Simultaneous subtalar fusion and total ankle arthroplasty

It is now known that the nonunion rate of subtalar fusions is higher in feet with a pre-existing ankle fusion.[10] This biomechanical study from The Hospital for Special Surgery, **New York, New York (USA)** demonstrates the relationship between this time by simulating subtalar fusion and measuring rotation and contact pressures in the ankle.[11] The conclusion of the basic science evidence appears to be that external rotation forces are increased across the ankle joint after simulated subtalar fusion. The addition of Chopart's joint fusion segments are not thought to contribute to these changes. However, knowing this doesn't really help the foot and ankle surgeon in deciding how to proceed for the patient with widespread hindfoot arthritis. This study from **Milan (Italy)** adds a lot to the application of current knowledge[12]. The authors present the results of 24 subtalar fusions performed with a synchronous total ankle arthroplasty as a treatment alternative to a tibiotalocalcaneal nail for widespread hindfoot degeneration This type of hybrid reconstruction is becoming more common as surgeons seek to avoid a poorly-tolerated pantalar fusion as a solution to widespread hindfoot degeneration. Although ankle arthroplasty clearly has its shortcomings, in carefully selected patients arthroplasty and fusion offer the tantalising potential for preserving motion, avoiding nonunion and possibly avoiding the dreaded pantalar fusion. Although a small, elementary study, these authors report a 92% fusion rate of the subtalar joint at 12 months and significant improvements in visual analogue pain scale (VAS) of between 8.6 mm and 2.1 mm, and American Orthopedic Foot and Ankle scores of between 27.9 and 75.1 points as a result of their intervention.

The Achilles and sural nerve

This article reports a retrospective review of MRI scans in patients both with and without Achilles tendon ruptures. The authors set out to establish simply what the anatomical relationship was between the Achilles tendon and the sural nerve, in addition to visualising the well-publicised 'twist' in the tendon with the eventual aim of establishing the safest and most effective form of percutaneous Achilles tendon release. Their observational study from the Hospital for Special Surgery, **New York, New York (USA)**[13] established convincingly that the Achilles tendon was externally rotated in both rupture and non-rupture, with rotations of around 15° by the point at which the tendon reaches the ankle. However, there is no rotation at 10 cm proximal to the insertion. At the distal end, the sural nerve was close to the tendon anteriorly, lying laterally further in the ruptured tendons. Clearly there is an important message here for those undertaking a percutaneous Achilles tendon repair, as although the anatomy is relatively constant in the uninjured tendon, the relationships change during tendon rupture and the recommendations of external rotation of 11° at the proximal end of the rupture and 16° at the distal end when using percutaneous and limited-open Achilles tendon repair devices, are likely at the very least to reduce the rate of sural nerve injury, and may also increase the chances of tendon capture. Useful if you are going to undertake a percutaneous repair, but perhaps the bigger question remains, should one be undertaking a percutaneous repair at all?

REFERENCES

1. **Fenton P, Al-Nammari S, Blundell C, Davies M.** The patterns of injury and management of cuboid fractures: a retrospective case series. *Bone Joint J* 2016;98-B:1003-1008.
2. **Akimau PI, Cawthron KL, Dakin WM, et al.** Symptomatic treatment or cast immobilisation for avulsion fractures of the base of the fifth metatarsal: a prospective, randomised, single-blinded non-inferiority controlled trial. *Bone Joint J* 2016;98-B:806-811.
3. **Ahn J, Lee HS, Seo JH, Kim JY.** Second metatarsal transfer lesions due to first metatarsal shortening after distal chevron metatarsal osteotomy for hallux valgus. *Foot Ankle Int* 2016;37:589-595.
4. **Tan EW, Sirisreetreerux N, Paez AG, et al.** Early weightbearing after operatively treated ankle fractures: a biomechanical analysis. *Foot Ankle Int* 2016;37:652-658.
5. **Kubiak EN, Beebe MJ, North K, Hitchcock R, Potter MQ.** Early weight bearing after lower extremity fractures in adults. *J Am Acad Orthop Surg* 2013;21:727-738.
6. **Haller JM, Potter MQ, Kubiak EN.** Weight bearing after a periarticular fracture: what is the evidence? *Orthop Clin North Am* 2013;44:509-519.
7. **Clement ND, MacDonald D, Dall GF, et al.** Metallic hemiarthroplasty for the treatment of end-stage hallux rigidus: mid-term implant survival, functional outcome and cost analysis. *Bone Joint J* 2016;98-B:945-951.
8. **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.
9. **Little MT, Berkes MB, Lazaro LE, et al.** Complications following treatment of supination external rotation ankle fractures through the posterolateral approach. *Foot Ankle Int* 2013;34:523-529.
10. **Zanolli DH, Nunley JA II, Easley ME.** Subtalar fusion rate in patients with previous ipsilateral ankle arthrodesis. *Foot Ankle Int* 2015;36:1025-1028.
11. **Hutchinson ID, Baxter JR, Gilbert S, et al.** How do hindfoot fusions affect ankle biomechanics: a cadaver model. *Clin Orthop Relat Res* 2016;474:1008-1016.
12. **Usuelli FG, Maccario C, Manzi L, Gross CE.** Clinical outcome and fusion rate following simultaneous subtalar fusion and total ankle arthroplasty. *Foot Ankle Int* 2016;37:696-702.
13. **MacMahon A, Deland JT, Do H, et al.** MRI evaluation of Achilles tendon rotation and sural nerve anatomy: implications for percutaneous and limited-open Achilles tendon repair. *Foot Ankle Int* 2016;37:636-643.

Wrist & Hand

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

Collagenase works for Dupuytren's - but with caveats

The use of collagenase clostridial histolyticum for Dupuytren's disease has (notwithstanding funding issues in many strained health systems) become part of the palette for treating this common condition. Offering the potential advantages of avoiding wound complications and providing a quick, simple and potentially acceptable option to many patients, the debate perhaps no longer surrounds whether it is appropriate in selected cases, but rather which cases, and when. A research group from **Southampton (UK)** have reported their prospective study of 237 patients.[1] Their study examines whether its efficacy can be translated to more complex cords involving more than one joint or more than one finger at a time. The take home message from their paper is that it is in fact possible to treat complex cords, although with experience, surgeons' use of repeated injections became less likely. Less severe pre-intervention contractures tended to correct more successfully. However, the authors found a high complication rate, which may cause alarm. Skin splits were more likely with more severe pre-injection deformity. The same group also surveyed 213 of their patients for satisfaction.[2] While three quarters were satisfied and would have the injection again, as time passed and the disease started to recur, satisfaction and willingness to have the injection again fell. Here at 360 we would promote the concept of careful consent when using collagenases in Dupuytren's contracture, warning patients that complications can be alarming and recurrence is common. A forewarned patient is more likely to be a happy patient.

What else is new in treating Dupuytren's contracture?

While collagenase clostridium histolyticum (CCH) has been taking much of the Dupuytren's limelight recently, other potential advances are emerging and starting to jostle for position in the treatment of Dupuytren's contracture. The accumulated evidence reporting short- and longer-term results for

percutaneous needle fasciotomy (PNF) concludes that it offers effective and safe correction of some discrete cords with low morbidity and a very quick recovery. Recurrence is always a threat, since no disease and no affected cells are removed, and there are some reported complications. A group from **Rotterdam (The Netherlands)** reported their experience of a modified technique, reasoning that the addition of autologous fat injection into the subcutaneous space prepared by extensive PNF may help reduce recurrence rates.[3] They have termed their technique 'percutaneous aponeurotomy and lipofilling' (PALF). The purpose is essentially to provide a soft 'firebreak' in the hopes of preventing or reducing the rate of recurrence of the disease. Their study reports the use of this technique and comparison in a randomised controlled trial of 80 patients with a comparator arm of traditional limited fasciectomy. Outcomes were assessed at two weeks, three weeks, six months and one year post-operatively, with contracture correction and recovery time the primary outcome measures. Unsurprisingly, there were no differences in contracture correction, with almost complete metacarpophalangeal correction and limited proximal interphalangeal (PIP) joint correction. However the PALF group reported a much quicker recovery, lower complication rate and similar immediate correction and one-year outcome. We look forward to further validation of this technique, perhaps compared with PNF or CCH as we continue to seek ways of reducing surgical invasion. We would be particularly interested to see a longer-term follow-up of this study focussing on recurrence rates between the two groups – does a fat interposition really act as a 'firebreak'?

What outcomes should we use in wrist fractures?

■ Here at 360 HQ we are committed to the use of validated outcome measures. After all, without validation we really do not know how well we are treating our patients, nor can we compare one treatment with another. Distal radial fractures are a case in point. The best treatment is controversial and there are far too few studies to guide us. Outcome measures can be general, domain- or disease-specific. Each would ideally be validated in the joint used, and the diagnoses such that the characteristics of the outcome score, its responsiveness to change, reliability, any floor or ceiling effects and most crucially, the minimally clinically important change associated with the outcome measure in the diagnoses, i.e. how much better is meaningful. A good starting place to improve our understanding of what is going on with distal radial fractures would be to ensure that we use the most suitable outcome measures. A team from **Deventer (The Netherlands)** systematically reviewed the measures used in distal radial fracture research[4] and found the patient-rated wrist evaluation (PRWE) and the disabilities of arm, shoulder and hand (DASH) questionnaires to be the most appropriate at present, although they are both only of moderate responsiveness and only the PRWE has good reliability and validity. There is clearly quite a lot to do and we are delighted to see these authors tackling this tricky topic.

Conduits revisited: can we avoid nerve grafting?

■ Nerve defects are a significant problem, contributing substantially to the workload of hand surgeons, and often with far from perfect results. Traditionally, patients suffering a peripheral nerve injury where tension-free repair is not possible have required a nerve graft in order to have any hope of restoration of function. While nerve grafts can be effective and are used regularly, by definition they incur donor site morbidity, can be technically difficult and have variable success. We have been watching with interest the increase in reported use of conduits - inert tubes which allow a nerve to regenerate along a gap by excluding the invasion of intervening scar tissue. The presence of an infrastructure through which the nerve can grow may, in theory, improve outcome, not just through providing a conduit guiding regeneration but also by enabling a more stable environment for neurons to release growth factors. The use of these growth factors has been specifically examined by an American group from **Baltimore, Maryland (USA)** in a randomised, blinded pilot study of 23 patients with 31 nerve injuries.[5] The study was conducted across four centres and patients were randomly allocated to either allograft or hollow conduit repair. Those patients included had an average nerve gap of 12 mm, and outcomes were assessed using static two-point discrimination testing. The authors could not find any significant differences in the baseline characteristics between the groups. However, in terms of outcomes, those patients whose digital nerve reconstructions were performed with processed nerve allografts (i.e. with the original intraneural infrastructure preserved) had significantly improved, with more consistent functional sensory outcomes in comparison with hollow conduits. So, we will watch this story unfold; the allograft remains king for now, albeit the results are still rather mixed. Another promising avenue will be the 'doping' of conduits with stem cells, neurogenic factors or Schwann cells to enhance the biology that underpins neural growth.

What is the best way to treat Boxer's fractures?

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■ Whenever we treat a patient, we must consider not just the long-term outcomes, but also the rate at which these are achieved. Treatments with similar long-term follow-up may not be equal in terms of health economic costs. Less intense treatments achieving the same result will likely have an edge, as will those which rapidly return patients to work. There are huge patient and societal cost advantages to this approach, not least of which is an early return to tax-paying status, an outcome not always captured in some health economic cost-effectiveness models. A study team from **Istanbul (Turkey)** compared 24 office workers, all of whom had sustained a metacarpal neck fracture and were treated with either a moulded gutter splint or an antegrade intramedullary wire.[6] The splint group returned to work at a mean of 34 days, whereas the wire group returned at four days; the QuickDASH score at 45 days was 40 in the splint group and 1 in the surgical group, with a better range of movement and improved radiological measurements. Always emphasising the caveat that any operation can go badly wrong, patients should be consented on the potential advantages of this type of simple surgical intervention when earlier return to function is important. However, it is nice to see a study (despite its inherent methodological weaknesses) that includes return to work in its health economic model.

Another look at collagenase

■ The fascinating ongoing battle for supremacy between collagenase injection and needle fasciotomy continues in the treatment (or really 'management', as we can't cure it) of Dupuytren's disease. This month's lead article from *The Journal of Hand Surgery (European Volume)* from **Lund (Sweden)** focusses on a randomised controlled trial (RCT) comparing outcomes between the two approaches.[7] These authors report the outcomes of a prospective RCT carried out in two centres in Sweden.

The authors recruited 96 rays in 93 patients into their study, with the majority of patients presenting with metacarpophalangeal contracture. The inclusion criteria consisted of a total extension deficit between 30° and 135°, with less than 60 of these degrees at the proximal interphalangeal joint. For good measure, at one of the centres an embedded study evaluating the benefit or otherwise of night splintage was also reported. Primary outcomes were established at one year post-operatively, with angular correction used as the primary outcome measure. The total extension deficit was reduced by an identical 70% in both groups at final one-year follow-up (42 needle and 39 collagenase rays available for follow-up at one year). There were additionally no differences found between the two centres, implying that night splinting may not have an effect. The authors conclude that the treatments are the same at one year. This is important as collagenase is associated with significant cost. Interestingly, collagenase seemed a little more painful in the short- to medium-term as well. The difficulty continues with unpicking the collagenase literature; there is certainly merit in continuing to investigate what is a promising but controversial treatment. The proponents argue that collagenase has better long-term outcomes, and may allow tackling of greater deformities than that offered by the needle fasciotomy. Nonetheless, as yet the evidence is inconclusive either way.

So what exactly does collagenase do to the cord?

With all the focus placed on clinical results, the finer points of the differences between the three current approaches for Dupuytren's release (open, needle and collagenase) in terms of what happens to the disease progression remain somewhat opaque, even more so than the relative benefits of the different approaches. We would draw readers' attention to a very interesting MRI-based study reported from **New York, New York (USA)**.[8] The authors of this study undertook two MRI scans, one before collagenase injection, and one after. Following treatment, the MRI scan showed evidence of cord dissolution with significant reduction in volume. Coupled with the observation of slight inflammatory changes in the flexor tendon, but an intact flexor tendon, this study does suggest that the collagenase may in fact have a very beneficial effect in terms of dissipating the underlying Dupuytren's cord. If this is indeed the case, then we would expect to see lower recurrence rates in the longer term than with the needle release. It is important to remember that MRI scanning is a static study, and that MRI sequences post-needle release are also needed to examine the effect on loss of cord volume on the release of tension – this could simply be an 'elastic band' phenomenon. A longer stretched elastic band is also thinner.

Evaluation of vitamin D levels in women with carpal tunnel syndrome

Vitamin D has become a focus of research in most areas of orthopaedics and medicine in general. As patients lead increasingly sedentary lives, and the ageing population are squirrelled away in homes with little exposure to the fresh air and natural light, it is little wonder that vitamin D biology is increasingly implicated in fragility fractures and a range of orthopaedic diagnoses. However, orthopaedics (like vitamins) is not completely limited to the bone. We were delighted to see a simple paper from **Seoul (South Korea)** reminding us that neurological symptoms are sometimes indicative of other pathology.[9] In their short paper, the authors compared the serum vitamin D levels in 135 female carpal tunnel syndrome patients with those in 135 matched controls. Significantly lower vitamin D levels were seen in those women under 50 years of age. This builds on some previous work suggesting that vitamin D supplementation may be effective for pain relief in diabetic patients with neuropathic pain. There are clearly many inherent weaknesses in this type of association study, and only a link is shown, not a causal relationship. However, this paper does serve as a timely reminder that in the setting of the orthopaedic outpatient clinic where simple diagnoses like carpal tunnel syndrome can be 'conveyor belt medicine', symptoms of neurological entrapment and dysfunction may not always be due to the simplest explanation. The surgeon should always think beyond the immediate mechanical environment of the nerve or bone before reaching for the knife.

Unpicking chronic wrist disease

Picking apart exactly what is going on in patients with chronic wrist pain can be a somewhat unrewarding pastime – patients with non-specific wrist pain can present with a variety of potential conditions, and often a clear diagnosis cannot be reached even with investigations like MRI scanning and wrist arthroscopy. Researchers in **Anjo (Japan)** have been looking at some decidedly 'unorthopaedic' explanations for chronic wrist pain, and have set out to investigate the association between chronic pain, depressive indices and inflammatory mediators.[10] They reported the outcomes of 38 patients, all of whom underwent arthroscopy for chronic wrist pain. Prior to surgery, the participants undertook a self-rating depressive index and pain scale. All of the patients had a range of differing pathologies, but the common factor was having experienced wrist pain for more than three months. At arthroscopy, expression of cytokines and chemokines were undertaken from synovial fluid samples. The authors established a correlation between the pre-operative self-rating depression scale and one-year outcome using the pain visual analogue scale score and a hand patient-reported outcome measure (the 'Hand 20') after treatment for chronic wrist pain. Perhaps more interesting than the depressive scales was the finding that these patients had a biological reflection of the pain and depressive indices, with higher expression of nerve growth factor and other cytokines in synovial fluid of the wrist correlated with pain and depression. The unpicking of depression, pain and chronic disease is going to take more than this relatively straightforward paper. Nevertheless, as understanding improves of the biological pathways that link these together, there is more of a chance for treatment. At the simplest level, the 'chicken and egg' quandary of depression first or pain first is still not understood; however, the beginnings of the unpicking of the biological pathway will help both with treatment of refractory pain and understanding of the link between pathology, mental state and pain perception.

REFERENCES

1. **Warwick DJ, Graham D, Worsley P.** New insights into the immediate outcome of collagenase injections for Dupuytrens contracture. *J Hand Surg Eur Vol* 2016;41E:583-588.
2. **Bradley J, Warwick D.** Patient satisfaction with collagenase. *J Hand Surg Am* 2016;41:689-697.
3. **Kan HJ, Selles RW, van Nieuwenhoven CA, et al.** Percutaneous aponeurotomy and lipofilling (PALF) versus limited fasciectomy in patients with primary Dupuytrens contracture: a prospective, randomized, controlled trial. *Plast Reconstr Surg* 2016;137:1800-1812.
4. **Kleinlugtenbelt YV, Nienhuis RW, Bhandari M, et al.** Are validated outcome measures used in distal radial fractures truly valid? A critical assessment using the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) checklist. *Bone Joint Res* 2016;5:153-161.
5. **Means KR Jr, Rinker BD, Higgins JP, et al.** A multicenter, prospective, randomized, pilot study of outcomes for digital nerve repair in the hand using hollow conduit compared with processed allograft nerve. *Hand (N Y)* 2016;11:144-151.
6. **Cepni SK, Aykut S, Bekmezci T, Kilic A.** A minimally invasive fixation technique for selected patients with fifth metacarpal neck fracture. *Injury* 2016;47:1270-1275.
7. **Scherman P, Jenmalm P, Dahlin LB.** One-year results of needle fasciotomy and collagenase injection in treatment of Dupuytren's contracture: A two-centre prospective randomized clinical trial. *J Hand Surg Eur Vol* 2016;41:577-582.
8. **Crivello KM, Potter HG, Moon ES, Rancy SK, Wolfe SW.** Does collagenase injection disrupt or digest the Dupuytren's cord: a magnetic resonance imaging study. *J Hand Surg Eur Vol* 2016;41:614-620.
9. **Lee SH, Gong HS, Kim DH, et al.** Evaluation of vitamin D levels in women with carpal tunnel syndrome. *J Hand Surg Eur Vol* 2016;41:643-647.
10. **Tatebe M, Iwatsuki K, Hirata H, et al.** Effects of depression and inflammatory factors on chronic conditions of the wrist. *Bone Joint J* 2016;98-B:961-968.