

# Ultrasound-guided continuous transmuscular quadratus lumborum block- L4 or L2 level catheter insertion for analgesia in open abdominal surgery: Case series

## INTRODUCTION

Quadratus lumborum block (QLB) is a technique for postoperative analgesia after abdominal surgeries. Nomenclature on types of QLB keeps changing.<sup>[1]</sup> An ultrasound-guided transmuscular quadratus lumborum (TQL) block, which involves passage of the needle through the QL muscle and injection of the local anaesthetic (LA) into the anterior aspect of the fascial interspace between the QL and psoas muscle is also called the QLB3.<sup>[2]</sup> There have been case reports on the use QLB block in abdominal surgery as an analgesic technique in paediatric and adult patients.<sup>[3-5]</sup> There is a general paucity of literature on continuous use of TQL block in adults for major abdominal surgery.<sup>[6,7]</sup> We have previously reported TQL block performed at L4 resulting in transient paraesthesia of the leg in one case.<sup>[6]</sup> In view of this issue, we performed the same block at L2 level without adverse effect. So far, no studies examined the analgesic effect of TQL catheters placed at different levels utilizing the anterior approach for major abdominal surgery. The aim of this study was to evaluate the efficacy of these blocks at two levels in open midline incision surgery.

## METHODS

Ten consecutive patients (7 males, 3 females) undergoing elective open abdominal surgery with any midline incision were recruited in 2016 at The Queen Elizabeth Hospital. Patients unable to provide consent and allergic to fentanyl, ropivacaine, and oral opioids were excluded. Human Research Ethics Committee approval was obtained. All patients received general anaesthesia with endotracheal intubation and were administered intermittent doses of Fentanyl for analgesia. The patients were placed in a lateral position following the surgical procedure and prior to extubation to insert the QLB catheters under

ultrasound guidance using a 2–5-MHz frequency curved probe (SonoSite X-Porte, SonoSite Inc, Bothell, Washington, USA). A lower approach (L4) was used in five patients where the probe was placed transversely in the posterior axillary line and moved towards L4 transverse process (iliac crest level). In the remaining five patients the probe was placed close to the transverse process at the L2 level. After identifying the QL muscle above the transverse process, an 18-gauge Touhy's needle was introduced at the respective transverse process, in a posterior to anterior direction, in plane through the QL muscle by saline hydro-dissection to reach the anterior thoracolumbar fascia [Figures 1 and 2]. A bolus of 20 ml of ropivacaine 0.5% was administered followed by bilateral catheter insertion directing cephalad to the depth of 3–4 cm to infuse ropivacaine 0.2% at 5–8 ml/h each side for 48 h. Patients were also administered multimodal analgesia with 1 g Paracetamol every 6 h, Dexamethasone 8 mg, and Fentanyl PCA. Parameters measured by acute pain service were dermatomal levels, pain scores on cough, and total analgesic consumption in the 48 h after surgery. Pain score ranged from 0 (no pain) to 10 (worst possible pain).

## RESULTS

Table 1 provides details of patient characteristics and the nerve block. Mean pain score during recovery was slightly higher among patients who had the block at L2 when compared to those at L4 (L2 v L4: 4.20 v 1.20). However, group differences were negligible at both time points (24 h: L2 v L4: 5.4 v 5.0) (48 h: L2 v L4: 5.6 v 5.6).

Mean fentanyl consumption over the 48 h was 1024 and 1277 mcg for block performed at L2 and L4, respectively. Femoral nerve palsy and hypotension occurred when blocks were performed at L4; however, there were no adverse events at L2. There were no complications relating to catheter, infections, or systemic side effects to ropivacaine during the study period.

## DISCUSSION

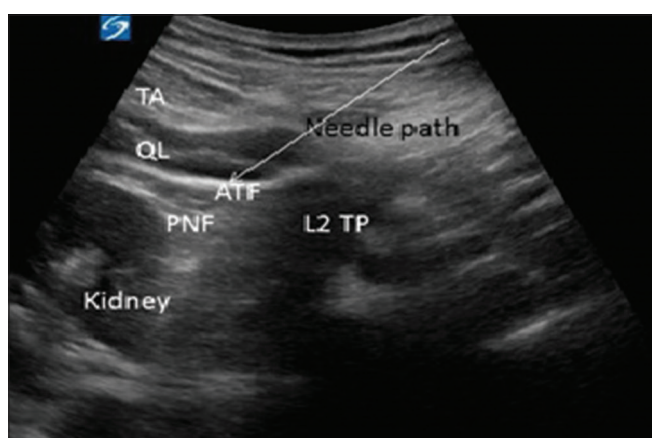
Continuous TQL block in abdominal open surgery reduced pain scores; the lower-level (L4) approach resulted in adverse effects such as hypotension and nerve palsy. This nerve palsy is possibly from the LA tracking to the lower lumbar roots and its proximity to the lumbar plexus in psoas muscle. Unanticipated femoral nerve

palsy was also reported after transversalis fascia block and QLB.<sup>[8,9]</sup> Unexplained hypotension following this block has also been reported.<sup>[10]</sup> We chose Borglum's QLB3, reporting anaesthesia from T7 to L1 based on traces of contrast in the thoracic paravertebral space.<sup>[11]</sup> There are no such studies performed at L2 level.

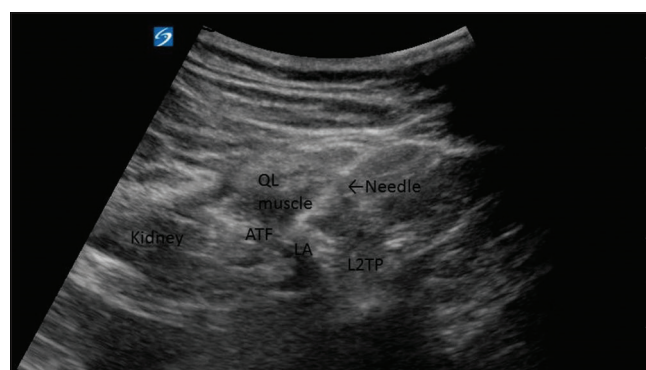
Ueshima reported that a single shot technique was effective for almost 24 h with dermatomes level up to T7.<sup>[12]</sup> We achieved dermatomal level up to T8, but there is a need for a technique that achieves cephalad block with catheters providing prolonged analgesia. However, because T6 is ideal for an incision close to xiphoid, there may be room for improvement

on cephalad spread in terms of bolus dosing and infusions.

TQL catheters have the advantage of analgesic benefit for both upper and lower abdominal surgery. The lower iliac crest level at L4 and higher near L1 spine, near the 12<sup>th</sup> rib have been established as approaches to TQL block.<sup>[2,13]</sup> At the L2 level we would qualify for the in between (mid-level) TQL block. At this stage we are unsure whether high,<sup>[13]</sup> mid or low level<sup>[2]</sup> TQL technique is optimal; however, this series suggests that L2 Rao's technique has an advantage with no adverse effects. Larger studies and randomized control trials are warranted to establish the efficacy and safety of these techniques. This study is limited by the small case series.



**Figure 1:** The sonoanatomy of TQL block at L2. TA = Transversus abdominis, QL = Quadratus lumborum muscle, ATF = Anterior thoracolumbar fascia, PNF = Perinephric fascia, TP = Transverse process



**Figure 2:** The ultrasound guided TQL with LA injected at L2 level. QL = Quadratus lumborum muscle, ATF = Anterior thoracolumbar fascia, TP= Transverse process

**Table 1: The demographics, dermatomes, pain scores, and analgesia used**

| Age (yrs) | Sex | ASA*   | TQL† block level | Dermatomal level | Pain scores PACU‡ | Analgesia in PACU | Pain scores Day 1 | Pain scores Day 2 | Total Fentanyl Used in 48 h (µg) | Type of surgeries |                            |
|-----------|-----|--------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|----------------------------------|-------------------|----------------------------|
| 1         | 69  | Male   | 2                | L4               | T8-L1             | 0                 | 0                 | 5                 | 4                                | 310               | Subtotal Gastrectomy       |
| 2         | 77  | Female | 3                | L4               | T6-L1             | 1                 | 160               | 5                 | 5                                | 1800              | Reversal of hartmans       |
| 3         | 63  | Female | 3                | L4               | T8-L1             | 5                 | 80                | 2                 | 4                                | 2300              | Extended hemi colectomy    |
| 4         | 42  | Female | 3                | L4               | T8-L1             | 0                 | 0                 | 7                 | 6                                | 900               | Extended hemi colectomy    |
| 5         | 68  | Male   | 2                | L4               | T8-L1             | 1                 | 60                | 5                 | 8                                | 1075              | Right hemicolectomy        |
| 6         | 60  | Male   | 2                | L2               | T8-L1             | 0                 | 0                 | 5                 | 5                                | 500               | Anterior resection         |
| 7         | 62  | Male   | 2                | L2               | T8-L1             | 7                 | 100               | 5                 | 5                                | 170               | Reversal of ilestomy       |
| 8         | 50  | Male   | 2                | L2               | T8-10             | 6                 | 100               | 6                 | 8                                | 800               | Left hemicolectomy         |
| 9         | 62  | Male   | 3                | L2               | T8-10             | 0                 | 0                 | 6                 | 7                                | 3000              | Laparotomy bowel resection |
| 10        | 65  | Male   | 3                | L2               | T8-L1             | 2                 | 80                | 5                 | 3                                | 650               | Low anterior resection     |

\*ASA=American society of anaesthesiologist, †TQL=Trans-muscular Quadratus lumborum ‡PACU=Post anaesthesia care unit, mcg=microgram

## CONCLUSION

A TQL catheter placed either at L4 and L2 levels reduced postoperative pain scores and analgesic use after major abdominal surgeries. Absence of neurological adverse events in the L2 group may suggest its possible safety.

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## Conflicts of interest

There are no conflicts of interest.

**Vasanth Rao Kadam, S Howell**

Acute Care Medicine, The University of Adelaide, The Queen Elizabeth Hospital, Adelaide, Australia

### Address for correspondence:

Dr. Vasanth Rao Kadam,  
Department of Anaesthesia, Senior Clinical lecturer,  
Acute Care Medicine, The University of Adelaide,  
Adelaide, Australia.  
E-mail: vasanth.rao@sa.gov.au

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