gait analysis and completed a Knee injury and Osteoarthritis Outcome Score (KOOS) at both two and four years following unilateral ACL reconstruction. The gait analysis was used to establish the knee centre of rotation. There were (as perhaps might be expected) marked differences between the two knees. The reconstructed knees demonstrated greater medial compartment motion and pivot, in addition to having a more lateral centre of rotation. The centre of rotation was more anterior in the reconstructed knees, although this did start to normalise with time, moving more towards normal by the four-year follow-up in the coronal plane. However, the sagittal centre of rotation worsened over time in 38% of patients, and the increasing anterior position of the centre of rotation demonstrated a negative correlation with KOOS scores, i.e. the more anterior the centre of rotation, the poorer the functional scoring. This is an extremely thought-provoking paper that attempts to quantify what surgeons have accepted innately: that, even with reconstruction, knees following ACL injuries do not have normal function and this likely leads to early-onset osteoarthritis. However, they have done an excellent job of looking at the science of why post ACL injury patients get post-traumatic OA and what exactly are the abnormal kinematics.

Arthroscopy in the year prior to TKA?

The future is not exactly bright for arthroscopy in the older patient group. The latest randomised controlled trials do not appear to favour arthroscopy for the 'tidy up' that used to be so commonplace in eking out a patient's life before TKA. However, many surgeons still offer the option, and with randomised studies suggesting no benefit, this series from **Preston (United Kingdom)** adds some valuable information to what is already known.[8] The authors ask: does knee arthroscopy within the year of surgery do any harm to outcomes following TKA? These authors undertook a retrospective review of 186 patients, all of whom underwent TKA within a year of arthroscopy, over a four-year period. The Oxford Knee Scores in this cohort were then compared with a reference cohort of 1708 patients who had undergone TKA in the same department in a similar time period. The take home message from this paper is that the arthroscopy group had a significantly lower Oxford Knee Score than the non-arthroscopy cohort (32.8 vs 36.3), and a high re-operation rate at 14%. This seemed to translate also into a higher revision rate, with an early revision rate of 3.8% *versus* 1.6% in the arthroscopy group. This effect was not seen in patients who had arthroscopy six months, or more, prior to the TKA. Although there is no causal link established in papers like this and the comparator group is, by definition, a different group (as the treating surgeons did not think arthroscopy was indicated for the year preceding surgery), it does raise a big question. Given that when randomised trials such as this do not suggest any improvement in mid-term outcomes from arthroscopic debridement of the degenerate knee, we do have to ask whether patients who are likely to need a knee arthroplasty should undergo arthroscopy at all. Furthermore, perhaps they should not be offered knee replacements within six months of a previous arthroscopy.

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Foot & Ankle

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

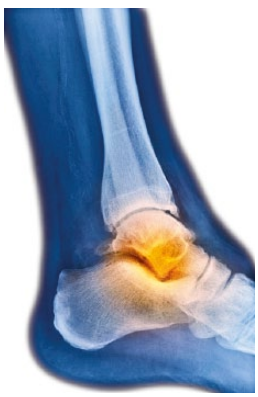
Mid-term results of the "Cartiva" first MTPJ hemiarthroplasty

Advanced arthritis of the first metatarsophalangeal joint (MTPJ) continues to provide us with a treatment challenge, and the traditional "gold standard" remains, for many an arthrodesis of the first MTPJ, a reliable operation with a known complication rate which has served well for many years. The inevitable sacrifice of joint motion associated with fusion, however, is not appealing to all patients, and, as such, surgeons and device manufacturers continue to search for reliable options offering a better functional result. Although the first MTPJ replacements have not had a terribly successful history, there are advances in technology which, combined with a greater understanding of the pathophysiology of the first MTPJ, have resulted in some newer and more innovative solutions. One of these is the Cartiva implant. The Cartiva synthetic cartilage implant (Cartiva, Inc., Alpharetta, Georgia) is a hydrogel implant, engineered to closely replicate the tensile and compressive properties of human articular cartilage. It is implanted into the first metatarsal head with the aim of being a joint-preserving procedure for treatment of advanced arthritis of the first MTPJ. In 2016, a prospective multicentre randomised clinical trial published evidence of equivalent results when compared with arthrodesis of the first MTPJ in terms of pain relief and functional outcome at two years' follow-up, and was reported in *360*. The Canadian centres led by **Vancouver (Canada)** that formed part of that initial trial have presented the mid-term five-year results of the Cartiva cohort of patients.[1] As this was an early reported study of the 68 patients who originally received the implant, 29 had reached five-year follow-up.

Two patients were lost to follow-up, and the authors report the outcomes of 27 patients. The cohort in question had a mean age of 56 years (40.1 to 71.9), with 21 females and six males. Patients were asked to complete a variety of patient-reported outcome measures and they also underwent an evaluation of active joint range of motion. Finally, a radiological examination was performed on plain radiograph for any complications associated with the implanted device. The overall implant survivorship at five years was 96%. A single case had been revised to a fusion due to ongoing pain. Peak MTPJ dorsiflexion was 29.7° (10 to 45) compared with pre-operative values of 20.9° (0 to 50) ($p < 0.02$). The patient-reported outcomes showed significant improvements at five years when compared with pre-operative values. Asked if they would undergo the procedure again, 96% of patients said that they would. The initial results from this study cohort show a reassuring 96% implant survival at five years. The patient-reported outcomes and clinical assessment of range of retained motion are also very encouraging. Clearly, there are many more patients from this study who have not yet reached the five-year follow-up, and the results of these will be eagerly awaited in order to validate the survivorship for the entire study population. These results are promising for those patients wishing to explore the possibility of motion-retaining surgery for end-stage arthritis of the first MTPJ.

Non-operative treatment of unstable ankle fractures results in poor outcomes in diabetic patients X-ref

There is a global rise in the incidence of diabetes and, with ankle fractures being one of the most common injuries seen in orthopaedic trauma, we can expect to be treating more diabetics with this fracture in the years to come. In order to address the paucity of data on the outcomes of non-operatively treated ankle fractures in diabetic patients, this group from **New York, New York (USA)** retrospectively reviewed their own case series with the aim of describing the outcomes and complications of non-operatively treated displaced ankle fractures in diabetic patients.[2] In what is a very small case-controlled series, the authors identified 20 patients from a database treated for a period of just over three years with non-operative management of their unstable ankle fracture. The non-operative management regime consisted of closed reduction and casting. A second group of operatively treated cases was also identified, and used as a comparison group for a secondary study outcome. Mean follow-up was seven months. Both insulin- and non-insulin-dependent diabetics were included in the study and no patients had an active diabetic ulcer at the time of initial presentation. Despite the obvious limitations of a small selected retrospective case series, the authors here report a marked difference in overall complication rates between the two series. In the non-operatively treated group, the complication rate was 75% which compared favourably with 25% in the operatively treated patients. However, the picture was somewhat more clouded than it first appears as not all patients were treated initially with operative care. Complications in the non-operative group were loss of reduction/malunion (55%), new-onset Charcot arthropathy (35%), cast ulcer (25%), need for unplanned surgery (25%) and deep infection (10%). Non-operative treatment was therefore associated with a 21-fold increase in odds ratio of complication rate when compared with operative treatment. In addition, the complication rate following unintended open reduction internal fixation (ORIF) for nonunion or malunion in non-operatively treated patients was 100%, compared with 12.5% in early ORIF cases. This cohort study concludes that in a diabetic population, non-operative treatment of displaced ankle fractures results in an unacceptably high rate of complication. In addition, there is a significant increase in complication rate when compared with operatively treated cases. This gives us helpful information for the consent and decision making process when faced with these patients in our trauma units.



Presence of ulceration significantly affects limb salvage rates in diabetic Charcot arthropathy

Charcot neuroarthropathy can be a devastating and relatively common complication of diabetes mellitus. Foot and ankle deformity, ulceration and infection can all result in failure to salvage the limb, and all foot and ankle surgeons the world over will have had mixed results with operative management of this condition. Improvements in surgical fixation techniques and the use of bespoke implants for Charcot deformity correction are intended to improve outcomes in these tricky-to-treat patients. In this paper from **Dallas, Texas (USA),** a cohort of diabetic Charcot neuroarthropathy cases were identified from a database covering a ten-year period, and the aim of this particular study was to evaluate the treatment outcomes in these cases with a particular endpoint of limb salvage (defined as a major amputation involving sacrifice of the ankle joint), need for surgery and mortality.[3] The authors went on to establish if there were any differences noted in treatment outcomes by the presence of ulceration or not. A total of 245 patients were identified, resulting in a total of 280 treated feet. Their mean age was 57.9 years and the median length of follow-up was 198 weeks. The cases were divided into those presenting with an ulcer and those where the skin was intact. Ulcers were categorised using the Eichenholtz grading system and also by location. The authors used a fairly standard and uncontroversial treatment protocol. Patients presenting with stage 0 and 1 disease were offloading into a total contact cast or boot. Ulcer management was performed using well established diabetic wound care procedures, and sharp debridement was performed where indicated. In stages 2 and 3, alignment was used as an indicator for surgical or non-surgical management. Feet that were considered non-plantegrade were corrected surgically. Overall, 27.9% of feet were successfully treated non-operatively. The remaining patients were treated surgically. This included primary amputation, soft-tissue procedures, infection drainage and osseous surgery including exostectomy, osteotomy and arthrodesis. In patients who presented with Charcot-related wounds, there were 35 amputations in 164 feet (21.3%). This compared with five amputations in 116 feet (4.5%) presenting without Charcot-related foot wounds. This difference was statistically significant. Overall, using the techniques described in their paper, there was a six-fold increase in the likelihood of major lower extremity amputation in Charcot neuroarthropathy cases that presented to the surgeon with a pre-existing Charcot-related foot wound. This paper presents some important results from a large cohort of what is an extremely challenging condition to treat. It is an insight not only into a strong predictor of outcome in these patients, but also into the overall difficulties and complications that we face when treating this complex condition.

Os trigonum excision: open, arthroscopic or not at all?

The os trigonum is a somewhat difficult diagnosis – patients who present with problems have often been asymptomatic for many years, and usually present after a trivial ankle injury. Given the relative frequency of the os trignum in the general population, we are often left scratching our heads, here at *360*, as to the benefits or otherwise of tinkering. There are some patients who in themselves are more likely to have posterior impingement, such as high performing athletes, particularly those requiring extensive ankle mobility. In some patients, there is a clear indication for removal, although we suspect that this is a small subset of those diagnosed with problems related to the os trigonum. Having established that there is a problem, the difficulty then is deciding what is the best method of treatment. Traditionally, open approaches and debridement of the posterior space and os trigonum have yielded the best results. However, with the increase in arthroscopic surgery, surgeons in **Thessaloniki (Greece)** have asked the question, 'which is better? Open or arthroscopic debridement?'[4] Amazingly, despite the rarity of the condition, this study team were able to conduct a randomised controlled trial (albeit an admittedly small one) in an attempt to establish which outcome was better. The American Orthopaedic Foot and Ankle Society (AOFAS) hind foot score and Visual Analogue Scale (VAS) pain score were used as the primary outcome measure in combination with sporting activity. A total of 52 athletes were randomised to either open or arthroscopic treatment and, although the functional scores were identical at final follow-up and despite the small nature of the study, there were some significant differences in outcomes. Perhaps the most striking was in the complication rates, with 23% of patients in the open group suffering complications as opposed to just 3.8% in the arthroscopic group. There were also differences in rates of return to sport, with the arthroscopic group returning after just over seven weeks as compared with 11 weeks in the open group. The evidence presented here – particularly with regard to the complication rates - is compelling enough to consign open debridement of posterior ankle impingement to the history books. Although the debate will still continue about which patients are and are not suitable for posterior impingement surgery, based on the results presented here, if surgery is to be undertaken then it is now fairly clear what is an acceptable surgical option.

Personalising talipes treatment X-ref

There is almost universal adoption of the Ponseti method for treatment of primary talipes. The method is reliable, cheap and offers low complication rates in a condition that would otherwise be difficult to treat, with surgical options often resulting in high complication rates and significant long-term morbidity. The authors of this study from **St Louis, Missouri (USA)** focused on the minority of patients for whom the Ponseti method is ultimately ineffective.[5] These patients' feet fail to correct and they are left with the spectre of lifelong disability and extensive surgery. Reasoning that there are genetic drivers associated with talipes, and these can be easily quantified using modern techniques, the study team set out to establish whether personalising treatment is possible, and specifically whether genetic sequencing can be used to guide treatment decisions and in particular to personalise Ponseti-type treatments for patients in whom they would otherwise be ineffective. This study reports on linkage of human gene sequencing, molecular genetic engineering of mouse models of clubfoot and MRI of clubfoot. It also reports on the development of new treatment models based on the concept that understanding the genetic and biological drivers of this condition can be used to drive the development of new treatment options. This paper, which is a summary of the research awarded the 2017 Nicolas Andry Award, traces the development of, and understanding of, genome-based treatments for complex congenital conditions of the foot, and in particular outlines how an understanding of the biology can be used to improve treatment methods. The investigators trace the development of both a new treatment for congenital vertical talus and a dynamic brace for use in the trickier cases.

Tibialis posterior tendon tear in ankle sprain

Ankle sprains are common, and represent a significant mixed bag of presentations ranging from those patients with just a soft-tissue contusion through to those with ligament injuries, osteochondral defects and even tendon sprains. In today's modern protocol-driven healthcare systems, this continuum of injuries will all initially be managed in the same way and often by a non-medical clinician. For the majority of patients, this isn't a problem, however, there is a subset of patients who would do well to have a more senior review as many patients with tendon tears and osteochondral defects are not diagnosed and face missed treatment for what can go on to be significant diagnoses. Clinicians in **Eugene, Oregon (USA)** focus on associated traumatic tears of the tibialis posterior tendon which are much more common than the more regularly reported peroneal muscle sprain.[6] These authors identified 13 patients over a four-year period, representing around 1% of injuries. These were identified most commonly on surgical review (11 patients) rather than as findings on MRI scanning. All patients also had an osteochondral defect, and the vast majority (n=12/13) had an associated ligamentous instability. In this series, all patients were offered surgery, with somewhat mixed results. Overall, nine patients had successful surgery at the first sitting, with just four available for review at 4.5 years, making the presented clinical results of dubious relevance. The MRI findings were noted often to be subtle, but the authors sensibly suggest that patients with ongoing medial-sided pain associated with a significant previous ankle sprain should be investigated for tibialis posterior tears.

Tourniquets and ankle scopes X-ref

The 'handed-down wisdom' for arthroscopy is that patients should, wherever possible, undergo arthroscopic surgery aided by tourniquets. This improves visualisation of the joint and avoids the difficulties of bleeding obscuring the view. However, there are some potential downsides, with use of the tourniquet associated with additional pain, and in some rare cases neuropraxia and ischaemic injury to the limb can occur, not to mention all additional costs of equipment, sterilisation and operative time. Researchers in **Zagreb (Croatia)** set out to determine whether the use of a tourniquet in anterior ankle arthroscopy really was required and what the effect was on anterior arthroscopy of the ankle in terms of operative time, bleeding and post-operative recovery.[7] The study the research team designed was a randomised controlled trial with 50 patients, 25 in each arm. The patients were all scheduled for anterior ankle arthroscopy and randomised to either tourniquet inflation or not. There were 49 patients available for final review. As with many of these small studies (let's face it, the effect size needed in a trial like this with just 25 patients in each arm to be detectable really is far beyond what might be expected to be reasonable from just tourniquet use alone), there were no real differences although the authors did report a significant reduction in pain in the tourniquet group in the post-operative period. There were few other differences and patients were followed up for six months

following surgery. This study really can be used to support either strategy, although given the potential drawbacks of tourniquet use and the lack of differences in terms of any of the measured outcomes, one does have to ask the question, 'why bother?'.

Syme's amputation worth considering? X-ref

■ Much is made of the increased metabolic demand for simple tasks, the higher the amputation level, with surgeons trying to maintain length at all costs – certainly between the foot-sparing, below-knee and above-knee amputation options. For the most part, the through-knee, Syme and Chopart amputations are somewhat neglected in both research and clinical practice. All three make prosthesis fitting awkward and are somewhat more difficult than the more standard options. However, with advances in prostheses, the advantages offered by a Syme amputation are perhaps worth revisiting. All in all, the higher amputation options a prosthesis is needed for any kind of amputation and the loss of lever arm length associated with the below-knee amputation can make mobilisation difficult for the older and frailer patients. Surgeons in **Maywood, Illinois (USA)** have reported their experience of the Syme amputation in 51 patients operated over a 23-year period.[8] The series includes patients who underwent a Syme ankle disarticulation as there was too little residium to effect a trans-metatarsal or Chopart amputation. Patients underwent amputation for diabetic forefoot infection (n = 33), crush injury (n = 11), non-diabetic infection (n = 3), uncorrectable deformity (n = 3) and a single case of tumour. Outcomes were reported using the Short Musculoskeletal Function Assessment (SMFA) at a mean follow-up of just over nine years. The outcomes of the Syme's patients were favourable although, as would be expected, the diabetic and non-diabetic patients fared rather differently. In the non-diabetic group, the authors report an average mobility index of 17.2, functional index of 14.7, and bothersome index of 16.7; in the diabetic cohort, the mean scores were 34.7, 29.9, and 30.6, respectively. This series reports an excellent long-term functional result, and casts some significant doubt on the long-held belief that Syme's procedure carries with it a high complication rate, and does not yield a functional and durable result. Given the ability to mobilise without any increased energy expenditure, and the benefits of an end-bearing prosthesis, we would join the authors in asking why more Syme's procedures are not considered.

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Wrist & Hand

X-ref ***For other Roundups in this issue that cross-reference with Wrist & Hand see: Trauma Roundup 1.***

Is it dangerous to operate on the hand outside of the operating theatre?

■ It is extremely tempting to undertake minor procedures in treatment rooms, or even in the office, and hand surgery can lend itself to this. The number of family doctors undertaking carpal tunnel procedures and other minor surgical procedures is on the rise, as is the number of specialised hand surgeons undertaking percutaneous Dupuytren's release, and other minor local anaesthetic procedures. It's certainly convenient, quick and cheap. The question lurking in the back of the mind is: is it safe? Surely the infection rate must be higher in a clean, rather than sterile, environment? Researchers from **Oxford (UK)** have undertaken this timely review as the push is towards more cost-effective healthcare provision, with the aim of establishing whether the use of the operating theatre conveys any advantage in terms of infection rates.[1] The authors' search initially identified 1200 studies, however, just 46 full-text articles were reviewed, and only six studies form the basis for this review. Three of the studies did not report any infections after surgery in an office, procedure room or emergency department. The two larger studies reported a combined number of 1962 carpal tunnel releases with a 0.4% infection rate. Their report finds an infection rate of just 0.4% for carpal tunnel release, and no infections in a range of other procedures, performed in the office or procedure room or Emergency Department. It should be borne in mind that the quality of evidence informing this report is really quite poor, with little in the way of evidence on which to make a fairly crucial decision. So, subject to the caveats of the data available and to meticulous procedure and careful audit, there probably should be a trend towards moving these smaller procedures into a less formal environment.

Does decompression still work with a diabetic neuropathy?

■ As the incidence of diabetes and the age of the average patient increases, there is an increasing number of patients presenting to the clinic with diabetic compressive neuropathies. Deciding exactly what to do with these patients is somewhat more troublesome than with your average patient. The complications of surgery are different in diabetic patients, and the microvascular and neuropathic disease seen with diabetes is likely to affect the recovery. This study team from **Shanghai (China)** undertook a thorough systematic review and meta-analysis treating diabetic neuropathies in general, rather than focusing on a particular entrapment syndrome.[2] The study team were able to identify a total of 12 papers reporting the outcomes of 1825 patients, all presenting with diabetic peripheral neuropathy and suitable for inclusion in the final analysis, although only