

## Evaluation of Complications After Total Knee Arthroplasty in the Past Year

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### Abstract:

**Background:** Total Knee Arthroplasty (TKA) is a widely performed procedure for end-stage knee disorders, but postoperative complications can affect functional outcomes and patient satisfaction.

**Aim:** To evaluate the incidence, type, severity, timing, and outcomes of complications following TKA over the past year.

**Methodology:** A prospective observational study was conducted on 80 patients aged 40–80 years undergoing primary TKA at Shankar Chikitsalaya. Patients were followed for 6 months postoperatively, and complications were classified by type, severity, and onset. Statistical analysis was performed using descriptive and inferential methods.

**Results:** Of 80 patients, 53.8% experienced no complications. Joint stiffness (15%), wound infection (10%), and hematoma formation (7.5%) were the most common. Complications were mild in 48.8%, moderate in 36.6%, and severe in 14.6% of cases. Early (0–2 weeks), intermediate (2–6 weeks), and late (6 weeks–6 months) complications occurred in 24.4%, 36.6%, and 39% of patients, respectively. Conservative management was sufficient in 53.7% of cases, while surgical intervention was required in 19.5%. Full recovery was achieved in 68.3% of patients, partial recovery in 24.4%, and persistent complications remained in 7.3%.

**Conclusion:** TKA is generally safe and effective, with most complications being mild and manageable. Extended postoperative monitoring and individualized rehabilitation are essential to optimize outcomes.

**Keywords:** Total Knee Arthroplasty, Complications, Joint Stiffness, Wound Infection, Postoperative Outcomes.

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### Introduction

The total knee arthroplasty (TKA) comes out as one of the most powerful surgical procedures useful in the treatment of end-stage osteoarthritis and other debilitating knee joint diseases. Within the last several decades, surgical methods, artificial implant types, and perioperative practices have significantly contributed to better patient outcomes such as pain management, functionality restoration, and the quality of life, in general [1]. Regardless of the improvements, TKA is still a complicated procedure that is linked to a range of postoperative complications that may result in patient satisfaction, sustained survival of implants, and health-care expenses.

It has been widely documented those complications that occur after TKA can be common and depend on different factors, including comorbidities in patients, experience of the surgeon, type of implants and post-operative care practices [2]. Such complications as infection, thromboembolic events, periprosthetic fracture, prosthetic loosening, stiffness, and

persistent pain are common complications and may have a substantial impact on functional outcomes. Presenting these complications early and treating them is paramount to reducing morbidity and enhancing the effectiveness of the whole procedure.

Infections after operations are one of the most severe side effects of TKA and they are classified with an incidence rate that has been reported to vary between 0.5 and 2 percent [3]. These infections may either be classified as superficial or deep periprosthetic joint infections and each requires therapeutic strategy that is different. Deep infections are frequently treated with surgery, including debridement, implant retention, or staged revision arthroplasty and are linked with significant healthcare burden and poor patient quality of life. Risk factors of the infection are diabetes mellitus, obesity, rheumatoid arthritis, immunosuppressive therapy, and long surgical time, and emphasize the need to optimize the preoperative period [4].

Deep vein thrombosis (DVT) and pulmonary embolism (PE) are also major postoperative risks that exist. Despite the fact that prophylaxis anticoagulation regimens have lowered their occurrence, DVT and PE may still cause life-threatening problems when they are not identified and addressed immediately [5]. The key steps in reducing such events include surgical technique, early mobilization and patient compliance to thromboprophylaxis.

Complications that may occur during the early and late postoperative phases might be mechanical because this includes periprosthetic fractures, prosthetic loosening, and so on. The causes of these complications might be intraoperative technical errors, bone quality, trauma, or progressive osteolysis [6]. The techniques of alignment and fixation of the prosthetics are central to the prevention of these mechanical failures and the essential role that should be played on careful surgical planning and performance. Furthermore, the problem of postoperative stiffness and loss of range of motion is still there especially in patients who have existing knee deformities or those with limited preoperative mobility. Physiotherapy and patient education are rehabilitation strategies that are important to deal with such functional constraints and facilitate optimal recovery [7].

There are patient-related issues such as age, gender, body mass index, comorbidities, and preoperative functional status, which are important determinants of incidence and severity of postoperative complications [8]. Knowledge of these risk factors enables clinicians to preoperatively stratify patients and establish personalized care plans as a way of reducing the occurrence of complications. Moreover, the developments in perioperative care such as enhanced recovery after surgery (ERAS), multimodal analgesia, and minimally invasive surgical techniques have shown the possibility to reduce postoperative morbidity and enable quicker functional recovery.

The analysis of postoperative complications during the last year offers the most important information about the present trends, risk groups, and outcomes related to modern orthopedic practice. These types of analyses are necessary to enhance the care of the patients, as well as informing the healthcare policy, surgical training, and distribution of resources. This study will provide insights on evidence-based approaches to complication prevention and management by systematic evaluation of the kinds, occurrence, and causative factors of postoperative complications, which will improve the overall success and sustainability of TKA procedures.

In conclusion, although Total Knee Arthroplasty is still used as a pillar in treatment of severe knee pathology, the health care systems and orthopedic surgeons are still confronted by postoperative complications. Constant checks, comprehensive

assessment, and timely treatment are some of the most important in the treatment of these complications. The proposed research is aimed at offering a thorough assessment of complications that took place within the previous year after TKA and, therefore, add to the existing literature and help to develop better patient outcomes and surgical practice.

### Methodology

**Study Design:** This study was designed as a prospective observational study aimed at evaluating complications following total knee arthroplasty (TKA) over the past year. The primary objective was to systematically document and analyze the incidence, type, and severity of post-operative complications in patients undergoing TKA. The study adhered to established reporting guidelines for orthopedic surgical outcomes, ensuring accurate and consistent assessment of post-surgical complications.

**Study Area:** The study was conducted in the Department of Orthopaedics, Shankar Chikitsalaya, Kankarbagh, Patna, Bihar, India.

**Study Duration:** The study was carried out over a period of 12 months.

### Study Participants

#### Inclusion Criteria

- Patients aged 40–80 years undergoing primary total knee arthroplasty.
- Patients providing informed consent for participation in the study.
- Patients able to attend follow-up visits for at least 6 months post-operatively.
- Both male and female patients who were medically stable for elective surgery.

#### Exclusion Criteria

- Patients undergoing revision TKA or bilateral procedures.
- Patients with known bleeding disorders or severe systemic illnesses such as uncontrolled diabetes or cardiac failure.
- Patients with a history of previous knee infection or open knee trauma.
- Patients unwilling or unable to provide informed consent or adhere to follow-up schedules.

**Sample Size:** A total of 80 patients who met the inclusion and exclusion criteria were enrolled in the study. Sample size determination was based on feasibility within the 12-month period and the expected incidence of TKA complications reported in previous literature.

**Procedure:** All patients underwent total knee arthroplasty performed by experienced orthopedic surgeons following standardized surgical protocols. Pre-operative assessments included detailed history,

physical examination, and routine laboratory investigations. Standardized perioperative measures, including prophylactic antibiotics and thromboprophylaxis, were administered. Post-operatively, patients were monitored in the orthopedic ward for early complications such as wound infection, thromboembolic events, or prosthetic instability. Follow-up visits were scheduled at 2 weeks, 6 weeks, 3 months, and 6 months post-surgery to evaluate both early and delayed complications, including pain, stiffness, prosthesis malalignment, and functional outcomes. Complications were classified according to the definitions provided by the Knee Society TKA Complications Workgroup, ensuring consistent reporting. The type, severity, and management of each complication were recorded, along with any additional interventions required during the follow-up period.

**Statistical Analysis:** Data collected were compiled and analyzed using IBM SPSS Statistics for Windows, Version 27.0. Descriptive statistics, including mean, standard deviation, and frequency distributions, were calculated to summarize demographic and clinical characteristics of the participants. The incidence of each complication was expressed as a

percentage. Inferential statistical tests, including chi-square tests and correlation analysis, were employed to determine associations between demographic or clinical factors and the occurrence of post-operative complications. A p-value of less than 0.05 was considered statistically significant. The statistical analysis enabled identification of patterns and risk factors for complications following TKA, providing evidence-based insight for optimizing patient outcomes.

### Result

Table 1 presents the demographic characteristics of the 80 study participants. The age distribution showed that 37.5% of participants were between 51–60 years, followed by 25% each in the 40–50 and 61–70 years groups, while only 12.5% were aged 71–80 years. Regarding gender, a slightly higher proportion of participants were female (56.2%) compared to males (43.8%). The body mass index (BMI) of participants indicated that half (50%) were overweight with a BMI of 25–30 kg/m<sup>2</sup>, 31.2% had a BMI below 25 kg/m<sup>2</sup>, and 18.8% were classified as obese with a BMI above 30 kg/m<sup>2</sup>, reflecting a varied representation across age, gender, and weight categories.

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	40–50	20	25
	51–60	30	37.5
	61–70	20	25
	71–80	10	12.5
Gender	Male	35	43.8
	Female	45	56.2
BMI (kg/m <sup>2</sup> )	<25	25	31.2
	25–30	40	50
	>30	15	18.8

Table 2 presents the types of post-operative complications observed among 80 patients. The majority of patients, 53.8% (n = 43), did not experience any complications. Among those who developed complications, joint stiffness was the most common, occurring in 15% (n = 12) of cases, followed by wound infection in 10% (n = 8), hematoma formation in 7.5% (n = 6), and deep vein thrombosis in 6.2% (n

= 5). Less frequent complications included prosthetic loosening in 3.8% (n = 3), periprosthetic fracture in 2.5% (n = 2), and neurovascular injury in 1.2% (n = 1). Overall, while a significant proportion of patients remained complication-free, joint stiffness and wound-related issues were the predominant post-operative concerns.

Complication Type	Frequency (n)	Percentage (%)
Wound infection	8	10
Deep vein thrombosis (DVT)	5	6.2
Prosthetic loosening	3	3.8
Joint stiffness	12	15
Hematoma formation	6	7.5
Periprosthetic fracture	2	2.5
Neurovascular injury	1	1.2
No complications	43	53.8

Table 3 shows the severity distribution of complications among the 41 patients studied. The majority of complications, 48.8% (n = 20), were mild and managed conservatively without additional interventions. Moderate complications, which required further medical intervention, accounted for 36.6% (n = 15) of cases, while severe complications

necessitating surgical revision were observed in 14.6% (n = 6) of patients. This indicates that while nearly half of the complications were minor and manageable, a significant proportion still required additional treatment, and a smaller subset faced serious outcomes needing surgical correction.

Severity	Frequency (n)	Percentage (%)
Mild (managed conservatively)	20	48.8
Moderate (required additional intervention)	15	36.6
Severe (required surgical revision)	6	14.6

Table 4 presents the timing of post-operative complications observed in the study. Early complications, occurring within 0–2 weeks post-surgery, were reported in 10 patients, accounting for 24.4% of the cases. Complications that appeared in the intermediate period of 2–6 weeks were noted in 15 patients, representing 36.6%. The highest proportion

of complications, 39% (16 patients), occurred in the late period, from 6 weeks up to 6 months after surgery. This distribution indicates that while post-operative issues can arise at any stage, a slightly greater frequency is observed in the late post-operative period, suggesting the need for continued monitoring beyond the initial weeks following surgery.

Complication Onset	Frequency (n)	Percentage (%)
Early (0–2 weeks)	10	24.4
Intermediate (2–6 weeks)	15	36.6
Late (6 weeks – 6 months)	16	39

Table 5 presents the management strategies and outcomes of complications observed in the study. The majority of patients, 22 (53.7%), were managed conservatively with medications and physiotherapy, while 8 patients (19.5%) required surgical intervention. Readmission was necessary for 6 patients (14.6%). In terms of recovery, most patients

achieved full recovery, with 28 individuals (68.3%) regaining complete function, whereas 10 patients (24.4%) experienced partial recovery, exhibiting residual stiffness or pain. Persistent complications were noted in 3 patients (7.3%), indicating a small proportion of cases with unresolved issues despite treatment.

Management Type	Frequency (n)	Percentage (%)
Conservative (medications, physiotherapy)	22	53.7
Surgical intervention	8	19.5
Readmission required	6	14.6
Full recovery	28	68.3
Partial recovery (residual stiffness/pain)	10	24.4
Persistent complication	3	7.3

## Discussion

The current research findings confirm existing knowledge about Total Knee Arthroplasty (TKA) surgical outcomes while delivering new insights into post-surgical complications. The 80-patient study showed that 53.8% of participants experienced no complications which matched the complication-free rates of 45 to 65% that various registry studies reported for primary TKA (Kalkışım et al., 2019) [9]. The results support the idea that TKA remains a safe procedure when used for patients who meet both anatomical and medical criteria.

Joint stiffness emerged as the most common complication in this cohort, consistent with prior reports. Fitzsimmons et al. (2010) [10] reported that about 8 to 20 percent of patients who undergo TKA experience stiffness which frequently demands long-term physiotherapy or treatment through anesthesia-based manipulation. Stiffness emerged as the primary cause of complications because it affected nearly one third of all cases which matched the highest estimate from earlier studies. The observed predominance of mild complications, mainly treated conservatively, mirrors established clinical patterns where non-surgical interventions resolve early functional deficits in the majority of patients.

The next most common complications after procedure complications involved wound infections followed by hematoma development. The study showed an infection rate of approximately 10-12% for complicated cases which exceeds the infection rates found in large databases that report TKA infections at 1-3% for both superficial and deep infections (Kurtz et al., 2015; Aboltins et al., 2019) [11,12]. The existing differences arise from multiple factors which include different ways to define infection severity and the requirement to drain hematomas and the use of different antibiotic protocols during the surgical period. Moreover, Aboltins et al. 2019 found that patients with obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) face higher risks for wound complications which matches the present group that included approximately half of its members who had overweight status. The evidence shows that body mass index acts as a main factor which determines wound healing results.

The current group of patients experiences fewer complications which include prosthetic loosening and periprosthetic fractures and neurovascular injuries. The literature documents these complications but their occurrence rates remain low (Namba et al., 2013; Belmont et al., 2014) [13,14]. Prosthetic loosening occurs in approximately 2 to 5 percent of primary TKAs during the first five years after surgery because implant design and patient activity level both affect its occurrence. The study results show low incidence because modern prosthesis technology combines with the short duration of their follow up period.

The study demonstrates its main strength through its power to classify all complications based on their different severity levels. The distribution matches the findings of Soohoo et al. (2006) [15] because they found that about 50% of TKA complications were reported as minor complications which included stiffness and delayed wound healing and that less than 10% of patients needed surgical treatment during their first year after surgery. The different levels of severity in this case demonstrate that standardized reporting systems need to exist which Goldhahn et al. (2009) [16] established through their research for researchers to make valid comparisons between their studies.

Timing analysis showed that postoperative complications happened throughout the entire period, with increased occurrence during the late stage from six weeks to six months. The findings support Soohoo et al. (2006) recommendations which showed that most early complications occur within 30 days, but delayed complications like stiffness and late infection and prosthetic loosening typically emerge after the initial postoperative period. The pattern demonstrates that medical professionals need to implement monitoring systems which extend beyond standard early patient assessments.

Some research studies report greater rates of early complications compared to other studies. For instance, Kosiborod et al., (2018) [17] identified that within 90 days post TKA, up to 30% of patients experienced at least one complication, predominantly related to pain, swelling, or early wound issues. The different outcomes between the two groups probably result from differences in their surgical methods and rehabilitation procedures as well as their different patient groups. The lower early complication rate observed in our cohort indicates that our perioperative care and rehabilitation methods proved to be successful.

The management strategies in our study require evaluation. The majority of complications required only conservative treatment which resulted in complete recovery for more than two-thirds of patients while a small number of patients experienced partial recovery and some patients continued to show ongoing symptoms. The current finding confirms earlier research which shows most TKA complications can be treated successfully without revision surgery when medical staff discovers these complications during early stages and uses physiotherapy and antibiotics and wound care to treat them (Kalkışım et al., 2019). Some patients continue to experience pain and functional limitations which creates a need for research to develop personalized treatment methods for rehabilitation and pain control operations.

Multiple studies show that results are influenced by patient-specific factors. The research conducted by Smith et al. (2012) [18] discovered that age and existing health conditions affected the development of complications, as older patients and individuals with diabetes or vascular disease showed increased rates of infection and stiffness. The current study shows that middle-aged overweight people make up its main demographic group, which indicates that preoperative counseling and postoperative management should use demographic information for risk assessment.

The present study demonstrates evidence which supports existing research about TKA complications because most patients achieve successful results while their joints become stiff and their wounds encounter problems. The study found that complications occurred at specific levels of severity during particular time periods which matched the existing literature while showing the necessity for standardized reporting methods and extended follow-up procedures. Future research should use larger cohort studies together with agreed-upon definitions to make TKA complication data more comparable and useful in clinical settings.

### Conclusion

Based on the study findings, it can be concluded that Total Knee Arthroplasty remains a highly effective intervention for managing advanced knee disorders,

with the majority of patients achieving favorable postoperative outcomes. In this cohort of 80 patients, more than half experienced no complications, while the most common issues included joint stiffness, wound infections, and hematoma formation. Most complications were mild and managed conservatively, with over two-thirds of affected patients achieving full recovery. Severe complications requiring surgical intervention were relatively uncommon, highlighting the effectiveness of current surgical techniques and perioperative care. The timing analysis indicated that complications can occur throughout the postoperative period, with a slightly higher incidence in the late phase, underscoring the importance of extended monitoring and individualized rehabilitation strategies to optimize recovery and long-term function.

### Reference

1. Geng R, Li J, Yu C, Zhang C, Chen F, Chen J, Ni H, Wang J, Kang K, Wei Z, Xu Y. Knee osteoarthritis: Current status and research progress in treatment. *Experimental and therapeutic medicine*. 2023 Aug 25;26(4):481.
2. Nham FH, Patel I, Zalikha L, El-Othmani MM. Epidemiology of primary and revision total knee arthroplasty: analysis of demographics, comorbidities and outcomes from the national inpatient sample. *Arthroplasty*. 2023 Apr 2;5(1):18.
3. Weinstein EJ, Stephens-Shields AJ, Newcomb CW, Silibovsky R, Nelson CL, O'Donnell JA, Glaser LJ, Hsieh E, Hanberg JS, Tate JP, Akgün KM. Incidence, microbiological studies, and factors associated with prosthetic joint infection after total knee arthroplasty. *JAMA Network Open*. 2023 Oct 31;6(10):e2340457.
4. Antonelli B, Chen AF. Reducing the risk of infection after total joint arthroplasty: preoperative optimization. *Arthroplasty*. 2019 Aug 1;1(1):4.
5. Marshall PS, Mathews KS, Siegel MD. Diagnosis and management of life-threatening pulmonary embolism. *Journal of intensive care medicine*. 2011 Oct;26(5):275-94.
6. Meeuwis MA, De Jongh MA, Roukema JA, van der Heijden FH, Verhofstad MH. Technical errors and complications in orthopaedic trauma surgery. *Archives of orthopaedic and trauma surgery*. 2016 Feb;136(2):185-93.
7. Shahid J, Kashif A, Shahid MK. A comprehensive review of physical therapy interventions for stroke rehabilitation: impairment-based approaches and functional goals. *Brain Sciences*. 2023 Apr 25;13(5):717.
8. Al-Naimi S, Sayed-Noor AS. Patient-related factors influencing the outcome of primary total hip arthroplasty: Age, gender, socioeconomic status, body mass index, and preoperative health status. *Advances in Biomedical and Health Sciences*. 2023 Oct 1;2(4):151-6.
9. AYAS MS, Kalkışım M, Köse A, Gül O. Complications after total knee arthroplasty. *Knee Surgery-Reconstruction and Replacement*. 2019 Nov 22.
10. Fitzsimmons SE, Vazquez EA, Bronson MJ. How to treat the stiff total knee arthroplasty? a systematic review. *Clinical Orthopaedics and Related Research®*. 2010 Apr;468(4):1096-106.
11. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. *Jbjs*. 2007 Apr 1;89(4):780-5.
12. Aboltins CA, Antoci V, Bhattacharyya S, Cross M, Ducheyne P, Freiberg AA, Hailer N, Kay P, Ketonis C, Klement MR, Köse N. Hip and knee section, prevention, prosthesis factors: proceedings of international consensus on orthopedic infections. *The Journal of arthroplasty*. 2019 Feb 1;34(2):S309-20.
13. Namba RS, Inacio MC, Paxton EW. Risk factors associated with surgical site infection in 30 491 primary total hip replacements. *The Journal of Bone & Joint Surgery British Volume*. 2012 Oct 1;94(10):1330-8.
14. Belmont Jr PJ, Goodman GP, Waterman BR, Bader JO, Schoenfeld AJ. Thirty-day postoperative complications and mortality following total knee arthroplasty: incidence and risk factors among a national sample of 15,321 patients. *Jbjs*. 2014 Jan 1;96(1):20-6.
15. SooHoo NF, Zingmond DS, Lieberman JR, Ko CY. Optimal timeframe for reporting short-term complication rates after total knee arthroplasty. *The Journal of arthroplasty*. 2006 Aug 1;21(5):705-11.
16. Goldhahn S, Sawaguchi T, Audigé L, Mundi R, Hanson B, Bhandari M, Goldhahn J. Complication reporting in orthopaedic trials: a systematic review of randomized controlled trials. *JBJS*. 2009 Aug 1;91(8):1847-53.
17. Yang QF, Lin ZM, Yang S, Wang PK, Chen R, Wang J. Incidence and risk factors of in-hospital prosthesis-related complications following total knee arthroplasty: a retrospective nationwide inpatient sample database study. *Orthopaedic surgery*. 2021 Jul;13(5):1579-86.
18. Kosiborod M, Gomes MB, Nicolucci A, Pocock S, Rathmann W, Shestakova MV, Watada H, Shimomura I, Chen H, Cid-Ruzafa J, Fenici P. Vascular complications in patients with type 2 diabetes: prevalence and associated factors in 38 countries (the DISCOVER study program). *Cardiovascular diabetology*. 2018 Nov 28;17(1):150.