The Bone & Joint Journal

Journal club: 29 January 2014
Chairman: A/Prof Simon Bell
Attendees: Consultants - John Salmon, Andrew Weber, Warwick Wright, Richard Dallalana, Shane Barwood, Brendan Soo. Fellows: Malin Wijeratna (Melbourne Orthopaedic Group), Scott Barker (Melbourne Shoulder and Elbow Centre) and Afshin Arianjam (San Francisco Orthopaedic Residency Program).
Melbourne Post-Graduate Upper Limb Journal Club

C Xu, J Zhao, D Li. Meta-analysis comparing single-row and double-row repair techniques in the arthroscopic treatment of rotator cuff tears. *J Shoulder Elbow Surg* 2014;23: 182-188.

Reviewer: Malin Wijeratna

Why was the study done? What question are they addressing?
Compare the clinical results of a double-row technique with the results of a single-row technique in patients with rotator cuff tears of different sizes.

Valid model?
All randomized controlled clinical trials (level I and II studies) that reported on the outcome of single row versus double-row techniques in the treatment of rotator cuff tear were included. All other levels of evidence were excluded.

Double row vs single row studies. Double row vs other techniques were excluded. Multiple group studies were included if the results for double and single row could be analysed separately.

Outcome measures – UCLA, ASES, Constant, ROM

Subgroups – Small tear (<30mm) vs large tear (>30mm) in the sagittal plane

Results
150 papers identified using 3 different databases

104 excluded on basis of abstracts and eligibility criteria

37 excluded on basis of eligibility criteria

9 studies included for the meta-analysis (5 level I, 4 level II) – total of 651 pts

Mean age 55-63 years. Mean follow-up from 12 to 42 months

Large tears had significantly better UCLA scores with double row repair (5 studies)

Large tears had significantly better ASES scores with double row repair (5 studies)

Double row repair had a lower re-tear rate on MRI (24%) compared with single row (40%). No subgroup analysis performed. (5 studies)

Double row had better IR but no difference in forward elevation or ER (however only 3 studies)

No difference between muscle strength of groups (4 studies)

Conclusion

Despite the fact that double-row rotator cuff repair techniques have a significantly lower re-tear rate, higher ASES score, and greater ROM of internal rotation, there is no difference in the improvement in the Constant score, UCLA score, ROM of forward elevation and external rotation, or muscle strength. Larger tears (>30 mm) show statistically significant improved functional outcomes with double-row repairs.

Journal Club opinion

Definition of double row and single row need clarification. Heterogenous techniques are being grouped under broad headings of 'double' and 'single' row. Difficult to draw conclusions from any meta-analysis due to this.

A systematic review in JBJS Am (2010) couldn't find a difference between single and double row repair. Only one study looked at tear size and this suggested that there may be improved outcomes for large (>3cm) tears.

Previous meta-analysis published in Sports Health (2011) used 5 of the 9 studies that were used in this study. They found no significant difference between double and single row repairs. However, they were unable to perform a subgroup analysis due to lack of detail in the studies they looked at.

The evidence is possibly showing that that double row repair is better for larger tears with no difference for tears <3cm in size. However, the quality of the studies currently in the literature makes a meta-analysis difficult. A well-constructed large randomised controlled trial is needed.

Smith GC, Hughes JS. Unreconstructable acute distal humeral fractures and their sequelae treated with distal humeral hemiarthroplasty: a two-year to eleven-year follow-up. *J Shoulder Elbow Surg* 2013;22:1710-23.

Reviewer: Scott barker

Why was the study done? What question are they addressing?
The aim of the study was to describe the medium to long-term outcome after distal humeral hemiarthroplasty (DHH) for the first time

Valid model?
Level IV – therapeutic case series, single surgeon

26 patients operated on over 10 years

Surgical technique reported previously by same author (Sorbie prosthesis 12 patients up until 2005, Latitude prosthesis with anterior flange after 2005, 14 patients)

Inclusion:

- patients with distal humeral fractures deemed unreconstructable and patient deemed too young for total elbow replacement due to concerns about wear and functional limitations

- elbow and prosthetic stability could be maintained by reconstructing columns and condyles

21 acute fractures (18 AO C3), 5 failed ORIF's

Mean follow up 80 months (25 – 133 months)

Post op clinical review by first author, although declared as NOT involved in the clinical care of the patients

Outcome measures – ASES, MEPS, QuickDASH, EQ5D

Radiological assessment – various parameters measured but main focus on ulnar Wear on AP radiograph (None = Grade 0, Partial thickness cartilage loss = Grade 1, Full thickness cartilage loss = Grade 2, Bone loss = Grade 3)

Hypothesis

- that there would be a statistically significant difference in the outcome scores between those with mild ulnar wear on radiographs (Grade 0 and 1) and those with severe wear (Grade 2 and 3)

- Ulnar wear would be associated with young age at surgery and increased time since surgery

Appropriate statistics??

– Kolmogorov-Smirnov test confirmed that the data was parametric (unusual for orthopaedic study) therefore Student T-test used. But Spearman correlation coefficient also used which is usually a test for non-parametric data

Only 14 out of 26 patients underwent full post op assessment

- 4 patients excluded as revised (2 periprosthetic fractures, 2 loosening – all Sorbie unflanged prosthesis)

- 4 died, 1 refused review, 1 dementia, 2 lived too far away

Results
Mean age 60 (29 to 85 years)

14 patients left in study – all had good post-op clinical outcome scores with little pain and satisfactory function

Patients with severe ulnar wear on radiographs did have poorer clinical results (in 3 out of 7 outcome measures)

Age at surgery had no bearing on the degree of ulnar wear

Time post-operatively strongly correlated with degree of ulnar wear

10 complications – 4 revisions (see above), 1 wound breakdown, 1 stiffness, 4 ulnar nerve neuritis – all 10 requiring further surgery

10 patients also underwent removal of metalwork from olecranon osteotomy repair

Clinical and radiological outcomes of selected patients presented in detail

Conclusions
DHH should be reserved for patients with unreconstructable distal humerus fractures

In this setting DHH can be reliable treatment for patients unable to comply with restrictions required for total elbow replacement

DHH demanding with high complication rate – could be minimised by using prosthesis with anterior flange and bone graft and performing ulnar nerve transposition

Ulnar wear increases with time postoperatively so may be prudent to advise activity modification as ulnar wear associated with poorer clinical outcome, although even patients with severe wear have not as yet required revision

Limitations
Large number excluded or lost to follow up, 12 out of 26 = 46%

High complication rate

Outcome reporting bias – first author performed clinical reviews

Discrepancy in statistical tests - parametric vs non-parametric

Small numbers compared in 2 ulnar wear groups 10 vs 6

Journal Club opinion
Although the results of this demanding procedure are reasonable and comparable with other studies where ORIF or total elbow replacement was performed for similar fracture patterns, we did not feel that DHH was a particularly attractive option.

In younger patients every attempt should be made to reconstruct the distal humerus and using bone graft and modern anatomical contoured locking plates this should be possible in most cases.

In older patients, total elbow replacement is probably a better option as modern anterior flanged semi-constrained prostheses are more durable than their predecessors and will most likely provide better functional results.

Tytherleigh-Strong G, Griffiths D. Arthroscopic excision of the sternoclavicular joint for the treatment of sternoclavicular osteoarthritis. *Arthroscopy* 2013;29:1487-91

Reviewer: Scott Barker

Why was the study done? What question are they addressing?
To report the results of a series of 10 patients who underwent an arthroscopic excision of the sternoclavicular joint (SCJ) for osteoarthritis (OA) refractory to conservative treatment

Valid model?
Level IV – therapeutic case series, single surgeon

10 consecutive patients with SCJ osteoarthritis underwent SCJ arthroscopic excision Feb 2008 – Feb 2011

Same technique reported previously by same author

All patients symptomatic SCJ with OA on MRI (8 tertiary referrals from other centres)

Mean follow up 28 months (17 – 41 months)

Pre and post op follow up by independent specialist nurse

Outcome measures – Constant and SCJ specific Rockwood score

Appropriate statistics - Wilcoxon signed rank test to detect difference between pre and post op scores (non-parametric data, $p<0.05$)

Results
Mean age 53 years (42 to 62)

All patients had regained full or pre-op ROM by 2 weeks

At most recent follow up:

- 7 no pain, 3 slight pain on activity

- Median Rockwood increased from 6 (poor) to 13.5 (excellent)

- Median Constant increased from 64.5 to 83

No complications

All patients pleased with results and would have procedure again

Conclusion
Arthroscopic SCJ excision is a satisfactory treatment for SCJ OA refractory to conservative treatment

Limitations
Small number of patients (but comparable to other SCJ excision studies)

Short follow up - mean 28 months

Outcome reporting bias – although mentioned in discussion, first 7 patients undergoing SCJ excision not included as slightly different technique used – these first 7 patients had significantly poorer outcomes than those included in the study

Journal Club opinion
Although most cases of SCJ OA can be adequately treated conservatively, Arthroscopic SCJ excision as described does appear to be a satisfactory and reproducible technique for refractory cases.

We agree with the author that this should only be performed by an experienced arthroscopic upper limb surgeon and due to the small numbers of cases it is likely that it will only be performed by a few surgeons in large referral centres.

Chalmers PN, Slikker W 3rd, Mall NA, et al. Reverse total shoulder arthroplasty for acute proximal humeral fracture: comparison to open reduction-internal fixation and hemiarthroplasty. *J Shoulder Elbow Surg* 2014;23:197-204.

Reviewer: Afshin Arianjam

Why was the study done? What question are they addressing?
The study was done to compare the clinical results and costs of reverse shoulder arthroplasty, open reduction internal fixation, and hemiarthroplasty for three and four-part proximal humerus fractures. The hypothesis was that the reverse group will have superior outcomes at a lower cost.

Valid model?
It is a retrospective case control study, level III. All surgeries were performed by a single surgeon in a single centre. Follow-up for the groups were on average: Reverse TSA 1.2 years, hemiarthroplasty 4.9 years, and ORIF 3 years.

Outcome measures – VAS, SST, ASES, SF-12 Quality of Life, radiographs (AP/ axillary/ scapular Y), and ROM. Exam was performed by an unblinded research associate.

Subgroups – Those who could reach 90 degrees active forward elevation (AFE) and thirty degrees external rotation (ER), as both were deemed clinically significant by the authors.

Methods

Inclusion criteria: surgery performed after 2010, Age > 65, three- and four-part proximal humerus fractures, functioning deltoid

Exclusion criteria: active infection, non-functioning deltoid, neurologic condition (Parkinson's), mental condition that would not allow for consenting to the surgical procedure

Note: Reverse TSA group was not given formal PT, and only home-exercises unlike the other two groups. In addition, only the Reverse group was followed prospectively, whereas the other patients were selected and reviewed retrospectively from the surgeon's cases.

Results

	Reverse TSA	Hemiarthroplasty	ORIF
90° AFE $p < 0.05$	9 out of 9 patients	4 out of 9 patients	4 out of 9 patients
Time to 90° AFE	4.2 months	6.9 months	3.8 months
Medicare and Implant Costs	$1735	$6081	$5296
Total Costs	$15352	$20899	$14321
Radiographs	No radiolucency, no notching, no dislocations	Anatomic reduction with tuberosity healing in all cases, no loosening, 1 patient with RC tear and proximal migration	All cases reached radiographic and clinical union, 2 cases with late greater tuberosity displacement
Complications	1 case of CRPS which underwent successful treatment post stellate ganglion block	1 arthrofibrosis (declined treatment) 1 ulnar neuritis (underwent release and transposition)	1 arthrofibrosis (underwent capsular release and subacromial decompression) subsequently developed AVN at 2.3 years → possible TSA

1. No difference in demographics between the groups as they were age and sex matched.

2. No statistically significant difference in outcome scores among all groups, or 30° ER.

Conclusion

Despite no difference in outcome scores, it appears that patients in the Reverse TSA group were all able to reach 90 degrees of active forward elevation much quicker and more reliably than the other groups. In addition, when accounting for costs of PT, in this case the Reverse group was almost as expensive as the ORIF group, with the hemiarthroplasty group being the most expensive option.

Journal Club opinion

There was selection bias in choosing the Hemiarthroplasty and ORIF groups as they were selected at the author's discretion. The authors admittedly acknowledged not having pre-injury function or range of motion, which can also add a variable that was unaccounted for in this project. In addition the authors needed to expand on their exclusion criteria in the case of mental status unfit for procedural consent. Did this mean that there were potential patients that received a reverse TSA who did not consent, or were patients excluded from the possibility of having a reverse if they were unable to consent? Either way, this may be another potential source for selection bias. In regards to the cost analysis, it may be a more common practice to include PT even with a reverse TSA, which does contribute substantially to the overall cost. Furthermore, variations among implant costs at different institutions can likely change the costs associated with each group. Therefore, this may invalidate the cost analysis done in this study. Given the relatively small sample size, nonrandomized nature of this study, potential selection bias, and limited follow-up (1.2 years), it is hard to draw any significant conclusions based on these results. Perhaps, one can infer from this study that there are more predictable clinical results with a Reverse TSA, assuming the patient has the mental capacity to consent to this procedure.

Di Giacomo G, Itoi E, Burkhart S. Evolving concept of bipolar bone loss and the Hill-Sachs lesion: from "engaging/ non-engaging" lesion to "on-track/ off-track" lesion. *Arthroscopy* 2014;30:90-8.

Reviewer: Afshin Arianjam

Why was the study done? What question are they addressing?

The study was done to illustrate two concrete methods of determining whether a Hill-Sachs lesion is engaging or "off-track."

Valid model?

This study was an expert opinion, Level V. Patients were not introduced in this study to demonstrate the validity of the suggested calculation, but a sample calculation was performed for the purposes of this study.

Methods

The glenoid track is defined as the area of glenoid that is in contact with the glenoid as the arm is abducted to 90 degrees, creating a contact area which goes from the inferomedial portion to the superolateral portion; this is roughly estimated to be 83 ± 12 % of the width of the glenoid in healthy non-pathologic glenoids.

To calculate whether the Hill Sachs lesion engages, one must either have CT images of both shoulders, or assess the lesion sizes intra-operatively with the use of a calibrated probe to measure the following:

D- diameter of the inferior glenoid

This can be calculated arthroscopically by doubling the distance from the posterior glenoid to the bare spot.

d- width of the anterior glenoid bone loss

HS- width of the Hill Sachs lesion

BB- width of the bone bridge between the rotator cuff and lateral portion of the Hill Sachs lesion

Equations:

Hill Sachs Interval (HSI) = HS + BB

Glenoid Track (GT) = 0.83D – d

Results

1. If HSI > GT then the Hill Sachs lesion is considered “off track” and it engages the glenoid.

2. If HSI < GT then the Hill Sachs lesion is considered “on track” and it does not engage the glenoid.

Conclusion

Based on this concrete method, the authors suggest that a remplissage and Bankart be performed on cases of anterior shoulder instability where there is less than 25% bone loss and the Hill Sachs lesion is engaging, or off track. A remplissage should not be performed if the Hill Sachs lesion is not engaging, or on track. In cases with greater than 25% bone loss, the Laterjet procedure is performed.

Journal Club opinion

This study provides an excellent resource for concrete measurements with pre-operative CT or intra-operative arthroscopic assessment to calculate and determine the glenoid track and the Hill Sachs interval. However we are not aware of any studies to date, which have demonstrated the validity, accuracy, intra-observer reliability, or reproducibility of such measurements or calculations in patients with anterior instability.