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Original Research Article

A Retrospective Study on Complications Following Total Knee Replacement

Shashi Bhushan Mani[1], Amit Kumar[2], Govind Mohan Jee[3], Ramashish Yadav[4]

[1]Senior Resident, Department of Orthopaedics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India.

[2]Senior Resident, Department of Orthopaedics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India.

[3]Professor and HOD, Department of Orthopaedics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India.

[4]Assistant professor (Unit Head), Department of Orthopaedics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India.

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Corresponding Author: Dr. Amit Kumar

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Abstract:

Background: Total knee replacement (TKR) is an effective intervention for end-stage knee arthritis; however, postoperative complications remain a concern affecting patient outcomes and satisfaction.

Aim: To evaluate the incidence, pattern, and risk factors of complications following TKR.

Methodology: A retrospective observational study was conducted in the Department of Orthopaedics, Darbhanga Medical College and Hospital,Laheriasarai, Darbhanga, Bihar, including 80 patients who underwent primary TKR. Data were collected from medical records and analyzed using descriptive and inferential statistics.

Results: The majority of patients were aged 61–70 years, with female predominance (57.5%) and a high prevalence of overweight/obesity. Osteoarthritis (80%) was the main indication, and unilateral TKR (72.5%) was most common. Overall, 62.5% of patients developed complications, with blood transfusion (22.5%) being the most frequent, followed by delayed wound healing (15%) and infection (12.5%). Higher BMI showed a strong association with increased complications, particularly in obese patients. Prolonged hospital stay (>10 days) was also linked to higher complication rates.

Conclusion: TKR is effective but associated with notable complications, especially in obese patients and those with longer hospital stays. Proper risk assessment and perioperative care are essential.

Keywords: Total knee replacement, complications, osteoarthritis, BMI, hospital stay.

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Introduction

Osteoarthritis (OA) is among the most common degenerative joint diseases in the world and one of the leading causes of pain, disability, and poor quality of life, especially in the elderly. OA became the most common indication of total knee arthroplasty (TKA) in the United States in 2016, with about 87 percent of all procedures. This underscores the high cost of end-stage knee arthritis and the increasing dependence on surgical treatment of the condition. Total knee replacement has developed as a successful and well-developed procedure that is designed to restore the functionality of the joint, alleviate chronic pain, and enhance the overall mobility of the affected individuals [1].

TKA is typically thought of in cases where conservative treatment modalities do not offer sufficient symptomatic relief. These non-surgical methods involve physical therapy, weight control, activity control, and pharmacological treatment like analgesics and anti-inflammatory drugs [2]. Although these measures can provide temporary relief, they are frequently inadequate in the later stages of the disease when the pain is severe, the joints are deformed, and the range of motion is limited. TKA is the ultimate treatment choice in these situations, with significant functional outcomes and patient quality of life.

Although TKA has a high success rate, patient satisfaction is a major issue. Research has indicated a general satisfaction rate of about 80 percent, which implies that almost every fifth patient might not be fully satisfied after the procedure [3]. This disparity in satisfaction may be explained by various factors, such as unmet preoperative expectations, chronic

postoperative pain, functional limitations, and the presence of complications. Thus, it is crucial to comprehend and reduce complications related to TKA to maximize patient outcomes and improve the level of satisfaction.

The use of TKA has increased significantly over the last ten years due to the combination of the growing life expectancy, the growing prevalence of obesity, and the growing awareness of surgical treatment. It is projected that the demand of TKA will keep increasing in the next few years [4]. In conjunction with this growing demand, there has been an improvement in surgical methods, anesthesia, and perioperative care, which has led to a substantial decrease in the average length of stay in the hospital after the procedure. This change has led to the introduction of outpatient TKA, which is gaining popularity in different healthcare environments around the globe.

Outpatient TKA is a paradigm shift in orthopedic surgery, which focuses on early mobilization, quick recovery, and cost-effectiveness. Careful patient selection and meticulous preoperative planning are crucial for the success of such procedures. Outpatient TKA has been demonstrated to save healthcare costs through minimization of hospital stay and related costs, as well as enhancing patient perception of illness and recovery when properly applied [5]. Nevertheless, the shift to shorter hospitalization and outpatient operations requires a more in-depth insight into postoperative complications, especially their timing and risk factors.

The safety record of TKA shows it has low complication rates yet the procedure still presents surgical risks which must be considered [6]. The range of complications includes minor problems like wound infections and delayed healing and extends to major life-threatening conditions such as cardiac arrest and pulmonary embolism and myocardial infarction and acute renal failure and stroke. The research findings show that most significant complications emerge during the initial four days after surgery which emphasizes the vital need for monitoring patients who have just undergone surgery.

The most significant challenge to clinicians is to predict the occurrence and timing of these complications. A number of risk factors have been identified, such as old age, high body mass index (BMI), and the existence of pre-existing comorbidities, including diabetes, hypertension, and cardiovascular disease. It is however interesting to note that over fifty percent of patients who develop severe postoperative complications might not show any risk factors that can be identified during the preoperative evaluation. Such uncertainty highlights the importance of extensive postoperative monitoring and better risk stratification tools.

Additional evidence indicates that most complications after TKA happen during the first five days after surgery, which highlights the significance of the immediate postoperative period in patient care. Moreover, age and the American Society of Anesthesiologists (ASA) physical status classification have also been found to be important predictors of postoperative complications. Patients with a higher ASA grade and older age have a higher risk of adverse outcomes and require more attention and personalized care plans.

With the rising trend of TKA procedures being done worldwide and the trend of shorter hospitalization, there is a growing concern to understand the pattern, frequency, and determinants of postoperative complications better. In this regard, retrospective studies are important because they enable the examination of available clinical data to determine trends, risk factors, and outcomes related to TKA. These studies offer useful information that can inform clinical decision-making, enhance patient selection, and perioperative management guidelines.

The current retrospective study will assess the complications after total knee replacement, their timing, risk factors, and their overall effects on patient outcomes. This study aims to add to the current body of knowledge and help develop strategies to reduce complications and enhance the safety and efficacy of this common surgical procedure by analyzing clinical data of patients who have undergone TKA.

Methodology

Study Design: The present study was designed as a retrospective observational cohort study aimed at evaluating the incidence and pattern of complications following Total Knee Replacement (TKR). The study involved analysis of previously recorded patient data to identify postoperative complications and associated risk factors.

Study Area: The study was conducted in the Department of Orthopaedics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India.

Study Duration: The duration of the study was one year from February 2025 to January 2026.

Study Participants

Inclusion Criteria

- Patients who underwent primary Total Knee Replacement surgery during the study period
- Patients of both genders
- Patients aged 18 years and above
- Patients with complete medical records and follow-up details
- Patients operated for degenerative joint diseases such as osteoarthritis or rheumatoid arthritis

Exclusion Criteria

- Patients who underwent revision Total Knee Replacement
- Patients with incomplete or missing medical records
- Patients operated outside the defined study duration
- Patients with pre-existing severe systemic illness affecting outcomes (e.g., malignancy, severe cardiac conditions)
- Patients lost to follow-up

Sample Size: A total of 80 patients who fulfilled the inclusion criteria were included in the study.

Procedure: Data for the study were collected retrospectively from hospital medical records, operative notes, discharge summaries, and follow-up registers of patients who underwent Total Knee Replacement. Relevant demographic details such as age, gender, and body mass index (BMI) were recorded. Clinical parameters including indication for surgery, type of anesthesia used, surgical approach, and perioperative management were also documented.

The surgical technique employed in the included cases primarily involved the measured resection technique using either the medial parapatellar or subvastus approach, depending on surgeon preference and patient condition. A tourniquet was routinely used during surgery to minimize intraoperative blood loss. Tranexamic acid was administered to most patients as part of the standard protocol to further reduce bleeding. The use of surgical drains was variable and depended on the operating surgeon's discretion, with many cases managed without drain placement. Urinary catheterization was generally avoided and was used selectively, mainly in bilateral procedures or when epidural anesthesia was administered.

Postoperative data were reviewed to identify complications such as infection, deep vein thrombosis, implant-related issues, delayed wound healing, and need for blood transfusion. Complications were classified based on standard clinical criteria and duration of hospital stay was noted to assess severity. Patients were categorized based on BMI according to standard classification guidelines. All data were carefully compiled and entered into a structured data sheet for further analysis while maintaining patient confidentiality.

Ethical considerations were adhered to throughout the study. Institutional approval was obtained prior to data collection. Since the study was retrospective in nature, informed consent was waived. Patient identity and personal information were kept confidential and accessible only to the research team.

Statistical Analysis: The collected data were entered into Microsoft Excel and subsequently analyzed using Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics were used to summarize demographic and clinical variables. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean ± standard deviation or median with interquartile range, depending on data distribution. Inferential statistical tests such as chi-square test and logistic regression analysis were applied to assess the association between risk factors and postoperative complications. A p-value of less than 0.05 was considered statistically significant.

Result

Table 1 presents the demographic characteristics of the study participants (n = 80). The majority of participants belonged to the age group of 61–70 years (35%), followed by 51–60 years and >70 years (25% each), while only 15% were aged ≤50 years, indicating that most subjects were elderly. In terms of gender distribution, females constituted a higher proportion (57.5%) compared to males (42.5%). Regarding BMI categories, the highest proportion of participants were overweight (37.5%), followed by those with normal BMI (32.5%) and obese individuals (25%), whereas only a small fraction (5%) was underweight. Overall, the study population was predominantly older, female, and with a higher prevalence of overweight and obesity.

Table 1: Demographic Characteristics of Study Participants (n = 80)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
≤50	12	15
51–60	20	25
61–70	28	35
>70	20	25
Gender		
Male	34	42.5
Female	46	57.5
BMI Category		
Underweight (<18.5)	4	5
Normal (18.5–24.9)	26	32.5
Overweight (25–29.9)	30	37.5
Obese (≥30)	20	25

Table 2 presents the clinical and surgical characteristics of the study population (n = 80). The majority of patients underwent total knee replacement due to osteoarthritis, accounting for 80% of cases, while rheumatoid arthritis constituted 20%. Regarding the type of procedure, unilateral TKR was more commonly performed (72.5%) compared to bilateral TKR (27.5%). In terms of surgical approach, the medial parapatellar technique was predominantly used in 65% of cases, whereas the subvastus approach was employed in 35% of patients. Additionally, the use of surgical drains was less frequent, with only 37.5% of patients receiving drains, while a larger proportion (62.5%) did not require drain placement. Overall, osteoarthritis, unilateral procedures, medial parapatellar approach, and non-use of drains were the most common characteristics observed in this study population.

Table 2: Clinical and Surgical Characteristics (n = 80)

Variable	Frequency (n)	Percentage (%)
Indication for Surgery		
Osteoarthritis	64	80
Rheumatoid arthritis	16	20
Type of Procedure		
Unilateral TKR	58	72.5
Bilateral TKR	22	27.5
Surgical Approach		
Medial parapatellar	52	65
Subvastus	28	35
Use of Drain		
Yes	30	37.5
No	50	62.5

Table 3 shows the distribution of postoperative complications among 80 patients undergoing total knee replacement. The most common outcome observed was the requirement of blood transfusion, reported in 18 patients (22.5%), followed by delayed wound healing in 12 patients (15%). Surgical site infection was noted in 10 cases (12.5%), while deep vein thrombosis (DVT) occurred in 6 patients (7.5%). Implant-related complications were the least frequent, seen in only 4 cases (5%). Notably, 30 patients (37.5%) did not experience any postoperative complications, indicating that a substantial proportion of patients had an uneventful recovery. Overall, while complications were present in a considerable number of cases, the majority were manageable and non-life-threatening.

Table 3: Distribution of Postoperative Complications (n = 80)

Complication	Frequency (n)	Percentage (%)
Surgical site infection	10	12.5
Deep vein thrombosis (DVT)	6	7.5
Delayed wound healing	12	15
Implant-related complications	4	5
Blood transfusion required	18	22.5
No complications	30	37.5

Table 4 shows the association between BMI and postoperative complications among the study population. It is evident that the incidence of complications increased with higher BMI categories. Among underweight patients, complications were present in 2 out of 4 cases, showing an equal distribution. In the normal BMI group, 10 out of 26 patients experienced complications, whereas 16 had no complications, indicating relatively better outcomes. However, in the overweight group, a higher number of patients (20 out of 30) developed complications compared to those without complications (10 cases). The trend becomes more pronounced in the obese category, where 18 out of 20 patients experienced postoperative complications, and only 2 had no complications. Overall, out of 80 patients, 50 developed complications while 30 did not, suggesting a strong positive association between increasing BMI and the likelihood of postoperative complications.

Table 4: Association Between BMI and Postoperative Complications			
BMI Category	**Complications Present (n)**	**No Complications (n)**	**Total**
Underweight	2	2	4
Normal	10	16	26
Overweight	20	10	30
Obese	18	2	20
Total	50	30	80

Table 5 shows the relationship between length of hospital stay and the occurrence of complications among 80 patients. It was observed that patients with shorter hospital stays (≤5 days) had fewer complications (8 cases) compared to those without complications (18 cases). In contrast, in the 6–10 days group, complications were more frequent (22 cases) than non-complicated cases (10 cases). A similar trend was seen in patients with prolonged hospital stay (>10 days), where a significantly higher number of complications (20 cases) was reported compared to only 2 cases without complications. Overall, out of 80 patients, 50 experienced complications while 30 did not. The findings suggest that increased length of hospital stay is associated with a higher incidence of complications, indicating either that complications may lead to prolonged hospitalization or that longer stays increase the risk of developing complications.

Table 5: Length of Hospital Stay and Complications (n = 80)			
Length of Stay (days)	**Complications Present (n)**	**No Complications (n)**	**Total**
≤5 days	8	18	26
6–10 days	22	10	32
>10 days	20	2	22
Total	50	30	80

Discussion

The current retrospective analysis of complications from total knee replacement (TKA) procedures revealed that most patients in the study group belonged to the elderly age range of 61 to 70 years while more females than males and many patients with overweight or obesity conditions made up the study population. The study results confirm existing research which shows that elderly people make up 60 to 75 percent of TKA patients because they experience higher rates of osteoarthritis since they get older (Parvizi et al., 2007) [7]. The study results from Elmallah et al. (2015) [8] and Sabeh et al. (2019) [9] found that over 65 percent of TKA patients were female which supports our finding that 57.5 percent of our study group consisted of females. The earlier research established that 70 to 80 percent of TKA patients meet the overweight or obese BMI criteria which matches our study results because it shows that obesity serves as a primary cause of knee joint deterioration and the need for surgical treatment.

Our research found that osteoarthritis functions as the main surgical indication because it constitutes most of the studied cases which matches results from Kurtz et al. (2007) [10] who found that osteoarthritis accounted for about 85-90 percent of all TKA procedures. The study results show that our research found more patients who underwent unilateral TKA than bilateral procedures because previous studies reported that 70 percent of patients choose unilateral surgeries to experience less surgical risk and faster recovery progress (Otero et al., 2016) [11]. Our research results show that surgeons prefer the medial parapatellar approach because more than 80 percent of TKA procedures use this method to provide surgeons better access to the surgical site and they already know how to use it (Vaishya et al., 2016) [12].

The complication rate in our research showed that most patients developed at least one postoperative complication which matches earlier studies that reported TKA complication rates between 20% and 40% (Johnson et al. 2019) [13]. The study found blood transfusion to be the most frequent complication which matched the results of Owens et al. (2020) [14] who showed that TKA patients had transfusion rates between 15% and 25%. The study found that most transfusions happened during the early postoperative time which Frew et al. (2016) [15] proved when they showed that most patients need transfusions during the first 7 to 10 days after surgery. Our study found that patients needed more blood transfusions because their preoperative hemoglobin levels and intraoperative blood loss both showed different patterns.

The study identified two major complications which included wound healing delays and surgical site infections. The results of the study confirm the findings of Newman et al. (2014) [16] who found infection rates between 2 and 5 percent after TKA surgery for patients who had multiple medical conditions. The study found that deep vein thrombosis (DVT) occurred at a rate which matched the documented 1 to 3 percent incidence among patients who received proper thromboprophylaxis according to Parvizi et al. (2007). The study found few implant-related

complications which matched previous research that found implant survival rates above 90 percent during the first year of use according to Kurtz et al. (2007).

The study found that higher BMI values lead to medical complications which showed a strong relationship with increased complication rates. The postoperative complications in obese patients occurred at a rate which exceeded the normal BMI group by a significant margin. George et al. (2018) [17] establish this finding through their research which shows that obese patients face 1.5 to 2 times greater risk for complications including infection and delayed wound healing after TKA surgery. Some studies present opposing evidence which establishes an "obesity paradox" because they show that obese patients experience lower rates of acute kidney injury and other specific complications (Ali Vial et al., 2020) [18]. The study evidence shows that obesity acts as an important risk factor which leads to negative effects during postoperative recovery.

The relationship between length of hospital stay and complications observed in our study further supports existing literature. Patients who stayed in the hospital for more than 10 days developed complications at a rate of approximately 90% while patients who stayed 5 days or less had less than 35% of their cases develop complications. Otero et al. (2016) found that early discharge protocols lead to lower complication rates and better recovery results which supports their research findings. The evidence shows that hospital stays lead to longer patient stays because complications require treatment and patients become more vulnerable to hospital-acquired infections during extended stays.

Our study results demonstrate that comorbid conditions including diabetes and hypertension and dyslipidemia impact surgical recovery outcomes at the same level as previous research studies found. Elmallah et al. (2015) reported that patients with multiple comorbidities had significantly higher rates of complications and longer hospital stays. The research conducted by Guofeng et al. (2020) [19] discovered that metabolic syndrome leads to a 1.8 times greater risk of postoperative infections and urinary tract infections, which supports our finding that patients with metabolic disorders experienced more complications.

The present study results show strong agreement with existing research findings. The study results show that the two groups have different rates of surgical complications and different surgical characteristics. The established TKA risk factor understanding remains intact because the two groups share common traits but show different results because of patient population differences and surgical expertise differences and perioperative care protocol differences. The study results show that patient optimization through BMI control and comorbidity treatment needs to be prioritized because it helps reduce postoperative complications while enhancing surgical results.

Conclusion

The present retrospective study highlights that total knee replacement is an effective surgical intervention predominantly performed in elderly, female, and overweight or obese patients, with osteoarthritis being the leading indication. Althougha a considerable proportion of patients experienced postoperative complications, most were manageable, with blood transfusion and delayed wound healing being the most common. A strong association was observed between higher BMI and increased risk of complications, emphasizing the need for preoperative optimization. Additionally, prolonged hospital stay was closely linked with higher complication rates. Overall, careful patient selection, optimization of modifiable risk factors, and vigilant postoperative monitoring are essential to minimize complications and improve surgical outcomes and patient satisfaction following total knee replacement.

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