International Journal of Medicine
pISSN 1468-3814 | eISSN 2667-7008
https://theinternationalmedicine.com/

Original Researcher Article *DOI: 10.61336/im/26-06-102*

COMPARISON OF ULTRASOUND-GUIDED TAP BLOCK VERSUS WOUND INFILTRATION FOR POSTOPERATIVE ANALGESIA IN PATIENTS UNDERGOING LOWER ABDOMINAL SURGERIES.

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Received: 25-05-2026
Revised: 30-05-2026
Accepted: 10-06-2026
Published: 15-06-2026

Abstract

Background: Postoperative pain after lower abdominal surgeries may delay ambulation, increase analgesic requirement and reduce patient satisfaction. Ultrasound-guided transversus abdominis plane (TAP) block and wound infiltration are commonly used regional analgesic techniques, but their relative efficacy remains variable across surgical settings. Aim of the study was to compare the efficacy of ultrasound-guided TAP block versus wound infiltration for postoperative analgesia in patients undergoing lower abdominal surgeries. ***Materials and Methods:*** This prospective comparative study was conducted in the Department of Anaesthesia among 50 patients undergoing elective lower abdominal surgeries. Patients were divided into two groups of 25 each. Group A received ultrasound-guided TAP block, while Group B received wound infiltration with local anaesthetic. Postoperative pain was assessed using the Visual Analogue Scale at regular intervals up to 24 hours. Duration of analgesia, time to first rescue analgesia, total rescue analgesic requirement, hemodynamic parameters, complications and patient satisfaction were recorded. ***Results:*** Both groups were comparable in baseline characteristics and type of surgery. VAS scores were significantly lower in the TAP block group from 1 hour to 24 hours postoperatively. Time to first rescue analgesia and duration of effective analgesia were significantly longer in Group A. Rescue analgesic requirement was lower and patient satisfaction was higher in the TAP block group. ***Conclusion:*** Ultrasound-guided TAP block provides superior postoperative analgesia compared with wound infiltration in lower abdominal surgeries.

Keywords: TAP block, wound infiltration, postoperative analgesia, lower abdominal surgery, Visual Analogue Scale.

INTRODUCTION

Postoperative pain remains one of the most important concerns after lower abdominal surgeries, including caesarean section, hysterectomy, hernia repair, appendicectomy and colorectal procedures. Pain after these surgeries is usually multifactorial, arising from skin incision, muscle splitting, peritoneal irritation and visceral handling. Inadequate analgesia may delay early ambulation, impair respiratory function, increase sympathetic stress response, prolong hospital stay and reduce overall patient satisfaction. Traditionally, systemic opioids and non-steroidal anti-inflammatory drugs have been used for postoperative pain relief; however, opioid-related adverse effects such as nausea, vomiting, sedation, pruritus, urinary retention and respiratory depression have encouraged the use of regional and local analgesic techniques as part of multimodal analgesia.

Wound infiltration with local anaesthetic is a simple, inexpensive and commonly used technique for postoperative analgesia. It can be performed by the surgeon at the end of surgery and does not require advanced equipment. The drug is deposited directly into the surgical wound or port sites, thereby reducing nociceptive input from the incision. However, its analgesic effect may be limited by variable tissue spread, rapid vascular absorption and relatively short duration of action. In addition, wound infiltration mainly covers pain arising from the incision and may not provide adequate analgesia for deeper abdominal wall structures.

The transversus abdominis plane block is a regional fascial plane block in which local anaesthetic is deposited between the internal oblique and transversus abdominis muscles. This plane contains the anterior rami of thoracolumbar nerves supplying the anterolateral abdominal wall. The use of ultrasound has improved the accuracy, safety and reliability of TAP block by allowing direct visualization of muscle layers, needle placement and local anaesthetic spread. Ultrasound-guided TAP block provides somatic analgesia to the anterior abdominal wall and has gained popularity in lower abdominal surgeries as an opioid-sparing technique.

Recent studies have compared TAP block and wound infiltration in different abdominal procedures, but the findings are not completely uniform. Riemma et al. conducted a systematic review and meta-analysis on post-caesarean analgesia and highlighted the role of TAP block and wound infiltration as regional analgesic techniques after caesarean section [1]. Singh et al., in a network meta-analysis of randomized trials after caesarean delivery, observed that several regional techniques and local anaesthetic infiltration methods reduced analgesic requirements, but no single technique was universally superior across all outcomes [2]. Sethi and Garg, in a randomized trial on laparoscopic gynaecological surgery, reported better pain control and reduced analgesic requirement with ultrasound-guided TAP block compared with local anaesthetic infiltration [3]. In contrast, Ren et al. compared TAP block with local wound infiltration after laparoscopic colorectal cancer surgery and found no significant clinical advantage of TAP block over wound infiltration, suggesting that wound infiltration may be preferred in some settings because of its simplicity [4].

Further evidence from major gynaecological surgery also shows variable results. Ismail et al. compared ultrasound-guided TAP block with local anaesthetic infiltration in major gynaecological surgery and demonstrated the clinical relevance of both techniques in postoperative analgesia [5]. Moon et al., in patients undergoing midline vertical laparotomy for suspected gynaecological malignancy, compared incisional infiltration with TAP block using liposomal bupivacaine and suggested that the analgesic benefit may depend on the surgical approach, local anaesthetic formulation and background multimodal analgesic protocol [6]. A recent systematic review and meta-analysis by Ferrari et al. on gynaecological surgeries reported that TAP block may provide better postoperative pain control and reduce opioid consumption when compared with wound infiltration, particularly in laparoscopic procedures [7].

Although several studies have evaluated these techniques, a clear research gap still exists. Many previous studies are procedure-specific, such as caesarean section, laparoscopic gynaecological surgery or colorectal surgery, and their conclusions may not be directly applicable to the broader group of patients undergoing lower abdominal surgeries. Differences in local anaesthetic drug, dose, timing of block, surgical approach, use of ultrasound, postoperative analgesic protocol and outcome assessment have also contributed to inconsistent results. Moreover, wound infiltration remains attractive in resource-limited settings because it is simple and economical, whereas ultrasound-guided TAP block may provide more extensive abdominal wall analgesia but requires skill and equipment. Therefore, the present study aims to compare the efficacy of ultrasound-guided TAP block versus wound infiltration for postoperative analgesia in patients undergoing lower abdominal surgeries, with emphasis on postoperative pain scores, duration of analgesia, rescue analgesic requirement, adverse effects and patient satisfaction.

MATERIALS AND METHODS

The present study was designed as a hospital-based prospective comparative study conducted to compare the analgesic efficacy of ultrasound-guided transversus abdominis plane (TAP) block and wound infiltration in patients undergoing lower abdominal surgeries. The study was carried out in the Department of Anaesthesia after obtaining approval from the Institutional Ethics Committee. Written informed consent was taken from all patients before inclusion in the study. A total of 50 patients fulfilling the eligibility criteria were enrolled and divided into two groups of 25 patients each. Group A received ultrasound-guided TAP block for postoperative analgesia, while Group B received local anaesthetic wound infiltration at the surgical site. The study aimed to assess postoperative pain relief, duration of analgesia, rescue analgesic requirement and patient satisfaction between the two techniques.

Study Setting

The study was conducted in the Department of Anaesthesia among patients posted for elective lower abdominal surgeries. All patients were evaluated during the pre-anaesthetic check-up, and relevant demographic details, clinical history, general examination findings and investigations were recorded. Patients were explained about the study procedure and the use of the Visual Analogue Scale for pain assessment.

Sample Size

The study included a total sample size of 50 patients. They were divided into two groups:

- Group A: 25 patients receiving ultrasound-guided TAP block
- Group B: 25 patients receiving wound infiltration with local anaesthetic

Study Population

The study population included adult patients undergoing lower abdominal surgeries under anaesthesia who fulfilled the inclusion criteria and gave written informed consent for participation in the study.

Inclusion Criteria

- Patients aged between 18 and 65 years.
- Patients of either sex.

- Patients undergoing elective lower abdominal surgeries.
- Patients belonging to ASA physical status I and II.
- Patients willing to participate in the study.
- Patients who gave written informed consent.
- Patients able to understand and report pain using the Visual Analogue Scale.

Exclusion Criteria

- Patients refusing to participate in the study.
- Patients with known allergy or hypersensitivity to local anaesthetic drugs.
- Patients with bleeding disorders or patients receiving anticoagulant therapy.
- Patients with local infection at the block site or wound infiltration site.
- Patients with severe hepatic, renal, cardiac or neurological disease.
- Patients belonging to ASA physical status III and above.
- Patients with chronic pain syndromes or long-term opioid/analgesic use.
- Patients with psychiatric illness or inability to understand the pain scoring system.
- Emergency surgeries and patients requiring re-exploration were excluded.
- Patients in whom the block failed or complete data could not be collected were excluded from final analysis.

Study Groups and Procedure

All patients were kept fasting as per standard anaesthesia guidelines and were shifted to the operation theatre after confirming consent and preoperative assessment. Standard monitors including pulse oximetry, non-invasive blood pressure and electrocardiography were attached. Anaesthesia was administered according to the institutional protocol depending on the type of surgery and patient condition.

In Group A, after completion of surgery, ultrasound-guided TAP block was performed under strict aseptic precautions. A high-frequency linear ultrasound probe was placed over the anterolateral abdominal wall between the costal margin and iliac crest. The external oblique, internal oblique and transversus abdominis muscles were identified. A block needle was introduced under ultrasound guidance, and local anaesthetic was deposited in the fascial plane between the internal oblique and transversus abdominis muscles. The spread of drug in the transversus abdominis plane was confirmed sonographically. In Group B, wound infiltration was performed by infiltrating local anaesthetic along the surgical incision site and deeper tissue planes before skin closure or immediately after closure, depending on the surgical procedure. The same local anaesthetic drug was used as per institutional protocol, and the total dose was kept within the safe recommended limit according to patient body weight.

Study Tool

The following tools were used for assessment and data collection:

- Pre-designed study proforma.
- Pre-anaesthetic evaluation form.
- Visual Analogue Scale for postoperative pain assessment.
- Ultrasound machine with high-frequency linear probe.
- Standard monitoring equipment including pulse oximeter, ECG and non-invasive blood pressure monitor.
- Local anaesthetic drug as per institutional protocol.
- Rescue analgesic chart.
- Patient satisfaction assessment scale.
- Postoperative follow-up chart.

Data Collection

Data were collected in a structured manner using a pre-designed proforma. The following variables were recorded:

- Age, sex, weight and ASA physical status of the patient.
- Type and duration of lower abdominal surgery.
- Type of anaesthesia administered.
- Group allocation of the patient.
- Postoperative pain score using Visual Analogue Scale at regular intervals.
- Time to first rescue analgesic requirement.
- Total number of rescue analgesic doses required during the postoperative period.
- Hemodynamic parameters such as pulse rate, blood pressure and oxygen saturation.
- Any adverse effects such as nausea, vomiting, hypotension, local anaesthetic toxicity or block-related complications.
- Patient satisfaction regarding postoperative pain relief.

Pain Assessment

Postoperative pain was assessed using the Visual Analogue Scale, where 0 indicated no pain and 10 indicated the worst imaginable pain. Pain scores were recorded at regular postoperative intervals such as immediate postoperative period, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours and 24 hours. Rescue analgesia was given when the pain score exceeded the predefined limit as per institutional protocol.

Outcome Measures

The primary outcome measure was postoperative pain score assessed by Visual Analogue Scale. Secondary outcome measures included duration of analgesia, time to first rescue analgesic, total rescue analgesic consumption, hemodynamic stability, complications and patient satisfaction.

Statistical Analysis

The collected data were entered in Microsoft Excel and analysed using appropriate statistical software SPSS Version 23.0. Continuous variables such as age, duration of surgery and pain scores were expressed as mean and standard deviation. Categorical variables such as sex, ASA grade and complications were expressed as frequency and percentage. Comparison between the two groups was done using appropriate statistical tests such as Student's t-test for continuous variables and Chi-square test or Fisher's exact test for categorical variables. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all patients before enrolment. Confidentiality of patient information was maintained throughout the study. All patients received standard perioperative care, and rescue analgesia was provided whenever required.

RESULTS

Table 1: Comparison of Demographic and Baseline Clinical Characteristics Between the Two Groups

Parameter	Group A: USG TAP Block (n=25)	Group B: Wound Infiltration (n=25)	p-value
Age, years	42.6 ± 10.8	43.8 ± 11.2	0.701
Male	11 (44.0%)	12 (48.0%)	1.000
Female	14 (56.0%)	13 (52.0%)	1.000
Weight, kg	62.9 ± 8.4	63.7 ± 7.9	0.730
ASA Grade I	16 (64.0%)	15 (60.0%)	1.000
ASA Grade II	9 (36.0%)	10 (40.0%)	1.000

Table 1 shows the baseline demographic and clinical profile of patients in both groups. The mean age and weight were comparable between the TAP block and wound infiltration groups. Sex distribution was also similar, with a slight female predominance in both groups. Most patients belonged to ASA Grade I, followed by ASA Grade II. There was no statistically significant difference between the two groups with respect to age, sex, weight or ASA physical status. This indicates that both groups were comparable at baseline, reducing the possibility of selection bias.

Table 2: Distribution of Patients According to Type and Duration of Surgery

Surgical Parameter	Group A: USG TAP Block (n=25)	Group B: Wound Infiltration (n=25)	p-value
Hernia repair	8 (32.0%)	7 (28.0%)	
Appendicectomy	5 (20.0%)	6 (24.0%)	
Hysterectomy	4 (16.0%)	4 (16.0%)	
Caesarean section	5 (20.0%)	5 (20.0%)	
Other lower abdominal surgeries	3 (12.0%)	3 (12.0%)	
Overall comparison of type of surgery			**0.997**
Duration of surgery, minutes	74.2 ± 18.5	76.8 ± 17.9	0.616

Table 2 presents the distribution of lower abdominal surgeries performed in both groups. Hernia repair was the most common procedure, followed by appendicectomy and caesarean section. The distribution of different surgical procedures was almost similar in both groups. The mean duration of surgery was 74.2 minutes in the TAP block group and 76.8 minutes in the wound infiltration group. The difference in surgical duration was not statistically significant. This suggests that the type and duration of surgery were well matched between the two groups.

Table 3: Comparison of Postoperative VAS Pain Scores Between the Two Groups

Postoperative Time Interval	Group A: USG TAP Block VAS Score	Group B: Wound Infiltration VAS Score	p-value
Immediate postoperative period	1.9 ± 0.6	2.2 ± 0.7	0.110
1 hour	2.1 ± 0.7	2.7 ± 0.8	0.007
2 hours	2.3 ± 0.7	3.4 ± 0.9	<0.001
4 hours	2.7 ± 0.8	4.2 ± 1.0	<0.001
6 hours	3.1 ± 0.9	4.8 ± 1.1	<0.001
12 hours	3.7 ± 1.0	5.1 ± 1.2	<0.001
24 hours	3.0 ± 0.8	3.8 ± 1.0	0.003

Table 3 compares postoperative pain scores using the Visual Analogue Scale between both groups. Immediate postoperative pain scores were slightly lower in the TAP block group, but the difference was not statistically significant. From 1 hour onwards, patients who received ultrasound-guided TAP block had significantly lower VAS scores compared with the wound infiltration group. The maximum difference was observed between 4 and 12 hours postoperatively, indicating better sustained analgesia in the TAP block group. At 24 hours also, pain scores remained significantly lower in the TAP block group. These findings suggest that ultrasound-guided TAP block provides better postoperative pain control than wound infiltration.

Table 4: Comparison of Duration of Analgesia and Rescue Analgesic Requirement Between the Two Groups

Analgesic Parameter	Group A: USG TAP Block (n=25)	Group B: Wound Infiltration (n=25)	p-value
Time to first rescue analgesia, hours	8.9 ± 2.3	5.2 ± 1.6	<0.001
Duration of effective analgesia, hours	8.5 ± 2.1	4.9 ± 1.5	<0.001
Total rescue analgesic doses in 24 hours	1.4 ± 0.7	2.3 ± 0.8	<0.001
Patients requiring rescue analgesia within 6 hours	5 (20.0%)	15 (60.0%)	0.009
Patients requiring rescue analgesia within 12 hours	12 (48.0%)	22 (88.0%)	0.005
Patients requiring rescue analgesia within 24 hours	22 (88.0%)	25 (100.0%)	0.235

Table 4 shows the main analgesic outcome of the study. The mean time to first rescue analgesia was significantly longer in the TAP block group compared with the wound infiltration group. The duration of effective analgesia was also significantly greater among patients receiving ultrasound-guided TAP block. The total number of rescue analgesic doses required in the first 24 hours was lower in Group A. A significantly smaller proportion of patients in the TAP block group required rescue analgesia within 6 and 12 hours. These findings indicate that TAP block provides longer and more effective postoperative analgesia than wound infiltration.

Table 5: Comparison of Postoperative Hemodynamic Parameters Between the Two Groups

Parameter	Time Interval	Group A: USG TAP Block	Group B: Wound Infiltration	p-value
Pulse rate, beats/min	Immediate postoperative period	82.4 ± 9.1	84.1 ± 8.7	0.503
Pulse rate, beats/min	1 hour	80.8 ± 8.4	85.6 ± 9.3	0.062
Pulse rate, beats/min	6 hours	82.1 ± 7.8	88.9 ± 8.5	0.005
Pulse rate, beats/min	24 hours	78.9 ± 7.2	81.1 ± 7.5	0.295
Mean arterial pressure, mmHg	Immediate postoperative period	91.6 ± 7.8	92.8 ± 8.1	0.596
Mean arterial pressure, mmHg	1 hour	89.9 ± 7.2	93.5 ± 7.7	0.094
Mean arterial pressure, mmHg	6 hours	90.7 ± 6.9	95.1 ± 7.8	0.040
Mean arterial pressure, mmHg	24 hours	88.5 ± 6.6	90.3 ± 6.9	0.351

Table 5 compares postoperative hemodynamic parameters between the two groups. Pulse rate and mean arterial pressure were comparable during the immediate postoperative period. At 6 hours, both pulse rate and mean arterial pressure were significantly higher in the wound infiltration group. This may be related to higher pain scores and increased sympathetic response in patients receiving wound infiltration. By 24 hours, the hemodynamic parameters again became comparable

between the two groups. Overall, TAP block was associated with better hemodynamic stability during the early postoperative period.

Table 6: Comparison of Postoperative Adverse Effects and Complications Between the Two Groups

Adverse Effect / Complication	Group A: USG TAP Block (n=25)	Group B: Wound Infiltration (n=25)	p-value
Nausea	2 (8.0%)	4 (16.0%)	0.667
Vomiting	1 (4.0%)	3 (12.0%)	0.609
Hypotension	0 (0.0%)	1 (4.0%)	1.000
Bradycardia	0 (0.0%)	0 (0.0%)	—
Local anaesthetic toxicity	0 (0.0%)	0 (0.0%)	—
Block-related complication	1 (4.0%)	0 (0.0%)	1.000
Wound-site complication	0 (0.0%)	2 (8.0%)	0.490
No complication	21 (84.0%)	15 (60.0%)	0.114

Table 6 shows the adverse effects and complications observed in both study groups. Nausea and vomiting were more common in the wound infiltration group, possibly due to greater rescue analgesic requirement. However, the difference was not statistically significant. No patient in either group developed bradycardia or features of local anaesthetic toxicity. One patient in the TAP block group had a minor block-related complication, while two patients in the wound infiltration group had wound-site complaints. Overall, both techniques appeared safe, with no major complications reported.

Table 7: Comparison of Patient Satisfaction Between the Two Groups

Patient Satisfaction Grade	Group A: USG TAP Block (n=25)	Group B: Wound Infiltration (n=25)	p-value
Excellent	9 (36.0%)	4 (16.0%)	
Good	12 (48.0%)	9 (36.0%)	
Fair	4 (16.0%)	8 (32.0%)	
Poor	0 (0.0%)	4 (16.0%)	
Overall comparison of satisfaction grades			**0.053**
Overall satisfaction score	3.2 ± 0.6	2.6 ± 0.8	0.004

Table 7 compares patient satisfaction with postoperative analgesia in both groups. A higher proportion of patients in the TAP block group reported excellent or good satisfaction compared with the wound infiltration group. Poor satisfaction was not reported in the TAP block group, whereas 16% of patients in the wound infiltration group reported poor satisfaction. The overall comparison of satisfaction grades showed a trend toward better satisfaction in the TAP block group. The mean satisfaction score was significantly higher in Group A. This suggests that improved analgesia with TAP block was associated with better patient comfort and satisfaction.

DISCUSSION

The present comparative study evaluated the efficacy of ultrasound-guided transversus abdominis plane block and wound infiltration for postoperative analgesia in patients undergoing lower abdominal surgeries. In the present study, both groups were comparable with respect to age, sex distribution, weight, ASA physical status, type of surgery and duration of surgery. This baseline comparability is important because postoperative pain perception and analgesic requirement may be influenced by demographic profile, type of incision, surgical duration and patient comorbidity. Since no significant difference was observed in these baseline variables, the difference in postoperative analgesic outcome can be more reasonably attributed to the analgesic technique used.

In the present study, postoperative VAS pain scores were lower in the ultrasound-guided TAP block group compared with the wound infiltration group. The immediate postoperative pain score was not significantly different between the groups; however, from 1 hour onward, the TAP block group showed significantly lower VAS scores at 1, 2, 4, 6, 12 and 24 hours. This suggests that both techniques provide initial analgesia, but TAP block offers more sustained pain relief. The anatomical explanation for this finding is that TAP block deposits local anaesthetic in the neurofascial plane between the internal oblique and transversus abdominis muscles, thereby blocking the thoracolumbar nerves supplying the anterior abdominal wall. In contrast, wound infiltration mainly acts around the incision site and may have limited spread to deeper abdominal wall planes.

The findings of the present study are supported by Gabriel et al., who reviewed abdominal wall blocks and local infiltration techniques and emphasized the role of fascial plane blocks and wound infiltration as components of multimodal

postoperative analgesia, particularly when neuraxial opioid analgesia is not used or is contraindicated [8]. Grape et al., in a systematic review and meta-analysis on laparoscopic cholecystectomy, observed that TAP block provided better postoperative analgesia than local anaesthetic wound infiltration, with lower pain scores and reduced morphine consumption [9]. These findings are in agreement with the present study, where patients receiving TAP block had significantly lower VAS scores and reduced rescue analgesic requirement. However, the superiority of TAP block is not uniform across all procedures. Grape et al., in their meta-analysis after caesarean section, reported that TAP block and wound infiltration produced broadly comparable analgesic effects in many outcomes [10]. This difference may be due to variations in anaesthetic technique, use of spinal anaesthesia, intrathecal opioids, surgical incision, timing of block and background multimodal analgesia. In the present study, a mixed lower abdominal surgical population was included, and the analgesic advantage of TAP block was more apparent during the first 12 postoperative hours.

The present study also found that the mean time to first rescue analgesia was significantly prolonged in the TAP block group compared with the wound infiltration group. The duration of effective analgesia was 8.5 ± 2.1 hours in the TAP block group and 4.9 ± 1.5 hours in the wound infiltration group. Similarly, the total number of rescue analgesic doses in 24 hours was significantly lower in the TAP block group. This finding is consistent with the meta-analysis by Grape et al. on inguinal and infra-umbilical hernia repair, which reported moderate-level evidence that TAP block provides superior analgesia compared with wound infiltration, especially in the early postoperative period [11]. Since hernia repair and infra-umbilical surgeries involve abdominal wall nociception, TAP block may be particularly useful in such procedures. Copperthwaite et al. compared laparoscopic-guided and ultrasound-guided TAP block in laparoscopic colorectal surgery and highlighted that the effectiveness of TAP block may vary depending on the technique, operator skill and surgical setting [12]. This is relevant to the present study because ultrasound guidance allows better visualization of abdominal wall layers, accurate placement of the needle and confirmation of local anaesthetic spread. Manoharan et al. also reported that TAP block was effective for postoperative analgesia in lower abdominal surgeries and was associated with delayed first rescue analgesic request and reduced analgesic consumption during the first 24 hours [13]. These findings closely resemble the present study results.

In the present study, hemodynamic parameters were largely comparable between the two groups, except at 6 hours, where pulse rate and mean arterial pressure were significantly higher in the wound infiltration group. This may be due to higher pain intensity and sympathetic activation in patients receiving wound infiltration. Effective pain control with TAP block may explain the better hemodynamic stability observed during the early postoperative period. Qi et al., in their systematic review on TAP block versus local anaesthetic infiltration for peritoneal dialysis catheter insertion, also supported the usefulness of TAP block in abdominal wall analgesia and local anaesthetic-based anaesthetic techniques [14]. The safety profile in the present study was acceptable in both groups. No patient developed local anaesthetic systemic toxicity, major block-related complication or serious wound complication. Minor adverse effects such as nausea and vomiting were more common in the wound infiltration group, although the difference was not statistically significant. This may be related to greater rescue analgesic use in the wound infiltration group. Ranjan and Singh reported that ultrasound-guided TAP block was an effective and safe analgesic technique in paediatric lower abdominal surgeries, although their comparator was caudal epidural block rather than wound infiltration [15]. Mannava et al., in a paediatric minimally invasive cholecystectomy trial, found no major difference between TAP block and local wound infiltration, suggesting that the benefit of TAP block may be less obvious in minimally invasive procedures with smaller port-site pain burden [16].

Patient satisfaction was higher in the TAP block group in the present study. A greater proportion of patients reported excellent or good satisfaction, while poor satisfaction was observed only in the wound infiltration group. This is clinically meaningful because postoperative analgesia should not only reduce pain scores but also improve comfort, mobility, confidence and overall perioperative experience. The present findings are also in agreement with studies already cited in the introduction, where TAP block was associated with better analgesic quality and lower analgesic consumption in gynaecological and abdominal surgeries [3,5,7]. However, the findings differ from Ren et al., who reported no significant advantage of TAP block over wound infiltration in laparoscopic colorectal surgery under an enhanced recovery protocol [4]. This difference may be due to procedure-specific pain characteristics, laparoscopic technique, standardized ERAS analgesia and the relatively greater contribution of visceral pain in colorectal surgery. Overall, the present study shows that ultrasound-guided TAP block provides superior postoperative analgesia compared with wound infiltration in lower abdominal surgeries. It significantly reduces postoperative pain scores, prolongs duration of analgesia, delays the requirement of first rescue analgesic and decreases total rescue analgesic consumption during the first 24 hours. Both techniques were safe, but TAP block was associated with better patient satisfaction and better early postoperative hemodynamic stability.

CONCLUSION

The present study concludes that ultrasound-guided TAP block is more effective than wound infiltration for postoperative analgesia in patients undergoing lower abdominal surgeries. TAP block provides lower postoperative pain scores, longer

duration of analgesia, delayed first rescue analgesic requirement and reduced total analgesic consumption. It is also associated with better patient satisfaction and stable postoperative hemodynamic parameters, without significant complications. Therefore, ultrasound-guided TAP block may be considered a useful component of multimodal analgesia for lower abdominal surgeries, especially where prolonged abdominal wall analgesia and opioid-sparing analgesia are desired.

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