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Early dislocation after reverse total shoulder arthroplasty

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Background: Although instability can occur after reverse total shoulder arthroplasty (RTSA), the risk factors, the treatment, and ultimate fate of the implant in these patients remains poorly understood.

Methods: Demographics, acute treatment, and the need for revision were evaluated in all patients with RTSAs who sustained a subsequent dislocation within the first 3 months. Standardized outcome scores were collected preoperatively and at the final follow-up.

Results: Atraumatic instability occurred in 11 patients (incidence, 2.9%) treated with RTSA early (before 3 months postsurgery). The mean time to dislocation was 3.4 weeks. These patients tended to be previously operated-on (64%), male (82%), overweight (mean body mass index (BMI) of 32.2 kg/m^2, with 82% having a BMI $\geq$30 kg/m^2), and without a satisfactory subscapularis repair at initial RTSA (64%). Initial treatment included closed reduction in 9 patients, open reduction in 1, and open reduction with a thicker polyethylene insert in 1. Four experienced recurrent instability requiring a thicker polyethylene insert. Two additional patients were converted to hemiarthroplasty due to persistent instability. Visual analog pain scores ($P = .014$) and American Shoulder and Elbow Surgeons scores ($P = .018$) were significantly improved. Simple Shoulder Test scores trended towards improvement ($P = .073$).

Conclusions: Early dislocations of the RTSA prosthesis were uncommon. The most common associated factors were a BMI >30 kg/m^2, male gender, subscapularis deficiency, and previous surgery; in these patients, we now use an abduction orthosis. Closed reduction alone was successful in 4 of the 9 closed reductions (44%). Five of 11 RTSAs (45%) required polyethylene exchange. The RTSA was retained in 82%, 36% with the original implant.

Level of evidence: Level IV, Case Series, Treatment study.

Keywords: Reverse total shoulder arthroplasty; shoulder instability; revision; complication; dislocation

Since the introduction of the Grammont prosthesis,[3] reverse total shoulder arthroplasty (RTSA) has achieved widespread usage and is now regularly used for a variety of indications,[14,29] including sequelae of proximal humeral fractures,[4,5,19] rheumatoid arthritis,[35] and as a revision for failed TSA.[30] Although excellent short-term outcomes have been described in several large series, with restoration of painless range of motion,[9,12,13,17,20,21,23] an increasing body of literature has been devoted to the complications associated with RTSA.[1,7,8,11,29,33] Complications occur in 19% to 68% of patients[7,32] and include neurologic injury, instability, periprosthetic fracture, hematoma, infection, scapular notching, mechanical baseplate failure, and acromial fracture.[1,7,8,11,29,33] Prosthetic instability accounts for up to half of these complications in some series.[8,11] The most recent series and literature analyses estimate the risk of

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Table I Summary of the patients included in our series

Patient	Sex	Age (y)	Diagnosis	BMI (kg/m^2)	Previously operated on?	Time from RTSA to dislocation (wks)	Reduction method	Operative treatment
1	M	55.8	CDSL	40.7	Yes	1.0	Open	Open reduction alone
2	M	65.2	FRCR	25.8	Yes	3.0	Clinic	None
3	M	77.0	FTSA	30.3	Yes	1.9	Closed	None
4	M	60.4	FRCR	36.4	Yes	1.0	Closed	9-mm spacer and 3+ poly placed
5	M	73.6	GHOA	23.8	No	5.0	Closed	Conversion to HHR
6	F	56.5	FRCR	36.0	Yes	12.0	Revision	40-mm glenosphere, 9-mm spacer, and 3+ poly placed
7	M	73.5	CTA	34.9	No	2.6	Clinic	Conversion to HHR
8	M	76.3	GHOA	32.4	No	2.0	Closed	None
9	M	76.4	CTA	30.3	Yes	4.9	Clinic	None
10	F	79.5	CTA	31.3	No	2	Closed	9-mm spacer placed
11	M	54.2	FRCR	32.5	Yes	2	Closed	9-mm spacer and 3+ poly placed
Mean		68.0		32.5	64% yes	3.4		

BMI, body mass index; *CDSL,* chronic dislocation; *CTA,* rotator cuff tear arthropathy; *F,* female; *FRCR,* irreparable rotator cuff tear; *FTSA,* failed total shoulder arthroplasty; *GHOA,* glenohumeral osteoarthritis with a massive rotator cuff tear; *HHR,* humeral hemiarthroplasty; *M,* male; *PHFx,* failed open reduction and internal fixation of a proximal humeral fracture; *Poly,* polyethylene component; *RA,* rheumatoid arthritis with a massive rotator cuff tear; *RTSA,* reverse total shoulder arthroplasty.

instability as 0% to 8%.[9,15,31] The specific causes for dislocation after RTSA are incompletely understood; however, most authors believe that contributing factors include component malposition,[28] inadequate tensioning of the soft tissue envelope,[1,3,13,16] insufficient subscapularis tendon for repair,[11] and use of the deltopectoral approach vs the superolateral approach.[1,3,10,14,20,25,27]

Although instability is the most frequent complication in many series,[8,11] we are unaware of any clinical studies devoted to the presentation, evaluation, management, and prognosis of this complication. We therefore reviewed our own series of RTSAs to identify early (<3 months), atraumatic postoperative dislocations and describe the presentation, evaluation, management, and prognosis of this complication.

Materials and methods

This study was a retrospective record review of prospectively collected data. The operative log of the senior author (G.P.N.) was reviewed from 2004 until the present, and those patients who underwent RTSA who experienced an atraumatic radiographically documented dislocation within 3 months postoperatively were included in this study. Exclusion criteria included patients with incomplete medical records, patients in whom instability was the result of a direct trauma, such as a fall, and patients with less than 6 months of follow-up.

Data collection

Data were recorded in Excel X software (Microsoft, Redmond, WA, USA). The preoperative, operative, perioperative, and postoperative records for each patient were reviewed. Demographic and preoperative data collected included the age, sex, side of the surgery, side of hand dominance, body mass index (BMI), number and type of previous shoulder surgeries, and the diagnosis leading to RTSA. Operative data included the status and reparability of the subscapularis tendon at the initial RTSA as well as at all further operative interventions, the type and size of prosthesis implanted, and the need for adjunctive procedures at the time of RTSA, such as bone grafting or tendon transfer. Postoperative data included the time from RTSA to discovery of the dislocation, the inciting event, the initial treatment (open vs closed), the details of all further operative interventions, including any component exchanges or revisions, and any recurrence of instability after treatment. Clinical data collected preoperatively and at final follow-up were the visual analog pain (VAS) score, the simple shoulder test (SST),[18] and the American Shoulder and Elbow Surgeons (ASES) score.[24]

Radiographs at final follow-up were reviewed for all patients. The Nerot-Sirveaux system was used to classify scapular notching.[27] In this system, a grade 1 defect is contained within the inferior pillar, a grade 2 defect progresses to the level of the inferior screw, a grade 3 defect extends over the screw, and a grade 4 defect extends to the baseplate.

Statistical analysis

All statistical analyses were performed in SPSS 18 software (IBM, Armonk, NY, USA). Descriptive statistics are reported. Planned statistical analyses included Kolmogorov-Smirnov testing to determine whether parametric or nonparametric tests would be more appropriate, and then, paired Student *t* tests or Mann-Whitney *U* tests, as appropriate, were used to compare preoperative and postoperative VAS, SST, and ASES scores.

Results

Demographics

Of the 385 RTSAs performed during the study period, 11 met our inclusion criteria, for an instability rate of 2.9% (Table I). These patients were followed up for a mean of