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Evaluating The Efficacy Of Multimodal Analgesia Versus Conventional Opioid Based Analgesia For Postoperative Pain Management In Orthopedic Surgeries.

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ABSTRACT

Effective pain management is critical in orthopedic surgeries to enhance patient outcomes and satisfaction. This study compared multimodal analgesia (MMA) with conventional opioid-based analgesia. Forty patients undergoing elective orthopedic procedures were randomly divided into two groups: Group A (MMA) and Group B (opioid-based analgesia). Postoperative pain scores, opioid consumption, side effects, mobilization time, hospital stay duration, and patient satisfaction were evaluated. MMA significantly reduced postoperative pain scores ($p<0.001$), opioid consumption (24.3 mg vs. 48.6 mg, $p<0.001$), sedation incidence (5% vs. 35%, $p=0.02$), mobilization time (16.5 hours vs. 22.8 hours, $p<0.001$), and hospital stay (4.2 days vs. 5.7 days, $p<0.001$). Patient satisfaction was higher in MMA (8.9 vs. 7.2, $p<0.001$). MMA provides superior analgesia with reduced opioid use, side effects, improved patient satisfaction, and better clinical outcomes in orthopedic surgeries. Adoption of MMA protocols is recommended.

Keywords: Multimodal analgesia, Orthopedic surgery, Postoperative pain, opioid analgesia.

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INTRODUCTION

Postoperative pain management remains a significant clinical challenge in orthopedic surgeries, influencing patient outcomes, satisfaction, and recovery duration. Traditional analgesic methods, primarily opioid-based monotherapy, often result in inadequate pain relief, significant side effects, and the potential risk of dependence and tolerance [1]. Consequently, there has been an increasing shift toward multimodal analgesia (MMA)—the combination of analgesic drugs with different mechanisms of action—to achieve enhanced analgesic efficacy, reduce opioid consumption, and minimize adverse effects [2].

Multimodal analgesia typically involves the use of opioids in conjunction with non-opioid analgesics such as NSAIDs, local anesthetics, and adjunctive therapies including regional anesthesia techniques2,3. Clinical evidence suggests that MMA can effectively reduce pain intensity, lower opioid consumption, decrease side effects such as nausea and sedation, and enhance patient satisfaction and recovery outcomes following various surgical interventions [2, 3].

Despite the growing evidence supporting MMA, limited data exist specifically comparing its efficacy and safety to conventional analgesic protocols in orthopedic procedures. Hence, this study aims to prospectively evaluate the clinical efficacy, safety, and patient satisfaction of MMA compared with traditional opioid-based analgesia in patients undergoing orthopedic surgery, providing insight into optimized postoperative pain management practices.

METHODOLOGY

This prospective, comparative, observational study was conducted at the Department of Orthopedics of a tertiary care hospital over a period of 12 months (January 2023–December 2023). Ethical clearance was obtained from the institutional ethics committee, and written informed consent was obtained from all participants prior to enrollment in the study.

The study included 40 patients aged between 18 and 65 years who underwent elective orthopedic surgeries, including fracture fixation, arthroplasty, and other elective procedures under general anesthesia. Patients were divided into two groups of 20 each through simple randomization: Group A received multimodal analgesia (a combination of NSAIDs, acetaminophen, local anesthetics, and minimal opioids), and Group B received conventional opioid-based analgesia alone.

Preoperative data collection involved demographic characteristics, detailed medical history, and baseline pain assessment using the Visual Analog Scale (VAS). Intraoperative management, including anesthesia and analgesic administration, was standardized according to group allocation. Postoperative pain was assessed at predefined intervals (2, 6, 12, 24, and 48 hours postoperatively). Secondary outcomes evaluated included opioid consumption, incidence of side effects (nausea, vomiting, sedation, respiratory depression), time to first mobilization, patient satisfaction scores, and hospital stay duration.

analysis was performed using SPSS version 23. Continuous variables were analyzed using Student's t-test or Mann-Whitney U test, depending on the data distribution, and categorical variables were assessed using Chi-square or Fisher's exact test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic Characteristics

Parameters	Group A (n=20)	Group B (n=20)	p-value
Age (years, mean±SD)	38.4±12.3	39.1±10.9	0.82
Gender (M/F)	12/8	11/9	0.75
BMI (kg/m^2, mean±SD)	25.2±3.8	24.9±4.1	0.81

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Graph 1: Age wise distribution

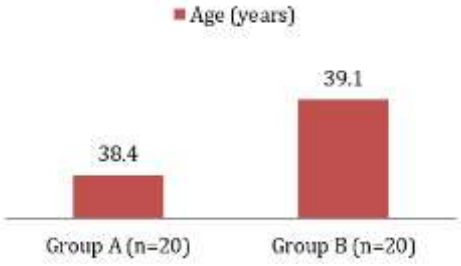

Table 2: Postoperative Pain Scores (VAS)

Time Interval	Group A (mean±SD)	Group B (mean±SD)	p-value
2 hours	3.1±1.2	5.4±1.5	<0.001
6 hours	2.8±1.1	4.9±1.3	<0.001
12 hours	2.3±0.9	4.1±1.0	<0.001
24 hours	1.8±0.7	3.3±0.8	<0.001
48 hours	1.2±0.6	2.5±0.7	<0.001

Graph 2: Postoperative Pain Scores (VAS)

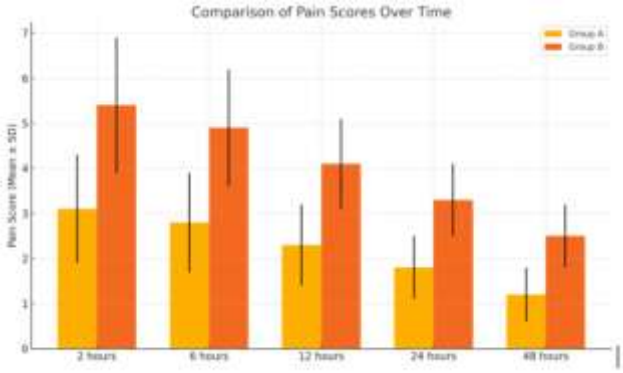

Table 3: Opioid Consumption and Side Effects

Parameters	Group A (n=20)	Group B (n=20)	p-value
Total opioid use (mg)	24.3±5.4	48.6±7.9	<0.001
Nausea (%)	2 (10%)	6 (30%)	0.12
Vomiting (%)	1 (5%)	5 (25%)	0.08
Sedation (%)	1 (5%)	7 (35%)	0.02
Respiratory depression (%)	0 (0%)	2 (10%)	0.47

Graph 3: Opioid Consumption and Side Effects

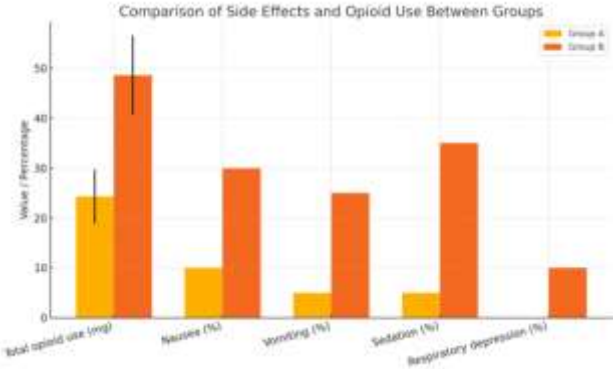

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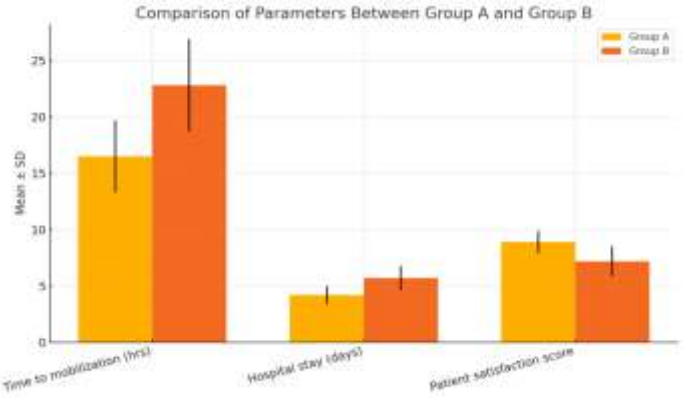
Table 4: Clinical Outcomes and Patient Satisfaction

Parameters	Group A (mean±SD)	Group B (mean±SD)	p-value
Time to mobilization (hours)	16.5±3.2	22.8±4.1	<0.001
Hospital stay (days)	4.2±0.8	5.7±1.1	<0.001
Patient satisfaction score	8.9±1.0	7.2±1.3	<0.001

Graph 4: Clinical Outcomes and Patient Satisfaction



DISCUSSION

The results of this study clearly demonstrated the superiority of multimodal analgesia (MMA) over conventional opioid-based analgesia in orthopedic surgeries. Patients who received MMA reported significantly lower postoperative pain scores across all assessment intervals compared to those receiving conventional analgesia. These findings align with prior literature highlighting the efficacy of combining analgesics with different mechanisms of action to provide superior pain relief [4-6].

A significant reduction in opioid consumption was observed in the multimodal analgesia group, supporting the hypothesis that a multimodal approach effectively reduces opioid requirements. Lower opioid consumption corresponded with fewer opioid-related adverse effects, including sedation, nausea, and vomiting, although only sedation reached statistical significance. The absence of respiratory depression in the MMA group underscores the safety advantage of this analgesic approach [7-11].

Patients in the MMA group experienced notably quicker postoperative mobilization, which can be attributed to better pain control and reduced sedation [12]. Early mobilization is crucial in orthopedic patients to prevent complications such as deep vein thrombosis, pulmonary embolism, and joint stiffness. Additionally, shorter hospital stays were noted among MMA patients, which is clinically significant for patient recovery and healthcare resource utilization [13-15].

Patient satisfaction scores were significantly higher in the MMA group, reflecting improved pain management and fewer side effects. High patient satisfaction is important for overall surgical outcomes and patient compliance with postoperative rehabilitation protocols. These results emphasize the need for wider adoption of MMA protocols in orthopedic surgical practices to enhance patient experiences and optimize clinical outcomes.

CONCLUSION

MMA provides superior analgesia with reduced opioid use, side effects, improved patient satisfaction, and better clinical outcomes in orthopedic surgeries. Adoption of MMA protocols is recommended.

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