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REVIEW

Anterior Quadratus Lumborum Block: A Scoping Review of Anatomical Rationale, Techniques, and Clinical Applications

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ABSTRACT

Introduction: The anterior quadratus lumborum block (aQLB) is a fascial plane block targeting the interfascial plane between the quadratus lumborum and psoas major muscles, aiming to achieve both somatic and visceral analgesia through potential spread of local anesthetic toward the thoracolumbar nerve roots. Despite years of clinical use and a growing body of randomized trials across different surgical settings, uncertainty remains regarding its mechanisms of action, patterns of local anesthetic spread, and overall clinical effectiveness. This scoping review aimed to systematically map and synthesize the available evidence on aQLB and identify key knowledge gaps relevant to clinical practice and future research.

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Methods: A comprehensive search of PubMed, Embase, Scopus, Web of Science, and the Cochrane Library was conducted from database inception to February 14, 2026. The search terms included variations of aQLB and related terminology. Only randomized controlled trials were included in this review.
Results: A total of 1174 records were identified, of which 360 underwent full-text assessment, and 119 randomized controlled trials were included. Most studies were conducted in Asia (63%) and involved adults (92%). Abdominal and urological procedures were the most commonly studied surgical indications (56%), followed by orthopedic surgeries (26%) and obstetric–gynecological procedures (17%). Multiple aQLB variants have been reported, including transmuscular, subcostal anterior, supra-arcuate ligament, and lateral arcuate ligament approaches. Comparators included sham or no block, wound infiltration, transversus abdominis plane block, erector spinae plane block, paravertebral block, neuraxial techniques, and other regional techniques. Across studies, the aQLB generally reduced postoperative pain scores, opioid consumption, and postoperative nausea and vomiting. However, the findings were heterogeneous and varied by surgical procedure and study design.
Conclusions: The available literature suggests that aQLB may provide effective postoperative analgesia and opioid-sparing benefits across different surgical procedures. However, inconsistent findings among studies, the limited number of well-designed randomized controlled trials, and substantial heterogeneity across surgical populations restrict the strength of the current conclusions. Moreover, the deep anatomical location of the block, technical complexity, and potential risks should be considered when evaluating its role in routine clinical practice.

Keywords: Analgesia; Nerve block; Quadratus lumborum block; Ultrasonography

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Key Summary Points

The aQLB targets the interfascial plane between the quadratus lumborum and psoas major muscles to provide postoperative analgesia.
This scoping review included 119 randomized controlled trials across multiple surgical settings.
The aQLB is generally associated with reduced postoperative pain and opioid consumption.
Heterogeneity in techniques and outcomes highlights the need for better-standardized trials.

INTRODUCTION

The concept of depositing local anesthetic (LA) in close proximity to the quadratus lumborum (QL) muscle was first described by Blanco in 2011 [1]. In this initial report, LA was injected at the anterolateral aspect of the QL muscle based on the hypothesis that spread along the thoracolumbar fascia could extend into the paravertebral space, thereby providing broader coverage and potentially visceral analgesia compared to the transversus abdominis plane (TAP) block [2]. However, subsequent clinical experience with the lateral approach has demonstrated variable LA spread, resulting in inconsistent dermatomal coverage and heterogeneous analgesic outcomes [3].

Following Blanco's original ultrasound (US)-guided description, several technical modifications have been introduced. As the number of approaches described has increased, conceptual ambiguity has emerged. To address this, subsequent efforts have focused on standardizing the nomenclature and clearly defining the anatomical targets of the lateral, posterior, and anterior approaches, replacing the previously inconsistent numerical QL block labeling [4]. This standardization aimed to reduce confusion in

the literature and improve comparability across clinical and anatomical studies.

Despite these refinements, uncertainty persists regarding the predictability of LA spread and the underlying mechanisms of action. A major technical advancement occurred with the description of the anterior QL block (aQLB) by Børglum et al. in 2013 [5]. In this approach, LA is deposited between the QL and psoas major (PM) muscles with needle placement guided by adjacent anatomical landmarks. This technique was intended to facilitate more consistent spread toward the thoracolumbar nerve roots, potentially enhancing both somatic and visceral analgesia [6].

In contemporary regional anesthesia practice, the aQLB has been integrated into multimodal, opioid-sparing analgesic strategies. Randomized controlled trials, systematic reviews, and meta-analyses have reported clinically meaningful analgesic benefits across several surgical settings, leading guideline committees to consider its routine incorporation into enhanced recovery and perioperative care pathways [7]. Nevertheless, the variability in reported outcomes and the ongoing debate regarding the mechanisms of analgesia underscore the need for a structured synthesis of the available evidence.

Therefore, this scoping review aims to systematically map, synthesize, and critically appraise the literature on the aQLB, with particular attention to its proposed mechanism of action, to clarify the current evidence, identify knowledge gaps, and inform both clinical practice and future research directions.

METHODS

Our scoping review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews guidelines [8]. This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

Literature Search

A comprehensive search of PubMed, Embase, Scopus, Web of Science, and the Cochrane Library was conducted from database inception to February 14, 2026, to identify relevant studies. The search strategy was constructed using predefined free-text keywords and their synonyms combined with Boolean operators. Key intervention-related terms included "anterior quadratus lumborum block," "transmuscular quadratus lumborum block," "QLB3," "supra-arcuate quadratus lumborum block," "infra-arcuate quadratus lumborum block," and "lateral-arcuate quadratus lumborum block." The search was limited to studies published in English only. No restrictions were imposed on the publication type, study status, or year of publication. In addition, the reference lists of all included studies and relevant review articles were manually screened to identify potentially missed publications. The detailed search strategies are presented in Supplementary Material.

Study Selection

All records retrieved from the electronic database searches were exported and uploaded to the web-based systematic review management platform Rayyan (Qatar Computing Research Institute, Doha, Qatar) to support structured and transparent screening. Duplicate records were identified and removed before screening. The remaining citations were independently assessed by two reviewers (ET and YEK).

Data Extraction and Data Retrieval

For each included study, predefined variables were systematically extracted and recorded in a secure, access-restricted database. The extracted data included the first author's name, year of publication, country of origin, surgical procedure, comparator interventions, block approaches, volumes and concentrations of LAs, and key outcomes. A Large

Language Model (ChatGPT 5.2; OpenAI, San Francisco, CA, USA) was used solely to review and improve the grammar and fluency of the manuscript. All content was critically reviewed and verified by the authors, who retained full responsibility and accountability for the final version of the manuscript [9].

RESULTS

Selection of Sources of Evidence

A total of 1174 unique articles were identified, of which 360 underwent a full-text review. A total of 119 randomized controlled studies were included in this review (Fig. 1). Given

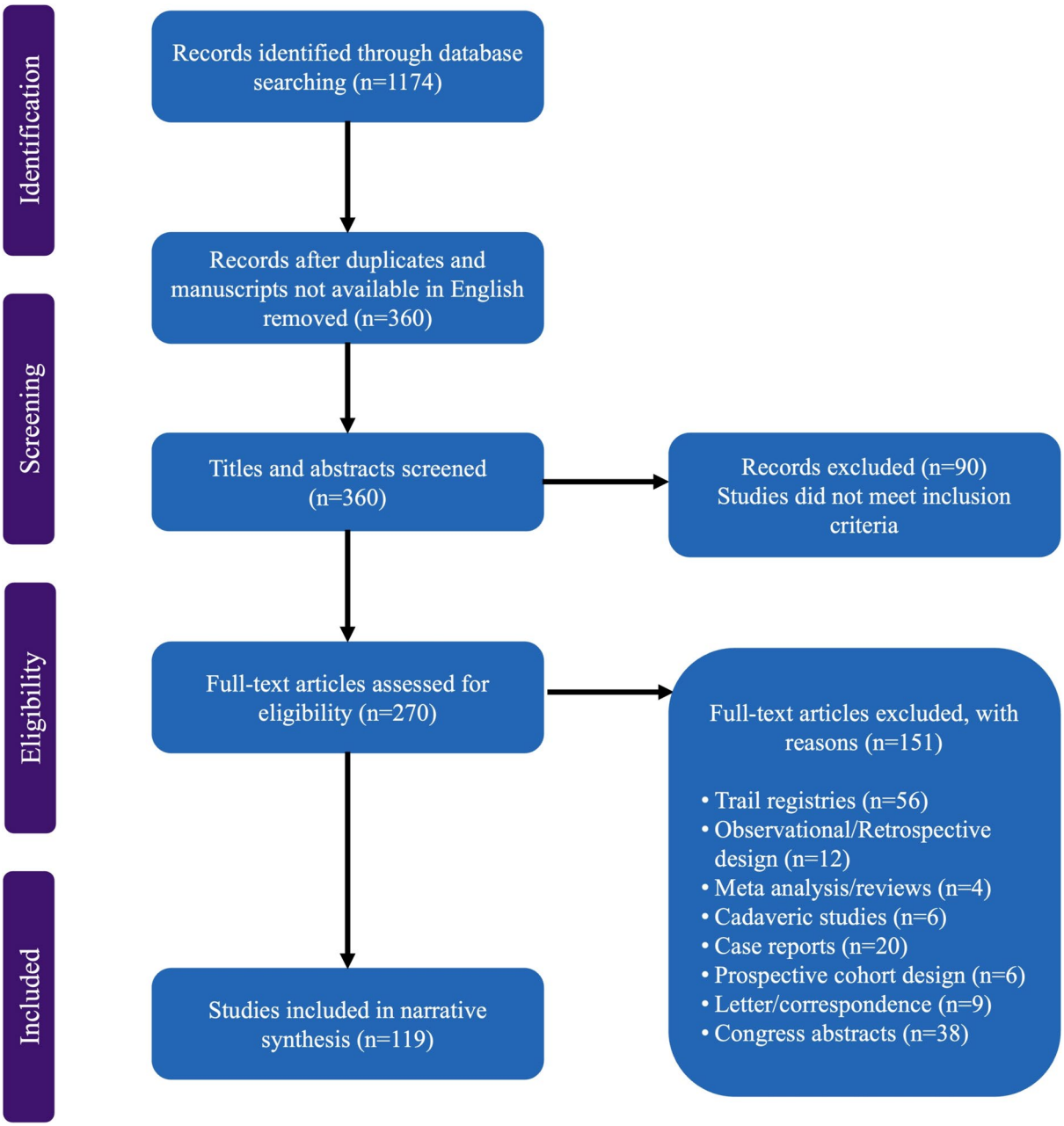


Fig. 1 Flow diagram of study selection

the availability of high-quality evidence, we decided to include only randomized controlled trials in this review.

Characteristics of Included Studies

All the included trials evaluated the analgesic efficacy of aQLB across a wide range of surgical procedures and patient populations. Most studies were conducted in Asia ($n = 75$, 63%), predominantly China and India, followed by the Middle East ($n = 20$, 17%), mainly Egypt and Türkiye. The majority of the included studies were conducted in adult populations ($n = 110$, 92%). The most frequently investigated procedures were abdominal and urological surgeries (including nephrectomy, colorectal surgery, gastrectomy, and hernia surgery), comprising approximately half of all trials ($n = 68$, 56%). Orthopedic procedures, primarily hip and femur surgeries, represented approximately one-quarter of the studies ($n = 31$, 26%). Obstetric and gynecological surgeries, mainly cesarean delivery and laparoscopic hysterectomy, accounted for approximately 17% ($n = 20$), while the remaining trials involved mixed or less common surgical populations, such as pediatric surgery and healthy volunteer studies (Supplementary Material).

Multiple approaches for aQLB have been investigated, including transmuscular, subcostal, supra-arcuate ligament, and lateral arcuate ligament techniques. Comparators varied across studies and included sham blocks, no-block controls, wound infiltration, TAP block, erector spinae plane (ESP) block, paravertebral block, fascia iliaca compartment block, pericapsular nerve group (PENG) block, thoracic epidural analgesia (TEA), intrathecal morphine, and other peripheral regional or neuraxial techniques.

LA regimens differed among trials, with bupivacaine, ropivacaine, and levobupivacaine being the most frequently used agents. Concentrations and volumes varied widely, reflecting differences in the block approach, patient population, and surgical context. Several studies also explored the use of adjuvants such as dexamethasone, dexmedetomidine, clonidine, or epinephrine, as well as continuous catheter techniques in selected populations.

Across the included studies, dermatomal coverage appeared to cluster predominantly in the lower thoracic and upper lumbar regions, with sensory spread most consistently reported between T10 and L1. Although a few studies described more cranial extension, including up to the upper thoracic dermatomes, such spread should be interpreted with caution, as extension as high as T2 appears anatomically unlikely and may reflect differences in sensory testing methods, indirect spread patterns, or possible epidural dissemination. Caudal extension beyond L2 was also infrequently reported, underscoring the substantial variability in the reported extent of blockade (Fig. 2).

Anatomical Rationale of the Anterior Quadratus Lumborum Block

The QL muscle is an axial muscle of the posterior abdominal wall that originates from the iliac crest and inserts onto the inferior border of the 12th rib and the transverse processes of the L1–L4 vertebrae. Its lateral free border follows an oblique path. The QL and PM muscles are located posterior to the lateral and medial arcuate ligaments of the diaphragm, respectively. The erector spinae muscle group forms the posterior anatomical relationship of the QL, which lies within the anterior and middle layers of the thoracolumbar fascia [10].

A thorough understanding of the thoracolumbar fascia anatomy is essential to appreciate the anatomical basis of the aQLB, as this fascia plays a central role in the proposed mechanism of action of the block. Two principal anatomical models have been described to explain the organization of the thoracolumbar fascia. In the two-layer model, the posterior layer envelops the erector spinae muscles, whereas the anterior layer extends between the erector spinae and QL; in this framework, the fascia covering the anterior surfaces of the QL and PM muscles is defined as the transversalis fascia [11]. In contrast, the three-layer model, which has gained wider acceptance, describes a posterior layer surrounding the erector spinae, a middle

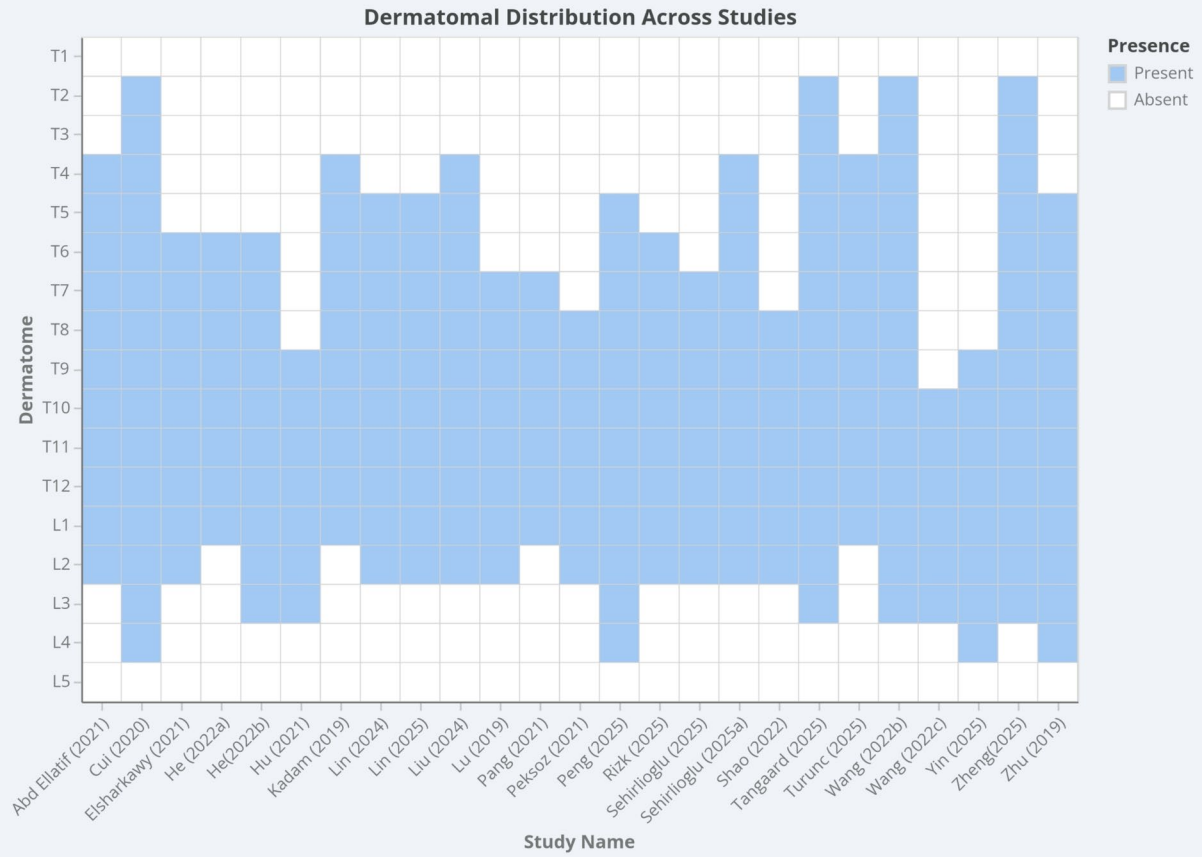


Fig. 2 Reported dermatomal sensory coverage following anterior quadratus lumborum block across included randomized controlled trials

layer between the erector spinae and the QL, and an anterior layer anterior to both the QL and PM muscles. Although these models primarily represent different anatomical descriptions rather than distinct mechanisms, the three-layer model is more widely adopted in the literature and offers a clearer conceptual framework for describing fascial relationships relevant to the QL block. Therefore, it was used as the reference framework in this study [11].

The relationship between the anterior thoracolumbar fascia (ATLF) and diaphragm is critical for understanding the anatomical basis for cranial spread. The medial and lateral arcuate ligaments are key anatomical structures, with the former extending from the anterolateral aspect of the L2 vertebral body to the transverse process of L1, whereas the lateral arcuate ligament spans from the L1 transverse process to the midportion of the T12 rib, collectively defining the inferior border of the diaphragm. As the ATLF covering the PM and QL muscles courses cranially, it splits into two laminae at the level of the arcuate ligaments: one lamina contributes to the inferior diaphragmatic fascia, whereas the other continues cranially, posterior to the ligaments, becoming continuous with the endothoracic fascia [10–12].

This anatomical configuration provides a potential pathway for the LA administered during aQLB to track cranially behind the medial and lateral arcuate ligaments, reaching the thoracic paravertebral space via the subendothoracic compartment. This mechanism constitutes the anatomical basis for achieving analgesia at higher dermatomal levels following aQLB [12, 13]. Another relevant anatomical feature is the apposition zone between the QL and diaphragm.

The lateral arcuate ligament extends from the L1 transverse process to the midportion of the T12 rib, traversing over the QL muscle and creating a strategic transitional zone at the supra-arcuate level between the endothoracic fascia covering the diaphragm and the investing fascia of the QL. The aQLB variants performed close to the lateral arcuate ligament level have been associated with more pronounced thoracic spread, typically involving dermatomes from approximately T6 to L2 [14–17].

Although the mechanism of action of the aQLB is not yet completely understood, the leading hypothesis posits that LA injected into the interfascial plane between the QL and PM muscles spreads craniocaudally along the fascial planes to exert an analgesic effect [4, 10, 13, 18, 19]. However, cadaveric and imaging-based studies have demonstrated substantial inconsistencies in the reported spread patterns. Several investigations have shown that following aQLB, the injectate frequently fails to reach the thoracic region and instead spreads medially and caudally along the PM muscle, staining branches of the upper lumbar plexus, particularly the ilioinguinal and iliohypogastric nerves, with high frequency [19–22]. Consistently, a recent review reported that only approximately 50% of the included studies demonstrated reliable involvement of the thoracic paravertebral space, whereas lumbar plexus spread was observed in the majority of cases [23]. Consequently, the dominant clinical spread pattern of aQLB remains variable, with approximately half of the studies reporting thoracic spread and the remainder demonstrating predominantly caudal or lumbar plexus distribution, suggesting that the pattern of spread is highly inconsistent and likely dependent on technical and anatomical factors [20].

Nevertheless, existing data suggest that several factors may influence the distribution of the injectate. The injection level appears to be a key determinant, as injections performed at more cranial levels (L1–L2) have been associated with increased thoracic spread and higher maximal cephalad dermatomal coverage, occasionally extending up to the T5 level [13, 24]. The ATLF seems to provide a barrier for the LA to reach the branches of the lumbar plexus, and breaching the layer (through extrafascial injection between the ATLF and the PM muscle) offers technical similarity of the aQLB to a lumbar plexus or psoas compartment block with associated quadriceps motor weakness [25, 26]. Another contributing factor may be the close anatomical relationship between the injection site and a region within the psoas major muscle where a separation between the posterior one-third and anterior two-thirds has been described. However, this structure is more likely to represent an intramuscular septum rather than a true interfascial plane, and its continuity with the ATLF or other fascial layers remains uncertain. Injection into this region may therefore result in unintended intramuscular spread and potential involvement of the lumbar plexus. [27]. In addition, the thoracolumbar fascia, which is densely innervated by sympathetic fibers, may play a role in the mechanism of action of the block; sympathetic blockade at this level could also contribute to visceral analgesia [28].

Finally, it should be acknowledged that dynamic factors absent in cadaveric studies, such as respiration and muscle tone, may facilitate broader dermatomal spread in living patients. Therefore, the clinical extrapolation of cadaveric findings should be undertaken with caution. Furthermore, variability in the injection techniques among the aQLB variants, together with individual anatomical differences, likely contributes to the heterogeneity of the LA spread patterns.

Techniques of the Anterior Quadratus Lumborum Block

The aQLB can be performed with the patient in the lateral decubitus position with the surgical side uppermost [17] or in the prone position. A curved-array US transducer (2–6 MHz) is placed transversely over the abdominal flank along the mid-axillary line between the iliac crest and the costal margin. The transducer is then translated dorsally while maintaining its transverse orientation until the triangular-shaped QL muscle is visualized at its attachment to the apex of the lumbar transverse process, most commonly around the L3–L4 level. With the PM muscle

located anteriorly, the erector spinae muscle posteriorly, and the QL muscle abutting the transverse process, a characteristic three-leaf clover-like configuration (the "shamrock sign") is identified. The block needle may be advanced in-plane using either a posterior-to-anterior (Fig. 3a, b) or an anterior-to-posterior (Fig. 4a, b) trajectory, depending on operator preference and sonographic conditions. Regardless of the approach, the needle tip is directed to traverse the QL muscle, penetrate its ventral investing fascia, and deposit LA deep to the ATLF, within the interfascial plane between the QL and PM muscles.

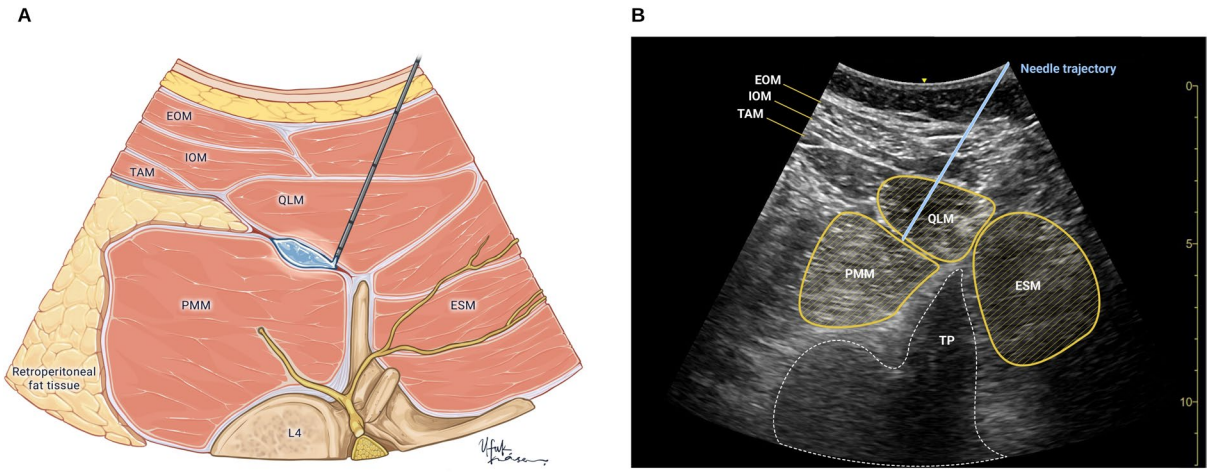


Fig. 3 **a** Schematic illustration of an ultrasound-guided anterior quadratus lumborum block using a posterior-to-anterior needle trajectory. **b** Ultrasound image of an anterior quadratus lumborum block using a posterior-to-anterior needle trajectory. *EOM* external oblique muscle, *IOM* internal oblique muscle, *TAM* transversus abdominis muscle, *QLM* quadratus lumborum muscle, *PMM* psoas major muscle, *ESM* erector spinae muscle, *TP* transverse process

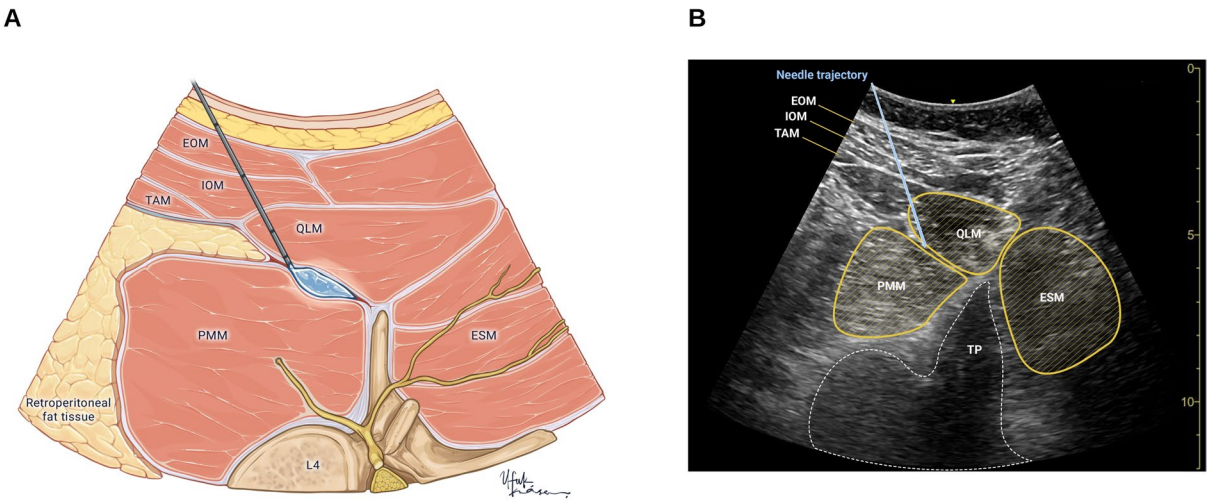


Fig. 4 **a** Schematic illustration of an ultrasound-guided anterior quadratus lumborum block using an anterior-to-posterior needle trajectory. **b** Ultrasound image of an anterior quadratus lumborum block using an anterior-to-posterior needle trajectory. *EOM* external oblique muscle, *IOM* internal oblique muscle, *TAM* transversus abdominis muscle, *QLM* quadratus lumborum muscle, *PMM* psoas major muscle, *ESM* erector spinae muscle, *TP* transverse process

To facilitate an alternative needle trajectory and patient positioning, Dam et al. introduced the transverse oblique paramedian approach in 2016, which can be performed with the patient in a sitting position [29]. In this technique, a curved-array US transducer is positioned approximately 3 cm lateral to the L2 spinous process in a transverse oblique paramedian orientation. The L2 transverse process and adjacent QL muscle were identified, after which the needle was inserted in-plane from the medial side of the probe and advanced laterally to access the interfascial plane between the QL and PM muscles.

Expanding on subcostal applications, Elsharkawy et al. described a paramedian sagittal oblique (subcostal) approach to the aQLB in 2019 [30]. The patient is placed in the lateral decubitus position. A curved-array transducer was placed posteriorly in the parasagittal oblique plane, approximately 6–8 cm lateral to the L1–L2 spinous processes, immediately below the 12th rib, and cranially oriented with a medial tilt. In this view, the QL muscle is visualized at its insertion into the inferior border of the 12th rib, with the latissimus dorsi (LD) muscle superficial to the QL and ATLF identified anteriorly. With medial transducer movement, sonoanatomical transitions revealed that the erector spinae, QL, and PM muscles moved from posterior to anterior. The block can be performed from either of the probe positions. The needle was advanced in-plane under US guidance in the caudal-to-cranial direction, traversing the LD and QL muscles, with the tip positioned either anterior to the QL muscle between its investing fascia and the ATLF or within the interfascial plane between the QL and PM muscles (Fig. 5a, b).

Recently, Li et al. described an ultrasound-guided aQLB targeting the supralateral arcuate ligament level [16]. In the transverse approach, the patient is positioned in the lateral decubitus position, and a convex probe is placed at the T12–L1 intervertebral level with the marker directed laterally. The probe is then translated laterally to approximately 3–5 cm from the abdominal midline and adjusted into a

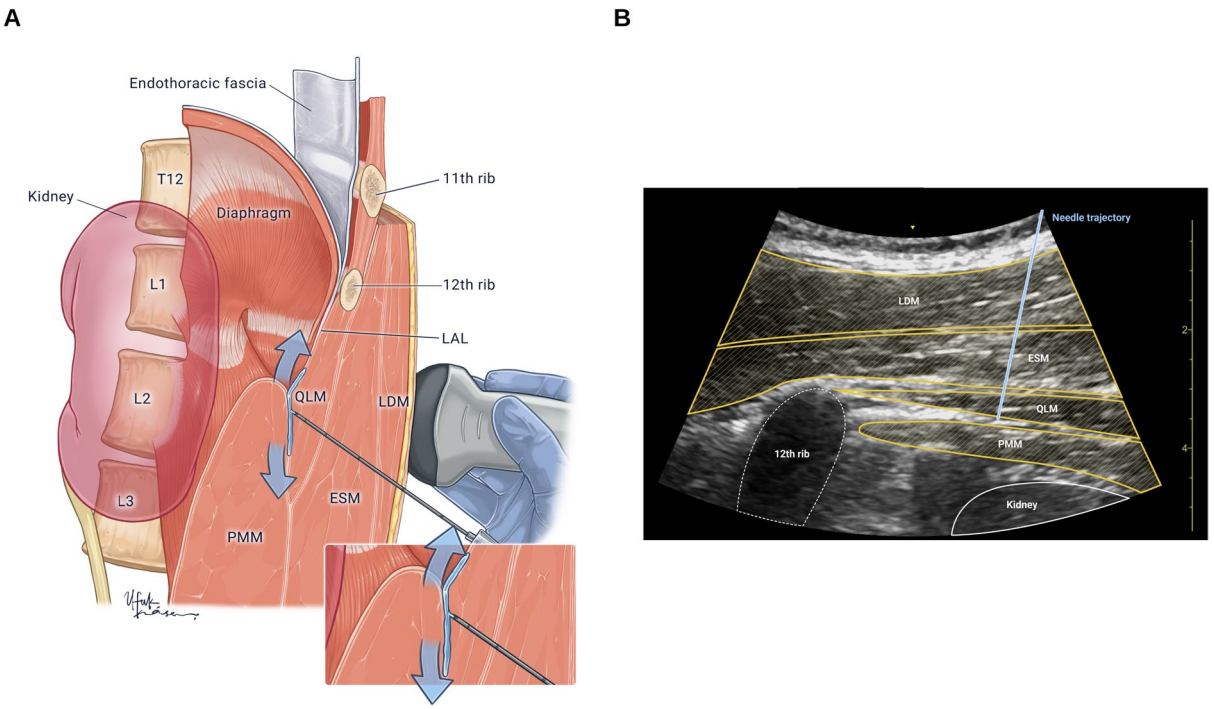


Fig. 5 **a** Schematic illustration of an ultrasound-guided subcostal anterior quadratus lumborum block. **b** Ultrasound image of a subcostal anterior quadratus lumborum block. *QLM* quadratus lumborum muscle, *PMM* psoas major muscle, *ESM* erector spinae muscle, *LDM* latissimus dorsi muscle, *LAL* lateral arcuate ligament

paramedian transverse-oblique plane, allowing visualization of the paravertebral structures. The needle is inserted in-plane from the inferior edge of the probe and advanced in a posteroanterior direction through the erector spinae and quadratus lumborum muscles toward the target site, which is the triangular gap between the quadratus lumborum and the diaphragm. Li et al. also described a paramedian sagittal (long-axis) approach targeting the same lateral arcuate ligament level, in which a convex probe is placed 6–8 cm lateral to the spinal midline with the marker directed cephalad to obtain a long-axis view [16]. This enables identification of the cranial attachment of the QL at the T12 rib, after which the probe is moved medially until the acoustic shadow of the L1 transverse process appears. Craniocaudal sliding of the probe then reveals the region between the T12 rib and L1 transverse process, where a thin diaphragm moving with respiration is visualized deep to the quadratus lumborum. An in-plane needle technique is used to advance the needle through the erector spinae and QL muscles into the potential space between the diaphragm and QL (apposition zone), where the inferior border of the diaphragm corresponds to the lateral arcuate ligament, which serves as the anatomical landmark for injection (Fig. 6a, b).

DISCUSSION

Review of Clinical Evidence

This scoping review maps and synthesizes the existing literature on aQLB across various surgical settings, focusing on its analgesic efficacy, opioid-sparing potential, and inherent clinical limitations. While pooled evidence suggests beneficial effects on postoperative pain and recovery-related outcomes, the magnitude and consistency of these effects vary substantially across different surgical contexts and study designs.

A recent systematic review and meta-analysis [31] including eight randomized controlled trials demonstrated that aQLB at the lateral arcuate

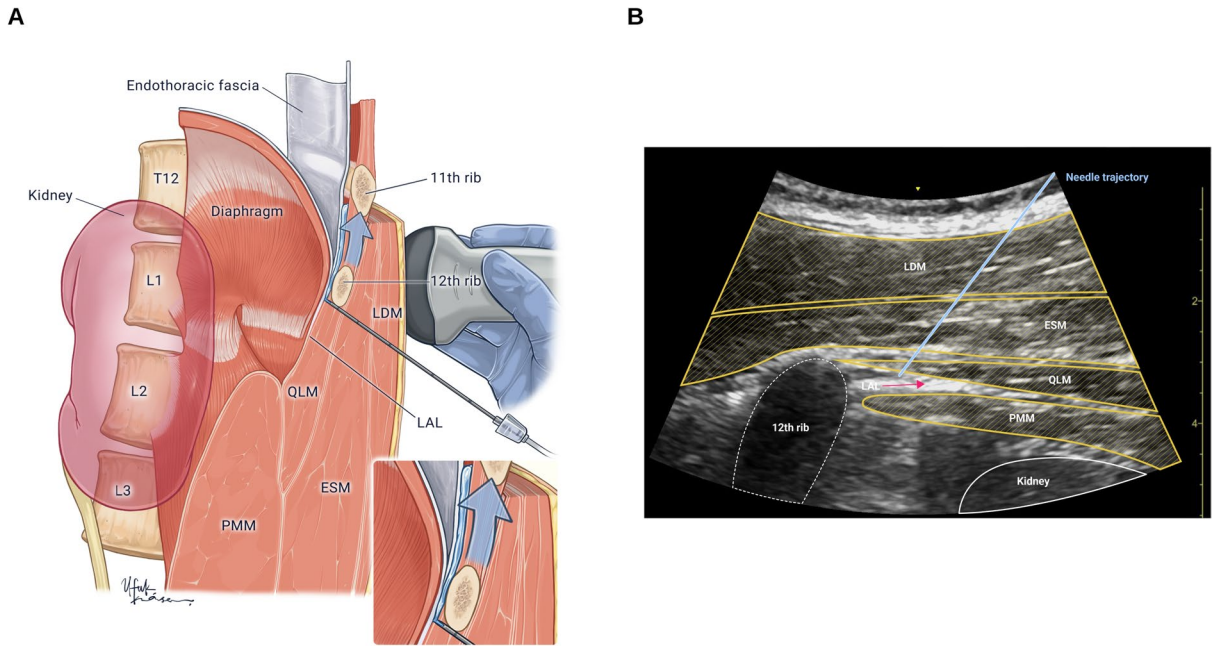


Fig. 6 **a** Schematic illustration of an ultrasound-guided anterior quadratus lumborum block at the supralateral arcuate ligament level. **b** Ultrasound image of an anterior quadratus lumborum block at the supralateral arcuate ligament level. *QLM* quadratus lumborum muscle, *PMM* psoas major muscle, *ESM* erector spinae muscle, *LDM* latissimus dorsi muscle, *LAL* lateral arcuate ligament

ligament significantly reduced 24-h postoperative opioid consumption, prolonged the time to first patient-controlled analgesia activation, and decreased the incidence of postoperative nausea and vomiting (PONV) compared with no block or alternative regional techniques. In addition, Liang et al. [32] reported that aQLB was associated with a lower incidence of PONV, improved early postoperative pain scores, shorter time to ambulation, and reduced length of hospital stay compared with no block. However, the included trials were predominantly single-center, procedure-specific, and methodologically heterogeneous, which limits the generalizability of these findings.

Abdominal and Urological Surgery

The aQLB has been most extensively studied in abdominal and urological surgeries, encompassing both open and minimally invasive procedures. The available evidence supports its clinically meaningful analgesic and opioid-sparing efficacy in major abdominal and urological procedures, including nephrectomy [33], percutaneous nephrolithotomy [34], colorectal surgery [35], laparoscopic gastrectomy [36], hepatectomy [37], and cholecystectomy [26], particularly when included as an element of multimodal analgesia. In contrast, a large multicenter randomized placebo-controlled trial in minimally invasive colorectal surgery found that adding a bilateral aQLB to multimodal analgesia did not reduce 24-h morphine consumption or improve postoperative pain scores, suggesting limited additional benefit [38].

Compared with more superficial fascial plane blocks, such as the TAP and ESP blocks, the aQLB may offer more pronounced visceral analgesic component [39]. This effect is likely related to the deeper injection site adjacent to the TLF, facilitating its spread toward the paravertebral space. The relatively slower systemic absorption of LA through the multilayered TLF compared to that through TAP may further contribute to the prolonged analgesic effects. Nevertheless, as a retroperitoneal technique, aQLB requires careful consideration because of its deep injection site and potential for complications, including retroperitoneal hematoma and inadvertent abdominal organ injury [27].

Conversely, compared with neuraxial and paraspinal techniques such as the thoracic paravertebral block and TEA, the aQLB generally achieves comparable analgesic efficacy, with some studies reporting advantages in terms of hemodynamic stability and avoidance of neuraxial-related adverse effects [40–43]. However, a randomized trial comparing subcostal aQLB with epidural analgesia for open nephrectomy failed to demonstrate non-inferiority, with patients in the epidural group receiving half the dosage of rescue opioids compared to the aQLB group [44]. In another trial [33] that enrolled patients undergoing laparoscopic nephrectomy, unilateral subcostal aQLB was compared with intrathecal morphine. The subcostal aQLB did not meet the predefined non-inferiority margin for 24-h postoperative opioid consumption, and patients receiving intrathecal morphine demonstrated lower opioid requirements and pain scores. These findings suggest that, although aQLB may contribute to multimodal analgesia, its analgesic effect may fall short of neuraxial techniques in procedures with a substantial visceral pain component. The variable spread of LA toward the nerve roots and cranial levels may partly explain this observation.

Orthopedic Surgery

The use of aQLB in orthopedic surgery has primarily been investigated in hip procedures, and the results remain inconsistent. Although some data suggest that the aQLB has modest analgesic effectiveness [45], Haskins et al. reported that the aQLB did not provide additional analgesic benefit beyond that of standard multimodal analgesia following hip arthroscopy [46]. Similarly, in a recent multicenter study on total hip arthroplasty, Rozier et al. found that aQLB offered no significant advantage over placebo with respect to opioid consumption within the first 24 postoperative hours, pain scores, time to first standing, ambulation distance, quadriceps strength, or length of hospital stay [47]. Compared with the many other regional techniques

available, such as the PENG block [48], femoral nerve block [49], and ESP block [50], the aQLB may only offer comparable analgesia.

Wider adoption of aQLB may also be constrained by safety and functional considerations. The spread of LA towards the lumbar plexus during aQLB may result in quadriceps or hip flexor weakness, which can impair early mobilization and potentially conflict with enhanced recovery protocols that emphasize rapid postoperative ambulation, particularly after hip surgery. Lower limb motor strength was better preserved when LA injections were performed subfascially (injection between the QL muscle and the anterior layer of the TLF) than with extrafascial injection (where the LA was placed between the ATLF and PM muscle). In the subfascial group, 65% of patients had normal muscular force in the lower limbs, compared to only 10% in the extrafascial group, which had more patients needing assistance with ambulation at 1 and 6 h postoperatively [26]. This motor involvement is consistent with clinical observations of reduced quadriceps strength and delayed ambulation following aQLB, compared with more motor-sparing techniques. In a randomized trial comparing aQLB and PENG block for total hip arthroplasty, aQLB showed an advantage in opioid sparing but was associated with greater motor impairment and delayed first ambulation, whereas PENG preserved motor function and facilitated earlier mobilization [48]. In addition, the aQLB is a deep block performed in close proximity to the psoas compartment, where vascular structures are small, variable, and often difficult to visualize, raising concerns about bleeding and prompting precautions similar to those for neuraxial techniques [51]. These limitations, together with the low to moderate quality of much of the available evidence, likely explain why current guideline recommendations, including PROSPECT, do not support the aQLB as a primary postoperative analgesic strategy in orthopedic surgery [52].

Caesarean Delivery and Hysterectomy

Although evidence supporting the use of the QL block in obstetric and gynecological surgeries exists, the overall quality of the published literature remains limited [53]. In the presence of intrathecal morphine, there is currently no convincing evidence that the addition of any fascial plane block provides a clinically meaningful improvement in analgesic outcomes. Accordingly, the PROSPECT guidelines [54] recommend the use of fascial plane blocks, including TAP and QL blocks, primarily in the absence of intrathecal morphine. Notably, a recent meta-analysis [55] reported that the QL block achieved postoperative analgesia comparable to intrathecal morphine after Caesarean delivery while reducing the incidence of opioid-related adverse effects, particularly nausea and vomiting; however, the analysis included multiple QL block variants and was not limited specifically to the aQLB. In laparoscopic hysterectomy, reported effects on pain scores and opioid consumption are heterogeneous across studies [56–58].

Pediatric Surgery

There have been few studies evaluating aQLB in pediatric surgery, but available randomized controlled trials have primarily focused on lower abdominal, urological, and orthopedic procedures, including inguinal hernia repair, pyeloplasty, and congenital hip surgery. The data suggest that aQLB provides effective postoperative analgesia and reduces rescue analgesic requirements compared with wound infiltration [59] or caudal [60] and TAP blocks [61]. Several trials have reported prolonged analgesia duration and higher parental satisfaction [62]. While the aQLB appears to be a feasible and effective component of multimodal analgesia in selected pediatric populations, its benefits over simpler and well-established techniques have not been consistently demonstrated. Consequently, current evidence supports a cautious, individualized use of aQLB in pediatric surgery rather than routine adoption as a first-line regional analgesic technique.

Limitations

This scoping review has some limitations. Given the nature of a scoping review, our aim was to

map the existing evidence rather than conduct a formal quantitative analysis. Therefore, any conclusions regarding comparative effectiveness should be interpreted with caution. Next, the literature on aQLB is marked by significant heterogeneity. We observed a wide range of practices, from the level of the block and needle trajectory to the specifics of the injection plane and whether the LA was deposited subfascially or extrafascially. Variations in LA choice, volume, the use of catheters versus single injection, and even the timing of the block further complicate this picture. In many cases, inconsistent terminology and vaguely defined anatomical targets suggest that fundamentally different techniques may have been grouped. Furthermore, the lack of objective data on injectate spread in most studies makes it difficult to draw definitive conclusions. In addition, several studies did not incorporate standardized basic multimodal analgesia, making it difficult to determine the true incremental analgesic value of aQLB beyond contemporary perioperative analgesic care. This limitation is particularly important because inconsistent clinical outcomes may partly reflect unreliable or insufficient injectate spread to the intended anatomical region, rather than the absence of a potential block effect.

Implications for Future Research

The interpretation of the evidence for aQLB is substantially limited by the overall quality of the available studies. High-quality randomized controlled trials remain scarce, and existing trials are frequently characterized by heterogeneous designs, small sample sizes, and the absence of placebo or clinically relevant comparator groups. Factors such as injection level, needle trajectory, and LA volume may substantially influence injectate distribution; however, the precise technical conditions required to achieve an optimal and clinically relevant spread remain incompletely defined [20]. In addition, the complex interplay between fascial planes, together with significant inter- and intra-individual anatomical variability, may further contribute to the heterogeneous patterns of LA distribution observed in clinical and cadaveric studies.

Moreover, many studies do not incorporate basic multimodal analgesia [63], which is recommended as a cornerstone of perioperative pain management for most surgical procedures. These methodological shortcomings, as outlined above, together with the frequent lack of blinding and use of suboptimal statistical approaches, likely contribute to inflated effect estimates and poor reproducibility.

Future trials evaluating the aQLB should adopt robust methodological standards, including appropriate sample size calculations, standardized multimodal analgesic regimens, systematic block testing to confirm area of coverage, and dedicated anatomical or mapping studies to characterize the spread of the injectate. Finally, dose-finding studies exploring LA concentration and volume are warranted.

CONCLUSIONS

The aQLB has been investigated across a wide range of surgical procedures. Although some studies suggest that aQLB may reduce postoperative opioid consumption and improve pain scores, the overall interpretation should remain cautious because the evidence is heterogeneous, procedure-specific effects are variable, and several studies have reported limited or no benefit. The relatively small number of high-quality randomized controlled trials and the diversity of surgical settings currently preclude strong surgery-specific recommendations. Moreover, aQLB is considered a deep block by recent guidelines, and its greater technical complexity compared with other fascial plane blocks, including the need for lateral decubitus positioning, operator experience, and additional challenges in patients with obesity, together with potential risks such as motor impairment and bleeding, may limit its routine use in clinical practice. Therefore, while aQLB may represent a potentially useful analgesic option in selected patients and procedures, its routine use remains debatable and should be guided by surgical context, available expertise, and individual risk–benefit assessment.

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Declarations

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Ethical Approval. This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

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