Background: The use of reverse total shoulder arthroplasty (RSA) is becoming increasingly common for treatment of rotator cuff arthropathy. In recent years indications have expanded to include elderly patients in whom internal fixation is not possible due to fracture configuration, poor bone quality, or presence of rotator cuff deficiency. There is however relatively little evidence to support its use in these circumstances. This study assesses the viability of RSA as a salvage procedure in the treatment of complex proximal humeral fractures or irreducible dislocations.

Methods: All patients presenting between January 2011 and December 2013 with a complex 3- or 4-part humeral fracture or irreducible non-acute dislocation, treated with RSA were included. Clinical outcome was measured at final follow up using patient reported satisfaction, clinician measured range of movement and reported complications.

Results: A total of 16 patients were eligible. Mean age at time of operation was 72.8 years with a mean follow-up of 7 months. Mean Oxford score was 39 (36-48). Range of movement post-operatively had mean active forward extension 97° (70-150°) and abduction 101° (80-170°). 43% of patients were pain-free, whilst the remainder required occasional analgesia. Patients who underwent RSA for dislocation fared better. The mean active forward extension was 107.5° (90-150°) and abduction 112.5° (90-170°) in the dislocation group (N=5) compared with those who had a fracture (N= 11) in which the forward extension was 91.4° (70-120°) and abduction 95° (80-120°).

Conclusions: Early results demonstrate good outcomes in terms of patient satisfaction, pain relief and preservation of function. These early results are encouraging however a further study with longer follow-up is required to confirm sustained benefit.

Implications: RSA should be considered in patients with complex proximal humeral fractures or delayed presentation with irreducible dislocation.

Conflict of Interest: None declared
Methods: Sixteen lateral end clavicle fractures with detached C-C ligament were identified. All of these fractures showed maintained integrity of the substance of C-C ligament pre-operatively (12 with bony fragment avulsion from clavicle, 3 with detachment of C-C ligament from clavicle and 1 with detachment of C-C ligament from coracoid process). These fractures were fixed with lateral clavicle locking plate. Bony fragment avulsion of C-C ligament was secured in this fixation. Pure ligament avulsions of C-C ligaments were secured using interosseous anchor sutures.

Results: Functional assessment of these 16 patients with average age of 42 years (17-64yrs) was done by American Shoulder and Elbow Surgeons (ASES) score. The average ASES score at an average follow up duration of 16 months (range 13-42 months) was 80 (range 44-100). All fractures healed with a well maintained coracoclavicular distance and acromio-clavicular joint integrity. Two patients required plate removal because of discomfort, one patient had breakage of a screw in the distal fragment and one patient developed superficial wound infection.

Conclusion(s): Reattachment of the coracoclavicular ligament in these very lateral clavicular fractures consistently gives good functional and radiological outcomes whilst preserving the acromioclavicular joint integrity and function.

Implications: Plate fixation of clavicle fracture and reattachment rather than reconstruction of coracoclavicular ligament in very lateral clavicle fractures is a viable option.

Conflict of Interest: None declared

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Scapulothoracic fusion with subcostal wires and autogenous bone graft for facioscapulohumeral muscular dystrophy: single surgeon series with long-term follow-up
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Background: Facioscapulohumeral muscular dystrophy (FSHD) results in pain, fatigue, limitation of movement and disability of the shoulder girdle. Fusion of the scapulothoracic articulation provides stability for glenohumeral motion. This challenging procedure is associated with significant complications and disagreement exists as to the optimum technique in orthopaedic literature. We reviewed the long-term outcomes from a single surgeon.

Methods: None of the ten patients (eighteen shoulders) to have undergone this procedure were excluded. A questionnaire based, patient self-reported outcome tools (Oxford Shoulder Score, DASH, EQ-5D) were sent to each patient. Radiographs and clinical notes were retrospectively reviewed.

Results: All ten forms were completed and returned. There were nine males and one female who underwent surgery between 2000 and 2013. The mean age was 28.8 years at the time of the first procedure (SD 7.3 years). Mean follow-up from the last procedure was 5.9 years (SD 4.8 years). All bilaterally operated patients had the second fusion within 18 months of the first. The mean abduction increased from 71° pre-operatively to 139° post-operatively (at final follow-up) and forward flexion from 73° to 141° respectively. A mean post-operative increase in abduction and forward flexion of 68° was observed. The mean Oxford Shoulder score was 36.5 (SD 11.6) on a 0-48 worst to best scale. The mean DASH score was 35 (SD 24). There was no statistical difference between EQ-5D scores and age and sex adjusted means p=0.39). Two patients underwent removal of prominent fusion wires and a third underwent plastic surgery to transfer fat to the deltoid region to improve cosmesis. There were no non-unions.

Conclusion(s): This study has demonstrated exemplary clinical and functional outcomes for this major procedure for a rare inherited muscular dystrophy.

Implications: This successful technique can be recommended and these functional results serve as a baseline for future surgical trials.

Conflict of Interest: None declared

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Outcome after Remplissage procedure for recurrent shoulder dislocation secondary to structural instability with large Hill-Sachs lesion
Background: Hill-Sachs lesions are a cause of recurrent shoulder dislocation. Remplissage is the anchoring of the posterior capsule or infraspinatus into the defect, preventing engagement on the anterior glenoid and subsequent dislocation. This study assesses the outcome of Remplissage procedure in these patients.

Methods: All patients presenting between December 2007 and May 2014 with structural instability and large Hill Sachs lesion treated with Remplissage were eligible for inclusion. A standard three arthroscopic portal approach was used. In all cases a single anchor was used to fill the defect. Clinical outcome was measured at final follow up using patient reported satisfaction, further dislocation and complications.

Results: A total of 25 patients met inclusion criteria. Mean age was 29.8 years. 84% were male and in 48% the dominant arm was affected. In half, the initial mechanism of injury was contact sport related. Mean number of dislocations was 4. There were no instances where Remplissage was used in isolation. 84% were performed with a bankhart repair, 8% SLAP repair and 8% combined repair. 6 patients required an inferior capsular shift. Mean time to discharge was 6 months. Mean time at final notes review was 3.5 years. Three patients were re-referred due to further dislocation (N=2) and persistent pain (N=1). The two patients with recurrent dislocation both were manual labourers who returned to work. In one patient the Remplissage repair had pulled out - a repeat Remplissage was performed successfully. The second patient had evidence of hyperlaxity and required an open Latarjet procedure. Two complications were recorded; 1 frozen shoulder and 1 wound infection. At final follow up 96% patients reported improved symptoms.

Conclusions: Early results of Remplissage are comparable with literature and appear favourable compared with structural repair alone.

Implications: Remplissage should be considered in patients with structural instability and a large Hill Sachs lesion.

Conflict of Interest: None declared

The effect of human amniotic membrane (HAM) on tendon-bone healing in rotator cuff repair in a rat model


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Background: With modern cryopreservation techniques that allow for storage and testing, human amniotic membrane (HAM) has seen a resurgence in Ophthalmology, Maxillofacial and Plastic Surgery. We designed an experiment to determine the effect of HAM on tendon-bone healing in a rat rotator cuff repair (RCR) model.

Methods: The right shoulders of 44 rats were randomised to standard RCR (control) or RCR with HAM following ethical approval. The supraspinatus was repaired in a standardised trans-osseous technique using 5-0 Prolene modified Mason-Allen suture. The HAM was placed on top of the tendon and under the sutures in this group. Shoulders, operated and non-operated, were harvested at 1 week, 4 weeks, and 8 weeks. At 1 week specimens were studied with radiographically, with radiographs and micro-CT, and histologically. At 4 weeks and 8 weeks specimens also underwent mechanical testing.

Results: At one week inflammatory response was seen at the tendon bone junction in both groups. Less inflammation was noted in the HAM group. Cells were seen in the region of HAM placement. At 4 weeks both groups showed reduced inflammation and cartilage defect healing. In the HAM group the healing was more advanced with richer and denser type 1 collagen. There was no significant difference in stiffness between the two groups (p=0.898 ANOVA), while there was a significant difference in mean failure load between groups with 25.7 ± 7.2 N in the control group and 35.8 ± 6.1 N in the HAM group (p=0.021 ANOVA).

Conclusion(s): These early results suggest HAM may advance tendon bone healing with richer type 1 collagen and with a higher load to failure than control subjects undergoing RCR in this rat model.
Implications: Further testing and development of a HAM scaffold may lead to improved healing rates of RCR in patients.

Conflict of Interest: NF is an Arthrex Fellow. JG runs an Arthrex Fellowship. WRW is a consultant for Aus Bio, WMT, Microport, Medtronic Advanced Energy.

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Outcomes of the Zimmer Anatomical Shoulder™ Fracture System hemiarthroplasty for complex fractures of the proximal humerus - a non-designer surgeon series
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Background: Hemiarthroplasty for acute complex fractures of the proximal humerus often produces variable results. The primary source of failure lies with the fixation method and resorption of the greater tuberosities. The Anatomical Shoulder Fracture System, with a large metaphyseal volume, was designed to prevent this.

Methods: Forty hemiarthroplasties were implanted for acute and complex proximal humerus fractures in 40 consecutive patients (average age 77 years; range 58 - 91). Three patients were lost to follow-up: eight subsequently died. Two patients were revised to a reverse total shoulder arthroplasty. Twenty-one of the remaining 27 patients were assessed both clinically and radiographically, while six were assessed by radiographic means alone. Mean follow-up was 3.5 years (range, 1.0 - 3.5).

Results: The greater tuberosity healed in situ in 15 patients (13 without displacement and 2 with evidence of displacement). In 18 patients, there was radiographic evidence of resorption of the greater tuberosity. Nine patients demonstrated evidence of a significant rotator cuff defect with superior migration of the humeral head. One patient showed signs of significant radiographic loosening and is currently listed for a revision procedure. The mean Constant score was 33 points (range, 16 - 62) and the mean Oxford shoulder score was 27 points (range, 5 - 46).

Conclusion(s): Both the functional and radiographic outcomes of the Anatomical Shoulder Fracture System demonstrated poor to moderate results, especially when compared directly to a recent designer-surgeon series. The failure rate of 11% was comparable, however the majority of greater tuberosities had resorbed radiographically and both the Constant and Oxford shoulder scores were low regardless of tuberosity resorption.

Implications: Our results are consistent with the generally poor results of trauma shoulder hemiarthroplasty. The expected outcomes for this prosthesis do not necessarily match those reported by the designer-surgeon and suggest that suitable alternatives should be considered.

Conflict of Interest: None declared

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Bilateral reverse total shoulder arthroplasty (RTSA) - functional outcome and activities of daily living (ADLs)
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Background: Reverse Total Shoulder Arthroplasty (RTSA) is gaining in popularity in recent years. Aim of our study is the evaluation of clinical outcome after bilateral Reverse TSA (RTSA) in restoration of function and activities of daily living (ADLs).

Methods: We prospectively collected data on 15 consecutive patients (30 shoulders) (mean age 75.8y) that underwent staged bilateral RTSA between 2007-2012. Indications for reverse TSA were 14 Cuff tear arthropathy and 3 Rheumatoid arthritis. Patients were evaluated clinically and radiographically pre-operatively and post-operatively at 3 weeks, 3 months, 6 months, 1 year and yearly thereafter, using the Constant score (CS), patient’s satisfaction score and Simple Shoulder
Results: Mean duration between the staged operations was 18.8 months (range 4 - 46m). Constant score improved from 18.7 points (2 - 38 points) pre-operatively to 57.3 points (12 - 87 points) (89% age/sex adjusted) at last follow-up. Elevation improved from 57.5º to 134.6º, Internal rotation (IR) from 9º to 28.6º, in 20 shoulders the patients could reach with their hand behind their back above sacroiliac joint. External rotation (ER) improved from 20º to 68.3º, and 22 shoulders had full external rotation in elevation. Patients’ satisfaction score and SSV improved from 2.1/10 to 8.6/10. The mean ADLEIR score at the last follow-up was 31/36 (33/36 on the right shoulder and 30/36 on the left shoulder). Most patients resumed their leisure and sport activities (gardening, golf).

Conclusion(s): Bilateral RTSA results in marked improvement in all movements, pain, and functional outcomes, with high patient satisfaction and high ADLEIR score. Most patients had no limitation in ADLs and their activities.

Implications: Questions remain open, whether these results are dependent on the implant design or the surgical technique.

Conflict of Interest: Innovative design orthopaedics (IDO) - Designing surgeon, Stock or stock options, Royalties, Unpaid consultant Collplant - Stock or stock options Paid consultant Estar- Medical (Tropocells) - Royalties Unpaid consultant Minivasive - Stock or stock options Paid consultant

Revision of shoulder arthroplasty: does the stem really matter?
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Background: Revision shoulder arthroplasty is technically demanding and has shown poorer results compared to primary cases. One of the challenges in revisions is removal of the humeral stem. Aim of this study is to compare intraoperative events and post-operative outcome of consecutive revisions from stemmed arthroplasty (STA) and Surface Replacement Arthroplasty (SRA).

Methods: Between 2005 - 2012, 37 arthroplasties were revised to reverse total shoulder arthroplasty (RTSA). 14 STA and 23 SRA. Mean age at operation 69.4 years. Indications were 31 cuff failure, 4 aseptic loosening, 2 periprosthetic fractures. We analysed the operation time, blood loss, intraoperative fractures, use of massive allograft and clinical and radiological outcome at a minimum of 12 months.

Results: Average operation time was 113.35 minutes for RSA and 186.54 for STA, 73.87 minutes longer (p=0.004). 6/14 (42.9%) STAs needed humeral osteotomy or massive allograft whereas none of RSAs. Intraoperative fractures occurred more in STAs. Blood loss was 32.3ml higher in STAs (p=0.765). Haemoglobin drop was 0.57g/dL greater in STAs (p=0.271). Blood transfusion 17.5% higher in STAs (p=0.284). Hospitalisation time was 0.37 days longer for STAs (p=0.846). Clinical outcome showed significant improvements. Constant score was 8.39 points higher in SRAs (p=0.324) without significant differences. Radiological outcomes did not differ between groups.

Conclusion(s): Revision of a STA to RTSA took, on average, more than an hour longer than revising a SRA, and humeral osteotomies and massive allograft often needed. Although revisions from RSA showed better results, these differences were not statistically significant.

Implications: Only stemless shoulder replacements are used in our unit.

Conflict of Interest: Innovative design orthopaedics (IDO) - Designing surgeon, Stock or stock options, Royalties, Unpaid consultant Collplant - Stock or stock options Paid consultant Estar- Medical (Tropocells) - Royalties Unpaid consultant Minivasive - Stock or stock options Paid consultant

Mid-term clinical results of a linked revision total elbow replacement system
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Background: There are few studies looking at the outcomes following total elbow revision surgery. Current evidence suggests the incidence of complications are higher than primary surgery. The aim of this study was to report our mid-term results of revision surgery using the Discovery elbow system. There are no reported studies assessing this implant.

Methods: A review of all revision elbow replacements from a prospectively compiled database. 23 patients (24 procedures) were reviewed, with a minimum 2 year follow-up. The validated Oxford Elbow Score (OES), clinical examination and radiological assessment were prospectively recorded.

Results: The mean age was 70.5 (50-94) and there were 7 males and 16 females. The mean follow-up was 35.5 months (24-84). Statistically significant improvements in range of movement and Oxford Elbow score were found (p< 0.001). Flex-Ext Arc improved from overall pre-operative average of 79.5 to 118.1 degrees, supination from 62 to 74.4 degrees, supination 62 to 70.5 degrees. The overall Oxford elbow score improved to a post-operative value of 30.9 from 42.4. Complications reported were 2 cases of infection requiring washout, 1 cases of triceps failure requiring surgical reattachment, 3 cases of asymptomatic radiolucency on radiograph (H:U 2:1), and 3 cases within the cohort that required further revision surgery, 2 for aseptic loosening and 1 for infection.

Conclusion(s): The Discovery TEA system provided an improvement in ROM and pain relief for those undergoing revision surgeries. The functional and patient outcomes for Discovery elbow system compared favourably to other linked systems. This supports its ongoing use as an implant for revision elbow surgery.

Conflict of Interest: None declared

Results of acromioclavicular joint reconstruction using the Surgilig technique
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Background: Injuries to the acromioclavicular joint (ACJ) are common, and account for approximately 12% of acute shoulder girdle injuries. The severity of the ACJ injuries varies from sprains, to complete dislocations resulting from disruption of the coracoclavicular ligaments possibly requiring surgical reconstruction. Many surgical options exist for ACJ reconstruction. The aim of this study was to evaluate the outcome of ACJ reconstruction using Surgilig artificial ligament in an independent centre.

Methods: A retrospective audit of 39 patients who underwent ACJ reconstruction using Surgilig over five years was performed on prospectively collected data. Patients were followed up clinically and radiologically. Outcome was assessed by use of the Oxford Shoulder Score, Nottingham Clavicle Score and patient satisfaction.

Results: 28 patients underwent 29 procedures (1 bilateral) using Surgilig. 24 male and 4 female with a mean age of 41.1 years (range 18-66). Type 3 ACJ injuries were most common (19) followed by type 4 (8) and type 5 (2). Mean time of follow up was 26 months (10-49). Mean post-operative Oxford Shoulder Score was 43.2 (range 22-48). Mean post-operative Nottingham Clavicle Score was 84.4 (range 46-100). Mean patient satisfaction 7.8 (range 1-10). 1 case required revision for persisting instability. One case of deep infection requiring further surgery and metalwork removal at five months post-operatively. Osteolysis around the clavicle screw was found in 10 patients, however remained asymptomatic in nine patients, with one requiring removal of the clavicle screw for loosening and irritation at eight months.

Conclusion(s): This study is one of the largest, from an independent centre, using Surgilig for ACJ reconstruction assessed with validated shoulder and clavicle outcome scores. Our results are encouraging and compare favourably to the other reconstructive techniques.

Implications: Good functional outcome and high patient satisfaction, support the ongoing use of Surgilig for acromioclavicular joint reconstruction.

Conflict of Interest: None declared