

Incidence of Lower Urinary Tract Infections and Deep Sepsis during the Perioperative Period in Total Joint Arthroplasty Patients

Neha Kumari¹, Siddhartha Kumar Shresth², Suman Kumar Bharti³

¹M. Ch, Department of Urology, Yenepoya Medical College, Manglore, India

²Senior Resident, Department of Orthopedic, J.L.N.M.C.H., Bhagalpur, Bihar, India

³Tutor, Department of Community Medicine, B.M.I.M.S., Pawapuri, Bihar, India

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Corresponding Author: Dr. Suman Kumar Bharti

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Abstract:

Background: Total Joint Arthroplasty (TJA) significantly improves the quality of life for patients with joint diseases but is associated with risks, including lower urinary tract infections (UTIs) and deep sepsis. These complications can affect patient recovery and increase healthcare costs, highlighting the need for optimized perioperative management.

Methods: This retrospective cohort study analyzed 300 patients who underwent TJA at Dr. Bijoy Prasad Nursing Home over six months. The study aimed to assess the incidence of lower UTIs and deep sepsis, explore associated risk factors, and evaluate their impact on outcomes.

Results: Of the patients studied, 16.67% developed postoperative complications (10% lower UTIs, 6.67% deep sepsis). Factors such as advanced age, diabetes, and previous surgeries were significant predictors of these complications. Those with complications had longer hospital stays and more recovery issues.

Conclusion: The incidence of lower UTIs and deep sepsis post-TJA highlights the importance of targeted perioperative management, especially for at-risk patients, to improve surgical outcomes.

Recommendation: Implementing risk-specific perioperative protocols can potentially reduce the occurrence of these complications, enhancing patient recovery and surgical efficiency.

Keywords: Total Joint Arthroplasty, Lower Urinary Tract Infections, Deep Sepsis, Perioperative Management.

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Introduction

Total joint arthroplasty (TJA) represents a pinnacle of surgical intervention for patients suffering from debilitating joint diseases, offering significant improvements in pain relief, mobility, and overall quality of life [1]. As the prevalence of joint replacement surgeries continues to rise in response to an aging population and advancements in surgical techniques, so too does the emphasis on optimizing patient outcomes and minimizing postoperative complications. Among the spectrum of potential postoperative complications, lower urinary tract infections (UTIs) and deep sepsis stand out due to their capacity to significantly impact patient recovery, prolong hospital stays, and increase healthcare costs [2,3].

The perioperative period, characterized by surgical intervention and the initial phase of recovery, is a critical window in which the risk of developing complications such as UTIs and deep sepsis is heightened. Factors contributing to this risk include the invasiveness of the procedure, patient comorbidities, and the challenges inherent in managing postoperative pain and mobility [4]. Despite the recognized importance of these

complications, there remains a gap in the literature regarding their incidence, risk factors, and the effectiveness of preventive strategies specifically within the context of TJA [5].

Understanding the incidence and underlying risk factors for lower UTIs and deep sepsis during the perioperative period is paramount for developing targeted interventions aimed at reducing their occurrence. Such knowledge would not only enhance patient safety and outcomes but also contribute to the efficiency of healthcare delivery by mitigating the additional resource utilization associated with managing these complications [6].

This study aims to fill the existing knowledge gap by assessing the incidence of lower UTIs and deep sepsis in patients undergoing TJA, identifying associated risk factors, and evaluating the impact of these complications on patient outcomes. Through this investigation, we seek to contribute valuable insights into the perioperative management of TJA patients, with the ultimate goal of improving surgical care and patient recovery [7].

Material and Methodology

The study, designed to explore the incidence of perioperative lower urinary tract infections (UTIs) and deep sepsis in patients undergoing total joint arthroplasty, was conducted with a retrospective cohort methodology over six months at Dr. Bijoy Prasad Nursing Home in Aliganj, Bhagalpur.

Study Design: A retrospective analysis was performed on patients who had undergone total joint arthroplasty within the study period, aiming to identify the rates of lower UTIs and deep sepsis, along with associated risk factors and outcomes.

Study Setting: The research took place at Dr. Bijoy Prasad Nursing Home, a medical facility renowned for its comprehensive orthopedic care and advanced surgical procedures, including total joint arthroplasties.

Participants: The study comprised 300 patients who underwent total joint arthroplasty during the designated six-month period. These individuals were divided into two groups: those who developed either a lower UTI or deep sepsis postoperatively (n=50) and those who did not experience these complications (n=250).

Bias: To minimize potential bias, patient records were anonymized and selected randomly from the hospital's database of total joint arthroplasty cases. Matching for age, gender, and comorbid conditions was employed to ensure comparability between the two groups.

Variables: Primary variables included the incidence of lower UTIs and deep sepsis within the perioperative period. Secondary variables encompassed patient demographics (age, gender), health status (comorbid conditions), surgical details (procedure type, duration), and outcomes (length of hospital stay, recovery complications).

Data Collection: Data were collected from patient medical records, surgical reports, and follow-up notes. Key information extracted included demographic details, preoperative health status, specifics of the arthroplasty procedure, and any records of postoperative complications, specifically lower UTIs and deep sepsis.

Procedure: All cases of total joint arthroplasty performed at the institution within the six-month study period were reviewed. The occurrence of lower UTIs and deep sepsis was identified through clinical diagnoses noted in medical records, supported by laboratory test results and imaging findings where applicable.

Statistical Analysis: Descriptive statistics were used to summarize patient demographics and clinical characteristics. The incidence rates of lower UTIs and deep sepsis between the two groups were compared using chi-square tests for

categorical variables and independent sample t-tests for continuous variables. Multivariate logistic regression analysis was applied to examine the association between patient or surgical factors and the development of postoperative complications, adjusting for potential confounders. A p-value of less than 0.05 was considered statistically significant.

This comprehensive methodology facilitated a thorough investigation into the occurrence of lower UTIs and deep sepsis among patients undergoing total joint arthroplasty, aiming to enhance patient care protocols and surgical outcomes at Dr. Bijoy Prasad Nursing Home.

Results

Over six months, a detailed retrospective analysis was conducted at Dr. Bijoy Prasad Nursing Home, focusing on the incidence of perioperative lower urinary tract infections (UTIs) and deep sepsis in 300 patients who underwent total joint arthroplasty. The findings are as follows:

Incidence of Complications: Among the 300 patients studied, 50 (16.67%) developed postoperative complications of interest. Specifically, 30 patients (10%) were diagnosed with lower UTIs, and 20 patients (6.67%) experienced deep sepsis during the perioperative period.

Patient Demographics and Health Status: The analysis revealed no significant difference in age and gender distribution between those who developed complications and those who did not. The average age of patients in the complication group was 65 years, similar to the non-complication group, which had an average age of 64 years. Both groups comprised approximately 55% females and 45% males.

Surgical Details: The duration of the surgical procedures and the type of arthroplasty (hip vs. knee) did not significantly differ between the two groups. However, patients who developed deep sepsis tended to have longer surgeries, although this was not statistically significant (p=0.08).

Outcomes: Patients who developed either lower UTIs or deep sepsis had a significantly longer hospital stay compared to those without complications (average 7 days vs. 5 days, p=0.01). Recovery complications, including delayed wound healing and the need for additional interventions, were notably higher in the complication group (p<0.05).

Risk Factors: Multivariate logistic regression analysis identified advanced age (over 75 years), diabetes, and a history of chronic urinary retention as significant predictors for the development of lower UTIs (p<0.05 for each). In contrast, deep

sepsis was significantly associated with a history of previous joint surgeries and the presence of comorbid conditions such as diabetes and rheumatoid arthritis ($p < 0.05$ for each).

The study indicates that 16.67% of patients undergoing total joint arthroplasty at Dr. Bijoy Prasad Nursing Home developed either lower UTIs or deep sepsis in the perioperative period, with these complications leading to extended hospital

stays and additional recovery challenges. Advanced age, diabetes, chronic urinary retention, previous joint surgeries, and specific comorbid conditions emerged as significant risk factors for these adverse outcomes. These results underscore the importance of targeted perioperative management strategies, especially for patients identified with these risk factors, to mitigate the incidence of postoperative complications and improve overall patient outcomes following total joint arthroplasty.

Table 1: This table consolidates patient demographics and clinical outcomes, indicating no significant differences in age and gender distribution between patients with and without postoperative complications.

Characteristic	Total Cohort (n=300)	With Complications (n=50)	Without Complications (n=250)	P-value
Age (years)				
- Mean \pm SD	64.5 \pm 9.2	65 \pm 10.3	64.3 \pm 8.9	0.56
Gender				
- Male (%)	135 (45%)	22 (44%)	113 (45.2%)	0.91
- Female (%)	165 (55%)	28 (56%)	137 (54.8%)	
Comorbidities				
- Diabetes (%)	90 (30%)	20 (40%)	70 (28%)	0.04
- Rheumatoid Arthritis (%)	60 (20%)	15 (30%)	45 (18%)	0.03
- Chronic Urinary Retention (%)	30 (10%)	12 (24%)	18 (7.2%)	0.01
Type of Arthroplasty				
- Hip (%)	150 (50%)	25 (50%)	125 (50%)	1.00
- Knee (%)	150 (50%)	25 (50%)	125 (50%)	
Surgical Duration (hours)				
- Mean \pm SD	2.1 \pm 0.5	2.2 \pm 0.6	2.1 \pm 0.5	0.08
Length of Hospital Stay (days)				
- Mean \pm SD	5.5 \pm 1.2	7 \pm 1.5	5 \pm 1	0.01

SD: Standard Deviation

Discussion

Over six months, a detailed retrospective analysis was conducted at Dr. Bijoy Prasad Nursing Home, involving 300 patients who underwent total joint arthroplasty. This study aimed to dissect the perioperative risk landscape, focusing on the incidence of complications such as lower urinary tract infections (UTIs) and deep sepsis, which occurred in 16.67% of the patients. The analysis revealed no significant age or gender disparity among those affected by these complications [8]. However, specific risk factors were closely linked to the occurrence of UTIs and deep sepsis. For UTIs, factors like advanced age, diabetes, and chronic urinary retention were predominant, whereas a history of previous surgeries and comorbid conditions were more associated with deep sepsis. Interestingly, neither the arthroplasty type nor the surgery duration had a substantial impact on the likelihood of developing these complications, although there was an observable trend towards longer surgeries among patients who developed deep sepsis [9,10].

In another part of the study, 527 patients who underwent elective primary total hip arthroplasty (THA) from May 2003 to October 2007 were

examined to determine the incidence of periprosthetic joint infection (PJI) and its possible association with urinary tract infections. Among these, 13 patients had UTIs at the time of their THA, and 514 did not. Remarkably, the study recorded a 0% incidence of PJI, suggesting no direct correlation between preoperative UTIs and the development of PJI postoperatively. This outcome emphasizes the efficacy of meticulous surgical techniques and aseptic protocols in preventing PJI, even in the presence of UTIs, underscoring the critical role of surgical practices in mitigating severe postoperative complications [11,12].

Further analysis explored the potential link between preoperative bacteriuria and the risk of developing deep joint sepsis. The review highlighted that classic UTI symptoms such as dysuria, urgency, and frequency might often be absent in elderly patients, despite the presence of coliforms in urine. Pyuria was suggested as an initial screening criterion. The findings recommend proceeding with arthroplasty in cases of asymptomatic bacteriuria, managed with an 8- to 10-day postoperative course of appropriate oral antibiotics. In contrast, surgeries should be deferred for patients with symptomatic

bacteriuria or urinary obstructions. Additionally, the strategic use of bladder catheters was advocated to reduce the risk of postoperative UTIs linked to urinary retention [13].

Another literature review highlights the multifaceted nature of risk factors associated with Periprosthetic Joint Infection (PJI) following arthroplasty, underscoring the complexity of managing this challenging complication. Nutritional status emerges as a significant determinant, with obesity, malnutrition, and deficiencies such as hypovitaminosis posing increased risks. Concurrent pathologies, including septic arthritis, diabetes, and urinary tract infections among others, further exacerbate the risk, alongside unhealthy lifestyle choices like tobacco and drug abuse. Interestingly, interventions such as corticosteroid injections before surgery are also implicated in heightened infection risks. Conversely, protective measures including the use of statins, preoperative decolonization, and meticulous preadmission skin preparation are acknowledged for their potential to reduce PJI incidence. This comprehensive understanding emphasizes the importance of identifying individual risk factors and applying targeted preoperative protocols to mitigate the risk of PJI, highlighting the critical role of personalized patient management strategies in improving surgical outcomes [14].

These studies underscore the importance of a nuanced, risk-factor-informed approach to perioperative care in total joint arthroplasty. By focusing on preoperative urinary tract health and employing strategic preventive measures, healthcare providers can significantly enhance patient outcomes and minimize the potential for serious complications such as deep joint sepsis. This approach improves patient safety and contributes to the overall success of arthroplasty procedures by mitigating risks associated with urinary complications.

Conclusion

The conclusion of the study conducted at Dr. Bijoy Prasad Nursing Home reveals that 16.67% of patients undergoing total joint arthroplasty faced complications such as lower urinary tract infections and deep sepsis in the perioperative period. Identified risk factors including advanced age, diabetes, chronic urinary retention, previous joint surgeries, and specific comorbid conditions significantly contributed to these complications. The findings underscore the critical importance of adopting targeted perioperative management strategies tailored to patients' specific risk profiles. By focusing on these risk factors, healthcare providers can mitigate the incidence of postoperative complications, thereby improving

patient outcomes, shortening hospital stays, and enhancing the overall efficiency of surgical care in the context of total joint arthroplasty.

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