



Original article

Does performing outpatient total hip arthroplasty contribute to early complications and readmissions? Retrospective case-control study of 50 patients[☆]



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ABSTRACT

Introduction: Advances in anesthesia and surgical practices have allowed total hip arthroplasty to be performed as an outpatient procedure. The aim of this study was to demonstrate its feasibility in a selected population compared to a group of inpatients by analyzing the cumulative length of hospital stay, complications and readmissions.

Patients and methods: This was a retrospective, single-surgeon study of continuous adult patients between October 2016 and May 2018 who underwent primary total hip arthroplasty (THA) and were eligible to undergo this procedure either as an inpatient or outpatient based on their health and comprehension level. Two groups of patients were set up. The outpatient group was given a preoperative treatment education session. The same anesthesia protocol and surgical technique was used in both groups.

Results: Fifty outpatients were compared to 77 inpatients. In the outpatient group, the patients were significantly younger, had a greater walking distance and were predominantly male. The two groups were comparable in terms of functional and medical criteria. The mean cumulative hospital stay was 1.2 days in the outpatient group with one discharge failure because of nausea and vomiting, versus 5.1 days in the inpatient group ($p < 0.0001$). There were three complications in each group ($p = 1.00$). There were three readmissions in the outpatient group and four in the inpatient group ($p = 1.00$) that were of similar length ($p = 0.86$). There was no difference in the mean number of additional office visits over this period between the two groups.

Conclusion: Outpatient THA procedures can be done reliably and safely in France in a carefully selected population without increasing the complication rate or readmission rate. Expanding this practice requires implementing specific anesthesia and surgery protocols, along with close perioperative monitoring to help manage risk.

Level of evidence: IV (retrospective cohort study).

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1. Introduction

Advances in anesthesia and surgical practices have reduced the length of hospital stay for primary total hip arthroplasty (THA) surgery [1–3]. The implementation of multimodal pain

management protocols has resulted in the pain control critical to allow rapid return to function, while the perioperative risks have been reduced by careful patient selection and appropriate anesthesia protocols [4,5]. Minimally invasive surgical techniques and instrumentation that preserve muscles and tendons around the hip allow for immediate weightbearing and faster functional recovery. Consequently, primary THA has been performed as an outpatient procedure for the past 15 years [6,7]. While there are published studies on “one-day surgery” [8–10], they do not readily apply to France where very few outpatient THA procedures are being performed. In 2016, there were 71,646 stays for THA (NEKA020 code)

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of which only 479 were ambulatory (0.67%) [11]. Only small case studies have been reported by French surgical teams. Biette et al. [12] described a case series of 21 consecutive patients who underwent THA by the anterior approach. Jouffroy et al. compared 27 THA cases performed by the anterior approach on a traction table with one-night hospital stay [13] to a prior series of 10 consecutive THA cases done on an outpatient basis [14]. Among the latter, only half the patients truly underwent an outpatient procedure; the major obstacle for discharge on the day of surgery was intra- and postoperative bleeding.

For this study, we hypothesized that THA can be performed as an outpatient procedure with the same safety and reliability as standard hospitalization in selected patients. The primary objective was to compare the cumulative length of stay over a 45-day postoperative period between two homogenous groups of patients operated either as outpatients or as inpatients for primary anterior THA. The secondary objectives were to study the complications, readmissions and medical visits during a 45-day postoperative period and to identify the reasons an outpatient procedure was ruled out in the hospitalized patients.

2. Patients and methods

This was a retrospective continuous study conducted between October 2016 and May 2018. The procedures were performed by a single experienced surgeon. Eligible for the study were adult patients undergoing unilateral primary THA for primary or secondary hip osteoarthritis. The inclusion criteria were the same for both groups: non-objection of the patient, ability to understand instructions and to follow medical prescription. The exclusion criteria were under legal protection, ASA ≥ 3 , treated but not stabilized disease, lack of agreement between anesthesiologist and surgeon, hemoglobin levels below 12 g/dL for women and below 13 g/dL for men, opioid addiction, need for associated surgical procedure, poor functional status (walking distance less than 30 m or permanent use of walker). Patients were assigned to an outpatient or inpatient procedure after a discussion between the anesthesiologist and surgeon; they were enrolled into the study after the surgery had been completed and placed into the appropriate groups. Along with the same preoperative assessment, the outpatients attended a group educational session (4–5 patients) led by a nurse and a physical therapist, supplemented by written materials and postoperative prescriptions. The same anesthesia protocol was used in both groups: tranexamic acid (15 mg/kg before incision and at end of procedure), intraoperative injection of soft tissue with ropivacaine (max dose of 4 mg/kg, with adrenalin for deep tissues), multimodal pain management (step 1, 2, 3 analgesics and anti-inflammatory drugs) and 45 days of thromboprophylaxis. The same surgical technique was used in both groups: minimally invasive anterior surgical approach on regular operating room table, without drains. The same implant was used in both groups: cementless stem and cup with ceramic-on-ceramic bearing. The first standing position was done in the recovery room with the physical therapist about 3 hours after the procedure for the outpatients and in the surgical ward for the inpatients. Both groups had the same discharge criteria: able to move from bed to chair by themselves, walk more than 50 m without assistance or a cane, go up and down stairs (if the home has stairs), bathing, dressing and eating meals by themselves, return of miction and evacuation of intestinal gas, pain controlled by oral analgesics (VAS < 3 at rest and < 5 during movements), no nausea or vomiting, clean dressings, satisfactory postoperative radiographs, and patient agrees to the discharge. Five physiotherapy sessions and nurse visits at home were prescribed. The patient education nurse called the outpatients the day after the surgery, then on postoperative day 8. A follow-up visit with the

surgeon was scheduled on days 21 and 45 for the outpatients and day 45 for the inpatients.

The primary outcome measure was the cumulative length of stay in the first 45 days post-THA (initial hospitalization and any readmissions). The day spent at the hospital in the outpatient ward and the patients' arrival at the ward the night before the procedure were counted as 1 day of hospitalization. The secondary outcome measures were the complication rate, readmission rate and number of secondary medical visits.

Authorization to start this non-interventional study was given by the Research and Innovation Management at the Rennes University Hospital after the study was approved by the ethics committee (No. 17.67). The absence of opposition by a patient in the 15 days following the receipt of an information letter was considered as non-objection to this study. The statistical analysis was performed with SAS software (version 9.4). Quantitative variables were described by their count, average, standard deviation. The groups were compared using a Mann–Whitney–Wilcoxon test since the length of stay data were not normally distributed. For the qualitative variables, the counts and percentages were determined for each modality. The groups were compared using the parametric χ^2 or nonparametric Fisher test.

3. Results

Among the 191 eligible patients, 64 were excluded: 48 for medical reasons, 12 for surgical reasons, and 4 because of a poor preoperative condition. Thus, 127 patients were enrolled: 50 in the outpatient group and 77 in the inpatient group (Fig. 1). The reasons for choosing standard hospitalization instead of an outpatient procedure among the theoretically eligible patients are given in Fig. 2. Twenty-eight patients (36%) were not suited to an outpatient procedure because of their living arrangements (Fig. 3). Twenty-six patients (34%) were ruled out by the surgeon, while 23 other patients preferred the standard hospital protocol, including one for administrative reasons.

The characteristics used for comparison are shown in Table 1. The patients in the outpatient group were more often male, younger and had a better walking distance preoperatively and lower ASA score. A drain was used more often in the inpatient group. The two groups were comparable in their preoperative functional status, smoking habits, BMI, presence of diabetes, associated treatments, operative time, and lumbar spine ailments.

The mean cumulative length of stay was 1.2 days in the outpatient group; one patient who could not be discharged on the day of surgery because of nausea and vomiting (discharged the next day). The mean cumulative length of stay in the inpatient group was 5.1 days, of which 4.9 days was for the initial stay (Fig. 4); 9 of the 77 patients were admitted on the day of the surgery.

The complication rate did not differ between the two groups (Table 2). There were three complications in two patients in the outpatient group and three dislocations in the inpatient group. After undergoing a CT scan that showed appropriate implant positioning, the latter patients did not require revision surgery. The readmission rate was not different between groups (Table 2), nor was the mean number of supplemental medical visits (mean 1.46 for outpatients and 1.14 for inpatients).

4. Discussion

The primary aim of our study was achieved: the 1.2 day cumulative length of stay (related to one discharge failure and the 3 readmissions out of 50 patients) were significantly less than the mean 5.1 days for the inpatient group (initial stay of 4.9 days; range 2–11 and 4 readmission out of 77 patients). The outpatient

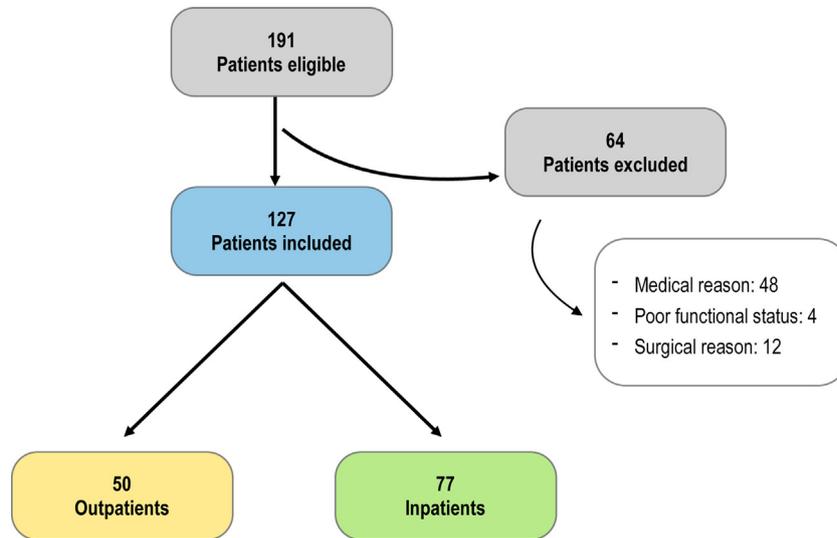


Fig. 1. Flow diagram summarizing the study design.

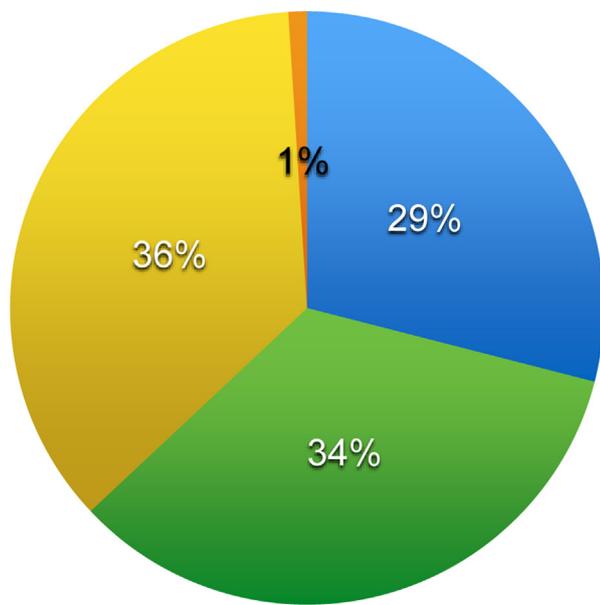


Fig. 2. Reasons for inpatient instead of outpatient total hip arthroplasty (THA) procedure.

option within two closely related patient populations reduced the length of hospital stay five-fold, without significantly increasing the complication rate or readmission rate. Since there are few studies of outpatient THA in France, it is difficult for us to compare our findings. Biette et al. [12] reported one failed discharge out of 21 patients due to excessive blood loss, but no complications or readmissions. Jouffroy et al. [14] described 10 consecutive cases in which only half truly had an outpatient procedure; the obstacle to same-day discharge was intra- and postoperative bleeding. In a later group, with a one-night hospital stay, one patient had to be readmitted because of a hematoma (no revision surgery needed). In our study, only one discharge failure occurred in the outpatient

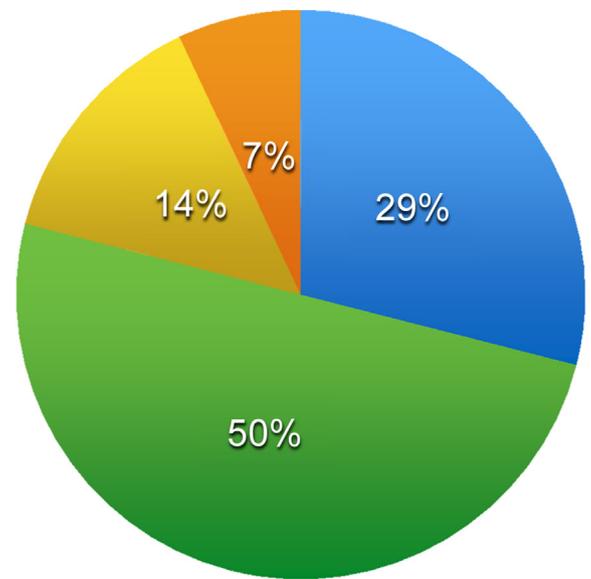


Fig. 3. Living arrangements for inpatients that made it impossible to have an outpatient procedure.

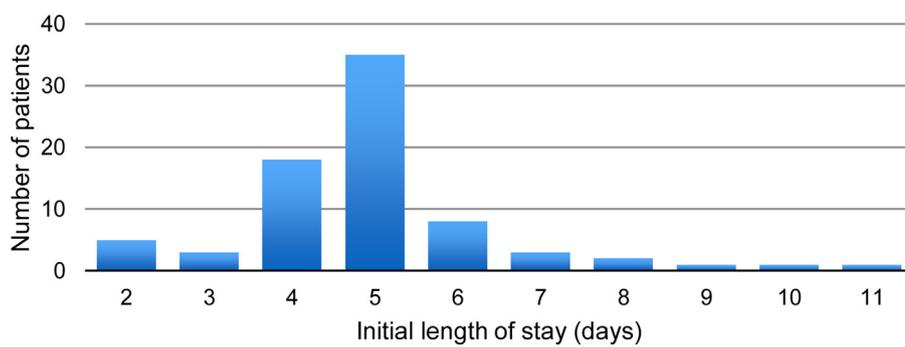
group, which is consistent with other published studies: Klein et al. [9] reported 1 out of 549, Hartog et al. [10] 3 out of 27 and Biette et al. [12] 1 out of 21.

The secondary aim was to analyze early complications. Three inpatients suffered a dislocation (during a hip dislocating movement) while only one outpatient experienced a dislocation (this patient had a non-displaced greater trochanter fracture). This difference may be related to the preoperative education describing which movements to avoid after THA. The importance of careful selection of patients eligible for an outpatient procedure is highlighted by comparing the postoperative complications reported in the literature (Table 3). Husted et al. reported 103 complications out of 957 patients (10.8%) who were not specifically selected [15] while we had 3 in 50 patients (6%) and Hartog et al. [10] 1 in 27 patients (3.7%) in cohorts that were specifically selected for an

Table 1
Characteristics of the THA patients in the two groups.

	Total (n = 127)	Outpatients (n = 50)	Inpatients (n = 77)	p
Age	67.41 ± 11.17	62.66 ± 10.81	70.49 ± 10.35	p < 0.0001
Sex				p < 0.0001
Female	84 (66.1%)	22 (44.0%)	62 (80.5%)	
Male	43 (33.9%)	28 (56.0%)	15 (19.5%)	
BMI (kg/m ²)	26.15 ± 4.32	25.64 ± 3.57	26.47 ± 4.73	p = 0.264
Smoking	10 (7.9%)	6 (12.2%)	4 (5.2%)	p = 0.185
Diabetes	9 (7.1%)	3 (6.1%)	6 (7.8%)	p = 1.000
ASA	1.64 ± 0.48	1.48 ± 0.50	1.74 ± 0.44	p = 0.003
Antiplatelet treatment	19 (15.2%)	4 (8.3%)	15 (19.5%)	p = 0.091
Anticoagulant treatment	3 (2.4%)	0 (0.0%)	3 (3.9%)	p = 0.284
Immunosuppression treatment	3 (2.4%)	0 (0.0%)	3 (3.9%)	p = 0.288
Anti-inflammatory treatment	24 (19.4%)	10 (21.3%)	14 (18.2%)	p = 0.672
Walking distance (m)	1571.6 ± 2840.8	2523.6 ± 4048.7	973.14 ± 1435.2	p = 0.002
Use of a crutch or a cane	36 (30.0%)	12 (25.5%)	24 (32.9%)	p = 0.391
Preoperative MDP score	12.05 ± 1.99	12.41 ± 1.81	11.83 ± 2.07	p = 0.130
Lumbar spine ailment	43 (34.1%)	16 (32.7%)	27 (35.1%)	p = 0.780
Operative time (min)	63.41 ± 11.57	63.26 ± 10.02	63.51 ± 12.5	p = 0.907
Drainage	18 (14.2%)	2 (4.0%)	16 (20.8%)	p = 0.008

THA: total hip arthroplasty.

**Fig. 4.** Initial length of the hospital stay in the inpatient group.**Table 2**
Complications and readmissions.

	Outpatients (50)	Inpatients (77)	p
Complications	3 complications (2 patients): greater trochanter fracture D4; dislocation D19 (same patient); seroma lavage D15	3 complications (3 patients): dislocation D4; dislocation D16; dislocation D12	p = 1.0000
Readmissions and length of stay	3 readmissions: soiled bandage D1: 1 day; dislocation D19: 4 days; seroma lavage D15: 4 days	4 readmissions: dislocation D4: 6 days; dislocation D16: 2 days; dislocation D12: 3 days; suspicion of VTE: 2 days	p = 1.0000 – p = 0.86

VTE: venous thromboembolism.

Table 3
Rate of postoperative events after outpatient THA reported in the literature.

	Our study	Klein et al.[9]	Husted et al.[15]	Hartog et al.[10]	Otero et al.[16]	Lovecchio et al.[17]
n	50	549	947	27	249	183
Complications				0 (0%)		
Dislocation	1 (2%)	6 (1%)	51 (5%)			
Infection	0 (0%)	5 (< 1%)	7 (< 1%)			
Fracture	1 (2%)		9 (< 1%)			
Readmission	3 (6%)		103 (11%)	1 (3.7%)	2.0%	2.2%
Reoperation	1 (2%)	≥ 1 (< 1%)	≥ 15 (1.6%)	0 (0%)	2.0%	2.2%
Failed same-day discharge	1 (2%)	3 (< 1%)		3 (11%)		

THA: total hip arthroplasty.

outpatient procedure. Otero et al. [16] and Lovecchio et al. [17] reported a 30-day readmission rate of 2.02% and 2.2%, respectively, while the rate in our study was 6% (smaller sample size). Lastly, the reoperation rate in our outpatient group was comparable to that reported in the literature, although this type of event is rare, and our sample size was small.

The limitations of our study are its small sample size, retrospective design and the fact it did not take into account general medicine visits or visits to other hospitals in the first 45 postoperative days. One of the fears associated with outpatient procedures is increased use of the medical system by transferring the care provision to office-based providers and emergency rooms; we only

considered the visits to our hospital. In particular, these visits could have been to treat pain. Having the patient education nurse call the patient 1 day and 8 days after the surgery helps to answer the patients' questions and adjust their analgesic intake to their pain level and postoperative prescriptions. The quality of postoperative prescriptions along with effective, relevant communication between the office-based and hospital providers should help prevent this transfer of care. One strength of this study is that all procedures were performed by the same orthopedic surgeon. This ensures stringent protocol application, reproducibility of the surgical technique and consistent follow-up. Its other strengths are the comparison to a control group of similar patients (medical criteria and MDP functional score) and an analysis of reasons that patients declined the outpatient procedure despite being eligible on a medical basis. This supports the expansion of outpatient procedures as it provides insight into patient recruitment. In our cohort, 29% of the inpatients (22/77) specifically decided not to have an outpatient procedure. This led us to improve our patient education and perioperative monitoring and to provide testimonials from other patients who have previously undergone outpatient THA. We also found that 36% of inpatients (28/77) could not undergo an outpatient procedure because of their living arrangements (live alone at home, unfavorable family context, unsuitable housing, too far away from hospital). One solution would be to develop temporary housing structures that cost less than one night at the hospital but cater patients in the early postoperative stage. Reminder that the presence of a caregiver at the postoperative residence must be evaluated in the context of the procedure–patient couple and must be defined beforehand by the stakeholders at the facility [18]. Hypothetically, twice as many patients could have undergone outpatient THA in a better context.

5. Conclusion

This study confirms the possibility of safely and reliably performing THA as an outpatient procedure in carefully selected patients, without increasing the risk of short-term complications or readmission. It also highlights the potential expansion of this practice as long as a specific treatment pathway is created to inform and educate the patients, particularly about the movements they can and cannot perform after THA surgery. The development of outpatient arthroplasty procedures also requires the implementation of strict protocols to better manage the perioperative risk (decompensation of comorbidities, excessive blood loss, implant dislocation). These improvements in medical and surgical care will also benefit inpatients.

Disclosure of interest

Dr. Polard is a consultant for Zimmer Biomet.
The other authors declare that they have no competing interest.

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None.

Author contributions

Dr. Crampet: data collection and writing of article.
Dr Polard: surgical procedures.
Dr. Bajeux: helped with study design.
Dr. Common and Mr. Bourgoïn: data collection.
Prof. Thomazeau: helped with study design and writing article.

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