

18% also reporting contralateral ACL injuries within four years. This contrasts sharply with those over the age of 20 years (where a 14% re-injury rate is reported). It is clear that in this series at least, early reconstruction is a risk factor for secondary injury, although in clinical practice the importance of protecting the meniscus may outweigh concerns of higher ACL re-injury rates.

Acute kidney injury following arthroplasty X-ref

■ Acute kidney injury (AKI) is becoming more of a focus in the study of patient safety and outcomes. The addition of calculated eGFR to the majority of standard renal function panels has focused attention on kidney injury, particularly in the peri-operative period. In a simple observational study from **Arran and Ayrshire (UK)**,⁸ investigators have simply evaluated current care provided to patients following a primary hip or knee arthroplasty at an NHS hospital. A retrospective review of hospital records of 413 consecutive patients forms the basis for this study, all having undergone

primary hip or knee arthroplasty over a one-year period. Post-operative AKI was identified in 34 patients (8.2%), however, 96 patients had an increase in creatinine of >25% from baseline which has been associated with a higher incidence of death in some studies. There has been a persistent increase in acute kidney injury, with its associated negative connotations, in patients following total hip or total knee arthroplasty over the past ten years. This may be due to changes in how we define AKI or due to changes in antibiotic prophylaxis or medical care in the peri-operative period. This risk of AKI should be highlighted to patients at the time of obtaining informed consent as it is potentially the most common complication following lower limb arthroplasty and can be easily identified with risk factors including age, pre-existing kidney disease and administration of more than a litre of post-operative fluids. Incidence was not increased in this series with the use of gentamicin or teicoplanin antibiotic prophylaxis or pre- or post-operative NSAIDs. Of these risk factors, multivariate analysis suggested that only age

and volume of post-operative fluids remained as significant predictors of AKI. The authors make an interesting suggestion to explain the increased incidence of AKI, attributing it to the widespread use of an enhanced recovery programme. As the programme is designed to encourage early mobilisation, this may result in patients receiving less intravenous fluids. A total of 72% of patients received no intravenous fluids post-operatively. Although there was no causal link identified between patients receiving no intravenous fluids and AKI, this may be due to the small numbers analysed. This important paper highlights an under-reported problem and, in view of the true incidence of AKI following lower limb arthroplasty, more studies are clearly needed in order to identify the risk factors and strategies to avoid it.

REFERENCES

1. **Ackerman IN, Bohensky MA, de Steiger R, et al.** Substantial rise in the lifetime risk of primary total knee replacement surgery for osteoarthritis from 2003 to 2013: an international, population-level analysis. *Osteoarthritis Cartilage* 2016 (Epub ahead of print) PMID: 27856293.

2. **Issa K, Pierce TP, Harwin SF, et al.** No decrease in knee survivorship or outcomes scores for patients with HIV infection who undergo TKA. *Clin Orthop Relat Res* 2016 (Epub ahead of print) PMID: 27743304.

3. **Bruno AA, Kirienko A, Peccati A, et al.** Knee arthrodesis by the Ilizarov method in the treatment of total knee arthroplasty failure. *Knee* 2016 (Epub ahead of print) PMID: 27876266.

4. **Hernandez VH, Ong A, Orozco F, Madden AM, Post Z.** When Is It Safe for Patients to Drive After Right Total Knee Arthroplasty? *J Arthroplasty* 2016;31:2495-2498.

5. **Ferreira ML, Zhang Y, Metcalf B, et al.** The influence of weather on the risk of pain exacerbation in patients with knee osteoarthritis – a case-crossover study. *Osteoarthritis Cartilage* 2016;24:2042-2047.

6. **Howells N, Murray J, Wylde V, Dieppe P, Blom A.** Persistent pain after knee replacement: do factors associated with pain vary with degree of patient dissatisfaction? *Osteoarthritis Cartilage* 2016;24:2061-2068.

7. **Webster KE, Feller JA.** Exploring the High Re-injury Rate in Younger Patients Undergoing Anterior Cruciate Ligament Reconstruction. *Am J Sports Med* 2016;44:2827-2832.

8. **Ferguson KB, Winter A, Russo L, et al.** Acute kidney injury following primary hip and knee arthroplasty surgery. *Ann R Coll Surg Engl* 2016;4:1-6.

Foot & Ankle

X-ref For other Roundups in this issue that cross reference with Foot & Ankle see: **Trauma Roundup 2; Research Roundup 6.**

Pain resolution after hallux valgus surgery

■ This article from **Singapore (Singapore)**¹ gives a slightly new perspective on pain relief after hallux valgus surgery. The authors argue that, despite the large number of publications, there are few reporting on pain resolution following surgery. They designed a prospective study of patients undergoing hallux valgus surgery who were prospectively followed. Patients were treated according to the institutional

preference and reconstructive surgery was chosen based upon hallux valgus angle, intermetatarsal angle and deformity of adjacent joints. The authors entered 308 patients into the study and reviewed them at both six months and two years following surgery to establish the residual pain levels. Outcomes were assessed using the visual analog scale (VAS), the AOFAS forefoot specific outcome and the 36-item short form survey (SF-36) to assess quality of life. The authors established that 31% (n = 94) of patients had residual pain at six months. Four of these went on to develop osteoarthritis, however, the picture was rosier for the remaining

90 patients, of whom 81% (n = 73) went on to improve their outcomes over the subsequent 18 months. The authors also investigated the potential predictors of poor outcomes. For patients who did not have a resolution of their pain higher pre-operative pain scores and a lower pre-operative mental component of the SF-36 were potentially predictive of ongoing pain following surgery. It is clear that, for many patients, forefoot hallux valgus surgery can be expected to improve their pre-operative pain levels, and that this improvement can be seen to span a two-year period, with outcomes improving between six

and 18 months. Some patient selection is obviously required as those reporting disproportionate pre-operative pain levels and with poor performance on the SF-36 mental component score did not do as well as the other patients.

A 'PROMIS' of success X-ref

■ Assessing outcomes is now widely researched but not yet done to death. We are more and more judged on our post-operative results, at a surgeon, institution, and even national level (commissioning of healthcare services, for which there is RCT evidence it doesn't work, is becoming increasingly tricky for healthcare providers). One of the

difficulties with the evidence-based approach is that effect size is key to establishing a health economic benefit and the ongoing push towards RCT evidence is seeing orthopaedic interventions being measured according to overall quality of life scores - easy to justify if the patient started with a disability significant enough to impact on overall quality of life. However, for smaller problems (such as, say, bunions), whilst the patient may report them as worthwhile and the 'friends and family' test may be strongly positive, the disability and the benefit of treatment of the disability may not be significant enough to be detected on a global quality of life score. This, of course, is where disease- or domain-specific scores (such as the Oxford family of PROMIS scores) come in. In themselves they are excellent outcome tools, however, they are now being used by healthcare funders in some parts of the world to 'ration' treatment, a purpose for which they were not developed and in which they are not validated for use. We were delighted to see this excellent article from surgeons in **Rochester, New York (USA)**² as it crossed the editorial desks here at 360 HQ. The authors set out to fill some of the evidence gap and evaluate the use of the PROMIS (patient reported outcome instrumentation system) score for predicting success in foot and ankle surgery. In the first stage of the study the authors prospectively collated pre-operative PROMIS scores, and looked to establish minimally clinically important changes in a cohort of foot and ankle patients. They then went on to use this information to attempt to validate the PROMIS score (with physical function, pain interference and depression subscales) as a method of predicting post-operative success in foot and ankle patients. Over a 14-month period, the authors collated PROMIS scores on 16 023 unique visits in 7996 new patients. The minimum clinically important difference (MCID) for the scores

was calculated using the distribution method, and a ROC analysis was then undertaken to identify the most sensitive pre-operative threshold value to achieve the MCID post-operatively. The core dataset for this was just 61 patients and they were followed from pre-operative to seven months' minimum post-operative follow-up and all PROMIS domains completed. All three domains were predictive on ROC analysis, with physical function (area under the curve (AUC) 0.83), pain interference (AUC 0.73) and pre-operative depression scores (AUC 0.74) all predictive of post-operative improvement. This is an excellent article from the AOFAS which would suggest that pre-operative values can be compared with predetermined thresholds to predict improvement after operative intervention. In this case, a physical function score above 42 gives a 94% probability of failing to achieve MCID, whilst a score below 30 points gives an 84% likelihood of achieving MCID. Patients with pre-operative pain scores below 55 had a 95% probability of failing to achieve MCID and those with pre-operative depression scores below 41.5 had around a 90% probability of failing to achieve MCID. Surgeons have, for many years, railed against the concept of using pre-operative scoring to control and determine patient suitability for surgery, arguing that a questionnaire-based scoring system is no surrogate for surgical intuition and time spent evaluating the patient. However, healthcare funding provision is clearly undergoing a transition towards these score-based thresholds, and the sensible approach to this problem is exactly as indicated here - to establish what the best thresholds are and to quantify likely success of treatment rather than the use of arbitrary threshold values. Ideally, similar pieces of work would be undertaken in other specialty areas.

Outpatient management best in surgical treatment of ankle fractures? X-ref

■ Bundled care payments are here to stay. Having been commonplace in Europe and Australasia for many years, the world's largest healthcare economy in the USA has followed suit. Whilst there are clearly some disadvantages to this for providers and surgeons, it does tend to focus the mind on reducing the attendant healthcare costs associated with surgery. There are many 'accepted' approaches in medicine in general, with the assumption being that the handed-down wisdom is the best. One such approach assumed to be correct is the inpatient management of unstable ankle fractures if they are not suitable for operative stabilisation initially. This ties up beds and leads to excess care costs for healthcare providers, but it does enforce bed rest and the theory, at least, is that it reduces complications. A research group in **Chicago, Illinois (USA)**³ have set out to establish whether this is strictly necessary, especially in light of fixed remuneration for bundled payments. The authors identified patients who had undergone open reduction and internal fixation of their ankle fracture over an eight-year period, although those which were undertaken as an emergency were excluded. The authors propensity-matched cases to account for potential differences in baseline characteristics and compared inpatient and outpatient management using the primary outcome measures of medical and surgical complications, re-admission, and re-operation within 30 days. It turns out that the handed-down wisdom is very possibly completely wrong. Outpatient surgical procedures in this series were associated with lower rates of UTI (0.4% vs 0.9%), pneumonia (0.0% vs 0.5%), venous thromboembolism (0.3% vs 0.8%) and transfusion (0.1% vs 0.6%). The authors have concluded that the lower rates of

complications associated with outpatient surgery make this a safe and effective alternative with the added benefit of reducing complications and improving the cost profile for bundled payments. We very much agree with the sentiments of this paper and it clearly demonstrates that outpatient care is safe and effective. Nonetheless, we have to inject a note of caution when interpreting the results. There are clearly two significant biases here: selection bias, where the infirm, unfit and significantly injured patients will have been managed as inpatients; and observation bias, where it is likely that patients managed at home will have undergone minor unrecorded complications, so the effect may not be as profound as this group would suggest.

Taking AIM at ankle fractures in the older patient X-ref

■ The AIM study run in **Oxford (UK)**⁴ is a large pragmatic randomised controlled trial comparing initial ankle fracture treatment with close contact casting (n = 311) or surgical internal fixation (n = 309). Outcomes were assessed primarily using functional outcome scores (Olerud-Molander Ankle Score). Designed as a pragmatic, multi-centre, equivalence, randomised controlled trial with blinded outcome assessors, patients were recruited from a range of UK trauma centres and district general hospitals. Included were patients over the age of 60 years with an acute malleolar fracture resulting in an unstable ankle joint, where surgery would ordinarily be offered. Exclusions included diabetes mellitus, open fractures, significant ankle arthritis and substantial cognitive impairment. Surgical technique was per the surgeon's preference whilst close contact casting was performed using a detailed protocol for its application, for which all surgeons had received training via an online video. The initial reduction and cast application was performed in the operating theatre using x-ray



imaging to ensure the best possible reduction of the ankle mortise.

The cast and ankle position were monitored by serial clinic visits and x-rays at the surgeon's discretion, and the cast changes when required in the out-patient clinic. The treatment protocol allowed for either treatment to be modified according to the surgeon's judgement, such as in the event of failure to achieve or maintain an initial closed reduction in the cast or when a surgical incision was deemed unsafe. Follow-up was at six weeks and six months, and a range of secondary outcome measures were additionally reported (healthcare resource use data, satisfaction questionnaires, ankle range of motion, time to weight bear, and mobility using a Timed Up and Go test), along with incidence of fracture nonunion and malunion, complications and adverse events. There was an impressive 96% follow-up rate at six months, and 19% of the casting group were converted to surgery due to loss of fracture reduction, with an additional 4% requiring return to theatre for a re-manipulation. There was no difference between groups in the primary outcome score at six months. In addition, quality of life, ankle range of motion, patient satisfaction and patient mobility all showed no difference at six months. However, incidence of nonunion and malunion were lower in the surgery group for both medial and lateral malleolus. Close contact casting appears in this patient population to yield equivalent functional outcomes to those

of surgical fixation at six months. It is important to note that the rate of failure to control fracture position in the close contact group was high (19% converted to internal fixation) and there are clear limitations in the length of follow-up for this study. There was a higher rate of malunion and nonunion in the close contact casting group and how this may affect outcome in the medium to longer term is unclear. Publication of longer-term follow-up will be eagerly awaited.

Physio and ankle sprains

■ Clinical trialists in **Kingston, Ontario (Canada)**⁵ have reported their large randomised controlled trial of 503 participants, all with ankle sprains. Their study involved randomisation to either physiotherapy or written instructions. The study was broad-ranging and patients were included who were aged 16 years or over with a grade 1 or 2 ankle sprain. Patients randomised to physiotherapy received a programme of intensive supervised physiotherapy, whilst the control group received an advice sheet with information on protection, rest, cryotherapy, compression, elevation, and graduated weight bearing. Outcomes were assessed using the foot and ankle outcome score and the primary outcome measure was the proportion of patients who achieved an excellent recovery. The authors somewhat arbitrarily defined as clinically important a 15% difference in proportions of patients reaching the MCIC. There were no significant differences in the proportion of physiotherapy patients (43%) and standard of care (37%) who went on to achieve a minimally clinically important change by six-month follow-up. Given the results of this study, it would certainly seem that patients should not really expect hospital-based rehabilitation following ankle sprains as there is no real difference in outcome. This study also underlines the significant pathology of ankle sprains, with many patients failing to make a decent recovery, even six months following their injury.

The cavus foot and Lisfranc injuries X-ref

■ The Lisfranc injury is a fickle beast. Associated with high-energy trauma to the midfoot, it is a rare diagnosis, sometimes difficult to spot on plain radiographs and often associated with a truly shocking long-term prognosis despite excellent early care. Despite the well publicised difficulty diagnosing Lisfranc injuries and the vigilance of many accident and emergency departments, as many as 20% of Lisfranc injuries are missed at first presentation. Injury patterns are sometimes associated with particular anatomical variants and given that, the Lisfranc joint usually (but not always) displaces dorsally. Clinicians in **New York, New York (USA)**⁶ sought to determine whether there is an association between cavus foot deformity and Lisfranc injury. The authors undertook a retrospective, case-control study over a three-year period. They compared a group of 23 Lisfranc injury patients with a control group of 61 patients without a foot injury. The talonavicular and talo-first metatarsal angles were measured as a marker of cavus foot deformity on plain anteroposterior and lateral weight-bearing radiographs. The authors established that cavus foot deformities were more common among patients with Lisfranc injuries than in the matched population. This of course isn't a causative link, however, clinicians should have a heightened clinical suspicion of Lisfranc injuries when the injured party has a cavus foot.

Mobile bearing ankle prosthesis in the longer term

■ The use of total ankle arthroplasty is becoming more acceptable, with patients and clinicians alike now expecting reasonable ten-year survivals and functional outcomes. There are very different designs of ankle replacement, varying in major as well as minor design features. The Scandinavian Total Ankle Replacement (STAR) is a widely accepted implant,

with proponents arguing that the mobile-bearing design with a mature surgical technique should yield excellent results. Surgeons in **Nijmegen (The Netherlands)**⁷ have shared their experience of the STAR at an average of ten years' (minimum of 7.5 years) follow-up. In line with many other series, the survival was around 80% at ten years, with the majority of failures undergoing explantation and fusion. There was a high reported rate of complications with fractured polyethylene inserts (10.4%), other complications (22%), and 16% of patients required further surgery for these complications. Heterotopic ossification was seen in around 70% of patients and 60% had visible expanding osteolytic lesions. This report represents a ten-year experience in a reasonably sized centre, and is in line with the survivals seen in other longitudinal series. The authors of this series report honestly their own experience and it highlights the vast number of patients experiencing complications following total ankle replacement, both those who require revision surgery, and those who are likely to do so in the future. It is very welcome that many of the large joint registries are now including data surrounding ankle and elbow arthroplasties which are historically less commonly performed, and currently the only data to support their use almost pose as many questions as they answer. We look forward to reports from these registries when there is enough follow-up to allow for accurate estimation of longer-term survival.

Diabetic feet: not trendy but serious

■ Considering the serious health and social care problems caused by diabetic foot disease, it is somewhat surprising that so little research is conducted into the area. Patients with diabetic foot disease of all varieties not only suffer from disability and loss of mobility resulting in the need for ongoing care, but the

ulcers, amputations and osteomyelitis associated with diabetic foot disease is a huge source of comorbidity. Patients in **Pittsburgh, Pennsylvania (USA)**⁸ were the focus of this study which rather bucks the trend of collective ignorance of what is a major orthopaedic pathology, and sets out to add some decent baseline data to the literature concerning the outcomes of diabetic foot disease. The authors report the outcomes of 229 patients, all of whom were hospitalised with diabetic foot disease. They report 155 patients with osteomyelitis and 74 patients with severe diabetic-associated foot infection as a comparison. Compared with the

soft-tissue infection group, those with osteomyelitis were 5.6 times more likely to suffer an amputation and over four times more likely to suffer a major amputation (16.7% of osteomyelitis and 5.3% of soft-tissue infections). On the other hand, there were no significant differences in hospital length of stay. This is a simple paper that quantifies the problem in a straightforward manner, but the problem is major. There are few other diagnoses (even grade III open tibial fractures) that have a 17% amputation rate associated with them. Although not terribly exciting or trendy, we have a sneaking suspicion that, with the ageing obese

population, we can expect to see many more diabetic foot complications in our hospitals and clinics.

REFERENCES

1. **Chen JY, Ang BF, Jiang L, et al.** Pain resolution after hallux valgus surgery. *Foot Ankle Int* 2016;37:1071-1075.
2. **Ho B, Houck JR, Flemister AS, et al.** Preoperative PROMIS scores predict postoperative success in foot and ankle patients. *Foot Ankle Int* 2016;37:911-918.
3. **Qin C, Dekker RG, Blough JT, Kadakia AR.** Safety and outcomes of inpatient compared with outpatient surgical procedures for ankle fractures. *J Bone Joint Surg [Am]* 2016;98:1699-1705.
4. **Willett K, Keene DJ, Mistry D, et al.** Close contact casting vs surgery for initial treatment of

unstable ankle fractures in older adults: a randomized clinical trial. *JAMA* 2016;316:1455-1463.

5. **Brison RJ, Day AG, Pelland L, et al.** Effect of early supervised physiotherapy on recovery from acute ankle sprain: randomised controlled trial. *BMJ* 2016;355:i5650.
6. **Podolnick JD, Donovan DS, DeBellis N, Pino A.** Is Pes Cavus alignment associated with Lisfranc injuries of the foot? *Clin Orthop Relat Res* 2016 Oct 28 [Epub ahead of print] PMID: 27796800.
7. **Kerkhoff YR, Kosse NM, Metsaars WP, Louwerens JW.** Long-term functional and radiographic outcome of a mobile bearing ankle prosthesis. *Foot Ankle Int* 2016;37:1292-1302.
8. **Wukich DK, Hobizal KB, Sambenedetto TL, Kirby K, Rosario BL.** Outcomes of osteomyelitis in patients hospitalized with diabetic foot infections. *Foot Ankle Int* 2016;37:1285-1291.

Wrist & Hand

X-ref For other Roundups in this issue that cross-reference with *Wrist & Hand* see: *Children's orthopaedics Roundup 4*.

Who is satisfied after fasciectomy?

■ As surgeons, we have a moral obligation to consider custodianship of scarce healthcare resources; treatment for cosmetic reasons alone may well not be justified. However, the flip side to that coin is that we also have to be aware that patient satisfaction is becoming recognised as an important outcome as more objective doctor-orientated measures such as range of movement. Dupuytren's contracture is one of those diseases in which decision making is increasingly difficult with patient expectations rather high and the evidence sometimes somewhat equivocal as to who will benefit, and who won't, from fasciectomy. A study team in **Rotterdam and Hilversum (The Netherlands)**¹ set out to establish what the predictors are of patient satisfaction following fasciectomy. They undertook an analysis of 194 patients, all of whom

completed the Michigan Hand Outcomes Questionnaire (MHQ), and collated a range of demographic and disease-specific factors. They performed a multivariate analysis, and the factors predictive of the satisfaction outcome question on the MHQ were the post-operative residual contracture, complications, a better pre-operative functional score and male gender. The bottom line appears to be that if you want your Dupuytren's patients to be satisfied then the key is contracture correction and absence of complications; appearance was the strongest predictor of patient satisfaction. Patients really do care about cosmesis and so should we if we want satisfied patients.

Arthroscopic resection of occult dorsal wrist ganglia

■ We should always try to treat conditions in simpler and safer ways, with quicker post-operative recovery. Whilst larger ganglia are often asymptomatic, smaller "occult" ganglia can be very painful, especially when present on the dorsal aspect. The ganglia can be 'nipped' between the capitate and dorsal rim of the radius on hyperextension,

leading to symptoms. The difficulty with open surgery has always been the magnitude of the operation to solve a simple problem and the risk of recurrence. In a study of 30 patients from **Baden-Baden (Germany)**,² the author asks whether these smaller occult ganglia can be successfully treated using an arthroscopic approach. In their reported series of 40 wrists treated in 39 patients, all with occult ganglia confirmed on MRI scanning, and treated with an arthroscopic procedure. Ganglia were identifiable in 25 patients at surgery and were addressed arthroscopically. Given that all but one patient were satisfied with symptom relief by arthroscopic excision of a capsular window through a midcarpal and radiocarpal window, this paper is far from definitive but it does make the point that this treatment is an option. So this technique appears to be an appropriate option for those small ganglia which need treating, avoiding the detriment of an open approach.

Needle or limited fasciectomy?

■ Continuing 360's theme of minimally invasive treatment, a study

from **Rotterdam (The Netherlands)**³ set out to compare the effectiveness of needle aponeurotomy and limited fasciectomy. Until a large RCT reports a comparison between a variety of different treatments, either in a stepwise two-armed approach or with a more complex factorial design, we must base our treatment decisions and set patients' expectations on large comparison studies like this one. The authors report treatment of percutaneous needle aponeurotomy or limited fasciectomy in six hand units, all within The Netherlands. Outcomes were assessed in terms of active extension deficit, the Michigan Hand Outcomes Questionnaire and all importantly reported outcomes of complications at between six and 12 weeks post-operatively. Their matched comparison was of nearly 200 patients treated with either needle fasciectomy or surgery. The simple percutaneous technique produced an equivalent measured correction with a much lower reported mild complication rate (5% vs 24%). However, patients reported a much higher satisfaction rate and more rapid return to