

X-ref For other Roundups in this issue that cross-reference with *Shoulder & Elbow* see: *Children's orthopaedics Roundup 7*; *Research Roundup 4*.

The subscapularis peel for head split

X-ref

■ Articular fractures, especially of the proximal humerus, present a dilemma in regard to the competing basic principles of anatomical reduction, on the one hand, and preservation of soft tissues and blood supply, on the other. In cases where the lesser tuberosity is intact, our traditional deltopectoral approach only permits windows through the rotator interval, or a subscapularis split in the line of its fibres, in order to visualize and instrument a head split fracture. Other options for access, such as lesser tuberosity osteotomy or subscapularis tenotomy or peel, are traditionally thought to increase the risk of avascular necrosis by placing in jeopardy, or even damaging, the anterior circumflex vessels or ascending arcuate branches. In the younger cohort of patients who would usually undergo open reduction and internal fixation (ORIF) rather than arthroplasty for head-splitting fractures, this is an important consideration, and so it is with interest that we read this article from **Houston, Texas (USA)**, which challenges the traditional idea that these approaches are inadvisable.¹ The authors present a case series of younger patients with head-split proximal humerus fractures treated with ORIF through a deltopectoral approach with a subscapularis peel. The anterior humeral circumflex artery and its venae comitantes were ligated as a matter of course, and a subscapularis peel was performed. Five patients were studied with a mean age of 44 years, and were followed up to a mean of 28 months (and a minimum of 12 months). No cases of avascular necrosis, infection, or failure of fixation were reported, and a mean American Shoulder and Elbow Surgeons Shoulder Score of 79 was achieved. Although a small series, the results are certainly encouraging; however, here at 360, we would like to see the results of a larger series before violating the anterior circumflex vessels wholesale. We also wonder if some fractures could be adequately visualized by peeling only the superolateral corner of the subscapularis and protecting the circumflex vessels. What this paper does serve to do is reconsider whether these approaches should be 'off the table' when dealing with a difficult head-split fracture in a young patient.

Rotator cuff repair with and without added platelet-rich plasma at five years

■ The indications for platelet-rich plasma (PRP) injections have expanded and, as predicted by Scott's parabola, the evidence seems to be catching up. Here at 360, we are interested to see the report of this mid-term randomized controlled trial of PRP use in the context of rotator cuff repair from **São Paulo (Brazil)**, which examines both the clinical and structural outcomes of patients enrolled into the trial at five years following surgery.² Overall, 54 patients who underwent a single-row arthroscopic repair of an isolated small or medium supraspinatus tear were randomized to either PRP application or no additional intervention. The PRP was applied at the bone-tendon interface and was prepared by apheresis with autologous thrombin. At final follow-up of this study, there were 51 patients remaining for clinical analysis and 44 for structural analysis. At 60-month follow-up, the mean University of California, Los Angeles (UCLA) scores in the PRP and no-PRP groups were 32.5 and 32.1, respectively; the Constant scores were 82.0 and 82.1, respectively; and the visual analogue scale for pain scores were 1.4 and 1.5, respectively. At the 6-, 12-, and 24-month follow-ups, there were no significant differences between the groups. Imaging was available in the form of MRI, and was performed at 12 and 60 months. The MRI scans were used to assess the tendon structure and were graded according to Sugaya's classification. The overall number of retears was not significantly different between the two groups: there were 11 partial-thickness retears and one full-thickness retear in the control group; and seven partial-thickness retears in the PRP group. Overall, this study appears to validate our beliefs that adding liquid PRP to a rotator cuff repair, without a retaining delivery vehicle and in an environment that is inevitably bloody at the end of the procedure, adds little to a tendon repair. However, we do wonder whether this study was underpowered to detect any difference, and observers may challenge the blanket choice of a single-row repair, especially for medium-sized tears.

MRI for glenoid bone loss: a matched CT analysis

■ There has been an explosion in the availability of 3D imaging in recent years and, in the orthopaedic profession, we are rarely shy about requesting CT scans. We do, however, often

overlook the doses of radiation involved, especially in younger patients. One area where we could potentially avoid the radiation associated with a CT scan without compromising on the diagnostic benefit of the scan is in the assessment of glenoid bone loss in shoulder instability, a condition that often affects a younger cohort. An MRI is commonly requested but, where some bone loss has occurred, many surgeons will request a CT, distrusting the accuracy of MRI for its quantification. This is important, as treatment decisions may depend on quite subtle differences. Is this unnecessary? This study from **Kansas (USA)** would contend that this may be the case.³ The authors present a comparative series of CT and MRI scans in patients with shoulder instability and glenoid bone loss. There were eight consecutive patients with shoulder instability reported in this paper, both acute and chronic, who had undergone both CT and MRI of their shoulder. In each case, the CT scans underwent 3D reconstruction and the MRI scans were performed with a 3-Tesla machine and also underwent additional volumetric and autosegmented sequencing. En-face views with each modality were both manually measured and auto-measured for glenoid bone surface area and bone loss. A best-fit circle technique was used, and the amount of bone loss was compared with the loss of surface area and expressed as a percentage. There were no differences in glenoid bone loss measured by 3D CT, with an estimate of 41 mm² in the CT group and 40 mm² with MRI. There was no difference between the mean glenoid bone surface areas seen in the manually calculated and auto-calculated CT scans, which were 644 mm² and 640 mm², respectively. This was also the case when comparing the manually calculated and auto-calculated MRI scans, where the measurements were 622 mm² and 618 mm², respectively. A regression analysis was performed, demonstrating excellent correlation between CT and MRI for both surface area and bone loss calculations, R² = 0.84 to 0.90. This study therefore suggests that MRI is a reliable alternative to CT scan in the estimation of glenoid bone loss, and allows us to safely reduce the radiation exposure for our patients. Although the software is not as readily available to undertake secondary CT analysis and there are more constraints on what can be achieved with images after they are acquired, this looks likely to be a worthwhile avenue to continue exploring.



What should we do with grade 3 and 4 acromioclavicular joint (ACJ) dislocations? X-ref

■ Although grade 3 and 4 acromioclavicular joint (ACJ) dislocations are relatively common injuries, their management remains somewhat controversial. Despite the obvious shoulder deformity, which tends to explain the inclination of surgeons and patients to explore fixation, the current evidence is inconclusive in its support for either operative or nonoperative treatment. A recent study published by the Canadian Orthopaedic Trauma Society (COTS) group included grade 5 injuries and utilized hook plate fixation for the operative group, concluding that there were no differences. In this single-centre prospective randomized controlled trial from **Edinburgh (UK)**, the authors randomized 60 patients to either nonoperative management (n=31) or surgery (n=29) involving open reduction and use of a tunnelled suspensory device fixation using two TightRope devices (Arthrex).⁴ Patients were reviewed for their outcomes at six weeks, three months, six months, and one year post-injury, with the primary outcome measure being the Disabilities of the Arm, Shoulder and Hand (DASH) score. Secondary outcome measures reported included the Oxford Shoulder Score, the 12-Item Short-Form Health Survey (SF-12), complications, and costs. Both groups were well matched at baseline, and the one-year follow-up rate was 93%. There were no significant differences seen in any of the outcome measures between groups at any timepoint, apart from inferior DASH scores in the surgical group at six weeks. The mean degree of x-ray displacement was significantly less in patients following surgery (1.75 mm vs 10.61 mm), but the cost was significantly higher (£796 vs £3360). There were five patients (16%) in the conservative group who subsequently underwent surgery: four for discomfort and one for cosmesis. Despite the obvious limitations of this trial related to its small size, this study adds further evidence to suggest there is no clear short-term benefit of surgery over conservative management for these injuries. However, as the authors themselves state, a notable number of patients in the nonoperative arm required delayed surgical ACJ reconstruction.

Identifying these patients early should be the aim of future work in this area.

Anatomical total shoulder arthroplasty: the sling matters

■ While there has been so much focus in the literature on the reverse shoulder arthroplasty, there has been little in terms of academic column inches spared for the anatomical total shoulder arthroplasty. However, over the past few years, studies have reported the improved mid-term outcomes for anatomical total shoulder arthroplasties, with five-year survival rates at 95% from the Norwegian Arthroplasty Register. As with many other areas of shoulder pathology, there is very little data on the method and importance of sling immobilization following injury or surgery. In this single-centre prospective randomized controlled trial from **South Dakota (USA)**, the authors randomized 36 patients to either neutral rotation (n=17) or internal rotation (n=19) slings following anatomical total shoulder arthroplasty for glenohumeral osteoarthritis.⁵ Patients were reviewed at two weeks, six weeks, three months, six months, and one year post-surgery; the primary outcome measure was the Disabilities of the Arm, Shoulder and Hand (DASH) score. Although this represents little more than a pilot study due to the small number of patients entered, it is an important study in that rehabilitation strategies are rarely tested in randomized trials. Secondary outcome measures reported here included the Western Ontario Osteoarthritis of the Shoulder Score, visual analogue scale for pain score, patient satisfaction, and range of movement. Both groups were well matched at baseline, apart from a higher proportion of males in the internal rotation group. The one-year follow-up rate was 92%. The authors report statistically significant superior improvements for the neutral rotation sling group for many of the range of movement assessments, including external rotation and adduction, as well as better night pain scores at two weeks. However, no statistically significant difference was found between the two groups for any patient-reported outcome score, or for satisfaction at any of the timepoints assessed. The authors advocate the use of a neutral rotation sling for this patient group following anatomical total shoulder arthroplasty surgery. Although this study adds data to a sparse area of the literature, it has obvious limitations, including the small sample size and lack of power, as well as the short-term follow-up. Further work in this area is needed to determine whether sling position does matter following this type of surgery.

Terrible triad injuries of the elbow: is excision really an option?

■ A terrible triad fracture-dislocation of the elbow is a complex injury, which is referred to as 'terrible' due to the problems of postoperative stiffness and instability. Surgery is routinely recommended, with the results of surgery improving following the well-cited surgical protocol put forward by the team at St. Michael's Hospital in Toronto, Canada. Very low rates of recurrent subluxation/dislocation have been found following early surgery within two weeks of injury, with repair of the lateral collateral ligament (LCL) and radial head arthroplasty. There have been some recent small case series documenting positive results when nonoperative management is employed in very select patients. In this retrospective series from **Tehran (Iran)**, 44 patients with a terrible triad injury of the elbow were reviewed following either radial head resection (n=29) or arthroplasty (n=15) with concomitant LCL repair.⁶ At the beginning of the manuscript, the authors state that this was driven by the unavailability of radial head prosthesis in their institution following international economic sanctions. Of the 29 patients in the resection, all underwent coronoid fixation and medial collateral ligament (MCL) repair. The two groups were well matched in terms of basic demographics and injury characteristics, but with a shorter length of follow-up in the resection group. No difference between the two groups was found in terms of range of movement, visual analogue scale for pain score, the Disabilities of the Arm, Shoulder and Hand (DASH) score, or the Mayo Elbow Score. All elbows and forearms were stable at the final follow-up, with overall comparable complication rates (but with different complication profiles consistent with the two techniques). The authors conclude that the outcome of radial head excision and arthroplasty are comparable for terrible triad injuries of the elbow. However, this study is limited by the retrospective design and small numbers, with the authors concluding that further studies would be needed to advocate excision over arthroplasty. Another important caveat to this study is that all patients in the resection group underwent MCL repair as standard. This is routinely only performed if there is ongoing stability following stabilization on the lateral side. Interestingly, 13/15 in the prosthesis group in this study also underwent MCL repair, which anecdotally seems higher than would be expected using this protocol, and is higher than elsewhere reported in the literature. Here at 360, we would suggest that there should be

a very low threshold for radial head arthroplasty for these injuries, as this would seem to negate any concern regarding elbow stability or forearm rotation in the longer term.

What determines outcome following upper limb injuries?

■ Psychological factors are known to influence both surgeon- and patient-reported outcomes for pretty much all conditions of the upper limb. There are also prospective randomized clinical trials that have reported the positive effects of pre-operative priming on patient-reported outcome scores. However, it remains unclear whether such patients still benefit from surgery, and whether anything can be done to influence these psychological factors so as to improve outcomes. In this international collaborative study, the authors performed a systematic review of 41 studies to determine which factors are commonly associated with disability after upper limb trauma in adults.⁷ The authors report that depression, catastrophic thinking, anxiety, pain self-efficacy, and pain interference were consistently associated with disability after upper limb trauma, along with social and demographic factors. Interestingly, factors such as injury severity and range of movement were least associated with disability. Also, of note, one in ten studies was found to misrepresent outcome scores related to disability. The authors highlight the importance of the association between psychological and social factors with disability, as well as emphasizing the use of World Health Organization International Classification of Functioning, Disability and Health (WHO ICF) framework to improve the research in this area. This study also further highlights issues that we have discussed previously here at 360. Should we adapt current patient-reported outcome measures to consider the obvious influence of psychosocial status? Also, should large prospective randomized controlled trials rely solely on outcome measures that can be so strongly influenced by the mental wellbeing of the patient?

Glenohumeral joint capsule alone does not prevent superior translation

■ One of the common end pathologies seen in cuff arthropathy is the superior migration of the humeral head, which is accompanied by severe degenerative changes, pain, and an alteration in biomechanics of the shoulder. In some centres, superior glenohumeral joint capsule reconstruction has achieved great popularity as an attempt to counter this, whereas in others there is a degree of scepticism. It is certainly a procedure with a long learning curve and there are likely many facets to the technique that we do not fully understand. One debate surrounds the principal mechanism by which superior translation of the humeral head is prevented. This has been purported to be via a physical spacer effect of the interposed tissue or via a tensional hammock effect. These concepts are difficult to examine *in vivo*, and so this group from **Shanghai (China)** have conducted a cadaveric study to analyze this further.⁸ A custom shoulder jig was utilized and six cadaveric injury models were generated: intact shoulder; supraspinatus dysfunction where the supraspinatus was de-tensioned; supraspinatus defect; superior capsule tear where the capsule was de-tensioned; superior capsule defect; and an irreparable cuff tear scenario where the superior capsule and supraspinatus were both removed. The superior translation of the humeral head and subacromial peak pressure were measured at varying degrees of abduction of the glenohumeral joint. At 0° of abduction, the supraspinatus defect model allowed up to 2.6 mm of superior translation and an increase in the subacromial peak pressure of 0.43 MPa, while the superior capsule defect model permitted only 0.6 mm and 0.11 MPa increases, respectively. The supraspinatus was found to have an important role even while dysfunctional, allowing only 1.7 mm of superior translation but no significant increase in the peak subacromial pressure compared with the intact model. There was no significant difference in either translation or pressure when compared

with the supraspinatus defect model, with these both having an intact superior capsule in common. The authors interpret their evidence as an indication that the supraspinatus, rather than the superior capsule, plays a primary role in preventing superior translation, and that the structures rely more heavily on inherent tension than on a spacer effect. These findings may be of interest to researchers investigating the technique of superior capsular reconstruction, where thicker grafts generally have better clinical outcomes and graft tensioning is a pursuit that has been poorly studied.

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