


Factors delaying mobilization after hip and knee arthroplasty

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WEBSITE: ijhs.org.sa

ISSN: 2735-4488

PUBLISHER: Qassim University

Introduction

Osteoarthritis is a common joint disease affecting many individuals across the world.^[1] Lower limb arthroplasty is an effective treatment option in osteoarthritis affecting knee and hip joints.^[2] It helps in relieving the symptoms, and improves mobility and quality of life.^[3] With increasing life span, the burden of arthritis on the health-care system is constantly increasing. In United Kingdom, many people are waiting for their arthroplasty procedures to be done under NHS. Enhanced Recovery After Surgery (ERAS) Society strongly recommended to mobilize the patient as soon as possible after arthroplasty.^[4] Arthroplasty patients can be mobilized as early as within 24 h of surgery, and length of stay can be reduced.^[5] In addition to reducing length of stay, early mobilization also helps in preventing adverse physiological effects including reduced pulmonary function, impaired tissue oxygenation, risk of pneumonia, urinary tract infection, and venous thromboembolism.^[6,7] A number of factors have been reported to be responsible for delayed mobilization in post-operative period.^[8,9]

ABSTRACT

Objective: Arthroplasty patients undergo pre-operative assessment and medical optimization before surgery with the objective to mobilize and discharge home as soon as deemed fit to reduce hospital stay. This study was aimed to investigate factors delaying mobilization after hip and knee arthroplasty in our hospital.

Methods: This observational study was conducted in our hospital between August 2021 and October 2021. We included all elective orthopedic patients who were admitted for hip and knee arthroplasty during this period. Patients admitted for revision arthroplasty were excluded from the study. We collected data prospectively on a pro forma including patient demographics and different other variables. All patients were reviewed on the first post-operative day by one of the authors and pro formas were completed. We used SPSS to analyze data.

Results: Sixty patients were included; 32 females and 28 males with a mean age of 69.62 years. Primary knee arthroplasty was done in 30 patients while 30 underwent primary hip arthroplasty. Most of the patients ($n = 50$) were mobilized on the 1st day; however, ten patients were unable to mobilize. Orthostatic hypotension, dizziness, and pain were statistically significant factors responsible for failed mobilization on day one. Patients who failed to mobilize on day one had longer hospital stay ($P = 0.018$).

Conclusion: Orthostatic intolerance and post-operative pain were independent factors delaying mobilization after hip and knee arthroplasty thereby increasing the length of stay in these patients.

Keywords: Hip arthroplasty, Knee arthroplasty, Mobilization, Orthostatic intolerance

Elective arthroplasty patients are medically optimized before surgery and aimed to be mobilized as early as possible to reduce the length of stay. We have observed that some of our patients failed to be mobilized on day 1 after primary hip or knee arthroplasty. The aim of this study was to identify the factors that were responsible for delaying the mobilization in post-operative period in our hospital.

Methods

This is a prospective observational study conducted at our hospital from August to October 2021. The study was approved by the Hospital Research Committee. All elective lower limb arthroplasty patients admitted during this period were assessed. Patients undergoing primary hip or knee arthroplasty were included in the study. Patients with revision arthroplasty were excluded from the study.

Patients were assessed in anesthesia pre-operative clinic before admission and were medically optimized. Patients

were allowed to take their regular medications until the day of surgery except oral anticoagulants, angiotensin-converting enzyme inhibitors, and angiotensin receptor blockers. These were restarted on day one. TEDs stockings were prescribed to all and assessed for venous thromboembolism. Patients underwent surgical procedure under general or regional anesthesia with local ropivacaine infiltration in some patients as per surgeon preference. None of the patients received a block for the procedure. Postoperatively, all patients were prescribed for analgesia by an anesthetist and managed by a pain team. DVT prophylaxis was prescribed as per NICE guidelines.

On day one, patients were encouraged to mobilize out of bed under direct supervision of physiotherapists. During mobilization, patients were assessed for symptoms of orthostatic hypotension including nausea, vomiting, and dizziness. Blood pressure readings were taken in the case of a symptomatic patient. If the symptoms were severe enough, then patients were not mobilized and shifted back to the bed. Pain score was calculated using visual analog score before and during mobilization. Patient analgesia prescription was reviewed, and morphine equivalent daily dose per day was calculated.^[10] Post-operative bloods were repeated, and hemoglobin level was compared with pre-operative values. Patient length of stay was recorded once discharged from the hospital.

A pro forma was designed to record patient demographics, medical comorbidities, medications, type of anesthesia, surgical details, and assessments at day one. Data were analyzed on SPSS. Different variables were compared in between patients who were mobilized or not. For categorical variables, Chi-square or Fischer exact test was used and for continuous variables, the independent samples t-test or Mann–Whitney U-test was used.

Results

There were 60 patients who underwent primary knee ($n = 30$) or hip ($n = 30$) arthroplasty during our study period. Mean age was 69.62 years (43–86 years) and 32 patients were females while 28 were male. Most of the patients ($n = 57$) were operated under spinal anesthesia and only three patients were under general anesthesia. Local infiltration of the operative field with ropivacaine was done in 25 patients.

All the patients were assessed by physiotherapist and were given a chance to be mobilized under supervision; however, ten patients failed to mobilize on day one. Some patients showed orthostatic intolerance when mobilized on day one. Thirteen patients experienced vomiting and 4 failed to mobilize ($P = 0.132$). Twelve patients felt dizziness and 50% ($n = 6$) were not mobilized ($P = 0.003$). Four patients had a fall in blood pressure as compared to pre-mobilization blood pressure and all failed to mobilize ($P = 0.000$). Thirty-three patients were taking anti-hypertensive medications including atenolol,

amlodipine, bisoprolol, losartan, ramipril, and furosemide; however, there was no statistically significant difference in terms of mobilization ($P = 0.243$).

The mean pain score in the patients before mobilization was 6.32. It was higher in the group of patients who failed to mobilize (7.1 vs. 6.16; $P = 0.035$). Similarly, the mean pain score during mobilization was 7.63. Again, it was higher in the group of patients who failed to mobilize (8.5 vs. 7.46; $P = 0.008$). All patients received opioids as analgesia in post-operative period. Mean morphine equivalent daily dose (MEDD) was almost similar in both groups of patients who were mobilized or not (30.56 vs. 30.20; $P = 0.934$).

Mean fall in hemoglobin was a little more in the patients who were not mobilized; however, the result was not statistically significant (23.9 vs. 18.73; $P = 0.088$). Patients who failed to mobilize stayed on average a day longer as compared to those who mobilized on the 1st day ($P = 0.018$). Results are summarized in Table 1.

Discussion

In our study, we found that many patients (83.3%) were mobilized on day 1; however, some (16.6%) failed to mobilize on day one after surgery resulting in increased length of stay. Pain and orthostatic intolerance including low blood pressure and dizziness were the main factors affecting mobilization at day one.

Table 1: Demographics and differences in perioperative factors among patient groups who were mobilized or not on day one after lower limb arthroplasty

	Mobilized	Not Mobilized	P-value
Age	69.58	69.80	0.943
Gender	F=28 M=22	F=4 M=6	0.491
THR versus TKR	THR=24 TKR=26	THR=6 TKR=4	0.365
Anesthesia	GA=1 Spinal=49	GA=2 Spinal=8	0.069
Local infiltration	Yes=22 No=28	Yes=3 No=7	0.325
Vomiting	Yes= 9 No=41	Yes=4 No=6	0.132
Dizziness	Yes=6 No=44	Yes=6 No=4	0.003
Fall in BP	Yes=0 No=50	Yes=4 No=6	0.000
Pain before Mob	6.16	7.10	0.035
Pain during Mob	7.46	8.50	0.008
MEDD	30.56	30.20	0.934
Anti-HTN Meds	Yes=29 No=21	Yes=4 No=6	0.243
Fall in Hb	18.73	23.9	0.088
Length of stay	2.46	3.50	0.018

Early mobilization after lower limb arthroplasty provides the number of health benefits, improve patient satisfaction, reduces rate of post-operative complications including DVT and reduced length of stay.^[11] Chua *et al.*^[12] presented the results of their observational study in which 818 total hip arthroplasty and 989 total knee arthroplasty patients were followed prospectively at 19 Australian hospitals. They found that at the end of day 1 65.2% of the patients were mobilized. Hospital site was one of the important covariant in their study as early mobilization required availability of staff which affected the mobilization protocols at different hospital sites. In addition, any acute complication may also delay mobilization. We also found staff shortage a limiting factor in our study as the physiotherapy team was only available at 1 time in a day. If the patient failed to mobilize once, then he was reviewed the next day. Vomiting, dizziness, and pain were also found to delay mobilization in our patients. Fast-track protocols favor mobilization at day 0 and consider it safe.^[13] Prinsloo and Keller^[14] compared a prospective patient group, which received an increased frequency of physiotherapy visits on day 0 to mobilize them early, with the traditional retrospective group undergoing hip and knee arthroplasty. They reported that same-day discharge is possible in patients undergoing advanced rehabilitation pathway. However, in our hospital, patients were mobilized at day one, again linked to availability of physiotherapy team.

Post-operative pain also affects mobilization. Holm *et al.*^[15] reported that 90% of their TKA patients were mobilized on the first day with a median pain intensity of 5 or less. In our study, the mean pain score at day 1 was 6.32 at rest and 7.63 during mobilization. Local infiltration of analgesia is an effective pain management tool in total knee arthroplasty with short-term safety.^[16] In our study, 25 patients received local infiltration at the time of surgery. However, three patients who received local infiltration also failed to mobilize on day 1. There was no statistically significant difference between the patients with local infiltration who were mobilized or not ($P = 0.325$). Additional adjuncts also can improve pain management and enhance recovery of joint function. Liao and Xu^[17] reported that application of cold therapy improves pain and swelling after total knee arthroplasty and shortens the recovery time.

Post-operative nausea and vomiting affect patient rehabilitation after hip and knee arthroplasty, increases length of stay, and leads to poor patient satisfaction. Wang *et al.*, reported vomiting in 7.52% of the patients who underwent unilateral hip or knee arthroplasty.^[18] In our study, 21.6% ($n = 13$) had vomiting and four failed to mobilize. It might be due to opioid analgesia receiving in post-operative period. Bulut and Vatansever^[9] assessed different factors affecting mobilization after hip and knee arthroplasty. In their study, nine patients had nausea/vomiting before mobilization and two patients had hypotension after mobilization; however, it was not statistically significant affecting mobilization time.

Raut *et al.*,^[19] examined various factors affecting the length of stay after total knee arthroplasty in patients over 75 years of age. They reported that patients who were mobilized early had reduced length of stay. In our study group, we also found that patients who failed to mobilize on day 1 stayed longer as compared to those who were mobilized. Smith *et al.*^[20] studied the clinical outcome of 95 patients of total hip and knee replacements who followed an enhanced recovery program. The patients who were mobilized on day 0 had shorter length of stay and better pain scores postoperatively. Oberfeld *et al.*^[21] compared two groups undergoing total hip arthroplasty in their randomized controlled trial. They focused on obese, elderly, and severely diseased patients. Patients in the first group were mobilized on day 0 while the patients in the other group were mobilized on day 1. They reported that the time to readiness for discharge was shorter in patients mobilized on day 0 and there was no increase in the rate of immediate adverse events.

Decreasing the length of stay will increase the availability of beds which can be utilized for providing medical services for other needy patients. There were some limitations of this study including a small number of patients as we were operating with reduced capacity due to COVID, and single-center design.

Conclusion

Post-operative pain and orthostatic intolerance were independent factors responsible for delayed mobilization. We recommend better pain control, an earlier visit by the pain team before mobilization, and use of other modalities like cryo cuff in TKA patients to improve pain. Availability of physiotherapy staff in the latter half of the day was to give another chance to those who failed to mobilize.

Authors' Declaration Statements

Ethical approval and consent to participate

Approval was obtained from the Hospital Research Committee. Informed consent was obtained from all individual participants included in the study.

Consent for Publication

Availability of data and material

The authors confirm that the data supporting the findings of this study are available within the article.

Competing interests

The authors declare that they have no conflicts of interest.

Funding statement

There is no funding source.

Authors' contributions

All authors contributed to the study's conception and design.

Acknowledgment

Not applicable

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