices for this injury. In what appear to be relatively well-matched groups, the functional outcome is improved with bridge plate fixation. However, as is always the case in retrospective grouped studies of this type, one must accept that there may be some selection bias in the surgeon's decision on treatment type based on patient and injury factors. This is one of only a small handful of papers comparing outcomes after bridge plate fixation for Lisfranc fractures, and as such is a welcome addition to the literature on this difficult-to-treat injury.

### The use of a single dorsal incision for fixation of Lisfranc fractures X-ref

■ This paper from **Melbourne (Australia)**, again regarding the Lisfranc fracture, deals with the use of a single dorsal incision for fixation.<sup>2</sup> As fixation methods evolve, it is important that we also consider the surgical approach and soft-tissue management. Incisions on the dorsum of the foot, especially in the presence of significant soft-tissue trauma, need careful planning to preserve blood supply, respect the soft tissues, and allow adequate visualization of the fracture in order

to achieve good surgical fixation. Many surgeons now utilize a single dorsal incision for fixation of the Lisfranc complex, carefully mobilizing the soft tissues to make use of multiple deep-tissue windows to access the tarsometatarsal joints (TMTJs) and the midfoot columns. This is often a preferred technique to minimize wound complications and maximize exposure to the midfoot. The authors describe a technique utilizing this single dorsal approach in a retrospective case note review that includes a large number (150) of cases. The authors made use of a single dorsal incision for the creation of three separate deep windows, allowing access to the first, second, and third TMTJs. Subsequent plate and screw fixation was performed. After the primary procedure, 14% of patients experienced wound-related complications, including delayed healing (3%), superficial infection (5%), dehiscence (3%), complex regional pain syndrome (1%), and impaired sensation (1%). In this large cohort of patients, the authors present a reassuring picture regarding the safety of this dorsal, single-incision approach to the Lisfranc fracture fixation. These are challenging injuries that frequently have sustained high-energy trauma and significant soft-tissue injury associated with the disruption to the midfoot joints. This is a valuable addition to the literature and certainly provides evidence

for the safety of this single-incision approach. There may be some degree of reporting bias in this study, however, with only a retrospective review of notes being carried out and no prospective collection of data performed. It is also worth noting that the majority of these procedures were carried out by a single surgeon, meaning that the results may not be immediately applicable to other units or surgeons.

### Does ankle dorsiflexion position really matter in syndesmosis fixation? X-ref

■ Conventional teaching has always been to place the ankle into maximum dorsiflexion before drilling and inserting a fixation screw across the syndesmosis. This is based on the theory that engaging the maximum width of the talus (its anterior articular surface) into the mortise will prevent overcompression of the joint, thus preventing overtightening and subsequent limitation of ankle motion. A team from **El Paso, Texas (USA)** put this theory to the test in a cadaveric study of 20 ankle joints.<sup>3</sup> They examined ankle range of movement after syndesmosis fixation performed with a 4.5 mm screw, which was placed firstly with the ankle in maximum plantarflexion and subsequently with the ankle in maximum dorsiflexion. This was carried out in both an intact specimen and specimens in which a pronation external rotation fracture was created. The syndesmosis was then fixed either with the syndesmosis screw alone, or with a plate and screw fixation on the fibula as well. When examining all of the created scenarios for syndesmosis fixation, there was no statistically significant difference in the dorsiflexion angle when comparing fixation in plantarflexion or dorsiflexion of the ankle. When addressing these injuries, it is critical to anatomically reduce the fracture and the syndesmosis. However, it appears that the position of the ankle at the time of the syndesmosis screw insertion is not a relevant factor

for ankle dorsiflexion, and is not therefore required to prevent against overtightening of the syndesmosis.

### Plantar fascia thickness: a cause of pain?

■ The measurement of plantar fascia thickness has previously been advocated as a diagnostic and prognostic instrument in patients with plantar fasciitis. This prognostic study from **Barcelona (Spain)** aimed to investigate whether there was a correlation between plantar fascia thickness and scores for pain, function, and self-reported quality of life in recalcitrant plantar fasciitis.<sup>4</sup> The authors recruited patients with plantar fasciitis (38 feet), and ultrasound and MRI imaging were collected to establish the measure of fascial thickness, along with each patient's visual analogue scale (VAS) score for pain, American Orthopaedic Foot and Ankle Society (AOFAS) Hindfoot Score, and 36-Item Short-Form Health Survey (SF-36) quality-of-life measure. The authors then attempted to find a relationship between these various patient-reported outcome scores and the radiological measures of plantar fascia thickness. In what is currently the most reliable evidence on the topic, the authors conclude that, in patients with recalcitrant plantar fasciitis, plantar fascia thickness does not correlate with pain as measured by the VAS score, function as measured by the AOFAS, or any item of the SF-36. It therefore seems that the two cannot be causally related. This, of course, is an important negative. If the plantar fascia is not driving pain, then we are curious to know what is.

### Readmission following ankle arthroplasty not related to patient factors

■ There are few respects in which the United States trails the rest of the world, but it is behind the curve in implementing the Comprehensive Care for Joint Replacement (CJR) model, which provides a bundled payment model similar to that used



in European healthcare systems for years. The model is based on the concept that fixing payments drives performance through incentivizing reduced-cost models, decreasing complications, and, in theory, lowering the number of readmissions. The authors of this study from **Durham, North Carolina (USA)** hypothesized that the Medicare implementation of a CJR model would reveal that patient comorbidities drive the utilization of several expensive healthcare interventions, such as readmissions, emergency department (ED) utilization, and wound-healing consultations.<sup>5</sup> The authors evaluated the healthcare records of 1024 patients undergoing total ankle arthroplasty over a nine-year period at a single academic centre, and complications were recorded to the 90-day follow-up period. The cohort reported on were roughly evenly distributed in terms of gender, and were overwhelmingly ethnically white and in their 60s. Comorbidities encountered by the authors with a relatively high frequency were hypertension, obesity, solid tumour, depression, rheumatic disease, cardiac arrhythmia, hypothyroidism, diabetes mellitus, and chronic pulmonary disease. Overall, just 5% of patients (n=53) were coded as having had a readmission, with a further 3.5% (n=36) attending the ED but not admitted. The most common reason for further hospital consultation was a wound complication, followed by thromboembolic events. In this series, which is the largest on the

topic to date, there were no associations found between comorbidities and 90-day readmission, A&E attendance, or wound complications. It appears, in this case at least, that there are no clear links between patient comorbidity and the need to seek further healthcare input.

### Addressing flat feet in adults

■ Adult flat foot deformity is a challenging and difficult diagnosis. It is usually driven by tibialis posterior dysfunction, which results in collapse of the longitudinal arch. This self-reinforcing condition is often, on presentation, a combination of mechanical failure of the osteoligamentous complex that maintains the medial longitudinal arch of the foot, and attenuation or complete tear of the posterior tibial tendon. There are many imaging studies defining which ligaments, muscular injuries, and degenerative changes are associated with adult flat foot. The posterior tibialis tendon is accepted to drive the pathology in the majority of cases and is reported in the literature as pathological in up to 100% of patients. The plantar spring ligament is seen to be attenuated, ruptured, or pathological in almost 90% of patients, whilst the deltoid ligament is involved in around a third of all cases. The authors of this study from **São Paulo (Brazil)** have reported a surgical approach for addressing the spring ligament and deltoid ligaments during surgical reconstruction, which involves the use of FiberTape to help and protect the soft-tissue healing.<sup>6</sup> The authors present their technique along with a report of ten consecutive patients. Whilst this sort of paper is nothing more than a 'line in the sand', with the authors reporting 'no loss of correction', it does describe a useful technique utilizing an artificial augment to address what is a tricky problem.

### Total ankle survival and alignment

■ It is known that preoperative ankle alignment is a risk factor for

early failure in total ankle arthroplasty. This study is designed to establish the effects of ankle implantation in varus, valgus, and neutral alignment on overall prosthesis survival. In this study, these authors from **Gwangju (South Korea)** studied the outcomes of 144 consecutive ankles, who all had a primary total ankle arthroplasty using the mobile-bearing HINTEGRA prosthesis.<sup>7</sup> This patient population was then subdivided based on preoperative deformity. There were 59 ankles in the varus group (5° to 20° varus), 34 ankles in the valgus group (5° to 20° valgus), and 51 ankles in the neutral group (<5° varus or valgus). There were no obvious differences in between groups in terms of baseline demographic characteristics. The authors collected a myriad of outcome measures, including the

Ankle Osteoarthritis Scale pain and disability score, American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hindfoot score, 36-Item Short-Form Health Survey Physical Component Summary score, visual analogue scale score for pain, and ankle range of movement. None of these differed meaningfully between the different preoperative groups. The authors then went on to analyze the groups by final postoperative coronal alignment. There were significantly more concomitant procedures in the varus group than in the neutral group, and there were some differences in overall probability of implant survival, which was 98% in the varus group, 81% in the valgus group, and 91% in the neutral group at just over seven years of follow-up. The authors have demonstrated in this moderate-sized series that, if postoperative alignment is good,

there is no effect on mid- and long-term results. This paper is valuable, in that it clearly demonstrates that if ankle alignment can be corrected post-surgery, this is more important than preoperative alignment. This, of course, makes perfect sense from the biomechanical standpoint. The question is in which ankles with preoperative deformity a neutral postoperative alignment can be achieved.

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## Wrist & Hand

### Is it cost-effective to image scaphoid fractures?

■ The management of patients with suspected scaphoid fractures is problematic, in part due to the limited sensitivity and low negative predictive value of conventional plain film radiographs. The reported incidence of fracture in patients with a suspected injury varies, but is typically low, at around 15%. Undiagnosed injuries can lead to significant complications that we are all familiar with, such as nonunion, avascular necrosis, and secondary wrist arthritis. False-positive diagnoses also incur the financial costs and morbidity of unnecessary treatment. In this systematic review, the authors from **London (UK)** examine the role of additional imaging for the suspected scaphoid fracture.<sup>1</sup> MRI and CT scanning have been used to diagnose these injuries more

accurately, with varying success; the most recent National Institute for Health and Care Excellence (NICE) guidance on Fractures (Non-Complex) suggests that one should consider MRI as first-line imaging for the suspected scaphoid fracture. This review addresses the issue of cost, describing the spectrum of economic evaluations, from simple monetary cost analysis through to incremental cost-effectiveness analysis, which considers both the monetary costs and the outcomes (and thus the costs associated with both poor and good outcomes). The authors note that there were few full economic evaluations performed that fulfilled their inclusion criteria, and, as such, conclusions are incomplete. The authors were able to include 15 studies in their analysis; however, direct comparison was difficult due to different outcome measures being

utilized. The conclusions of the included studies varied, with one finding no cost difference with use of advanced imaging, one demonstrating favourable cost evidence, and three demonstrating unfavourable evidence; this variation was likely due to differing methodology. Given that the follow-up concluded at 42 days in one study, which was perhaps too early to capture all missed scaphoid fractures, it seems doubtful that the cost evaluations are sufficiently robust. Considering the relatively low incidence of actual scaphoid fractures, there is clearly a grey area here. The balance between a scaphoid fracture being missed, on the one hand, and large numbers of patients undergoing negative and ultimately unnecessary scans, on the other, needs to be addressed. From a societal cost perspective, there appears to be a benefit to early

advanced imaging. However, when considered from the point of view of cash-strapped health systems, there is no robust economic evidence to suggest advanced imaging is cost-effective. As the authors have recommended, well-designed economic impact research is required to establish whether the financial costs incurred as a result of performing advanced scaphoid imaging on every patient with post-traumatic radial-sided wrist pain are justified.

### Wrist inflammation: a retrospective comparison between septic and non-septic arthritis

■ Wrist joint inflammation is a relatively common problem with multiple possible causes, one of the more serious being septic arthritis. There is, however, much overlap in the clinical presentation of septic and non-septic