Age Stratifies Risk of 2-Year Revision Following Reverse Total Shoulder Arthroplasty: A Retrospective, Multicenter Study

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INTRODUCTION: Reverse total shoulder arthroplasty (RTSA) is a valuable surgical modality for treating various shoulder pathologies including rotator cuff tear arthropathy, proximal humerus fracture, and glenohumeral osteoarthritis. As the incidence of this surgery increases, so does the burden associated with adverse complications, including revisions. Age has been recognized as an independent risk factor for revision; however, current literature lacks data-driven thresholds to guide surgical-decision making . Therefore, the aim of this study was to identify data-driven age thresholds that predict significant differences in 2-year revision rates following RTSA.

METHODS: A retrospective cohort analysis of patients undergoing RTSA from 2010 to 2022 was conducted using a national administrative claims database. Stratum specific likelihood ratio (SSLR) analysis was conducted to determine data-driven age cut-offs associated with varying risks of revision surgery within 2-years following RTSA. To control for confounders, multivariable regression analysis was conducted to confirm the association of the identified data-driven cutoffs with 2-year all-cause revision rates.

RESULTS: In total, 54,719 patients undergoing RTSA were included in this study. SSLR analysis identified four data-driven age cutoffs associated with varying risks of revision: 40-60 years, and 61-67 years, 68-77 years, and 78+ years at the time of surgery. As age increased, the incidence of all-cause revision decreased within each age stratum: 2.52% in the Age 40-60 cohort, 1.64% in the Age 61-67 cohort, 1.14% in the Age 68-77 cohort, and 0.49% in the Age 78+ cohort. Relative to the Age 78+ cohort, the odds of 2-year all-cause revision was significantly higher and sequentially increased as the age cohort decreased: Age 68-77 (OR: 2.31), Age 61-67 (OR: 3.29), Age 40-60 cohort (OR: 4.92) (P<0.001 for all).

DISCUSSION AND CONCLUSION: This study not only demonstrates the clear association between patient age and 2-year revision following RTSA, but also successfully identified four unique data-driven age cutoffs which stratified the risk of early all-cause revision following RTSA: Age 40-60, Age 61-67, Age 68-77, and Age 78+. Surgeons should not only consider patient age as a significant risk factor for revision, but should also consider these age cutoffs when discussing the potential risks and benefits of RTSA. Patients younger than 60 years, in particular, should be informed of the higher likelihood of early revision surgery.

Table 1: Multivariate logistic regression analysis of 2-year revision outcomes of Age 40-60, Age 61-67, Age 68-77, and Age 78+ cohorts

Age Stratum	Odds Ratio*	95% Confidence Interval	P-Value
All-Cause Revision			
Age 40-60	4.92	3.46-6.99	**<0.001**
Age 61-67	3.29	2.36-4.59	**<0.001**
Age 68-77	2.31	1.70-3.15	**<0.001**
Dislocation			
Age 40-60	2.85	2.08-3.90	**<0.001**
Age 61-67	2.35	1.77-3.12	**<0.001**
Age 68-77	1.57	1.22-2.03	**<0.001**
Mechanical Loosening			
Age 40-60	6.57	4.54-9.48	**<0.001**
Age 61-67	4.41	3.11-6.27	**<0.001**
Age 68-77	3.45	2.47-4.75	**<0.001**
Periprosthetic Joint Infection			
Age 40-60	4.27	3.04-5.94	**<0.001**
Age 61-67	2.74	2.00-3.76	**<0.001**
Age 68-77	2.04	1.53-2.73	**<0.001**

*Odds ratios are relative to the Age 78+ cohort, which was used as the reference

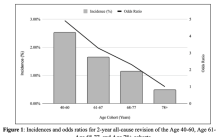

Figure 1: Incidences and odds ratios for 2-year all-cause revision of the Age 40-60, Age 61-67, Age 68-77, and Age 78+ cohorts

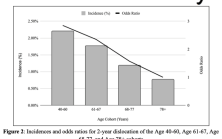

Figure 2: Incidences and odds ratios for 2-year dislocation of the Age 40-60, Age 61-67, Age 68-77, and Age 78+ cohorts

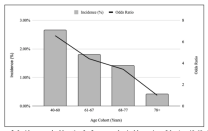

Figure 3: Incidences and odds ratios for 2-year mechanical loosening of the Age 40-60, Age 61-67, Age 68-77, and Age 78+ cohorts

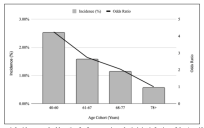

Figure 4: Incidences and odds ratios for 2-year periprosthetic joint infection of the Age 40-60, Age 61-67, Age 68-77, and Age 78+ cohorts