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ORIGINAL ARTICLE

Outpatient total shoulder arthroplasty in an ambulatory surgery center is a safe alternative to inpatient total shoulder arthroplasty in a hospital: a matched cohort study

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Background: Recent emphasis on safe and efficient delivery of high-quality health care has increased interest in outpatient total joint arthroplasty. The purpose of this study was to evaluate the safety of outpatient total shoulder arthroplasty (TSA) by comparing episode-of-care complications in matched cohorts of patients with anatomic TSA as an outpatient or inpatient procedure.

Methods: Thirty patients with outpatient TSA at a freestanding ambulatory surgery center (ASC) were compared with an age- and comorbidities-matched cohort of 30 patients with traditional inpatient TSA to evaluate 90-day episode-of-care complications, including hospital admissions or readmissions and reoperations. Two-tailed *t*-tests were used to evaluate differences, and differences of $P < .05$ were considered statistically significant.

Results: No significant differences were found between the ASC and hospital cohorts regarding average age, preoperative American Society of Anesthesiologists score, operative indications, or body mass index. No patient required reoperation. There were no hospital admissions from the ASC cohort and no readmissions from the hospital cohort. Minor complications in the ASC cohort were arthrofibrosis in 2 patients and mild asymptomatic anterior subluxation in 1 patient; the only major complication was in an outpatient who fell 11 weeks after surgery and disrupted his subscapularis repair. Three minor complications in the hospital cohort were mild asymptomatic anterior subluxation, blood transfusion, and superficial venous thrombosis. The complication rates (13% vs. 10%) were not significantly different.

Conclusions: Outpatient TSA is a safe alternative to hospital admission in appropriately selected patients. Further investigation is warranted to evaluate the longer term outcomes and cost-effectiveness of outpatient TSA.

Level of evidence: Level III; Retrospective Cohort Design; Treatment Study

Keywords: Total shoulder arthroplasty; ambulatory surgery center; hospital; outcomes; cost-effectiveness; safety; complications

This study was approved by the University of Tennessee Health Science Center Institutional Review Board: No. 14-03191-XP.

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Total shoulder arthroplasty (TSA) is a well-recognized treatment for glenohumeral arthritis that can reliably restore function and provide pain relief for patients in whom nonoperative management has failed. Improvements in implant design and instrumentation as well as improved surgical techniques have decreased the overall complication rate of TSA,[9] which has contributed to the increasing demand for TSA, with an average increase of 9.4% per year.[12]

As the American health care policy environment continues to evolve, increasing emphasis has been placed on high-quality health care that can be delivered in a safe and efficient manner, which has increased interest in outpatient total joint arthroplasty. Concerns about the adequacy of pain control and the possibility of perioperative complications have generally kept total joint arthroplasty an inpatient procedure, although the average length of stay after total joint arthroplasty is declining, with no compromise in patient safety or satisfaction.[14,22,23] Successful outpatient total knee arthroplasty (TKA), unicompartmental knee arthroplasty (UKA), and total hip arthroplasty (THA)[3,6,7,11,13,21] have led to increased interest in outpatient TSA.

Previous studies have documented decreased morbidity and mortality of TSA compared with TKA and THA,[15,17] but reported complication rates still range from 2.8% to 12%, depending on study design.[1,2,8,9,16,27] Singh et al reported a 90-day risk for a cardiac event after TSA of 2.6% and for a thromboembolic event, 1.2%.[26] One concern about outpatient total joint arthroplasty is whether this would lead to an increase in complication rate or subsequent need for hospital admission, possibly leading to unfavorable outcomes.[10,22,25] Preliminary studies of outpatient THA and TKA have been promising; however, there is no literature regarding the safety of outpatient TSA done in an ambulatory surgery center (ASC).[6,7,11,13,21]

To determine if outpatient TSA has rates of hospital admissions or readmissions, reoperations, and complications similar to those with inpatient TSA, we compared quality-of-care measures including hospital admissions or readmissions, reoperations, and complications in matched cohorts of patients who had TSA at a freestanding ASC or a traditional inpatient hospital setting.

Materials and methods

Clinic records were queried to isolate all primary unilateral TSAs performed at a single freestanding ASC as identified by *Current Procedural Terminology* code 23472. Only primary anatomic TSAs were included; hemiarthroplasties, reverse TSAs, and revision shoulder arthroplasties were excluded. Thirty consecutive patients had TSAs done by a single surgeon between April 2012 and April 2015. All patients had radiographic and clinical indications for TSA, and nonoperative management had failed to alleviate their symptoms. An age- and comorbidities-matched cohort of 30 patients with primary anatomic TSA by the same surgeon done in the traditional inpatient hospital setting was used for comparison.

Patients for whom outpatient TSA was indicated were offered that option on the basis of several criteria, including the patient's wishes, social situation, and overall health status. For those undergoing outpatient TSA, a preanesthetic evaluation at the ASC was performed under supervision of a staff anesthesiologist and included a thorough review of health history and medications. Patients undergoing inpatient TSA were evaluated in similar fashion at the hospital before surgery. There were no differences in surgical technique between inpatient and outpatient groups; all procedures were done with the patient in the beach chair position under general anesthesia using muscle paralysis. A deltopectoral approach and subscapularis tenotomy were used in all patients. After surgery, patients in the ASC were evaluated in the postanesthesia care unit. Once pain control was adequate and patients could ambulate and urinate without assistance, they were discharged to home. An ASC staff member called the patients the following day to ensure adequate pain control and to answer any questions. Patients with inpatient TSA were transferred from the postanesthesia care unit to the hospital floor once the same criteria were met. On the day after surgery, patients were discharged to home after clearance from an internal medicine consultant. Patients with pain control or mobility problems were discharged after those were corrected, typically the following day.

A multimodal pain management program was used for both groups, including long- and short-acting oral oxycodone, gabapentin, and celecoxib, both immediately before and after surgery. An intraoperative periarticular injection consisting of liposomal bupivacaine, bupivacaine with epinephrine, and ketorolac was placed in the deltoid, pectoralis major, and soft tissues around the incision.

Postoperative rehabilitation was standardized by protocol with sling immobilization and passive range of motion for the first 6 weeks. Between 6 and 12 weeks, patients began use of the operative extremity for gentle activities in front of the body and continued passive range of motion in physical therapy. Isometric strengthening was initiated at 10 weeks, with unrestricted use of the arm allowed at 12 weeks.

Retrospective review of both the hospital and clinic electronic medical records was used to collect all data. Patient-specific demographic data included diagnosis, age, sex, comorbidities, American Society of Anesthesiologists (ASA) score, body mass index (BMI), and operative extremity. Surgical details, such as the need for glenoid bone grafting or rotator cuff repair, were obtained from the operative notes. The 90-day episode-of-care data including complications, reoperations, and hospital admissions or readmissions also were recorded. Complications were defined as any deviation from the standard postoperative course that might jeopardize health or function and were categorized as minor or major, depending on their effect on overall outcome.

Two-tailed *t*-tests were used to evaluate differences between the ASC and inpatient groups. Differences of $P < .05$ were considered statistically significant.

Results

No statistically significant differences were found between the ASC and hospital cohorts regarding age, preoperative ASA score, operative indication, or BMI (Table I).

All patients in the ASC group were discharged to home on the day of surgery without complications. The mean length