

## THE ROLE OF ANAESTHETIC TECHNIQUES IN REDUCING PERIOPERATIVE OPIOID CONSUMPTION: AN OBSERVATIONAL STUDY IN MAJOR SURGERIES

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### Abstract

**Background:** Postoperative pain management is crucial in surgical care, influencing recovery and patient satisfaction. The choice of anesthesia can significantly affect perioperative opioid consumption, which is pivotal in the current context of opioid overuse and associated complications. **Objective:** This study aims to compare opioid consumption across different anesthesia techniques in patients undergoing major surgeries. **Materials and Methods:** In this observational study, we evaluated 100 patients categorized into three groups based on the anesthesia technique: General Anesthesia (40 patients), Regional Anesthesia (30 patients), and a Combination of Techniques (30 patients). We measured total opioid consumption during the perioperative period as the primary outcome. **Results:** The average opioid consumptions were 120 mg, 80 mg, and 100 mg for General Anesthesia, Regional Anesthesia, and Combination of Techniques, respectively. Statistical analysis indicated that opioid consumption was significantly lower in patients receiving Regional Anesthesia compared to those under General Anesthesia ( $p < 0.05$ ). The Combination of Techniques resulted in an intermediate level of opioid use, suggesting its potential benefits over General Anesthesia. **Conclusion:** The study demonstrates that Regional Anesthesia significantly reduces opioid consumption in the perioperative period compared to General Anesthesia, with Combination Techniques also offering a reduction, though less pronounced than Regional alone. These findings support the consideration of anesthesia type in the strategic planning of perioperative pain management.

## INTRODUCTION

The management of postoperative pain remains a critical challenge in the field of surgery, with opioids being the cornerstone for pain relief.<sup>[1,2]</sup> However, the escalating rates of opioid-related complications, including dependency and overdose, have prompted a reevaluation of perioperative pain management strategies.<sup>[3]</sup> Anesthesia plays a pivotal role in this context, as the choice of anesthesia technique can significantly influence both the immediate postoperative pain levels and the subsequent need for opioid analgesics.<sup>[4]</sup>

Recent advancements in anesthesia have diversified the options available, ranging from traditional general anesthesia to regional techniques and

innovative combinations thereof.<sup>[5]</sup> General anesthesia, while effective for a wide range of surgical procedures, often results in significant opioid requirements postoperatively.<sup>[6,7]</sup> In contrast, regional anesthesia techniques, such as nerve blocks and spinal or epidural anesthesia, can provide targeted pain relief, potentially reducing the need for systemic opioids.<sup>[8]</sup>

This observational study seeks to empirically evaluate the impact of different anesthesia techniques on opioid consumption in patients undergoing major surgeries. By comparing general anesthesia, regional anesthesia, and a combination of techniques, this research aims to provide evidence-based insights that could influence clinical practices towards optimizing pain management while minimizing opioid use.

## MATERIALS AND METHODS

**Study Design and Setting:** This observational study was conducted at the Government Medical College, Ananthapuram, a tertiary care institution serving a diverse population. The study period spanned from July 2022 to December 2022. The research was approved by the Institutional Review Board of Government Medical College, Ananthapuram, with all patients providing informed consent prior to their inclusion in the study.

**Participants:** A total of 100 adult patients scheduled for elective major surgeries were consecutively enrolled in the study. Inclusion criteria included patients aged 18 years and older who were undergoing surgeries expected to last more than two hours. Patients were excluded if they had known allergies to the study medications, chronic opioid use, or contraindications to regional anesthesia.

**Anesthesia Techniques:** Patients were allocated to one of three anesthesia technique groups based on the anesthesiologist's discretion and the specific surgical procedure:

**General Anesthesia Group:** Patients received a standard general anesthesia regimen.

**Regional Anesthesia Group:** Patients received regional anesthesia techniques such as spinal, epidural, or nerve blocks, either solely or as the primary method of anesthesia.

**Combination Techniques Group:** Patients received a combination of general and regional anesthesia techniques.

**Data Collection:** Data on opioid consumption were collected from the anesthesia record and postoperative nursing records. Total opioid consumption in the perioperative period (defined as the time from induction of anesthesia to 24 hours postoperatively) was calculated and converted into morphine milligram equivalents (MME) for standardization.

**Statistical Analysis:** Descriptive statistics were used to summarize the data. Differences in opioid consumption among the three groups were analyzed

using ANOVA, followed by post hoc comparisons where appropriate. A p-value of less than 0.05 was considered statistically significant. All analyses were performed using statistical software SPSS version 26.

### Ethical Considerations

The study was conducted in accordance with ethical guidelines and standards. Informed consent was obtained from all participants. The study protocol was reviewed and necessary prior permissions taken from concerned authorities.

## RESULTS

The study included 100 patients undergoing major surgeries, categorized by the type of anesthesia received. The distribution of anesthesia techniques was as follows: General Anesthesia (40 patients), Regional Anesthesia (30 patients), and a Combination of Techniques (30 patients). [Table 2] Opioid consumption during the perioperative period was measured across the different groups. Patients receiving General Anesthesia had an average opioid consumption of 120 mg. In contrast, those administered Regional Anesthesia had a significantly lower average consumption, at 80 mg. Patients under Combination Techniques had an intermediate average consumption of 100 mg. [Table 3]

Statistical analysis revealed significant differences in opioid consumption between the groups. Patients who received Regional Anesthesia had significantly lower opioid consumption compared to those who received General Anesthesia ( $p < 0.05$ ). Those treated with a Combination of Techniques displayed an opioid consumption level that was intermediate between the other two groups, suggesting a potential benefit over General Anesthesia but less effectiveness compared to Regional Anesthesia alone. [Table 4]

These findings underscore the impact of anesthesia technique on opioid consumption in the perioperative setting, highlighting the potential of Regional Anesthesia to reduce the need for opioids in major surgeries

**Table 1: Study Design Overview**

| Parameter          | Details                                       |
|--------------------|---|
| Sample Size        | 100 patients                                  |
| Study Type         | Observational                                 |
| Variables Measured | Types of anesthesia, Total opioid consumption |

**Table 2: Anesthesia Techniques and Patient Distribution**

| Anesthesia Technique      | Number of Patients |
|---------------------------|--------------------|
| General Anesthesia        | 40                 |
| Regional Anesthesia       | 30                 |
| Combination of Techniques | 30                 |

**Table 3: Average Opioid Consumption by Anesthesia Technique**

| Anesthesia Technique      | Average Opioid Consumption (mg) |
|---------------------------|---------------------------------|
| General Anesthesia        | 120                             |
| Regional Anesthesia       | 80                              |
| Combination of Techniques | 100                             |

**Table 4: Statistical Analysis of Opioid Consumption**

| Comparison                         | Result                                      |
|------------------------------------|---|
| Regional vs. General Anesthesia    | Regional significantly lower ( $p < 0.05$ ) |
| Combination vs. General Anesthesia | Combination intermediate level              |

## DISCUSSION

This observational study explored the influence of different anesthesia techniques on opioid consumption in patients undergoing major surgeries at Government Medical College, Ananthapuram. The findings reveal significant variations in opioid use among the groups, with regional anesthesia associated with the lowest opioid consumption.

### Comparison with Existing Literature

Our results are consistent with existing literature that suggests regional anesthesia techniques can significantly reduce the need for postoperative opioids.<sup>[9,10]</sup> Studies have demonstrated that regional anesthesia not only limits the initial pain experience by blocking nerve conduction at the site of surgery but also may reduce the inflammatory response to surgical trauma, potentially decreasing long-term opioid requirements.<sup>[11]</sup> This effect is particularly pronounced when compared to general anesthesia, which typically requires more extensive opioid use for effective pain management post-surgery.

### Potential Mechanisms

The reduced opioid consumption in the regional anesthesia group could be attributed to the direct and localized action of the anesthetics used, which provide effective pain control without the systemic side effects associated with opioids. Additionally, the combination of anesthesia techniques showcased intermediate opioid consumption, suggesting that integrating regional anesthesia with general anesthesia might offer a balanced approach, optimizing pain control while minimizing opioid use.<sup>[12]</sup>

### Clinical Implications

The implications of these findings are significant, especially in the context of the ongoing opioid crisis. By adopting regional or combined anesthesia techniques more broadly, healthcare providers can potentially mitigate the risks associated with excessive opioid use, including dependency and other adverse effects. Furthermore, the study underscores the importance of personalized anesthesia planning, where the choice of technique is tailored to the patient's specific surgical and physiological needs.

**Limitations and Future Research:** This study has limitations, including its observational design and the relatively small sample size, which may affect the generalizability of the results. Future research should focus on randomized controlled trials to provide more definitive evidence of causality between anesthesia technique and opioid consumption. Additionally, exploring patient-reported outcomes such as satisfaction, pain scores, and recovery times could provide a more comprehensive understanding of the benefits and drawbacks of each anesthesia technique.

## CONCLUSION

Our study suggests that the type of anesthesia administered can have a substantial impact on perioperative opioid consumption. Regional anesthesia offers a promising alternative to traditional general anesthesia, with potential benefits for pain management and opioid reduction. The adoption of such techniques could be crucial in addressing the challenges posed by postoperative pain management and the broader public health issue of opioid overuse.

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