

(USA).⁴ The authors report the clinical outcomes of overhead athletes undergoing primary arthroscopic anterior shoulder stabilization, including recurrent instability or reoperation, and return to sport. Of note, some athletes in the cohort participated in multiple overhead sports preoperatively. The study collected recorded medical notes as well as recording subjective outcome scores. Analysis was undertaken including regression to determine factors predictive of return to sports participation. Of the 49 overhead athletes included in the trial, only 31 (63%) reported return to at least one overhead sport at two years, and only 22 (45%) returned to the same level of participation. Two patients (4.1%) underwent revision surgery, and 14

(28.6%) reported subjective apprehension or instability from a clinical perspective at final follow-up. In terms of risk factors, the authors identified that patient age, sex, baseline competition level, range of movement, and subjective outcomes scores showed no significant differences in those who did and did not return to sport. Although addressing anterior instability in the overhead athlete remains particularly challenging, it would seem that less than half of these overhead athletes are returning to overhead sport following surgical treatment. Long term follow-up may provide additional guidance, but, based on these outcomes, the goal of return to sport may not be realistic for the majority of patients.

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Foot & Ankle

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

Total talus for a total ankle arthroplasty?

■ Total ankle arthroplasty (TAA) is increasingly being used for treatment of end-stage arthritis of the ankle. However, there have been valid concerns regarding the success of the procedure in patients with inadequate bone stock of the talus, as talar loosening remains a common mode of failure of TAA, along with a range of other talar complications, such as subsidence avascular necrosis and fracture. In this paper, researchers from **Nara (Japan)** present their midterm report of TAA using a total talar implant (combined TAA).¹ The TAA prosthesis used was TNK ankle (Kyocera, Japan). The TNK ankle is a third-generation, two-component alumina ceramic prosthesis, in which the polyethylene insert is fixed to the tibial component. The talar component was custom-made. In the standard TAA group, the talar component was cemented but the tibial component was cementless, although the authors used “beads of cement”, bone marrow, and calcium phosphate paste to induce osseointegration. The postoperative regime was similar in both groups. None of the patients required ligament reconstruction in the combined TAA group, as the ankle was deemed stable following talar implant insertion. The authors presented the functional and clinical outcomes of ten patients who underwent combined TAA between 2009 and 2013. Outcome was compared with 12 patients matched by age, sex, and follow-up who

underwent standard TAA. Mean follow-up was just short of five years for the combined TAA group. Both groups reported significant improvement in pain and function. The two groups did not differ in pain relief or functional improvement. It should be noted that this is a small series. Although authors included age- and sex-matched cases undergoing standard TAA to compare the functional gain between the two groups, the comparison of outcome may not be entirely valid. Unfortunately, authors did not report complications or radiological outcome. Despite the unusual nature of the procedure, the indications for surgery in the combined TAA group are not fully described. A total talar replacement essentially represents TAA, along with hemiresurfacing of the subtalar and the talonavicular joints. It would have been useful if the authors had elaborated further technical details as to how they achieved stability of the talar component without resorting to any types of ligament reconstruction or augmentation. In this regard, future studies should also look at gait analysis and biomechanics of TAA with total talar replacement. It is difficult to agree with the authors’ conclusion that combined TAA resulted in better clinical results than standard TAA, as such little data is presented here. However, the paper is promising in its reporting of TAA in a difficult group of patients with inadequate talar bone stock. Improvement in technology has made the planning and design of custom-made implants easily available, and one can envisage increasing use of this technology in the coming days. Considering that the current option is mostly limited to

hindfoot fusion in this group of patients, combined TAA – if it proves durable in the long run – would be a useful progression.

Removal of implants in the foot and ankle: not necessary

■ Practice still varies in the orthopaedic community regarding implant removal (IR) following fracture fixation below the level of the knee. In some settings, the removal of metalware is routine. In the absence of much data one way or the other, good-quality research investigating the benefits and risks of such a common procedure would be welcome. This paper from **Amsterdam (The Netherlands)** seeks to explore the functional and quality-of-life outcome of patients undergoing IR below the level of the knee following fracture fixation.² The prospective series is part of a large cohort of patients recruited for a randomized controlled trial called the WIFI (Wound Infection Following Implant Removal below the Knee) trial. The remit of the original trial was to assess the effect that a single dose of prophylactic antibiotics administered prior to IR had on the risk of surgical site infection (SSI) in patients who previously underwent fracture fixation below the knee. This substudy reports the outcomes of 179 patients. Quite correctly, the authors excluded patients who had Kirschner wire fixation or IR within six months of surgery, as well as patients for whom the interval between fracture fixation and IR was unknown. The median time to IR was around a year. Pain was the most common reason for IR (83%) and functional problems

were rare (8%). None of the implants had failed and four IRs had been initiated by the surgeon. The ankle was the most common site of IR (101) and all patients completed the Lower Extremity Functional Scale (LEFS), a 20-question patient-reported outcome measure. The functional EuroQol (EQ)-5D and a patient-reported health status using a visual analogue scale were the secondary outcomes. The study demonstrated a statistically significant improvement of six points in functional outcome following IR (using the LEFS scale), especially in the case of ankle metalwork removal. However, the authors have prudently pointed out that this difference did not reach the minimal clinically important difference (MCID) mark of nine points. The authors were unable to identify any variable that would reliably predict functional outcome following IR. The study was adequately powered so there would be no concerns of a type II error. There was a 17% rate of SSI. Deep infection was rare (3%). The authors had excluded patients with suspected active infection from the trial. It would have been useful, though, if the authors had investigated explanted metalwork and tissue sample to rule out occult infection. SSI was found not to be dependent on administration of antibiotic prophylaxis. The study had a sound methodology and the statistical conclusions are prudent. Unfortunately, since the remit of the original study revolved around SSI, the study does not give us other risks of IR. This paper is a welcome addition to this topic and would certainly help interested readers to have a more informed discussion with their patients regarding the advantages and disadvantages of IR.

The anatomy of a normal distal tibiofibular syndesmosis

■ Distal tibiofibular syndesmosis (TFS) injuries can be difficult to diagnose, partly because of the limitations of our understanding of the joint mechanics and the resulting abnormality. Although there is general agreement regarding the criteria for abnormal radiological widening of the TFS, translational and rotational abnormalities are poorly understood and commonly missed. This paper from **Stanmore (UK)** investigated the normal reference measurements of the TFS, side-to-side difference, and age- and sex-based variation in TFS anatomy using weightbearing CT scan.³ Weightbearing CT is a novel investigation and is still not widely available, but is exceptionally useful in this circumstance. The purported advantage of a weightbearing CT is that the joint is investigated while subject to normal weightbearing load, and therefore may allow a more accurate assessment of the joint anatomy. Some early reports using

weightbearing CT have indicated a difference in hindfoot alignment between lying and weightbearing views. Therefore, an investigation of the TFS is entirely appropriate, given the difficulty in establishing normal parameters using currently available modalities. This was a retrospective study of 100 patients who underwent bilateral weightbearing CT scan of their lower legs between 2013 and 2017. Patients with clinically obvious hindfoot or ankle problems were excluded. Two authors independently measured six lengths and two angles that allowed calculation of rotation, anteroposterior translation, and lateral translation of the TFS. The intra- and inter-rater reliability was assessed using intraclass correlation coefficient and was found to be moderate to excellent. The authors found no difference between the two sides and therefore the uninjured side can be benchmarked as a reliable landmark while assessing or reconstructing TFS injury. In terms of absolute measurements, 5.27 mm was the upper limit of lateral translation in the uninjured ankle. The authors found age to affect lateral translation, with increasing age associated with less translation, although this was not further quantified. There was a demonstrable difference in TFS anatomy according to sex; distal fibula in men demonstrated a trend towards more external rotation, lateral translation, and posterior translation. The most important practical implication of the study is the finding that there is no appreciable difference between the two sides. This finding would give credence to foot and ankle surgeons' usual practice to screen the contralateral ankle when reducing and reconstructing the TFS. This would also justify CT scanning of "normal" ankles in complex cases to establish individual normal parameters. As a retrospective study, there are limitations, and one cannot be entirely confident that patients included in the study did not have an unreported ankle syndesmosis injury, although this does seem somewhat improbable. The described measurement techniques are complex and described in millimetres, and therefore may have been affected by the inter-rater reliability. However, this study would provide useful guidance to surgeons assessing or reconstructing TFS injury. We expect to see further studies using this useful tool to validate the results further.

The longer the wait for bunion surgery, the lesser the gain?

■ Ever-increasing demand and chronically reduced resources have resulted in increasing wait for elective surgical treatment here in the United Kingdom. Is there any evidence that increasing waiting times have a negative impact on health

outcome of patients? In this paper, researchers from **Vancouver (Canada)** wished to investigate the relationship between preoperative waiting time for bunion correction surgery and postoperative patient-reported outcomes.⁴ Bunion surgery has a variable reputation and has been described both as mostly cosmetic and as a life-improving operation. Patients listed for bunion correction surgery under the care of four orthopaedic surgeons in Vancouver were enrolled in the study with the aim of assessing the effects of waiting time and reported results. Depression, pain, and foot and ankle health outcomes were recorded when patients were listed for surgery and six months postoperatively. The response rate was 53% among the eligible patients and 87 participants were finally included. The mean waiting time for surgery was 25.5 weeks. Although depression status did not change, pain score did improve following surgery. As expected, there were significant gains in all domains of the foot and ankle outcome score. Pain and activities of daily living (ADL) domains of the foot and ankle outcome score were plotted against waiting time in weeks and demonstrated that longer wait for surgery, adjusted for other factors, was associated with smaller gains following surgery. The results of this study are in keeping with previous research suggesting that patients waiting for hip or knee arthroplasty surgery are adversely affected by longer waiting times. However, compared with large joint arthritis, hallux valgus is considered to be relatively innocuous and, as such, a significant wait would not widely be expected to affect patient outcome. One would wonder whether the extent of deformity might have played a role, and it would have been useful if the severity of hallux valgus was documented. It is fairly common for patients to present with associated lesser ray symptoms. Did patients also have concomitant lesser ray surgery that might have affected the outcome? Did patients have surgical complications that might have affected the outcome? Unfortunately, these key pieces of information are missing from the paper. The instruments used to assess pain, depression, and foot and ankle health are not widely reported. The follow-up was also short, at six months, whereas it is expected that some patients after bunion correction surgery may continue to improve up to a year after surgery. This is an interesting research question but, given the inherent weaknesses in the study design and some reporting issues, agreeing with the authors' conclusions would require a certain leap of faith. Nevertheless, this study would certainly help to build a basis for further research assessing the relationship

between waiting times in foot and ankle surgery and postoperative health gain.



Syndesmosis under the spotlight

■ This study from **Vail, Colorado (USA)** was designed to evaluate the most responsive measurements on CT to evaluate the syndesmosis.⁵ The authors utilized 12 cadaveric lower-leg specimen pairs, which were each imaged using CT. The legs were then used to produce four specific malreduction models, and the initial 35 measurements were then repeated to compare the reliability and accuracy of existing described CT methods for measuring the distal tibiofibular syndesmosis. The malreductions evaluated were translations of 2 mm in each of the lateral and posterior directions. In addition, a 7° external rotation was produced, and then all three deformities were combined,

which probably simulates best the malreduction usually seen. Using this method, the authors established that the most accurate of the 35 methods for evaluating clear space was the Leporjärvi clear space for lateral translation, the Nault anterior tibiofibular distance for posterior translation, and the Nault talar dome angle for external rotation of the fibula. While this is certainly an interesting paper that adds considerable weight to the use of CT scanning to detect deformity in the syndesmosis – either as the result of an injury or in assessing reduction following injury – there are a number of caveats to the paper as it stands. The study is cadaveric, which has the advantages that injuries can be simulated. However, the nature of the generated deformities adds some specific limitations to the study, insofar as these are neither injuries nor simulated injuries. In fact, they are simulated deformities, so it is not clear how the various methods would perform with an actual injury or post-reduction film.

Subtalar arthrodesis: comparison of bone graft types

■ Subtalar distraction arthrodesis is a well-recognized operation that is performed for a variety of reasons. However, one of the most common indications is for a malunited calcaneal fracture in combination with subtalar arthritis. A distraction arthrodesis requires the use of allograft or autograft, which can be locally based or from a donor site. There are potential complications to navigate if a donor site is used; however, the graft may be of better quality and, if structural grafting is required, this is often the preferred option. These authors from **Mansoura (Egypt)** have reported their prospective outcomes of 28 patients presenting with calcaneal malunion who were treated with subtalar distraction arthrodesis using local calcaneal bone graft.⁶ These patients were compared with a control group of

ten patients who had iliac crest bone graft. The authors hypothesized that the local graft would be as effective in terms of clinical outcomes and fusion rate. Patients appear well matched, with a mean age of around 40 years in both groups. The authors reported that the American Orthopaedic Foot & Ankle Society hindfoot score improved in both the study and the control groups. In terms of successful fusion, all patients in the study achieved fusion, other than a single patient in the local bone graft group, and this was at a mean time of 13 weeks in both groups. In both groups, the radiological outcomes were satisfactory and there did not appear to be any differences in terms of success of correction. Overall, the authors of this study report that other than donor site complications (reported in 40% of the iliac crest group), there were no overall differences in between the two groups.

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Wrist & Hand

Outcome of surgical repair of adult digital nerve injury: a systematic review

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■ A lot of resources are invested in addressing digital nerve repair in the hand, and this review from **Oxford (UK)** sought to determine whether this is justified in terms of clinical benefit and

outcomes.¹ As perhaps would be expected from the champions of evidence-based medicine, this was a well-conducted review that searched a number of databases, including in-process and in-progress studies across all languages. From an initial pool of 4036 articles, 3045 were excluded as they were nonclinical, animal studies, or

performed exclusively in children. A further 852 articles were excluded as they were selective concerning the location of digital nerve injury, 66 of which only included details on digital replantation and not isolated nerve injury. Finally, 45 articles were excluded as they were expert opinion pieces only. Two articles were added following