ROUNDUP360

Shoulder & Elbow

x-ref *For other roundups in this issue that cross-reference with Shoulder & Elbow see: Trauma roudup 8; Children's Orthopaedics roudups 1 and 3.*

Myofibroblasts perhaps not implicated in post-traumatic elbow stiffness x-ref

■ The incidence of post-traumatic stiffness in the elbow is considerable, despite the congruent nature of the joint even minor injuries treated non-operatively can result in significant stiffness, which can be permanent. There are some pre-clinical studies that suggest the aetiology may be an active pathology, with increased differentiation of fibroblast-myofibroblasts, which if true would result in active capsular contraction. Surgical release often yields contracted thickened capsule with myofibroblasts visible which are usually absent in normal elbows. Researchers in **Amsterdam (The Netherlands)** set out unpicking some of the basic science in this common clinical problem, performing one of the few case controlled basic science studies in this area.[1] The research team compared two groups of elbow tissue – capsule obtained from 21 patients after acute fracture and from 34 patients undergoing post traumatic release, with specific reference to the distribution and presence of myofibroblasts. Tissue was processed and stained for the presence of alpha-smooth muscle actin which is synonymous with expression of myofibroblasts. The authors noticed a definite difference between the early acute fractures (< 7 days since injury) and the later acute fractures (7 to 14 days after injury); there was no expression of alpha-smooth muscle in the early fractures (10/11) whereas there was a much higher expression (8/10) in the later samples. The picture was completely different with the late releases. The 32 post-traumatic release patients all demonstrated histological changes associated with long standing fibrosis, marked by fibroblast-like cell proliferation, however only two of the longer standing contractures demonstrated changes associated with myofibroblasts. The absence of myofibroblasts in long standing contractures has not previously been described, perhaps there are other as yet unknown processes at work.

Olecranon tip biomechanically sound for coranoid reconstruction

■ Use of the olecranon tip is described in a number of case series as a potentially effective reconstruction for comminuted coronoid fractures. There is little in the literature other than some rather sparse cases describing the technique. As this is a potentially useful reconstruction to be able to restore the normal biomechanical function of a coronoid deficient elbow, researchers in **London (Canada)** investigated the technique with a cadaveric model and an elbow simulator to establish the biomechanical ramifications of this reconstruction.[2] The research team performed biomechanical testing with six arms to establish stability in valgus and varus stress, as well as horizontal and vertical orientations throughout the range of flexion and extension. Testing was undertaken with intact elbows, a 40% coronoid defect and an olecranon tip reconstruction. When compared with the intact elbows, the olecranon defects did result in an angularly unstable elbow with angular deviations of between 3.6° and 10.9° which was particularly pronounced with varus stress. Reconstruction of the coronoid with the olecranon tip restored the elbows completely to their intact state and restored stability to the elbow. This biomechanical cadaveric study very much supports the use of the olecranon tip to restore elbow stability with a coronoid deficiency.

Obesity and elbow replacement don't mix

■ Not to be outdone by their arthroplasty colleagues in the lower limb, the elbow arthroplasty team at the Mayo Clinic, **Rochester (USA)** has set out to establish the effects of obesity on the longevity of total elbow replacements.[3] Current designs of elbow replacement have improved longevity, but the so called 'sloppy hinge' does have its drawbacks. The olecranon component does not have fantastic torsional control and is prone to early loosening and the dissipation of torque forces at the articulation can be associated with significant implant wear and early failure. For this reason many elbow replacement surgeons advocate lifelong restricted weight-bearing following elbow replacement. It is reasonably logical to assume that in obese patients with larger soft-tissue envelopes these torque forces are likely to be more significant, however despite the increasing prevalence of obesity in the western world there is little information concerning the impact this may have on elbow replacement success. With probably the longest experience of elbow replacement in the US and certainly one of the largest series, the team at the Mayo Clinic are ideally placed to answer this question. Over the nine years of the study the surgical team implanted 723 total elbow replacements (TER) into 654 patients, the majority of whom (76%) were women. The majority of patients were non-obese with a BMI <30 kg/m^2 (78% n = 564) while 22% were obese (n = 159). Follow-up was to 5.8 years and survival proportions estimated with the Kaplan–Meier method with a Cox regression model used for estimating revision risks. During the duration of the study, the risk of revision was roughly 1:6 with a ten year estimated survival of 86% in non-obese patients and 70% in obese patients for all causes of revision. The excess revisions were accounted for by the disparity in mechanical failure rates. These differences were more pronounced in the severely obese, with hazards for revision of 3.08 compared with normal controls. This disparity is so great that the authors feel "obese patients being considered for elbow replacement surgery should be counselled accordingly", and we have to say here at *360* we tend to agree. Whilst

the authors have not shared any clinical outcome data, the discrepancy in survivals is great enough that obese patients should be warned of their higher chances of revision surgery.

Single column plating successful for extra-articular distal humeral fractures x-ref

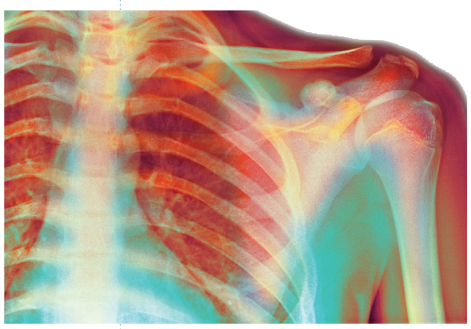
Biomechanically, the distal humerus has been historically challenging to treat with many authors opting for orthogonal plates, even for extra-articular diaphyseal fractures. This raises some challenges to avoid excessive soft-tissue stripping and neurological injuries. The extra-articular locking compression humeral plate was developed to try and address this problem. With a re-inforced shaft component and contoured anatomical locking lateral column flare, it is designed to sit as a single plate on the posterior aspect of the humerus. Given the widespread adoption of this technique with the new plate enthusiastically taken up by shoulder and elbow surgeons the world over, clinicians in **New York (USA)** decided it was high time to see if the prosthesis is as successful as surgeons had hoped it might be.[4] They report a series of 21 consecutive prospectively followed patients, all treated for extra-articular fractures of the distal humerus with the extra-articular distal humerus plate. Patients were followed-up for ten months and clinical and radiological scores were collected including outcomes assessed with the DASH and VAS pain scores. Outcomes as assessed on radiographs showed no loss of reduction or fixation by final review. There was a single complication with a post-operative sensory ulna nerve palsy. The nature of the Holstein-Lewis fracture is such that unsurprisingly nine patients had a pre-operative palsy. All of these nerve palsies recovered in the post-operative period. DASH scores were a mean of 25.8 points at final follow-up with an excellent recovery in range of movement. This particular plate does appear to have solved the loss of fixation associated with single column plating historically and provides an excellent construct biomechanically to provide high levels of stability to this otherwise often deceptively tricky fracture.

Satisfaction not predictable in frozen shoulder

Adhesive capsulitis is a condition with certain connotations, and we have previously in the pages of *360* carried reports of papers examining the psychological and depressive associations with patients suffering from frozen shoulder. Researchers in **Toplice (Croatia)** have revisited this difficult condition taking a slightly different approach in an attempt to pick the problem apart and shed a little more light on who does well and who does not with arthroscopic release.[5] Using an interesting methodology the study team performed a comparative cohort series comparing arthroscopic release for frozen shoulder in both post-traumatic and idiopathic subgroups. Unusually the study team managed to collect data on both satisfaction scores and clinical outcomes. This case matched series consisted of 50 patients (25 in each group) and all patients were treated with six months of physiotherapy prior to surgery followed by extensive arthroscopic capsular release. Outcomes were assessed using the Constant score, range of movement and satisfaction scores. Outcomes were assessed pre-operatively, and at 48 hours, 1 month and 6 months after operation. Clinical outcomes improved significantly in both groups and there were no significant differences in outcomes between the two groups. Despite the lack of difference in clinical outcome measures, the satisfaction rates were different between the two groups. Patients expressed higher satisfaction rates in the post-traumatic group than the idiopathic group. Further investigation is definitely needed here to establish the causation.

Tenodesis and repair both acceptable in Grade II SLAP tears

In the lower grades of SLAP tear it is unclear if repair or simply tenodesis is the more effective treatment. In a comparative uncontrolled series, surgeons from **Melbourne (Australia)** analysed a retrospective case series of just 25 patients.[6]



Of the 25 patients, 15 underwent tenodesis and 10 a SLAP repair. As this was an uncontrolled case series, operation choice was at surgeon discretion and patients undergoing tenodesis tended to be older with frayed or moderately degenerate labral tears. Follow-up was to just over 30 months in each group and outcomes were assessed using the American Shoulder and Elbow Surgeons Score (ASES). There were no significant differences between the repair and tenodesis groups with scores of 93% and 93.5%, respectively and satisfaction scores of around 90% in both groups. In both groups there was a single case of failure and no cases of infection. In the case of isolated type II SLAP tear it does appear that surgeon discretion leaves patients with very similar functional results. This does not of course mean that the treatments are equivalent – a randomised controlled trial would be needed for that!

Glenoid bone grafting is effective

One of the more tricky pre-operative arthritis patterns to deal with in shoulder replacement is that of eccentric glenoid wear. Migration of the humeral head in erosive arthritis can result in eccentric bone loss, leaving a glenoid that is neither suitable for a hemiarthroplasty due to its involvement nor particularly suited to a total shoulder replacement due to the lack of (usually superior) support. In other types of arthroplasty surgery the use of bone grafting to restore bone stock is common place in complex primary surgery (such as protrusion-acetabulae and valgus knees) but, although in use, is not commonly reported in the literature around the shoulder. Surgeons in **Rochester (USA)** have been using glenoid bone grafting during primary shoulder arthroplasty to restore bone stock in the asymmetrically eroded glenoid.[7] They argue that the benefits of additional support and improved position and lever arm is likely to result in a longer lasting, better functioning prosthesis. In their series they used structural bulk autograft using bone harvested from the humeral head and screw fixation was used to restore the geometry of the shoulder. In this database study of 2607 primary shoulder arthroplasties performed over a 32 year period, just 25 shoulders underwent structural bone grafting (0.96%). Clinical follow-up was achieved to a mean of nearly nine years and radiological to a mean of just over 7.5 years. Outcomes were impressive, with active elevation reaching 148°, and external rotation to 60°. From a radiological perspective, ten of the glenoids were classified as 'at risk' although pain relief and satisfaction rates were unaffected in these patients. Over the period of the study, two shoulders required revision and overall the clinical and revision outcomes were favourable. This is a useful although seldom used technique that offers good clinical outcomes. The authors inject a note of caution with honest concerns about the radiological outcomes in the longer term. Given the complexity of the primary surgery and the likelihood of early failure had the bone stock not been restored,

here at *360* we think the authors may be overplaying the downsides of this technique.

Glenohumeral articular lesions best seen with an arthroscope

Although the majority of patients undergoing rotator cuff surgery these days will undergo a therapeutic arthroscopy, there is still a fairly sizeable cohort of surgeons who prefer an open approach, and a number of patients who do not have arthroscopically amenable lesions. In the majority of healthcare settings, patients are likely to have diagnostic imaging prior to undergoing their rotator cuff surgery, in some centres this is ultrasound, in others it is MRI with or without contrast. MRI potentially visualises the shoulder and other structures including, if present, glenohumeral articular cartilage lesions. In a simple but interesting diagnostic study, authors from **Philadelphia (USA)** obtained non-contrast MRI scans on 84 serial patients undergoing shoulder arthroscopy for rotator cuff pathology.[8] Patients all subsequently underwent arthroscopic evaluation with specific attention to the glenohumeral joint and articular cartilage defects noted. The MRI scans were reported by two independent and blinded radiologists on two separate occasions. At arthroscopy there was a 27% frequency of humeral head lesions and a 24% incidence of glenoid lesions. The humeral head lesions were diagnosed with a 78% accuracy (sensitivity 43%, specificity 91%) and the glenoid lesions were slightly more accurate at 84% (sensitivity 53%, specificity 93%). It probably comes as little surprise that low grade lesions were the most commonly missed (63% missed in glenoid and 86% missed in the humerus). Not unreasonably the authors of this study recommend that given the high incidence of osteochondral defects, that patients with rotator cuff tears should undergo a diagnostic arthroscopy even if they are listed for an open repair.

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