

IMPACT OF MULTIMODAL ANALGESIA VS TRADITIONAL OPIOIDS AFTER CARDIO THORACIC SURGERIES

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Abstract

Background: Postoperative pain management is critical in cardiac and thoracic surgery. Traditional opioid therapy (TOG) can result in higher pain scores and complications, while multimodal analgesia (MAG) may improve outcomes.

Objective: To compare the effectiveness of MAG versus TOG in reducing postoperative pain and complications.

Methods: A cross-sectional study included 96 patients (48 cardiac, 48 thoracic) at Mayo Hospital Lahore. Patients received either MAG or TOG after surgery. Pain was measured using the Visual Analog Scale (VAS), and postoperative complications were recorded. Descriptive statistics and chi-square tests were applied to analyze associations between analgesia type and outcomes.

Results: In cardiac patients, 2 MAG patients and 10 TOG patients reported VAS ≥ 4 . In thoracic patients, 2 MAG and 12 TOG patients reported VAS ≥ 4 . Postoperative complications were lower in MAG groups. Chi-square analysis showed a significant association between analgesia type and pain scores ($p < 0.05$), while age and gender were not significant.

Conclusion: Multimodal analgesia provides better postoperative pain control and fewer complications compared with traditional opioid therapy in cardiac and thoracic surgery patients.

INTRODUCTION

Cardiothoracic surgeries rank among the most complex surgical procedures in modern clinical practice. These operations include a wide range of interventions performed on the heart, lungs, and major vessels within the thoracic cavity. Procedures such as coronary artery bypass grafting, valve replacement, lung resections, and other thoracic operations remain essential for the treatment of serious cardiovascular and pulmonary diseases. Advances in surgical techniques, anesthesia, and perioperative management have improved survival

rates and surgical outcomes in patients undergoing these procedures. Despite these improvements, postoperative pain continues to remain a major concern in cardiothoracic surgery and affects the recovery and overall well-being of patients (1). Postoperative pain after cardiothoracic surgery often results from multiple factors including surgical incision, tissue trauma, rib retraction, chest tube placement, and manipulation of thoracic structures. Patients frequently report moderate to severe pain during the immediate postoperative period,

especially after procedures involving thoracotomy or sternotomy. Poorly controlled pain can lead to several adverse consequences such as impaired respiratory function, reduced mobility, delayed recovery, and prolonged hospital stay. In cardiothoracic patients, inadequate pain control also interferes with deep breathing, coughing, and early mobilization, which are essential for preventing postoperative complications such as atelectasis, pneumonia, and venous thromboembolism (2).

Although opioids remain effective in relieving pain, their use often associates with several adverse effects. Common opioid-related complications include nausea, vomiting, constipation, sedation, respiratory depression, and delayed gastrointestinal recovery. In cardiothoracic patients, excessive opioid use raises additional concerns because respiratory depression and sedation interfere with effective breathing and pulmonary rehabilitation after surgery. These complications prolong recovery, increase patient discomfort, and contribute to longer hospital stays. Increasing awareness regarding opioid-related side effects and the global concern about opioid dependence has encouraged clinicians to explore alternative approaches for postoperative pain management (3).

Multimodal analgesia has emerged as an important strategy for improving pain control while reducing reliance on opioids. This approach involves the use of multiple analgesic medications and techniques that target different pain pathways. Multimodal analgesia often combines non-opioid medications such as nonsteroidal anti-inflammatory drugs, acetaminophen, local anesthetics, regional nerve blocks, and other adjuvant therapies. Each component of the multimodal regimen acts through a different mechanism, which allows better pain relief while reducing the dose of any single medication. The combined effect improves analgesia and limits the adverse effects associated with high doses of opioids (4).

In recent years, multimodal analgesia has gained increasing attention in perioperative care, particularly in major surgeries where postoperative pain remains significant. Studies show improved pain control, reduced opioid consumption, faster recovery of physical function, and shorter hospital stays among patients who receive multimodal pain

management strategies. In cardiothoracic surgery, effective multimodal analgesia also supports early extubation, improved respiratory effort, and better participation in postoperative physiotherapy. These outcomes contribute to improved recovery and reduced postoperative complications (5).

Despite the growing interest in multimodal analgesia, traditional opioid-based analgesia continues to remain widely used in many healthcare settings. Variations in institutional protocols, availability of resources, and clinical practice patterns influence the choice of postoperative pain management strategies. In developing healthcare systems, including those in many low and middle income countries, opioid-based pain management remains common due to familiarity with traditional approaches and limited implementation of multimodal protocols. Evaluating the effectiveness of multimodal analgesia in comparison with traditional opioid therapy therefore remains important in improving perioperative care (6).

Mayo Hospital Lahore serves as one of the largest tertiary care hospitals in the region and manages a significant number of cardiothoracic surgical cases each year. Patients treated at this facility present with diverse clinical conditions and often undergo major cardiac and thoracic procedures requiring careful postoperative management. Assessing pain management approaches in this clinical setting provides valuable insight into strategies that improve recovery and patient comfort following surgery. The purpose of this research is to evaluate the impact of multimodal analgesia compared with traditional opioid-based analgesia in the postoperative period.

Methodology

Study Design

A cross sectional study design was used to assess the impact of multimodal analgesia compared with traditional opioid therapy among patients undergoing major cardiothoracic surgeries.

Study Setting

The study was conducted at Mayo Hospital Lahore, a large tertiary care teaching hospital that performs cardiac and thoracic surgical procedures and provides specialized postoperative care.

Study Duration

The study was carried out over a period of three months from December 2025 to February 2026.

Sample Size

The sample size was calculated using Cochran's formula for cross sectional studies with a 95 percent confidence level and a 10 percent margin of error.

The estimated minimum sample size was approximately 96 patients. Therefore, a total of 96 patients undergoing major cardiothoracic surgeries during the study period were included (6).

The sample was distributed according to the surgical population available during the study period:

- 48 patients undergoing major **cardiac surgeries** such as coronary artery bypass grafting and valve replacement
- 48 patients undergoing major **thoracic surgeries** such as lung resections and other thoracic procedures

Sampling

A non probability consecutive sampling technique was used. All eligible patients undergoing cardiac or thoracic surgery during the study period were approached and recruited until the required sample size was achieved.

Technique

Inclusion

- Patients aged 18 years and above
- Patients undergoing major cardiac surgeries or thoracic surgeries
- Patients receiving either multimodal analgesia or traditional opioid based analgesia after surgery
- Patients admitted in cardiothoracic surgical units during the study period

Criteria

- Patients who provided informed consent for participation

Exclusion

- Patients younger than 18 years
- Patients undergoing minor thoracic procedures
- Patients with severe cognitive impairment or inability to report postoperative pain
- Patients with incomplete medical records regarding postoperative analgesia
- Patients who refused participation

Criteria

Postoperative analgesia protocols and drug regimes

In this study, postoperative pain management followed two approaches. In the traditional opioid group (TOG), patients received **intravenous nalbuphine 10 mg every 6–8 hours as needed** along with **IV paracetamol 1 g every 8 hours** for pain control. In the multimodal analgesia group (MAG), patients were given **IV paracetamol 1 g every 8 hours and intravenous ketorolac 30 mg every 8 hours**, while **IV nalbuphine 5–10 mg** was used only for breakthrough pain. Analgesia was started after extubation in the cardiothoracic ICU and continued during the early postoperative period (5).

Data Collection Procedure

Data were collected using a structured questionnaire and patient medical records. Information regarding demographic characteristics, type of surgery, analgesic method used after surgery, and postoperative pain outcomes was recorded. Patients were assessed during the postoperative period to determine the analgesic approach used and related outcomes. Data was collected after getting approval from IRB of the institute.

Results

Table 1: Descriptive statistics of cardiac patients (N=48)

Variable	Category	Frequency	Percentage
Age	18-40	10	20.8%
	41-60	28	58.3%
	61+	10	20.8%
Gender	Male	30	62.5%

Variable	Category	Frequency	Percentage
	Female	18	37.5%
Analgesia Technique	Multimodal (MAG)	24	50%
	Traditional Opioid (TOG)	24	50%
Pain Score (VAS \geq 4)	Yes	12	25%
	No	36	75%
Postoperative Complications	Yes	8	16.7%
	No	40	83.3%

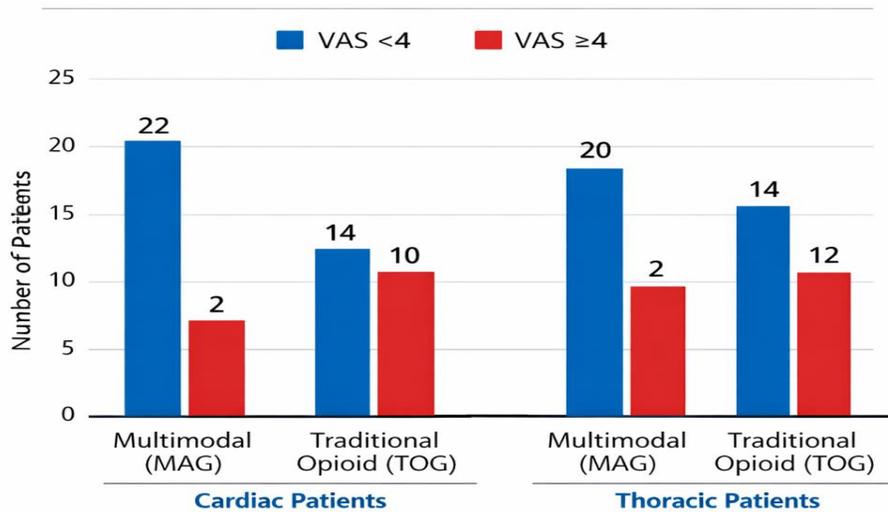
Table 2: Descriptive statistics of thoracic patients

Variable	Category	Frequency	Percentage
Age	18-40	12	25%
	41-60	26	54.2%
	61+	10	20.8%
Gender	Male	28	58.3%
	Female	20	41.7%
Analgesia Technique	Multimodal (MAG)	22	45.8%
	Traditional Opioid (TOG)	26	54.2%
Pain Score (VAS \geq 4)	Yes	14	29.2%
	No	34	70.8%
Postoperative Complications	Yes	10	20.8%
	No	38	79.2%

Impact of Analgesia on Postoperative Pain

Surgery Type	Analgesia	VAS <4	VAS ≥4	Total
Cardiac	MAG	22	2	24
Cardiac	TOG	14	10	24
Thoracic	MAG	20	2	22
Thoracic	TOG	14	12	26

Postoperative Pain: MAG vs TOG



Multimodal (MAG) shows Better Pain Control,

Discussion

This study examined the effect of multimodal analgesia (MAG) compared with traditional opioid therapy (TOG) on postoperative pain in cardiac and thoracic surgery patients. In cardiac patients, 50% received MAG and 50% received TOG. Only 2 patients in the MAG group reported moderate-to-severe pain (VAS ≥4), compared with 10 patients in the TOG group. Similarly, among thoracic patients, MAG was used in 22 patients and TOG in 26. Moderate-to-severe pain occurred in 2 MAG patients versus 12 TOG patients. Postoperative complications

were also lower in MAG groups for both surgery types, indicating better overall outcomes (7, 8). These results are consistent with studies showing that combining non-opioid analgesics with limited opioid use improves pain control. Multimodal analgesia reduces overall opioid requirements and decreases the incidence of opioid-related side effects while maintaining effective pain relief. In cardiac surgery, better pain control can improve early recovery and reduce intensive care duration. In thoracic surgery, effective analgesia is critical for maintaining adequate lung function and minimizing complications, and MAG was associated with fewer adverse events in our study (9, 10).

Demographic factors such as age and gender did not show a significant association with analgesia type or postoperative pain, suggesting that the choice of analgesia is the main determinant of outcomes. Overall, this study demonstrates that multimodal analgesia provides superior pain management, lowers postoperative complications, and reduces reliance on opioids compared with traditional opioid therapy in both cardiac and thoracic surgery patients (11).

Limitations

This study was conducted at a single center with a relatively small sample size, which may limit the generalizability of the findings. Pain assessment relied on self-reported Visual Analog Scale scores, which are subjective and may vary between patients. Additionally, the study focused only on early postoperative outcomes and did not evaluate long-term pain control, complications, or patient satisfaction.

Conclusion

Multimodal analgesia (MAG) provides superior postoperative pain control compared with traditional opioid therapy (TOG) in both cardiac and thoracic surgery patients. MAG was associated with lower pain scores, fewer patients experiencing moderate-to-severe pain, and slightly reduced postoperative complications, indicating it is the more effective analgesia approach.

Recommendations

Multimodal analgesia should be adopted as the standard postoperative pain management protocol for cardiac and thoracic surgeries. Larger, multicenter studies are recommended to confirm these results and assess long-term outcomes. Training healthcare staff on multimodal analgesia protocols can further improve patient recovery and overall care quality.

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