ROUNDUP360

Shoulder & Elbow

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

Deltoid impairment not necessarily a contra-indication for shoulder arthroplasty

The indications for reverse shoulder arthroplasty continue to grow, and we were amazed to see this report from surgeons in **Meyrin (Switzerland)** describing their experience of reverse shoulder arthroplasty in patients with severe deltoid impairment. Traditionally, patients with deltoid impairment have been contra-indicated in the most part for total shoulder replacement due to the high risk of dislocation following surgery. These plucky Swiss surgeons have, however, not been deterred by lack of muscle stability, and reasoning that the reverse shoulder arthroplasty (RSA) has a semi-constrained design, they have been offering the RSA to patients with deltoid impairment for over ten years now. They report their experience of nearly 50 cases in this month's *Bone & Joint Journal*. Patients were included in the review if they had electro-diagnostic studies demonstrating denervation of the deltoid or an MRI scan demonstrating grade 3 or 4 fatty infiltration of the deltoid. Patients were only felt to be clinically suitable for RSA if they had clinically assessable MRC grade III motor function in the deltoid. Patients were operated on in a standard manner through both a delto-pectoral and deltoid split approach at the surgeon's discretion, and the anatomy and biomechanics of the proximal humerus were restored as much as possible. Of the 49 patients in this series, 18% (n = 9) suffered post-operative complications which is in line with previously published series, and there were only two episodes of dislocation at the time of final follow-up (minimum 12 months). Other complications included neurological injury and compromise (two patients), superficial infection (two patients), stiffness requiring arthrolysis (two patients) and a single case of periprosthetic fracture. The functional outcomes reported by the investigators for this series are impressive (with some patients achieving up to 120 ° of forward elevation) and whilst improvement is better than in many reported series, as would be expected, overall outcomes are not quite comparable with other data-published series. There are a large number of significant complications reported in this series (with five patients, 10%, requiring operative intervention for complications).[1] The authors conclude that they have been able to obtain acceptable functional results in their series of patients with severe deltoid impairment. We are certainly extremely impressed with the results reported here. If these results are reproducible in other centres then here at *360* we believe this paper should (and hopefully will) change the indications for reverse shoulder arthroplasty.

The tricky radiograph

It is not an uncommon thing for us here at *360* to be faced with a bit of head scratching when trying to interpret the scapula radiograph in the presence of a fracture. Deciding the indications for scapular fracture fixation is tricky enough and often requires a two-way dialogue between shoulder surgeons and their trauma surgical colleagues. In many published series (and nearly every textbook chapter on the subject) one of the indications for fixation of extra-articular scapular fractures is the assessment of the glenopolar angle. Taking a good scapula radiograph is difficult at the best of times. When the patient has a fracture, obtaining an accurate radiograph can be extremely difficult. Researchers in **Minneapolis (USA)** have designed a deceptively simple study to establish the effect of scapular rotation on perceived glenopolar angle on the AP shoulder radiograph. Using 25 non-paired scapula samples, the researchers undertook a radiographic study using metal markers and fluoroscopic imaging to assess the effect of rotation on perceived glenopolar angle. The research team used fluoroscopic imaging to assess the measured glenopolar angle in 10° increments from the true AP projection. The research team identified difficulties with assessment of the true glenopolar angle with variation by up to 40°, depending on the rotational offset of the scapula.[2] Whilst the study team conclude that true AP radiographs are essential for decision making in scapular fractures, we do wonder if, in this day and age of easily accessible cross sectional imaging, a CT scan with an appropriate reconstruction in the plane of the scapula would not add a vast amount of information to help in the decision making process and would also overcome difficulties of rotation in assessing the glenopolar angle.

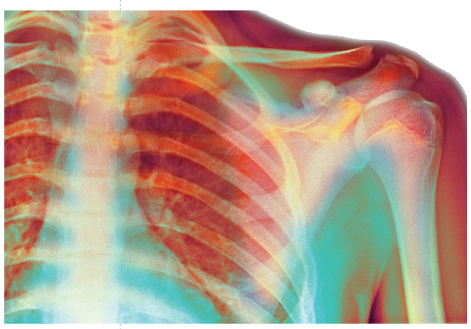
Not so asymptomatic cuff tears

The asymptomatic cuff tear is something of an enigma. Little is known of the prevalence, incidence or long-term prognosis of patients presenting with an incidental finding of a rotator cuff tear. Researchers in **Oslo (Norway)** have set out to establish if the 'innocent' finding of an asymptomatic cuff tear really is so innocent. The study team identified 50 patients who presented with initially asymptomatic cuff tears that were followed in a prospective cohort study (Level II prognostic study). The research team undertook clinical, ultrasonographic and MRI prospective follow-up on the patients over a three-year period. They document changes in symptomatology, and structural (radiologically determined) changes of tear size, atrophy, fatty degeneration and function of the long head of biceps. During the period of follow-up, 36% of patients became symptomatic, and these patients were found to have significant propagation of their tear by over 10 mm. The symptomatic patients also had a higher rate of progression to advanced muscle

atrophy (35% *versus* 12%), with similarly significant changes seen in the rate of fatty degeneration (35% *versus* 4%) and biceps tendon pathology (33% *versus* 6%).[3] Although these authors report a relatively short-term outcome study, they do report some of the best data on the prognosis of asymptomatic rotator cuff tears. This paper sheds some light on the natural history of rotator cuff tears and the pathoanatomy of symptomatic cuff degeneration. The authors make some extremely reasonable recommendations that patients who present with the incidental finding of an asymptomatic rotator cuff tear should be followed up, and that repeated imaging may be necessary to assess for progression.

Total shoulder arthroplasty: kinder on the glenoid

■ Proponents of shoulder hemiarthroplasty for arthritis often cite the difficulties of revising a total shoulder arthroplasty should they go on to develop glenoid loosening, whilst proponents of primary total shoulder replacement point to better functional scores in patients who have undergone primary total shoulder replacement. Researchers in **Adelaide (Australia)** set out to establish the differences (if any) in the long-term outcomes of total shoulder arthroplasty (TSA) and hemiarthroplasty (HA) in a small randomised controlled trial (Level I evidence). The study team were able to follow up 33 patients to a minimum of ten years following their surgery. There were no losses to follow-up except through death. Patients were followed up with pain and function scores. By six months there were significantly better functional outcomes in the TSA group and this difference continued to widen until two years post-operatively. At final (ten-year) follow-up there were no statistically significant differences in pain, function or daily activities, however, 42% of surviving TSA patients were "pain free" where no HA patients were. There were four revisions in the HA group and only two in the TSR group, giving survival rates of 69% and 90%, respectively.[4] This paper, a well conducted randomised trial with long-term follow-up, apparently confirms the superiority of TSR to HA, not only in a short perspective, but also after ten years. The contention that TSR leads to an unacceptably high rate of glenoid revision is not supported in this series and on the contrary, the authors found conversion from HA to TSR at revision more challenging than revision of a loose glenoid component. The severe glenoid bony erosion, found particularly in the posterior glenoid, in the failed HA patients is likely to present a major challenge to revision surgery.



Barbotage for calcific tendonitis

■ The incidence of supraspinatus tendonitis is significant, and is often associated with acute onset of severe shoulder pain. There is, however, very little consensus on the most appropriate treatment. The two most commonly practiced treatments are injection (usually with corticosteroid) and more invasive barbotage treatments (usually arthroscopic or ultrasound guided). Despite the relative frequency of the condition there is no real agreement on the best treatment: an ideal equipoise position for resolving with an RCT. Researchers in **Leiden (The Netherlands)** designed and implemented a randomised controlled trial to evaluate the two interventions, subacromial injection with or without barbotage. The outcomes were assessed primarily by the Constant shoulder score and Western Ontario Rotator Cuff Index administered at six weeks, three months, six months and a year. In addition, the DASH score, calcification location, size and radiographic classification were measured to determine secondary outcomes. The researchers were able to recruit 48 patients to their study with a mean baseline constant score of just short of 70. The research team were able to achieve 100% follow-up, and by final follow-up at one year the outcome scores were significantly better in the group who had undergone barbotage than in those who had not (constant scores 86 *versus* 73.9). This was accompanied by a decrease in size of calcification. Additionally, a significantly higher proportion of patients who had undergone barbotage had complete resolution of their calcification (54% *versus* 25%).[5] The study adequately demonstrates that patients who undergo barbotage have a significantly higher chance of better functional outcome and resolution of their calcification.

What happens to the arthritic glenoid?

■ The traditional time-honoured teaching for patients undergoing joint replacement for any indication is the restoration of premorbid anatomy in order to restore soft-tissue tension and function. In total knee replacement many years of study have resulted in (almost) universal agreement about where to place the prosthesis to maximise longevity of the polyethylene and function of the knee replacement. Shoulder arthroplasty has not been examined in such detail, although much attention has been paid to the ideal humeral component position to maximise cuff function and joint stability.

■ Researchers in **Cleveland (USA)** question whether patients having a shoulder arthroplasty procedure have abnormal glenohumeral anatomy (which may even have predisposed to the osteoarthritis). Should we really be aiming to restore the abnormal anatomy through arthroplasty? The researchers decided to establish if the premorbid glenoid anatomy was abnormal with regards to version or inclination as determined by the glenoid vault model, and whether it is best to reconstruct the abnormal anatomy or not. The researchers designed an innovative study using bilateral cadaveric shoulder CT scans in 30 patients with unilateral glenohumeral OA and a further group of 30 CT scans of normal cadaveric shoulders. They used both direct measurement and the glenoid vault model to establish version and inclination in the normal cadaveric shoulders, the osteoarthritic shoulder and contralateral non-pathological shoulder. The researchers established that there really were no differences in the shoulder geometry between any of the shoulders. Pathological shoulders had version of -7° and 10°, respectively; and non-pathologic shoulders -7° and 12° compared with -7° and 12° on the cadavers. There were no differences between the direct measurement and vault model.[6] We have to say we aren't too surprised with the results here at 360. The hypothesis that patients with glenohumeral OA may have abnormal shoulder geometry initially does seem a little unlikely, especially in a condition with such a high event rate. We are delighted, however, to find that there is no requirement to use one particular measurement tool to establish glenoid version and inclination.

Two screws a screw too few?

■ Like the majority of modern uncemented implants, glenoid components rely on osseointegration and bony ingrowth to obtain a stable long-term biologic 'fix'. This fixation is achieved through the use of a suitable surface treatment and screws/pegs to augment the fixation. Screws are only designed to provide the primary stability and must hold the baseplate stable enough to allow for bony ingrowth over the first few weeks to months following surgery.

There are currently a number of glenoid baseplate designs available, and those with fewer screws allow the potential for more flexible positioning and the potential for easier revision without compromising the initial fixation. However, the effect that fewer screws may have on initial fixation is not exactly clear. Researchers in **Syracuse (USA)** designed a series of experiments to establish the effect of either a two-screw or four-screw baseplate design on the initial stability obtained. They used a standardised flat backed glenoid baseplate design with four-screw options, implanted into six matched pairs of cadaver scapulae. The baseplates were randomised to either a two-or four-screw construct and implanted with a glenosphere. Transducers were then used to assess baseplate motion in both anteroposterior and inferosuperior directions during cyclical loading of the glenosphere. There were no differences in peak displacement between the two-or four-screw constructs at any of the test cycles or load. However, as would be expected, the increase in cycles and increasing load were associated with increases in peak central displacement.[7] The authors conclude that given the lack of difference with two screws, that reduced operative time, cost and risk is likely to be associated with the use of a two-screw construct and it does not appear to interfere with obtaining good primary fixation. Perhaps more importantly, it seems to us here at 360 that revision of loose screws can often be associated with large bone voids, and if not required biomechanically, it would seem sensible to leave some 'virgin glenoid' in case of eventual revision.

Sloppy hinge best for elbow arthroplasty

Elbow arthroplasty (like ankle arthroplasty) has a bad reputation across the general orthopaedic community based on a few historic series with high complication rates and relatively poor outcomes. There are two widespread designs of elbow replacement in use today, the unconstrained prosthesis and the so-called 'sloppy hinge' semi-constrained prosthesis. There are few long-term comparative series examining the different survivals and complication rates. Surgeons in **Seoul (South Korea)** have compared their experience of the unconstrained Pritchard & Kudo prosthesis with the newer Coonrad-Morrey prosthesis. The study encompasses 84 primary elbow replacements performed since 1984 with an average follow-up of 13 years. There were 35 unconstrained prostheses and 49 semi-constrained. Patients were managed with a standard post-operative regime including the limitation of lifting to 2.25 kg for repetitive loading and 4.5 kg for a single lift. Both groups experienced a significant improvement in elbow performance scores from a mean Mayo Elbow score of 34 pre-operatively to 84 post- operatively, with a matched increase in range of movement (from 25° to 94° pre-operatively to 12° to 130° post-operatively). The overall complication rate was 44% (n = 37/84) and this rate was significantly higher in the unlinked group (63% *versus* 31%). By the 13-year follow-up reported in this study, the overall revision rate was 27%, with around one in five of the sloppy hinges undergoing revision but almost one in three of the unconstrained prostheses.[8] It is unusual to see long-term, independent follow-up studies of elbow arthroplasties, and even more unusual for them to be comparative outcome studies. While it is important to remember that there is a shorter follow-up in the sloppy hinge group and this is not a randomised controlled trial, it certainly provides evidence favouring the more modern, semi-constrained prosthesis.

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