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Assessing the Benefits of Standardizing Transversus Abdominis Plane (TAP) Block in Laparoscopic Surgeries: A Retrospective Study

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Abstract

Background: Effective postoperative pain control is a key determinant of recovery following laparoscopic surgery. Transversus Abdominis Plane (TAP) block is widely used as part of multimodal analgesia to reduce postoperative pain and opioid consumption. However, real world evidence comparing analgesic outcomes associated with TAP block use in routine clinical practice remains limited.

Aim: To assess the association between the use of TAP block and postoperative analgesic outcomes in patients undergoing elective laparoscopic surgeries.

Methods: This retrospective observational comparative study reviewed medical records of 100 adult patients (20–65 years) who underwent elective laparoscopic surgeries between January 2023 and January 2024. Based on documented analgesic technique, patients were categorized into those who had received TAP block (n=50) and those managed with conventional systemic analgesia (n=50). Pain score at 6 hours postoperatively (VAS) was the primary outcome. Secondary outcomes included total opioid consumption and time to discharge. Independent sample t tests and linear regression analysis were applied.

Results: Patients with documented TAP block use demonstrated significantly lower mean VAS scores at 6 hours (2.8 ± 0.9) compared with the conventional analgesia group (5.3 ± 1.2; $p < 0.001$). Opioid consumption was lower in the TAP block group (18.1 ± 4.24 mg *vs* 29.9 ± 4.55 mg; $p < 0.001$), and time to discharge was shorter (22.26 ± 3.85 hours *vs* 27.38 ± 4.57 hours; $p < 0.001$). Regression analysis showed that TAP block use was independently associated with lower postoperative pain scores.

Conclusion: In routine clinical practice, the use of TAP block was associated with improved postoperative analgesia, reduced opioid requirement, and earlier discharge following laparoscopic surgery. These findings support further prospective studies to confirm the role of TAP block within multimodal analgesia protocols.

Keywords: Transversus Abdominis Plane Block; Laparoscopic Surgery; Postoperative Pain; Opioid Sparing Analgesia; Retrospective Study

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Introduction

Effective postoperative pain management is a cornerstone of enhanced recovery after surgery (ERAS) and significantly influences patient comfort, early mobilization, hospital stay, and overall clinical outcomes. Although laparoscopic surgeries are minimally invasive, patients often experience considerable postoperative pain due to factors such as port-site trauma, tissue manipulation, and abdominal wall stretching from pneumoperitoneum. Inadequate analgesia can delay recovery, increase the risk of complications, and negatively affect patient satisfaction.

Systemic opioids have traditionally been the mainstay of postoperative pain control; however, their use is associated with well-recognized adverse effects including nausea, vomiting, sedation, respiratory depression, and constipation. The risk of opioid-related complications and delayed recovery has prompted widespread adoption of multimodal analgesia strategies, which combine regional anesthetic techniques, non-opioid analgesics, and adjuvant therapies. These approaches aim to optimize pain relief while minimizing opioid consumption and associated side effects.

The Transversus Abdominis Plane (TAP) block is a regional anesthetic technique that provides somatic analgesia to the anterior abdominal wall by targeting the thoracolumbar nerves (T6–L1). Evidence from randomized controlled trials and meta-analyses indicates that TAP block can effectively reduce postoperative pain scores, decrease opioid requirements, and facilitate early recovery, particularly in the immediate postoperative period. Despite these benefits, variability in clinical practice, particularly in Indian healthcare settings, has limited the availability of real-world data on TAP block efficacy relative to conventional analgesia.

To address this gap, the present retrospective observational study evaluates the association between TAP block use and postoperative analgesic outcomes in patients undergoing elective laparoscopic surgeries. By comparing pain scores, opioid consumption, and time to discharge between patients receiving TAP block and those managed with conventional systemic analgesia, this study aims to provide clinically relevant evidence supporting the incorporation of TAP block into routine perioperative pain management protocols.

Materials and Methods

Study Design and Setting

This retrospective observational comparative study was conducted at Parul Sevashram Hospital, Vadodara, Gujarat, after approval from the Institutional Ethics Committee. Patient records from January 2023 to January 2024 were reviewed.

Study Population

Medical records of adult patients aged 20–65 years with ASA physical status I–II who underwent elective laparoscopic cholecystectomy, appendectomy, or hernia repair were included.

Exclusion Criteria

Patients with incomplete records, known allergy to local anesthetics, coagulopathy, cognitive impairment, or chronic opioid use were excluded.

Exposure Classification

Based on documented postoperative analgesic technique in medical records, patients were categorized into:

- **TAP block group:** Patients who had received TAP block as part of routine perioperative analgesic practice.
- **Conventional analgesia group:** Patients managed with systemic analgesics without TAP block.

Outcomes

- **Primary outcome:** VAS pain score at 6 hours postoperatively.
- **Secondary outcomes:** Total opioid consumption (mg) within the first 24 hours and time to discharge (hours).

Statistical Analysis

Data were analyzed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation. Independent sample t-tests were used to compare outcomes between groups. Linear regression analysis was performed to assess factors associated with postoperative pain scores. A p-value < 0.05 was considered statistically significant.

Results

Pain Scores

Patients in the TAP block group had significantly lower mean VAS scores at 6 hours compared with the conventional analgesia group (2.8 ± 0.9 *vs* 5.3 ± 1.2; p < 0.001) as shown in Table 1.

Table 1: Effect of TAP Block on Postoperative Pain, Opioid Consumption, and Discharge Time.

Variable	TAP Block Group (Mean ± SD)	Control Group (Mean ± SD)	t-value	p-value
Pain Score (VAS @ 6h)	2.8 ± 0.9	5.3 ± 1.2	12.88	< 0.001
Total Opioid Consumption(mg)	18.1 ± 4.24	29.9 ± 4.55	12.73	< 0.001
Time to Discharge (hrs)	22.1 ± 3.8	27.3 ± 4.58	6.06	< 0.001

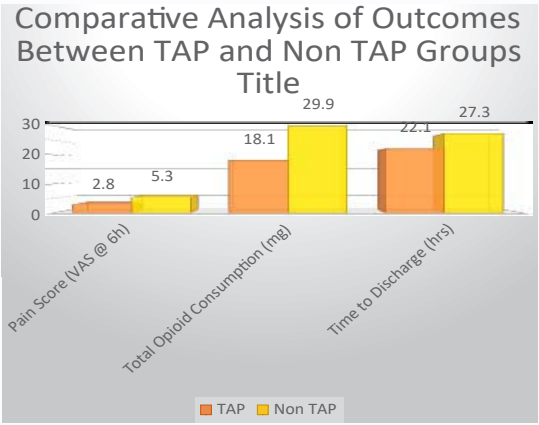


Figure 1: Comparative analysis of outcomes.

Table 2: Regression analysis.

Predictor	B	SE	t	p
TAP block (yes)	-2.35	0.18	-13.06	<0.001
Age	0.02	0.04	0.50	0.62
Sex (male)	-0.12	0.14	-0.86	0.39

Opioid Consumption

Mean opioid consumption was lower in the TAP block group (18.1 ± 4.24 mg *vs* 29.9 ± 4.55 mg; p < 0.001).

Time to Discharge

Time to discharge was also shorter in the TAP block group (22.26 ± 3.85 hours *vs* 27.38 ± 4.57 hours; p < 0.001).

Comparative Analysis

A comparative analysis of postoperative outcomes between TAP and non-TAP groups is illustrated in Figure 1.

Regression Analysis

Linear regression identified TAP block as an independent predictor of lower postoperative pain scores after adjusting for age, sex, and type of surgery (Table 2).

Regression analysis demonstrated that documented TAP block use was independently associated with lower postoperative pain scores after adjusting for demographic variables.

Discussion

The present study demonstrates that the use of Transversus Abdominis Plane (TAP) block in routine clinical practice is associated with significantly improved postoperative analgesia following laparoscopic surgeries. Patients who received TAP block had lower

VAS scores at 6 hours postoperatively compared to those managed with conventional systemic analgesia. This confirms TAP block's efficacy in providing somatic analgesia to the anterior abdominal wall by targeting the thoracolumbar nerves (T6–L1), consistent with prior studies and meta-analyses demonstrating early pain reduction and improved patient comfort. These findings reinforce the role of TAP block as a critical component of multimodal analgesia protocols, particularly for minimally invasive abdominal procedures.

Beyond pain scores, TAP block significantly reduced opioid consumption within the first 24 hours postoperatively. The observed opioid-sparing effect has multiple clinical implications: lower risk of nausea, vomiting, sedation, and other opioid-related adverse events; faster recovery; and enhanced patient satisfaction. Our regression analysis further confirmed that TAP block independently predicts lower postoperative pain scores, even after adjusting for demographic and surgical variables. This highlights the block's reliability and reproducibility when appropriately administered, suggesting it can be a standardized approach for abdominal analgesia in laparoscopic procedures.

Time to discharge was also significantly shorter in the TAP block group, suggesting that effective pain control translates into earlier mobilization, faster return of gastrointestinal function, and reduced hospital stay. Shorter discharge times align with the principles of Enhanced Recovery After Surgery (ERAS) protocols, emphasizing that regional analgesia techniques like TAP block can meaningfully contribute to perioperative efficiency. The combined benefits of improved pain scores, opioid reduction, and shorter hospitalization strongly support integrating TAP block as a routine part of laparoscopic perioperative care, rather than leaving its use to individual anesthesiologist discretion.

Given the consistent evidence from our study and previous trials, there is a compelling rationale to **standardize TAP block protocols in laparoscopic surgery**. Standardization would include specifying local anesthetic type, volume, and technique (ultrasound-guided), ensuring consistent outcomes across institutions. Moreover, training anesthesiologists in standardized TAP block administration would minimize variability, enhance patient safety, and facilitate incorporation into multimodal analgesia bundles. By adopting TAP block as a routine, standardized practice, hospitals can achieve improved patient satisfaction, reduced opioid exposure, and accelerated postoperative recovery, supporting both clinical and operational efficiency in laparoscopic surgery. Future prospective, multicenter studies could further refine dosing, timing, and technique to optimize outcomes and establish formal guidelines for widespread implementation.

Conclusion

TAP block is associated with lower postoperative pain scores, reduced opioid consumption, and earlier discharge in elective laparoscopic surgeries. These findings support its role in multimodal analgesia strategies and underscore the need for prospective studies to confirm these benefits.

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Conflict of Interest

None declared. All authors have read and approved the final manuscript.

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