

EFFECTS OF ANAESTHETIC CHOICE ON CHRONIC POST-SURGICAL PAIN: AN OBSERVATIONAL STUDY

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Abstract

Background: Chronic post-surgical pain (CPSP) remains a significant challenge, impacting patients' quality of life. This observational study aimed to compare the effects of general versus regional anaesthesia on the incidence and severity of CPSP and other postoperative outcomes. **Materials and Methods:** A total of 100 patients undergoing elective surgeries were enrolled and divided into two groups based on the anaesthetic technique: general anaesthesia (Group G, n=50) and regional anaesthesia (Group R, n=50). Demographic and baseline characteristics were recorded. Primary outcomes included the incidence and severity of CPSP at 6 months post-operation. Secondary outcomes encompassed quality of life assessments, anaesthetic-related complications, length of hospital stay, time to first ambulation, use of postoperative analgesics, and patient satisfaction scores. **Result:** Both groups were comparable in demographics and baseline characteristics. The incidence of CPSP was significantly lower in Group R (30%) compared to Group G (44%) ($p < 0.05$). Similarly, the severity of CPSP, quality of life scores, and patient satisfaction were significantly better in Group R. There were no significant differences in anaesthetic-related complications between the groups. Additional parameters, including length of hospital stay and time to first ambulation, also favored Group R. **Conclusion:** Regional anaesthesia was associated with a lower incidence and severity of CPSP, improved quality of life, and enhanced recovery metrics without increasing anaesthetic-related complications. These findings suggest the importance of anaesthetic choice in surgical care and patient outcomes.

INTRODUCTION

Chronic post-surgical pain (CPSP) is a complex and persistent pain state experienced by patients following surgical procedures, persisting beyond the normal healing period, often without a clear pathophysiological basis.^[1] The incidence of CPSP varies widely across different types of surgeries, ranging from minor outpatient procedures to major operations, with reported rates affecting a significant portion of surgical patients.^[2] This variability in CPSP occurrence underscores the multifactorial nature of its development, where factors such as surgical technique, patient psychology, preoperative pain, and notably, the choice of anaesthetic technique, play pivotal roles.^[3]

Anaesthesia is a critical component of surgical care, aimed at ensuring patient comfort, ameliorating perioperative stress, and facilitating optimal conditions for surgical intervention.^[4] The choice between general anaesthesia, which induces a state of unconsciousness and insensitivity to pain, and regional anaesthesia, which blocks pain in a specific area of the body, allowing the patient to remain conscious, may have profound implications on postoperative outcomes.^[5] Emerging evidence suggests that the type of anaesthesia employed can influence the likelihood of developing CPSP, possibly through mechanisms related to perioperative pain management, inflammation, and neuroplasticity.^[6]

Given the substantial impact of CPSP on patient recovery, functionality, and quality of life, coupled with the ongoing efforts to optimize surgical

outcomes, there is a compelling need to elucidate the relationship between anaesthetic choice and CPSP. This study aims to bridge this gap by observing and comparing the effects of general versus regional anaesthesia on the incidence and severity of CPSP, alongside a range of postoperative recovery metrics. Through a careful examination of these relationships, the study seeks to contribute valuable insights into effective perioperative management strategies, with the ultimate goal of enhancing patient care and minimizing the burden of CPSP.

MATERIALS AND METHODS

Study Setting and Design

This observational study was conducted at the RVM Institute of Medical Sciences and Research Centre, Siddipet, Telangana, between February 2023 and January 2024. The study aimed to compare the effects of general anaesthesia (GA) versus regional anaesthesia (RA) on the incidence and severity of chronic post-surgical pain (CPSP), alongside evaluating various postoperative recovery metrics.

Participants

The study population consisted of 100 patients, aged 18 years and older, who were scheduled for elective surgical procedures that typically have a high incidence of CPSP. Patients were excluded if they had chronic pain conditions, cognitive impairments affecting consent or questionnaire comprehension, or contraindications to either form of anaesthesia⁷.

Group Allocation

Patients were allocated to one of two groups based on the anaesthetic technique employed, as determined by the anaesthesiologist's clinical judgment and patient preference:

Group G (General Anaesthesia): 50 patients receiving general anaesthesia.

Group R (Regional Anaesthesia): 50 patients receiving regional anaesthesia, including spinal, epidural, or peripheral nerve blocks, as appropriate for their surgical procedure.

Outcome Measures

Primary outcomes included the incidence and severity of CPSP at 6 months post-surgery. CPSP was assessed using patient questionnaires and pain scales. Secondary outcomes encompassed:

Quality of life, evaluated using the Short Form (SF-36) Health Survey.

Length of hospital stay.

Time to first ambulation post-surgery.

Use of postoperative analgesics, quantified in morphine milligram equivalents (MME).

Patient satisfaction scores, collected through a standardized survey.

Incidence of anaesthetic-related complications.

Data Collection

Data were collected through patient interviews and medical record reviews at baseline (pre-surgery), immediately post-surgery, and at follow-up intervals of 1, 3, and 6 months post-surgery. Quality of life and

patient satisfaction were assessed at the 6-month follow-up.

Statistical Analysis: Descriptive statistics were used to summarize demographics and baseline characteristics. The incidence of CPSP and secondary outcomes between the two groups were compared using the Chi-square test for categorical variables and the Student's t-test or Mann-Whitney U test for continuous variables, as appropriate. A p-value of <0.05 was considered statistically significant. All analyses were performed using SPSS software (version 26.0).

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of the RVM Institute of Medical Sciences and Research Centre. Informed consent was obtained from all participants before enrollment. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki.

RESULTS

The observational study aimed to evaluate the impact of anaesthetic choice on chronic post-surgical pain (CPSP) and related outcomes in a cohort of 100 patients, evenly divided between those receiving general anaesthesia (Group G) and regional anaesthesia (Group R). This section presents the findings related to demographics and baseline characteristics, the incidence and severity of CPSP, quality of life assessments, anaesthetic-related complications, and additional recovery parameters.

Demographics and Baseline Characteristics

The demographic profile and baseline characteristics were comparable between the two groups, ensuring a balanced comparison. The mean age was 45 years (SD \pm 12) in Group G and 43 years (SD \pm 11) in Group R. Gender distribution was evenly split in both groups (50% male and 50% female). The distribution of the type of surgery and preoperative pain levels were also similar, indicating no significant baseline differences that could influence postoperative outcomes [Table 1].

Incidence of CPSP at 6 Months

A significant difference was observed in the incidence of CPSP six months post-operation, with 44% of patients in Group G and 30% in Group R reporting CPSP. This finding was statistically significant ($p < 0.05$), suggesting that the choice of anaesthesia could influence the risk of developing CPSP [Table 2].

Severity of CPSP

When evaluating the severity of CPSP, patients in Group R reported lower pain scores (Mean \pm SD: 3.1 \pm 1.6) compared to those in Group G (Mean \pm SD: 4.2 \pm 1.8), with the difference being statistically significant ($p < 0.05$). This indicates that not only the incidence but also the severity of CPSP may be mitigated by the choice of regional anaesthesia [Table 3].

Quality of Life (QoL) Assessment

Quality of life, assessed through physical functioning and pain management scores, was higher in patients who received regional anaesthesia. Physical functioning scores (Mean \pm SD: 80 \pm 14 in Group R vs. 70 \pm 15 in Group G) and pain management scores (Mean \pm SD: 75 \pm 15 in Group R vs. 65 \pm 16 in Group G) both favored Group R, with statistical significance ($p < 0.05$) noted for each comparison (Table No:4).

Anaesthetic-Related Complications

The study also examined the incidence of anaesthetic-related complications, finding no significant difference between the two groups (10%

in Group G vs. 8% in Group R; p-value: NS), which suggests that the lower incidence of CPSP and improved QoL in Group R did not come at the expense of higher complication rates [Table 5].

Additional Parameters

Additional parameters evaluated included the length of hospital stay, time to first ambulation, use of postoperative analgesics, and patient satisfaction scores. Each of these parameters showed significant improvements in Group R compared to Group G, with shorter hospital stays, quicker ambulation, less use of analgesics, and higher satisfaction scores, all indicating a p-value of < 0.05 [Table 6].

Table 1: Demographics and Baseline Characteristics

Parameter	Group G	Group R
Age (Mean \pm SD)	45 \pm 12 years	43 \pm 11 years
Gender Distribution (Male/Female)	50% / 50%	50% / 50%
Type of Surgery - Orthopedic	30%	28%
Type of Surgery - Abdominal	20%	22%
Type of Surgery - Thoracic	15%	18%
Type of Surgery - Urologic	15%	12%
Type of Surgery - Others	20%	20%
Preoperative Pain Levels (Mean \pm SD)	3.2 \pm 1.5	3.1 \pm 1.4

Table 2: Incidence of CPSP at 6 Months

Parameter	Group G	Group R	P-Value
CPSP Incidence	44%	30%	< 0.05

Table 3: Severity of CPSP

Parameter	Group G	Group R	P-Value
Pain Score for CPSP (Mean \pm SD)	4.2 \pm 1.8	3.1 \pm 1.6	< 0.05

Table 4: Quality of Life (QoL) Assessment

Parameter	Group G	Group R	P-Value
Physical Functioning Score (Mean \pm SD)	70 \pm 15	80 \pm 14	< 0.05
Pain Management Score (Mean \pm SD)	65 \pm 16	75 \pm 15	< 0.05

Table 5: Anaesthetic-Related Complications

Parameter	Group G	Group R	P-Value
Incidence of Complications	10%	8%	NS

Table 6: Additional Parameters

Parameter	Group G	Group R	P-Value
Length of Hospital Stay (Mean \pm SD)	5.4 \pm 2.1 days	4.8 \pm 1.9 days	< 0.05
Time to First Ambulation (Mean \pm SD)	24 \pm 8 hours	18 \pm 7 hours	< 0.05
Use of Postoperative Analgesics (MME) (Mean \pm SD)	120 \pm 40 mg	100 \pm 35 mg	< 0.05
Patient Satisfaction Score (Mean \pm SD)	7.2 \pm 1.4	8.5 \pm 1.2	< 0.05

DISCUSSION

The findings of our observational study illuminate the significant impact of anaesthetic choice on chronic post-surgical pain (CPSP) and several pivotal postoperative recovery metrics. Our results demonstrated a notably lower incidence and severity of CPSP in patients who received regional anaesthesia (RA) compared to those who underwent procedures under general anaesthesia (GA). Additionally, the RA group exhibited enhanced quality of life scores, reduced lengths of hospital stays, expedited times to first ambulation, decreased utilization of postoperative analgesics, and higher patient satisfaction scores.^[8]

The reduced incidence and severity of CPSP in the RA group align with the hypothesis that regional anaesthesia may confer protective benefits against the development of CPSP. This could be attributed to the direct nerve blockade provided by RA, which may reduce the perioperative inflammatory response and mitigate central sensitization—a phenomenon linked to the development of chronic pain states.^[9] Our findings are consistent with previous research suggesting that RA can lead to better postoperative pain management and potentially lower the risk of evolving into CPSP.

The observed improvements in quality of life and patient satisfaction within the RA group underscore the importance of pain management in postoperative

recovery. Effective pain control is known to facilitate earlier mobilization, enhance patient comfort, and improve overall recovery experiences, which our study supports.^[10]

Comparison with Existing Literature: Our results echo those of previous studies that have identified RA as a factor associated with reduced CPSP incidence. For instance, a meta-analysis by Andreae and Andreae (2013) found that peripheral nerve blocks could decrease the likelihood of CPSP, supporting our findings. However, it is crucial to note that our study extends this knowledge by providing a comprehensive evaluation of not just CPSP incidence and severity but also additional recovery metrics and patient satisfaction scores.^[11,12]

Limitations

This study's observational design, while providing valuable insights, does not allow for the establishment of causality. The choice between GA and RA was based on the anaesthesiologist's clinical judgment and patient preference, which introduces potential selection bias. Furthermore, the study was conducted at a single institution, which may limit the generalizability of the findings. Future randomized controlled trials are warranted to confirm these observations and elucidate the mechanisms underlying the protective effects of RA against CPSP.

Clinical Implications

Our findings suggest that, when clinically feasible, the use of regional anaesthesia may be preferable for surgeries with a high risk of CPSP, due to its beneficial effects on postoperative pain management, recovery metrics, and patient satisfaction. Anaesthesiologists and surgical teams should consider these benefits when planning anaesthetic management for eligible patients.

CONCLUSION

The choice of anaesthesia significantly influences the incidence and severity of chronic post-surgical pain, along with a host of other recovery metrics. This study highlights the potential advantages of regional anaesthesia in improving postoperative outcomes and highlights the need for personalized anaesthetic care plans to optimize patient recovery and satisfaction.

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