



CASE REPORT

Revision reverse total shoulder arthroplasty in a patient with preoperative deltoid insufficiency: a case report



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Case report

We present the case of a 35-year-old right hand–dominant man with a history of right shoulder trauma and multiple surgical interventions at an outside institution. At the age of 13 years, he had a motocross accident that resulted in a right humeral head fracture and a complete axillary nerve palsy. The fracture was initially missed, resulting in a malunion that was treated several months later with an osteotomy and open reduction–internal fixation. By the age of 33 years, he had significant right shoulder pain and was treated with an anatomic total shoulder arthroplasty (TSA). One year after his TSA, the patient complained of continued pain, weakness, and instability. As a result, he subsequently underwent a single-incision latissimus dorsi transfer through a deltopectoral approach. This was done in an attempt to improve function and to stabilize the prosthesis by providing compressive force to the humerus. A year later, the patient presented to our institution for the first time with significant pain and instability despite an extensive course of physical therapy.

Clinical examination revealed severe atrophy of the deltoid with decreased sensation over the lateral shoulder. The range

of motion for the right shoulder was active forward flexion to 80°, abduction to 20°, internal rotation to T10, and external rotation to 70°. All of the patient’s motion was from his scapulothoracic articulation. Rotator cuff testing was difficult because of his postsurgical scarring but suggested incompetence.

Review of radiographic imaging revealed an overstuffed TSA with the greater tuberosity 3.5 cm lateral to the acromion (Fig. 1). The patient had minimally elevated inflammatory markers with an erythrocyte sedimentation rate of 13 mm/h and C-reactive protein level of 9.8 mg/L. An aspirate of the shoulder joint obtained under fluoroscopic guidance had no growth after being held for 21 days. Electromyography and nerve conduction studies reported that the patient had a complete right axillary mononeuropathy with denervation of the deltoid. No other nerve abnormalities were identified.

We discussed the difficulty in treating the patient’s current condition and discussed several treatment options including arthrodesis, resection arthroplasty, and reverse TSA (RTSA). We believed the patient’s symptoms were a result of excessive translation between the polyethylene glenoid and the humeral head of the TSA. It was our belief that a revision to RTSA would increase the constraint of the shoulder and provide more stability. We also discussed in great length that deltoid insufficiency was an absolute contraindication to the procedure because of the increased risk of dislocation and minimal functional gains. Ultimately, a shared decision was made to undergo the RTSA procedure in a staged fashion, given the patient’s elevated erythrocyte sedimentation rate and

This is a case report and needs no Institutional Review Board or Ethical Committee approval. The patient gave informed consent and permission for this publication.

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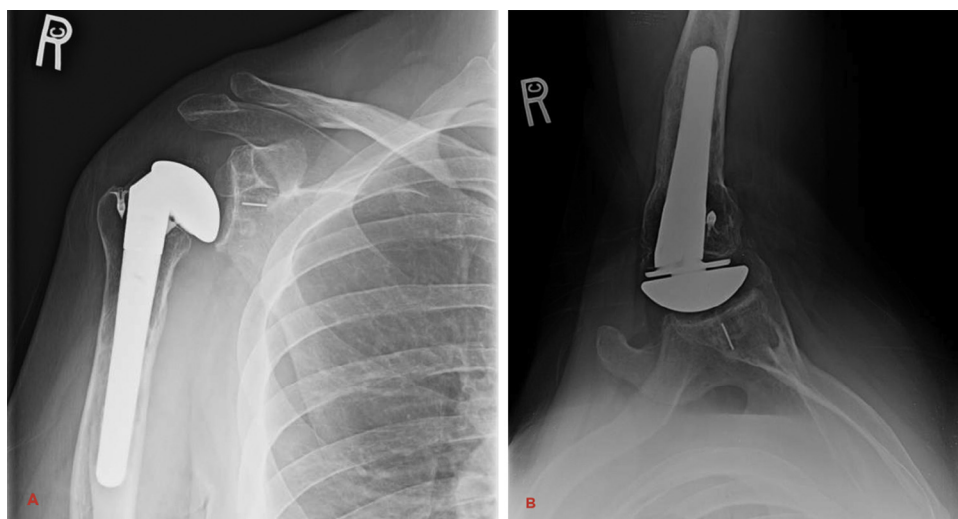


Figure 1 Preoperative anteroposterior (A) and axillary (B) radiographs.

C-reactive protein level and suspicion of indolent underlying chronic infection.

During the resection arthroplasty, no subscapularis was noted, and the other rotator cuff tendons appeared friable. The latissimus dorsi transfer was intact and had good fixation on the posterolateral greater tuberosity. After the capsulotomy was performed, culture specimens and frozen sections were taken from the capsule, humerus, and synovial fluid. The glenoid component was found to be loose and was easily removed with an osteotome. Cement was removed from the glenoid using a burr, leaving a well-contained cavitory defect. Again, culture specimens and frozen sections were taken from the glenoid reamings. The wound bed was then irrigated with 12 L of normal saline, and an antibiotic spacer with 3 g of vancomycin and 3.6 g of tobramycin was implanted at the humeral and glenoid defects. Postoperatively, the infectious disease service was consulted, and a 6-week course of intravenous vancomycin and oral levofloxacin was recommended.

All intraoperative culture and pathology specimens from the resection arthroplasty were negative for infection and indicated no acute inflammation. Eight weeks after the resection arthroplasty, the patient was taken to the operating room for revision RTSA. After removal of the antibiotic spacers, the glenoid and humerus were débrided until bleeding bone was exposed. A femoral head allograft and calcium phosphate bone substitute were used to address the cavitory defect of the glenoid. A 2-mm eccentric Integra glenosphere (Integra LifeSciences, Plainsboro Township, NJ, USA) with 25-mm baseplate was placed to compensate for the superior location of the cavitory defect. Next, the humerus was dislocated, and a 13-mm Integra press-fit stem was implanted with a size 0 retentive liner. The shoulder was then reduced, and excellent stability and passive range of motion were noted (Fig. 2, A and B). The infectious disease service recommended continuation of intravenous vancomycin and oral levofloxacin for 2 weeks after surgery. The patient was immobilized for 6 weeks in an abduction pillow

to allow the bone graft to heal. Repeated pathology and culture specimens were negative for infection and acute inflammation.

The patient had no evidence of infection, fracture, or dislocation at any of his postoperative visits. By 6 months after revision RTSA, the patient was pain free. At 1-year follow-up, he continued to be pain free, and the allograft appeared healed on radiography without evidence of resorption. When the patient was seen at his 2-year postoperative visit, he had no instability events, and his active forward flexion was 60°, internal rotation was to the lower lumbar spine, and external rotation was to 30° (Fig. 2, C and D). His arm motion came from his scapulothoracic articulation. At 2-year follow-up, he had an American Shoulder and Elbow Surgeons (ASES) score of 81.8.

Discussion

This case study provides a unique scenario wherein a revision RTSA successfully treated shoulder pain and instability in a young patient with a long-standing complete deltoid insufficiency. We propose that deltoid insufficiency may be a relative contraindication as opposed to an absolute contraindication to RTSA in a select population of patients. There are very few treatment options for a young patient with a failed TSA, subsequent latissimus dorsi transfer with intractable pain, and instability.

There is literature supporting the use of RTSA in patients with deltoid impairments. Lädermann et al showed good functional outcomes in patients with preoperative deltoid deficits. All of these patients had Medical Research Council grade 3 function of the deltoid. Only 2 of 49 shoulders with deltoid deficits had dislocations by 3 years postoperatively. One of the dislocations was treated with simple closed reduction and immobilization. The second dislocation was associated with an infection requiring irrigation and débridement with open reduction and internal fixation.⁴ In addition, Schneeberger et al

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