Clavicle stress fracture after reverse shoulder arthroplasty

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The reverse total shoulder arthroplasty (RTSA), when it is performed in carefully selected patients, leads to satisfactory outcomes.2,9 In recent years, its indications and the volume performed per year have expanded. Subsequently, there has been a concomitant rise in complications noted and reported.1,2 The complication rate for RTSA ranges from 19% to 68%.1,2 Some of the common complications noted and reported include scapular notching,1,2,10 fracture,1,2,7,12,15 dislocation,1,2,15 and infection.1,2,15 In this report, we present the case of a clavicle stress fracture after RTSA.

Case series

Patient 1

An 82-year-old woman (body mass index, 20.6; 1.42 m; 42 kg) complaining of right shoulder pain for several months presented to our clinic with rotator cuff arthropathy that failed conservative management. She had a remote history of smoking but quit 8 years earlier. She had preoperative anterior-superior escape with active forward flexion and external rotation with the arm at the side of 10°/C14 and 0°/C14, respectively. Radiographs at that time showed superior migration of the humeral head with evidence of glenohumeral arthropathy suggestive of rotator cuff arthropathy (Seebauer type 1B). After thorough discussion of options, risks, and benefits, the decision was made to proceed with a reverse shoulder arthroplasty. She underwent an uneventful cemented Tornier RTSA (Tornier, Inc., Bloomington, MN, USA) with a 6-mm stem and 25-mm baseplate, standard glenosphere, and 6-mm polyethylene (Fig. 1). The rehabilitation protocol consisted of sling immobilization and passive range of motion for 6 weeks, followed by daily activities and active assisted and active range of motion. Initially, she had minimal pain, was neurovascularly intact, and made progress with range of motion 1 month postoperatively with active forward flexion of 70° and external rotation of 20°. She continued to progress well with physical therapy.

Ten weeks after surgery, she began to note atraumatic right shoulder pain. Radiographs showed a nondisplaced clavicular stress fracture (Fig. 2). Conservative management with a sling was implemented. Despite 10 weeks of nonoperative treatment, no evidence of fracture healing was seen on radiographs. In addition, further displacement of the fracture was noted (Fig. 3). Therefore, open reduction with internal fixation of the clavicle fracture was performed without complication.

Six months after open reduction and internal fixation, the clavicle fracture was healed and the patient was satisfied with her shoulder. At her most recent follow-up, 1 year from RTSA, she does not have any pain. She has 95° of active forward flexion and 45° of active external rotation with the arm at the side.

Discussion

The reverse prosthesis, a semiconstrained ball-and-socket device, provides satisfactory functional outcomes when it is used in carefully selected patients with rotator cuff arthropathy and pseudoparalysis, failed shoulder arthroplasty, and fracture sequelae.4,5,9,11 Whereas the long-term outcomes in regard to durability and survivorship are pending, some studies have attempted to improve our understanding of implant and functional longevity. A study by Guery et al.10 noted an implant survival of 91% at 120 months. However, increased pain and decreased function were appreciated around the 6-year mark. A more recent study by Cuff et al.1 revealed 94% implant survivorship and maintained improvement in range of motion.

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and pain at 5 years. Despite considerable success, reverse shoulder arthroplasty can be associated with myriad complications. The most common complications of RTSA include glenoid loosening (5%-38%), instability (2.4%-31%), infection (1%-15.3%), scapular notching (44%-96%), and baseplate failure (11.1%-40%).1,2 In the setting of inflammatory arthropathy, there is an increased risk for intraoperative and postoperative fractures.8,14 Acromial fractures after RTSA have been reported to occur at a rate of 0.9% to 4.9%.7,13 This is of concern because of RTSA reliance on a functional deltoid.7,12 Acromial base fractures in particular have been shown to alter the biomechanics of this deltoid-dependent prosthesis.12 The cause of these fractures remains to be fully elucidated. Wahlquist et al12 in 2011 reported the cases of 5 patients who sustained acromial base fractures after RTSA. All 5 patients were noted to have unsatisfactory results in terms of function despite achieving union (3 treated with open reduction and internal fixation and 2 treated non-operatively). Acromial fractures tend to be manifested with pain within 6 months of surgery, which may indicate excessive constraint about the scapula, eventually leading to fracture. Furthermore, as the acromial base serves as a fulcrum for the deltoid, disruption of this bone structure can lead to devastating results.

A well-placed reverse prosthesis is biomechanically different from a native shoulder. Furthermore, the rotator cuff is poorly functional, and there is an increased reliance on surrounding musculature. Our patient was noted to have a relatively small body, being 1.42 m. It is possible that by the nature of her smaller stature, she was more susceptible to the consequences of excessive joint and soft tissue tension after RTSA. One of the theories behind acromial fractures after RTSA is that by excessively lengthening or lateralizing of the deltoid, the tension on the acromion in these elderly patients may be sufficient to cause a fracture. However, it is unclear why the patient fractured her clavicle and not the acromion if deltoid tension was excessive. It is possible that she had a preoperative stress reaction at the clavicle, which then fractured after the RTSA. However, she had no evidence of this on her initial visit. Load transfer through the acromioclavicular joint to a weakened clavicle is theoretically possible, but we are unable to prove this.

**Conclusion**

We present a clavicle stress fracture after RTSA. Our patient noted pain out of proportion to examination
The pain was fairly abrupt, occurring about 10 weeks after the index surgery in the absence of trauma. This fracture required operative intervention.

Disclaimer

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References