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Reverse shoulder replacement: a day-case procedure

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Background and hypothesis: Reverse shoulder arthroplasty (RSA) is an increasingly popular treatment modality for glenohumeral joint arthritis in association with rotator cuff arthropathy. A prolonged hospital stay following joint arthroplasty risks increased complications for patients plus financial implications for institutions. We hypothesized that RSA could be safely and effectively carried out as an outpatient procedure with reduced risks to patients and institutional costs.

Methods: Patients attending our institution for RSA during March 2015 to August 2018 were reviewed preoperatively for consideration for RSA as an outpatient procedure. The inclusion criteria were arthritis of the shoulder having failed conservative management, age older than 50 years, and intact deltoid muscle function. Patients were excluded if they underwent RSA for trauma or for revision following previous total shoulder replacement or hemiarthroplasty. Overall health, social circumstances, and individual wishes were considered.

Results: A total of 21 patients underwent RSA as an outpatient procedure. The mean age was 74 years (range, 59–84 years). There were 8 male and 13 female patients. No overnight stays were required in patients in whom outpatient surgery was planned. The Oxford Shoulder Score increased from a mean of 16 (range, 4–30) preoperatively to a mean of 31 (range, 7–35) at 6 months postoperatively; it was a mean of 36 (range, 7–48) at 12 months postoperatively. Of the patients, 88% were “very satisfied” or “satisfied” with the service and 81% would undergo the surgical procedure again as a day-case procedure.

Conclusion: RSA as an outpatient procedure can be carried out effectively with high patient satisfaction rates in carefully selected patients.

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Reverse shoulder arthroplasty (RSA) was originally designed in the 1970s with the aim of improving motion and strength in patients, without increasing prosthesis loosening and dislocation. These complications had been seen in earlier total shoulder arthroplasty (TSA). As the design progressed, the focus became improving stability through maximizing the deltoid lever arm, thus being beneficial to patients with a deficient rotator cuff.⁷ RSA has been approved by the US Food and Drug Administration since 2004. Although RSA was initially used for rotator cuff tears found in association with lesions in the glenohumeral joint, its use has increased to include proximal humeral fractures with both early

and late presentations, osteoarthritis with glenoid deformity and an intact rotator cuff, post-traumatic arthritis, and revision shoulder replacement.⁶ As implants develop and population demands rise, the number of RSAs performed continues to increase.^{6,17}

Length of stay is often used as an outcome determining success of surgery.¹³ The average length of stay for RSA has been recorded as 1.31 to 2.8 days.^{3,6,13,15,17} An increase in length of stay has been shown to be associated with age, female sex, low to intermediate surgical volumes, and geographical location.¹³ Increased length of stay is associated with an increase in the surgical-site infection rate.¹⁶ Reducing the length of stay has the potential to reduce cost, reduce the infection rate, and increase patient satisfaction.¹⁵ Few studies in the literature have described TSA carried out as an outpatient procedure.^{4,9,10} Only 1 previous study described RSA carried out as an outpatient procedure in a series of 12 patients.⁸

Different types of perioperative and postoperative analgesia regimens used in combination with general anesthetic exist for use

Institutional review board approval was not required for this case series.

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in patients undergoing RSA.^{3,5,14} Following a pilot study on the pain levels of patients undergoing RSA under combined general anesthetic and nerve blockade followed by an opioid-based postoperative analgesic regimen, carefully selected patients at our institution underwent RSA as an outpatient procedure. The aim of this retrospective case series was to analyze the efficacy, safety, and outcomes of performing RSA as an outpatient procedure.

Materials and methods

During the study period March 2015 to August 2018, patients attending the outpatient clinic at our institution were selected for suitability for reverse-polarity shoulder arthroplasty following careful clinical review. The inclusion criteria for selection for RSA were arthritis of the shoulder having failed conservative management, age greater than 50 years, and intact deltoid muscle function. Patients were excluded if they underwent RSA for trauma or for revision following previous total shoulder replacement or hemiarthroplasty.

Patients deemed suitable were offered outpatient RSA dependent on their overall health status, social situation, and individual wishes. Patients were excluded if they lived alone and a caregiver could not present overnight from the day of surgery to the first day postoperatively. They were also excluded if they had ongoing medical problems precluding outpatient surgery, including sleep apnea, current treatment with anticoagulation, and neurologic compromise preventing independent mobility.

Patients were reviewed preoperatively in a combined clinic with a musculoskeletal physiotherapist with a special interest in shoulder complaints. They underwent an informed discussion regarding the procedure, consent process, and expectations for the immediate postoperative period, as well as medium- and longer-term outcomes. They were all provided with an information leaflet detailing outpatient shoulder arthroplasty. They all underwent preoperative anesthetic review prior to the day of admission.

On the day of surgery, patients were reviewed preoperatively by both the admitting surgeon and the anesthetist. Patients were provided with an information leaflet advising on them postoperative pain management. All were reviewed again postoperatively on the day of surgery and provided that their pain was controlled and they had passed urine, they could be discharged home.

Analgesia for the procedure included an ultrasound-guided interscalene brachial plexus block under sedation with 20 mL of 0.5% levobupivacaine and a superficial cervical plexus block with 10 mL of 0.25% levobupivacaine. All procedures were carried out under the care of a single specialist shoulder surgeon with general anesthesia. All were performed with patients in the beach-chair position via the deltopectoral approach. Postoperative drains were not used. Adhesive postoperative dressings were routinely applied and wounds were checked by the community nurses.

The postoperative analgesic regimen included paracetamol, 1 g for four times a day; ibuprofen, 400 mg 3 times a day; morphine sulfate, 10 mg twice daily; and oral morphine sulphate as required. A standardized postoperative rehabilitation routine was followed, consisting of immobilization in a polysling for 3 weeks allowing passive range of shoulder movement; pendular exercises; and active elbow, wrist, and hand exercises. Between 3 and 6 weeks, patients progressed to active range-of-movement exercises with strengthening exercises. Unlimited mobility was encouraged at 12 weeks.

Postoperatively, patients were seen in the outpatient clinic at 6 weeks, 6 months, and 12 months. Preoperatively and at these follow-up assessments, they all completed the Oxford Shoulder

Score (OSS). They were also contacted by mail with a satisfaction survey at 12 months postoperatively.

Results

Of the 39 patients undergoing RSA who did not fulfill the exclusion criteria for the study, 21 were selected to undergo RSA as an outpatient procedure. None of the selected patients had to be admitted or required an overnight stay. The mean patient age was 74 years (range, 59–84 years). There were 8 male and 13 female patients.

No readmissions were necessary. Moreover, no immediate postoperative complications and no significant adverse effects were experienced from the analgesia or surgery.

The OSS increased from a mean of 16 (range, 4–30) preoperatively to a mean of 31 (range, 7–35) at 6 months postoperatively. It was a mean of 36 (range, 7–48) at 12 months postoperatively.

There was a 76% response rate to the patient satisfaction survey at 12 months postoperatively. Of the patients, 11 (69%) reported that they were “very satisfied,” 3 (19%) were “satisfied,” and 2 (13%) were “not satisfied.” In addition, 81% reported that they would undergo the surgical procedure again as an outpatient procedure. When asked to recall their pain on day 1 postoperatively on a visual analog pain scale at 12 months postoperatively, they reported a mean of 5 (range, 2–10).

Discussion

Postoperative pain scores in the previously carried out pilot study group were recorded on a scale of 0–4 with the mode score being 2. As patients were comfortable with this analgesic regimen, pain scores were not recorded for this patient cohort. The median score on the retrospective questionnaire was higher, with a median visual analog scale score of 5 (range, 0–10). It is interesting to note that the 1 patient who retrospectively reported the pain score as being 10 on the first day postoperatively also reported being very satisfied with the outpatient arthroplasty service and, if given the choice, would undergo the arthroplasty as an outpatient again. A study limitation is that patients being asked to recall pain scores retrospectively may cause our study to suffer from recall bias. However, in a previous study by Lowe et al¹² (2017), patients recalled worse pain than they originally reported beyond 6 weeks postoperatively after TSA.

The 2 patients who would not chose to undergo outpatient arthroplasty surgery again both reported high satisfaction with the arthroplasty service and showed increases in the OSS by 7 and 18 points. The patient with a greater increase in score reported that there were no concerns with the operation but that this patient had been discharged from the hospital too early.

Patient selection is key in the success of outpatient arthroplasty, and preoperative screening is crucial. As well as fulfilling the exclusion criteria for the study, patients were also reviewed on an individual basis for their general medical comorbidities and social circumstances. This has previously been reported as of high importance in preparing patients for outpatient arthroplasty of the hip and knee and should also be applied to the shoulder.^{2,8}

Reported complications in patients undergoing RSA include instability, infection, scapular notching, neurologic injury, and implant loosening.¹¹ None of these complications occurred in our patient cohort by the time of patients' final follow-up appointment at 12 months. This finding suggests that the early infection rate is not increased by outpatient RSA. Further research into longer-term follow-up is required to assess late infection.

The mean age of patients in our cohort (74 years; range, 59–84 years) was older than the ages of 64 years,¹⁰ 53 years,⁹ and 52.6

years⁴ reported in studies of patients undergoing day-case TSA procedures. Patients undergoing RSA have been reported to have a higher age than those undergoing TSA,¹ as seen in our patient population.

Improved blood loss control and careful soft-tissue handling and analgesia reduce the length of stay in arthroplasty patients in general and have been evaluated in detail in hip and knee arthroplasty.⁴ No evidence is available to evaluate these measures in RSA as an outpatient procedure or a cost-comparison analysis. This is a potential area for future research.

Although our study has a small patient cohort providing a retrospective review of prospectively collected data, it provides important results. Providing bespoke management for patients plays a valuable role in improving patient satisfaction. Our results show that appropriate outpatient surgery can reduce departmental costs associated with hospital stays and reduce the length of time patients are exposed to potential hospital-acquired infection.

Conclusion

RSA can be safely carried out as an outpatient procedure in carefully selected patients. This could lead to significant cost and bed-occupancy savings with good patient satisfaction.

Disclaimer

Bedford Hospital Trust has a contract for research with Exactech. J.J. George Malal is a consultant for Exactech and hosts visiting surgeons.

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