

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.<sup>11</sup> 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. Chey 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;7:5. [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 balk 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)**<sup>1</sup> and **New York (USA)**<sup>2</sup> 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

equivalent results reported in these two studies, and given the higher costs of the procedure, we might wonder whether society or the patient recoups this from a quicker return to work?

### Does vascularised bone grafting work in scaphoid fractures?

■ The scaphoid remains a notorious bone to manage. If it fails to heal - not an uncommon event - then bone grafting with fixation is the standard of care across the world. However, this is essentially where the consensus ends, with debate concerning vascularised or non-vascularised graft. Matters are further confounded by the definitions of failure; does it matter if there is 'avascular necrosis'? Indeed, do we always know whether there is avascular necrosis? A group from **Nottingham (UK)** undertook a systematic review of the literature concerning bone grafting, particularly focussing on the value of vascularised bone grafting (VBG) versus non-vascularised grafting (NVBG).<sup>3</sup> There were a large number of 2710 articles which met the screening criteria; however, just 144 of these studies reported the outcomes of 5464 scaphoid nonunions. The mean union rates when using VBG and NVBG were 84% and 80%, respectively. When considering the value of avascular necrosis of the scaphoid, the proximal pole was identified pre-operatively then the mean union rate was 74% with VBG, compared with 62% with NVBG. The results of this review highlight that perhaps in this setting there is a small advantage in a vascularised graft when there is AVN, but this is a difficult technique which should nowadays mean referral to a specialised centre.

### Do we need antibiotics for distal phalanx fractures?

■ All orthopaedic surgeons must remember their duty as custodians of proper antibiotic use. There is a real threat within just a few years of infections for which there is no cure. Excessive use of antibiotics by

doctors will carry much of the blame. So we should take note of this work from **Coventry (UK)**<sup>4</sup> in which a meta-analysis of four randomised trials (353 fractures) found that antibiotics made no difference to the infection rate. So we are obliged to take note, to disseminate this work to our colleagues in general practice and emergency departments and to focus on proper washout and to avoid antibiotics.

### Nerve conduction studies for carpal tunnel syndrome?

■ There is much variation in the diagnosis of carpal tunnel syndrome. Patients are usually managed using a standardised treatment pathway, however these pathways often vary from unit to unit, and specifically the routine use of electrodiagnostic studies is particularly controversial. In some units they are used as a gateway for referral, and in others are considered superfluous to requirements and patients can move through the entire pathway including release without any consideration of electrodiagnostic studies. Researchers in **Ann Arbor, Michigan (USA)** undertook a population-based analysis with the intention of establishing what role, if any, electrodiagnostic tests took in the US population undergoing carpal tunnel release between 2009 and 2013.<sup>5</sup> Their analysis included three different multivariable analyses with the intention of establishing the relationships between timing of surgical interventions, the number of pre-operative physician visits and the total health economic costs. As is only possible with studies of this size, encompassing 62 894 patients, the authors were able to control for sociodemographic variables, comorbidities, health care insurance and treatment characteristics. Of the study population, 58% underwent pre-operative electrodiagnostic studies. Perhaps unsurprisingly, patients undergoing electromyography (EMG) waited longer for their decompression intervention and as

perhaps might be expected, the total health economic costs were higher, with one additional visit and nearly \$1000 additionally spent on healthcare provision for the group with the EMGs. The total cost analysis also identified that the use of occupational therapists and steroid injections introduced excess healthcare costs and delayed time to surgery. There is little data in this paper that supports anything other than access directly to carpal tunnel decompression; however it is important to remember that the outcome selected can result in additional costs and delays to treatment, so it isn't surprising that less intervention hastens treatment and costs less.

### Sterilising the hand

■ Sometimes some of the simplest papers are the most useful. We were interested when this paper from the **Rothman Institute, Philadelphia (USA)** crossed the desks at 360 HQ. The research team undertook a simple study to determine the effectiveness of skin coverage during surgical preparation of the hand.<sup>6</sup> The team undertook a comparison of preparation using pre-stick applicators against 4 inch sterile gauze sponges. Their study was a comparison volunteer study, with thirty healthy volunteers having their hands prepped in matched pairs. Both groups were treated with the commercially available ChloraPrep compared to soaked gauzes applied using sterile gloved hands. Outcomes were reviewed using an image analysis technique to assess the number and location of un-prepped areas after both techniques. There were a greater number of unprepped areas in the ChloraPrep group (77 vs 14) and the total percentage of unprepped skin was greater in the

ChloraPrep group (0.76% vs 0.15%). There is a clear message here with regards to the total coverage of the skin achieved with each method. However, there is little really to tie this to clinical relevance (either in the literature or in this paper). So although the message appears to be that a ChloraPrep device does not provide as good skin coverage as the traditional swab squares, it is not clear what the effects on the eventual infection

rates might be. However, this paper does highlight for us that there are often unforeseen complications from introducing novel technologies.

### The biomechanical implications of wrist fusions X-ref

■ The partial wrist fusion is a sometimes useful salvage operation in a range of wrist pathologies from scaphoid nonunion to wrist arthritis. Whilst clearly only suitable for end stages of disease as any fusion carries with it comorbidities, the partial fusion can maintain near-normal biomechanics in selected patients. The biomechanical implications of different fusions however are still not completely ironed out. A research team in **Providence, Rhode Island (USA)** undertook one of the few biomechanical studies into this phenomenon with a cadaveric study examining the biomechanics of 20 wrists when treated with either a 4-, 2- or 3-corner bone fusion.<sup>7</sup> The study examined the motion effects across 24 pre-determined directions of wrist motion. The results were perhaps slightly surprising. Those patients with a 4-corner fusion lost pure flexion relative to the intact state and other fusions, whilst all fusions reduced extension. There were no restrictions on range of motion seen in radial deviation seen



in the limited fusion groups. Whilst the composite range of motions (perhaps predictably) were within acceptable limits, there was a clear difference in the extremes of motion for flexion and radial deviation between the three fusions.

### Just how good is a wrist arthrodesis?

■ Wrist arthrodesis is one of those bailout options that exist in all sub-specialities of surgery – “if it all goes wrong we can always fuse it” is something that is perhaps more often thought than said, but is always at the back of the mind when evaluating the difficult-to-treat wrist. As the ‘salvage option’ however, it is far from clear how much is salvaged. The hand surgery team in **Canberra (Australia)** set out to establish what outcomes could be expected from wrist fusion, specifically according to indication.<sup>8</sup> Their study reported the results of 77 consecutive patients all of whom underwent a wrist arthrodesis with a pre-contoured dorsal plate. Outcomes were reported using a range of outcome scores with mean scores more than acceptable at final six year follow up (Buck-Gramcko Lohman 9, Disabilities of the Arm, Shoulder 19, Hand and Patient Rated Wrist Evaluation 13). As is always the

case, final outcomes were affected adversely by workers’ compensation claims. In general however the cohort did well, demonstrating wrist fusion to be a successful operation even in the days of heavy use at the computer keyboard. Certain subgroups did not do so well, and patients with inflammatory arthritis or of the female sex had a significantly poorer outcome.

### Social support and upper limb functions? X-ref

■ It isn’t just an interesting observation that patients with psychological illness, or comorbidities have poorer outcomes, in these days of ‘surgeon-level reporting’ it is essential that patients who are likely to have poorer outcomes are identified so that this can both be taken into account in outcomes reporting and steps can be taken to ensure their function is optimised. Researchers in **Boston (MA, USA)** have undertaken a comprehensive analysis of the measurable effect of support (emotional, instrumental and psychosocial) on the patient’s perception of upper limb function.<sup>9</sup> The research team administered the QuickDASH and the computer adaptive testing (CAT) PROMIS measurement system to establish the effects of pain interference and emotional

support measures. The study concerns the responses of 193 patients all with upper limb pathology, and the study was designed to establish the contributory effect of the pain interference, depression, emotional support, psychosocial illness impact, and instrumental support on the QuickDASH score as a primary outcome measure. The results in themselves were somewhat surprising. Whilst there was a weak correlation between the emotional and instrumental support measures and QuickDASH in a multivariable analysis the social support measures were discarded and the pain interference CAT (perhaps not surprisingly) was able to explain 66% of variability in function. So it seems that social support has little bearing on initial presentation with upper limb illness. We would be intrigued to see what the outcomes of this study were if repeated to look at the effects on postoperative recovery – do patients who are isolated and not socially supported really vary in their outcomes as much as we think they do?

### REFERENCES

1. **Hu K, Zhang T, Xu W.** Intraindividual comparison between open and endoscopic release in bilateral carpal tunnel syndrome: a

meta-analysis of randomized controlled trials. *Brain Behav* 2016;6:e00439.

2. **Sayegh ET, Strauch RJ.** Open versus endoscopic carpal tunnel release: a meta-analysis of randomized controlled trials. *Clin Orthop Relat Res* 2015;473:1120-1132.

3. **Ferguson DO, Shanbhag V, Hedley H, et al.** Scaphoid fracture non-union: a systematic review of surgical treatment using bone graft. *J Hand Surg Eur Vol* 2016;41:492-500.

4. **Metcalfe D, Aquilina AL, Hedley HM.** Prophylactic antibiotics in open distal phalanx fractures: systematic review and meta-analysis. *J Hand Surg Eur Vol* 2016;41:423-430.

5. **Sears ED, Swiatek PR, Hou H, Chung KC.** Utilization of preoperative electrodiagnostic studies for carpal tunnel syndrome: an analysis of national practice patterns. *J Hand Surg Am* 2016;41:665-672.e1.

6. **Seigerman DA, Rivlin M, Bianchini J, Liss FE, Beredjikian PK.** A comparison of two sterile solution application methods during surgical preparation of the hand. *J Hand Surg Am* 2016;41:698-702.

7. **Got C, Vopat BG, Mansuripur PK, et al.** The effects of partial carpal fusions on wrist range of motion. *J Hand Surg Eur Vol* 2016;41:479-483.

8. **Owen DH, Agius PA, Nair A, et al.** Factors predictive of patient outcome following total wrist arthrodesis. *Bone Joint J* 2016;98-B:647-653.

9. **Nota SP, Spit SA, Oosterhoff TC, et al.** Is social support associated with upper extremity disability? *Clin Orthop Relat Res* 2016; Epub ahead of print.

## Shoulder & Elbow

**X-ref** For other Roundups in this issue that cross-reference with

**Shoulder & Elbow** see: **Research Roundup 1, 3; Trauma Roundup 5.**

### Glenoid fracture still an issue in shoulder arthroplasty X-ref

■ The longevity of total shoulder arthroplasty is usually considered to be limited by the glenoid component. The large forces placed across a small surface area (in traditional arthroplasty) and large lever arm (in reverse arthroplasty), both resisted by the relatively slight bone seen in the glenoid, are more often than not

the cause of wear, loosening and failure. The advent of more modern materials, in particular polyethylene bearings which can form carbon-carbon cross-links between polyethylene molecules during irradiation, changes to glenoid designs and different joint kinematics have potentially improved the longevity of these components and their functional outcomes. There is, however, a wide array of component designs, and material scientists in **Berkeley (USA)** have set out to establish which of these design variations are

associated with mechanical failure and fracture.<sup>1</sup> This interesting and insightful study is based on the retrieval of 16 glenoid components, all presenting with fracture. The implants consisted of a range of materials, including gamma-sterilised Hylamer and ultra-high-molecular-weight polyethylene (UHMWPE), and gas plasma-sterilised, remelted, highly cross-linked (HXL) UHMWPE, and a range of conformities between a 0 mm and 10 mm radial mismatch. The explanted components were subjected to highly detailed analysis

including scanning electron microscopy (SEM) and oxidative analysis. There was a common pattern of failure with fracture at the rim of the component for all 16 explanted components, and significant oxidative change was seen in the components subjected to gamma sterilisation. However, this was not seen in the HXL glenoid component. Fracture at the rim of the glenoid component in traditional total shoulder arthroplasty is still clearly a problem, despite evolution in component design. Whilst this paper cannot