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Original Article

Safe Selection of Outpatient Joint Arthroplasty Patients With Medical Risk Stratification: the "Outpatient Arthroplasty Risk Assessment Score"

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ABSTRACT

Background: Current patient selection criteria and medical risk stratification methods for outpatient primary total joint arthroplasty (TJA) surgery are unproven. This study assessed the predictive ability of a medically based risk assessment score in selecting patients for outpatient and short stay surgery.
Methods: A retrospective review of 1120 consecutive primary TJAs in an early discharge program was performed. An Outpatient Arthroplasty Risk Assessment ("OARA") score was developed by a high-volume arthroplasty surgeon and perioperative internal medicine specialist to stratify patients as "low-moderate risk ($\leq$59)" and "not appropriate" ($\geq$60) for early discharge. OARA, American Society of Anesthesiologists Physical Status Classification System (ASA-PS), and Charlson comorbidity index (CCI) scores were analyzed with respect to length of stay.
Results: The positive predictive value of the OARA score was 81.6% for the same or the next day discharge, compared with that of 56.4% for ASA-PS ($P < .001$) and 70.3% for CCI ($P = .002$) scores. Patients with OARA scores $\leq$59 were 2.0 (95% confidence interval [CI], 1.4-2.8) times more likely to be discharged early than those with scores $\geq$60 ($P < .001$), while a low ASA-PS score was 1.7 (95% CI, 1.2-2.3) times more likely to be discharged early ($P = .001$). CCI did not predict early discharge ($P \geq .301$). With deliberate patient education and expectations for outpatient discharge, the odds of early discharge predicted by the OARA score, but not the ASA-PS score, increased to 2.7 (95% CI, 1.7-4.2).
Conclusion: The OARA score for primary TJA has more precise predictive ability than the ASA-PS and CCI scores for the same or next day discharge and is enhanced with a robust patient education program to establish appropriate expectations for early discharge. Early results suggest that the OARA score can successfully facilitate appropriate patient selection for outpatient TJA, although consideration of clinical program maturity before adoption of the score is advised.

Over the past decade, there has been gradually increasing interest in performing primary hip and knee arthroplasties in the outpatient setting [1–10]. In part, rapid recovery protocols have created a natural evolution from the inpatient to outpatient setting [2,3,6,10–13]. Interest in outpatient arthroplasty also has been fueled by financial considerations including the ability to control costs within the episode of care, the potential for surgeon ownership in ambulatory surgery centers, and the ability for a surgeon to control his or her operating room and surgical care environment more easily in an ambulatory surgery center [1,5,8,14]. Although only recently embraced by a larger segment of orthopedic surgeons,

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outpatient total joint arthroplasty (TJA) has been successfully performed during the past decade [4,12,15,16]. Success has been attributed to multidisciplinary care coordination, standardized perioperative protocols, discharge planning, and careful patient selection [2–4,7,12,15,16]. However, reports have been isolated to a few surgeon practices, and patient selection remains largely subjective and without specific criteria.

Despite these limited success stories and recent increase in interest, outpatient arthroplasty has not been widely adopted, primarily because there is not yet a proven method for confidently identifying patients who can safely undergo outpatient hip and knee arthroplasties. The most important aspect of performing an early discharge or outpatient arthroplasty is appropriately selecting patients to avoid putting them at undue risk in either the ambulatory setting or in their home. An additional consideration is whether patients can predictably be discharged the same day or within 23 hours allowing hip and knee arthroplasties to be performed safely in the ambulatory setting. Although all involved in the care of the arthroplasty patient would agree it is imperative to optimize safety through proper patient selection, the lack of specific guidelines for the surgeon or perioperative medical physician in this process is a substantial challenge [8,12,17], with the risk of complications after discharge further fueling appropriate apprehension.

Lacking arthroplasty-specific guidelines, the American Association of Anesthesiologists Physical Status Classification System (ASA-PS) [18,19] and the Charlson comorbidity index (CCI) [20] have been explored as surrogates for risk assessment. Although these measures are accepted in the general medical community, they were not developed with the specific considerations of TJA in mind, and their appropriateness in safely selecting outpatient TJA patients is unproven.

With the inevitable increase in demand for hip and knee arthroplasty in the outpatient setting over the coming years, a more specific and predictive medical risk stratification methodology is needed to safely select patients to minimize risk and optimize outcomes. A novel medical risk stratification and outpatient feasibility scoring system was developed based on the senior authors' extensive perioperative medical and surgical management of patients in an early discharge TJA program. The Outpatient Arthroplasty Risk Assessment (OARA) score was designed to safely select patients for outpatient and short stay TJA by identifying patients at a higher risk for extended length of stay (LOS) and readmission. This study compared the predictive value of the OARA score for successful early discharge defined as the same or postoperative day (POD) 1 discharge to ASA-PS and CCI scores.

Methods

Study Sample

Institutional review board approval was obtained to review the perioperative medical records of 1120 consecutive patients who underwent unilateral primary TJA by a single surgeon between December 01, 2011, and July 31, 2016. One-hundred forty cases considered to be confounds were excluded from analysis due to perioperative situations unrelated to medical conditions that would necessitate an extended LOS (Table 1) leaving a final sample of 980 cases.

Patient Care Procedure

All patients underwent medical clearance within 4 weeks of surgery by a perioperative internal medicine specialist whose practice focuses exclusively on TJA. Patients and family members received comprehensive perioperative education and postoperative care by the surgeon, internal medicine specialist, and a multidisciplinary inpatient care team. As care coordination and program experience evolved, expectations for early discharge progressed. Between 2011 and 2013, patients (n = 297) were educated with the expectation of being discharged to home no later than POD 2, if appropriate and safe. During that time, patients were allowed to discharge the morning after surgery if so motivated. Beginning in 2014, patients (n = 232) were informed to anticipate discharge the morning after surgery. The only perioperative protocol change occurring in 2014 coincident with universal expectation of the next day morning discharge was the adoption of adductor canal blocks to the existing multimodal pain control program for total knee arthroplasty (TKA) procedures. In 2015, expectations for POD 1 discharge were still in place, but appropriate patients (as identified by the OARA score) were offered outpatient surgery with the same day discharge (n = 451). Expectations for discharge were communicated to patients in all educational material and by all physicians, nursing staff, physical therapists, and discharge planners involved in patient care. The same rehabilitation protocol encouraging ambulation in the afternoon on the day of surgery was used for all patients. Upcoming surgeries were discussed during a routine coordinated care conference attended by key members of the multidisciplinary care team. The goal of the meeting is to share information across disciplines, anticipate and answer questions, and proactively develop patient care plans.

Table 1
Case Exclusions.

Exclusion Reason	N
Simultaneous bilateral knee surgery	8
Bleeding disease	2
Extended care facility placement delay	54
Surgery performed for fracture	20
Extreme medical complication	2
Movement disorder	1
Musculoskeletal disease	16
Orthopedic complexity (bone loss, retained hardware, and so forth)	11
Perisurgical complications due to intrathecal morphine	18
Surgery performed at a different hospital	8
Total	140

Study Procedure and Measures

The preoperative history and physical compiled by the internal medicine specialist was reviewed to document the presence and/or severity of existing medical conditions included in the OARA score. ASA-PS classification as assigned on the day of surgery also was obtained. Comorbidities and inpatient complications as documented by the *International Classification of Diseases* (*ICD*) codes, discharge dispositions, and all-cause readmissions within 90 days of discharge were extracted from the electronic medical record. Gender, race, age, procedure, and LOS were retrieved from our TJA registry. Comorbidities in the preoperative history and physical and those documented as *ICD* codes were compared and discrepancies resolved.

The OARA score was developed by a high-volume arthroplasty surgeon with a decade of experience with rapid recovery and early discharge protocols [3,21–23] and a perioperative internal medicine specialist whose practice has exclusively focused on >15,000 TJA patients since 2005. Based on their collective experience, the score comprised 9 comorbidity areas (Table 2) each of which contains specific conditions (ie, body mass index [BMI], chronic narcotic use, and so forth) scored based on the presence and/or severity and the