ROUNDUP360

Shoulder & Elbow

For other Roundups in this issue that cross-reference with Shoulder & Elbow see: *Children's orthopaedics Roundups 3 and 7; and Research Roundups 3 and 5.*

Proximal humeral fractures: a comprehensive review

x-ref Trauma

■ The management of proximal humeral fractures is one of the topics that perhaps provokes most debate among surgeons. With a number of studies showing only small advantages (or more often no advantage) of one treatment over another, this really is a diagnosis where there is little evidence to support any one particular management strategy. Researchers in **Chicago (USA)** set out to establish if a more comprehensive review of a large number of studies could provide a more solid answer than a single trial or group of studies.[1] Their systematic review included 92 studies reporting the results of 4500 patients. The study was designed to compare the outcomes of proximal humeral fractures treated with either open reduction and internal fixation (ORIF), closed reduction and percutaneous pinning (CRPP), hemiarthroplasty (HA), or reverse shoulder arthroplasty (RSA). ORIF for proximal humeral fractures demonstrated better clinical outcome scores but with a significantly higher re-operation rate. The systematic review was appropriately conducted with analysis of bias, methodological scoring and data extraction to allow for meta-analysis. The headline results of this study make for interesting reading. In all outcome scores (ASES, DASH and Constant) reported in the studies, significantly better outcomes for ORIF were seen over HA and RA. However, re-operation rates were higher. It appears from this study, and the outcomes reported, that comparing HA and RA found no differences in outcomes. The untested comparison here is surgical management *versus* conservative therapies. This has been tested in the NIHR-funded PROPHER study which has already reported (although is not yet published), and this would also seem to suggest no differences between surgical and non-surgical outcomes.

Predicting complications in shoulder ORIF

x-ref Trauma

■ In a highly topical study, when taken in context with the systematic review reported above, researchers from **Seoul (South Korea)** asked which patients are at risk of loss of fixation after locking plate fixation of the proximal humerus. This is in the context of a large systematic review suggesting that if complications do not occur then outcomes of ORIF are superior to other methods of treatment of the proximal humerus. The research team set out to identify the risk factors for loss of reduction after locking plate fixation of proximal humeral fractures.[2] In their study they used retrospective evaluation of 252 patients in a prognostic study attempting to identify factors associated with early loss of position. Reduction was judged using standardised AP and lateral films with the definition of ≥ 10% angulation in any direction, ≥ 5 mm height loss of the humeral head from the plate or fixation failure. The authors found that osteoporosis (less than -2.5 BMD), displaced varus fracture (less than 110 degrees), medial comminution (more than one fragment), and insufficient medial support (no cortical or screw support) were independent risk factors for reduction loss in the proximal humeral fractures surgery. The study team evaluated standardised AP and lateral radiographs in conjunction with a review of patient records to identify any surgical, patient or fracture factors that might be associated with eventual loss of reduction. Across this large series there was a loss of reduction in 6.7% of cases (n=17/252), all requiring revision surgery. Loss of reduction was found to be more of a risk in older patients and those with osteoporosis or varus displacement, in addition to medial comminution or poor reduction.

The coronoid revisited

x-ref Trauma

■ The coronoid is the key to the treatment of elbow fractures and instability. Providing an insertion for the anteromedial bundle of the medial collateral ligament, the anterior capsule and the bony restraint to anterior translation, any compromise of the integrity of the coronoid can have significant consequences in terms of outcomes. Little work has been done since the initial Morrey classification of coronoid fractures to evaluate fracture configurations and their implications for elbow instability. A research team in **Amsterdam (The Netherlands)** used the CT scans of 82 patients quantify the fracture fragments, type and relationship to instability.[3] There are few studies like this with large enough numbers of patients to make any form of reasonable generalisation. This fascinating series reported that the 45 patients sustaining fractures to the coronoid tip (type 1) sustained low fragmentation, and the joint volume involvement of those fractures was small. The remaining fractures were roughly split into anteromedial facet fractures (n=20) and coronoid base fractures (n=17). Those fractures of the base of the coronoid resulted in the largest disruption to the articulating surface whilst anteromedial fractures were more fragmented than the others. In a development of the initial observations of Regan and Morrey, the authors of this paper were able to comment that, of those injuries associated with terrible triad fractures (n=42), there were smaller fragments and smaller fragment volume whereas the transolecranon fracture dislocations (n=17) were associated with significantly larger fragment volumes and greater disruption of the articular surface. This interesting little study builds on our previous understanding of coronoid fractures and the relation between their pattern and the injury. However, it is important to remember that this information is based on a series of scanned elbows, all of which presumably had an injury and

were therefore a selected series. This casts some doubt on the reported incidence of associated injuries as this paper reports a selected series.

Remplissage and Bankart repair for Hill-Sachs lesions

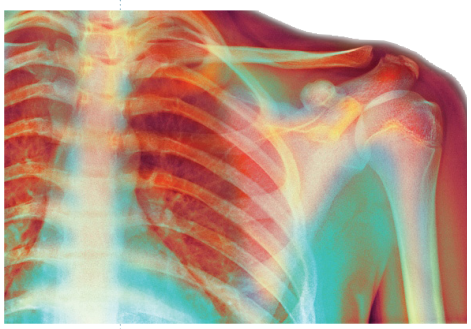
The engaging Hill-Sachs lesion (where the lesion in the humeral head 'engages' with the anterior glenoid and the humerus levers out to dislocate) is a common and disabling injury. Although there are a number of treatment approaches, the anterior Bankart repair with a concomitant remplissage remains a popular option. Surgeons in **Rimini (Italy)**, reasoning that this approach may affect the strength of the infraspinatus in the longer term (due to transposition), have set out to report the results of 61 patients who underwent the procedure compared with 40 health controls at at least two years of follow-up.[4] All patients underwent a fairly standard care pathway with pre-operative MRI imaging, clinical scoring (Constant, Rowe and Walch-Duplay) and clinical evaluation including strength measurement of cuff function. From a clinical perspective the outcomes were good, with only a single recurrence of instability, and at 34 months no clinical difference noted in any cuff function between the two sides. While patients still had some compromise in their shoulder function scores, these were significantly better than the pre-operative scores and did not translate into a compromise in cuff strength. In addition, all operative patients underwent dynamic ultrasound during their post-operative course confirming healing of the capsulotenodesis and filling of the Hill-Sachs defect in all subjects. This paper puts to bed concerns some surgeons and patients may have about compromising infraspinatus strength following arthroscopic stabilisation and remplissage. It also confirms previous reports of excellent outcomes following this procedure, with only a single dislocation in 61 patients in over two years of follow-up.

Diabetes and elbow arthroplasty

The impact of diabetes on arthroplasty in the lower limb and shoulder has been reported relatively extensively over the past few years, yet surprisingly there is very little known about the potential implications of diabetes on patients undergoing total elbow arthroplasty. Researchers in **Springfield (USA)** set out to close this knowledge gap with a national-based study using the (possibly overutilised) national inpatient sample over a four-year period[5]. The research team identified 13 698 patients undergoing total elbow replacement during that time, of which 16.5% were diabetic. Specific outcome measures included complications and length of stay. The study team recorded potential confounders and adjusted for age, gender, insurance type and geographical location with a combination of straightforward univariant and multivariant analyses. Even after allowing for the significant (and expected) differences between the diabetic and non-diabetic cohorts, there were significant differences in both hospital stay and discharge location in the diabetic group – despite allowing for the confounding effects of differences in demographics. In terms of complications, the likelihood of needing a transfusion and the odds of having a complication were higher in the diabetic cohort. While none of this is surprising – given what is known about diabetes and other arthroplasties – this study adds valuable information about the increased risks of surgery in diabetics undergoing elbow replacements.

Salvage surgery for failed Bankart repair

Surgery for shoulder instability is not always universally successful. Although recurrence rates are low, patients can re-injure themselves, suffer ongoing micro-instability or failure of the primary procedure. There is little written about revision surgery with a second Bankart repair (although the outcomes of other procedures such as the Laterjet are well described). Given the significant downsides of the 'non anatomic' stabilisations which are popular in failed instability surgery, surgeons in **Washington (USA)** have been performing an open revision Bankart procedure.[6] Their results are now available at a minimum of ten years' follow-up. In one of the longest and largest revision series, the clinical team report their patient cohort at more than ten years of mean follow-up following revision shoulder stabilisation surgery. Their 30 patients had all undergone revision surgery for failed primary shoulder stabilisation. All of these patients had undergone failed Bankart repair (15 patients a single arthroscopic procedure, seven open repairs and the remainder a range of other procedures). These patients all underwent revision surgery by a single experienced surgeon who performed comprehensive open stabilisation. As would be expected, there was some minor stiffness (elevation loss 1.15°, abduction loss 4.2°, external rotation loss 3.2°) when compared with the normal side. Reassuringly, when examined by an independent examiner the authors report no apprehension signs, excessive pain, or residual instability. The majority of athletes returned to sport post-revision surgery (n = 22/23). While the authors report acceptable outcomes following revision stabilisation, the long-term outcomes are still as yet far from clear following failed primary stabilisation surgery. Worryingly, the authors report just 13 normal radiographs in their series, with the remainder having a mixture of mild or moderate OA changes.



Sternoclavicular joint reconstruction

x-ref Trauma

High energy shoulder girdle trauma associated with blunt injuries such as road traffic accidents and falls from a height can result in some fairly severe injuries such as sternoclavicular joint dislocation, scapulothoracic dissociation and first rib fracture. These injuries are commonly associated with neurovascular compromise including severe plexus injury, subdanan artery injury and, in the longer term if the acute sequelae are avoided, ongoing pain and stiffness. The sternoclavicular joint injury is a rare and difficult injury to treat, often associated with longer-term instability and pain. With difficulties and risks associated with metalwork migration into and around the mediastinum, there has traditionally been some understandable reluctance to provide stabilisation. The figure-of-eight tendon graft technique has not only superior biomechanical properties to other techniques, but also minimises the risk of metalwork migration. A study team in **Birmingham (USA)** report the clinical outcomes of this technique which has been previously shown to have superior stiffness and peak load properties to alternative options.[7] They were able to report the clinical results of a small series of ten patients, all treated with the figure-of-eight technique and followed up using clinical outcome scores (American Shoulder and Elbow Surgeons (ASES) score, QuickDASH score, and VAS pain). The graft was secured using two tenodesis screws. Follow-up was achieved to a mean of 38 months and the mean ASES score achieved was 35.3 points. Perhaps the most marked change was in VAS pain scores falling from 7.0 pre-operatively to 1.15 post-operatively.

There were no major post-operative complications; two patients suffered minor complications. The results of this series are suggestive of excellent results, for the most part, for this tricky and rare injury. Use of tendon grafting appears to be safe and suitably effective in what is admittedly a small group of patients.

Steroids effective in the short term for tennis elbow

Elbow problems are relatively common (up to 3% of the population will suffer from tennis elbow), however, there are few surgeons who specialise in elbow surgery and little in the way of good quality evidence to support their practice. We were delighted here at *360* HQ when the report from a research team in **Isfahan (Iran)** the results of a randomised controlled trial crossed our desks.[8] The research team set up the trial to compare the adequacy of two treatments for tennis elbow. The study was designed to establish any differences in clinical efficacy of local steroid injection when compared with a placebo of saline. This double blind randomised controlled trial included both interventions used with and without splintage, and used a primary outcome score of the VAS for pain measured at two, four and 24 weeks, with the Oxford Elbow Score also being reported at 24 weeks. The study team recruited 79 patients and established that those in the corticosteroid group had improved pain measured by the VAS at both two and four weeks post intervention (4.5 *versus* 2.8) although this difference had narrowed by 24 weeks post injection. Interestingly, at final follow-up there was a greater improvement in the Oxford Elbow Score in the saline injection groups when compared with the corticosteroid groups. The authors concluded that the clear short-term benefits of steroid injection are precisely that – short-term benefits. Clearly not the long-term solution for tennis elbow. However, this study shows some short-term benefit, certainly up to a month, and in all likelihood significantly longer.

REFERENCES

1. **Gupta AK, Harris JD, Erickson BJ, et al.** Surgical management of complex proximal humerus fractures – a systematic review of 92 studies including 4,500 patients. *J Orthop Trauma* 2014;29:54-59.
2. **Jung SW, Shim SB, Kim HM, Lee JH, Lim HS.** Factors that influence reduction loss in proximal humerus fracture surgery. *J Orthop Trauma* 2014 Dec 2.[Epub ahead of print] PMID: 25470562.
3. **Mellema JJ, Janssen SJ, Guitton TG, Ring D.** Quantitative 3-Dimensional Computed Tomography Measurements of Coronoid Fractures. *J Hand Surg [Am]* 2014 Dec 13. [Epub ahead of print] DOI doi:10.1016/j.jhsa.2014.07.059.
4. **Merolla G, Paladini P, Di Napoli G, Campi F, Porcellini G.** Outcomes of Arthroscopic Hill-Sachs Remplissage and Anterior Bankart Repair: A Retrospective Controlled Study Including Ultrasound Evaluation of Posterior Capsulotenodesis and Infraspinatus Strength Assessment. *Am J Sports Med* 2014 Dec 11. [Epub ahead of print] PMID: 25504843.
5. **Pope D, Scaife S, Tzeng TH, Vasdev S, Saleh KJ.** Impact of diabetes on early postoperative outcomes after total elbow arthroplasty. *J Shoulder Elbow Surg* 2014 Dec 9. [Epub ahead of print] PMID: 25499723.
6. **Neviaser AS, Benke MT, Neviaser RJ.** Open Bankart repair for revision of failed prior stabilization. *J Shoulder Elbow Surg* 2014 [Epub ahead of print] PMID: 25498480.
7. **Sabatini JB, Shrug JR, Clay TB, Oladeji LO, Ponce BA.** Outcomes of augmented allograft figure-of-eight sternoclavicular joint reconstruction. 2014 Dec 3. [Epub ahead of print] PMID: 25487906.
8. **Tahririan MA, Moayednia A, Momeni A, Yousefi A, Vahdatpour B.** A randomized clinical trial on comparison of corticosteroid injection with or without splinting versus saline injection with or without splinting in patients with lateral epicondylitis J Res Med Sci 2014;19:813-818.