

# Evaluation of Postoperative Analgesia Using Transversus Abdominis Plane Block Versus Epidural Analgesia in Abdominal Surgeries

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## Abstract

**Background:** Effective postoperative analgesia after abdominal surgery is essential for early mobilisation, respiratory function, patient comfort, and recovery. Epidural analgesia is widely used for major abdominal procedures, whereas transversus abdominis plane block offers a peripheral regional technique with a favourable safety profile. The objective is to compare postoperative analgesic efficacy, rescue analgesic requirement, patient satisfaction, and adverse events between transversus abdominis plane block and epidural analgesia in patients undergoing elective abdominal surgeries. **Material and Methods:** This prospective comparative study included 60 patients undergoing elective abdominal surgeries at Kamineni Institute of Medical Sciences, Narketpally, Telangana, India, from January 2025 to December 2025. Patients were divided into Group T, receiving transversus abdominis plane block, and Group E, receiving epidural analgesia, with 30 patients in each group. Baseline characteristics, visual analogue scale pain scores, time to first rescue analgesia, rescue analgesic consumption, patient satisfaction, and postoperative complications were assessed. **Results:** Baseline demographic and operative variables were comparable between the groups. Epidural analgesia produced significantly lower pain scores at 2, 4, 6, and 8 hours postoperatively. Time to first rescue analgesia was longer in Group E than Group T, and 24-hour tramadol consumption was lower in Group E. TAP block was associated with fewer hemodynamic and procedure-related adverse effects. Urinary retention was significantly more frequent in the epidural group. **Conclusion:** Epidural analgesia provided stronger early postoperative analgesia and reduced rescue analgesic requirement, while TAP block demonstrated better hemodynamic stability and fewer adverse effects. Both techniques were effective for postoperative analgesia after abdominal surgeries.

**Keywords:** Abdominal surgery; Epidural analgesia; Postoperative pain; Regional anaesthesia; Rescue analgesia; Transversus abdominis plane block.

Received: 06 April 2026

Revised: 22 April 2026

Accepted: 05 May 2026

Published: 11 May 2026

## INTRODUCTION

Postoperative pain after abdominal surgery is a clinically important problem because it affects respiratory mechanics, mobilisation, sleep quality, bowel recovery, and patient satisfaction. Poorly controlled pain also increases sympathetic activation and delays functional recovery, particularly after open or extensive abdominal procedures.<sup>[1]</sup> Modern perioperative care therefore emphasises planned, procedure-specific and multimodal analgesia, with regional techniques used whenever appropriate to reduce systemic opioid exposure and improve recovery quality.<sup>[2]</sup>

Epidural analgesia has traditionally been regarded as a highly effective technique for abdominal surgery. By delivering local anaesthetic with or without opioid into the neuraxial space, epidural analgesia can provide segmental sensory blockade and reduce stress responses related to surgical trauma.<sup>[3,4]</sup> Meta-analyses have shown that epidural analgesia improves postoperative pain control compared with systemic opioid-based analgesia and has favourable effects on pulmonary outcomes in selected abdominal and thoracic surgical populations.<sup>[5-12]</sup> However, epidural analgesia requires technical expertise, monitoring, and attention to complications such as hypotension, motor block, urinary retention, pruritus, accidental dural puncture, and

contraindications related to coagulation status or infection risk. The transversus abdominis plane (TAP) block is a peripheral abdominal wall block that targets the neural plane between the internal oblique and transversus abdominis muscles. The technique was initially described through the lumbar triangle approach and subsequently refined using ultrasound guidance.<sup>[5]</sup> TAP block provides somatic analgesia to the anterior abdominal wall and has been evaluated in several abdominal and gynaecological surgeries.<sup>[6-9]</sup> Its advantages include avoidance of neuraxial catheter placement, relative hemodynamic stability, and suitability in patients for whom epidural analgesia is less desirable. A limitation is that TAP block mainly covers somatic incisional pain and provides limited visceral analgesia, which influences its effectiveness depending on the type and extent of

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**DOI:**  
10.21276/amit.2026.v13.i2.649

**How to cite this article:** Pooja G, Peddinti KC. Evaluation of Postoperative Analgesia Using Transversus Abdominis Plane Block Versus Epidural Analgesia in Abdominal Surgeries. *Acta Med Int.* 2026;13(2):80-84.

abdominal surgery.<sup>[7,9]</sup> Comparative evidence between TAP block and epidural analgesia continues to evolve. Recent analyses suggest that TAP block can provide clinically useful analgesia after abdominal surgery, while epidural analgesia often reduces opioid requirements more effectively but carries a higher burden of neuraxial-related adverse effects.<sup>[13,14]</sup> Local institutional evidence remains useful because patient selection, operative mix, anaesthetic practice, and postoperative rescue protocols influence outcomes in routine care. The objective of this study was to compare postoperative pain scores, duration of analgesia, rescue analgesic requirement, patient satisfaction, and postoperative complications between TAP block and epidural analgesia among patients undergoing elective abdominal surgeries at a tertiary care teaching hospital. This comparative evaluation also intended to support local protocol development for postoperative pain care.

### MATERIALS AND METHODS

**Study design and setting:** This prospective comparative study was conducted in the Department of Anaesthesiology at Kamineni Institute of Medical Sciences, Narketpally, Telangana, India. The study period extended from January 2025 to December 2025. Written informed consent was obtained from all participants before enrolment.

**Study population:** A total of 60 adult patients scheduled for elective abdominal surgeries were included. Patients were considered eligible when they were fit for the planned anaesthetic technique and postoperative regional analgesia. Patients with refusal for regional analgesia, local infection at the puncture site, allergy to local anaesthetic drugs, significant coagulation abnormality, severe cardiorespiratory instability, pre-existing neurological deficit, chronic opioid use, or incomplete postoperative assessment records were excluded. All 60 enrolled patients completed the study and were included in the final analysis.

**Group allocation and analgesic technique:** Patients were divided into two equal groups. Group T included 30 patients who received transversus abdominis plane block, and Group E included 30 patients who received epidural analgesia. The selected analgesic technique was performed under standard

aseptic precautions by an experienced anaesthesiologist. In Group T, TAP block was administered according to departmental protocol after completion of surgery under ultrasound or landmark guidance as appropriate. In Group E, epidural catheter placement and postoperative epidural analgesic administration were performed according to institutional practice. Standard intraoperative monitoring, anaesthetic management, and postoperative rescue analgesia protocols were followed in both groups.

**Outcome assessment:** The primary outcome was postoperative pain intensity assessed using the visual analogue scale at 1, 2, 4, 6, 8, 12, and 24 hours after surgery. Secondary outcomes included time to first rescue analgesia, proportion of patients requiring rescue analgesia within 24 hours, number of rescue analgesic doses, total tramadol consumption during the first 24 hours, patient satisfaction score, and postoperative adverse events. Hemodynamic events and complications such as nausea and vomiting, hypotension, urinary retention, pruritus, motor weakness, and respiratory depression were recorded.

**Statistical analysis:** Data were entered into a spreadsheet and analysed using standard statistical methods. Continuous variables were expressed as mean  $\pm$  standard deviation. Categorical variables were presented as frequency and percentage. Intergroup comparison of continuous variables was performed using the independent samples t-test, while categorical variables were compared using chi-square test or Fisher exact test as applicable. A p-value less than 0.05 was considered statistically significant.

### RESULTS

A total of 60 patients undergoing elective abdominal surgeries were included in the study. Patients were divided into two equal groups: Group T received transversus abdominis plane block, and Group E received epidural analgesia. Each group included 30 patients. All enrolled patients completed the study and were included in the final analysis.

The baseline demographic and clinical characteristics were comparable between the two groups. There was no statistically significant difference between the groups with respect to age, sex distribution, body mass index, ASA physical status, type of abdominal surgery, or duration of surgery [Table 1].

**Table 1: Baseline demographic and clinical characteristics of the study population**

Variable	Group T: TAP block (n=30)	Group E: Epidural analgesia (n=30)	p-value
Age, years	45.8 $\pm$ 12.6	47.1 $\pm$ 13.2	0.697
Male/Female	17/13	16/14	0.795
Body mass index, kg/m <sup>2</sup>	24.9 $\pm$ 3.4	25.3 $\pm$ 3.6	0.659
ASA I/II/III	8/16/6	7/17/6	0.948
Duration of surgery, minutes	112.4 $\pm$ 24.8	116.7 $\pm$ 26.1	0.516
Upper/lower abdominal surgery	12/18	13/17	0.793

Postoperative pain scores were lower in the epidural analgesia group during the early postoperative period. At 2, 4, 6, and 8 hours after surgery, the mean visual analogue scale scores were significantly lower in Group E compared with Group T. However, at 12 and 24 hours, the difference between the groups was not statistically significant, indicating that both techniques provided effective pain

control during later postoperative assessment [Table 2]. The duration of analgesia was significantly longer in the epidural group compared with the TAP block group. The mean time to first rescue analgesic requirement was 7.6  $\pm$  2.1 hours in Group T and 10.2  $\pm$  2.6 hours in Group E. Total rescue analgesic consumption during the first 24 hours was also lower in Group E. Patient satisfaction score was slightly

higher in the epidural group, but the difference was not statistically significant [Table 3].

**Table 2: Comparison of postoperative VAS pain scores between the two groups**

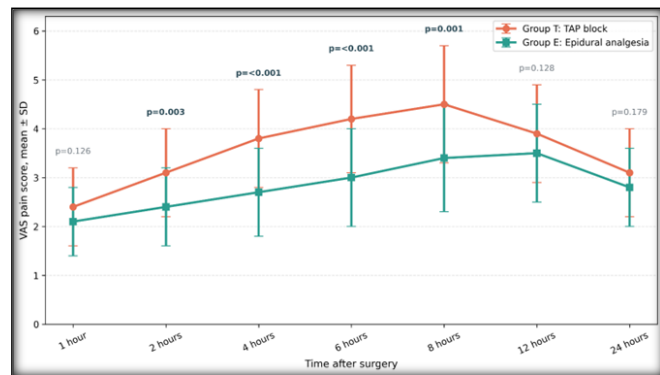
Time after surgery	Group T: TAP block	Group E: Epidural analgesia	p-value
1 hour	2.4 ± 0.8	2.1 ± 0.7	0.126
2 hours	3.1 ± 0.9	2.4 ± 0.8	0.003
4 hours	3.8 ± 1.0	2.7 ± 0.9	<0.001
6 hours	4.2 ± 1.1	3.0 ± 1.0	<0.001
8 hours	4.5 ± 1.2	3.4 ± 1.1	0.001
12 hours	3.9 ± 1.0	3.5 ± 1.0	0.128
24 hours	3.1 ± 0.9	2.8 ± 0.8	0.179

**Table 3: Comparison of analgesic outcomes between the two groups**

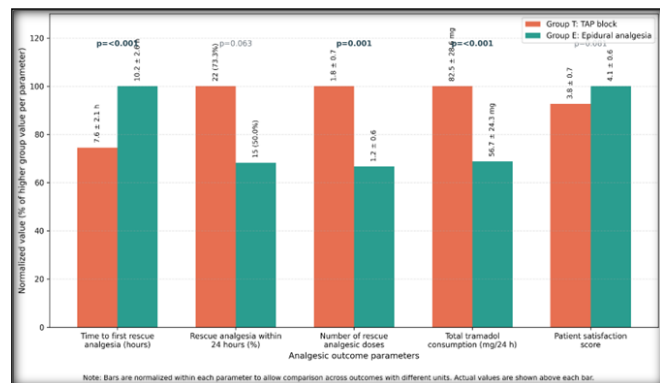
Parameter	Group T: TAP block (n=30)	Group E: Epidural analgesia (n=30)	p-value
Time to first rescue analgesia, hours	7.6 ± 2.1	10.2 ± 2.6	<0.001
Patients requiring rescue analgesia within 24 hours	22 (73.3%)	15 (50.0%)	0.063
Number of rescue analgesic doses in 24 hours	1.8 ± 0.7	1.2 ± 0.6	0.001
Total tramadol consumption, mg/24 hours	82.5 ± 28.6	56.7 ± 24.3	<0.001
Patient satisfaction score	3.8 ± 0.7	4.1 ± 0.6	0.081

**Table 4: Comparison of postoperative complications between the two groups**

Complication	Group T: TAP block (n=30)	Group E: Epidural analgesia (n=30)	p-value
Nausea and vomiting	3 (10.0%)	5 (16.7%)	0.448
Hypotension	1 (3.3%)	7 (23.3%)	0.052
Urinary retention	0 (0.0%)	4 (13.3%)	0.038
Pruritus	0 (0.0%)	2 (6.7%)	0.150
Motor weakness	0 (0.0%)	3 (10.0%)	0.076
Respiratory depression	0 (0.0%)	0 (0.0%)	—



**Figure 1: Comparison of postoperative VAS pain scores between the two groups**



**Figure 2: Comparison of analgesic outcomes between the two groups**

Hemodynamic parameters were more stable in the TAP block group. Episodes of hypotension were more frequent

among patients receiving epidural analgesia. No patient in either group developed respiratory depression, local anaesthetic toxicity, or block-related neurological complications. Urinary retention was significantly higher in Group E compared with Group T [Table 4].

Overall, epidural analgesia provided superior postoperative pain relief, longer duration of analgesia, and reduced rescue analgesic requirement compared with TAP block. However, TAP block was associated with better hemodynamic stability and fewer procedure-related adverse effects. Both techniques were effective for postoperative analgesia following abdominal surgeries, but epidural analgesia showed stronger analgesic efficacy during the early postoperative period.

## DISCUSSION

This prospective comparative study evaluated postoperative analgesia using TAP block and epidural analgesia in elective abdominal surgeries. The principal finding was that epidural analgesia provided lower pain scores during the early postoperative period, particularly at 2, 4, 6, and 8 hours. Epidural analgesia also prolonged the time to first rescue analgesic requirement and reduced 24-hour tramadol consumption. These findings support the established role of epidural analgesia as a strong regional technique for abdominal surgery, consistent with previous evidence showing superior postoperative analgesia compared with systemic opioid-based strategies.<sup>[10,11]</sup>

The observed superiority of epidural analgesia during the early postoperative period is biologically plausible. Epidural analgesia produces segmental blockade and can address both somatic and visceral components of abdominal surgical pain. By contrast, TAP block primarily targets the sensory nerves of the anterior abdominal wall, thereby producing useful somatic incisional

analgesia without consistent visceral pain control.<sup>[5,7]</sup> This explains why TAP block was effective but less intense than epidural analgesia in early postoperative assessments. Earlier clinical trials and systematic reviews have also shown that TAP block reduces pain scores and opioid consumption after abdominal surgery, although its benefit varies across surgical procedures and background analgesic protocols.<sup>[6,8,9]</sup>

In the present study, TAP block showed a favourable safety profile. Hypotension, urinary retention, pruritus, and motor weakness were numerically more common in the epidural group, and urinary retention reached statistical significance. This pattern is aligned with the known side-effect profile of neuraxial analgesia, where sympathetic blockade and neuraxial opioid effects can influence hemodynamics, bladder function, and pruritus. Meta-analytic data also indicate that epidural analgesia provides effective pain relief, but adverse effects and monitoring requirements remain important determinants of clinical selection.<sup>[12-14]</sup>

The findings have practical relevance for anaesthesia practice in tertiary care settings. Epidural analgesia remains an appropriate choice when dense and prolonged analgesia is required, particularly in major abdominal operations where visceral pain is prominent. TAP block is a valuable alternative or adjunct in patients where epidural placement is technically difficult, contraindicated, or associated with increased risk. The choice of technique should therefore be individualized according to surgical procedure, patient comorbidities, anticoagulation status, expected pain severity, monitoring resources, and recovery goals. In this study, both techniques were effective, but they offered different balances between analgesic potency and adverse-effect burden. The statistically significant reduction in rescue dose frequency and tramadol requirement in the epidural group further reinforces the clinical importance of analgesic duration, not only immediate pain score reduction.

**Limitations:** This study included a relatively small sample size from a single tertiary care centre, limiting wider generalisability. Blinding was not feasible due to the nature of the interventions. Surgical heterogeneity also influenced pain intensity and rescue analgesic requirement. Follow-up was restricted to the first 24 postoperative hours, so delayed pain outcomes and longer recovery indicators were not evaluated. Analgesic drug dosing details require final author verification.

## CONCLUSION

Epidural analgesia provided superior early postoperative pain relief, longer duration of analgesia, and lower rescue analgesic requirement compared with TAP block in patients undergoing elective abdominal surgeries. Pain scores at later postoperative intervals were comparable between the groups, suggesting that both techniques offered clinically useful analgesia over 24 hours. TAP block demonstrated better hemodynamic stability and fewer neuraxial-related adverse effects, especially regarding urinary retention and motor weakness. Therefore, epidural analgesia remains suitable for patients requiring stronger analgesia, whereas TAP block is a practical alternative when safety, simplicity, and

hemodynamic stability are priorities. Technique selection should be individualized according to patient risk profile and surgical context. These findings support pragmatic regional analgesia planning.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Chou R, Gordon DB, de Leon-Casasola OA, Rosenberg JM, Bickler S, Brennan T, et al. Management of postoperative pain: a clinical practice guideline from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council. *J Pain*. 2016;17(2):131-157. doi:10.1016/j.jpain.2015.12.008. PMID:26827847.
2. Kehlet H, Holte K. Effect of postoperative analgesia on surgical outcome. *Br J Anaesth*. 2001;87(1):62-72. doi:10.1093/bja/87.1.62. PMID:11460814.
3. Rafi AN. Abdominal field block: a new approach via the lumbar triangle. *Anaesthesia*. 2001;56(10):1024-1026. doi:10.1046/j.1365-2044.2001.02279-40.x. PMID:11576144.
4. Hebbard P, Fujiwara Y, Shibata Y, Royse C. Ultrasound-guided transversus abdominis plane (TAP) block. *Anaesth Intensive Care*. 2007;35(4):616-617. PMID:18020088.
5. McDonnell JG, O'Donnell BD, Farrell T, Gough N, Tuite D, Power C, Laffey JG. Transversus abdominis plane block: a cadaveric and radiological evaluation. *Reg Anesth Pain Med*. 2007;32(5):399-404. doi:10.1016/j.rapm.2007.03.011. PMID:17961838.
6. Carney J, McDonnell JG, Ochana A, Bhinder R, Laffey JG. The transversus abdominis plane block provides effective postoperative analgesia in patients undergoing total abdominal hysterectomy. *Anesth Analg*. 2008;107(6):2056-2060. doi:10.1213/ane.0b013e3181871313. PMID:19020158.
7. Petersen PL, Mathiesen O, Torup H, Dahl JB. The transversus abdominis plane block: a valuable option for postoperative analgesia? A topical review. *Acta Anaesthesiol Scand*. 2010;54(5):529-535. doi:10.1111/j.1399-6576.2010.02215.x. PMID:20175754.
8. Johns N, O'Neill S, Ventham NT, Barron F, Brady RR, Daniel T. Clinical effectiveness of transversus abdominis plane (TAP) block in abdominal surgery: a systematic review and meta-analysis. *Colorectal Dis*. 2012;14(10):e635-e642. doi:10.1111/j.1463-1318.2012.03104.x. PMID:22632762.
9. Baeriswyl M, Kirkham KR, Kern C, Albrecht E. The analgesic efficacy of ultrasound-guided transversus abdominis plane block in adult patients: a meta-analysis. *Anesth Analg*. 2015;121(6):1640-1654. doi:10.1213/ANE.0000000000000967. PMID:26397443.
10. Block BM, Liu SS, Rowlingson AJ, Cowan AR, Cowan JA Jr, Wu CL. Efficacy of postoperative epidural analgesia: a meta-analysis. *JAMA*. 2003;290(18):2455-2463. doi:10.1001/jama.290.18.2455. PMID:14612482.
11. Wu CL, Cohen SR, Richman JM, Rowlingson AJ, Courpas GE, Cheung K, et al. Efficacy of postoperative patient-controlled and continuous infusion epidural analgesia versus intravenous patient-controlled analgesia with opioids: a meta-analysis. *Anesthesiology*. 2005;103(5):1079-1088; quiz 1109-10. doi:10.1097/0000542-200511000-00023. PMID:16249683.
12. Pöpping DM, Elia N, Marret E, Remy C, Tramèr MR. Protective

- effects of epidural analgesia on pulmonary complications after abdominal and thoracic surgery: a meta-analysis. *Arch Surg.* 2008;143(10):990-999; discussion 1000. doi:10.1001/archsurg.143.10.990. PMID:18936379.
13. Desai N, El-Boghdadly K, Albrecht E. Epidural vs. transversus abdominis plane block for abdominal surgery: a systematic review, meta-analysis and trial sequential analysis. *Anaesthesia.* 2021;76(1):101-117. doi:10.1111/anae.15068. PMID:32385856.
14. Turan A, Cohen B, Elsharkawy H, Maheshwari K, Soliman LM, Babazade R, Ayad S, Hassan M, Elkassabany N, Essber HA, et al. Transversus abdominis plane block with liposomal bupivacaine versus continuous epidural analgesia for major abdominal surgery: the EXPLANE randomized trial. *J Clin Anesth.* 2022;77:110640. doi:10.1016/j.jclinane.2021.110640. PMID:34969004.