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Review Article

The Shift to Same-Day Outpatient Joint Arthroplasty: A Systematic Review

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ABSTRACT

Background: Hip and knee arthroplasties length of stay continues to shorten after advances in perioperative and intraoperative management, as well as financial incentives. Some authors have demonstrated good results with outpatient arthroplasty, but safety and general feasibility of such procedures remain unclear. Our hypothesis is that outpatient arthroplasty would demonstrate higher readmission and complication rates than inpatient arthroplasty.

Methods: We performed a systematic review of all publications on outpatient arthroplasty between January 1, 2000 and June 1, 2016. Included publications had to demonstrate a specific outpatient protocol and have reported perioperative complications and unplanned readmissions. Patient demographics, surgical variables, and protocol details were recorded in addition to complications, readmission, and reoperation.

Results: Ten manuscripts accounting for 1009 patients demonstrated that 955 (94.7%) were discharged the same day as planned, with the majority of failures to discharge being secondary to pain, hypotension, and nausea. There were no deaths and only 1 major complication. Only 20 patients (1.98%) required reoperation and 20 (1.98%) had readmission or visited the emergency room within 90 days of their operation. In the 2 series recording patient outcomes, 80% and 96% of patients reported that they would choose to undergo outpatient arthroplasty again.

Conclusion: For carefully selected patients with experienced surgeons in major centers, outpatient arthroplasty may be a safe and effective procedure. Although our data is promising, further study is required to better elucidate the differences between inpatient and outpatient arthroplasty outcomes.

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Hip and knee arthroplasties have shifted in recent years toward outpatient and short stay procedures. This is in part owed to improvements in perioperative care and surgical technique, but also to an ever-growing impetus for reduction in health care costs. Ambulatory surgery centers offer a substantial cost savings over hospital-based outpatient surgical establishments [1,2]. Financial analysis has demonstrated that outpatient hip arthroplasty performed for just 30% of the 250,000 procedures performed annually at the time of publication would save $300 million in billing charges and $87 million in reimbursements [3]. However, concerns remain as to the safety and feasibility of outpatient arthroplasty.

There is agreement that patients must be carefully selected to undergo same-day procedures. Multiple studies have attempted to qualify the ideal patient characteristics for outpatient joint replacement surgery and risk factors for postoperative arthroplasty complications [1,4]. Risk factors for perioperative complications and readmission have been elucidated. These include cardiac or pulmonary history, a higher comorbidity burden specifically hypertension, advanced age, obesity, hypoalbuminemia, cirrhosis, and patients who did not receive adequate local analgesia [1,4–9].

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Table 1
Patient and Surgical Characteristics.

Author	Year	Procedure	Total Patients	Average Age	Gender, M:F (% M)	Average ASA Class	Average BMI, kg/m^2	Average Surgical Time, min (Range)	EBL, cc (Range)	Discharged Patients the Same Day (%)
Berger [10]	2006	TKA	100	65	57:43 (57%)	NR	27.7	104 (74-136)	NR	98 (98%)
Berger [11]	2009	THA	150	58	112:38 (74.7)	NR	29.8	99 (66-141)	266 (100-1000)	150
Berger [12]	2009	TKA/UKA	111	65	66:45 (59.5)	NR	28.8	103 (78-126)	NR	104 (93.7%)
Kolisek [13]	2009	TKA	64	55	40:24 (62.5)	NR	30.8	45 (36-62)	NR	64
Dorr [14]	2010	THA	69	54.1	37:32 (53.6)	NR	28.3	79.9 (55-133)	311.2 (200-800)	53 (76.8%)
Chen [15]	2013	THA	87	56	53:34 (60.9)	NR	27.9	59 (38-91)	250 (50-1500)	86 (98.9%)
Gondusky [16]	2014	UKA/PFA	160	65.3	104:56 (65.0)	1.84	27.7	81 (58-115)	NR	160
Cross [17]	2014	UKA	105	67.5	63:42 (60.0)	2.13	27.5	NR	NR	105
Parcells [18]	2016	TKA/THA	51	58.8	30:21 (58.8)	2.04	30.1	130.9	NR	50 (98.0%)
Goyal [19]	2017	THA	112	59.8	59:53 (52.7)	NR	27.6	NR	NR	85 (76%)
Total			1009	60.4	621:388 (61.2%)	1.97	28.5	88.1	271.6	955 (94.7%)

ASA, American Society of Anesthesiologist Classification; BMI, body mass index; F, female; EBL, estimated blood loss; M, male; NR, not reported; PFA, patellofemoral arthroplasty; THA, total hip arthroplasty; TKA, total knee arthroplasty; UKA, unicompartmental knee arthroplasty.

Patient body mass index (BMI) and American Society of Anesthesiologists (ASA) have been identified as independent predictors of postoperative complications in knee arthroplasty [6]. Despite identification of individual factors that could predict poor outcomes, no standard screening metric has been accepted for short stay or outpatient arthroplasty. Similarly, no widely accepted protocol for exists guiding the perioperative regimen that best allows for safe outpatient arthroplasty.

We performed a systematic review of the published literature to characterize the patient demographic, institutional protocols, and adverse outcomes including complications and unplanned readmission after the same-day outpatient joint arthroplasty performed at centers with distinct institutional protocols. Our hypothesis is that outpatient arthroplasty would result in higher rates of complication and readmission than inpatient arthroplasty. We propose that outpatient procedures would also require tightly controlled patient populations not generally applicable to the cohorts seen by most orthopedic surgeons.

Materials and Methods

Literature Search

A comprehensive literature review was performed using an internet-based search beginning with queries into the PubMed database for all articles between January 1, 2000 and June 1, 2016. The search terms included: (1) “same day joint replacement,” (2) “outpatient joint arthroplasty,” (3) “fast track arthroplasty,” (4) “day of surgery discharge after arthroplasty,” and (5) “ambulatory surgical center joint replacement”. This yielded a total of 10 original articles that were isolated for screening.

Study Selection

The abstracts of all identified articles were subsequently analyzed to determine relevance to same-day outpatient joint replacement. Articles were excluded for one or more of the following criteria: literature review or expert opinion, publication in non-English language, published before the year 2000, reporting “outpatient” as a proxy for short hospital length of stay without planned same-day surgery, or subgroup analysis of a larger population isolating patients incidentally discharged home the same day. The full manuscripts of the remaining investigations were then reviewed for the following inclusion criteria: peer-reviewed clinical studies of level I-IV evidence, case series including at least 50 patients, involving patients undergoing total or partial hip or knee arthroplasty procedures, inclusion of an established institutional same-day or outpatient protocol, reporting the number of patients discharged same day by this protocol as well as perioperative complications and unplanned readmission. The references of all articles were reviewed as well for any additional articles which were not found on the initial search. The patient cohorts of studies with the same authors and/or institutions were scrutinized to ensure that no redundant data was collected.

Patient demographics (age, gender, BMI, and ASA status), institutional protocols (preoperative and postoperative therapy and/or

Table 2
Patient Selection and Preoperative Counseling.

Author	Year	Preoperative Medical Clearance From IM Provider	Preoperative Surgeon, Nurse, and/or Coordinator Teaching	Preoperative PT Teaching	Family Member Identified for Help Perioperatively	Excluded Patient with Cardiac History (MI, Cardiac Surgery/Stents)	Excluded Patient with Pulmonary History (COPD, Pulmonary Disease)	Excluded Patient with Prior DVT/PE
Berger [10]	2006	Y	Y	Y	Y	Y	N	Y
Berger [11]	2009	Y	Y	Y	Y	N	N	N
Berger [12]	2009	Y	Y	Y	Y	N	N	N
Kolisek [13]	2009	NR	Y	Y	Y	Y	Y	Y
Dorr [14]	2010	NR	Y	NR	N	N	N	N
Chen [15]	2013	Y	Y	Y	Y	N	N	N
Gondusky [16]	2014	Y[a]	Y	N	N	N	N	N
Cross [17]	2014	Y	Y	Y	Y	N	N	N
Parcells [18]	2016	NR	Y	Y	Y	Y	N	Y
Goyal [19]	2017	NR	NR	NR	NR	Y	Y	N

COPD, chronic obstructive pulmonary disease; DVT, deep venous thrombosis; IM, internal medicine; MI, myocardial infarction; PE, pulmonary embolism; PT, physical therapy; Y, yes; N, no; NR, not reported.
[a] Separate cardiac clearance if cardiovascular history.