

Feasibility and safety of performing outpatient unicompartmental knee arthroplasty

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Abstract

Purpose Unicompartmental knee arthroplasty (UKA) has a faster short-term recovery than total knee arthroplasty (TKA). The purpose of this study was to determine the feasibility and safety of performing outpatient UKAs in a consecutive group of patients presenting with unicompartmental knee osteoarthritis.

Methods A total of 105 consecutive patients underwent unicompartmental arthroplasty before noon with the intention of being discharged as an outpatient. All patients followed an established rapid recovery pathway to facilitate a same-day discharge. Post-operative complications and hospital readmissions were retrospectively recorded for all patients at one week and at three months after surgery.

Results All of the 105 patients (100 %) indicated for outpatient UKA could be discharged home on the same day of surgery. No patients required readmission within the first week post-operatively, while one patient required readmission between week one and week 12. The single patient who required readmission developed a post-operative infection requiring irrigation/debridement with polyethylene liner exchange and intravenous antibiotics.

Conclusion Using an established, multidisciplinary, rapid recovery protocol, outpatient UKA is safe and feasible in the vast majority of patients.

Keywords Rapid recovery · Outpatient · Unicompartmental knee arthroplasty · Safety · Feasibility

Introduction

Unicompartmental knee arthroplasty (UKA) has been shown to have a quicker short-term recovery, decreased morbidity and decreased post-operative pain compared to total knee arthroplasty (TKA) [1, 2]. However, despite a more rapid recovery, UKA is still considered by most to be an inpatient operation, requiring acute, in-hospital care post-operatively. However, patients who stay in the hospital as inpatients after UKA do so mostly because of physician concern for post-operative complications and patient's concerns of inadequate pain control at home, as well as their fear of being dependent on others [3, 4].

Given the current focus on the cost of health care delivery, orthopaedic surgeons are encouraged to find methods of safely reducing the duration of inpatient stay after knee arthroplasty [5–7]. As a result, the length of stay after UKA has been successfully decreased over the last several years because of improved pain control and implementation of “rapid recovery pathways” [3, 8–10]. Further, it has been shown that reducing the inpatient stay after knee arthroplasty can be accomplished without compromising patient safety or patient satisfaction [11, 12]. And some authors report that reducing the inpatient hospital stay reduces post-operative complications and improves patients' outcomes and satisfaction [8–10, 13].

However, because of the increased pressures and regulations placed upon surgeons by hospital administrations, some surgeons are now electing to perform outpatient procedures at surgery centres, some of which are physician owned. Physician-owned hospitals (POH) and surgery centres have been shown to achieve high patient satisfaction ratings, while

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also giving surgeons more control over their daily clinical practice, including but not limited to providing surgeons more operating room time, more control over staff and the potential to increase operating room efficiency [14, 15].

Critics of previously published reports on the feasibility of outpatient TKA state that the patients recruited for the prior studies were a select groups of patients who were healthy and highly motivated to undergo outpatient TKA [16, 17]. However, our initial experience with *unselected* outpatient UKA was also promising, although the numbers were small [3]. In our first 25 patients, Berger et al. reported in 2009 [3] that 95 % could be discharged home the same day of surgery, when the surgery was performed before noon. Further, no patients required readmission to the hospital in the first three months post-operatively [3].

The purpose of this study was to determine whether outpatient UKA could be performed safely in a large, non-selected group of consecutive patients undergoing UKA using an established outpatient arthroplasty protocol as previously published [3]. Our hypothesis was that outpatient UKA is not only feasible in the majority of patients, regardless of age and medical co-morbidities, but is also safe, provided that a multidisciplinary team approach is used.

Methods

An Institutional Review Board approved this study. A total of 105 consecutive patients from January 2010 to January 2013 who underwent UKA were retrospectively reviewed. All patients had the operation performed before noon, and all patients were expecting to be discharged home the same day of surgery following our previously published rapid recovery protocol [3]. No patients were excluded from the outpatient protocol, as all patients indicated for UKA by the senior author are booked as outpatient operations with the expectation of being discharged home the same day. The consecutive cohort included 42 women and 63 men; 93 patients underwent medial UKA and 12 patients underwent lateral UKA. The average age of the cohort was 67.5 years (range 48–88), while the mean body mass index (BMI) was 27.5 (range 18.3–41.0). Medical co-morbidities were scored and risk stratified using the American Society of Anesthesiologists (ASA) classification. In our cohort, seven patients were ASA 1, 84 patients were ASA 2 and 14 patients were ASA 3.

Our outpatient protocol includes a multidisciplinary team approach to patient care, including the anaesthesiologist, nurses, physical therapists and discharge planners [3]. Patients attend a pre-operative teaching class that is taught by a clinical nurse and a physical therapist. At this teaching session, the procedure is discussed in detail, and expectations are set that the patient will be discharged on the day of surgery. The physical therapist then instructs the patients on how to use

the various assistive devices, in order to reduce their fear of being dependent on loved ones post-operatively. The patient also meets with a discharge planner preoperatively to establish needs prior to the operation itself, again reducing their fear of dependency. Finally, the patient sees an internist at our institution to make sure the patient is of acceptable risk to undergo knee arthroplasty.

All UKAs were performed by a single surgeon (RAB) prior to noon, as our initial experience with outpatient knee arthroplasty proved this time frame to be optimal [3]. Each patient receives 10 mg of OxyContin (oxycodone hydrochloride sustained release, Purdue Pharma, Stamford, CT, USA) the morning before surgery, and a scopolamine patch is placed in the holding area to minimise post-operative nausea. Male patients with a history of benign prostatic hyperplasia (BPH) did not receive a scopolamine patch. Furthermore, in general, patients older than 75 year of age did not receive OxyContin pre-operatively. Intra-operatively, every patient receives epidural anaesthesia (10 µg/ml fentanyl+0.1 % bupivacaine at 6 ml, 1 ml every 15 minutes with a 40-ml four hour lockout) without intravenous narcotics to minimise the post-operative ill effects of narcotic pain medication; minimal sedation is accomplished using the very short-acting agent Diprivan (propofol, AstraZeneca Pharmaceuticals, Wilmington, DE, USA) if necessary. All patients also receive one unit of autologous blood (donated pre-operatively) and intravenous acetaminophen.

The surgical procedure was performed in all patients using a previously described minimally invasive, mini-midvastus approach [3]. The implant used was the fixed-bearing DePuy® Sigma High Performance UKA (DePuy®, Warsaw, IN, USA). A suction-reinflation drain was placed intra-articularly in all patients prior to arthrotomy closure and was removed in the recovery room by a clinical nurse prior to being discharged home. Aggressive intravenous hydration is used post-operatively to minimise post-operative hypotension including giving every patient a 500 cc bolus of Hespan (hydroxyethyl starch, B. Braun Medical Inc., Melsungen, Germany). A Foley catheter is used to minimise bladder distention and/or urinary retention caused by the epidural and is removed after one to two hours in the recovery room, after recovery of motor function and sensation in the lower extremities. Post-operative pain in the recovery room is controlled using oral narcotics including 10 mg of OxyContin (no OxyContin is given if the patient is older than 75 years of age) and Norco 5–10/325 (hydrocodone+acetaminophen, Watson Pharmaceuticals, Corona, CA, USA) for breakthrough pain; intravenous hydromorphone is only used in rare circumstances. Some patients who had a history of narcotic use received 20 mg of OxyContin. To reduce severe nausea, patients are given 4 mg of Zofran as needed, 10 mg of Reglan every six hours as needed, and the scopolamine patch (which was placed in the holding area) is maintained in place for 72 hours in total.

All patients are allowed to be weight-bearing as tolerated, using an assistive device (cane, walker, etc.) as needed. Physical therapy is begun five to six hours after arrival in the recovery room. Standard discharge milestones [3] that are used at our institution must be met by all patients prior to discharge, which include: (1) the ability to transfer from a supine position to a standing position, and then back to a supine position, (2) walk ≥ 100 feet without assistance and (3) ascend/descend a flight of stairs. In addition, the patients must have stable vital signs and have adequate pain control on oral narcotics prior to discharge.

Once the patient is discharged home, visiting nursing services visit the patients at home (as their needs require), and all patients undergo home physical therapy until their function allows them to attend/drive to outpatient physical therapy. Outpatient physical therapy is continued for two to six weeks post-operatively, depending on the patient's progress. Pharmacologic venous thromboembolic prophylaxis is accomplished using 325 mg of aspirin given every 12 hours for three weeks.

All patients were followed up at one week, three weeks and three months as part of our standard post-operative protocol. Post-operative complications and readmissions (at time points of before one week post-operatively and after one week post-operatively) were recorded in all patients and were retrospectively reviewed. One hundred per cent (100 %) follow-up was achieved at three months. Our clinical staff, which includes fellows and clinical nurses, follows all outpatient UKAs closely with telephone conversations and through communications with visiting nursing services and physical therapists, even when the patients are at home; this ensures accurate timing of complications and readmissions if they do occur.

Results

All 105 patients had successful completion of their unicompartmental knee replacement. All patients had an epidural anaesthesia, and no patient required general anaesthesia. Of the 105 patients, all of whom were indicated for outpatient UKA, all 105 patients (100 %) were discharged home on the same day of surgery. Using this pathway, all but one patient went through the recovery room stay without incident or adjustment of the pathway. One patient required an alteration in the pathway but was still discharged home the day of surgery. This one patient required prolonged stay in the recovery room for pain control; she ultimately required intravenous hydromorphone until the oral analgesia became effective. After this intervention, however, she was placed back in the pathway and was still able to be discharged home on just oral medications. There were no significant delays in the pathway for nausea, hypotension or dizziness.

All 105 patients successfully completed physical therapy, by walking either with or without a cane 100 feet and

independently ascending and descending stairs. All patients were discharged with a cane although many chose not to use it. None required walkers or crutches.

Eleven patients who were over the age of 75 received no OxyContin post-operatively, while another seven patients also received no OxyContin post-operatively due to prior sensitivity to narcotics. Four patients received 20 mg of OxyContin post-operatively due to prior narcotic use. The remaining 82 patients received the standard dose of 10 mg of OxyContin post-operatively, including 11 patients over the age of 75 who had a history of narcotic use, a difficult time with pain during prior surgeries or OxyContin was chosen due to the patient's request.

No patients required readmission within the first week post-operatively. One patient required readmission between week one and three months post-operatively. This single patient who required readmission developed a post-operative infection (1 %) requiring irrigation/debridement with polyethylene liner exchange and intravenous antibiotics.

There were no emergency room (ER) visits in the first week after surgery, nor were there any ER visits related to the unicompartmental replacement or any severe side effect from the medication, pain control, nausea or anaemia. There were no pulmonary embolisms, myocardial infarctions or deaths in the three months post same-day discharge in this study group.

Discussion

Given that UKA has been found to have a faster recovery time and reduced morbidity, and maintains the ligamentous integrity of the knee when compared to TKA [1, 2], we hypothesised that outpatient UKA using an established rapid recovery protocol would be safe and feasible for all patients. We have concluded that outpatient UKA is indeed safe, with complication rates that are similar to published rates after inpatient UKA in this consecutive series of 105 unicompartmental replacements. From this study we would further conjecture that same-day discharge after UKA is feasible in most patients healthy enough to undergo UKA.

There are several limitations to our study. First, we concede that establishing an effective outpatient rapid recovery protocol for outpatient UKA requires a significant investment of time and resources including money; thus, our results may not be directly applicable to all institutions around the world. However, our results serve as a proof of concept that perhaps orthopaedic surgeons should begin to move away from long inpatient hospitalisations after UKA, given that this study found outpatient UKA to be safe in a large cohort of patients that were not preselected based on medical co-morbidities, age or functional status. Second, given our study is a retrospective review, selection bias is inherent to this study design;

however, this is minimised given we have 100 % clinical follow-up, and the group of patients included were *all* consecutive patients undergoing UKA during the three year study period that we completed before noon.

Given the recent increase in hospital administration pressures and regulations on surgeons, some surgeons have begun performing outpatient procedures in surgery centres, giving them more control over their daily clinical practice. Given the safety of outpatient UKA seen in this large cohort of patients, it would seem reasonable to consider performing UKA as an outpatient procedure at a surgery centre. While we acknowledge this is a shift in current practice, many procedures that were once inpatient operations are now performed as outpatient operations, including anterior cruciate ligament (ACL) reconstruction; however, transitions, as such, will require some time to fully adopt safely.

In our initial experience with outpatient UKAs [3] in non-selected patients in 2006, we demonstrated that 95 % of UKAs (24/25) could be discharged home the same day of surgery. The one patient who could not be discharged in our initial cohort had severe post-operative nausea requiring hospital admission; since 2006, we began using a scopolamine patch for 72 hours post-operatively to further reduce the risk of severe nausea. In this same smaller cohort of outpatient UKA patients, none of the 25 patients required a readmission after UKA, compared to ~5 % (four of 86) of outpatient TKAs performed during the same study period, using the same rapid recovery protocol [3]. Similar to our initial experience, in this study, we confirmed in a larger cohort of non-selected UKA patients that 100 % of patients who were booked for outpatient UKA could be discharged home the same day of surgery. Our improved success rate in discharging patients the day of surgery is partly related to minor improvements in the outpatient protocol since 2006, including the addition of a scopolamine patch. Further, in this study, no patients required readmission during the first week post-operatively, and only one patient required readmission for a post-operative infection between the first week and three months post-operatively. This patient underwent a successful irrigation and debridement with polyethylene liner exchange and was maintained on parenteral antibiotics for six weeks; further, at final follow-up, the patient had no recurrence of the infection and had a good result. Still, although the readmission rate is very low, one could speculate that the one patient who developed an infection may not have developed an infection if he would have stayed in the hospital overnight to receive 24 hours of prophylactic antibiotics.

While we have seen excellent results with outpatient UKA at our institution, we recommend surgeons begin reducing their post-operative stay after UKA gradually. Our multidisciplinary rapid recovery protocol has been in use since 2003, and we have admittedly made improvements in our protocol over time. Our recommendation to surgeons who wish to

perform outpatient UKA is to first attempt to decrease the admission after UKA by one day at a time, until a “next-day” discharge can be performed safely. While our results demonstrate that an outpatient UKA can be done on the vast majority of patients regardless of their age and BMI, we recommend gradually performing outpatient UKAs with selected healthy patients until the rapid recovery protocol is perfected. Significant time must be invested in the anaesthesiology team, as well as the nurses and physical therapists, to change expectations of UKA being an inpatient operation requiring long hospital stays, and thus, the surgeon must find individuals in all disciplines who are willing to attempt an outpatient protocol following UKA. Finally, pre-operative teaching, in which patient expectations are set that the patient will be discharged on the same day of surgery, is essential to implementing the rapid recovery protocol.

In summary, in a large cohort of unselected patients undergoing outpatient UKA before noon the vast majority of patients can be safely discharged home the same day of surgery. For the rapid recovery programme to be successful after UKA, the surgical team must minimise severe post-operative nausea, inadequate pain control, oversedation, prolonged urinary retention, post-operative hypotension and patient fears/anxiety; thus, a multidisciplinary team approach using multimodal pain control, multimodal anaesthesia, motivated physical therapists, clinical nurses and discharge planners are required to ensure the success of the rapid recovery protocol.

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