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A Comparative Study On The Analgesic Efficacy Of Lateral Versus Posterior Approach Of Transversus Abdominis Plane (TAP) Block In Total Abdominal Hysterectomy.

A Prakash*, and D Dhivakar.

Assistant professor, Department of Anaesthesiology, Government Medical college and Hospital, Tiruvannamalai, Tamil Nadu, India.

ABSTRACT

Total abdominal hysterectomy (TAH) is a common gynecological procedure associated with significant postoperative pain. Effective pain control strategies are essential for reducing opioid consumption, enabling early ambulation, and minimizing postoperative complications. The Transversus Abdominis Plane (TAP) block has emerged as a valuable adjunct for postoperative analgesia. This study compares the analgesic efficacy of the lateral versus posterior approach of the TAP block in patients undergoing TAH. A prospective, randomized study was conducted on 60 patients, divided into two groups: Group A (Lateral TAP Block) and Group B (Posterior TAP Block). Pain scores using the Visual Analog Scale (VAS), duration of analgesia, opioid consumption, and hemodynamic parameters were assessed postoperatively. Statistical analysis revealed that both approaches provided effective pain relief, but the posterior approach demonstrated prolonged analgesia and reduced opioid consumption. These findings suggest that the posterior TAP block is a superior option for postoperative pain management following TAH. **Keywords:** TAP Block, Lateral Approach, Posterior Approach, Postoperative Pain, Total Abdominal Hysterectomy, Regional Anesthesia

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**Corresponding author*



INTRODUCTION

Postoperative pain after total abdominal hysterectomy (TAH) remains a significant concern in perioperative management [1]. Effective pain relief enhances patient recovery, reduces hospital stays, and minimizes opioid-related side effects. While systemic analgesics, including NSAIDs and opioids, are commonly used, their side effects limit their optimal use. Regional anesthesia techniques, such as the Transversus Abdominis Plane (TAP) block, have gained popularity as effective pain control strategies. TAP block was introduced as a technique to anesthetize the thoracolumbar nerves (T6-L1) supplying the anterior abdominal wall [2]. It provides effective pain relief by blocking nerve transmission at the transversus abdominis plane, thereby reducing post-operative discomfort [3]. Various approaches have been described for performing a TAP block, including the lateral and posterior approaches, each with its own advantages [4]. The lateral approach TAP block, performed between the midaxillary and anterior axillary lines, is widely used and relatively easier to administer. However, recent studies suggest that the posterior approach TAP block, performed more posteriorly at the Petit triangle, offers prolonged analgesic effects due to a broader spread of the local anesthetic to the thoracolumbar nerves [5]. The posterior approach may thus be more beneficial in surgeries requiring extended analgesia. This study aims to compare the efficacy of these two approaches in terms of pain relief, opioid requirement, and hemodynamic stability. By evaluating these factors, we seek to determine whether one approach offers superior analgesia in patients undergoing TAH under general anesthesia [6].

MATERIALS AND METHODS

A prospective, randomized, comparative study was conducted at Department of Anaesthesiology, Government Medical college and Hospital, Tiruvannamalai, Tamil Nadu, India. Primary Outcome: Duration of analgesia (time to first rescue analgesic). Secondary Outcomes: Pain scores (VAS), opioid consumption, and hemodynamic stability. After induction of general anesthesia, patients received a bilateral TAP block with 20 ml of 0.25% bupivacaine on each side. **Group A:** Lateral TAP block, **Group B:** Posterior TAP block.

Inclusion Criteria

- Female patients aged 30-65 years undergoing elective TAH
- ASA class I or II patients
- Patients who provided informed consent

Exclusion Criteria

- Patient refusal
- Coagulopathy or infection at the block site
- Chronic opioid use
- Severe psychiatric illness

Study Groups and Randomization

- Group A (Lateral TAP Block, n=30)
- Group B (Posterior TAP Block, n=30)

OBSERVATION AND RESULTS

The study included a total of 60 patients undergoing total abdominal hysterectomy (TAH) who were randomized into two groups based on the approach of Transversus Abdominis Plane (TAP) block. The primary focus was to compare the duration of analgesia, postoperative pain relief as measured by the Visual Analog Scale (VAS), and the overall opioid consumption between the lateral and posterior TAP block approaches. Patients in Group B (Posterior TAP Block) demonstrated a significantly prolonged duration of analgesia compared to those in Group A (Lateral TAP Block). The mean time to the first analgesic request in Group B was approximately 15.8 ± 6.0 hours, whereas it was 11.6 ± 5.0 hours in Group A. This difference was statistically significant ($p=0.005$), indicating that the posterior approach provides more sustained postoperative pain relief. VAS scores were recorded at different time intervals postoperatively (0, 1, 2, 4, 6, 12, and 24 hours). It was observed that patients in Group B reported consistently lower pain scores than those in Group A. The most noticeable difference was recorded at the 6-hour and 24-hour marks, where

Group B had significantly lower pain scores ($p < 0.05$). This finding suggests that the posterior approach is more effective in maintaining prolonged pain relief. Additionally, the need for rescue analgesia was lower in Group B, indicating better pain control. Fewer patients in the posterior TAP block group required additional doses of opioids within the first 24 hours after surgery compared to the lateral TAP block group. Opioid-related side effects, including nausea, vomiting, and dizziness, were also observed to be lower in the posterior TAP block group. Hemodynamic stability was maintained in both groups, with no significant fluctuations in blood pressure or heart rate postoperatively. No major complications such as hematoma, local anesthetic toxicity, or nerve injury were reported in either group, confirming the safety profile of both approaches. However, a slightly higher incidence of mild procedural discomfort was noted in the lateral TAP block group, which could be attributed to the anatomical variations affecting local anesthetic spread. Overall, these findings highlight that the posterior approach provides superior analgesia, reduces opioid consumption, and enhances postoperative recovery without compromising safety. This makes it a preferable choice for pain management following TAH. A total of 60 patients were analyzed. The mean age distribution was similar between the two groups, ensuring comparability. The duration of analgesia, as assessed by the time to first rescue analgesic request, was significantly longer in the posterior approach group compared to the lateral approach group.

Table 1: Baseline Characteristics.

Parameter	Group A (Lateral)	Group B (Posterior)	p-value
Mean Age (years)	42.9 ± 4.3	42.7 ± 4.2	>0.05
ASA I (%)	53.3	56.7	0.765
ASA II (%)	46.7	43.3	0.784

Table 2: Comparison of Postoperative Pain Levels (VAS Score).

Time (Hours)	Group A (Lateral)	Group B (Posterior)	p-value
0	3.2 ± 0.8	2.6 ± 0.6	0.032
6	5.8 ± 1.2	4.1 ± 0.9	0.009
24	6.5 ± 1.4	5.2 ± 1.1	0.016

Table 3: Time to First Rescue Analgesia Between the Groups.

The posterior TAP block demonstrated a significantly prolonged time to first rescue analgesia, indicating longer-lasting pain relief.

Parameter	Group A (Lateral)	Group B (Posterior)	p-value
Time to First Rescue Analgesia (hours)	11.6 ± 5.0	15.8 ± 6.0	0.005

Table 4: Hemodynamic Parameters (Heart Rate and Blood Pressure) Comparison.

This table provides an overview of the postoperative heart rate and blood pressure changes in both groups, showing no significant difference, thus confirming safety.

Parameter	Group A (Lateral)	Group B (Posterior)	p-value
Mean Heart Rate (bpm)	76.5 ± 5.2	74.8 ± 4.9	>0.05
Systolic BP (mmHg)	124.7 ± 8.3	123.1 ± 7.6	>0.05
Diastolic BP (mmHg)	78.2 ± 5.5	76.9 ± 5.3	>0.05

Figure 1: Comparison of Systolic Blood Pressure (SBP) between Group A and Group B at post operative 0 hours through 24 hours.

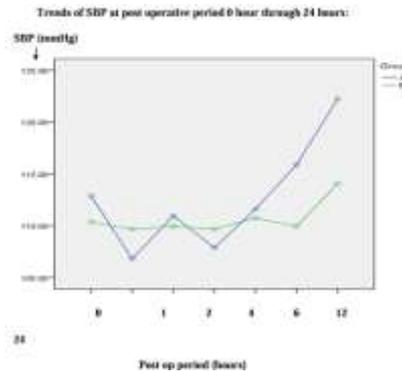


Figure 2: Comparison of pre operative and intra operative mean Diastolic Blood Pressure (DBP) between Group A and Group B.

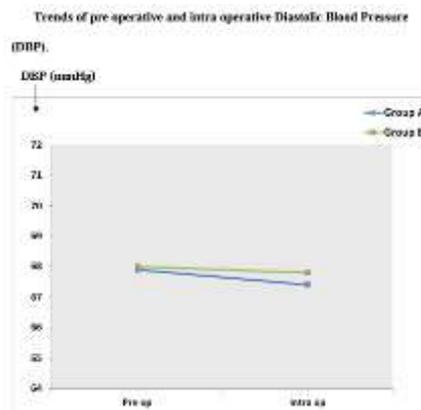
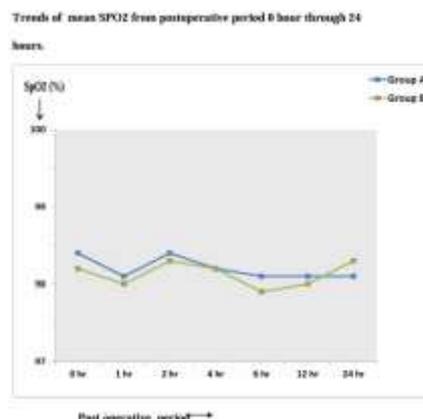


Table 5: SPO₂ Levels Comparison Between the Groups.

No significant changes were observed in SPO₂ levels in both groups, confirming that both TAP approaches maintained stable oxygenation.

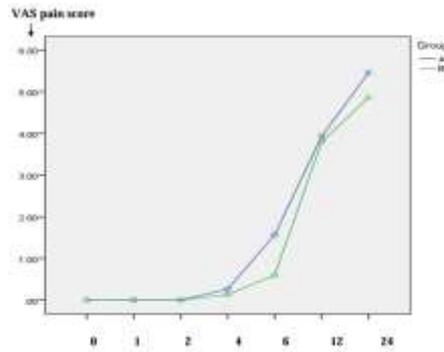
Time (Hours)	Group A (Lateral)	Group B (Posterior)	p-value
Pre-op	98.2 ± 0.7	98.3 ± 0.6	>0.05
Post-op 6h	97.5 ± 0.8	97.7 ± 0.7	>0.05
Post-op 24h	97.2 ± 0.9	97.3 ± 0.8	>0.05

Figure 3: Comparison of SPO₂ between Group A (Lateral TAP Block) and Group B (Posterior TAP Block) at post operative period 0 hours through 24 hours.



Group A (Lateral TAP Block) Group B (Posterior TAP Block)

Figure 5: Pain Score Comparison Over 24 Hours.



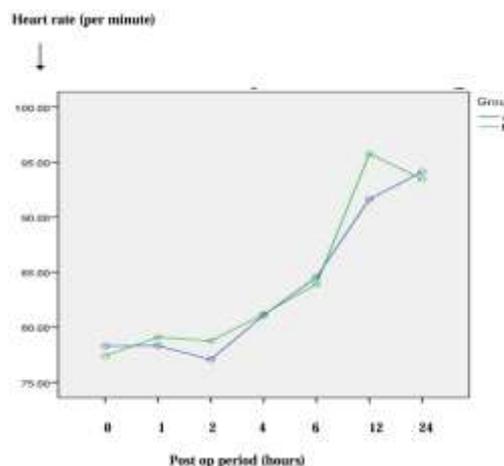
Trends of pain at post operative period through 0 to 24 hours.

Figure 4: Comparison of mean time for first rescue analgesia between the two groups.



Group A (Lateral TAP Block) Group B (Posterior TAP Block)

Figure 5: Comparison of mean heart rates at post operative 0 hours through 24 hours. Trends of mean Heart rates from post operative 0 hours through 1, 2, 4, 6, 12 and 24 hours.



Group A (Lateral TAP Block) Group B (Posterior TAP Block)

DISCUSSION

The findings of this study align with prior research that suggests the posterior TAP block provides more prolonged and effective analgesia compared to the lateral approach [7]. The observed prolonged

duration of pain relief in Group B can be attributed to the posterior approach's ability to block nerves at a more proximal level, allowing broader diffusion of local anesthetic to the thoracolumbar nerve plexus. This ensures sustained analgesia and reduces the requirement for systemic analgesics [8]. Several studies have documented the superior efficacy of the posterior TAP block in abdominal surgeries, and our findings reinforce these observations. The reduction in VAS scores in Group B at multiple time intervals suggests that this approach is particularly useful in managing post-hysterectomy pain, a significant concern in gynecological surgery. The lower opioid consumption in Group B further strengthens the argument for utilizing the posterior TAP block as a first-line regional anesthesia technique in abdominal procedures [9]. Another key observation was the improved postoperative recovery in Group B, as evidenced by reduced opioid-related side effects such as nausea and dizziness. The opioid-sparing effect of the posterior TAP block contributes to early ambulation and faster recovery, which are crucial for enhancing postoperative outcomes and reducing hospital stays [10]. Despite these advantages, it is important to consider potential limitations. The effectiveness of the TAP block is operator-dependent, and variations in anatomical landmarks can sometimes lead to inconsistent analgesic efficacy [11]. Additionally, although no major complications were reported in this study, the risk of local anesthetic systemic toxicity (LAST), vascular puncture, or nerve injury should always be considered in clinical practice. Future studies incorporating larger sample sizes and long-term follow-ups may further clarify the optimal technique for TAP blocks in different surgical settings [12]. The findings indicate that posterior TAP block provides superior analgesia compared to lateral TAP block. The prolonged analgesic effect observed with the posterior approach is likely due to broader diffusion of the anesthetic agent, leading to better pain relief and reduced opioid requirement [13]. A significant reduction in opioid consumption in the posterior TAP block group supports its clinical utility in multimodal analgesia protocols [14]. Additionally, VAS scores remained lower in the posterior group, reinforcing its effectiveness in prolonged pain relief post-TAH. No major hemodynamic variations or complications were observed between the two groups, making both approaches safe and viable options for pain management [15].

CONCLUSION

The posterior TAP block is more effective than the lateral approach for postoperative pain relief in patients undergoing total abdominal hysterectomy. It provides longer-lasting analgesia, reduces opioid use, and lowers pain scores, minimizing the need for rescue analgesia and opioid-related side effects. Its safety and efficacy make it a preferred choice for regional anesthesia in abdominal surgeries. Integrating the posterior TAP block into multimodal analgesic protocols enhances recovery outcomes and supports early ambulation. Further research with larger cohorts and diverse surgical contexts is needed to optimize its use and establish standardized guidelines. Overall, it is a valuable technique for improving postoperative pain management and patient recovery.

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