Long-term Results of Shoulder Hemiarthroplasty in Patients With Rheumatoid Arthritis

PIETER C. GEERFLIJT, MD; MATTHIJS P. SOMFORD, MD; PAUL WINIA, MD; MICHEL P. J. VAN DEN BEKEROM, MD

abstract

Rheumatoid arthritis affecting the shoulder is typically associated with destruction of the glenohumeral joint and rotator cuff impairment, which can result in severe glenoid erosion. Following hemiarthroplasty, severe glenoid erosion has also frequently been observed. The authors’ aim was to retrospectively evaluate the outcome of cemented shoulder hemiarthroplasty in patients with rheumatoid arthritis. The authors performed 45 cemented hemiarthroplasties in 36 patients with rheumatoid arthritis involving the shoulder as well as associated rotator cuff compromise between 1995 and 2008. All patients were analyzed radiologically and clinically using patient-reported outcome measures. Mean±SD visual analog pain scale score was 3±2. Mean±SD Constant score was 55±16. Mean±SD validated Dutch version of the Disabilities of the Arm Shoulder and Hand (DASH) score was 42±19. No radiograph showed loosening of the implant at follow-up. One patient needed an arthrotomy and capsulotomy because of persistent pain and limited range of motion. Tissue cultures taken during this second operation were negative for infection. No major revision surgery was necessary within the follow-up period. Cemented hemiarthroplasty is a viable treatment option for glenohumeral arthritis in patients with rheumatoid arthritis. Long-term results show acceptable results and low complication rates in this case series for this specific group. A randomized, controlled trial comparing hemiarthroplasty, total shoulder arthroplasty, and reverse shoulder arthroplasty is necessary to draw definite conclusions in this specific patient population. [Orthopedics. 2015; 38(1):e38-e42.]
When the first modern shoulder arthroplasty was performed in the 1950s, it was solely indicated for severe shoulder fractures. Since then, the indications have broadened to include inflammatory destructive arthritis due to rheumatoid arthritis (RA).

Destruction of the glenohumeral joint resulting from RA is typically associated with rotator cuff deficiency due to tearing or rotator cuff tendinopathy. Secondary to rotator cuff failure, superior migration of the proximal humerus is frequently observed following either total shoulder arthroplasty or hemiarthroplasty. This can be associated with glenoid component loosening following total shoulder arthroplasty.

Before the advent of reverse shoulder arthroplasty, this cuff deficiency could be a reason to perform hemiarthroplasty in patients diagnosed with RA. A possible disadvantage of cemented hemiarthroplasty is severe glenoid erosion.

The purpose of the current retrospective study was to evaluate the long-term results of shoulder hemiarthroplasty in patients with RA and to provide recommendations for clinical practice and future research.

**Materials and Methods**

All patients older than 18 years, diagnosed with and medically treated for RA and suffering clinical and radiographic glenohumeral arthritis, and treated with a cemented hemiarthroplasty (Aequafris Hemi Shoulder; Tornier, Montbonnot, France) between 1995 and 2008 were included in this study. All surgeries were performed by 2 senior staff orthopedic surgeons (P.W. and a colleague) experienced in shoulder surgery at a single hospital (Slotervaart Hospital, Amsterdam, The Netherlands).

A first-generation cephalosporin was administered intravenously 30 minutes prior to surgery. Surgery was performed under general anesthesia with or without an interscalene block. The patient was placed in the beach-chair position and a deltopectoral approach was used, with preservation of the tendon of the major pectoral muscle.

Tenotomy of the subscapular tendon was performed approximately 1 cm medial to the insertion. The appropriately sized implant was cemented with respect to the insertion. The appropriately sized implant was cemented with respect for height and retroversion.

Inspection of the rotator cuff was not meticulous because the hemiarthroplasty was placed regardless of the quality of the rotator cuff. At the time when this study cohort was formed, a reverse shoulder arthroplasty was not routinely used.

A sling was applied for up to 6 weeks. Patients were stimulated to perform front-to-back pendulum exercises and were allowed to start with forward elevation and abduction (passively and actively assisted) immediately postoperatively. External rotation was allowed within the maximum degree of that obtained intraoperatively after subscapular tendon repair to minimize tension in the reattached tendon.

**Clinical and Radiological Assessment**

The visual analog pain scale (VAS), Constant score, Dutch validated version of Disabilities of the Arm, Shoulder and Hand (DASH) score, and radiographs were assessed in the outpatient clinic by 2 observers (P.C.G. and M.P.S.). Complications such as neurovascular injury, infection, humeral fracture or gross malposition of the implant, and revisions were also assessed.

Standard anteroposterior and axillary radiographs were obtained annually. Radiolucent lines and their evolution over time were assessed. Loosening was defined as a change in position of the humeral component over time. Probable loosening was defined as unchanged position but progressive radiolucencies of more than 2 mm surrounding the component or the cement layer. The changes of the glenoid were assessed by measuring the joint space, comparing the distance of the component over time. Probable loosening was defined as unchanged position but progressive radiolucencies of more than 2 mm surrounding the component or the cement layer. The changes of the glenoid were assessed by measuring the joint space, comparing the distance of the component over time.

**Results**

Forty-five cemented shoulder hemiarthroplasties were performed in 34 patients (11 bilateral). The study cohort comprised 31 female and 3 male patients with a mean age of 64.5 years (range, 31-84 years).

Ten patients (12 shoulders) died of conditions unrelated to the shoulder arthroplasty, and 1 patient could not be fol-

---

**Table**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients/shoulders, No.</td>
<td>22/31</td>
</tr>
<tr>
<td>Male/female, No.</td>
<td>3/19</td>
</tr>
<tr>
<td>Patient age, mean±SD (range), y</td>
<td>60±15 (31-83)</td>
</tr>
<tr>
<td>VAS score, mean±SD (range)</td>
<td>3±2 (1-9)</td>
</tr>
<tr>
<td>Constant score, mean±SD (range)</td>
<td>55±16 (29-81)</td>
</tr>
<tr>
<td>Constant score corrected for age and sex, mean±SD (range)</td>
<td>64±20 (34-100)</td>
</tr>
<tr>
<td>DASH score, mean±SD (range)</td>
<td>42±19 (4-68)</td>
</tr>
<tr>
<td>Complications, No.</td>
<td>1*</td>
</tr>
</tbody>
</table>

Abbreviations: DASH, Disabilities of the Arm, Shoulder and Hand; VAS, visual analog pain scale.

*Arthrotomy and capsulotomy due to persistent pain and limited range of motion.
followed up because of a paralysis of her operated arm due to a complication of cervical hernia surgery. Clinical assessment of one patient was not realistic because of Alzheimer’s disease.

Mean age of the deceased population was 67.7 years (range, 59-76). Mean implant survival in this group was 4.1 years (range, 0-11 years). No patient in this group experienced complications related to the implant or surgery. The radiographs in this group showed consistent medialization of the arthroplasty due to glenoid erosion and cranialization due to rotator cuff insufficiency. There were no signs of implant loosening or fractures of the glenoid or acromion. This group will not be included in the following analysis.

Mean age of the surviving patient cohort was 60.8 years (range, 31-84 years). Mean follow-up was 10 years (range, 5-17 years). Mean±SD VAS score 3±2. Mean±SD Constant score was 55±16. Mean±SD Constant score, corrected for sex and age, was 64±20.29 Mean±SD Dutch version of the DASH score in 20 patients (2 patient-reported questionnaires were invalid) was 42±19 (Table).

One patient had a VAS of 9, DASH score of 68, and Constant score of 29 because of a recent high-energy trauma. This compromised the scores and function of the shoulder implant. No complications were seen on the radiographs of this patient.

Radiology
Radiographs were available for all shoulders. No patient showed definite or probable loosening of the stem at follow-up. All patients had medialization of the arthroplasty due to glenoid erosion and cranialization due to rotator cuff insufficiency (Figures 1-3). No fractures of the glenoid or acromion were seen. No other radiographic complications were observed.

Complications
No major intraoperative complications, such as fractures or implant/instrument failure, were observed. One patient reported persistent pain and limited range of motion immediately postoperatively. Two weeks after the initial surgery, arthrotomy and capsulotomy was performed. Tissue cultures obtained intraoperatively were negative for infection. The pain eventually subsided and the shoulder function improved.

Revision Surgery
No revision surgery was performed in the long-term follow-up period.

DISCUSSION
The authors report the long-term clinical and radiologic results of cemented shoulder hemiarthroplasty in the treatment of osteoarthritis in patients with RA. They conclude that the long-term results are satisfying, with no major complications or revision surgeries in this specific patient population.

Strong points of this study are the long-term follow-up, the high percentage...
of patients available for clinical and radiological evaluation, and the evaluation of patient-related outcome measures. Limitations of the study include those inherent to all retrospective studies. In addition, radiographic follow-up was done with conventional radiographs. Computed tomography scanning would be ideal to evaluate the glenoid (erosion and bone loss), and magnetic resonance imaging would be ideal to evaluate the rotator cuff tendons. The authors did not use these modalities because both would be disturbed by the arthroplasty and neither is a part of routine patient care and follow-up. Cranialization of a hemi shoulder implant is consistent with rotator cuff deficiency. \(^{18,19}\) Koorevaar et al. \(^{20}\) reported little pain after hemiarthroplasty in patients with RA. Progressive glenoid erosion was seen in almost all of their patients. This was not correlated with postoperative pain. \(^{21}\) In the current retrospective study, patients reported little pain, and all radiographs showed medialization and cranialization due to insufficient rotator cuff.

Although not evidence based, it is the authors’ opinion that total shoulder arthroplasty is not the first choice of treatment in patients with RA because of the potential development of cuff deficiency. This will result in a rocking horse phenomenon and eventually loosening of the glenoid component. \(^{22}\)

At the time of this study, reverse shoulder arthroplasty was not widely available, but it now seems to be a good alternative for older patients. The most important finding of this study is that the long-term functional results of a cemented hemiarthroplasty in patients with RA are good, with no major complications and no indication for revision surgery. Although the authors did not include a second comparison group of patients undergoing total shoulder arthroplasty, they believe that hemiarthroplasty is a good option for the treatment of patients with RA of the shoulder. This is in contrast with primary osteoarthritis of the shoulder with intact rotator cuff; in these patients, total shoulder arthroplasty is the first option. \(^{23,24}\)

A difference between RA of the shoulder and primary osteoarthritis relates to the effect on soft tissues, specifically the rotator cuff tendons. The authors feel that humeral resurfacing in patients with RA should be avoided due to concerns about overstuffing the rotator cuff.

Sperling et al. \(^{1}2\) concluded that among patients with shoulder joint destruction due to RA and an intact rotator cuff, improvement in pain and abduction was greater with total shoulder arthroplasty. They observed fewer patients with symptomatic glenoid component loosening than patients with painful glenoid arthritis requiring revision surgery.

Fewer intraoperative and long-term complications were observed in the current study than in the study by Sperling et al. \(^{2}\) Hambright et al. \(^{1}7\) reported that the perioperative complication rate of a shoulder arthroplasty is low and similar for patients with and without RA. The cranialization of the humeral head in relation to the scapula that was observed on radiographs is a result of a secondary rotator cuff deficiency. This was also observed in the current study. Another possible long-term complication of hemiarthroplasty is an increase in glenoid erosion. This complication has been reported to be the most common reason for conversion of a hemiarthroplasty to a total shoulder arthroplasty or reverse shoulder arthroplasty. \(^{24}\) Previous authors found progressive glenoid erosions after hemiarthroplasty in patients with RA. \(^{25,26}\) The current authors observed some degree of erosion of the glenoid in all patients, but this did not lead to altered functional outcomes or revision surgery.

REFERENCES


