

## Original Research Article

# COMPARISON OF POSTOPERATIVE ANALGESIC EFFICACY OF ROPIVACAINE VERSUS ROPIVACAINE WITH DEXMEDETOMIDINE IN ULTRASOUND GUIDED ANTERIOR QUADRATUS LUMBORUM BLOCK IN ELECTIVE LOWER ABDOMINAL SURGERY: A RANDOMIZED CONTROL TRIAL

Vishwanath Meti<sup>1</sup>, Swathi Rajshekar<sup>2</sup>, Prashanth Vadigeri<sup>3</sup>, Sachin Reddy<sup>4</sup>, Balaraju TC<sup>5</sup>

<sup>1</sup>Professor, Department of Anesthesiology and Critical Care, Navodaya Medical College Hospital and Research Centre, Raichur, India.

<sup>2</sup>Assistant Professor, Department of Anatomy and Critical Care, Navodaya Medical College Hospital and Research Centre, Raichur, India.

<sup>3</sup>Associate Professor, Department of Anesthesiology and Critical Care, Navodaya Medical College Hospital and Research Centre, Raichur, India.

<sup>4</sup>Postgraduate, Department of Anesthesiology and Critical Care, Navodaya Medical College Hospital and Research Centre, Raichur, India.

<sup>5</sup>Professor, Department of Anesthesiology and critical care, Navodaya medical college hospital and research centre, Raichur, India.

Received : 11/02/2026  
Received in revised form : 04/04/2026  
Accepted : 19/04/2026

**Corresponding Author:**

**Dr. Vishwanath Meti,**  
Professor, Department of  
Anesthesiology and Critical Care,  
Navodaya Medical College Hospital  
and Research Centre, Raichur, India.

DOI: 10.70034/ijmedph.2026.2.755

Source of Support: Nil,  
Conflict of Interest: None declared

**Int J Med Pub Health**  
2026; 16 (2); 4620-4623

**ABSTRACT**

**Background:** Truncal nerve blocks, such as the Quadratus Lumborum (QL) block, are increasingly used for perioperative pain management in abdominal surgeries due to their effectiveness in providing analgesia from T4-L3 dermatomes. QL blocks, including anterior approaches, improve postoperative pain scores, reduce opioid use, and enhance recovery compared to alternatives like transversus abdominis plane blocks, particularly in procedures such as cesarean sections, inguinal hernia repairs, and laparoscopic surgeries.

**Materials and Methods:** This prospective randomized controlled trial will enrol 100 ASA I-II patients aged 18-60 undergoing elective lower abdominal surgery under spinal anesthesia, randomized into two groups of 50 each. Group I receives 30 ml of 0.375% ropivacaine (diluted with saline), Group II receives the same volume of ropivacaine 0.375% plus dexmedetomidine (1.5mcg/kg). Followed by all patients received spinal anesthesia. Outcomes include onset/duration of sensory (pinprick test) and motor blocks, hemodynamic parameters, VAS pain scores up to 24 hours, rescue analgesia, and statistics via chi-square tests with  $p < 0.05$  significance.

**Results:** Both groups showed effective pain relief. Group II demonstrated a significantly faster onset of sensory blockade  $p < 0.05$  and prolonged duration of analgesia, leading to reduced VAS scores and delayed need for rescue analgesia compared to Group I. However, higher doses of dexmedetomidine were associated with a higher incidence of bradycardia and hypotension, though all were clinically manageable.

**Conclusion:** The addition of dexmedetomidine to ropivacaine in ultrasound-guided QLB enhances analgesia for patients undergoing lower abdominal surgeries. At the same time it is safe to use dexmedetomidine in QLB without much adverse effects.

**Keywords:** Dexmedetomidine, Ropivacaine, Anterior Quadratus Lumborum Block.

## INTRODUCTION

Effective postoperative pain management remains a cornerstone of enhanced recovery after surgery (ERAS) protocols, influencing patient satisfaction, reducing opioid consumption, and minimizing complications such as chronic pain.<sup>[1]</sup> Regional anesthesia techniques, particularly fascial plane blocks, have gained prominence for their opioid-sparing effects and safety profile. Among these, the Quadratus Lumborum Block (QLB) has emerged as a versatile trunk block, targeting the thoracolumbar fascia to provide analgesia for abdominal, pelvic, and retroperitoneal procedures.<sup>[2,3]</sup> Ropivacaine was used for QL blocks in previous studies which showed effective postoperative analgesia.<sup>[4,5]</sup> Dexmedetomidine as an additive enhances the analgesic effect of ropivacaine.<sup>[6]</sup>

Collectively, these studies—from Blanco's 2015 inception to recent 2022 trials—demonstrate QLB's evolution from a novel block to a gold standard for postoperative analgesia across inguinal hernia, spinal, adrenal, abdominal, and obstetric surgeries.<sup>[7]</sup> Its variants offer tailored dermatomal coverage, opioid reduction, faster recovery, and chronic pain prevention, surpassing transversus abdominis plane blocks in multiple domains.<sup>[8-10]</sup> Despite this evidence, gaps persist in volume standardization, long-term outcomes, and comparative effectiveness in high-risk cohorts. This study addresses these by prospectively evaluating TQLB for postoperative analgesia, aiming to refine QLB protocols for optimized perioperative care.

## MATERIALS AND METHODS

This prospective randomized controlled trial enrolled 100 ASA I-II patients aged 18-60 yrs undergoing elective lower abdominal surgery under spinal anesthesia, after obtaining ethical committee clearance and written informed consent. Patients with contraindications to regional anesthesia were excluded from the study. Patients were randomized into two groups of 50 each. Group I receives 30 ml of 0.375% ropivacaine (diluted with saline), Group II receives the same volume of ropivacaine 0.375% plus dexmedetomidine (1.5mcg/kg). Patients are typically positioned in the lateral decubitus position (side-lying) with the side to be blocked facing up. Following aseptic skin preparation with chlorhexidine, a low-frequency curvilinear probe

(2–5 MHz) is placed in the axial plane (transverse) at the level of the posterior axillary line, between the costal margin and the iliac crest. The "Shamrock Sign" is sought: The transverse process of the L4 vertebra is the "stem," the Psoas Major is the anterior leaf, the Erector Spinae is the posterior leaf, and the Quadratus Lumborum is the lateral leaf. The QL muscle appears as a tapered muscle belly extending from the tip of the transverse process.

The skin is infiltrated with 2–3 ml of 1% lignocaine. A 21G or 22G, 100-mm echogenic nerve block needle is inserted in-plane from lateral to medial (or posterior to anterior). The needle tip is advanced through the transversus abdominis aponeurosis until it reaches the posterior aspect of the QL muscle (for a QL2 block). Local anaesthetic is administered after negative aspiration. Success is confirmed by the hydrodissection of the local anaesthetic between the QL muscle and the middle layer of the thoracolumbar fascia.

Group I receives 30 ml of 0.375% ropivacaine (diluted with saline), Group II receives the same volume of ropivacaine 0.375% plus dexmedetomidine (1.5mcg/kg). Followed by all patients received spinal anesthesia with 2-4 mL hyperbaric 0.5% bupivacaine. Outcomes include onset/duration of sensory (pinprick test) and motor blocks, hemodynamic parameters, VAS pain scores up to 24 hours, rescue analgesia (Tramadol 1-2mg/kg).

The data were entered in SPSS software version 26.0. Independent t-test for comparing continuous variables (e.g., VAS scores). Chi-square test for categorical data (e.g., incidence of adverse effects). Repeated measures ANOVA for trends in VAS scores over time. A p-value of <0.05 will be considered significant. Results will be displayed using graphs and tables.

## RESULTS

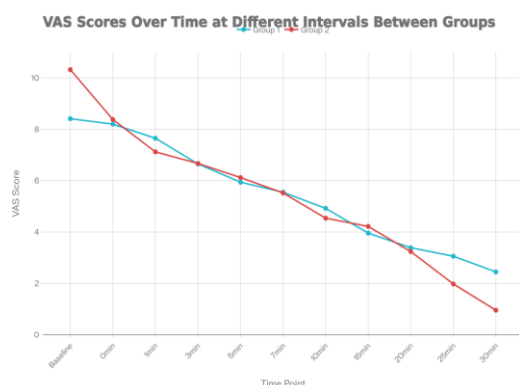
In our study, the demographic profile of patients of both the groups were comparable. Sensory blockade characteristics are compiled in table 1. Group I demonstrated a mean peak sensory block time of 47.48 minutes compared to 32.52 minutes in Group II ( $p < 0.001$ ), and the onset of sensory blockade was significantly prolonged in Group I (25.06 minutes) compared to Group II (11.46 minutes), with both differences being highly statistically significant.

**Table 1: Sensory Block Timing**

| Parameter  | Group I (Mean ± SD)<br>(min) | Group II (Mean ± SD)<br>(min) | P value              |
|------------|------------------------------|-------------------------------|----------------------|
| Onset time | 25.06 ± 3.46                 | 11.46 ± 1.11                  | $2.0 \times 10^{-4}$ |
| Peak onset | 47.48 ± 1.72                 | 32.52 ± 1.68                  | $2.3 \times 10^{-6}$ |

Both groups showed progressive reduction in VAS score due to effective QLB. However, Group II showed significantly lower VAS at 10, 25, and 30 minutes Indicates superior analgesic quality. Figure

1 shows the VAS score changes between two groups.



**Figure 1: VAS Scores Over 30 Minutes**

**Table 2: Adverse Effects with p-values**

| Adverse event | Group I  | Group II | P value |
|---------------|----------|----------|---------|
| Bradycardia   | 3 (4.3%) | 5 (7.1%) | 0.72    |
| Hypotension   | 1 (1.4%) | 4 (5.7%) | 0.36    |
| Nausea        | 2 (2.9%) | 6 (8.6%) | 0.27    |
| Vomiting      | 2 (2.9%) | 6 (8.6%) | 0.27    |

## DISCUSSION

The results of the present study clearly demonstrate that the addition of dexmedetomidine to ropivacaine significantly enhances the quality of analgesia, accelerates onset of sensory blockade, prolongs block duration, and reduces postoperative pain scores without causing clinically significant hemodynamic instability or increased adverse effects. These findings support the growing evidence favouring the use of alpha-2 adrenergic agonists as adjuvants in regional anesthesia. Our findings are supported by a randomized controlled trial by Singh et al focused on the addition of dexmedetomidine to ropivacaine specifically for QL blocks, reporting a significant reduction in the time to first rescue analgesic and lower 24-hour cumulative opioid consumption.<sup>[6]</sup>

Collectively, studies from Blanco's 2015 inception of QLB to recent trials demonstrate QLB's evolution from a novel block to a gold standard for postoperative analgesia across inguinal hernia, spinal, adrenal, abdominal, and obstetric surgeries.<sup>[7]</sup> Its variants offer tailored dermatomal coverage, opioid reduction, faster recovery, and chronic pain prevention, surpassing transversus abdominis plane blocks in multiple domains.<sup>[8-10]</sup>

One of the most significant findings of this study was the marked reduction in onset time of sensory blockade in Group II. The faster onset in the dexmedetomidine group can be explained by its mechanism of action. Dexmedetomidine, a highly selective alpha-2 adrenergic receptor agonist, enhances hyperpolarization of nerve membranes by increasing potassium conductance and inhibiting calcium influx. This results in faster inhibition of action potential transmission in C and A-delta fibers, which are primarily responsible for pain transmission. The time required to achieve peak

With respect to adverse events, in our study there is no statistically significant difference between two groups. Although slightly higher numerical incidence of bradycardia and hypotension occurred in Group II, differences were not statistically significant as shown in table 2 and all were clinically manageable. Bradyarrhythmia was reported in 7% (Group I) and 14% (Group II), showing no significant difference ( $p = 0.72$ ). Hypotension was reported in 1.4% (Group I) and 7.5% (Group II), showing no significant difference ( $p = 0.36$ ). Nausea occurred in 2.9% (Group I) and 8.6% (Group II), vomiting affected 2.9% (Group I) and 8.6% (Group II)— but there was no statistically significant difference.

sensory blockade was also significantly reduced in Group II. This indicates that dexmedetomidine not only accelerates onset but also facilitates earlier attainment of maximal block effect.

Both groups demonstrated progressive reduction in pain scores over time. The marked difference at 25 and 30 minutes indicates superior early postoperative analgesia in Group II. The incidence of adverse effects was comparable between groups. Although numerically slightly higher in Group II, the differences were not significant and all events were clinically manageable. Thus, dexmedetomidine at 1.5  $\mu\text{g/kg}$  maintains a favourable safety profile. Similarly, Alver S et al. found that bilateral QL block provided good analgesia for lumbar spine surgery and it enhances early recovery of the patients.<sup>[3]</sup>

## CONCLUSION

The addition of dexmedetomidine (1.5  $\mu\text{g/kg}$ ) to 0.375% ropivacaine in ultrasound-guided anterior quadratus lumborum block significantly enhances the quality and duration of analgesia in patients undergoing elective lower abdominal surgeries. The technique is safe, effective, and hemodynamically stable. Therefore, dexmedetomidine can be recommended as a valuable adjuvant in anterior quadratus lumborum block as part of a multimodal analgesic strategy aimed at optimizing postoperative pain management and improving patient outcomes.

## REFERENCES

1. Yuan Q, Lu S, Cui X, Zhang Y. Transmuscular quadratus lumborum block for postoperative pain and recovery after laparoscopic adrenalectomy. *BMC Anesthesiol*. 2021;21:274.

2. Shao L, Luo X, Ye Y, Liu L, Cai Y. Anterior quadratus lumborum block area comparison in three different volumes of ropivacaine. *BMC Anesthesiol.* 2022;22:365.
3. Alver S, Bahadır C, Tahta AC, Cetinka A. The efficacy of ultrasound-guided anterior quadratus lumborum block for pain management following lumbar spinal surgery. *BMC Anesthesiol.* 2022;22:39.
4. Mieszkowski MM, Mayzner-Zawadzka E. Evaluation of the effectiveness of quadratus lumborum block type I using ropivacaine in postoperative analgesia after cesarean section. *Ginekol Pol.* 2018;89(2):89-96.
5. Murouchi T, Iwasaki S, Yamakage M. Quadratus lumborum block: analgesic effects and chronological ropivacaine concentrations after laparoscopic surgery. *Reg Anesth Pain Med.* 2016;41(2):146-50.
6. Singh N, Anandan V, Ahmad SR. Effect of dexmedetomidine as adjuvant in quadratus lumborum block in caesarean section. *J Clin Anesth.* 2022;78:110892
7. Blanco R, Ansari T, Girgis E. Quadratus lumborum block for postoperative pain after caesarean section. *Eur J Anaesthesiol.* 2015;32(11):812-18
8. Çaparlar CÖ, Altınsoy S, Akelma FK, Özhan MÖ, Ergil J. Posterior quadratus lumborum block versus posterior transversus abdominis plane block for unilateral inguinal hernia surgery. *Niger J Clin Pract.* 2022;25:1457-65
9. Borys M, Zamaro A, Horeczy B. Quadratus lumborum and transversus abdominis plane blocks and their impact on acute and chronic pain in patients after caesarean section. *J Clin Med.* 2021;10:1379
10. Liu X, Song T, Chen X, Zhang J. Quadratus lumborum block versus transversus abdominis plane block for postoperative analgesia in patients undergoing abdominal surgeries. *BMC Anesthesiol.* 2020;20:53.