e-ISSN: 0975-1556, p-ISSN:2820-2643
Available online on www.ijpcr.com
International Journal of Pharmaceutical and Clinical Research 2024; 16(3); 1556-1559

Original Research Article

Acute Kidney Injury Following Outpatient Primary Total Joint Arthroplasty Due to Combined NSAID Administration

Neha Kumari[1], Siddhartha Kumar Shrest[2], Suman Kumar Bharti[3]

[1]M.Ch, Department of Urology, Yenepoya Medical College, Manglore, India
[2]Senior Resident, Department of Orthopedic, J.L.N.M.C.H., Bhagalpur, Bihar, India
[3]Tutor, Department of Community Medicine, B.M.I.M.S., Pawapuri, Bihar, India

Received: 25-01-2024 / Revised: 23-02-2024 / Accepted: 18-03-2024
Corresponding Author: Dr. Suman Kumar Bharti
Conflict of interest: Nil

Abstract:

Background: Acute kidney injury (AKI) is a notable risk in patients undergoing total joint arthroplasty (TJA), especially with postoperative dual NSAID use. This study assesses AKI incidence and severity in patients receiving NSAIDs after outpatient TJA.

Methods: A six-month prospective cohort study at Dr. Bijoy Prasad Nursing Home included 150 patients, divided into an NSAID group (n=75) and a control group (n=75). AKI detection followed KDIGO criteria, using creatinine level changes. Analysis utilized chi-square, t-tests, and logistic regression.

Results: The NSAID group showed a higher AKI incidence (24%) versus the control group (9.3%), with significant lengthier hospital stays (4.2 days vs. 3.7 days, p=0.048). No difference in long-term outcomes was noted, though NSAID users reported slightly lower satisfaction.

Conclusion and Recommendation: Dual NSAID use post-TJA significantly raises AKI risk and hospital stay length without affecting long-term recovery. Careful NSAID use and strict renal monitoring are advised to reduce AKI risk in outpatient TJA settings.

Keywords: Acute kidney injury, NSAIDs, Total joint arthroplasty, Outpatient surgery

Introduction

Acute kidney injury (AKI) emerges as a notable concern in the aftermath of surgical interventions, particularly within the sphere of orthopedic surgery, such as total joint arthroplasty (TJA), known for its significant role in alleviating pain and enhancing function in individuals with severe joint afflictions [1]. The trend towards conducting these procedures in outpatient settings introduces a critical need to reassess postoperative care strategies, with a specific focus on managing pain effectively. Non-steroidal anti-inflammatory drugs (NSAIDs), central to post-surgical pain relief due to their anti-inflammatory and analgesic properties [2,3], pose a potential risk for AKI when used in combination following surgery. This condition, characterized by a swift decline in renal function, can escalate morbidity, prolong hospitalization, and in severe cases, lead to mortality [4]. The intricacies of managing pain while preventing renal complications are accentuated in outpatient scenarios, where continuous monitoring is not as rigorous as in hospital settings [5]. With the rising frequency of outpatient TJA and prevalent NSAID use for postoperative pain, examining the correlation between the concurrent use of NSAIDs and AKI incidence is critical [6,7].

This investigation endeavors to shed light on the occurrence and intensity of AKI among patients administered dual NSAIDs after outpatient primary TJA, addressing the specific concerns associated with NSAID-induced renal risks in contemporary orthopedic surgical practice. Through this examination, the study contributes essential insights into postoperative AKI, advocating for the development of safer, more effective pain management approaches for patients undergoing outpatient TJA.

Material and Methodology

A focused examination was conducted to understand acute kidney injury (AKI) occurrences in patients receiving dual non-steroidal anti-inflammatory drugs (NSAIDs) after outpatient total joint arthroplasty (TJA). This prospective cohort study spanned six months at Dr. Bijoy Prasad Nursing Home, chosen for its high volume of outpatient TJA procedures.

Study Design: The research aimed to delineate the incidence and severity of AKI among patients treated with dual NSAIDs following outpatient TJA through a prospective cohort study framework.

Setting: The study locale, Dr. Bijoy Prasad Nursing Home in Aliganj, Bhagalpur, was selected for its distinguished orthopedic department.

Participants: The study encompassed 150 patients who underwent outpatient TJA, divided equally into two groups: those prescribed dual NSAIDs post-surgery (n=75) and a control group not receiving NSAIDs post-surgery (n=75). Inclusion was limited to adults aged 18 and older, excluding those with pre-existing chronic kidney disease or prior NSAID use within 30 days before surgery.

Bias Reduction: To minimize selection bias, participants were sequentially enrolled based on their surgery dates, ensuring comparability across key variables such as age, gender, body mass index (BMI), and baseline renal function.

Variables and Data Collection: The primary variable was AKI development within 30 days post-surgery, measured against KDIGO criteria. Secondary variables included AKI severity, hospital stay length, and postoperative renal complications. Data were collected from medical records, surgical reports, and pharmacy records, focusing on demographic information, surgical specifics, NSAID administration, and renal function.

Analysis Procedure: Following baseline and postoperative renal assessments, AKI instances were identified per KDIGO criteria. Statistical analyses involved chi-square tests, independent t-tests, and multivariate logistic regression, adjusting for potential confounders to pinpoint independent AKI predictors.

Insights and Implications

This structured inquiry into the effects of dual NSAID administration post-outpatient TJA provides crucial evidence for refining postoperative care strategies. The detailed methodology underscores the importance of vigilant renal function monitoring and careful NSAID use to mitigate the risk of AKI in this patient cohort, paving the way for safer pain management protocols in outpatient orthopedic surgeries.

Result

A six-month study at Dr. Bijoy Prasad Nursing Home, Aliganj, Bhagalpur, investigated the effects of postoperative dual NSAID administration on acute kidney injury (AKI) in patients undergoing outpatient primary total joint arthroplasty. The study involved 150 patients, evenly split into an NSAID group (n=75) and a control group (n=75), to assess AKI incidence, severity, hospital stay lengths, functional outcomes, and patient satisfaction.

The study found a significant difference in AKI incidence, with 24% of the NSAID group developing AKI compared to only 9.3% in the control group (p=0.012). Severity assessment revealed a higher occurrence of Stage 2 and 3 AKI among NSAID recipients, indicating not just an increased risk but also a tendency towards more severe renal impairment in this group (p=0.034).

Patients in the NSAID group had a statistically longer average hospital stay (4.2 days) compared to the control group (3.7 days), highlighting the potential for NSAID-related complications to prolong recovery (p=0.048).

Despite the disparities in AKI incidence and hospital stay, long-term functional outcomes, as measured by the Knee Society Score (KSS), showed no significant difference between groups six months postoperatively, suggesting that AKI's impact on functional recovery might be minimal (p=0.197).

A slight but marginally significant difference in patient satisfaction was noted, with 84% of NSAID users reporting high satisfaction levels versus 92% in the control group (p=0.045). This discrepancy underscores the nuanced impacts of AKI on patient perceptions of recovery and overall treatment success.

Multivariate analysis reinforced dual NSAID use as an independent predictor of AKI post-surgery, with an odds ratio of 2.8. This analysis underscores the need for careful consideration of NSAID use in managing postoperative pain in outpatient arthroplasty settings.

The study conclusively demonstrates the association between dual NSAID use and increased risk for AKI, prolonged hospitalization, and slightly reduced patient satisfaction following outpatient primary total joint arthroplasty. These findings emphasize the critical need for judicious NSAID use and rigorous renal function monitoring to mitigate AKI risk, without significantly affecting long-term functional outcomes.

Table 1: Representation of different characteristics of two groups

Demographic Characteristics	NSAID Group (n=75)	Control Group (n=75)	p-value
Age (years)			
- Mean ± SD	65.4 ± 7.2	64.8 ± 6.9	0.564
Gender			
- Male (%)	45 (60%)	44 (58.7%)	0.841
- Female (%)	30 (40%)	31 (41.3%)	

BMI (kg/m²)			
- Mean ± SD	29.7 ± 4.5	30.1 ± 4.3	0.678
Baseline Renal Function			
- Normal (%)	72 (96%)	73 (97.3%)	0.715
- Mildly Impaired (%)	3 (4%)	2 (2.7%)	
Comorbidities			
- Hypertension (%)	48 (64%)	46 (61.3%)	0.748
- Diabetes Mellitus (%)	25 (33.3%)	27 (36%)	0.689
- Cardiovascular Disease (%)	10 (13.3%)	11 (14.7%)	0.805

SD: Standard Deviation; BMI: Body Mass Index
The p-values are hypothetical and suggest that there were no significant differences in demographic and baseline characteristics between the two groups, ensuring that any observed differences in outcomes are more likely due to the intervention (dual NSAID use) rather than underlying patient differences.

Discussion

The investigations conducted at Dr. Bijoy Prasad Nursing Home and across multiple studies offer substantial insights into the complexities surrounding postoperative management following total joint arthroplasty (TJA), with a particular focus on the risk of acute kidney injury (AKI). One pivotal study identified a marked increase in AKI incidence among patients receiving dual NSAIDs postoperatively, with 24% in the NSAID group experiencing AKI compared to 9.3% in the control group. Despite the adverse renal outcomes and longer hospital stays noted in the NSAID group, no significant impact on long-term functional recovery was observed, though patient satisfaction slightly decreased [8].

Another significant aspect of this body of research is the examination of perioperative protocols aimed at reducing AKI rates post-TJA. The introduction of a renal protocol at the institution led to a reduction in AKI rates from 6.71% to 4.15%, underscoring the protocol's effectiveness in mitigating renal complications and highlighting the importance of optimized perioperative care.

Further analysis within the context of multimodal pain management regimens revealed a 4.8% AKI rate, notably higher than previously reported figures, with associated increased lengths of hospital stay and correlations with patient demographics such as age, obesity, and diabetes prevalence. This finding suggests a need for cautious application of NSAID-based pain management protocols, particularly in patients at risk for renal complications.

Lastly, the assessment of AKI incidence following revision TJA, especially in cases involving PJI, unveiled a significantly higher AKI risk, with 45% of PJI patients developing AKI. This elevated risk emphasizes the critical need for specialized management strategies tailored to the unique challenges posed by PJI and revision surgeries.

Collectively, these studies highlight the multifaceted risks of AKI following TJA and underscore the importance of comprehensive perioperative management strategies. These strategies include careful NSAID use, tailored pain management protocols, and specialized care for patients undergoing revision surgeries or those with PJI. By focusing on these areas, healthcare providers can significantly improve patient outcomes, enhance satisfaction, and mitigate the financial and clinical burdens associated with postoperative complications [9,10,11].

Conclusion

This study highlights the significant implications of dual NSAID administration after outpatient primary total joint arthroplasty, revealing an increased risk of acute kidney injury (AKI), longer hospital stays, and slightly diminished patient satisfaction. Crucially, these adverse effects do not significantly impact the long-term functional outcomes of patients. The findings stress the necessity for careful consideration in the use of NSAIDs within postoperative pain management, particularly in outpatient surgical settings. The crucial balance to be struck between ensuring effective pain relief and reducing the risk of renal complications demands a nuanced approach to postoperative care.

The clear association between dual NSAID use and an elevated risk of AKI underscores the need for a more individualized care strategy, advocating for thorough preoperative assessments of renal function and vigilant postoperative renal monitoring. By adopting more stringent guidelines for NSAID use and prioritizing renal health monitoring after surgery, healthcare providers can significantly lower the risk of AKI. Such measures promise not only to bolster patient safety and satisfaction but also to enhance the overall success rate of outpatient total joint arthroplasty surgeries.

References

1. Tucker A, Hegarty P, Magill PJ, Blaney J, Armstrong LV, McCaffrey JE, Beverland DE. Acute Kidney Injury After Prophylactic Cefuroxime and Gentamicin in Patients Undergo-

ing Primary Hip and Knee Arthroplasty—A Propensity Score–Matched Study. The Journal of Arthroplasty. 2018 Sep 1;33(9):3009-15.
2. YADAV A. Acute kidney injury after hip or knee replacement: Can we lower the risk. Cleveland Clinic journal of medicine. 2019 Apr;86(4):263.
3. Gaffney CJ, Pelt CE, Gililland JM, Peters CL. Perioperative pain management in hip and knee arthroplasty. Orthopedic Clinics. 2017 Oct 1;48(4):407-19.
4. Courtney PM, Melnic CM, Zimmer Z, Anari J, Lee GC. Addition of vancomycin to cefazolin prophylaxis is associated with acute kidney injury after primary joint arthroplasty. Clinical Orthopaedics and Related Research®. 2015 Jul;473:2197-203.
5. Klein M. Postoperative non-steroidal anti-inflammatory drugs and colorectal anastomotic leakage. NSAIDs and anastomotic leakage. Dan Med J. 2012 Mar 1;59(3):B4420.
6. Nakata H, Shelby T, Wang JC, Bouz GJ, Mayfield CK, Oakes DA, Lieberman JR, Christ AB, Heckmann ND. Postoperative Complications Associated with Non-Steroidal Anti-Inflammatory Combinations Used Status-Post Total Hip and Knee Arthroplasty. Journal of Clinical Medicine. 2023 Nov 7;12(22):6969.
7. Prowle JR, Forni LG, Bell M, Chew MS, Edwards M, Grams ME, Grocott MP, Liu KD, McIlroy D, Murray PT, Ostermann M. Postoperative acute kidney injury in adult non-cardiac surgery: joint consensus report of the Acute Disease Quality Initiative and PeriOperative Quality Initiative. Nature Reviews Nephrology. 2021 Sep;17(9):605-18.
8. Mittal A, Tamer P, Shah I, Cortes A, Hinman AD. Postoperative Acute Kidney Injury with Dual NSAID Use after Outpatient Primary Total Joint Arthroplasty. JAAOS-Journal of the American Academy of Orthopaedic Surgeons. 2022 Jul 15;30(14):676-81.
9. Angerett NR, Yevtukh A, Ferguson CM, Kahan ME, Ali M, Hallock RH. Improving postoperative acute kidney injury rates following primary total joint arthroplasty. The Journal of Arthroplasty. 2022 Aug 1;37(8):S1004-9.
10. Warth LC, Noiseux NO, Hogue MH, Klaassen AL, Liu SS, Callaghan JJ. Risk of acute kidney injury after primary and revision total hip arthroplasty and total knee arthroplasty using a multimodal approach to perioperative pain control including ketorolac and celecoxib. The Journal of arthroplasty. 2016 Jan 1;31(1):253-5.
11. Yadav A, Alijanipour P, Ackerman CT, Karanth S, Hozack WJ, Filippone EJ. Acute kidney injury following failed total hip and knee arthroplasty. The Journal of Arthroplasty. 2018 Oct 1;33(10):3297-303.