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Comparison of Short-Term Outcomes After Total Hip Arthroplasty Between an Orthopedic Specialty Hospital and General Hospital



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ABSTRACT

Background: The purpose of this study is to compare perioperative outcomes for total hip arthroplasty (THA) at an orthopedic specialty hospital (OSH) and a general hospital (GH).

Methods: A retrospective study of all primary THAs was performed at an OSH and GH in 2014. A cohort of GH patients was manually matched to the OSH by clinical and demographic variables blinded to outcome. These matched groups were then unblinded and compared by length of stay (LOS), 90-day readmissions, mortality, reoperations, and inpatient rehabilitation utilization.

Results: The 329 THAs at the OSH were matched with 329 THAs at the GH. Average LOS for THA at the OSH was 1.10 ± 0.51 days compared with 1.27 ± 0.93 ($P = .004$) at the GH. There were 2 OSH readmissions vs 5 GH readmissions ($P = .25$). There were 3 OSH reoperations vs 4 GH reoperations ($P = .70$). There were no mortalities. Three OSH patients used inpatient rehabilitation vs 13 GH patients ($P = .011$). When GH outlier and rehabilitation patients were excluded, the difference in LOS was not significant (1.08 ± 0.47 vs 1.13 ± 0.55 days; $t = 1.331$; $P = .184$). Two OSH patients required transfer to a GH postoperatively (angina and gastrointestinal bleed).

Conclusion: This study found that perioperative outcomes for THA were equally good at the OSH and GH. Rehabilitation utilization was higher at the GH. The LOS at both facilities was lower than the national average of 2.9 days. When rehabilitation patients and outliers were excluded, there was no significant difference in LOS between the two.

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The federal government is making efforts to reduce healthcare costs and improve outcomes while increasing access to care [1]. Through these efforts, high volume inpatient procedures like total hip arthroplasty (THA) are being scrutinized [2,3]. THA is a clinically reliable treatment for osteoarthritis [4,5] that is projected to increase in demand significantly by the year 2030 [6]. As the Centers for Medicare and Medicaid Services begins to implement a bundled

payment model for THA reimbursement to providers and facilities [7,8], reimbursement models will be value-based rather than volume-based. These models will focus on quality and economic metrics. Specific quality variables are perioperative mortality, perioperative readmissions, and reoperations [9]. Specific economic variables will be length of stay (LOS) and direct costs of the hospital stay and postoperative course (such as cost of postoperative rehabilitation utilization) [9].

The impact of orthopedic specialty hospital (OSH) utilization on these metrics has not been well-studied. A retrospective analysis by Cram et al [10] demonstrated that Medicare patients undergoing total joint arthroplasty at an OSH had significantly fewer complications and a nonsignificant trend toward decreased LOS compared with general hospitals (GHs). However, these patients also had fewer preoperative medical comorbidities than the GH cohort. Recent analysis found that patients undergoing primary shoulder arthroplasty at an OSH had equal readmission rates and

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perioperative mortality with significantly shorter LOS by about half a day when compared with GH patients [11]. This study controlled for medical comorbidities, demographic variables, and socioeconomic variables [11].

With the renewed emphasis on value in healthcare and the results of these recent analyses, OSH utilization may have a significant role in the evolving healthcare economy. However, there has been recent legislative action affecting OSH utilization. The Patient Protection and Affordable Care Act prohibits physician investment in hospitals and caps existing investment in hospitals [1,12]. This disproportionately affects specialty hospitals as many are at least partially physician-owned [13–17]. Therefore, further study on outcomes at an OSH is important for influencing future healthcare policy. It is in this context that we sought to analyze outcomes of THA at our OSH and GH.

The purpose of this study was to compare the THA patients treated at an OSH to a medically and demographically matched cohort treated at a GH with regards to LOS, 90-day readmission rate, reoperation rate, postoperative rehabilitation facility utilization, and mortality rates. We hypothesize that both institutions will be able to perform THA safely and efficiently.

Materials and Methods

Primary Data Collection

All primary THAs performed by 5 joint arthroplasty fellowship trained orthopedic surgeons in a 1-year period from January 1, 2014 to December 31, 2014 were identified by retrospective review of a single practice database. Each of the contributing surgeons perform over 150 primary THAs annually. Primary THAs were identified by code 81.51 of *International Classification of Diseases, Ninth Revision, Clinical Modification* codes. Exclusion criteria included revision THA and THA performed for trauma.

For each patient, age, gender, body mass index (BMI), insurance type, age-adjusted Charlson Comorbidity Index (AACCI) [18,19], and 17 individual medical comorbidities (present at final preoperative visit) were recorded. The following were the 17 variables included: history of myocardial infarction, cancer, congestive heart failure, connective tissue disorder, dementia, diabetes, diabetes complications, human immunodeficiency virus, liver disease, metastatic cancer, paraplegia, cerebrovascular disease, peptic ulcer disease, peripheral vascular disease, pulmonary disease, renal disease, and severe liver disease. The location of surgery (OSH or GH) was identified. There were a total of 329 primary THAs performed at the OSH and 1747 performed at the GH during the study period. The inpatient physical therapy protocols are the same at the OSH and GH. Total joint arthroplasty patients ambulate with physical therapy at least once on the day of surgery as soon as the spinal anesthetic has worn off and they are neurovascularly intact. The same-day surgery therapy session typically occurs in the patient room and, if tolerated, into the hallway. Each postoperative day has 2 mandatory physical therapy sessions in the physical therapy gym so that patients are ambulating and exercising at least twice per day. Nurses are also encouraged to walk with patients between their dedicated physical therapy sessions.

Matching Process

Our institution's patient criteria for OSH utilization is enumerated in Table 1. Most of the critical variables for patient selection are cardiopulmonary comorbidities. Patients who meet these criteria are given the choice, and typically the hospital site of surgery is determined by geographic proximity to the hospital. The OSH patients were then individually matched to GH patients by identical

Table 1

Patient Screening Criteria for the OSH.

Hard Stops (<i>nearly automatic disqualification from OSH utilization</i>)		
<input type="checkbox"/> AICD	<input type="checkbox"/> History or family history of malignant hyperthermia	
<input type="checkbox"/> BMI >40 kg/m ²	<input type="checkbox"/> End-stage renal disease	
Long-term Conditions (<i>each worth one point toward risk score</i>)		
<input type="checkbox"/> CHF	<input type="checkbox"/> Chronic steroids	<input type="checkbox"/> Hemoglobin <9
<input type="checkbox"/> TIA or CVA	<input type="checkbox"/> Atrial fibrillation	<input type="checkbox"/> Vascular disease
<input type="checkbox"/> CKD	<input type="checkbox"/> Cancer	<input type="checkbox"/> BMI >35 kg/m ²
<input type="checkbox"/> Diabetes	<input type="checkbox"/> HIV/AIDS	<input type="checkbox"/> Asthma
<input type="checkbox"/> COPD	<input type="checkbox"/> Sleep apnea	
Lifestyle Risk Factors (<i>each worth one point toward risk score</i>)		
<input type="checkbox"/> Hospitalization or emergency room visit in past 12 mo		<input type="checkbox"/> History of falls
<input type="checkbox"/> Admission to nursing facility or rehab in past 6 mo		<input type="checkbox"/> Lives alone
<input type="checkbox"/> Requires assistance with activities of daily living		<input type="checkbox"/> <5 medications
<input type="checkbox"/> Requires assistance with home medications		<input type="checkbox"/> Long-term pain
<input type="checkbox"/> Noncompliance with home treatment (eg, accuchecks)		<input type="checkbox"/> Alcohol/Drug abuse
<input type="checkbox"/> Noncompliance with home medications		<input type="checkbox"/> Dyspnea
<input type="checkbox"/> Impaired ambulatory status (other than orthopedic issue)		<input type="checkbox"/> Low economic status
<input type="checkbox"/> Limited access to transportation		<input type="checkbox"/> Poor health literacy
<input type="checkbox"/> Care giver anxiety or patient is primary care giver		<input type="checkbox"/> Pets in the home
<input type="checkbox"/> Acute/chronic wound or pressure ulcer		<input type="checkbox"/> Cognitive impairment
<input type="checkbox"/> Depression/anxiety or history of mental illness		<input type="checkbox"/> Weak social support
<input type="checkbox"/> Set up of home environment (stairs, throw rugs, hand rails)		<input type="checkbox"/> Age over 76 y
Scoring: Sum of all boxes checked ____ (<i>mild risk <2; moderate risk 3-5; and high risk >5</i>)		

BMI, body mass index; OSH, orthopedic specialty hospital; AICD, automatic implantable cardioverter-defibrillator; CHF, congestive heart failure; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; CVA, cerebrovascular accident; TIA, transient ischemic attack.

gender, within one AACCI point, within 5 years of age, within 5 BMI points, matched insurance types (private vs Medicare vs Medicaid), and 17 individual medical comorbidity categories. The matching process was performed in a blinded fashion to all outcomes by 3 authors without financial stake in the OSH. The blinded nature of the matching process allowed these researchers to see only the age, gender, BMI, AACCI, the 17 individual medical comorbidities, and insurance type when assigning a corresponding GH patient to each OSH patient. Outcomes such as LOS, readmission rates, reoperation, inpatient rehabilitation utilization, and mortality were not available to these researchers during the matching process. The final patient cohorts were 329 OSH patients and a matched subpopulation of 329 GH patients.

Outcomes Analysis

After the matching process, the OSH and matched GH patients were unblinded and outcomes were compared. These populations were compared by LOS (defined by the Health Care Utilization Project and Centers for Medicare and Medicaid Services as total nights spent in the hospital) [20], 90-day readmission rate, revision surgery, postoperative inpatient rehabilitation utilization, and mortality rates. Readmissions for a different elective surgery were excluded. We also identified those at the OSH who had a complicated postoperative course requiring transfer to a GH and compared these patients with those at the GH who had postoperative complications.

On evaluation of LOS, patients who used inpatient rehabilitation were found to have a prolonged LOS. Similarly, outliers for LOS because of postoperative medical complications were also identified. Therefore, a repeat analysis of outcomes was performed with

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