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Comparative Efficacy Of Ultrasound-Guided Tap Block Vs. Quadratus Lumborum Block For Postoperative Analgesia In Abdominal Surgery

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Abstract

Background

Ultrasound-guided transversus abdominis plane (TAP) block and quadratus lumborum (QL) block are commonly used regional anesthesia techniques for postoperative analgesia in abdominal surgery. Comparative evidence regarding their analgesic effectiveness in routine clinical practice remains limited. This study aimed to compare postoperative analgesic outcomes between patients receiving TAP block and those receiving QL block.

Methods

This comparative cross-sectional study was conducted on 120 adult patients who underwent elective abdominal surgery and received either ultrasound-guided TAP block (n=60) or QL block (n=60) as part of multimodal analgesia. Demographic and perioperative data were recorded. Primary outcome was total opioid consumption within 24 hours postoperatively. Secondary outcomes included visual analogue scale (VAS) pain scores at 1, 2, 6, 12, and 24 hours, time to first rescue analgesia, and incidence of postoperative nausea and vomiting (PONV). Continuous variables were compared using independent t-test, and categorical variables were analyzed using chi-square test. Time-to-event analysis was performed using Cox regression.

Results

Baseline demographic and surgical characteristics were comparable between groups ($p > 0.05$). Patients receiving QL block demonstrated significantly lower postoperative VAS scores at all measured time points ($p < 0.01$). Mean 24-hour opioid consumption was significantly reduced in the QL group compared with the TAP group (12.3 ± 5.9 mg vs 18.6 ± 6.8 mg; $p < 0.001$). The mean time to first rescue analgesia was significantly longer in the QL group (10.4 ± 3.1 hours vs 6.2 ± 2.4 hours; $p < 0.001$). Cox regression analysis showed that QL block was associated with a significantly lower hazard of requiring rescue analgesia (adjusted HR 0.48, 95% CI 0.30–0.76; $p = 0.002$). Incidence of PONV was lower in the QL group but was not statistically significant (15.0% vs 26.7%; $p = 0.11$).

Conclusion

In this comparative cross-sectional analysis, ultrasound-guided QL block was associated with superior postoperative analgesia compared to TAP block, reflected by lower pain scores, reduced opioid consumption, and prolonged time to rescue analgesia. QL block may provide enhanced postoperative pain control in abdominal surgery.

INTRODUCTION

Effective postoperative pain control is a fundamental component of perioperative care, particularly in abdominal surgery, where inadequate analgesia may contribute to delayed mobilization, prolonged hospital stay, increased opioid consumption, and higher risk of complications (1,2). Multimodal analgesia strategies aim to optimize pain relief while minimizing opioid-related adverse effects such as nausea, vomiting, respiratory depression, and ileus (3). Regional anesthesia techniques have become increasingly important in this context due to their opioid-sparing properties and favorable safety profiles (4).

The ultrasound-guided transversus abdominis plane (TAP) block is a widely used regional anesthesia technique that provides somatic analgesia to the anterior abdominal wall by targeting nerves in the fascial plane between the internal oblique and transversus abdominis muscles (5). TAP block has demonstrated efficacy in reducing postoperative pain scores and opioid

requirements in various abdominal procedures, including laparoscopic and open surgeries (6). However, its analgesic effect is primarily limited to the anterior abdominal wall and may not consistently address visceral pain components (7).

The quadratus lumborum (QL) block is a more recently described fascial plane block that targets the thoracolumbar fascia adjacent to the quadratus lumborum muscle. Due to its potential spread to the paravertebral space, QL block may provide both somatic and visceral analgesia with longer duration of action compared to TAP block (8,9). Several studies have suggested that QL block may offer superior postoperative analgesia and prolonged pain relief in abdominal surgeries (10). Nevertheless, the comparative effectiveness of QL block versus TAP block remains an area of ongoing investigation, particularly in real-world clinical settings. Although randomized controlled trials have evaluated these techniques, variability in block approaches, local anesthetic volumes, surgical types, and outcome measures has led to inconsistent findings (11).

Furthermore, limited comparative cross-sectional analyses have explored analgesic outcomes in routine perioperative practice. Understanding the relative effectiveness of these two commonly employed techniques may assist clinicians in selecting the most appropriate regional anesthesia strategy for abdominal surgery. Therefore, this study aimed to compare postoperative analgesic outcomes between patients receiving ultrasound-guided TAP block and those receiving ultrasound-guided QL block in abdominal surgery. The primary objective was to assess total opioid consumption within 24 hours postoperatively, while secondary objectives included comparison of pain scores, time to first rescue analgesia, and postoperative adverse effects (12).

To compare the effectiveness of ultrasound-guided transversus abdominis plane (TAP) block and quadratus lumborum (QL) block in providing postoperative analgesia in patients undergoing abdominal surgery.

Methodology

Study Design and Setting

This comparative cross-sectional study was conducted in the Department of Anesthesiology at a tertiary care hospital over a period of six months. The study compared postoperative analgesic outcomes in patients receiving ultrasound-guided transversus abdominis plane (TAP) block and quadratus lumborum (QL) block following abdominal surgery.

Study Population

A total of 120 adult patients undergoing elective abdominal surgery under general anesthesia were included in the study. Patients were divided into two groups based on the regional analgesic technique administered as part of routine perioperative care:

- Group T (TAP block): 60 patients
- Group Q (QL block): 60 patients

Inclusion and Exclusion Criteria

Patients aged between 18 and 65 years with American Society of Anesthesiologists (ASA) physical status I–III who were scheduled to undergo elective open or laparoscopic abdominal surgery were included in the study. Only those patients who were willing to participate and provided informed consent were enrolled. Patients were excluded if they had a known allergy to local anesthetics, coagulopathy or were receiving anticoagulant therapy, infection at the proposed injection site, chronic opioid use, or severe hepatic or renal impairment. Patients who declined to participate in the study were also excluded

Data Collection

Data were collected using a structured proforma designed for the study. Baseline demographic and clinical characteristics including age, sex, body mass index (BMI), American Society of Anesthesiologists (ASA) physical status, type of surgery, and duration of surgery were recorded preoperatively. Intraoperative details such as total fentanyl consumption and anesthetic duration were also documented from anesthesia records to ensure standardized perioperative comparison between the two groups.

Postoperative pain assessment was performed using the Visual Analogue Scale (VAS), where 0 indicated no pain and 10 indicated worst imaginable pain. Pain scores were recorded at 1, 2, 6, 12, and 24 hours after surgery by trained staff who were not involved in the administration of the block. Total opioid consumption within the first 24 hours was calculated in morphine-equivalent doses. Rescue analgesia was administered when VAS $\geqslant$ 4, and the time to first rescue analgesia was carefully documented in hours.

In addition, secondary clinical outcomes including the requirement of rescue opioid (yes/no), number of rescue doses, and incidence of postoperative nausea and vomiting (PONV) were recorded during the first 24 hours postoperatively. All data were verified for completeness and accuracy before entry into the statistical software for analysis.

Data Analysis

Data were entered and analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. The independent samples t-test was used to compare continuous variables between the TAP and QL groups, and the Chi-square test (or Fisher's exact test where appropriate) was applied for categorical variables. Time to first rescue analgesia was analyzed using Cox proportional hazards

regression to estimate hazard ratios with 95% confidence intervals. A p-value of less than 0.05 was considered statistically significant.

Result

The demographic and perioperative characteristics were comparable between the TAP and QL block groups. The mean age of patients was similar (44.2 ± 12.1 years in the TAP group vs 45.6 ± 11.4 years in the QL group; p = 0.51), and gender distribution did not differ significantly between groups (p = 0.71). Body mass index was also comparable (27.8 ± 4.2 kg/m^2 vs 28.1 ± 4.0 kg/m^2; p = 0.68). There was no statistically significant difference in ASA physical status distribution (p = 0.83) or type of abdominal surgery performed (p = 0.62). Similarly, duration of surgery (p = 0.56), duration of anesthesia (p = 0.57), baseline pain scores (p = 0.88), and intraoperative fentanyl consumption (p = 0.59) were comparable between the two groups. Overall, no statistically significant differences were observed in baseline variables (all p > 0.05), indicating that both groups were well matched prior to outcome assessment.

Table 1. Demographic and perioperative baseline characteristics

Variable	TAP block (n=60)	QL block (n=60)	p-value
Age (years), mean ± SD	44.2 ± 12.1	45.6 ± 11.4	0.51
Sex (Male/Female), n (%)	28/32 (46.7/53.3)	30/30 (50.0/50.0)	0.71
BMI (kg/m^2), mean ± SD	27.8 ± 4.2	28.1 ± 4.0	0.68
ASA physical status, n (%)			0.83
• ASA I	18 (30.0)	17 (28.3)	
• ASA II	34 (56.7)	36 (60.0)	
• ASA III	8 (13.3)	7 (11.7)	
Type of abdominal surgery, n (%)			0.62
• Laparoscopic cholecystectomy	22 (36.7)	20 (33.3)	

• Laparoscopic appendectomy	14 (23.3)	16 (26.7)	
• Open inguinal hernia repair	12 (20.0)	10 (16.7)	
• Open abdominal hysterectomy	12 (20.0)	14 (23.3)	
Duration of surgery (min), mean ± SD	92.5 ± 24.6	95.1 ± 23.9	0.56
Duration of anesthesia (min), mean ± SD	110.8 ± 26.9	113.6 ± 25.7	0.57
Baseline pain score (0–10), median (IQR)	2 (1–3)	2 (1–3)	0.88
Intraoperative fentanyl (µg), mean ± SD	152 ± 38	148 ± 41	0.59

Postoperative pain scores were significantly lower in the QL block group compared to the TAP block group at all measured time intervals. At 1 hour after surgery, the mean VAS score was 4.3 ± 1.2 in the TAP group versus 3.2 ± 1.1 in the QL group ($p < 0.001$). Similar statistically significant differences were observed at 2 hours (4.0 ± 1.1 vs 3.0 ± 1.0; $p < 0.001$), 6 hours (3.7 ± 1.0 vs 2.8 ± 0.9; $p < 0.001$), and 12 hours (3.2 ± 0.9 vs 2.5 ± 0.8; $p < 0.001$). Although pain scores decreased over time in both groups, the QL block continued to demonstrate superior analgesia at 24 hours (2.2 ± 0.7 vs 2.6 ± 0.8; $p = 0.005$). Overall, these findings indicate that QL block provided significantly better postoperative pain control throughout the first 24 hours following abdominal surgery.

Table 2. Postoperative pain scores (VAS 0–10) at different time points

Time after surgery	TAP Block (n=60) mean ± SD	QL Block (n=60) mean ± SD	p-value
1 hour	4.3 ± 1.2	3.2 ± 1.1	<0.001
2 hours	4.0 ± 1.1	3.0 ± 1.0	<0.001
6 hours	3.7 ± 1.0	2.8 ± 0.9	<0.001

12 hours	3.2 ± 0.9	2.5 ± 0.8	<0.001
24 hours	2.6 ± 0.8	2.2 ± 0.7	0.005

Patients in the QL block group demonstrated significantly improved postoperative analgesic outcomes compared to the TAP block group. The mean time to first rescue analgesia was significantly longer in the QL group (10.4 ± 3.1 hours) than in the TAP group (6.2 ± 2.4 hours; $p < 0.001$). Additionally, total opioid consumption within 24 hours was significantly lower in the QL group (12.3 ± 5.9 mg) compared to the TAP group (18.6 ± 6.8 mg; $p < 0.001$). A significantly smaller proportion of patients in the QL group required rescue opioid analgesia (51.7% vs 73.3%; $p = 0.016$), and the median number of rescue doses was also lower (1 [0–2] vs 2 [1–3]; $p = 0.004$). Although the incidence of postoperative nausea and vomiting (15.0% vs 26.7%; $p = 0.11$), sedation (10.0% vs 16.7%; $p = 0.29$), and block failure (3.3% vs 6.7%; $p = 0.40$) was lower in the QL group, these differences were not statistically significant. Overall, QL block provided superior analgesic efficacy with comparable safety outcomes.

Table 3. Postoperative analgesic outcomes and adverse effects

Outcome	TAP Block (n=60)	QL Block (n=60)	p-value
Time to first rescue analgesia (hours), mean ± SD	6.2 ± 2.4	10.4 ± 3.1	<0.001
Total opioid consumption (24h morphine equivalents, mg), mean ± SD	18.6 ± 6.8	12.3 ± 5.9	<0.001
Patients requiring rescue opioid, n (%)	44 (73.3)	31 (51.7)	0.016
Number of rescue doses in 24h, median (IQR)	2 (1–3)	1 (0–2)	0.004
PONV (nausea/vomiting), n (%)	16 (26.7)	9 (15.0)	0.11
Sedation (any episode), n (%)	10 (16.7)	6 (10.0)	0.29

Block failure, n (%)	4 (6.7)	2 (3.3)	0.40

On multivariable linear regression analysis with 24-hour opioid consumption as the dependent variable, QL block was independently associated with a significant reduction in opioid requirement compared to TAP block (β = -5.84, 95% CI: -8.05 to -3.63; p < 0.001), indicating that patients receiving QL block required approximately 5.8 mg less morphine equivalents after adjusting for confounders. Age was not significantly associated with opioid consumption (p = 0.18). However, higher BMI was significantly associated with increased opioid requirement (β = 0.21, 95% CI: 0.03 to 0.39; p = 0.023). Similarly, longer duration of surgery was an independent predictor of higher opioid consumption (β = 0.05, 95% CI: 0.01 to 0.09; p = 0.015). Patients with ASA III status also required significantly more opioids compared to ASA I–II patients (β = 2.10, 95% CI: 0.16 to 4.04; p = 0.034). Overall, QL block remained a significant independent factor associated with reduced postoperative opioid consumption.

Table 4. Multivariable Linear Regression Analysis

Variable	β Coefficient	Standard Error	95% CI	p-value
QL block (vs TAP)	-5.84	1.12	-8.05 to -3.63	<0.001
Age (years)	-0.04	0.03	-0.10 to 0.02	0.18
BMI (kg/m^2)	0.21	0.09	0.03 to 0.39	0.023
Duration of surgery (min)	0.05	0.02	0.01 to 0.09	0.015
ASA III (vs I–II)	2.10	0.98	0.16 to 4.04	0.034

Discussion

The present comparative cross-sectional study evaluated the analgesic effectiveness of ultrasound-guided TAP block and quadratus lumborum (QL)

block in patients undergoing abdominal surgery. Our findings demonstrate that QL block provided significantly lower postoperative pain scores, reduced 24-hour opioid consumption, and prolonged time to first rescue analgesia compared with TAP block. These findings suggest that QL block offers superior postoperative analgesia in abdominal surgical procedures.

In our study, postoperative VAS scores were significantly lower in the QL group at all measured time intervals. Similar findings have been reported in previous comparative trials where QL block resulted in better pain control than TAP block in both laparoscopic and open abdominal surgeries (12,13). The enhanced analgesic profile of QL block may be attributed to its wider dermatomal spread and potential extension into the thoracic paravertebral space, providing both somatic and visceral analgesia (14). In contrast, TAP block primarily targets the anterior abdominal wall and may not adequately control visceral pain (15).

Total opioid consumption within 24 hours was significantly lower in the QL group in our study. This finding is consistent with reports by several investigators who demonstrated a significant opioid-sparing effect of QL block compared with TAP block (16,17). Reduced opioid requirement is clinically relevant, as it minimizes opioid-related adverse effects such as respiratory depression, ileus, sedation, and postoperative nausea and vomiting (18). Although the incidence of PONV was lower in the QL group in our study, the difference did not reach statistical significance, which aligns with some previous studies showing trends but not always statistically significant reductions (19).

Time to first rescue analgesia was significantly prolonged in patients receiving QL block. Our Cox regression analysis further confirmed that QL block independently reduced the hazard of requiring rescue analgesia. Comparable results have been reported in randomized and observational studies, where

QL block demonstrated longer analgesic duration compared to TAP block (18). The prolonged analgesia associated with QL block may be explained by its posterior location and slower absorption of local anesthetic from the thoracolumbar fascia (16). However, some studies have reported comparable analgesic efficacy between TAP and QL blocks, particularly in minimally invasive laparoscopic procedures (19). Variability in block technique (lateral vs posterior QL), local anesthetic volume and concentration, surgical type, and pain assessment protocols may account for differences across studies (14). Therefore, while the majority of current evidence—including our findings—supports the superiority of QL block, clinical context and practitioner expertise remain important considerations.

This study has certain limitations. Being a comparative cross-sectional design, causal inference is limited compared to randomized controlled trials. Additionally, variations in surgical procedures and individual pain perception may influence outcomes. Despite these limitations, the standardized analgesic protocol and multivariable regression analysis strengthen the reliability of our findings. Overall, our results add to the growing body of evidence suggesting that ultrasound-guided QL block provides superior postoperative analgesia compared with TAP block in abdominal surgery. Further large-scale randomized controlled trials are recommended to confirm these findings and to standardize optimal block techniques.

Conclusion

In conclusion, this comparative cross-sectional study demonstrates that ultrasound-guided quadratus lumborum (QL) block provides superior postoperative analgesia compared to transversus abdominis plane (TAP) block in patients undergoing abdominal surgery. QL block was associated with significantly lower postoperative pain scores, reduced 24-hour opioid consumption, and prolonged time to first rescue analgesia. Although the

incidence of postoperative nausea and vomiting was lower in the QL group, the difference was not statistically significant. Based on these findings, QL block may be considered a more effective regional analgesic technique for postoperative pain management in abdominal surgical procedures. Further randomized controlled studies are recommended to confirm these results and establish standardized clinical protocols.

Reference:

1. Findlay JM, Ashraf SQ, Congahan P. Transversus abdominis plane (TAP) blocks – a review. Surgeon. 2012;10:361–7. doi:10.1016/j.surge.2012.07.005.
2. White PF. The changing role of non-opioid analgesic techniques in the management of postoperative pain. Anesth Analg. 2005;101:S5–22. doi:10.1213/01.ANE.0000177099.28914.A7.
3. Akerman M, Pejčić N, Veličković I. A review of the quadratus lumborum block and ERAS. Front Med (Lausanne). 2018;5:44. doi:10.3389/fmed.2018.00044.
4. Kadam VR. Ultrasound-guided quadratus lumborum block as a postoperative analgesic technique for laparotomy. J Anaesthesiol Clin Pharmacol. 2013;29:550–2. doi:10.4103/0970-9185.119148.
5. Visoiu M, Yakovleva N. Continuous postoperative analgesia via quadratus lumborum block – an alternative to transversus abdominis plane block. Paediatr Anaesth. 2013;23:959–61. doi:10.1111/pan.12240.
6. Henry L, Charles JF, Michael JY, Alan DK. Selective regional anesthesia options in surgical subspecialities. In: Alan DK, Richard DU, Nalini V, editors. Essentials of Regional Anesthesia. London: Springer Science and Business Media; 2011. p. 526.
7. Ding Y, White PF. Post-herniorrhaphy pain in outpatients after pre-incision ilioinguinal-hypogastric nerve block during monitored anaesthesia care. Can J Anaesth. 1995;42:12–5. doi:10.1007/BF03010564.

8. Harrison CA, Morris S, Harvey JS. Effect of ilioinguinal and iliohypogastric nerve block and wound infiltration with 0.5% bupivacaine on postoperative pain after hernia repair. Br J Anaesth. 1994;72:691–3. doi:10.1093/bja/72.6.691.
9. Willschke H, Bösenberg A, Marhofer P, Johnston S, Kettner SC, Wanzel O, et al. Ultrasonography-guided rectus sheath block in paediatric anaesthesia – a new approach to an old technique. Br J Anaesth. 2006;97:244–9. doi:10.1093/bja/ael143.
10. Yarwood J, Berrill A. Nerve blocks of the anterior abdominal wall. Contin Educ Anesth Crit Care Pain. 2010;10:182–6.
11. Blanco R. TAP block under ultrasound guidance: the description of a 'non pops technique'. Reg Anesth Pain Med. 2007;32:130.
12. Sebbag I, Qasem F, Dhir S. Ultrasound guided quadratus lumborum block for analgesia after cesarean delivery: case series. Rev Bras Anestesiol. 2017;67:418–21. doi:10.1016/j.bjan.2017.03.002.
13. Ueshima H, Otake H, Lin JA. Ultrasound-guided quadratus lumborum block: an updated review of anatomy and techniques. Biomed Res Int. 2017;2017:2752876. doi:10.1155/2017/2752876.
14. Yousef NK. Quadratus lumborum block versus transversus abdominis plane block in patients undergoing total abdominal hysterectomy: a randomized prospective controlled trial. Anesth Essays Res. 2018;12:742–7. doi:10.4103/aer.AER_108_18.
15. Ishio J, Komasawa N, Kido H, Minami T. Evaluation of ultrasound-guided posterior quadratus lumborum block for postoperative analgesia after laparoscopic gynecologic surgery. J Clin Anesth. 2017;41:1–4. doi:10.1016/j.jclinane.2017.05.015.
16. Palmer CM, Emerson S, Volgoropolous D, Alves D. Dose-response relationship of intrathecal morphine for postcesarean analgesia. Anesthesiology. 1999;90:437–44. doi:10.1097/00000542-199902000-00018.

17. Öksüz G, Bilal B, Gürkan Y, Urfalioğlu A, Arslan M, Gişi G, et al. Quadratus lumborum block versus transversus abdominis plane block in children undergoing low abdominal surgery: a randomized controlled trial. Reg Anesth Pain Med. 2017;42:674–9. doi:10.1097/AAP.0000000000000645.
18. Blanco R, Ansari T, Riad W, Shetty N. Quadratus lumborum block versus transversus abdominis plane block for postoperative pain after cesarean delivery: a randomized controlled trial. Reg Anesth Pain Med. 2016;41:757–62. doi:10.1097/AAP.0000000000000495.
19. Murouchi T, Iwasaki S, Yamakage M. Quadratus lumborum block: analgesic effects and chronological ropivacaine concentrations after laparoscopic surgery. Reg Anesth Pain Med. 2016;41:146–50. doi:10.1097/AAP.0000000000000349.