

HOT TOPIC

CAN I QL BLOCK IT?

The Lateral Quadratus Lumbar Block in paediatric abdominal surgery

SUMMARY OF KEY POINTS:

- The lateral QL block provides analgesia for lower abdominal daycase procedures
- Sensory coverage is T9-L1, similar to a TAP block with longer lasting analgesia
- As a paediatric Plan A block it is considered versatile with a low risk of complications

REVIEW OF EVIDENCE

Abdominal wall nerve blocks are a pillar of pain management in paediatric anaesthesia, and can be used to improve patient experience and minimise opioid use in many common paediatric procedures. Often the question is, which technique to use?

Amongst the recently developed fascial plane blocks is the lateral quadratus lumborum block (QLB), an ultrasound guided technique that offers unilateral analgesia in infra-umbilical abdominal surgery. It was first reported in 2007 to have more extended coverage than the similar TAP (transversus abdominis plane) block. Sensory blockade extends from T9 to L1 reliably, and up to T7 in 40% (Hernandez et al., 2017). The Lateral QLB is often used in inguinal hernia repair and orchidopexy, and has many other uses (e.g. laparoscopic procedures, stoma formation and iliac crest bone harvesting).

Anatomy

The quadratus lumborum muscle runs the length of the abdomen from the 12th rib to the iliac crest, sitting laterally to the vertebral column. It lies anterior to the erector spinae muscle, and posterior to the psoas muscle. These three muscles are enveloped within layers of the thoracolumbar fascia, which separates them from the paraspinal muscles. The nerves that supply sensory innervation to the lower abdomen and inguinal region include the thoracoabdominal nerves (T7-11) and branches of the lumbar plexus; the iliohypogastric (T12-L1) and ilioinguinal (L1) nerves. They leave the spinal cord via the ventral rami, travel in between the psoas and quadratus lumborum muscles, and continue in the TAP plane to the abdominal wall. The QL blocks target these nerves along this pathway, outlined in figure 1.

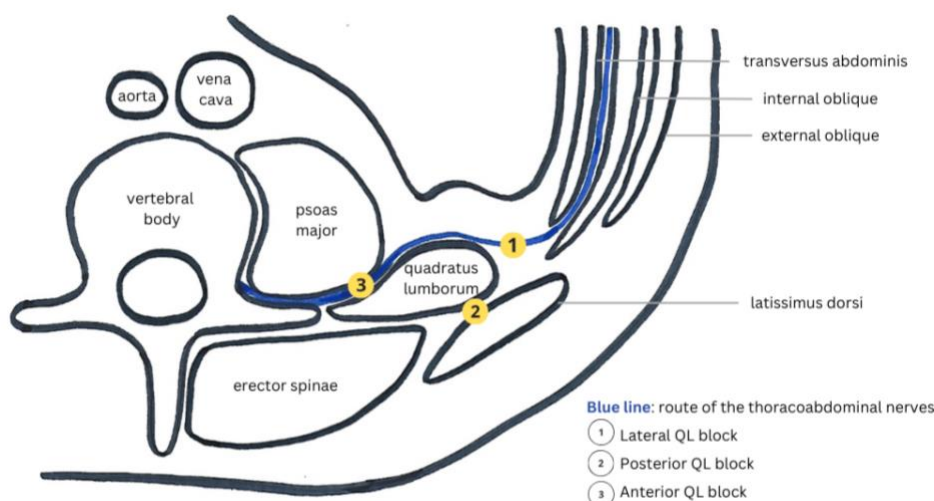


Figure 1. Anatomy of the quadratus lumborum block with the 3 needling techniques

How is the QLB performed?

With the patient lying laterally, place a linear ultrasound probe horizontally at the mid-axillary line between the iliac crest and subcostal margin. In older children, a curvilinear probe may be better suited. Slide the probe posteriorly until the three flat abdominal wall muscles (external oblique, internal oblique and transversus abdominis) taper into an aponeurosis and the QL muscle can be identified between this aponeurosis and the bony transverse process. Tilt of the probe can improve visualisation of the psoas and erector spinae muscles nearby.

There are 3 areas around the quadratus lumborum muscle that local anaesthetic can be deposited to achieve varying sensory coverage of the abdominal wall. The nomenclature of the QLB refers to this needle tip position in relation to the muscle:

1. Lateral QL block (*previously known as type 1*): local anaesthetic injected on the lateral aspect of the QL muscle, in the potential space between this and the abdominal wall muscles aponeurosis. The needle can be directed in-plane, from anterior to posterior.
2. Posterior QL block (*previously type 2*): local anaesthetic deposited posterior to the QL muscle between that and the erector spinae and latissimus dorsi muscles.
3. Anterior QL block (*previously type 3, or "transmuscular"*): local anaesthetic deposited anterior to the QL muscle, between the QL and psoas muscles. Typically performed with in-plane needling from posterior to anterior. Cadaveric studies have shown spread from here to the paravertabral space, blocking sympathetic fibres that achieves visceral analgesia (Carline et al., 2016)

The lateral QLB has been proposed as a paediatric Plan A block (Pearson et al, 2023) and further discussion here will focus on this technique. It is simple to perform, with low risk of complications.

Is the Lateral QLB superior to other abdominal blocks?

Orchidopexy:

This commonly performed procedure in children can have challenging analgesia management due to the complex innervation of the testis and spermatic cord. Peritoneal dissection is performed to mobilise the testicular vessels and spermatic cord which can cause severe visceral pain.

A RCT of 90 patients (age <12yrs) compared the efficacy of analgesia in orchidopexy of a posterior TAP versus lateral QL block (Mutlu et al, 2024). The QL block group required significantly less intra-operative remifentanyl, with lower post-operative pain scores (at 6, 16 and 24hrs), less analgesic consumption post-operatively up to 24hrs and higher parent satisfaction (all $p < 0.001$). Other smaller RCTs have repeated these findings of better and longer analgesia for orchidopexy with QLBs (Oksuz et al, 2017).

Inguinal Hernia Repair:

Multiple nerve blocks are suited to cover inguinal hernia surgery which involves T10-L2 sensory innervation, and the genitofemoral nerve (L1-2) supplying the hernial sac. Ilioinguinal/iliohypogastric (II/IH) nerve blocks are simple and quick to perform in the supine position. However, a large volume of local anaesthetic in this plane can cause surgical difficulty in flooding the surgical field. TAP blocks are commonly used, either as an ultrasound guided or landmark technique.

Priyadarshini et al (2022) compared the efficacy of II/IH, TAP and QL blocks for paediatric inguinal hernia repair and found time to first analgesic was significantly longer in the QLB group (720 mins) than the II/IH group (480 mins) and TAP block (360 mins). Patients used less postoperative opioid in the QL and II/IH groups than the TAP block group.

Abdelbaser et al. (2023) compared the QLB with a transversalis fascia plane block (slightly lateral to a TAP block, which targets the lateral cutaneous nerves of T12 and L1) and found comparable analgesia

and longevity. Only 20% of patients in both groups required analgesia (paracetamol) in the first 12hrs post-operatively after receiving 1ug.kg fentanyl and 10mg.kg ibuprofen intra-operatively. Performing the QL block took longer (5 min) than the TFP block (3 min) which is insignificant clinically.

Numerous small studies note the duration of block of QLB is greater than a TAP block. The space where local anaesthetic is deposited within the thoracolumbar fascia is filled with adipose tissue, with a low vascularity resulting in low systemic absorption and longer analgesic effect. A paediatric RCT (Gul et al., 2023) studying children age 1-7yrs undergoing inguinal hernia repairs noted the median time to first rescue analgesia was 12hr with a QL block, which was extended to 18-20hours if 0.5-1ug.kg dexmedetomidine was added to the 0.25% bupivacaine. The groups with added dexmedetomidine had higher Ramsey Sedation Scale scores, which could impact daycase surgery logistics.

How does it compare to a caudal?

Caudals have been used in children since 1933 and are an essential skill in paediatric regional anaesthesia. The beauty of the caudal epidural block lies in its low failure rate and excellent analgesia for approximately 4-6 hours. Complications such as motor blockade and urinary retention can delay discharge in daycase surgery. A study in 2019 (Ipek et al.) comparing lateral QLB with caudal for orchidopexy or inguinal hernia repair observed a shorter time until discharge with LQLB, with lower postoperative pain scores in the first 4hrs ($p<0.05$).

Summary

When considering regional anaesthesia for infra-umbilical surgery, numerous studies demonstrate Lateral QLB to be superior to TAP and II/IH blocks (longer time to rescue analgesia and more extensive coverage). However, each of these techniques are shown to provide good postoperative analgesia for daycase surgery and other factors such as procedural time, availability of ultrasound and operator familiarity will influence choice of regional technique.

In comparison to caudal analgesia, limited published work suggests QL blocks have comparable patient satisfaction, longer-lasting analgesia and fewer complications but there is far less data comparing the two. The three different approaches to local anaesthetic deposition around the quadratus lumborum muscle adds heterogeneity into studies which makes large-scale evaluation of efficacy more challenging.

To integrate this block into your clinical practice, there are many sources of education such as the RA-UK Paediatric Plan A block content or baby-blocks.com.

REFERENCES:

- Hernandez MA, Vecchione T, Boretsky K. Dermatomal spread following posterior transversus abdominis plane block in pediatric patients: our initial experience. *Pediatr Anesth* 2017; **27**:300–4
- Carline L, McLeod GA, Lamb C. A cadaver study comparing spread of dye and nerve involvement after three different quadratus lumborum blocks. *Br J Anaesth* 2016; **117**:387-394
- Pearson, Roberts, Turbitt. New blocks on the kids: core basic nerve blocks in paediatric anaesthesia. *Anaesthesia* 2023; **78**:3-8
- Mutlu ÖPZ, Tütüncü AÇ, Kendigelen P, Kara Esen B. Posterior transversus abdominis plane block versus lateral quadratus lumborum block in children undergoing open orchiopexy: a randomized clinical trial. *Braz J Anesthesiol* 2024; **74**
- Öksüz G, Bilal B, Gürkan Y, et al. Quadratus lumborum block versus transversus abdominis plane block in children undergoing low abdominal surgery: a randomized controlled trial. *Regional Anesthesia and Pain Medicine* 2017; **42**:674–9.

Priyadarshini K, Behera BK, Tripathy BB, *et al.* Ultrasound-guided transverse abdominis plane block, ilioinguinal/iliohypogastric nerve block, and quadratus lumborum block for elective open inguinal hernia repair in children: a randomized controlled trial. *Reg Anesth Pain Med* 2022; **47**:217-221.

Abdelbaser I, Salah DM, Ateyya AA, Abdo MI. Ultrasound-guided transversalis fascia plane block versus lateral quadratus lumborum plane block for analgesia after inguinal herniotomy in children: a randomized controlled non-inferiority study. *BMC Anesthesiol* 2023; **23**(1):82.

Gul Y, Tutuncu A, Kendigelen P. OP035 Efficacy of dexmedetomidine as an adjuvant to Quadratus lumborum block for children undergoing inguinal surgeries. A prospective randomized trial. *Reg Anesth Pain Med* 2023; **48**:A20-A21.

İpek CB, Kara D, Yilmaz S, *et al.* Comparison of ultrasound-guided transversus abdominis plane block, quadratus lumborum block, and caudal epidural block for perioperative analgesia in pediatric lower abdominal surgery. *Turk J Med Sci* 2019; **49**:1395-1402

Ragab S, El Gohary M, Abd El baky D, Nawwar K. Ultrasound-Guided Quadratus Lumborum Block Versus Caudal Block for Pain Relief in Children Undergoing Lower Abdominal Surgeries: A Randomized, Double-Blind Comparative Study. *Anesth Pain Med* 2022; **12**(4)

AUTHORS:

Dr E A Brodier, Dr N Canchi-Murali

elizabeth.brodier@nhs.net