

The Effectiveness of Quadratus Lumborum Block Compared to Transversus Abdominis Plane Block in Treating Acute Pain Post Abdominal Surgery: A Systematic Review

Devina Martina Bumi¹, I Gusti Ngurah Mahaalit Aribawa², I Made Gede Widnyana², Tjokorda Gde Agung Senapathi²

¹*Department of Anesthesiology and Intensive Therapy, Faculty of Medicine, Udayana University / Ngoerah Hospital, Denpasar, Indonesia*

²*Department of Anesthesiology and Intensive Therapy, Faculty of Medicine, Udayana University / Ngoerah Hospital, Denpasar, Indonesia*

Abstract

Citation : Bumi, D. M., Aribawa, I. G. N. M., Widnyana, I. M. G., & Senapathi, T. G. A. 2026. The Effectiveness of Quadratus Lumborum Block Compared to Transversus Abdominis Plane Block in Treating Acute Pain Post Abdominal Surgery: A Systematic Review. *Medicinus*, 15(3), 151–159.

Keywords : quadratus lumborum block; transversus abdominis plane block; pain management; abdominal surgery

Correspondance : Devina Martina Bumi

E-mail : devinabumi@student.unud.ac.id
Online First : 25 June 2026

Background:

Parameters of successful anesthesia and surgery include postoperative pain management. Abdominal surgery can cause severe pain, affect recovery, and trigger pathophysiological reactions. Quadratus lumborum block (QLB) and transversus abdominis plane (TAP) block are commonly used peripheral nerve blocks for postoperative analgesia.

Methods:

This systematic review aimed to compare the effectiveness of QLB and TAP block, including postoperative opioid consumption, in adults aged 18 to 65 years undergoing abdominal surgery. The review followed PRISMA guidelines and searched studies assessing QLB and TAP block for acute postoperative pain management.

Result:

A total of 475 records were identified, and four randomized controlled trials met the inclusion criteria for further analysis. Outcomes were synthesized descriptively using pain scores (VAS, NPIS, and NRS) and total opioid consumption.

Conclusions:

QLB showed more favorable primary and secondary outcomes compared with TAP block in the included studies, suggesting better postoperative analgesic effectiveness after abdominal surgery.

Introduction

Successful anesthesia and surgery are closely linked to postoperative pain management. Effective postoperative pain control improves outcomes after surgery, reduces morbidity and complications, increases patient comfort and satisfaction, facilitates early mobilization and recovery, and can reduce treatment costs.^{1–4} Abdominal surgery can produce severe pain that affects recovery and may trigger a series of pathophysiological responses.^{5–7,9} Therefore, safe and effective perioperative pain management is

essential. Local and regional analgesia as part of multimodal analgesia has been increasingly developed because it can reduce opioid use, provide faster recovery in minimally invasive abdominal surgery, and improve perioperative care.^{5,6,10} Opioids may cause adverse effects, including nausea, vomiting, dizziness, and systemic complications.^{1,8}

Novel anesthesia techniques have been developed by anesthesiologists to provide analgesia for surgical procedures and to manage acute or chronic pain. One of these techniques is quadratus

lumborum block (QLB), a posterior abdominal truncal block that provides pain relief by delivering local anesthetic to the thoracolumbar fascia and potentially the thoracic paravertebral space, thereby contributing to somatic and visceral analgesia.^{18,20} This truncal block is commonly used in lower and upper abdominal surgery as well as hip and lower extremity procedures. QLB techniques include lateral, posterior, and anterior approaches. QLB has been reported to provide analgesia for abdominal, laparoscopic, abdominal wall, hip, and femur surgeries, with analgesic effects lasting up to 24 to 48 hours in selected reports.¹⁸

Another technique is transversus abdominis plane (TAP) block, which is more conventional than QLB. TAP block provides analgesia by blocking sensory afferent nerves between the abdominal muscles, commonly targeting the T10 to T12 dermatomes. Ultrasound-guided TAP block can be performed using subcostal, lateral, or posterior approaches and has been used as part of multimodal pain management.¹⁹ However, TAP block may have a shorter analgesic duration than QLB and has been associated with potential complications, including local anesthetic systemic toxicity, transient femoral nerve palsy, seizures, arrhythmia, and visceral injury, especially when performed without image guidance.^{17,19}

Quadratus lumborum block (QLB) and transversus abdominis plane (TAP) block are effective constituents of multimodal analgesia and are mainly used for postoperative analgesia in abdominal surgery.¹⁷ Several studies have shown that QLB may be more effective for postoperative analgesia and can prolong analgesic duration compared with TAP block, while no consistent difference has been reported in postoperative side effects. The aim of this systematic review was to measure the effectiveness of quadratus lumborum block compared to transversus abdominis plane block and postoperative opioid consumption in the management of acute pain after abdominal surgery.^{13–17}

Material and Methods

This systematic review was carried out using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.¹¹ The author conducted a comprehensive search strategy to identify QLB and TAP block studies in adult patients aged 18 to 65 years who underwent any type of abdominal surgery. Electronic literature database searches were performed using ProQuest, PubMed, Cochrane, and ScienceDirect from 2018 until January 2021 using the keywords quadratus lumborum block (QLB), transversus abdominis plane block (TAP), abdominal surgery, and pain management. The literature search was limited to randomized controlled trials (RCTs). There were no restrictions on language and publication date. From these searches, a total of 475 records were obtained, four of which met the criteria for further analysis.

Studies that meet the criteria

For studies that meet the criteria, screening is conducted independently by two different authors. Based on existing protocol, differences in views and opinions of the two researchers will be resolved through a discussion that can involve third author if necessary. The inclusion criteria in this systematic review are 1) aged between 18 to 65 years old, 2) with physical status of the American Society of Anesthesiologist (ASA) I and II, 3) studies using randomized controlled trials (RCTs), 4) studies assessing postoperative pain scores as primary output, and 5) analgesic effects of QLB distinguished from TAP block. Studies that did not meet the inclusion criteria were excluded at this stage. Authors excluded all types of retrospective studies, case reports, nonrandomized studies, and studies that did not specifically mention the use of QLB and TAP anesthesia techniques during abdominal surgery.

Data Extraction

Data collection and bias risk assessment can be carried out using standardized forms and then analyzed using Microsoft Excel 2010 (Microsoft Corp, Redmond, WA). Data extracted from each study included: patient characteristic, methodology, anesthesia, and analgesic techniques and outcomes obtained. Primary outcome of this systematic review is postoperative pain scores. Secondary outcomes included opioid consumption, postoperative analgesia duration, and PONV incidence.

The methodological bias of each RCT was independently assessed using the Cochrane Collaboration risk-of-bias tool, with attention to randomization, allocation

concealment, blinding, incomplete outcome data, selective reporting, and other sources of bias.¹² Assessments were tabulated using Review Manager version 5.3 (RevMan; Cochrane Collaboration, Oxford, UK).

The authors used Cochrane Collaboration tool to assess the risk of bias. The risk of selection bias, performance, detection, friction, reporting bias and other biases are also assessed. Meta-synthesis with meta-aggregation approach that authors collected specifically looked for comparisons between the QLB and TAP blocks so that even study categories or literature that did not use blinding sampling were included in this systematic study.

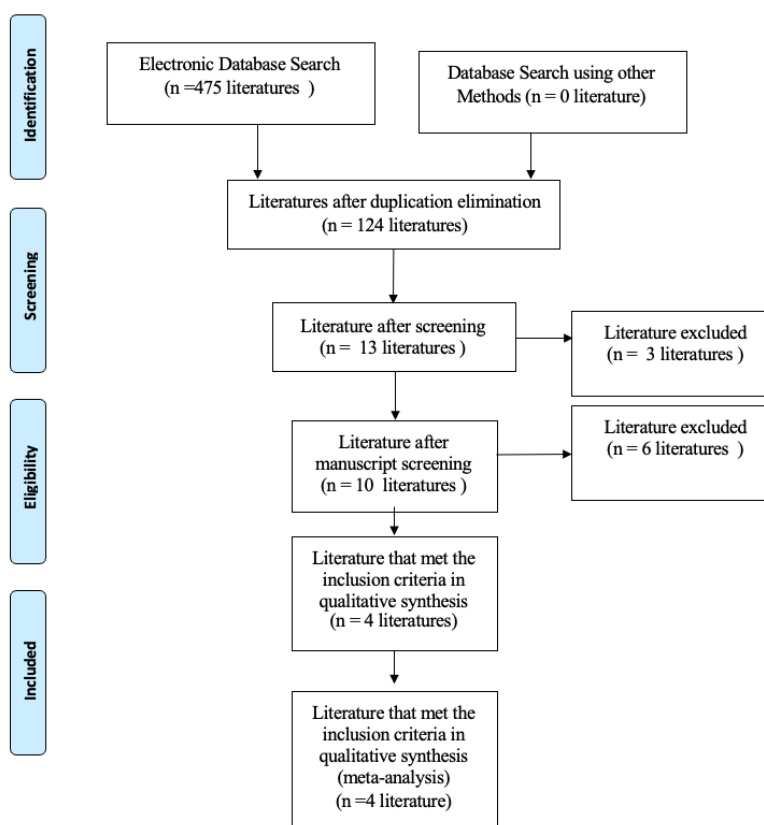


Figure 1. Literature Selection Diagram¹¹

Results

Figure (1) showed online literature search. According to electronic database searching, the authors found 475 literatures. Out of the 475 literatures obtained, as many as 124 pieces are deleted due to duplication. The final result is 4 literatures with a total of 258

participants. The risk assessment bias can be shown in Figure (2). Details of the 4 literatures or studies that authors have analyzed are explained in detail in Table 1. Three of them applied peripheral nerve block anesthetic techniques in the form of quadratus lumborum block (QLB) and transverse abdominis plane (TAP) block to

the treatment group following by application of general anesthesia. While

one literature applies peripheral nerve block alone.

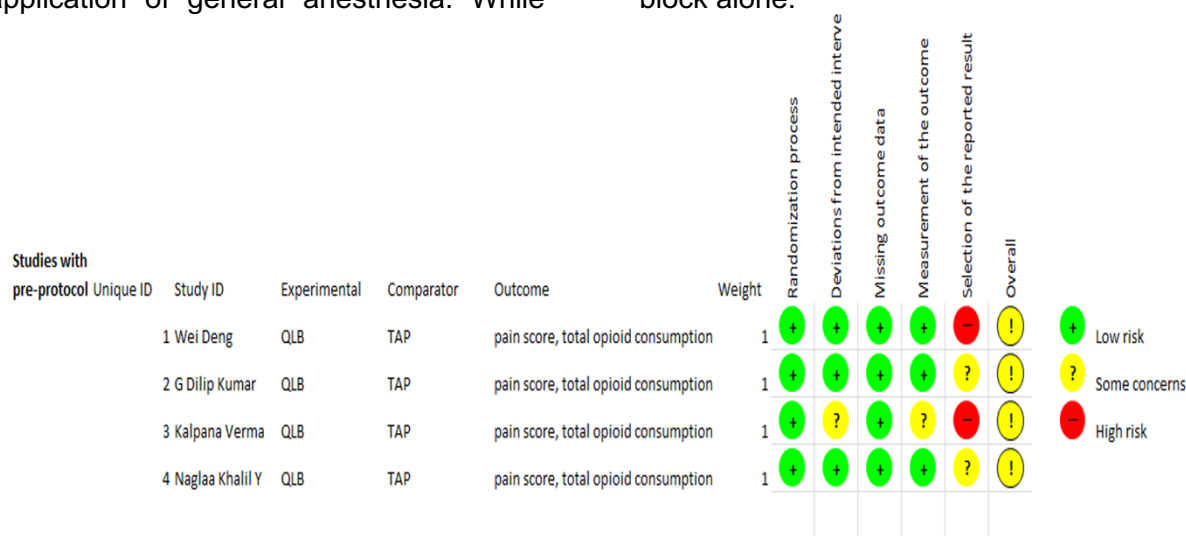


Figure 2. Bias Risk Assessment for Studies that met the inclusion criteria¹²

*QLB, Quadratus Lumborum Block, *TAP, Transversus Abdominis Plane Block

The result of this systematic review identified 4 randomized controlled trials in evaluating the effectiveness of the quadratus lumborum block compared to transverse abdominis plane block and systemic analgesia using morphine or fentanyl in acute postoperative pain management through suppression against inflammatory response inflicted. The second result that can be assessed from each of these publications is relating to the total consumption of opioids during surgery and post surgery, complications from the nerve block, and nausea and vomiting side effects.

Deng et al. revealed that 68 patients scheduled for laparoscopic colorectal surgery were randomly assigned to either the QLB or TAP groups. The two groups' NRS readings at rest and during movement did not differ significantly ($P>0.05$). Sufentanil use was considerably lower in the QLB group than in the TAP group at 24 and 48 hours after surgery ($P<0.05$), although there was no significant difference at 6 hours ($P=0.33$). The QLB group experienced fewer side effects, such as dizziness, than the TAP group ($P<0.05$). This study showed that QLB is a safe, dependable, and effective analgesic

technique without serious adverse effects.¹³

Similarly, Kumar et al. found that pain scores at 1, 2, 4, 6, 8, 10, 12, and 16 hours postoperatively were statistically significant between the two groups. However, there was no significant difference in pain scores 24 hours after surgery. Pain was assessed using the NPIS scale at rest. A notable finding was that total morphine consumption was significantly lower in the QLB group compared with the TAP group. This study included 70 patients aged 18 to 60 years undergoing elective lower abdominal surgery under general anesthesia, with ASA physical status I–II, and used a prospective, double-blind, randomized controlled design.¹⁴

Verma et al. highlighted that the need for analgesics over a 72-hour period was significantly lower in the QLB group compared with the TAP group, and the time until rescue analgesics were required was longer in the QLB group. Pain scores measured using the VAS scale at rest and during movement were significantly lower in the QLB group compared with the TAP group after caesarean section.¹⁵ In a separate study by Yousef, postoperative

morphine consumption over 24 hours was assessed in patients undergoing total abdominal hysterectomy. Mean postoperative morphine use was significantly higher in the TAP group than in the QLB group. VAS scores were also significantly higher in the TAP group at all measured postoperative times, the block duration was shorter in the TAP group, and the number of patients requesting analgesia was greater in the TAP group. No serious complications were reported in either group.¹⁶

Discussion

This systematic review of 4 RCTs including 258 patients, comparing the postoperative analgesia provided by the QLB and TAPB, demonstrated that the QLB was more effective for abdominal surgery, with a significantly increased analgesic effect, reduced opioid consumption and minimal systemic side effect.

The primary outcome assessed in this review was postoperative abdominal pain score, assessed using the VAS, NRS, and NPIS scales. The four studies reviewed showed significant differences in pain scores between the QLB and TAP groups. In Yousef's study, the VAS score measured up to 24 hours postoperatively was significantly higher in the TAP group than in the QLB group.¹⁶ This result is in line with Verma et al., who reported that VAS scores were significantly reduced in the QLB group compared with the TAP group up to 72 hours postoperatively.¹⁵ Anatomically, the QLB targets the T7-L1 dermatomes, while lateral and posterior TAP blocks mainly affect the T10-T12 dermatomes and subcostal TAP block covers the T7-T10 dermatomes. The precise mechanism of QLB is not fully established, but the thoracolumbar fascia is considered important in its widespread analgesic effect. Injecting local anesthetic during QLB may relieve both somatic and visceral pain through spread along the thoracolumbar fascia and potentially toward the paravertebral space.^{18,20} In contrast, TAP block primarily provides

somatic analgesia of the anterior abdominal wall.¹⁹

In terms of secondary outcomes, this review found a small difference in total opioid consumption—morphine, fentanyl, and sufentanil—within the first 24 hours after surgery between the QLB and TAP block groups. Opioid use was lower in the QLB group compared with the TAP group.^{13–17} This may be attributed to slower absorption of local anesthetics in the QLB, where relatively low perfusion of the thoracolumbar fascia and endothoracic fascia may contribute to longer-lasting analgesia. The analgesic effects of QLB lasted longer than TAP block, even with similar doses of ropivacaine or bupivacaine.^{17,18,20} Additionally, opioid-related side effects, such as postoperative nausea and vomiting and dizziness, were lower in the QLB group in several studies, suggesting that QLB may be a favorable option for abdominal surgery.^{13,17}

This significant results can be used as a consideration and reference for future investigators to use QLB block instead of TAP block in supporting anesthesia in abdominal surgery. The QLB technique is relatively new technique used in the field of peripheral block anesthesia used in abdominal surgery, where this technique is still being developed and reported in the form of RCTs and case reports, but not many details about the benefits and risks of using this technique.

Based on previous protocol, we conducted a sequential analysis test to evaluate the strength of available evidence despite high level of heterogeneity. This analysis was monitoring representation in a single randomized controlled trial. The risk of type-1 and -2 statistical analysis error and shift exist both in the transient analysis and in the single meta-analysis were increased. For our main results shows a lack of sufficient strength to draw definitive conclusions that there are no differences, so this is a drawback of this systematic review. In a single trial study, strength analysis is done a priori, usually based on a pilot study or based on data from other experiments. This analysis cannot provide a priori estimates of the

number of patients needed to get to the conclusion or proof before a meta-analysis is conducted. Variance between trials and proportion of events in the meta-analysis control group can changed when we added new trial to the analysis. The size of information and amount needed in a future research study were affected by these two parameters. Although this systematic review cannot apply meta-analysis because of its qualitative nature and inadequate number of studies due to QLB techniques is relatively new in abdominal surgery, but the author's meta synthetic directly describes the effectiveness of the two anesthetic techniques in management of acute postoperative pain. We hope that this review can become a reference for future research relating to other primary outputs in addition to assessments of

acute postoperative pain, one which is by discussing the anti-inflammatory effects of peripheral nerve block techniques such as QLB and TAP block in specifically abdominal surgery.

Conclusion

In conclusion, this systematic review suggested that QLB is a more effective postoperative analgesia as it reduces pain scores, opioid consumption and has minimal systematic side effects, so as to improve postoperative outcome and patient satisfaction.

Acknowledgement

None.

References

1. Bora FA, Dewi DAMS, Kurniyanta IP, Senapathi TGA, Widnyana IMG, Suarjaya PP, et al. The Association Between Preoperative Anxiety and Pain Severity, Opioid Requirement, Neutrophil-to-Lymphocyte Ratio, and Postoperative Blood Glucose After Gynecologic Laparotomy at Ngoerah Hospital. *Medicinus*. 2026;15(2):75-84. doi:10.19166/med.v15i2.10969.
2. Sudirman T, Wiguna AL. Postoperative Pain Comparison Between Open Hemorrhoidectomy and Stapled Hemorrhoidopexy on Internal Hemorrhoid at Siloam Hospitals Lippo Village. *Medicinus*. 2023;12(2):141-145. doi:10.19166/med.v10i3.7038.
3. Sudirman T, Kosasih JA. Comparison of Post Operative Pain Score between Doppler-Guided Hemorrhoidal Artery Ligation and Recto Anal Repair with Open Hemorrhoidectomy on Internal Hemorrhoid Grade III-IV at Siloam Hospitals Lippo Village. *Medicinus*. 2021;11(1):38-43. doi:10.19166/med.v9i2.4701.
4. Sidharta NA, Irawan A, Siregar JI, Lugito NPH. Comparison of Early Postoperative Pain between Lightweight Mesh and Heavyweight Mesh in Lichtenstein Hernia Repair for Geriatric Patients at Rumah Sakit Siloam Karawaci from January 2018-December 2019. *Medicinus*. 2023;11(3):10-15. doi:10.19166/med.v10i1.6989.
5. Pakardian IA, Dewi DAMS. Anesthetic Management in Obese Patients Undergoing Laparoscopic Cholecystectomy: A Case Report. *Medicinus*. 2025;14(3):201-212. doi:10.19166/med.v14i3.10152.
6. Tantri IL, Saroso NFDA, Domini MA, Wiwing V. A Case Report: Combined Sciatic Nerve and Lumbar Plexus Nerve Block in a Patient with Acute Decompensated Heart Failure Undergoing Lower Extremity Surgical Debridement. *Medicinus*. 2023;12(3):30-35. doi:10.19166/med.v11i1.7366.
7. Hermawan GN, Wibisono JJ, Nembo LF. Abdominal Wound Dehiscence: A Review of Risk Factors, Prevention and Management in Obstetrics and Gynecology Practice. *Medicinus*. 2021;10(2):102-110. doi:10.19166/med.v8i3.3767.
8. Huang I. Addressing Uncontrolled Symptoms and Communication Gaps in a Patient with Metastatic Cholangiocarcinoma: Lessons from a Palliative Care Case. *Medicinus*. 2025;14(2):150-156. doi:10.19166/med.v14i2.9553.
9. Elsa MC, Sudirman T. Comparison of Post-Operative Pain Score Between Open Appendectomy and Laparoscopic Appendectomy on Acute Appendicitis Patient in Siloam Hospital Lippo Village. *Medicinus*. 2023;12(3):6-11. doi:10.19166/med.v11i1.7362.

10. Wijaya AA, Deviadry R, Utoyo GA. Acromioclavicular Joint Repair Utilizing a Button Technique for Chronic Instability: A Case Report. *Medicinus*. 2025;14(3):222-230. doi:10.19166/med.v14i3.10154.
11. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi:10.1136/bmj.n71.
12. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA, editors. *Cochrane Handbook for Systematic Reviews of Interventions*. 2nd ed. Chichester (UK): John Wiley & Sons; 2019.
13. Deng W, Long X, Li M, Li C, Guo L, Xu G, et al. Quadratus lumborum block versus transversus abdominis plane block for postoperative pain management after laparoscopic colorectal surgery: a randomized controlled trial. *Medicine (Baltimore)*. 2019;98(52):e18448. doi:10.1097/MD.00000000000018448.
14. Kumar GD, Gnanasekar N, Kurhekar P, Prasad TK. A comparative study of transversus abdominis plane block versus quadratus lumborum block for postoperative analgesia following lower abdominal surgeries: a prospective double-blinded study. *Anesth Essays Res*. 2018;12(4):919-923. doi:10.4103/aer.AER_158_18.
15. Verma K, Malawat A, Jethava D, Jethava DD. Comparison of transversus abdominis plane block and quadratus lumborum block for post-caesarean section analgesia: a randomised clinical trial. *Indian J Anaesth*. 2019;63(10):820-826. doi:10.4103/ija.IJA_61_19.
16. 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(3):742-747. doi:10.4103/aer.AER_108_18.
17. Liu X, Song T, Chen X, Zhang J, Shan C, Chang L, et al. Quadratus lumborum block versus transversus abdominis plane block for postoperative analgesia in patients undergoing abdominal surgeries: a systematic review and meta-analysis of randomized controlled trials. *BMC Anesthesiol*. 2020;20:53. doi:10.1186/s12871-020-00967-2.
18. Elsharkawy H, El-Boghdadly K, Barrington M. Quadratus lumborum block: anatomical concepts, mechanisms, and techniques. *Anesthesiology*. 2019;130(2):322-335. doi:10.1097/ALN.0000000000002524.
19. Taylor R Jr, Pergolizzi JV, Sinclair A, Raffa RB, Aldington D, Plavin S, Apfel CC. Transversus abdominis block: clinical uses, side effects, and future perspectives. *Pain Pract*. 2013;13(4):332-344. doi:10.1111/j.1533-2500.2012.00595.x.

20. Willard FH, Vleeming A, Schuenke MD, Danneels L, Schleip R. The thoracolumbar fascia: anatomy, function and clinical considerations. *J Anat.* 2012;221(6):507-536. doi:10.1111/j.1469-7580.2012.01511.x.

Author's Statement

The authors declared that all the images and figures in this manuscript is/are author's own work and/or has obtained necessary permission to re-use the content from the authors and publisher of respective materials.

(Devina Martina Bumi)