10.5° in the -rcRSA cohort (p = 0.011) but was similar to the TSA cohort of 14.7° (p = 0.244). There was a similar preoperative mean glenoid inclination angle between groups. At final follow up there were no differences in VAS or ASES between -rcRSA vs +rcRSA and -rcRSA vs TSA. SSV was lower in +rcRSA (83.9) compared to -rcRSA (91.8, p = 0.021), but was similar to TSA (90.5, p = 0.073). Similar ROM was achieved in forward flexion, external rotation, and internal rotation at final follow up between +rcRSA and -rcRSA. Similar forward flexion was achieved between +rcRSA and TSA, though TSA demonstrated greater external rotation (44° vs 38°, p = 0.041) and internal rotation (6.5° vs 5.0°, p = 0.001) compared to +rcRSA at final follow-up. There were no differences in complications between +rcRSA and either RSA or TSA cohorts. DISCUSSION: Preservation of the rotator cuff in RSA demonstrated similar outcomes at a minimum of 12 months compared to RSA with a deficient rotator cuff and TSA with the exception of slightly greater ER and IR with TSA. While indications have expanded for RSA beyond rotator cuff arthropathy, our study demonstrates that RSA with preservation of the rotator cuff demonstrates excellent outcomes without increased risk of complications.

Category: Shoulder - Arthroplasty

Glenoid Tilt Affects Kinematics During Internal Rotation That Are Associated With Clinical Outcomes After Reverse Shoulder Arthroplasty

Abstract ID# 22513
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Summary: Inferior glenoid tilt may negatively influence kinematics that lead to poorer outcomes in the hand-to-back motion after reverse shoulder arthroplasty.

Data: INTRODUCTION: Internal rotation is not reliably improved after reverse shoulder arthroplasty (RSA). Surgical parameters such as glenosphere size, lateralization, and retroversion have been associated with internal rotation after RSA. The aim of this study was to determine effects of surgical technique and pros thesis geometry on in vivo movement patterns and patient-reported outcomes (PROs) after RSA. We hypothesized that kinematics and contact path that are influenced by greater glenosphere size, glenoid tilt, and lateralization during the hand-to-back motion would correlate with better PROs.

METHODS: Patients who received RSA within previous 1-5 years consented to participate in this IRB-approved study. RSA was performed using standard 135°-degree or 145-degree humeral implants. Lateralization, glenosphere size, and eccentricity were recorded from surgical notes. Humeral retroversion and glenoid tilt were measured on post-operative CT. Participants performed a hand-to-back movement while synchronized biplane radiographs were collected at 50 images/s for 2 seconds. Digitally reconstructed radiographs from subject-specific segmented bone tissue of the humerus and scapula with respective implants were matched to biplane radiographs with sub-millimeter accuracy to determine six degree-of-freedom scapular and humeral kinematics. The contribution of each component of rotation (glenohumeral (GH) abduction, plane of elevation and internal/external (E/I) rotation, as well as scapular upward rotation, protraction, and tilt) to the overall motion was calculated. Average end position, peak angles, and range of motion (ROM) of all rotations were found. ASES, DASH, and CMS scores were collected at testing. Implant characteristics and surgical techniques that predicted kinematics were identified using multiple linear regression using forward selection with SPSS 29.0 software. The center of contact between a 3D CAD model of the polyethylene and gelenosphere was calculated and superior/inferior (SI) and anterior/posterior (AP) locations were averaged across corresponding angles to establish contact path. Associations between the most anterior, posterior, inferior, and superior points on the contact path and surgical technique were identified using multiple linear regression using forward selection. Pearson correlation evaluated associations between either kinematics or contact path and PROs. Significance was set at p < 0.05.

RESULTS: The study included 35 patients who received RSA (17M,18F,72.8 ± 5.8 years) with average follow-up of 2.2 ± 1.1 years. Inferior glenoid tilt correlated with less GH abduction, more scapular upward rotation, and less scapular protraction (all p < 0.05). 145° neckshaft implants and higher retroversion angles both associated with more anterior contact paths, and larger glenosphere had a more inferior contact path (all p < 0.05). DASH and ASES scores improved with more scapular protraction (p = 0.026 and p = 0.014, respectively). DISCUSSION: During hand-to-back after RSA, increased scapular protraction was the primary kinematic factor associated with better PROs. The only surgical factor associated with scapular protraction was glenoid tilt. This suggests that more inferior glenoid tilt decreases scapular protraction, leading to less favorable PROs. Contrary to previous work, we found lateralization, a surgical parameter that has been associated with improved IR ROM, did not correlate with kinematics or contact path location. The mechanism for lateralization’s influence on IR performance may not be explained by in vivo kinematics. ACKNOWLEDGEMENTS: Work was funded by NIH Grant: R03AG064417

Category: Shoulder - Arthroplasty

Comparison of Clinical Outcomes Using Inlay Versus Onlay Humeral Trays in Reverse Shoulder Arthroplasty for Patients with Cuff Tear Arthropathy

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Summary: This study found that at a two-year minimum follow up, the position of humeral tray as either inlay or onlay did not influence the clinical outcomes of function, range of motion, complications including baseplate loosening and acromial stress fracture, and scapula notching.

Data: Introduction The inlay design of humeral tray in reverse shoulder arthroplasty (RSA) has been suggested to have the advantage of better humeral side fixation, but there are concerns of greater tuberosity fracture. In comparison, onlay humeral tray in RSA are suggested to have the advantages of impingement free range of motion and reduced scapular notching, but there are concerns of increased scapula stress fractures. The aim of this study was to compare the clinical results among patients with RSA with two prostheses having lateralized glenosphere and 135° NSA, but which differed in the position of the humeral tray as either inlay or onlay design. Methods This was a retrospective study of prospectively obtained data from a single institutional database of shoulder division of a tertiary care center and was approved by our institutional review board. The database was searched for all patients who underwent primary RSA between 2009 to 2017 (N = 511). To be included, patients with a diagnosis of and cuff tear arthropathy had to be treated with a RSA prostheses having a lateralized glenosphere and 135° NSA either with an inlay or onlay humeral tray design. 102 patients met the inclusion criteria and had a minimum of 2 years follow up (mean, 44, range 24-125 months). Of the included 102, 63 (62%) had implanted a RSA design with an inlay humeral tray (inlay group) and 39 (38%) had onlay tray (onlay group). All patients underwent a preoperative and postoperative evaluation including a physical examination for range of motion (ROM), radiographs, and multiple PROs (ASES, SST, and WOOS score). The clinical significance was evaluated using published minimal clinically important difference (MCID) values. Results Preoperatively there were no significant differences in the two groups demographically except for more proportion of females in the inlay group (75% vs 56%, p = 0.04). The preoperative PROs and ROM were not statistically different between the inlay and onlay groups. The comparison of final follow up PROs and ROM including external rotation were not statistically or clinically significantly different between inlay or onlay groups. There was no statistically significant difference between the inlay and onlay design for baseplate loosening (3% vs 5%, p = 0.63) and revision (0% vs 5%, p = 0.07). Of 3 patients in the onlay group who required a revision, the reason was baseplate failure in one patient, instability in another patient, and peri-prosthetic shoulder infection in the third patient. The rate of acromial stress fracture (3% vs 5%, p = 0.63) and prosthesis dislocation (0 vs 2.5%, p = 0.20) were also similar between inlay and onlay groups (Table 3). There was no difference between the inlay and onlay groups postoperatively for the rate

S130