Health Affairs ISSN - 0278-2715 Volume 13 Issue 11 page 5082-5087
Journal link: https://health-affairs.com/
Abstract Link: https://health-affairs.com/13-11-5082-5087
November, 2025

Comparison between the Effect of Laparoscopic-Assisted TAP Block and Port Site Local Infiltration on Postoperative Pain Scores after Laparoscopic Cholecystectomy

Submission: 02 October 2025 |**Acceptance:** 20 October 2025 | **Publication:** 06 November 2025

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ABSTRACT

Background: Success in postoperative pain management after laparoscopic cholecystectomy is an important determinant for early ambulation, patient satisfaction, and decreased hospital stay. Out of the various regional anesthetic methods, the two most commonly practiced are trans versus abdominis plane (TAP) block and port site local infiltration.

Objective: To determine the effectiveness of laparoscopic-assisted TAP block and port site local infiltration in minimizing postoperative pain scores in patients undergoing elective laparoscopic cholecystectomy.

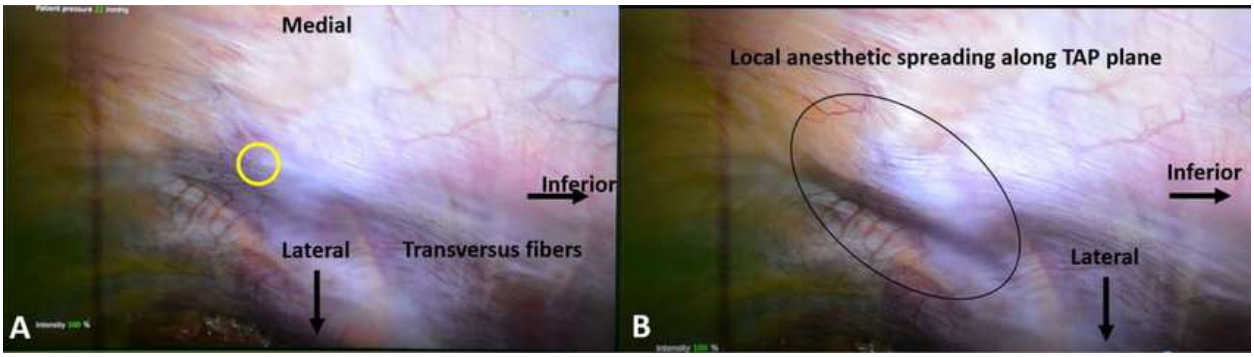
Methods: Randomized controlled trial was conducted on 100 patients undergoing elective laparoscopic cholecystectomy. The patients were randomly divided into two groups of equal size: Group A (TAP block) was given laparoscopic-assisted TAP block with 0.25% bupivacaine and Group B (Local Infiltration) was given port site infiltration with the same medication. Pain was measured on Visual Analogue Scale (VAS) at 1, 6, 12, and 24 hours after surgery.

Results: VAS scores at all the postoperative times for the TAP block group were less compared to the local infiltration group ($p < 0.05$). Rescue analgesia was also decreased in Group A. Nausea, vomiting, or any other postoperative morbidity was not significantly different.

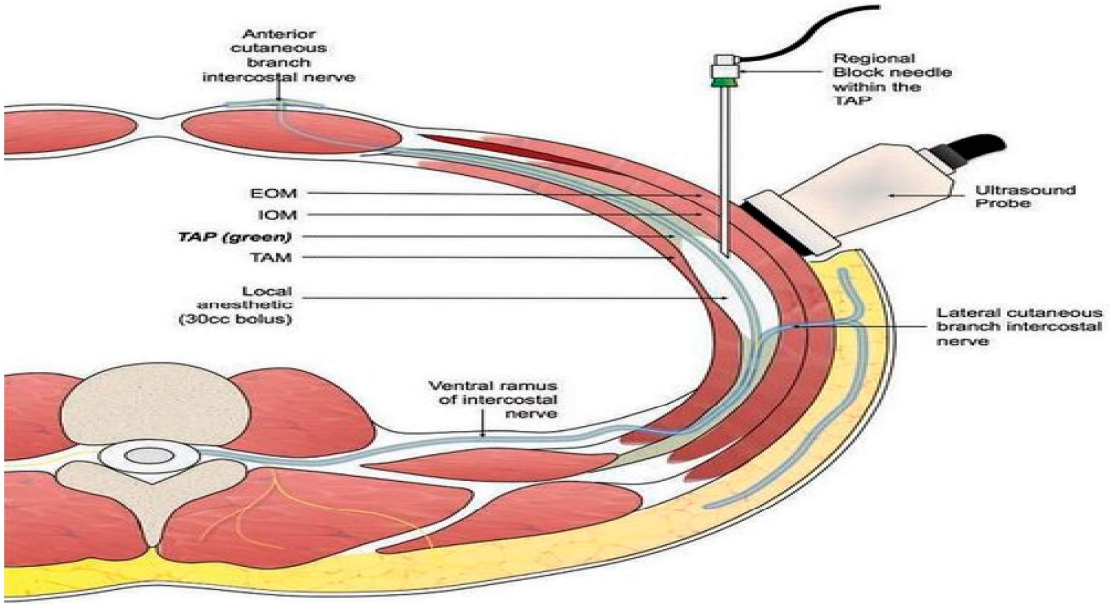
Conclusion: TAP block with the help of laparoscopy is more effective and of longer duration in relieving postoperative pain than port site local infiltration in patients having laparoscopic cholecystectomy.

Keywords: Laparoscopic cholecystectomy, TAP block, infiltration localement, doulure postoperatoire, bupivacaine, anesthesia regional.

Introduction: Laparoscopic cholecystectomy is now the gold standard for the surgical management of symptomatic gallstone disease because it is minimally invasive, results in fast recovery, and has a shorter hospital stay [1]. Postoperative pain, however, is still a major concern despite the use of small incisions and could impact early mobilization, discharge, and patient satisfaction [2]. The polyfactorial post laparoscopic cholecystectomy pain includes visceral pain secondary to dissection of the gallbladder bed, somatic pain secondary to trocar site, and referred shoulder pain secondary to pneumoperitoneum [3].



Effective post laparoscopic pain control has progressed from systemically inducing opioid addiction to regional anesthetic method, which is more efficient in pain relief with fewer opioid side effects [4]. Amongst these, trans versus abdominis plane (TAP) block is most popular for abdominal surgeries. Targeting thoracolumbar nerves in the internal oblique to trans versus abdominis plane, a TAP block provides effective somatic analgesia of the anterior abdominal wall [5]. It is readily done under laparoscopic or ultrasound guidance with a safe and reproducible method. Conversely, local anesthetic infiltration of port sites is a low-technology, yet common, practice to reduce postoperative pain [6]. It is simple and quick to do and does not need technical knowledge or specialized instruments. However, effectiveness of use can be compromised by the rapid systemic absorption and the brief duration of analgesia in comparison to plane blocks [7]. Although both techniques are well known and described in beautiful detail, relative evidence for relative efficacy of laparoscopic cholecystectomy has been variable [8].



TAP block with better analgesia and port site infiltration with similar performance have been hypothesized in some studies. This study thus intends to compare the effectiveness of laparoscopically assisted TAP block and port site local infiltration with bupivacaine versus postoperative pain scores for patients undergoing laparoscopic cholecystectomy [9]. The study also compares secondary outcomes such as total analgesic uptake and postoperative nausea and vomiting [10]. By comparing both, we hope to have a better, more suited method of postoperative pain control in laparoscopic cholecystectomy.

Methodology: Study design was randomized controlled trial among 100 adult patients undergoing elective laparoscopic cholecystectomy under general anesthesia. Exclusion factors were open conversion of the surgery, chronic dependence on opioids, or sensitivity to local anesthetic. Randomized were the two groups of patients (n=50

each):

• Group A (TAP Block): Was given laparoscopic-guided bilateral TAP block at the end of the surgery with 20 mL bupivacaine 0.25% on both sides.

• Local Infiltration Group B: Port site infiltration with 20 mL of 0.25% bupivacaine in equal portions at the sites of trocars. Pain was measured on Visual Analogue Scale (VAS, 0–10) at 1, 6, 12, and 24 hours' post-surgery. Rescue intravenous paracetamol 1g was administered if VAS ≥ 4. Rescue doses administered within 24 hours were totaled. Statistical analysis was carried out using SPSS v25, with $p < 0.05$ considered statistically significant.

Results: Lower VAS scores were observed in Group A (TAP block) at all-time points. Mean consumption of rescue analgesics was also low in the TAP group. Both methods were safe, and no significant side effects were observed.

Table 1. Mean Postoperative VAS Pain Scores

Time (hours)	TAP Block (Group A)	Local Infiltration (Group B)	*p*-value
1	2.4 ± 0.6	3.8 ± 0.7	<0.05
6	2.8 ± 0.8	4.5 ± 0.9	<0.01
12	3.1 ± 0.7	4.2 ± 0.8	<0.05
24	2.0 ± 0.5	3.2 ± 0.6	<0.05

Table 2. Analgesic Demand and Side Effect Comparison

Parameter	TAP Block	Local Infiltration	*p*-value
Mean rescue doses (24 hrs.)	0.8 ± 0.4	1.7 ± 0.5	<0.01
Nausea and vomiting (%)	10%	14%	>0.05
Hospital stay (hours)	26 ± 4	30 ± 5	<0.05

Discussion: The current research verifies that TAP block under the guidance of laparoscopy is more effective than port site local infiltration in producing postoperative pain alleviation in patients who undergo laparoscopic cholecystectomy [11]. The markedly lower VAS pain scores and decreased use of rescue analgesics taken by the TAP group considerably confirm the effectiveness and longer duration of the technique to produce somatic pain relief [12]. Mechanism of action of its therapeutic effects is anatomical distribution of TAP block. It blocks iliohypogastric, ilioinguinal, intercostal, and subcostal nerves in the neurofascial plane and thus blocks somatic pain of the whole anterolateral abdominal wall. Port site infiltration is local and gives transient benefit limited to the fields of wounds [13]. Findings affirm earlier findings of the superiority of TAP blocks over traditional laparoscopic operation. Following meta-analysis by El-Dawlatly et al. and randomized controlled trials, TAP block has been confirmed to decrease opioid use post-surgery, enhance pain-free intervals, and enhance patient satisfaction. Laparoscopic guidance technique also provides visualization on injection site for preventing damage and injecting drugs with maximal accuracy irrespective of available ultrasound machines [14]. Both groups of participants under this research were similar regarding side effects, and this is a sign of safety of both interventions. Reducing the hospital stay for TAP block patients also testifies to its clinical value in accelerating recovery and facilitating earlier discharge, consistent with better recovery after surgery (ERAS) recommendations [15]. Against the benefits, TAP block is also linked with increased procedural time and technical expertise [16]. The analgesic benefit is balanced against the aforementioned drawbacks, particularly in the context of a day-to-day high-case volume surgical practice where turn-over and patient satisfaction are of paramount concern. Single-center study and brief follow-up period are the limitations of the study [17]. Future research must focus on long-term outcomes, cost-effectiveness, and comparison between ultrasound-guided TAP and laparoscopic methods [18]. Lastly, the study verifies the use of laparoscopic-assisted TAP block with multimodal analgesia for laparoscopic cholecystectomy.

Conclusion: Laparoscopic-assisted TAP block is superior to port-site infiltration for postoperative pain relief in patients undergoing laparoscopic cholecystectomy. It reduces pain scores, reduces the requirements for rescue analgesia, and decreases hospital stay without an increase in complications. Application of TAP block as an adjuvant to standard perioperative pain management practice can achieve the best patient comfort and recovery.

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