# Predictors of Dislocations after Reverse Shoulder Arthroplasty (RSA): A Study by the ASES Complications of RSA Multicenter Research Group

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INTRODUCTION: Instability after reverse shoulder arthroplasty (RSA) is an infrequent but challenging complication. Current evidence is limited by small sample size, single-center, or single-implant methodologies that limit generalizability. We sought to determine the incidence and patient-related risk factors for dislocation after RSA, using a large, multicenter cohort with varying implants.

METHODS: A retrospective, multicenter study was performed involving 15 institutions and 21 ASES members across the United States. Inclusion criteria consisted of patients undergoing either primary or revision RSA between January 2013 and June 2019 with a minimum 3-month follow up. All definitions, inclusion criteria, and collected variables were determined using the Delphi method, an iterative survey process involving all primary investigators requiring at least 75% consensus to be considered a final component of the methodology for each study element. Dislocations were defined as complete loss of articulation between the humeral component and the glenosphere and required radiographic confirmation. Multivariate logistic regression was performed to determine patient predictors of postoperative dislocation following RSA.

RESULTS: We identified 5,743 patients who met inclusion criteria with a mean follow up of 19.5 months (range 3-79.9 months). The study population was 40% male with an average age of 70.8 years (range 23-101 years). The rate of dislocation was 2.0% (n = 112) for the whole cohort (Table I), 1.5% (n = 80) for primary RSAs, and 6.4% (n = 32) for revision RSAs. Dislocations occurred at a median of 8.0 weeks (IQR Range 3.0 – 72.0) after surgery with 68.8% (n = 77) following a trauma. Patients with a primary diagnosis of glenohumeral osteoarthritis with an intact rotator cuff comprised a significantly smaller proportion of the dislocation cohort than the non-dislocation cohort (27.4%; P<0.001). Patient-related factors independently predictive of dislocation, in order of the magnitude of significance, were primary diagnosis of fracture nonunion (2.6%; OR 7.14, P < 0.001), revision RSA (8.7%; Odds Ratio [OR] 7.01, P < 0.001), male sex (40.0%; OR 2.67, P < 0.001), primary diagnosis of rotator cuff disease (48.0%; OR 2.37, P < 0.001), and no subscapularis repair at surgery (29.3%; OR 1.91, P = 0.002) (Table II).

DISCUSSION AND CONCLUSION: The findings of this large, multicenter cohort indicate an overall dislocation rate of 2.0% following RSA. The strongest patient-related factors associated with dislocation were revision RSA and having a primary diagnosis of fracture nonunion. Notably, RSAs for osteoarthritis showed lower rates of dislocations than RSAs for rotator cuff disease. This data could be used to optimize patient counseling prior to reverse shoulder arthroplasty, particularly in male patients undergoing revision RSA.

**Table I: Cohort Demographics**

| | n = 5175 |
|---|---|
| Dislocations† | 97 (1.9%) |
| Age‡ | 70.7 ± 8.7 |
| Male Sex† | 2070 (40%) |
| Revision† | 499 (9.6%) |
| BMI‡ | 30.2 ± 6.7 |
| ASA Score† | |
| 1 | 106 (2.0%) |
| 2 | 2243 (43.3%) |
| 3 | 2457 (47.5%) |
| 4 | 84 (1.6%) |
| No Subscap Repair† | 1634 (31.6%) |
| Primary Diagnosis† | |
| Rotator Cuff Disease | 2348 (45.4%) |
| OA | 1494 (28.9%) |
| Malunion | 126 (2.4%) |
| Nonunion | 137 (2.6%) |
| Other | 1070 (20.7%) |
| History of Prior Surgery† | 1724 (33.3%) |
| Smoking Status† | |
| Never | 2852 (55.1%) |
| Former | 1927 (37.2%) |
| Current | 381 (7.4%) |
| Follow-up (Months)‡ | 19.5 ± 16 |

†Data Represented as n (%)
‡Data Represented as mean ± standard deviation
BMI - Body Mass Index; ASA - American Society of Anesthesiology

**Table II: Binary Logistic Regression Results**

| Parameter | OR (95% CI) | P-Value |
|---|---|---|
| Age | 1.00 (0.98 - 1.03) | 0.869 |
| **BMI** | **1.04 (1.01 - 1.07)** | **0.013\*** |
| **Male Sex** | **2.64 (1.72 - 4.04)** | **<0.001\*** |
| History of Prior Ipsilateral Shoulder Surgery | 0.75 (0.44 - 1.29) | 0.295 |
| **Revision RSA** | **6.00 (3.11 - 11.57)** | **<0.001\*** |
| Clinical Follow-up | 1.00 (0.99 - 1.02) | 0.603 |
| **No Subscap Repair at Surgery** | **1.88 (1.23 - 2.89)** | **0.004\*** |
| Primary Diagnosis of Malunion | 1.98 (0.46 - 8.53) | 0.360 |
| **Primary Diagnosis of Nonunion** | **5.92 (2.59 - 13.55)** | **<0.001** |
| **Primary Diagnosis of Rotator Cuff Disease** | **2.04 (1.23 - 3.38)** | **0.006\*** |

*Represents significant values with alpha-risk set at 0.05

OR - Odds Ratio; CI - Confidence Interval; BMI - Body Mass Index; RSA - Reverse Shoulder Arthroplasty