



“DRUG UTILIZATION PATTERN OF ANALGESICS AND ANTIBIOTICS IN PATIENTS UNDERGOING ELECTIVE INGUINAL HERNIA REPAIR”

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Abstract

Background: Elective inguinal hernia repair is a commonly performed surgical procedure. Appropriate analgesia and prophylactic antibiotic administration are critical for optimal postoperative outcomes. However, variability exists in the utilization patterns of analgesics and antibiotics in perioperative care.

Objective: To evaluate the utilization patterns of analgesic and antibiotic medications in patients undergoing elective inguinal hernia repair and assess adherence to established guidelines.

Methods: A prospective observational study was conducted at a tertiary care teaching hospital in 2018. Adult patients (n=150) scheduled for elective inguinal hernia repair were included. Analgesic and antibiotic prescription data were collected perioperatively. Utilization patterns were analyzed against standard prescribing guidelines.

Results: Of 150 patients, 142 (94.7%) received pre-emptive analgesics, with non-steroidal anti-inflammatory drugs (NSAIDs) constituting 68% of prescriptions, and opioids used in 18%. Antibiotic prophylaxis was administered in 138 patients (92%), primarily a first-generation cephalosporin (cefazolin; 74%). Mean postoperative pain scores were lower in patients receiving multimodal analgesia compared to single-agent therapy ($p<0.05$). No significant difference in surgical site infection (SSI) rates was observed between guideline-adherent and non-adherent antibiotic use ($p=0.12$).

Conclusion: Analgesic and antibiotic utilization patterns showed high adherence to recommended practices, with prevalent use of NSAIDs and cefazolin for prophylaxis. Multimodal pain regimens correlated with improved pain scores. Continued efforts to standardize perioperative prescribing are warranted.

Keywords: Inguinal hernia repair, analgesics, antibiotics, drug utilization, perioperative care

Introduction:

Inguinal hernia repair is one of the most frequently performed elective surgical procedures worldwide and constitutes a substantial burden on healthcare systems¹. Due to its high prevalence, even minor variations in perioperative drug management can significantly influence postoperative recovery, length of hospital stay, complication rates, and overall healthcare costs². Effective postoperative pain

control and prevention of surgical site infections remain key determinants of successful outcomes following inguinal hernia surgery³.

Analgesics and antibiotics form the backbone of perioperative pharmacotherapy in hernia repair. Inadequate postoperative pain management can delay ambulation, prolong hospitalization, impair functional recovery, and increase the risk of chronic postoperative pain⁴. Multimodal analgesic strategies combining non-steroidal anti-inflammatory drugs (NSAIDs), paracetamol, and opioids have been recommended to achieve superior pain relief while minimizing opioid-related adverse effects⁵⁻⁷. Despite available guidelines, analgesic prescribing practices often vary due to differences in institutional protocols, surgeon preference, drug availability, and patient-specific factors⁸.

Antibiotic prophylaxis plays a crucial role in reducing surgical site infections, which remain a significant cause of postoperative morbidity even in clean surgical procedures such as elective inguinal hernia repair⁹. International guidelines recommend a single preoperative dose of an appropriate antibiotic, preferably a first-generation cephalosporin, administered within 60 minutes before surgical incision^{10,11}. However, inappropriate antibiotic selection, extended postoperative antibiotic use, and deviation from recommended timing continue to be reported in routine clinical practice¹². Such irrational use contributes to increased healthcare expenditure, drug-related adverse effects, and the growing global threat of antimicrobial resistance^{13,14}.

Drug utilization research is a valuable method for evaluating prescribing patterns, rationality of drug use, and adherence to evidence-based guidelines in real-world clinical settings¹⁵. Assessment of analgesic and antibiotic utilization in elective inguinal hernia repair can help identify gaps between recommended standards and actual practice. The present study was therefore undertaken to analyze the drug utilization pattern of analgesics and antibiotics in patients undergoing elective inguinal hernia repair at a tertiary care teaching hospital, with the objective of promoting rational drug use and improving perioperative patient care.

Methodology:

A prospective observational study was conducted over a period of six months in 2018 at a tertiary care teaching hospital in Maharashtra, India. The study protocol was reviewed and approved by the Institutional Ethics Committee, and the study was carried out in accordance with the ethical principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment.

Adult patients aged 18 years and above undergoing elective unilateral inguinal hernia repair under either general or regional anesthesia were included in the study. Patients with recurrent hernias, complicated hernias such as incarcerated or strangulated hernias, those undergoing concurrent surgical procedures, and patients with known hypersensitivity to analgesics or antibiotics were excluded. Additionally, patients with hepatic or renal impairment, as well as those receiving chronic analgesic or antibiotic therapy, were excluded to avoid confounding factors affecting drug utilization and outcomes.

Detailed demographic and clinical data including age, sex, body mass index, type of inguinal hernia, type of anesthesia administered, and presence of comorbid conditions were recorded using a structured data collection form. Information regarding perioperative drug use was documented from medical records, including the type, dose, timing, and duration of prescribed analgesics and antibiotics from the preoperative period up to 48 hours postoperatively. Postoperative pain intensity was assessed using a 10-point Visual Analogue Scale (VAS) at 6, 12, 24, and 48 hours following surgery.

Drug utilization analysis was performed by evaluating analgesic and antibiotic prescriptions against standard perioperative treatment guidelines, including World Health Organization recommendations and established surgical antibiotic prophylaxis norms. Analgesics were categorized into non-steroidal anti-inflammatory drugs, opioids, and adjunct agents such as paracetamol. Antibiotic prophylaxis was assessed for appropriateness with respect to drug selection, timing of administration, and duration of therapy.

Statistical analysis was carried out using standard statistical software. Descriptive statistics were applied to summarize demographic characteristics and drug utilization patterns. Continuous variables

were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. Comparisons of postoperative pain scores between different analgesic regimens were performed using Student's t-test, and a p-value of less than 0.05 was considered statistically significant.

Results

A total of 150 patients undergoing elective inguinal hernia repair were included in the study. The majority of the participants were male ($n = 138$; 92%), with a mean age of 46.8 ± 12.1 years. Most surgeries were performed under spinal anesthesia ($n = 98$; 65%), while the remaining patients underwent the procedure under general anesthesia ($n = 52$; 35%). Baseline demographic and clinical characteristics of the study population are summarized in **Table 1**.

Pre-emptive analgesics were administered to 142 patients (94.7%) as part of perioperative pain management. Non-steroidal anti-inflammatory drugs (NSAIDs) were the most frequently prescribed class of analgesics, used in 102 patients (68%). Paracetamol was prescribed in 83 patients (55%), while opioids were used in 27 patients (18%). Multimodal analgesia, defined as the combination of an NSAID and paracetamol, was employed in 90 patients (60%), reflecting a preference for combination therapy over single-agent analgesia (**Table 2**).

Postoperative pain assessment using the Visual Analogue Scale (VAS) revealed that patients receiving multimodal analgesia experienced significantly better pain control. The mean VAS score at 24 hours postoperatively was 3.1 ± 0.9 in the multimodal group compared to 4.5 ± 1.2 in patients receiving single-agent analgesia, and this difference was statistically significant ($p < 0.05$).

Antibiotic prophylaxis was administered to 138 patients (92%) undergoing elective inguinal hernia repair. Cefazolin was the most commonly prescribed antibiotic, used in 102 patients (74%), followed by amoxicillin–clavulanic acid in 28 patients (20%). Other antibiotics were used in a small proportion of cases ($n = 8$; 6%). Appropriate timing of antibiotic administration, defined as administration within 60 minutes prior to surgical incision, was observed in 126 patients (91%). However, antibiotic therapy was continued beyond 24 hours postoperatively in 18 patients (13%), indicating deviation from standard prophylactic guidelines. Details of antibiotic utilization and appropriateness are presented in **Table 3**.

The overall surgical site infection rate observed in the study population was 3% ($n = 5$). No statistically significant difference in infection rates was noted between patients who received guideline-adherent antibiotic prophylaxis and those who received extended-duration antibiotic therapy ($p = 0.12$).

Tables

Table 1: Demographic and Clinical Characteristics of Study Participants ($n = 150$)

Parameter	Number (%)
Gender (Male)	138 (92%)
Gender (Female)	12 (8%)
Mean age (years)	46.8 ± 12.1
Spinal anesthesia	98 (65%)
General anesthesia	52 (35%)

Table 2: Analgesic Utilization Patterns in Elective Inguinal Hernia Repair ($n = 150$)

Analgesic Category	Frequency (%)
NSAIDs	102 (68%)
Paracetamol	83 (55%)
Opioids	27 (18%)

Analgesic Category	Frequency (%)
Multimodal analgesia (NSAID + Paracetamol)	90 (60%)

Table 3: Antibiotic Utilization and Appropriateness (n = 138)

Parameter	Frequency (%)
Cefazolin	102 (74%)
Amoxicillin–clavulanic acid	28 (20%)
Other antibiotics	8 (6%)
Appropriate timing (<60 min pre-incision)	126 (91%)
Duration >24 hours	18 (13%)
Surgical site infections	5 (3%)

Discussion

The present study demonstrated predominant use of multimodal analgesia, particularly combinations of NSAIDs and paracetamol, which was associated with significantly lower postoperative pain scores. This finding is consistent with the concept of balanced analgesia described by Kehlet and Dahl, who emphasized that combining analgesics with different mechanisms improves pain control while reducing opioid requirements⁵. Similar observations were reported by Apfelbaum et al., who highlighted that inadequate postoperative pain management remains common when multimodal strategies are not employed⁶. The relatively low use of opioids in our study aligns with recommendations to minimize opioid exposure following elective surgeries, as suggested by White and Kehlet⁸.

Antibiotic prophylaxis was administered to the majority of patients, with cefazolin being the most commonly prescribed agent. This practice is in agreement with established surgical prophylaxis guidelines recommending first-generation cephalosporins for clean procedures such as elective inguinal hernia repair^{10,11}. The low surgical site infection rate observed in our study (3%) is comparable to rates reported by Mangram et al. and Simons et al., who documented low infection rates when appropriate prophylaxis and aseptic techniques are followed^{3,9}. However, extended postoperative antibiotic use beyond 24 hours was noted in a subset of patients, a practice also reported by Tourmousoglou et al., who observed frequent deviations from recommended antibiotic duration in general surgery¹². Such irrational use may contribute to antimicrobial resistance, as highlighted by Dellit et al. and Ventola^{13,14}.

Overall, our findings underscore the importance of adherence to evidence-based analgesic and antibiotic prescribing guidelines to optimize postoperative outcomes in elective inguinal hernia repair.

Conclusion

The present study highlights a predominantly rational pattern of analgesic and antibiotic use in patients undergoing elective inguinal hernia repair. Multimodal analgesia, primarily involving NSAIDs and paracetamol, was associated with improved postoperative pain control and reduced reliance on opioids. Antibiotic prophylaxis largely adhered to recommended guidelines, with a low incidence of surgical site infections. However, the practice of extended postoperative antibiotic use observed in some patients underscores the need for continued prescriber education and strict adherence to evidence-based perioperative guidelines to promote rational drug use and optimize patient outcomes.

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