

ROUNDUP³⁶⁰

Foot & Ankle

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Hawkins fractures revisited

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■ Fractures of the talus are potentially devastating injuries. The combination of a high proportion of articular cartilage cover and fragile retrograde blood supply results in high rates of avascular necrosis and post-traumatic arthritis in patients who sustain a talar fracture. A staple of trauma conferences and postgraduate exams is the Hawkins classification which divides talar fractures according to their displacement and the number of joints involved. Investigators in [Cleveland \(USA\)](#) set out to revisit the commonly held beliefs surrounding the treatment of talar fractures. They designed a retrospective prognostic study to establish the contribution of timing of surgery, displacement, and Hawkins grade on the eventual outcomes of these injuries (with respect to rates of arthritis and avascular necrosis). Their study included the case records of an astonishing 81 patients with talar fractures with a mean age of 37 years. Their series included all Hawkins subtypes and 30% of these injuries were open. The investigators were able to report outcomes to a mean of 30 months with just a single infection, two nonunions and two malunions. However, the investigators identified an avascular necrosis rate of nearly 25% (of whom 44% eventually revascularised without collapse). Poorer outcomes

with higher rates of osteonecrosis were seen following open fracture (30% vs 21%). Although 46 fractures were treated with emergent open reduction, there was no association between timing of surgery and outcomes. Thirty-five patients (54%) developed post-traumatic arthritis, the majority of these being associated with a talar body fracture (83%) or Hawkins type-III injuries (59%).¹ The authors identified that osteonecrosis of the talar body is associated with initial fracture displacement and that separation of Hawkins type-II fractures into those without and with subtalar dislocation improved the predictive value of this score. In this series, osteonecrosis never occurred without subtalar joint dislocation. Although there is some potential for significant selection bias, these results would suggest that emergent reduction and definitive internal fixation does not reduce the risk of developing osteonecrosis.

Arthrodesis comparable with ankle replacement in osteoarthritis

■ In contrast to the design of the previous paper (reported without a comparative group), ankle replacement in the osteoarthritic patient population is not perceived to enjoy such favourable long-term results. Surgeons in [Toronto \(Canada\)](#), noting that choice of treatment is therefore not so straightforward, have used The Canadian Orthopaedic Foot and Ankle Society (COFAS) Prospective Ankle Reconstruction Database to try and establish if fusion

or arthroplasty is more effective. The database contains data on patients stretching back as far as 2001 treated with total ankle replacement (involving Agility, STAR, Mobility, or HINTEGRA prostheses) or ankle arthrodesis by consultant fellowship-trained foot and ankle surgeons at four centres across Canada. Their study included different centres, prostheses, patient demographics and, crucially, all types of degenerative joint disease. The study design included collation of patient demographics, comorbidities, outcome scores (Ankle Osteoarthritis Scale (AOS) and quality of life score (SF-36)). Patients were evaluated to four years post-operatively and the dataset included only patients who still had a primary ankle joint in situ. Aiming to adjust as much as possible for variability, the surgical team utilised a linear mixed-effects regression model to allow comparison between scores while adjusting for age, sex, laterality, smoking status, body mass index, inflammatory arthritis diagnosis, baseline score, and surgeon. The dataset included 388 ankles (281 arthroplasties and 107 arthrodeses) and outcome data was available for just over 80% of these (n = 321) at around 5.5 years' follow-up. Demographically, surgeons had selected patients for a fusion procedure who were typically younger, diabetic, smokers and less likely to have rheumatoid arthritis. The failure rates were different with 17% of arthroplasties (n = 48) and 7% of arthrodeses (n = 7) requiring revision during the study

period. Of interest, there was a much higher rate of significant complication in the arthroplasty group (19% vs 7%). Outcome scores improved significantly from baseline in both the arthroplasty (53.4 to 33.6 points) and arthrodesis groups (51.9 to 26.4 points) but this difference was not significant after adjustment for baseline characteristics.² While the results for both of these procedures are similar, they do highlight some of the difficulties faced by the specialist foot and ankle surgeon when treating arthritis. With no better functional outcomes in the arthroplasty group (although there is some significant selection bias in this kind of study) and a much higher complication and revision rate, one does wonder if the future of ankle arthroplasty is limited. This study also nicely highlights the difficulties of volume associated with this procedure. The four surgeons in this series all work in large centres, yet each was only able to perform five arthrodeses per year, highlighting the relative rarity of this problem.

Mobile bearing ankle replacement successful in the longer term

■ Traditionally, joint replacement has been favoured in patients with inflammatory arthropathies such as rheumatoid arthritis as, although the patients often have poor bone stock and are younger than their osteoarthritic counterparts, they have very low functional demands, and outcomes in hip, knee, ankle and elbow arthroplasty are reported to be universally good even in the

very young age group. However, despite promising short- and mid-term results, there are very few long-term outcome studies in this patient cohort, particularly addressing total ankle replacements performed in those patients with end stage inflammatory arthritis. A study team in **Amsterdam (The Netherlands)** has been able to follow up the results of 93 total ankle replacements (TAR) in 76 patients to a minimum of ten years. Patients all underwent treatment with a mobile bearing TAR between 1988 and 1999. The study team were able to report a surprisingly successful series in this highly selected group of patients with a cumulative failure rate of 20% at 15 years of follow-up. Functionally, the AOFAS scores were around 80 points and 23 TARs required further intervention (six implant or bearing exchanges and 17 revisions to fusion).³ Given these excellent long-term results describing low failure rates and excellent functional outcomes, here at 360 we would tend to agree with the authors of this study that for patients with end stage inflammatory arthropathies, total ankle replacement remains a viable and successful long-term option and is potentially the treatment of choice.

Osteolysis an increasing worry in ankle replacement

■ In the final of a small flurry of important papers on ankle replacement this month, a research team in **Seoul (South Korea)** have gone on to look at ankle replacement with a more objective eye. Interested in identifying the incidence of and difficulties relating to the development of osteolytic lesions surrounding ankle replacements, they designed a study to assess the incidence and characteristics of periprosthetic osteolysis and its association with clinical outcomes after TAR using the HINTEGRA ankle system. They designed a retrospective cohort study (Level IV evidence) including patients who underwent TAR during a six-year period. The study team identified 99 ankles (in 90 patients)

who had undergone TAR and had at least 24 months of follow-up. Patients were evaluated for pain and clinical outcomes (visual analog scale and the American Orthopaedic Foot and Ankle Society score) as well as screening with fluoroscopy to evaluate for osteolytic lesions surrounding the foot and ankle. Patients with early signs of osteolysis were evaluated with CT scanning to characterise the incidence of and progression of osteolysis. Twenty-five per cent required a CT scan to characterise their osteolysis. Nearly 40% of patients (n = 37) demonstrated evidence of osteolysis with continuous progression demonstrated on ten patients during the study period. The researchers were unable to identify any demographic or surgical risk factors for osteolysis and, even more worryingly, osteolysis itself did not have a significant effect on clinical or radiological outcomes.⁴ This high rate of osteolysis is of great concern. With the increased sensitivity of CT, a large number of patients with large balloon osteolytic lesions is being picked up here. While the results of ankle arthroplasty presented in the previous two studies look promising in terms of functional outcomes, there may be a ticking timebomb of difficult to revise osteolytic ankle replacements not so far off on the horizon.

Ankle synostosis post fracture not important Xref

■ There has been a fair bit of research surrounding the syndesmosis of late, with evidence to support the difficulties of achieving an acceptable reduction prior to placement of the syndesmosis screw and authors recommending on-table CT. Surprisingly, despite a number of recent research forays into the distal tibiofibular joint, there is little in the way of evidence looking at post-traumatic synostosis. While distal

tibiofibular synostosis is a recognised complication of ankle fractures (and often present on CT even if not on plain films), little is known about the aetiology of, or its outcome in patients with synostosis, incomplete bony bridging, or complete synostosis. Researchers at the Hospital for Special Surgery, **New York (USA)** evaluated all operatively treated ankle fractures recorded on their prospective trauma database. All patients with an operatively treated ankle fracture with at least three months of radiographic follow-up were included in the study. Details on patient demographics, injury pattern, medical history, complications and operative information were recorded. Fractures were treated in a fracture-specific and ligament-specific fashion with syndesmotic screws and, when used, these were subsequently removed four months

post-operatively. Outcomes were assessed using the Foot and Ankle Outcome Score (FAOS) and range of motion (ROM) scores.⁵ The research team identified 564 ankle fractures who were included in the study. Of these, 91 had complete synostosis injuries and 46 demonstrated incomplete bony bridging. Using a multivariate model,

risk factors of male sex (odds ratio = 2.82), syndesmotic screw fixation (OR = 2.46), and tibiotalar dislocation (OR = 1.74) were found to be significant independent risk factors for the development of bony bridging at the level of the syndesmosis. Despite a significant reduction in dorsiflexion, plantar flexion, and inversion, there were no differences in the patient-reported outcome measures between the two groups.

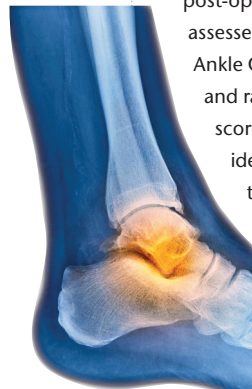
Radiofrequency ablation for plantar fasciitis

■ Treatment for chronic heel pain can be exceedingly frustrating for both patient and surgeon alike. While eccentric loading has

revolutionised conservative treatments for plantar fasciitis, patients failing conservative management can present as an extremely difficult challenge. Surgical treatments have mixed reported outcomes and carry with them the potential complications associated with surgery as well as unclear efficacy. Surgical options include plantar fascia release, spur excision and gastrocnemius lengthening but to our knowledge here at 360, radiofrequency ablation of the calcaneal nerve branches responsible for the pain has never been adequately evaluated. Researchers in **Kocaeli (Turkey)** took a straightforward approach to the problem and report the efficacy of radiofrequency nerve ablation (RFNA) of the calcaneal branches of the inferior calcaneal nerve at two years of follow-up. The researchers were able to report the results of treatment of 35 feet in 29 patients. All patients were treated for recalcitrant heel pain which had failed to resolve with six months of conservative treatment. Outcomes were assessed with VAS scores at one month, one year and two years following procedure. Radiofrequency ablation was surprisingly effective, with VAS scores falling from 9.2 on presentation to 1.3 by two years of follow-up. A similar improvement was seen with the AOFAS score (66.9 to 93.9 at two years).⁶ The results of this treatment are remarkably effective for patients with recalcitrant plantar fasciitis with a sustained and significant benefit over a period of years. It certainly seems that denervation may be a more successful treatment than surgical release.

The right approach for tibiototalcalcaneal fusion

■ Hindfoot fusion is a relatively commonly performed salvage operation in both ankle arthritis surgery and for post-traumatic arthrosis. The operation may be performed through a number of approaches, although it is not clear what the advantages and disadvantages of each are. The most commonly described ap-



proaches are the transfibular, the medial and the posterolateral approach. Surgeons in **Jena (Germany)** attempted to shed some light on the subject by attempting to assess the effects of the three approaches to the underlying neurovascular structures and the extent of surgical access to the different compartments. The surgeons designed a cadaveric study on six pairs of formalin-fixed legs, and for each approach four specimens underwent formal surgery with the neurovascular structures at risk and the debrided portions of the articular cartilage compared. The transfibular approach places vascular structures at the lowest risk as compared with

the posterolateral approach (endangering lateral malleolar branches of the peroneal artery) and medial approach (venous structures at risk). The medial approach also places neurological structures (saphenous nervous structures) at risk. There was no difference in access to the joint with very similar proportions of cartilage accessible for debridement on the tibia, talus and calcaneus.⁷ This simple paper highlights the anatomical risks from the three commonly used approaches to the hindfoot for arthrodesis surgery. It would seem that unless there is a strong reason to use a different approach, in all likelihood the transfibular approach

provides the safest window with good access to the articular cartilage to achieve tibiotalar and subtalar arthrodesis.

REFERENCES

1. **Vallier HA, Reichard SG, Boyd AJ, Moore TA.** A new look at the hawkins classification for talar neck fractures: which features of injury and treatment are predictive of osteonecrosis? *J Bone Joint Surg [Am]* 2014;96-A:192-197.
2. **Daniels TR, Younger AS, Penner M, et al.** Intermediate-Term Results of Total Ankle Replacement and Ankle Arthrodesis: A COFAS Multicenter Study. *J Bone Joint Surg [Am]* 2014;96-A:135-142.
3. **Kraal T, van der Heide HJ, van Poppel BJ, et al.** Long-term follow-up of mobile-bearing total ankle replacement in patients with inflammatory joint disease. *Bone Joint J* 2013;95-B:1656-1661.
4. **Yoon HS, Lee J, Choi WJ, Lee JW.** Periprosthetic osteolysis after total ankle arthroplasty. *Foot Ankle Int* 2014;35:14-21.
5. **Hinds RM, Lazaro LE, Burket JC, Lorich DG.** Risk factors for posttraumatic synostosis and outcomes following operative treatment of ankle fractures. *Foot Ankle Int* 2014;35:141-147.
6. **Erken HY, Ayanoglu S, Akmaz I, Erler K, Kiral A.** Prospective study of percutaneous radiofrequency nerve ablation for chronic plantar fasciitis. *Foot Ankle Int* 2014;35:95-103.
7. **Rausch S, Loracher C, Fröber R, et al.** Anatomical evaluation of different approaches for tibiotalocalcaneal arthrodesis. *Foot Ankle Int* 2014;35:163-167.