all presenting with a stiff knee following total knee arthroplasty. The mean age at revision was 65.5 years and all surgeries were performed by a single surgeon with pre-operative arc of stiffness < 70° or flexion contracture of > 15°. Essentially, the authors describe an open revision and arthrolysis combined with a downsizing of the polyethylene liner by 4 mm, giving a 'sloppy' revision. There are no long-term outcomes published for this approach (which may well open the door for catastrophic wear and macroscopic failure). However, within the constraints of the outcomes reported, this can be described as a successful approach. At a mean of 60 months' follow-up, the authors report a mean improvement in composite flexion arc of nearly 45° – a remarkable achievement. It is easy to be either sceptical about the results presented here, or simply to write this off as a series of 'overstuffed' knees at initial surgery. However, it is an interesting technique and from a reputable unit it would be churlish to ignore such an honest account of treating complications.

REFERENCES

1. **Tammachote N, Kanitnate S, Yakumpor T, Panichkul P.** Intra-articular, single-shot hylan G-F 20 hyaluronic acid injection compared with corticosteroid in knee osteoarthritis: a double-blind, randomized controlled trial. *J Bone Joint Surg [Am]* 2016;98-A:885-892.
2. **Rossman SR, Reb CW, Danowski RM, et al.** Selective early hospital discharge does not increase readmission but unnecessary return to the emergency department is excessive across groups after primary total knee arthroplasty. *J Arthroplasty* 2016;31:1175-1178.
3. **Waterman BR, Belmont PJ Jr, Bader JO, Schoenfeld AJ.** The total joint arthroplasty cardiac risk index for predicting perioperative myocardial infarction and cardiac arrest after primary total knee and hip arthroplasty. *J Arthroplasty* 2016;31:1170-1174.
4. **Longo UG, Ciuffreda M, D'Andrea V, et al.** All-polyethylene versus metal-backed tibial component in total knee arthroplasty. *Knee Surg Sports Traumatol Arthrosc* 2016. [Epub ahead of print]
5. **Nielsen CS, Jans Ø, Ørsnes T, et al.** Combined intra-articular and intravenous tranexamic acid reduces blood loss in total knee arthroplasty: a randomized, double-blind, placebo-controlled trial. *J Bone Joint Surg [Am]* 2016;98-A:835-841.
6. **Woelfle-Roos JV, Dautel L, Wernerus D, Woelfle KD, Reichel H.** Vascular calcifications on the preoperative radiograph: predictor of ischemic complications in total knee arthroplasty? *J Arthroplasty* 2016;31:1078-1082.
7. **Bell SW, Anthony I, Jones B, et al.** Improved accuracy of component positioning with robotic-assisted unicompartmental knee arthroplasty: data from a prospective, randomized controlled study. *J Bone Joint Surg [Am]* 2016;98-A:627-635.
8. **Donaldson JR, Tudor F, Gollish J.** Revision surgery for the stiff total knee arthroplasty. *Bone Joint J* 2016;98-B:622-627.

Foot & Ankle

X-ref ***For other Roundups in this issue that cross-reference with Foot & Ankle see:*** *Trauma Roundups 3, 6, 8; Research Roundup 5.*

First metatarsophalangeal joint arthroplasties: perhaps some more work to do

The treatment of arthritis of the first metatarsophalangeal joint (MTPJ) continues to evolve, and in the last few years replacement arthroplasty has largely been the focus in attempts to improve outcomes. There is now a wide variety of hemi and total joint arthroplasty implants available commercially, however, there is less in the way of evidence to support their use. The data recently published from the Cartiva Motion Study Group concern the early results of their viscoelastic hemiarthroplasty for the first metatarsal head. The literature reflecting the mid-term results of these implants is conflicting, but some series have reported revision rates of 24% at 33 months, leading to abandonment of the procedure.[1] The recurrent difficulty appears to be failure of osseointegration of the metatarsal implant. In response to this, efforts to find range of movement-preserving solutions to end-stage MTPJ arthritis are ongoing. The study team designed their own prospective, randomised non-inferiority study involving patients from 12 centres in the **USA**, **Canada** and the **UK**. A total of 202 patients were enrolled in the study and randomised to receive either the implant or arthrodesis.[2] This non-inferiority study reveals no difference in pain relief or patient satisfaction at two-year follow-up, but a quicker recovery and return to function in the early post-op phase for the implant group. The conversion rate to arthrodesis at two years was 9.2%, all of which were undertaken for persistent pain of unknown cause. This would appear to compare favourably with a secondary surgery rate of 14% in the arthrodesis group (7 of 50), however, these were usually small operations, mostly metalwork removal. Five-year follow-up data are awaited, but with a failure rate of nearly 10% at two years, patients should be counselled carefully prior to receiving this novel implant.

The neuropathic foot: understanding the muscle drivers

Acquired deformity and abnormal weight distribution, combined with the loss of protective sensibility, are the major factors in the development of ulceration in the diabetic neuropathic foot. The well recognised changes of metatarsophalangeal joint (MTPJ) hyperextension leading to abnormal forefoot weight distribution is probably the most common acquired deformity seen in neuropaths. This forefoot abnormality is commonly seen in conjunction with subtle contractures of the tendoachilles complex, which manifest as ankle stiffness and contribute to the plantar forefoot overload which is causative in diabetic foot ulceration. The initial driver for this whole process is largely unknown but is ascribed to a general imbalance between the long extensor and short flexors of the foot. An interesting paper from **St Louis, Missouri (USA)** sheds some light on the potential underlying causes. The authors aim to categorise intrinsic muscle fatty infiltration, peripheral neuropathy and the presence of accumulated advanced products of glycosylation with the degree of deformity measured at the MTPJs of diabetic patients, in an attempt to understand the pathological process.[3] Their study reports data from 34 patients, all with diabetic neuropathy. Cross-sectional CT and MRI imaging of the foot was undertaken, allowing the deformity and muscle changes to be measured. In addition, glycosylation was measured with skill fluorescence and kinematic studies to establish range of motion in the hind- and forefoot. The authors established that the lean muscle volume correlated well to the MTPJ deformity, as did hindfoot deformity, and were able to account for 35% of the variation in forefoot deformity. Whilst neuropathy did have a predictive effect on forefoot deterioration, the level of skin fluorescence did not. The paper also usefully describes a novel algorithm which can be applied to MRI scans of the forefoot to accurately measure total lean muscle volumes within the flexor compartment. Previous studies have used single slice acquisition techniques and applied atrophy criteria as determined by a clinician. This is interesting in itself as a possible screening tool to identify feet at risk of ulceration, with a view to initiating preventative measures. (total contact innersoles, stretching programmes, etc.). Given the enormous cost burden of diabetic feet, any measure which prevents

complications arising in this population is likely to be beneficial.

Primary fusion and Lisfranc injuries X-ref

The question whether to primarily fuse the second tarsometatarsal joint in the context of severe trauma is controversial, with two published level 1 studies apparently contradicting each other.[4,5] The anxiety for the operating surgeon, especially in treating younger, higher demand patients, is whether a primary fusion by definition limits the functional capability of the foot in the future, due to either loss of the joint or the inherent shortening that always occurs. Hence there is general hesitance to fuse joints in the younger population and a tendency to try and preserve motion by joint reconstruction in the index surgery. This paper from the team at the Hospital for Special Surgery, **New York (USA)**[6] has some significant value in that, although not a randomised trial, it does present the return to function data for a mixed group of purely ligamentous and mixed osseoligamentous injuries after primary fusion at index surgery. The study has a retrospective design and utilised patient-reported activity level questionnaires, and concludes participation in sports as equivalent to pre-injury in 64% and reduced in 25% of patients. This was a mixed group of partial fusions, including single column or all three. The activities referred to included impact sports, and relied on patient declaration to record the premorbid activity levels. Despite the sources of bias inherent in this study design, the strength is in the generalisability of the data. It is reasonable to advise patients contemplating a primary fusion that on average just over half of patients make a full return to sporting activity following this kind of surgery. Clearly there is still some way to go to narrow the evidence gap in Lisfranc injuries, and we are still waiting for the 'definitive study' to inform practice. However, for the time being these functional data do reassure all involved in their care that these patients may be successfully treated with a fusion, and that the long-term results are not as bad as one might think.

Radiographic severity important in predicting outcomes in total ankle arthroplasty

It is widely known and accepted that in total knee arthroplasty, the best predictor of post-operative outcome is pre-operative function. However, this is not a concept that has ported across to the world of ankle arthroplasty. Reasoning that patient selection for total ankle arthroplasty is key to achieving the best outcomes, researchers in **Newcastle upon Tyne (UK)** set out to investigate the impact that the pre-operative radiographic arthritis grade may have on post-operative functional results in total ankle arthroplasty (TAA).[7] The research team focused on a large series of 178 ankle replacements in 170 patients. They undertook a retrospective review of their pre-operative radiographs and prospectively collated clinical outcome data (Foot and Ankle Outcome Score [FAOS; pain, function, and stiffness], MOS 36-item and Short-Form Health Survey [SF-36] scores). The patients were subdivided by the pre-operative Kellgren-Lawrence scores assessed on pre-operative weight-bearing films. There were few differences in patient demographic data; perhaps most interestingly, pre-operative FAOS scores were similar across all three groups with no statistically significant differences observed. However, the improvements in both domain-specific and general outcome scores differed dramatically between the groups. As perhaps might be expected, those patients with severe or end-stage arthritis had the greatest post-operative satisfaction rates (achieving > 90% at two years in severe arthritis), whereas in the mild to moderate group rates were as low as 50%. This paper informs decision making in an area where technologies continue to evolve and the relative indications for arthroplasty are not yet clear.

Osteolysis around the ankle: a ballooning problem? X-ref

There are definitely some differences in the osteolytic reaction between patients, but there are also some differences between joints and implants, suggesting that perhaps the final common pathway for bone loss is likely to be through a single, unified route. In common with the pattern of ballooning osteolysis seen on the tibial plafond following osteochondral defects, wear debris around ankle arthroplasties can result in a very similar pattern of osteolysis. A research team in **Magdeburg (Germany)** have investigated the outcomes of 71 patients, all undergoing revision surgery for failed ankle replacements.[8] Those with ballooning osteolytic cysts were compared with a primary group of ankle arthroplasties and some revisions without the characteristic balloon lysis. The research team undertook a fairly thorough basic science analysis of the explanted tissue including histomorphometric, immunohistochemical, and elemental analysis. Those patients with ballooning osteolysis showed characteristic changes including higher levels of lymphocytic expression and perivascular expression of CD3+, CD11c+, CD20+, and CD68+ cells. The study team also established that there were much higher odds of balloon osteolysis in those patients with a high calcium concentration in the periprosthetic tissue. Putting it all together, the study team propose that perhaps the pattern of tissue expression and very high calcium concentrations implicate the hydroxyapatite coating in the development of balloon osteolysis.

Posterior fixation of the ankle? X-ref

There has been a slow tectonic drift in ankle fracture surgery away from the 'anterior-posterior' screw towards an open approach to the posterior malleolus, either through a lateral incision with the patient supine or through a more formal posterior approach to the ankle. The rationale being that, given the low incidence of sheer patterns of the fracture, reduction is best maintained with direct reduction and buttress plating. However, despite this change in practice, there is little in the literature (as so often happens) to support one approach over another. Patients treated in **The Hague (The Netherlands)** over a four-year period have been the subject of this recently published case series. The study team included 52 patients, all with significant posterior malleolar fractures presenting with an articular step. The authors undertook a direct reduction and fixation of the fragments, and achieved (they report) anatomical reduction in all fractures.[9] The authors sadly do not include any functional data, although they are able to comment that there were no wound healing problems (bar a single superficial infection). Radiographic outcomes were satisfactory in all but one patient. This paper is a bit of a lost opportunity – it would be great to know the outcomes of open reduction and posterior plating of the distal tibia, and a comparative case series with functional scores is a much-needed study. Sadly this paper does not quite pass muster, and all that can be said is that this approach is possible.

Resection *versus* fusion in the lesser toes

This is a simple paper that does exactly what it says on the tin. The authors have designed a neat randomised controlled trial to evaluate the benefits or otherwise of proximal interphalangeal joint fusion (PIPJ) over a simple resection of the joint in patients undergoing a hammertoe correction. The clinical trial based in **Breda (The Netherlands)** reports the outcomes of 55 patients randomised to either resection (26 patients, 39 toes) or fusion (29 patients, 50 toes),[10] sadly leaving somewhat uneven groups. The PIPJ procedure was combined as

necessary with metatarsophalangeal releases to correct the toes' attitude. Outcomes were assessed at one year following surgery using the American Orthopaedic Foot & Ankle Society scale, the Foot Function Index, and visual analogue scale pain outcome scores. In addition to clinical scores, the alignment of the toes was evaluated at final follow-up. Essentially there were no differences in functional outcome scores between the two groups, however, the fusion group had a superior alignment in the sagittal plane at final follow-up. It is reasonable to presume that late recurrence will also be less common in the fusion group, although longer follow-up is clearly required to establish this. This study really does leave the choice of surgery to the patient and surgeon. However, although there are no differences in the clinical outcomes selected by the study design team, given that the aim of the surgery is to correct toe malalignment and there was a significant difference in favour of the fusion group with regard to sagittal malalignment, we can't help thinking that perhaps the authors have not quite been definite enough with their conclusions. A fusion, we would conclude, is more reliable and has the same functional outcomes.

Minimally invasive ankle fixations? X-ref

■ Minimally invasive surgery (MIS) has a number of potential clinical, cosmetic (and even financial) advantages - on paper at least! The majority of readers will remember the fashion for mini-hip, followed by 'mini-knee' and even 'mini-bunion', so given the lack of advantage these passing surgical fads have shown (and some have even been discredited due to higher complication rates), it is with some trepidation that we approach this paper from **Taipei (Taiwan)**, a retrospective comparative series of mini- *versus* open reduction and internal fixation for unstable ankle fractures.[11] The authors make the not unreasonable comment that in the face of higher infection rates and compromised soft tissues, there is perhaps an argument for minimally invasive surgery. The surgical teams undertook a retrospective study of 71 patients, all with 44-B type fractures, 34 of whom underwent a standard ORIF and 37 of whom underwent MIS surgery of two different types. Although the authors set their paper out as a validation of their protocol, there is little evidence to support the algorithm itself, just the overall outcomes. The authors report essentially no differences in any of the outcome measures other than lower wound complication rates in the MIS group. This paper certainly supports the concept of MIS surgery in ankle fractures to reduce complication rates, however, in the face of other, better studies (such as the randomised controlled trials from Edinburgh reporting the fibular nail), a prospective randomised controlled trial would really be needed here to prove any kind of superiority.

REFERENCES

1. Titchener AG, Duncan NS, Rajan RA. Outcome following first metatarsophalangeal joint replacement using TOEFIT-PLUS™: a mid term alert. *Foot Ankle Surg* 2015;21:119-124.

2. Baumhauer JF, Singh D, Glazebrook M, et al. Prospective, randomized, multi-centered clinical trial assessing safety and efficacy of a synthetic cartilage implant versus first metatarsophalangeal arthrodesis in advanced hallux rigidus. *Foot Ankle Int* 2016 [Epub ahead print]

3. Cheuy VA, Hastings MK, Commean PK, Mueller MJ. Muscle and joint factors associated with forefoot deformity in the diabetic neuropathic foot. *Foot Ankle Int* 2015 [Epub ahead of print]

4. Henning JA, Jones CB, Sietsema DL, Bohay DR, Anderson JG. Open reduction internal fixation versus primary arthrodesis for Lisfranc injuries: a prospective randomized study. *Foot Ankle Int* 2009;30:913-922.

5. Coetzee JC, Ly TV. Treatment of primarily ligamentous Lisfranc joint injuries: primary arthrodesis compared with open reduction and internal fixation. Surgical technique. *J Bone Joint Surg [Am]* 2007;89-A:122-127.

6. MacMahon A, Kim P, Levine DS, et al. Return to sports and physical activities after primary partial arthrodesis for Lisfranc injuries in young patients. *Foot Ankle Int* 2016;37:355-362.

7. Chambers S, Ramaskandhan J, Siddique M. Radiographic severity of arthritis affects functional outcome in total ankle replacement (TAR). *Foot Ankle Int* 2016;37:351-354.

8. Singh G, Reichard T, Hameister R, et al. Ballooning osteolysis in 71 failed total ankle arthroplasties. *Acta Orthop* 2016;1-5. [Epub ahead of print]

9. Verhage SM, Boot F, Schipper IB, Hoogendoorn JM. Open reduction and internal fixation of posterior malleolar fractures using the posterolateral approach. *Bone Joint J* 2016;98-B:812-817.

10. Schrier JC, Keijsers NL, Matricali GA, Louwerens JW, Verheyen CC. Lesser toe PIP joint resection versus PIP joint fusion: a randomized clinical trial. *Foot Ankle Int* 2016;37:569-575.

11. Chiang CC, Tzeng YH, Lin CC, Huang CK, Chang MC. Minimally invasive versus open distal fibular plating for AO/OTA 44-B ankle fractures. *Foot Ankle Int* 2016;37:611-619.

Wrist & Hand

X-ref ***For other Roundups in this issue that cross-reference with Wrist & Hand see:*** *Research Roundups 1, 6, 8.*

Is there any advantage in endoscopic carpal tunnel release? X-ref

■ Sometimes in surgery we just like to make things more interesting. Sometimes that results in better outcomes for patients; it however always seems to result in a more complicated operation. Endoscopic carpal tunnel release is one such intervention. Whilst there is no argument that it is more complicated than the open approach, there is still very much debate about the relative benefits of each approach. Endoscopic carpal tunnel release is not as easy to perform as open surgery - there is a learning curve, and special equipment is needed. That equipment is not cheap and some financially-strained systems might baulk at the cost, especially for an approach many perceive to be unproven. Added to this is the fact that a traditional open operation can be delegated to a more junior surgeon, thereby reducing the total health economic costs. So is there any advantage to the endoscopic approach? Separate review teams from **Shanghai (China)**[1] and **New York (USA)**[2] have systematically reviewed the evidence, and find that the outcomes in their reviews are essentially the same. The differences are that the endoscopic surgery takes significantly longer; however the patient recovery is significantly quicker. The two meta-analyses were structured slightly differently, with one reporting just five trials of 142 patients who had contralateral hands randomised to one of each treatment intervention, whilst the larger meta-analysis from New York reports the outcomes of 1859 hands randomised to one treatment or another. Both studies essentially reported the same outcomes with a reported higher risk of complications with endoscopic surgery as well. Given the essentially