

# Effectivity of Quadratus Lumborum Block in Pediatric Patient Undergoing Abdominal Surgery at Sanglah General Hospital: A Case Series

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## ABSTRACT

The Quadratus Lumborum Block (QLB) technique is a peripheral nerve block technique that aims to block pain in the abdominal area. This technique can be useful in surgeries with abdominal-pelvic incisions. In clinical studies, QLB have also been shown to provide less opioid consumption and longer postoperative analgesia than most of conventional procedures such as TAP (Transversus Abdominis Plane) blocks. Our case series study included five patients undergoing abdominal procedure with QLB approach. Mean age of patients included in this study was 2,8 years old; mean weight of 15,2 kg; mean height of 98,8 cm and mean BMI of 71 kg/m<sup>2</sup>. All patients were classified as ASA physical status I-II. Mean duration of operation was 94 minutes, and mean total opioid used was 6,6 mg. The pain severity score in FLACC was 0 in all patients at 0, 1<sup>st</sup> and 2<sup>nd</sup> hours post-operatively. However, the FLACC score at 4<sup>th</sup> hours were variable with a maximum score of 3. All patients had the FLACC score of 0 after the 4<sup>th</sup> hours. This study concludes that QLB is an effective analgesic option for patients undergoing abdominal procedure reflected by lower pain intensity using FLACC scoring system and reduced post-operative analgesic consumption.

**Keywords:** Quadratus Lumborum Block, Post-Operative Analgesia, Opioid

## INTRODUCTION

Abdominal surgery is the most common operation in pediatrics. Trauma to

the tissue due to surgery will trigger a series of processes that cause pain. Untreated pain in pediatrics will affect pain memory and cause chronic pain.

Prevention of pediatric pain using a multimodal approach to analgesia has yielded good results. Regional anesthesia is superior to opioids as a modality of pain management in children because of the lower incidence of respiratory depression. Caudal epidural anesthesia is widely used and is a popular technique of postoperative analgesia in children undergoing lower abdominal surgery because of its high effectiveness and convenience. However, this technique has potential side effects such as unintentional dural puncture, motor blockade of the lower limbs, and bladder dysfunction and the short duration of postoperative analgesia which is only about 4–6 hours.<sup>1</sup>

Quadratus lumborum block (QLB) is a new and effective anesthetic modality for truncal nerve blockage in the upper and lower abdomen. The QLB allows more coverage block from T4-L1 (somatic and visceral block) and longer duration of postoperative analgesia which is 24-48 hours. Research conducted by Oksuz found that QLB was more effective than caudal block in pediatric patient undergoing inguinal hernia and orchidopexy.<sup>2,3</sup>

In our centre, Sanglah General Hospital, QLB is not yet performed in

routine practice for pediatric surgery. The aim of this case series was to investigate the effectivity of multimodal analgesia approach using the combination of QLB and general anesthesia for post-operative analgesia in pediatric patients undergoing abdominal surgery at Sanglah General Hospital.

### CASE SERIES

This study is retrospective in nature and was granted a waiver of consent from the Ethics Committee at Sanglah General Hospital. All cases were conducted at Sanglah general Hospital. Cases included in this study were patients with American Society of Anesthesiologists physical status I-II, aged 11 months old – 4 years old, undergoing elective major abdominal surgery under general anesthesia supplemented by QLB. Patients who refused to be included in this study, underlying infection or wound on block area, coagulopathy and allergic to local anesthetic agents or opioid were excluded.

The blocks were performed after intubation using Transducer Ultrasound Machine with 6 – 18 MHz linear probe on lateral position between costal margin and iliac crest, on mid axillary line. From this visualization, we can see the internal oblique muscles, the external oblique muscles, the transversus abdominis muscles, and the peritoneal cavity. Follow the

muscles laterally until they look like a tail where the transversus abdominis muscle will merge with the internal oblique muscle, becoming the transversalis fascia. The low-frequency convex transducer was then positioned vertically above the iliac crest, the Shamrock sign was visualized where the L4 vertebra transversus process was obtained as the stalk, where the erector spina muscle was located on the posterior side, the quadratus lumborum muscle on the lateral side and the psoas major muscle on the anterior side represented as three leaves. Then prepare a stimuplex 22G 50-100 mm for children through the medial to lateral direction. Place the tip of the needle into the transversalis fascia, anterior to the quadratus lumborum muscle. Each single shot of 0,2% bupivacaine (dose 0,5 ml/kgBW with maximum dose of 2,5mg/kgBW) was injected to every sides using 22G needles.

Assessment of post-operative pain was conducted in all patients in the recovery room and in-patient room by an anesthesiologist (independent observer) at 0, 1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup>, 12<sup>th</sup>, 24<sup>th</sup> hour. FLACC (Face Leg Activity Cry Consolability) score was used to assess pain, with score 0 indicates no pain at all and score 10 indicates extreme pain. Assessment of fentanyl dosage used after 24 hour post-operative was done in the in-patient room.

Table 1. Patient Demographics Data

No	Gender	Age	Type of Operation	Weight	Height	BMI	ASA
1	Male	4	Hypospadias repair	19	110	16	1
2	Female	11	Closure of retro vestibular stoma	9	90	11	1
3	Female	1	Closure of colostomy	10	92	10	1
4	Male	7	Orchidopexy	30	140	25	1
5	Male	11 months	Hernia repair	8	62	9	2

Table 2. Outcome of the Study

No	Duration of Operation (min)	Duration 'til 1 <sup>st</sup> analgesia (hours)	Total Opioid Used (mcg)	FLA CC 0	FLA CC 1	FLA CC 2	FLA CC 4	FLA CC 6	FLA CC 8	FLA CC 12	FLA CC 24
1	65	12	25	0	0	0	1	0	0	3	0
2	75	0	0	0	0	0	1	0	0	1	0
3	90	0	0	0	0	0	0	0	1	0	0
4	120	0	0	0	0	0	1	0	0	0	0
5	120	4	8	0	0	0	3	0	0	0	0

This intervention was performed in five patients (three male patients and two female patients). Mean age of patients

included in this study was 2,8 years old; mean weight of 15,2 kg; mean height of 98,8 cm and mean BMI of 71 kg/m<sup>2</sup>. All

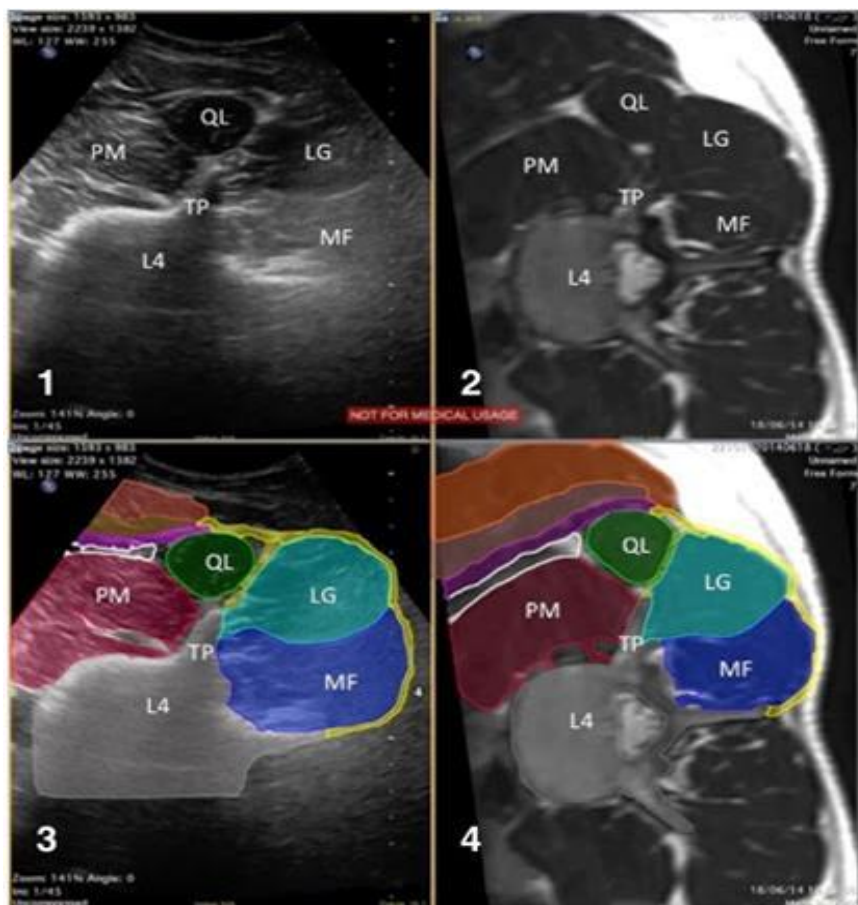
patients were classified as ASA physical status I or II. Mean duration of operation was 94 minutes, and mean total opioid used was 6,6 mg. Demographic data, duration of operation, duration until first analgesia need post-operative, total opioid dosage used and FLACC at 0, 1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup>, 12<sup>th</sup>, 24<sup>th</sup> hour of each patient are listed in Table 1 and 2.

## DISCUSSION

The use of regional blocks in pediatric patients has been approved and is used as a service standard. The incidence of side effects of regional anesthesia in pediatrics is extremely rare. Study by the Association of Pediatric Anesthetics in France showed a complication rate of 0.12%. The Pediatric Regional Anesthesia Network (PRAN) also reported the same result. Temporary neurologic deficits were found in only 25 cases (2.4 in 10,000), but none resulted in permanent sequelae. Regional anesthesia has a protective effect

in reducing surgical stress and minimizing the use of anesthesia.<sup>3</sup>

Lower abdominal surgery is common in pediatric patients. Maintaining adequate analgesics is important in perioperative care, especially in the pediatric population. Through a meta-analysis study conducted by Wen li zhao in 2020, it was found that QLB is an effective method as postoperative analgesic in pediatrics undergoing lower abdominal surgery.<sup>4</sup> Based on a case series data, it was found that quadratus lumborum block significantly reduces opioid use in children thus decrease the incidence of nausea and vomiting. Quadratus lumborum block prolongs the rescue time of analgesic drugs and speeds up the mobilization and discharge of the patient from the hospital, which is in accordance with the ERAS (Enhanced Recovery After Surgery) protocol.<sup>5</sup>



Picture 1. Shamrock sign in QLB<sup>8</sup>

The quadratus lumborum (QLB) block was first introduced by Blanco as a variant of the transversus abdominis block (TAP block) in 2007. Ultrasound-guided QLB has become one of the most popular interfascial plane blocks in regional anesthesia for the past few years considering the increasing number of abdomino-pelvic surgeries that are included in the indications for QLB in both pediatric and adult patients.<sup>6</sup>

The mechanism of action of the quadratus lumborum block is based on the distribution of the injection, namely the endothoracic fascia pathway, involvement of the roots and branches of the lumbar spine and peripheral sympathetic block fields. In the endothoracic fascia pathway, a local anesthetic spread to the thoracic paravertebral space, to block the somatic nerves and thoracic sympathetic trunk. In peripheral sympathetic block, blocking these sympathetic afferents could theoretically cause changes in local circulation and overall autonomic tone. This has the potential to increase the analgesia efficacy of posterior QLB.<sup>7</sup>



Picture 2. Transducer position for QLB<sup>7</sup>

ESRA (European Society of Regional Anaesthesia) and ASRA (American Society of Regional Anaesthesia) issued reference local anesthetic dosage guidelines based on an evidence-based approach for the administration of local anesthetics pediatrics in the fascial plane block group with ultrasound assistance, the

dose of local anesthetic bupivacaine or ropivacaine 0.25 mg – 0.75 mg/kg (for bolus injection) and bupivacaine or 0.2% ropivacaine using a continuous infusion dose of 0.1-0.3 mg/kg/hour (continuous dose).<sup>9,10</sup>

## CONCLUSION

The quadratus lumborum block might be an effective analgesic option for pediatric patients undergoing abdominal surgery reflected by lower pain intensity using FLACC scoring system and reduced post-operative analgesic consumption. The variability of FLACC value, mean dosage of analgesic consumption and duration to first post-operative analgesia administration may be due to variable anatomical peripheral nerves variants in each patient and slightly different approach of block. Further analytical study is needed regarding the use of QLB to inflammatory response associated with surgical trauma.

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