A Comparison of Anatomic Total Shoulder Arthroplasty with Augment versus Reverse Total Shoulder Arthroplasty for the Treatment of B2 and B3 Glenoids

William Harkin, Jennifer Kurowicki, Colton Mowers, Arden C Shen, Tyler C Williams, Samuel G Lorentz, Christopher Klifto, Grant E Garrigues, Gregory P Nicholson

INTRODUCTION:
Addressing posterior glenoid deficiency in glenohumeral osteoarthritis (GHOA) with an intact rotator cuff intact has become an area of contention for shoulder surgeons. Anatomic total shoulder arthroplasty (ATSA) with an all polyethylene posterior augmented glenoid (PAG) has become a viable option for treating patients with GHOA with eccentric posterior wear. However, ATSA with PAG has not been directly compared to reverse shoulder arthroplasty (RSA for this patient population. The purpose of this study is to evaluate clinical outcomes of ATSA utilizing an all PAG component to RTSA for patients with GHOA with Walch B2 or B3 glenoid.
METHODS:
This retrospective matched cohort analysis utilized prospectively collected data to compare outcomes of ATSA with PAG and RTSA in patients with GHOA and B2/B3 glenoid deformities. Patients who underwent surgery between 2017 and 2023 were matched 1:1 by age, sex, glenoid retroversion, and Walch glenoid classification. Inclusion criteria included patients aged 18 or older with an intact rotator cuff and a minimum of two years follow-up. Preoperative imaging confirmed glenoid morphology and rotator cuff status. Patient-reported outcome measures (PROs), range of motion (ROM), and complications were collected post-operatively. Data were analyzed using 2-tailed independent-samples t-tests, Wilcoxon signed-rank tests, and chi-squared tests or Fisher Exact tests to compare outcomes between the cohorts.
RESULTS:
196 arthroplasties were included in this study, 98 ATSA with PAG and 98 RSA. Imperfect matches were allowed and resulted in some differences in pre-operative characteristics, including age (ATSA: 62.3 vs. RSA: 72, $p<0.0001$), ASA score ($p=0.02$), and female sex ($p<0.0001$). RSA was associated with lower pre-operative forward flexion and external rotation ($p<0.0001$ and $p=0.006$ respectively), as well as pre-operative VR-12 Physical and PROMIS Upper Extremity scores ($p=0.001$ and $p=0.004$ respectively). There was no significant difference between groups in post-operative PROs. The RSA cohort showed significantly lower post-operative external rotation ($p <0.001$). There was no significant different between groups in meeting ASES minimal clinically important difference (MCID) (92% vs. 97% for ASTA and RSA respectively, $p=0.51$) and ASES substantial clinical benefit (80% vs. 80% for or ASTA and RSA respectively, $p=0.94$). There was no difference in gross loosening between cohorts ($p=0.959$). A total of five shoulders were revised, 3 ATSAs (2 for glenoid loosening and 1 for a subscapularis tear, and 2 RSAs (1 for baseplate loosening and 1 for infection). 43% of TSA and 9% of RSA cases had post-operative radiolucency ($p<0.0001$).
DISCUSSION AND CONCLUSION:
For patients with GHOA with posterior glenoid deficiency, ATSA and RSA have comparable 2-year clinical outcomes.