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Opioid-Sparing Analgesic Protocols in Postoperative Pain: A Retrospective Study

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ABSTRACT

Background: Postoperative pain management remains a critical component of surgical care, with opioids traditionally serving as the mainstay of analgesia. **Objective:** To compare the effectiveness of opioid-sparing analgesic protocols with conventional opioid-based analgesia in terms of postoperative pain control, opioid consumption, recovery outcomes, and complications. **Study Design:** Retrospective comparative study. **Place and Duration of Study:** The study was conducted at Allied Hospital Faisalabad from June, 2025 November, 2025. **Methodology:** A total of 125 patients aged 18–70 years who underwent elective surgical procedures were included. Patients were divided into two groups based on analgesic protocol: opioid-sparing and conventional opioid-based analgesia. Data were retrieved from medical records, including demographic variables, postoperative pain scores (VAS), total opioid consumption within 24 hours, time to mobilization, length of hospital stay, and opioid-related complications. Data were analyzed using SPSS version 26. **Results:** The mean postoperative VAS score at 24 hours was significantly lower in the opioid-sparing group (3.2 ± 1.1) compared to the conventional group (4.5 ± 1.3) ($p < 0.001$). Total opioid consumption was also significantly reduced in the opioid-sparing group (18.6 ± 6.4 mg vs 32.8 ± 8.7 mg, $p < 0.001$). Patients receiving opioid-sparing analgesia demonstrated earlier mobilization (14.2 ± 5.6 vs 20.5 ± 7.3 hours, $p = 0.002$) and shorter hospital stay (3.1 ± 1.2 vs 4.6 ± 1.5 days, $p = 0.001$). **Conclusion:** Opioid-sparing analgesic protocols provide superior pain control, reduce opioid requirements, enhance recovery, and minimize complications compared to conventional opioid-based analgesia.

INTRODUCTION

Uncontrolled postoperative pain is a major issue in surgical care, which is linked with a slow rate of recovery, length of stay and low patient satisfaction [1]. Opioids used to be the mainstay of post surgery analgesia since they are effective painkillers. Nevertheless, the growth of the awareness of opioid-associated side effects, such as respiratory depression, nausea, constipation, sedation, and the predisposition to dependency and misuse, has cast doubt on their regular application [2]. The increased incidence of opioid related complications in the world has increased the necessity of safer and more effective pain management methods. Within recent years, opioid-sparing analgesic guidelines have become a major part of the contemporary perioperative practice [3]. The goals of these protocols are to reduce the use of opioids and ensure sufficient management of pain with the use of multimodal analgesia. This is the method in which a combination of non-opioid medications and methods is used, such as nonsteroidal anti-inflammatory drugs, acetaminophen, local anaesthetics, regional nerve blocks, and adjuvant agents like gabapentinoids and ketamine [4]. Multimodal approaches increase analgesic efficacy and decrease the use of opioids by acting upon alternative pathways of pain. Enhanced recovery after surgery (ERAS) initiatives have been interconnected with the introduction of opioid-sparing protocols, as they aim at improving the outcome of the perioperative care and speeding up patient recovery [5]. It has been shown that opioid-sparing strategies would have a significant impact on the reduction of opioid use, a

decrease in the number of opioid-associated side effects, and an increase in early mobilisation and functional recovery. Moreover, these protocols are both clinically and economically advantageous, as they lead to lower health care costs and reduced hospitalisation [6].

Although such benefits exist, there is variation in the implementation and success of opioid-sparing methods across operating environments. Some factors that affect outcomes include the nature of the surgery, patient factors, the presence of regional anaesthesia knowledge, and institutional guidelines [7]. Additionally, it is still possible to question the sufficiency of pain management in conditions of minimising opioid use, especially in significant surgical operations. Patient-centred care is another important factor in the success of opioid-sparing protocols [8]. The different perceptions of pain, psychological aspects and comorbidities among individuals require individual approaches to analgesia. Preoperative counselling, expectation management, and the participation of multidisciplinary teams comprising anesthesiologists, surgeons, and pain specialists are necessary to achieve the best possible results [9]. The use of patient-reported outcome measures would also contribute to assessing the effectiveness of these protocols and to creating individual treatment plans. Postoperative pain has been a burning issue both to the anaesthetists and the patients, but Surgical patients tend to have poor control of the pain [10]. Postoperative pain occurs in up to 80% of patients whose pain is not adequately relieved. Lack of adequate pain management during postoperative care is linked with slow physical recovery, low patient satisfaction, and high risk of developing chronic pain [11]. Proper analgesia after surgery enables the patient to rehabilitate much faster and minimises unfavourable results. Opioids are used in pain management; according to recent research, 89.6% of patients receive opioid therapy after surgery [12]. Nevertheless, adverse events associated with opioid use include postoperative nausea and vomiting (PONV), sedation, dizziness, pruritus, urinary retention, and respiratory depression, which are known as opioid-related adverse events [13]. In 2021, drug overdoses were cited as the cause of over 100000 deaths in the United States, and more than 75000 were caused by opioids [14].

Objective

To compare the effectiveness of opioid-sparing analgesic protocols with conventional opioid-based analgesia in terms of postoperative pain control, opioid consumption, recovery outcomes, and complications.

METHODOLOGY

This retrospective comparative study was conducted at Allied Hospital Faisalabad from June, 2025 November, 2025. The study used a total of 125 patients. The sampling method applied was a non-probability consecutive sampling technique. The reviews involved medical records of adult patients (18-70 years) who underwent elective surgical operations under general or regional anaesthesia. The patients were separated into two categories according to the postoperative analgesic protocol recorded in their history: patients who had an opioid-sparing analgesic protocol and patients who had traditional opioid-based analgesia. The patients who had chronic use of opioids, were severely impaired with hepatic or renal impairment, substance abusers, or had incomplete medical history were excluded.

Data Collection

Hospital files were searched to find relevant patient records after getting clearance of the institutional ethical review committee. Demographic information was collected, including age, gender, body mass index, and comorbidities. The medical records included details on the analgesic protocol used, postoperative pain scores, the total amount of opioids consumed within 24 hours, time to mobilization, length of hospital stay and opioid related side effects like nausea, vomiting, sedation and respiratory depression, which were extracted using a structured proforma.

Data Analysis

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables such as age, pain scores, opioid consumption, and hospital stay were presented as mean ± standard deviation, while categorical variables such as gender, comorbidities, type of analgesic protocol, and adverse effects were presented as frequencies and percentages. Independent sample t-test was applied to compare mean pain scores, opioid consumption, and hospital stay between the two groups. Chi-square test was used to compare categorical variables. A p-value of ≤0.05 was considered statistically significant.

RESULTS

Data were collected from 125 patients, with 62 in the opioid-sparing group and 63 in the conventional opioid group. The mean age was comparable between groups (45.2 ± 12.9 years vs 46.4 ± 13.5 years), with similar age ranges. Gender distribution was also nearly identical, with males comprising 54.8% and 54.0% in the opioid-sparing and conventional groups, respectively. The mean BMI was comparable (26.8 ± 4.3 vs 27.1 ± 4.6), with a similar distribution across BMI categories. Comorbidities were present in 46.8% of the opioid-sparing group and 49.2% of the conventional group. Likewise, the prevalence of hypertension (33.9% vs 36.5%) and diabetes mellitus (30.6% vs 33.3%) was similar.

Table 1

Baseline Demographic and Clinical Characteristics (n = 125)

Variable	Category	Opioid-Sparing (n = 62)	Conventional Opioid (n = 63)
Age (years)	Mean ± SD	45.2 ± 12.9	46.4 ± 13.5
	Range	19 – 70	20 – 72
Gender	Male	34 (54.8%)	34 (54.0%)
	Female	28 (45.2%)	29 (46.0%)
BMI (kg/m^2)	Mean ± SD	26.8 ± 4.3	27.1 ± 4.6
	<25	18 (29.0%)	16 (25.4%)
	25–29.9	27 (43.5%)	29 (46.0%)
	≥30	17 (27.5%)	18 (28.6%)
Comorbidities	None	33 (53.2%)	32 (50.8%)
	Present	29 (46.8%)	31 (49.2%)
Hypertension	Yes	21 (33.9%)	23 (36.5%)
Diabetes Mellitus	Yes	19 (30.6%)	21 (33.3%)

At 6 hours, the mean VAS score was 3.8 ± 1.2 compared to 5.1 ± 1.4 in the conventional group (p < 0.001). Similarly, at 12 hours, scores were 3.4±1.1 versus 4.8±1.3 (p<0.001), and at 24 hours, 3.2 ± 1.1 versus 4.5 ± 1.3 (p<0.001). In addition, total opioid consumption was significantly lower in the opioid-sparing group (18.6 ± 6.4 mg) compared to the conventional group (32.8 ± 8.7 mg), with a wider range observed in the conventional group (p < 0.001).

Table 2

Postoperative Pain Scores and Opioid Consumption (n=125)

Variable	Category	Opioid-Sparing (n = 62)	Conventional Opioid (n = 63)	p-value
VAS Score (6 hrs)	Mean ± SD	3.8 ± 1.2	5.1 ± 1.4	<0.001
VAS Score (12 hrs)	Mean ± SD	3.4 ± 1.1	4.8 ± 1.3	<0.001
VAS Score (24 hrs)	Mean ± SD	3.2 ± 1.1	4.5 ± 1.3	<0.001
Opioid Consumption (mg)	Mean ± SD	18.6 ± 6.4	32.8 ± 8.7	<0.001
	Range	8 – 35	15 – 55	

The mean time to mobilization was shorter (14.2 ± 5.6 hours vs 20.5 ± 7.3 hours, p = 0.002). A greater proportion of patients in the opioid-sparing group mobilized within 12 hours (40.3% vs 19.0%, p = 0.01). Similarly, the mean hospital stay was shorter in the opioid-sparing group (3.1 ± 1.2 days vs 4.6 ± 1.5 days, p = 0.001), with more patients discharged within 3 days (58.1% vs 28.6%, p = 0.002).

Table 3

Functional Recovery Outcomes (n = 125)

Variable	Category	Opioid-Sparing (n = 62)	Conventional Opioid (n = 63)	p-value
Time to Mobilization (hours)	Mean ± SD	14.2 ± 5.6	20.5 ± 7.3	0.002
	≤12 hours	25 (40.3%)	12 (19.0%)	0.01
	>12 hours	37 (59.7%)	51 (81.0%)	
Length of Hospital Stay (days)	Mean ± SD	3.1 ± 1.2	4.6 ± 1.5	0.001
	≤3 days	36 (58.1%)	18 (28.6%)	0.002
	>3 days	26 (41.9%)	45 (71.4%)	

The incidence of nausea and vomiting was 21.0% compared to 44.4% in the conventional group (p = 0.006). Sedation was also less frequent (14.5% vs 28.6%, p = 0.048). Although respiratory depression was lower in the opioid-sparing group (3.2% vs 7.9%), the difference was not statistically significant (p = 0.27). Pruritus was significantly less common in the opioid-sparing group (8.1% vs 22.2%, p = 0.03).

Table 4

Postoperative Complications (n = 125)

Variable	Category	Opioid-Sparing (n = 62)	Conventional Opioid (n = 63)	p-value
Nausea / Vomiting	Yes	13 (21.0%)	28 (44.4%)	0.006
	No	49 (79.0%)	35 (55.6%)	
Sedation	Yes	9 (14.5%)	18 (28.6%)	0.048
	No	53 (85.5%)	45 (71.4%)	
Respiratory Depression	Yes	2 (3.2%)	5 (7.9%)	0.27
	No	60 (96.8%)	58 (92.1%)	
Pruritus	Yes	5 (8.1%)	14 (22.2%)	0.03
	No	57 (91.9%)	49 (77.8%)	

DISCUSSION

This research compared the efficacy of opioid-sparing analgesic regimens with standard opioid-based analgesia in the post-operative patient population. The results showed that opioid sparing strategies offered a significant improvement in pain management, reduced the use of opioids, resulted in early recovery and reduced the occurrence of opioid-related adverse effects. The findings underscore the growing importance of multimodal analgesia in contemporary perioperative care and justify its routine use in the clinic. The primary demographic and clinical data for the two patient groups were similar, and the differences in outcomes were unlikely to be confounded. This enhances the internal validity of the study and indicates that variations in postoperative outcomes mainly lie in the type of analgesic protocol used. Closely related results have been presented in earlier studies, in which similar baseline features were used to ensure the validity of comparisons between intervention groups [15].

One of the most important results of the present research was that the postoperative pain scores in the opioid-sparing group were significantly lower at several time intervals. This implies that multimodal analgesia would be able to effectively stimulate various areas of the pain pathways, leading to excellent control of pain as opposed to an opioid-only approach [16]. The study findings are also supported by previous studies that found that the use of non-opioid analgesics plus regional methods is better at analgesia and patient comfort. Besides enhanced pain management, consumption of opioids was highly decreased in the opioid-sparing group. This has clinical significance because the exposure to opioids is reduced, which will reduce the likelihood of adverse outcomes and possible dependence [17]. The past research indicated a consistent reduction in opioid needs when using opioid-sparing regimes with no adverse effect on analgesia, which supported the acquired findings of the current study. The researchers also proved better functional outcomes of opioid-sparing analgesia patients due to an earlier mobilisation and a reduction in the length of stay [18]. Early mobilisation can be one of the most significant factors in minimising postoperative complications and improving overall recovery. These results are in line with the enhanced recovery after surgery (ERAS) guidelines, which focus on the reduction of opioid use to promote a quicker recovery and release.

Moreover, in the opioid-sparing group, the rates of opioid-related events, including nausea, vomiting and sedation had reduced considerably. These are the negative outcomes of opioid-based analgesia and may adversely affect patient satisfaction and recovery [19]. These complications reduced in the present study are in line with other studies in the past that have indicated that multimodal analgesia is more tolerable and lessens the morbidity in postoperative patients. Regardless of these positive results, no statistically significant difference was observed in respiratory depression between the two groups, although the number of incidences was lower in the opioid-sparing group. This can be attributed to the relatively low overall incidence of this complication, which limits the statistical power to detect a significant

difference. However, opioid-sparing strategies remain the trend [20].

Limitations: The study is associated with several limitations that must be considered when interpreting the results. As a retrospective study, it relied on the completeness/accuracy of medical records, which could introduce bias and make it difficult to control data quality. The research was conducted at a single centre, and the sample size was relatively small (125 patients), which may limit the generalizability of the results to larger populations. Anaesthetic techniques, surgeons' personal styles, and variability in surgical practices could not be completely standardised and might affect outcomes. Moreover, pain measurement relied on documented VAS scores, which are subjective and may differ among patients. The chronic pain and long-term opioid use were not considered, which restricted the measurement of the long-term advantage of opioid-sparing protocols.

CONCLUSION

Opioid-sparing analgesic protocols were associated with improved postoperative pain control, reduced opioid consumption, faster functional recovery, and a lower incidence of opioid-related adverse effects compared to conventional opioid-based analgesia. These findings support the effectiveness and safety of multimodal analgesia and highlight its role as a preferred approach in postoperative pain management.

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