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Original Research Article

Comparison of Postoperative Pain Control Using Conventional Analgesics and Multimodal Analgesia

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Abstract:

Background: Effective postoperative pain management is essential for improving patient recovery, reducing hospital stay, and preventing complications. Conventional analgesic regimens often rely on single-drug therapy, which may not provide optimal pain relief and may increase side effects. Multimodal analgesia, by combining drugs with different mechanisms of action, aims to enhance analgesic efficacy while minimizing adverse effects.

Objective: To compare the effectiveness of conventional analgesics with multimodal analgesia in managing postoperative pain among patients undergoing elective surgeries.

Methods: This prospective observational study was conducted in the Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India, from November 2023 to October 2024. total of 130 patients was included, divided into two groups: 65 patients received conventional analgesics (opioids or NSAIDs alone) and 65 patients received multimodal analgesia (a combination of NSAIDs, opioids, and adjuvants). Pain intensity was assessed using the Visual Analogue Scale (VAS) at 6, 12, 24, and 48 hours postoperatively. Secondary outcomes included analgesic consumption, adverse effects, and duration of hospital stay.

Results: Patients in the multimodal group demonstrated significantly lower mean VAS scores at all time intervals compared to those in the conventional group ($p < 0.05$). Total analgesic consumption was also lower in the multimodal group. Adverse effects such as nausea, vomiting, and sedation were more common in the conventional group. Mean hospital stay was reduced in patients receiving multimodal analgesia.

Conclusion: Multimodal analgesia provided superior pain control, reduced analgesic requirements, and fewer side effects compared to conventional single-drug regimens. Incorporating multimodal strategies into postoperative pain management protocols can enhance patient comfort and recovery.

Keywords: postoperative pain, multimodal analgesia, conventional analgesics, pain management, visual analogue scale

Introduction

Postoperative pain is an inevitable consequence of surgical procedures, and inadequate pain control can significantly affect patient recovery, functional outcomes, and overall satisfaction. Uncontrolled pain may lead to delayed mobilization, impaired pulmonary function, increased risk of thromboembolic events, prolonged hospital stays, and even the development of chronic pain syndromes [1]. Therefore, effective management of postoperative pain is a critical component of perioperative care.

Traditionally, postoperative analgesia has relied on conventional single-drug regimens, including opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), or acetaminophen. While these agents are effective, each class has limitations [2]. Opioids, for instance, are highly effective in controlling moderate to severe pain but are associated with adverse effects such as nausea, vomiting, respiratory depression, constipation, and potential for dependence [2]. NSAIDs provide analgesic and anti-inflammatory effects but may cause gastrointestinal irritation, renal dysfunction, and platelet inhibition. Consequently, relying solely on a single analgesic agent may not achieve optimal pain control and can increase the incidence of side effects [3].

Multimodal analgesia is a strategy that combines two or more analgesic agents or techniques with

different mechanisms of action to enhance pain relief while minimizing adverse effects. By targeting multiple pathways in the pain cascade, multimodal regimens can provide superior analgesia at lower doses of individual drugs [4]. Techniques may include the combination of NSAIDs, opioids, local anesthetics, acetaminophen, and adjuvants such as gabapentinoids or alpha-2 agonists, as well as regional anesthesia or nerve blocks where applicable. Studies have shown that multimodal analgesia reduces opioid consumption, lowers the incidence of opioid-related side effects, and facilitates faster recovery and early mobilization [5].

Despite these advantages, the adoption of multimodal analgesia is not uniform across surgical departments, and many centers continue to rely primarily on conventional analgesic protocols. Institutional policies, surgeon preference, resource availability, and lack of standardized protocols are among the factors influencing practice patterns. Evaluating the efficacy of multimodal analgesia in real-world clinical settings is essential to provide evidence for its broader implementation [6].

This study was designed to compare the effectiveness of conventional analgesics with multimodal analgesia in managing postoperative pain among patients undergoing elective surgeries at a tertiary care center. The objectives were to assess differences in pain intensity, total analgesic consumption, incidence of adverse effects, and duration of hospital stay. By providing detailed comparative data, this study aims to inform clinical decision-making and improve postoperative pain management strategies.

Materials and Methods

Study Design And Setting: This prospective observational study was conducted in the Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India, over a period of 12 months from November 2023 to October 2024.

Sample Size and Grouping: A total of 130 patients undergoing elective surgeries were included. Patients were divided into two groups based on postoperative pain management strategy:

- Group A (Conventional Analgesics): 65 patients received standard single-drug analgesics, either opioids or NSAIDs, as per routine institutional protocol.
- Group B (Multimodal Analgesia): 65 patients received a combination of analgesics with different mechanisms, including NSAIDs, opioids, acetaminophen, and adjuvants, with or without regional anesthesia techniques.

Inclusion Criteria:

- Patients aged 18 years and above.
- Patients undergoing elective general surgical procedures.
- Patients able to understand and use the Visual Analogue Scale (VAS) for pain assessment.
- Patients providing informed written consent.

Exclusion Criteria:

- Emergency surgical procedures.
- Patients with chronic pain conditions or opioid dependence.
- Known allergy or contraindications to study medications.
- Patients with cognitive impairment or inability to report pain accurately.

Data Collection: Demographic data, type of surgery, comorbidities, duration of surgery, and baseline pain scores were recorded. Postoperative pain was assessed using the Visual Analogue Scale (VAS) at 6, 12, 24, and 48 hours postoperatively. Total analgesic consumption during the first 48 hours and any adverse effects, such as nausea, vomiting, sedation, or pruritus, were recorded. Length of hospital stay was also documented.

Pain Management Protocols:

- **Conventional group:** Single-drug therapy with opioid (tramadol or morphine) or NSAID (diclofenac or paracetamol) administered at standard intervals as needed.
- **Multimodal group:** Combination therapy including an NSAID, acetaminophen, and low-dose opioid as required. Regional analgesia (e.g., wound infiltration or peripheral nerve block) was added when applicable.

Outcome measures:

- Primary outcome: Pain intensity measured on the VAS at 6, 12, 24, and 48 hours postoperatively.
- Secondary outcomes: Total analgesic consumption, incidence of adverse effects, and duration of hospital stay.

Statistical Analysis: Data were analyzed using SPSS software. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Comparison between groups was performed using independent t-tests for continuous variables and Chi-square test for categorical variables. A p-value < 0.05 was considered statistically significant.

Results

A total of 130 patients were included in the study, with 65 patients in each group (conventional analgesics and multimodal analgesia). Baseline demographic characteristics were comparable between the groups. Postoperative pain scores, total

analgesic consumption, adverse effects, and hospital stay were analyzed to compare the efficacy and safety of the two pain management strategies. The mean age of patients was 43.5 years in the conventional group and 44.2 years in the multimodal group. Male patients slightly outnumbered females in both groups. Surgeries performed included hernia repairs, cholecystectomy, appendectomy, and thyroidectomy. Patients in the multimodal analgesia group experienced significantly lower mean VAS scores at all time points. Total analgesic consumption was lower in the multimodal group. Adverse effects such as nausea, vomiting, and sedation were more frequent in the conventional group. Patients in the multimodal group had a shorter mean hospital stay compared to the conventional group.

Table 1: Age distribution of patients

Age group (years)	Conventional (n=65)	Multimodal (n=65)	Total (n=130)	Percentage (%)
18–30	13	12	25	19.2
31–40	20	18	38	29.2
41–50	18	19	37	28.5
51–60	10	11	21	16.2
>60	4	5	9	6.9

Table 1 shows that most patients were aged between 31 and 50 years.

Table 2: Gender distribution of patients

Gender	Conventional (n=65)	Multimodal (n=65)	Total (n=130)	Percentage (%)
Male	36	37	73	56.2
Female	29	28	57	43.8

Table 2 shows a slight male predominance in both groups.

Table 3: Distribution by type of surgery

Type of surgery	Conventional (n=65)	Multimodal (n=65)
Hernia repair	20	21
Cholecystectomy	15	14
Appendectomy	12	13
Thyroidectomy	18	17

Table 3 shows the common surgical procedures in both groups.

Table 4: Postoperative pain scores (VAS)

Time post-op	Conventional (VAS, mean ± SD)	Multimodal (VAS, mean ± SD)
6 hours	5.8 ± 1.2	3.6 ± 1.0
12 hours	5.1 ± 1.1	3.1 ± 0.9
24 hours	4.3 ± 1.0	2.5 ± 0.8
48 hours	3.2 ± 0.8	1.9 ± 0.7

Table 4 shows that patients receiving multimodal analgesia had consistently lower pain scores.

Table 5: Total analgesic consumption (first 48 hours)

Group	Total opioid dose (mg)	Total NSAID dose (mg)	Total acetaminophen dose (g)
Conventional	120 ± 25	200 ± 30	–
Multimodal	65 ± 15	150 ± 25	4.0 ± 0.5

Table 5 shows reduced analgesic requirements in the multimodal group.

Table 6: Incidence of adverse effects

Adverse effect	Conventional (n=65)	Multimodal (n=65)
Nausea	15	6
Vomiting	12	4
Sedation	10	3
Pruritus	5	2
No adverse effect	23	50

Table 6 shows fewer side effects in the multimodal analgesia group.

Table 7: Duration of hospital stay

Group	Mean stay (days)	Standard deviation
Conventional	6.5	1.7
Multimodal	5.2	1.3

Table 7 shows shorter hospital stay in the multimodal group.

Table 8: Pain control effectiveness at 24 hours

Group	Patients with VAS ≤ 3	Patients with VAS > 3	Total	Percentage with adequate pain control (%)
Conventional	18	47	65	27.7
Multimodal	45	20	65	69.2

Table 8 shows the proportion of patients with adequate pain relief (VAS ≤ 3) at 24 hours.

Table 9: Analgesic rescue requirement

Group	Patients requiring rescue analgesia	Percentage (%)
Conventional	30	46.1
Multimodal	12	18.5

Table 9 shows that fewer patients in the multimodal group required additional rescue analgesia.

Table 10: Summary of outcomes

Outcome	Conventional	Multimodal
Mean VAS at 24 hours	4.3	2.5
Total opioid consumption	120 mg	65 mg
Adverse effects	Higher	Lower
Patients with adequate pain relief	27.7%	69.2%
Mean hospital stay	6.5 days	5.2 days

Table 10 provides an overall comparison of key postoperative outcomes.

Table 1 shows that most patients were aged 31–50 years. Table 2 indicates a slight male predominance. Table 3 presents the types of surgeries performed, with hernia repair and thyroidectomy being the most common. Table 4 demonstrates significantly lower VAS scores in the multimodal group at all time points. Table 5 shows reduced total analgesic consumption in the multimodal group. Table 6 indicates fewer adverse effects in the multimodal group. Table 7 shows shorter hospital stays for multimodal analgesia patients. Table 8 highlights that a higher proportion of multimodal patients achieved adequate pain control at 24 hours. Table 9 shows that fewer patients in the multimodal group required rescue analgesics. Finally, Table 10 summarizes overall superior outcomes with multimodal analgesia compared to conventional analgesics.

Discussion

Effective postoperative pain control is a cornerstone of enhanced recovery after surgery. Inadequate pain management not only causes patient discomfort but can also impair respiratory function, delay mobilization, prolong hospital stay, and increase the risk of complications. The present study compared conventional single-drug analgesia with multimodal analgesia to evaluate differences in pain control, analgesic consumption, side effects, and hospital stay [7].

Our study demonstrated that multimodal analgesia provided significantly better pain relief compared to conventional analgesics. Patients in the multimodal group had consistently lower Visual Analogue Scale (VAS) scores at 6, 12, 24, and 48 hours postoperatively [8]. At 24 hours, 69.2% of patients in the multimodal group achieved adequate pain control (VAS ≤ 3) compared to only 27.7% in the conventional group. This indicates that targeting multiple pain pathways simultaneously enhances analgesic efficacy [9].

Total analgesic consumption was significantly reduced in the multimodal group, particularly opioid requirements. Lower opioid use is clinically important because it minimizes opioid-related adverse effects such as nausea, vomiting, sedation, and respiratory depression [10]. Our results support previous evidence that multimodal strategies not only improve analgesia but also reduce the incidence of complications associated with high-dose opioids. In this study, adverse effects were notably fewer in the multimodal group, with only 15% of patients reporting nausea or vomiting, compared to nearly 41% in the conventional group [11].

The mean hospital stay was shorter in the multimodal group (5.2 days) compared to the conventional group (6.5 days), suggesting that better pain control facilitates earlier mobilization and recovery. This aligns with the principles of enhanced recovery protocols, which emphasize multimodal analgesia as a key component in reducing postoperative morbidity and length of stay [12].

The study highlights the importance of implementing multimodal analgesia in routine surgical practice. The combination of NSAIDs, acetaminophen, opioids, and adjuvants, with regional anesthesia where appropriate, allows for superior pain management while minimizing side effects. These findings are particularly relevant in resource-limited settings where optimizing patient outcomes and reducing hospital stay are priorities.

Limitations of this study include its single-center design and the lack of long-term follow-up to assess chronic pain outcomes. Future studies with larger

sample sizes and multicenter participation would provide more generalizable evidence and could explore cost-effectiveness and patient satisfaction in addition to clinical outcomes.

Conclusion

Multimodal analgesia provided superior postoperative pain control compared to conventional single-drug analgesic regimens. Patients receiving multimodal analgesia experienced lower pain scores, reduced opioid and overall analgesic consumption, fewer adverse effects, and shorter hospital stays. These findings support the adoption of multimodal strategies as a standard approach for postoperative pain management to enhance patient comfort, improve recovery, and reduce healthcare burden.

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