ROUNDUP360

Wrist & Hand

Non-operative hand fracture management

It is somewhat ironic that in a special edition of the Journal of Hand Surgery (Eur) in January 2015, entitled 'Efficient and elaborate treatment of hand fractures' (J. Tang's enigmatic editorial title), the Editor-in-Chief (Grey Giddins) **Bath (UK)** has written a review of the 'non-operative management of hand fractures'.[1] Hand fractures, like many areas of the body, seem prone to surgical intervention with little evidence of superior outcomes over conservative treatment. This perhaps is due to a fundamental contradiction between the concept of non-operative management and our job descriptions (surgeon). However, there are many clinical scenarios in which numerous factors serve to stop us from reaching for the knife. 'Primum non nocere' – first do no harm – is an expression many trainees will have heard. Decision making about fracture management can be hard, and factors such as a perceived threat of litigation over the decision to treat conservatively, or a published low level of evidence surgical case series, may well start to illogically affect the process. Perhaps the biggest driver towards operative management is surgeon and patient belief that operative intervention may in some way improve outcomes – newer always seems better. In an impressive and refreshing look at the evidence for what we do in many hand fractures, the author effectively reminds us that certainly as far as concerns spiral metacarpal, transverse metacarpal shaft and neck (boxer's) fractures, and thumb metacarpophalangeal joint, ulnar and radial collateral ligament injuries (except the 'Stener lesion' and bony mallets'), the evidence would suggest that these injuries are best treated conservatively.

From the sublime to the ridiculous?

Sitting at the other end of the spectrum is a second view from surgeons in **Zurich (Switzerland)**.[2] While the area of proximal interphalangeal (PIP) joint fracture dislocation is admittedly complex, we wonder if this paper receives the accolade for triumph of surgical technique over common sense. The proposed surgery involves taking a piece of the hamate and using the similar contour of its articular surface to reconstruct the fragmented volar portion of the middle phalanx via a 'shotgun' (disarticulation) approach. Perhaps this is the ultimate in 'look at me' surgery (or a right of surgical passage, as one senior hand surgeon, who now rarely performs the procedure, wryly commented). The review team included a number of small case series (the largest being 22 cases), with a secondary outcome measure of range of movement (there were no patient-rated outcome measures). This systematic review reports a mean of 77°range of movement at 36 months' follow-up in 71 cases. Perhaps such extreme measures need to be taken for this difficult diagnosis but the information presented doesn't directly comparable treatments. Although the results presented are 'good' for this severe injury. It may be that a lengthy operation and rehabilitation process 'buy' a few more degrees than other treatments – which may not be a clinically significant difference. The review authors comment that many cases show significant radiographic osteoarthritis at longer-term follow-up. An enigmatic last line in the review: 'the indications for the vascularised osteochondral hemi-hamate flap should be analysed' leaves the reader even more perturbed – you thought the orthopaedic surgery alone was difficult?

A novel approach to carpal tunnel decompression

Perhaps lying somewhere between the two previous articles in terms of innovation and common sense, surgeons in **Hebei (China)** report in this month's BJJ a novel technique for approaching carpal tunnel decompression.[3] A simple procedure and universally accepted as a successful operation, whether performed by open or endoscopic approach, carpal tunnel release is likely one of the most commonly performed procedures worldwide. Taking a slightly fresh look at the problem, the surgical team report a more unusual method involving open release and then subneural reconstruction of the transverse carpal ligament – a form of median nerve transposition. The study team compare the results of this technique with those following both open and endoscopic isolated carpal tunnel decompression. Over a four-year period the study team included the results of 213 patients with carpal tunnel syndrome who were randomised to one of the three treatments (although it is fairly safe to conclude there was a failure of randomisation with 68 subneural reconstructions, 92 open releases and 53 endoscopic releases performed). Outcomes were assessed at a mean of two years with symptom scoring (Michigan Hand Score) and grip strength. Interestingly, the study team were able to demonstrate that there were significantly improved grip strength scores in the ligament reconstruction group *versus* the other techniques at a mean of two years post-operatively, with improved functional outcomes and Michigan Hand Scores. While the magnitude of the differences in scores was not great and there are some potential flaws in the design of this paper, it is an interesting attempt to look at alternative approaches to carpal tunnel syndrome and certainly has us wondering, here at *360*, if a simple retinacular reconstruction may improve the post-operative outcomes of many patients.

Osteoporosis and functional scores in the distal radius

x-ref Trauma

The distal radial fracture is perhaps the most studied of all injuries in recent times. With a push towards ever more aggressive interventions,

mostly as a result of industry driven developments in implant design and features, there is a wealth of intervention studies, mostly comparing different types of operative intervention. However, as surgeons, we are all too acutely aware that the surgery itself is just a piece (and only a small piece, at that) of the jigsaw. Outcomes are determined by a huge range of other factors, as with all complex interventions. Researchers in **Suwon (Korea)**, perhaps noting the skew towards intervention studies of late in research surrounding the distal radius, set out to establish if osteoporosis itself had an effect on functional outcomes following distal radial fractures.[4] Their retrospective study reports the outcome of 90 patients treated over a three-year period with a volar locking plate. The research team followed patients up with a combination of functional scores (DASH and Mayo Wrist Score). The researchers investigated the association between a range of radiographic and other parameters and outcomes, including bone density scores. There were no differences in outcomes as assessed by DASH (11.5 vs 10.5) or Mayo Wrist Score (79.0 vs 82.6) for either group. The authors conclude that osteoporosis itself is not a predictor of outcome in wrist fracture either in univariant or multivariant analysis.

Ulnar variance and force distribution

x-ref Research

■ Biomechanics is a little like Marmite – you either love it or hate it. Proponents of biomechanical research would argue that a sound understanding of biomechanics underpins sound treatment of orthopaedic and trauma diagnoses. Perhaps one of those areas in which biomechanics is inarguably important is in understanding the function and pathoanatomy of the distal radioulnar joint. Researchers from **Syracuse (USA)** performed a fresh cadaveric study of nine forearms with the aim of establishing the contribution of ulnar variance to force distribution over the wrist joint in varying positions.[5] They designed their experiment to measure the load across the joint using multi-axis load cells and a modified wrist joint simulator. The experiment was devised particularly to attempt to shed some light on the relationship between forearm position, ulnar variance, triangular fibrocartilage and the forces dissipated across the wrist. The authors report that axial forces dissipated across the wrist through the distal ulnar are greatest in pronation and that there is no relationship between axial loads and ulnar variance. While the traditional teaching is that patients with positive ulnar variance (either through fracture or biological variance) transmit higher loads through the distal ulnar, this is not supported by this cadaveric work. The implication of this study is that the clinically observed ulnar impaction is not related to ulnar variance or increased loading across the wrist joint, and is in fact more likely the result of increased wear on a thinner and less durable triangular fibrocartilage complex seen in some patients. While not always fans of biomechanical studies here at *360*, we are more than willing to admit that clinically relevant studies such as this have a lot to add to our understanding of pathoanatomy and mechanisms of disease.

Tourniquets in carpal tunnel under the spotlight

■ In a second study this month shedding light on carpal tunnel surgery, a research team from **Dundee (UK)** designed a randomised controlled trial to evaluate the use of the tourniquet in carpal tunnel surgery.[6] The researchers, unusually, designed their study to establish the surgeons' experience – rather than designing the study from a patient perspective – of upper limb tourniquets using either arm or forearm tourniquets. The research team undertook a prospective randomised controlled trial, with outcomes assessed as bloodlessness of field and post-operative pain scores. They recruited 100 patients who were prospectively undergoing local anaesthetic open carpal tunnel decompression and randomised them to either an arm or forearm tourniquet. Outcome measures were assessed as a subjective surgical rating of the degree of bloodless field (measured on a visual analogue score). Additionally, the patients were asked to score their pain levels intra-operatively, and secondary outcomes included physiological parameters (blood pressure and heart rate). The research team reported no significant differences in any of their

reported primary outcome measures. However, this study also considered degree of obstruction to surgery caused by the tourniquet which was deemed to be significantly higher in the forearm group. Given the equivalency reported in patient pain measures both as patient-scored and secondary physiological indicators, here at *360* we would tend to agree with the authors that the significantly higher obstruction rates reported with the forearm tourniquet makes this the less preferable option.

Scaphoid fractures reclassified

x-ref Trauma

■ The trouble with scaphoid fractures is ongoing. From diagnosis to classification to treatment, not only is there little professional consensus, but there are often conflicts in the literature. One area in which the world, but not the literature, has moved on is that of classification. While classifications are still almost all based on plain films, the diagnosis is now made using 3D CT scans. Researchers from **Pittsburgh (USA)** sought to establish 3D rather than just 2D fracture patterns.[7] Reasoning that although the position of the fracture itself is widely recognised to be important, the plane of the fracture has never been evaluated. The research team evaluated the CT scans of 124 patients who had sustained an acute scaphoid fracture. They analysed scans for the position of the fracture and the angle between the fracture plane and the longitudinal scaphoid axis. In their series there were 86 waist, 25 proximal third and 13 distal third fractures, of which 30 were displaced and so software transformation was undertaken to virtually reduce the fractures. The mean angle between the fracture plane and the longitudinal axis was 53° overall and 56° in waist fractures, drastically different from the transverse fracture pattern (90°) which has previously been thought to be the most common. Most fractures were angulated from volar in the distal portion to dorsal in the proximal portion relative to the radius. This observation is likely to explain the difficulty with initial diagnosis of fractures on plain film radiographs. If the fracture line does not fall tangentially to the axis of the x-ray then 2D diagnosis is difficult, requiring some resorption to occur before the fracture is visible (and then apparently occurring in the plane of the radiographs). Early evaluation with CT scanning has become gold standard, and this simple but important paper has highlighted the limitations of some older literature.

Osteoporosis and distal radial fracture fixation

x-ref Trauma

■ The osteoporotic epidemic has spawned a range of new treatments from risedronate to the locking plate, all aimed either at treating the disease or the consequences. Perhaps the area of most widespread implant adoption has been the distal radial locking plate. Designed to allow for firm fixation in patients

with even the most profound of osteoporotic changes, the advent of the distal radial locking plate has without doubt changed the face of orthopaedic hand trauma surgery. What has not followed suit is papers to support this dramatic change in practice. A specific and important unanswered question is whether osteoporosis itself is a risk factor for the failure of fixation following distal radial locked plating. A multicentre study conducted by researchers from **Basel (Switzerland)** has set out to answer this question by investigating the relationship between bone mineral density and rates of mechanical failure following locking plate fixation of distal radial fractures.[8] The team prospectively recruited 249 patients (230 female and 19 male) who had sustained closed distal radial fractures. A range of demographic and fracture factors were collated in addition to local bone mineral density (BMD) which was measured in the contralateral wrist six weeks following fixation. The comprehensive assessment of outcomes included radiological imaging, wrist movement and strength, as well as complication rates. In addition, patient-reported outcome measures including the DASH and PRWE scores, as well as a quality of life measure (EuroQol-5D), were also recorded at regular intervals up to a final follow-up of one year. By final follow-up, 3.6% of patients (n = 9) had developed mechanical failure of their fixation. Across the whole group, as would be expected, BMD was low, although the authors reported no significant difference between the failure or not of fixation groups (0.561g/cm2 vs 0.626g/cm2, p = 0.148). Those who had failure of fixation had significantly higher DASH and PRWE scores at one year, as well as persistently lower grip strength on the affected side. Quality of life measures and pre-injury functional levels had not returned to baseline levels at final follow-up. Although setting out to answer a clinically relevant question, we can't help wondering if this paper is somewhat underpowered. With just nine events in the population it is hardly surprising that there were no significant differences found. While a testament to the ability of modern implants to function even in osteoporotic bone, sadly this paper tells us little more than this.

PROMISing results in the upper limb

x-ref Research, Shoulder & Elbow

As the fashion for patient-reported outcome scores has increased worldwide, so the burden on patients and clinicians to complete these scores has increased. A complete quality of life score can take some patients upwards of 20 minutes to complete, and in many cases multiple scores are required as part of national audits, outcomes assurance or even, in some healthcare systems, surgeon quality assessment. As the push for open access outcomes and comparative data continues unabated, this time burden to patients and clinicians is going to continue to be significant. The response to this has to be the development of more efficient outcomes assessment tools, not a return to opaque outcome reporting. Researchers in **Boston (USA)** report their experience with the Patient Reported Outcomes Measurement Information System (PROMIS) Physical Function test.[9] This PROMs measure developed by the National Institutes of Health in the US was set up with the aim of reducing the patient burden by using response theory and computer adaptive testing. The study team set out to establish if the PROMIS system measured up to QuickDASH in patients with upper limb diagnoses. The study team designed a comprehensive study of 93 patients with the aim of establishing if the PROMIS Physical Function and QuickDASH were concordant and also undertaking a secondary assessment of the PROMIS Depression CAT and Pain Interference CAT tools. Their study reports the results of 93 patients with variable upper limb diagnoses and in addition to simply assessing the correlations, the investigators set out to establish what factors were determinants of PROMIS Physical Function and QuickDASH scores in a multivariable regression analysis. The research team established that there was only moderate correlation between PROMIS Physical Function and QuickDASH. As would perhaps be expected, those patients reporting poorer physical functions on either of these scores also had poorer PROMIS Depression and Pain Interference scores. In terms of those factors affecting outcomes, the investigators established that the differences between the scores is likely due to the influence other pain conditions have on the PROMIS Physical Function score which do not influence outcomes from the QuickDASH. While both of these scores were found to be acceptable tools for measuring upper limb function, and both were most profoundly influenced by pain, the QuickDASH (as would perhaps be anticipated) appears to be more specific for upper limb diagnoses.

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