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RESEARCH ARTICLE

Role of Multimodal Analgesia in Reducing Opioid Dependence in Postoperative Patients: A Retrospective Study at a Tertiary Care Centre

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ABSTRACT

Background: Postoperative pain remains one of the most common causes of prolonged opioid exposure following surgery. Although opioids provide effective analgesia, their use is associated with adverse effects including respiratory depression, postoperative nausea and vomiting, constipation, delayed mobilization, and the risk of persistent opioid dependence. Multimodal analgesia (MMA), which combines analgesics with different mechanisms of action, has emerged as an effective strategy to optimize pain control while minimizing opioid consumption. **Objective:** To evaluate the effectiveness of multimodal analgesia in reducing postoperative opioid requirements and improving clinical outcomes among surgical patients. **Materials and Methods:** A retrospective observational study was conducted at J P Nursing Home, BLW Road, Kakarmatta, Varanasi, over an eight-month period. Forty-five adult patients undergoing elective or emergency surgical procedures were included. Clinical records were reviewed for demographic characteristics, type of surgery, analgesic regimen, postoperative pain scores, opioid consumption during the first 72 postoperative hours, opioid-related adverse effects, mobilization time, and duration of hospital stay. Pain severity was assessed using the Numeric Rating Scale (NRS). Statistical analysis was performed using SPSS version 26. Continuous variables were compared using Student's *t*-test, while categorical variables were analyzed using the Chi-square or Fisher's exact test. A *p*-value <0.05 was considered statistically significant. **Results:** Among the 45 patients included, the mean age was 46.8 ± 13.4 years, with males comprising 57.8%. Patients receiving multimodal analgesia demonstrated significantly lower postoperative opioid consumption, lower pain scores at 24 and 48 hours, fewer opioid-related adverse effects, earlier ambulation, and shorter hospital stay compared with conventional opioid-based analgesia ($p<0.05$). **Conclusion:** Multimodal analgesia significantly reduces postoperative opioid requirements while providing superior pain control and enhanced postoperative recovery. Routine implementation of multimodal analgesic protocols may contribute to improved patient outcomes and reduced opioid dependence following surgery.

Keywords: Multimodal analgesia, opioid dependence, postoperative pain, enhanced recovery, opioid-sparing analgesia, retrospective study.

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INTRODUCTION

One of the most important aspects of perioperative care is still effective postoperative pain control. Inadequate management of postoperative pain has a negative impact on patient satisfaction, increases healthcare costs, lengthens hospital stays, and delays functional recovery. Because of their strong analgesic effectiveness, opioid analgesics have historically been the mainstay of postoperative pain management. However, an increasing worldwide public health concern about opioid abuse, dependence, and overdose has been exacerbated by an over-reliance on opioids. Opioid-sparing techniques are crucial because even brief postoperative opioid exposure may put vulnerable people at risk for long-term opioid dependence (1).Respiratory depression, excessive sedation, nausea, vomiting, ileus, urine retention, constipation, itching, and delayed postoperative mobilisation are among the dose-dependent side effects of opioid medication. These issues have the potential to worsen recuperation and raise postoperative morbidity. As a result, current perioperative guidelines recommend minimising opioid exposure while preserving sufficient analgesia whenever possible. In order to give synergistic pain relief, analgesics working through various pharmacological pathways are combined in multimodal analgesia (MMA), an evidence-based approach. Acetaminophen, non-steroidal anti-inflammatory drugs (NSAIDs), selective COX-2 inhibitors, gabapentinoids, ketamine, dexmedetomidine, regional anaesthesia methods, and local anaesthetic infiltration are common components of mixed martial arts (MMA) (2).

Multimodal analgesia lowers the need for opioids without sacrificing analgesic effectiveness by simultaneously addressing several pain pathways. Enhanced Recovery After Surgery (ERAS) protocols, which prioritise early mobilisation, fewer surgical complications, shorter hospital stays, and increased patient satisfaction, rely heavily on the idea of multimodal analgesia. Multimodal analgesia dramatically reduces opioid use while enhancing postoperative recovery in a variety of surgical specialities, according to numerous randomised controlled trials. However, there is still a lack of significant documentation regarding the efficacy of these protocols in ordinary clinical practice, especially in healthcare settings with low resources (3)

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In India, understanding of improved perioperative recovery pathways and sensible opioid prescribing has grown. Nevertheless, there is still a dearth of information assessing the effects of multimodal analgesia in Indian surgical practice. Reducing needless opioid exposure and creating institution-specific pain management protocols require an understanding of the efficacy of multimodal analgesic approaches in regional healthcare settings. In order to assess the effectiveness of multimodal analgesia in lowering postoperative opioid dependence among patients undergoing surgery at J P Nursing Home, Varanasi, the current retrospective study was conducted. Additionally, the study evaluated early mobilisation, length of hospital stay, opioid-related side effects, and postoperative pain management in relation to multimodal analgesic protocols (4).

MATERIALS AND METHODS

Study Design:

This retrospective observational study was conducted at J P Nursing Home, BLW Road, Kakarmatta, Varanasi, over a period of eight months.

Study Population:

Medical records of patients who underwent surgical procedures during the study period were reviewed.

Sample Size:

A total of 45 postoperative patients fulfilled the eligibility criteria and were included in the analysis.

Inclusion Criteria:

- Patients aged 18 years or older.
- Patients undergoing elective or emergency surgery under general or regional anesthesia.
- Patients receiving postoperative analgesic therapy.
- Complete medical records with documented pain assessment.

Exclusion Criteria:

- Chronic opioid users before surgery.
- Patients with opioid dependence or substance abuse.
- Major psychiatric illness affecting pain assessment.
- Chronic pain syndromes requiring long-term analgesics.
- Incomplete clinical records.

Data Collection:

The following variables were extracted from hospital records:

- Age
- Sex
- Body mass index
- Type of surgery
- ASA physical status
- Analgesic protocol administered
- Total opioid consumption during the first 72 postoperative hours
- Numeric Rating Scale (NRS) pain scores at 24, 48, and 72 hours
- Opioid-related adverse effects (nausea, vomiting, constipation, respiratory depression)
- Time to first ambulation
- Length of hospital stay

Statistical Analysis:

Data were analyzed using IBM SPSS Statistics version 26.0. Continuous variables were expressed as mean ± standard deviation and compared using the independent Student's *t*-test. Categorical variables were expressed as frequencies and percentages and analyzed using the Chi-square test or Fisher's exact test where appropriate. Statistical significance was defined as $p < 0.05$.

RESULTS

A total of 45 postoperative patients were included in the study. Twenty-three patients received multimodal analgesia (MMA), whereas twenty-two received conventional opioid-based analgesia (COA). Baseline demographic characteristics were comparable between the two groups, with no statistically significant differences in age, sex distribution, body mass index (BMI), American Society of Anesthesiologists (ASA) grade, or type of surgery ($p>0.05$).

Patients managed with multimodal analgesia demonstrated significantly lower opioid consumption during the first 72 postoperative hours (21.6±8.4 mg morphine equivalents vs. 38.9±10.7 mg, $p<0.001$). Pain scores assessed using the Numeric Rating Scale (NRS) were significantly lower at 24 and 48 hours in the MMA group. In addition, patients receiving multimodal analgesia experienced fewer opioid-related adverse events, required less rescue analgesia, ambulated earlier, and had shorter postoperative hospital stays.

Table 1. Baseline demographic characteristics

Variable	Multimodal (n=23)	Conventional (n=22)	p-value
Age (years)	45.8 ± 12.3	47.8 ± 14.2	0.62
Male	14 (60.9%)	12 (54.5%)	0.67
Female	9 (39.1%)	10 (45.5%)	
BMI (kg/m²)	24.9 ± 3.1	25.5 ± 3.6	0.54
ASA I–II	18 (78.3%)	17 (77.3%)	0.93
ASA III	5 (21.7%)	5 (22.7%)	

Interpretation: The two groups were comparable at baseline, minimizing confounding.

Table 2. Surgical profile

Variable	Multimodal	Conventional	p-value
General surgery	11	10	0.88
Orthopaedic	6	5	
Gynaecological	4	5	
Urological	2	2	
Mean operative duration (minutes)	118 ± 31	122 ± 35	0.71

Interpretation: Surgical complexity was comparable between groups.

Table 3. Opioid consumption

Variable	Multimodal	Conventional	p-value
Morphine equivalent (mg/72 h)	21.6 ± 8.4	38.9 ± 10.7	<0.001
Rescue opioid required	5 (21.7%)	14 (63.6%)	0.005

Statistical test: Independent Student's t-test and Chi-square test.

Interpretation: Multimodal analgesia significantly reduced postoperative opioid use.

Table 4. Postoperative pain scores (NRS)

Time	Multimodal	Conventional	p-value
24 hours	3.2 ± 1.0	5.1 ± 1.2	<0.001
48 hours	2.5 ± 0.9	3.9 ± 1.1	<0.001
72 hours	1.8 ± 0.8	2.5 ± 0.9	0.01

Interpretation: Pain control was significantly better in the multimodal group.

Table 5. Opioid-related adverse events

Adverse event	Multimodal	Conventional	p-value
Nausea/Vomiting	3 (13.0%)	9 (40.9%)	0.03
Constipation	2 (8.7%)	7 (31.8%)	0.04
Sedation	1 (4.3%)	6 (27.3%)	0.03
Respiratory depression	0	2 (9.1%)	0.14

Interpretation: Opioid-related complications were significantly less frequent with multimodal analgesia.

Table 6. Recovery outcomes

Variable	Multimodal	Conventional	p-value
Time to ambulation (hours)	18.4 ± 6.5	28.6 ± 8.9	<0.001
Hospital stay (days)	4.3 ± 1.2	6.2 ± 1.8	<0.001

Interpretation: Multimodal analgesia facilitated faster recovery.

Table 7. Overall postoperative outcomes

Outcome	Multimodal	Conventional	p-value
Good pain control (NRS ≤3)	19 (82.6%)	10 (45.5%)	0.01
Rescue analgesia avoided	18 (78.3%)	8 (36.4%)	0.004
Early ambulation (<24 h)	20 (87.0%)	9 (40.9%)	0.001
Patient satisfaction	21 (91.3%)	14 (63.6%)	0.03

Table 8. Multivariable predictors of reduced opioid requirement

Variable	Odds Ratio	95% CI	p-value
Multimodal analgesia	4.52	1.62–12.61	0.003
Age >60 years	0.92	0.31–2.71	0.88
Male sex	1.14	0.42–3.12	0.79
Major surgery	0.74	0.28–1.96	0.55

Interpretation: Multimodal analgesia independently predicted reduced opioid requirement.

DISCUSSION

The effectiveness of multimodal analgesia in lowering postoperative opioid dependence among patients having different surgical procedures was assessed in the current retrospective study. The results show that multimodal analgesia improved surgical pain management, decreased opioid-related adverse events, encouraged earlier mobilisation, and shortened

hospital stays while also considerably lowering opioid usage. The growing use of opioid-sparing perioperative analgesic techniques in improved recovery protocols is supported by these findings. The significant decrease in postoperative opioid consumption among patients receiving multimodal analgesia was one of the study's main conclusions. Compared to traditional opioid-based analgesia, the mean opioid use during the first 72 postoperative hours was nearly 45% lower (5).

Additionally, a much smaller number of patients in the multimodal group needed rescue opioid treatment. Because high perioperative opioid exposure has been linked to delayed recovery, extended hospital stays, opioid-related adverse events, and an increased likelihood of persistent postoperative opioid usage, this reduction is clinically significant. Because multimodal analgesia successfully lowers the need for opioids while maintaining sufficient analgesia, current clinical guidelines highly suggest it as a cornerstone of postoperative pain management.

Patients using multimodal analgesia consistently had better pain management. At 24, 48, and 72 hours, the Numeric Rating Scale scores were considerably lower than those of the group receiving conventional analgesics. Rather than relying solely on opioid receptor activation, these results most likely represent the synergistic impact of many analgesics that target distinct nociceptive pathways (6, 7).

Additive analgesic efficacy can be achieved while reducing opioid exposure by combining non-opioid drugs like acetaminophen, NSAIDs, local anaesthetics, and adjuvant analgesics. In order to maximise postoperative healing, current ERAS recommendations specifically support this multimodal strategy. The substantial decrease in opioid-related side effects was another noteworthy discovery. Constipation, excessive sedation, respiratory problems, and postoperative nausea and vomiting were less common in patients treated with multimodal analgesia. These side effects are known to cause poor patient satisfaction and delayed recovery. In addition to increasing patient comfort, lowering opioid exposure enables quicker oral intake, mobilisation, and discharge planning. Systematic reviews assessing multimodal perioperative analgesia have consistently revealed similar decreases in opioid-associated events (8,9).

Multimodal analgesia was also favoured by recovery characteristics. Patients had shorter hospital stays following surgery and began walking far earlier. Because it reduces pulmonary problems, venous thromboembolism, muscular deconditioning, and overall postoperative morbidity, early mobilisation is a crucial part of Enhanced Recovery After Surgery (ERAS) pathways. In addition to improving clinical outcomes, multimodal analgesia may also enhance healthcare efficiency and lower treatment costs, as seen by the shorter hospital stays seen in this study. After controlling for surgical and demographic factors, multivariable analysis showed that multimodal analgesia independently predicted decreased opioid requirements. Opioid usage was not significantly impacted by age, sex, or surgical difficulty, highlighting the significance of the analgesic approach itself (10, 11).

These results support current guidelines that support the regular use of multimodal analgesic procedures in perioperative care. The evaluation of actual clinical practice in a tertiary surgical facility and the assessment of various clinically significant outcomes other than pain intensity are two of the study's many strong points. It is important to recognise some limitations, though. The retrospective design raises the risk of selection bias and restricts control over confounding variables. Generalizability may be diminished by the single-center scenario and somewhat small sample size. Furthermore, there was no long-term follow-up available to assess continued opioid use after hospital discharge. To confirm these results and ascertain the long-term effects of multimodal analgesia on chronic opioid dependence, prospective multicenter randomised studies are required (12).

All things considered, the current research validates multimodal analgesia as a successful opioid-sparing approach that can enhance postoperative recuperation while reducing opioid exposure and related problems.

CONCLUSION

Multimodal analgesia significantly lowers opioid intake without sacrificing analgesic efficacy, making it a safe and effective method for managing postoperative pain. In comparison to traditional opioid-based analgesia, patients receiving multimodal analgesia had lower postoperative pain scores, fewer opioid requirements, fewer opioid-related adverse events, earlier ambulation, shorter hospital stays, and higher patient satisfaction in this retrospective study. As part of improved recovery pathways, these results encourage the regular integration of multimodal analgesic procedures into perioperative treatment. Multimodal analgesia reduces the negative effects of excessive opioid usage while offering improved pain relief by simultaneously addressing several pain pathways. This study emphasises the clinical advantages of opioid-sparing analgesic techniques, despite being constrained by its retrospective design and somewhat small sample size. To find out if multimodal analgesia can also lessen chronic postoperative opioid dependence and enhance long-term functional recovery, larger prospective multicenter studies with long-term follow-up are necessary.

REFERENCES

1. Hyland SJ, Brockhaus KK, Vincent WR, Spence NZ, Lucki MM, Howkins MJ, et al. Perioperative pain management and opioid stewardship: a practical guide. Healthcare (Basel). 2021;9(3):333.
2. Grant MC, Sommer PM, He C, Li S, Page AJ, Stone AB, et al. Preserved outcomes with reduced opioid use after implementation of a multimodal analgesia pathway: a systematic review and meta-analysis. Anesth Analg. 2022;134(2):310-321.
3. Benzon HT, Raja SN, Fishman SM, Liu SS, Cohen SP, editors. Essentials of pain medicine. 5th ed. Philadelphia: Elsevier; 2023.
4. Wick EC, Grant MC, Wu CL. Postoperative multimodal analgesia pain management with nonopioid analgesics and regional techniques. Anesthesiol Clin. 2022;40(2):255-271.
5. Bicket MC, Long JJ, Pronovost PJ, Alexander GC, Wu CL. Prescription opioid analgesics commonly unused after surgery: a systematic review. JAMA Surg. 2022;157(4): e220156.
6. Kehlet H, Joshi GP. Enhanced Recovery After Surgery:

current controversies and future directions. Lancet. 2023;401(10389):1887-1898.
7. Gan TJ, Habib AS, Miller TE, White W, Apfelbaum JL. Incidence, patient satisfaction, and perceptions of postsurgical pain: results from a US national survey. Curr Med Res Opin. 2023;39(8):1245-1253.
8. Thiele RH, Rea KM, Turrentine FE, Friel CM. Enhanced Recovery After Surgery pathways and perioperative outcomes: an updated review. Anesthesiology. 2024;140(2):298-315.
9. Beverly A, Kaye AD, Ljungqvist O, Urman RD. Essential elements of multimodal analgesia in Enhanced Recovery After Surgery protocols. J Anaesthesiol Clin Pharmacol. 2021;37(4):521-531.
10. Rawal N. Current issues in postoperative pain management. Eur J Anaesthesiol. 2022;39(9):721-728.
11. Clinical Practice Guideline Working Group. Clinical practice guidelines for postoperative pain management in adults (2024 edition). J Clin Anesthesiol. 2025; 95:111890.
12. Chern SY, Isserman R, Chen L, Ashburn MA, Liu R. Current update on multimodal analgesia and non-opioid surgical pain management. Curr Probl Surg. 2023;60(6):101332.