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Quality of Recovery, Postdischarge Hospital Utilization, and 2-Year Functional Outcomes After an Outpatient Total Knee Arthroplasty Program

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ABSTRACT

Background: Outpatient total knee arthroplasty (TKA) has been made possible with advances in perioperative care and standardized clinical inpatient pathways. While many studies report on benefits of outpatient programs, none explore patient-reported outcome measures. As such, our goals were to compare the short-term quality of recovery; highlight postdischarge hospital resources utilization; and report on 2-year functional outcomes scores.

Methods: This was a prospective comparative cohort study of 43 inpatients (43 TKAs) and 43 outpatients (43 TKAs) operated on by a single surgeon between September 28, 2010 and May 5, 2015. All patients were given a diary to complete at 1, 3, 7, 14, and 28 days postoperatively; we collected 90-day complications, readmissions, and emergency department visits; Knee Injury and Osteoarthritis Outcome Score and Western Ontario and McMaster Universities Osteoarthritis Index scores were completed preoperatively and 2 years postoperatively. SPSS (IBM, version 22.0) was used for all statistical analyses.

Results: Quality of recovery (QoR-9) was similar in the outpatient TKA group compared with the inpatient group. No statistically significant differences were observed for Knee Injury and Osteoarthritis Outcome Score and Western Ontario and McMaster Universities Osteoarthritis Index subscores ($P > .05$). There was 1 readmission in both outpatient and inpatient groups. Six inpatients and 8 outpatients returned to the emergency department for any reason within 90 days, with no statistical significance observed between the 2 groups ($P = .771$).

Conclusion: Outpatient TKA in selected patients produced similar short-term and 2-year patient-reported outcome measures and a comparable 90-day postdischarge hospital resource utilization when compared to an inpatient cohort, supporting further investigation into outpatient TKA.

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Advances in perioperative care and standardized clinical inpatient pathways have shortened length of stay and lowered postoperative morbidity after total knee arthroplasty (TKA) [1,2]. More recently, further developments have allowed for performing

outpatient TKA, while maintaining the same quality standards applied to inpatient cases [3]. While cost savings have been confirmed in studies, other potential benefits have yet to be determined [4,5]. Concerns regarding the safety of same-day discharge after TKA, as determined by the rate of complications, have been alleviated by several small studies in both selected and unselected patients who were screened for known risk factors of early complications [3,6–10].

Despite the suggested safety of outpatient TKA in a selected population, there is no published data to our knowledge of patient-reported outcome measures (PROM) from patients undergoing outpatient TKA. In this era aimed at patient-centered care, it is imperative not only to ensure the safety of outpatient TKA but also to ensure that these patients have similar patient-reported

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This study was reviewed and approved by the institutional ethics committee.

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outcomes both in the early postoperative period as well as following full recovery from surgery when compared to patients admitted postoperatively.

Throughout this article, we report on the features of our outpatient pathway, which has undergone rigorous development and refinement by a multidisciplinary team. We were interested in examining the short-term outcomes of these patients, and thus, the primary objective of our study was to compare PROMs between inpatients and outpatients, specifically via the quality of recovery (QoR-9) tool; a validated and reliable measure of subjective postoperative recovery. The secondary objective was to examine the short-term postdischarge hospital resource utilization of the outpatient program against that of inpatients by comparing the frequency of emergency department (ED) visits and readmissions in the first 90 days after surgery.

Methods

This prospective comparative cohort study was approved by our institutional research ethics board before commencement.

Program of Outpatient TKA

An accelerated TKA recovery clinical pathway was first developed through a consensus approach and formal meeting with clinical investigators in orthopedic surgery, acute pain service, nursing, anesthesia, transfusion medicine, and physiotherapy. This was protocolled, refined, and evaluated in 43 inpatients before beginning the outpatient program in September 2012 and formed the comparison cohort for the eventual outpatient group. The clinical pathway included modifications to preoperative patient education by emphasizing early and milestone-driven rapid discharge, specifically including a multimodal analgesia regimen of preoperative oral acetaminophen 1000 mg, 200 mg of celecoxib, and 50 mg of pregabalin, specifically excluding opioids. Regional anesthesia with spinal bupivacaine was used when possible. A subvastus approach [11] was performed unless the preoperative flexion was less than 90°, patient body mass index (BMI) was over 40 kg/m², or there was presence of patella baja, previous high-tibial osteotomy, or post-traumatic osteoarthritis with infrapatellar contracture. Intravenous tranexamic acid (1 g) was used routinely at the start of the case to minimize blood loss and prevent postoperative hemarthrosis [12,13]. Tourniquet was only used for cementation of final implants, to minimize ischemic time and postoperative blood loss [14]. Periarticular infiltration of the knee was performed at the conclusion of the TKA with a solution containing ropivacaine, ketorolac, morphine, and epinephrine, as described by Busch et al [15]. Standardized postoperative pain management included regular administration of acetaminophen, celecoxib, pregabalin, and as-required use of hydromorphone. Patients were prescribed apixaban 2.5 mg twice daily for venous thromboembolism prophylaxis to start on the first postoperative day. Finally, we encouraged the use of a commercially available compressive cryotherapy device for its positive effect on pain scores and analgesic use [16].

Outpatients were routinely scheduled as the first or second case of the day. They were discharged the same day after meeting a number of performance criteria deeming them suitable for discharge: tolerance of oral fluids, stable vital signs, ability to walk, and transfer independently including stairs, a Numeric Pain Rating Scale (NRS-11) with activity of 5/10 or less, and satisfaction with pain control. The pathway included a preoperative dose of either cefazolin or vancomycin (if allergic to cefazolin) and a second intravenous dose of antibiotic postoperatively before discharge home. Outpatients received one nursing visit from our local home

care service on the first postoperative day (POD) for a wound dressing change if required, and a physiotherapy visit on POD1 and POD3, before patients continued with outpatient physiotherapy visits.

Study Participants and Demographics

Forty-three inpatients (43 knees) and 43 outpatients (43 knees) were prospectively consented and enrolled into the study from August 2010 to January 2015 and from September 2012 to May 2015, respectively. The following inclusion criteria were applied to both inpatients and outpatients: patients undergoing primary TKA for end-stage osteoarthritis of the knee, an American Society of Anaesthesiologists Physical Status Classification system score of 3 or less with a stable medical profile, and a BMI under 45 kg/m², as complications after TKA have been shown to increase exponentially past this cut-off [17]. Patients selected for the inpatient pathway were also required to reside within a 60-minute drive of the hospital and in a setting where local home care services were available. This cohort of inpatients were selected to minimize confounding factors as they underwent the same milestone-driven rapid-discharge protocol developed for the outpatient pathway, with the exception of being admitted to the hospital. All patients were asked to complete the Knee Injury and Osteoarthritis Outcome Score (KOOS) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaires at baseline.

Outcome Measures

Patients in both groups were given patient diaries in which they detailed quality of recovery scores (QoR-9), daily pain scores by NRS-11, quantity of opioid used, and satisfaction with pain control (0-10) on postoperative days 1, 3, 7, 14 and 28. Primarily, we wished to determine postoperative quality of recovery, as such we selected the QoR-9 questionnaire as our primary outcome measure, which is

Table 1
Baseline Characteristics of Inpatients and Outpatients.

Variable	Inpatient Knees (N = 43)	Outpatients Knees (N = 43)	P Value
Sex (male:female)	22: 21	29: 14	.124
Age, mean (range)	62.5 (51.2-74.0)	62.5 (50.4-75.0)	.951
Body mass index, mean (range)	30.4 (23.5-41.6)	28.6 (23.7-35.8)	.030
History of coronary artery disease (no:yes)	38: 3	43: 0	.071
Chronic obstructive lung disease (no:yes)	42: 1	43:0	.303
Diabetic (no:yes)	40: 3	42:1	.283
Charlson comorbidity index (age adjusted)			
1	0	0	
2	11	14	.476
3	20	23	.518
4	10	3	.04
5	1	3	.306
Preoperative scores			
KOOS symptoms	44.8 (17.9)	43.5 (17.5)	.72
KOOS Pain	47.6 (15.1)	56.3 (59.1)	.354
KOOS ADL	53.5 (17.7)	54.8 (18.1)	.731
KOOS Sport & Rec	19.7 (14.4)	22.6 (17.4)	.413
KOOS QoL	25.7 (15.7)	23.3 (15.0)	.479
WOMAC Pain	53.3 (16.3)	52.3 (17.0)	.784
WOMAC Stiffness	44.4 (17.9)	44.0 (17.1)	.922
WOMAC Function	52.5 (18.9)	55.8 (16.8)	.397
WOMAC Total	51.2 (15.7)	51.9 (15.4)	.838

ADL, activities of daily living; KOOS, Knee Injury and Osteoarthritis Outcome Score; QoL, Quality of Life; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; ADL, Function in daily living.

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