J Shoulder Elbow Surg (2016) ■■, ■■–■■

ELSEVIER

Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

Conversion to hemiarthroplasty as a salvage procedure for failed reverse shoulder arthroplasty

Michael C. Glanzmann, MD[a,*,‡], Christoph Kolling, MD[a,b,‡], Hans-Kaspar Schwyzer, MD[a], Laurent Audigé, PhD[a,b]

[a]*Upper Extremities Department, Schulthess Clinic, Zürich, Switzerland*
[b]*Research and Development Department, Schulthess Clinic, Zürich, Switzerland*

Background: Optimal treatment of a failed reverse shoulder arthroplasty (RSA) is unclear. In the case of poor glenoid bone stock, retaining a RSA may be infeasible. We report our experience with conversions to hemiarthroplasty.

Methods: Within 7 years, 16 patients underwent conversion to hemiarthroplasty after failed RSA. All patients had insufficient bone stock for reimplantation of another RSA. Standard radiographs and Constant, Shoulder Pain and Disability Index, and the 11-item version of the Disabilities of the Arm, Shoulder and Hand scores were assessed preoperatively and up to a minimum of 24 months after surgery. Postoperative superior migration and complications were also documented.

Results: Glenoid loosening was the primary reason for RSA failure in 11 patients. Three required revision surgery because of infection. Postoperative functional outcome was generally poor at the latest follow-up, with mean Constant, Shoulder Pain and Disability Index, and 11-item version of the Disabilities of the Arm, Shoulder and Hand scores of 25, 37, and 63 points, respectively. Baseline pain also did not improve. Medialization progressed beyond the coracoid in 6 patients, and complete anterosuperior escape was reported in 3 patients. Three postoperative complications were recorded by the final follow-up, including 2 periprosthetic humeral fractures treated conservatively and 1 patient with painful humeral component medialization leading to resection arthroplasty.

Conclusion: With excessive bone stock loss, hemiarthroplasty remains an option, despite the associated risks of uncertain pain relief and poor functional outcome. This technique offers a lower likelihood of undertaking further surgical interventions within the short-term to midterm postoperative period. Nevertheless, resection arthroplasty may still be considered another valuable solution.

Level of evidence: Level IV; Case Series; Treatment Study

Keywords: Reverse shoulder arthroplasty; revision, surgery [MeSH]; hemiarthroplasty; complications [MeSH]; prosthesis failure [MeSH]; postoperative outcome

With the introduction of the reverse shoulder arthroplasty (RSA) prosthesis for patients with cuff tear arthropathy,[13] improved outcomes reported during the last 2 decades encouraged many orthopedic surgeons to expand the indications to other shoulder pathologies such as post-traumatic conditions, rheumatoid arthritis, or recurrent instability.[10,16-18,26,31]

The Cantonal Ethics Committee of Zürich, Switzerland approved for analyses the local clinical register (KEK-ZH Nr. 2014-0483) on January 23, 2015.

*Reprint requests: Michael Glanzmann, MD, Orthopaedics Department—Upper Extremities, Schulthess Klinik, Lengghalde 2, CH-8008 Zürich, Switzerland.

E-mail address: michael.glanzmann@kws.ch (M. Glanzmann).

‡These authors contributed equally to this manuscript.

1058-2746/$ - see front matter © 2016 Journal of Shoulder and Elbow Surgery Board of Trustees. All rights reserved.
http://dx.doi.org/10.1016/j.jse.2016.03.011

Since gaining more experience with this type of prosthesis over longer follow-up periods, several studies reported higher complication rates after primary implantation of the RSA compared with that for anatomic shoulder arthroplasties.[7,9] A systematic review by Zumstein et al[36] reported an overall complication rate of 20.7% and a revision rate of 10%. The most common postoperative complications included instability, infection, and aseptic glenoid loosening.

When revision of a failed RSA is indicated, treatment options widely vary—depending on the type of failure—from minor corrections, such as implanting a humeral spacer or exchanging the polyethylene inlay, to major revisions involving the exchange or removal of the glenosphere, humeral stem, or both. Boileau et al[6] reported a series of revision operations after failed RSA, where reimplantation of another RSA was most often feasible and resulted in the preservation of shoulder function and satisfied patients. When a secondary RSA was not possible because of poor bone stock, recurrent infection, or uncontrollable instability, resection arthroplasty or conversion to hemiarthroplasty were regarded as salvage procedures.

To our knowledge, outcomes after resection arthroplasty for failed RSA are limited to 2 published studies.[24,30] In addition, only 1 small series of conversions from failed RSA to hemiarthroplasty is available in the literature.[12]

There is a general belief that future orthopedists are likely to be confronted with an increasing number of failed RSA. Yet, the optimal treatment for this condition remains unknown. The goal of this study was to contribute our experience with the functional and radiographic outcomes of a consecutive series of revision hemiarthroplasties after failed RSA. These results will extend the current knowledge and may further assist surgeons in providing better information to their patients on what can be expected regarding postoperative outcome.

Materials and methods

Patient selection and baseline characteristics

Since March 2006, all patients who received a shoulder arthroplasty were consecutively documented in our local clinic shoulder arthroplasty registry.[21,29] Patients who underwent revision of a failed RSA involving conversion to a hemiarthroplasty were identified and selected for our analysis.

Between March 2006 and October 2013, 16 women underwent revision of a failed RSA with conversion to a hemiarthroplasty and had a minimum of 24-month postoperative follow-up documentation (Table I). Patients were a mean age of 74 years (range, 57-83 years) at the time of the revision procedure. Five of the 16 index RSAs were performed at a clinic other than our own. The main indications for the index surgery were rotator cuff arthropathy in 12, rheumatoid destruction of the glenohumeral joint in 2, posttraumatic osteoarthritis in 1, and an acute proximal humeral fracture in 1. Before the index RSA, 9 patients had undergone at least 1 previous shoulder operation involving repair to the rotator cuff, 1 required open reduction and internal fixation (ORIF) of a proximal humeral fracture, and 2 underwent previous exchange of a RSA.

The mean interval between the index RSA implantation and conversion to hemiarthroplasty was 4.5 years (range, 2 months-13 years). Most of the index RSA implants removed during the conversion procedure were Delta III (DePuy Synthes GmbH, Zuchwil, Switzerland) and Promos Reverse (Smith & Nephew Orthopaedics AG, Rotkreuz, Switzerland; Table I). The humeral component was uncemented in 9 patients and was cemented in the remaining 7.

Preoperative radiographs and in most cases (n = 15) computed tomography scans or magnetic resonance imaging were highly suggestive that retaining a RSA was not feasible due to insufficient bone stock, even if considering additional bone grafts. The preoperative perception was in accordance to the intraoperative findings. In none of the patients did the intraoperative evaluation change the initial treatment plan. Glenoid bone defects were massive in all cases. According to the classification by Antuna et al,[4] 7 patients showed a peripheral defect, 3 patients a central defect, and 6 individuals a combined abnormality. In addition, a pseudarthrosis of a coracoid fracture was present in 2 patients with peripheral defects.

Indications for revision surgery

Glenoid loosening

The main indication for hemiarthroplasty was loosening of the glenoid component (Table I). For 7 patients, the glenoid component showed radiographic signs of loosening accompanied with relevant clinical symptoms. The loose components were removed and the RSA converted to a hemiarthroplasty.

Periprosthetic fracture

A periprosthetic fracture of the scapular spine led to loosening of the glenoid component in 4 patients. In 3 of these patients, a traumatic event was absent. One patient suffered a low energy impact to the affected shoulder from a sedentary position. Three scapular spine fractures were conservatively treated, and 1 patient underwent a 2-stage intervention. First, the glenosphere and humeral body/cup were removed while leaving the stem in situ and the scapula was treated by ORIF. Conversion to hemiarthroplasty was completed 4 months later by implanting the humeral head.

In 2 patients, a periprosthetic humeral fracture with loosening of the humeral stem led to revision surgery. One revision was performed in 2 stages because the humeral bone was judged too fragile after stem removal to receive a new stem at the same time. The fracture was treated with ORIF in a first stage, and the hemiarthroplasty was implanted 11 months later.

Bacterial infection

Loosening in 3 patients was associated with bacterial infection. One of the 3 patients with infection had been revised involving exchange of the stem due to aseptic loosening