

DOI: 10.14744.etd.2018.18158

Manuscript Type: Original Article

Title: The Efficacy of Quadratus Lumborum Block in Children with Laparoscopy-assisted Pyeloplasty

Running Title: The Quadratus Lumborum Block in Pyeloplasty

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Cite this article as: Doğan AB, Öksüz G. The Efficacy of Quadratus Lumborum Block in Children with Laparoscopy-assisted Pyeloplasty. Erciyes Med J 2019; DOI: 10.14744.etd.2018.18158.

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ABSTRACT

Objective: The quadratus lumborum block (QLB) is a new and effective truncal block used for postoperative analgesia in patients undergoing upper and lower abdominal surgery. We aimed to evaluate and compare the efficacy of quadratus lumborum block and wound infiltration with using postoperative Face, Legs, Activity, Cry, and Consolability (FLACC) pain scores and total 24-hour analgesic consumption in pediatric patients who underwent laparoscopy-assisted pyeloplasty (LAP).

Material Method: Patients who underwent LAP operation between May 2016 and June 2017 were examined retrospectively. Patients were divided into two groups; QLB group and wound infiltration (WI) group. Patient's FLACC scores at 1st., 6th, 12th and 24th hours, postoperative analgesic doses and complications were evaluated from the patient's records.

Results: A total of 31 patients who underwent LAP were identified from the records. Of those 31 patients, 14 had QLB, and 17 had WI. The demographic characteristics of the patients and operation duration were similar. FLACC scores on 1st, 6th, 12th and 24th hours and postoperative total 24-hour paracetamol consumption were significantly lower in QLB group. No complications were seen in both groups.

Conclusion: According to this study, QLB provides longer and more effective postoperative analgesia than WI in pediatric patients with LAP.

Keywords: quadratus lumborum block, laparoscopy-assisted pyeloplasty, postoperative pain management, children

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Introduction

Laparoscopic surgery has become the first choice for many surgical procedures in pediatric patients. Although the pain felt at the end of the operation is less compared to open surgeries, multimodal analgesia techniques are still needed to manage postoperative pain ¹. Trunk blocks are included in multimodal analgesia techniques for abdominal surgeries ².

The quadratus lumborum block (QLB) is a new and effective truncal nerve block used for postoperative analgesia in patients undergoing upper and lower abdominal surgery ³. There are few cases and studies in which QLB is used for postoperative analgesia in pediatric patients ^{4,5}. In our clinic, laparoscopy-assisted pyeloplasty (LAP) operations are performed with QLB and wound infiltration (WI) for postoperative analgesia. In this study, we aimed to investigate the analgesic effect of QLB and WI with using postoperative Face, Legs, Activity, Cry, and Consolability (FLACC) pain scores and total 24-hour analgesic consumption in pediatric patients who underwent LAP in the one-year period ⁶.

Material-Method

After the approval of the Clinical Investigations Ethics Committee, patients who underwent laparoscopic-assisted pyeloplasty operation between May 2016 and June 2017 were examined retrospectively from the anesthesia and pain follow-up forms. Patients were divided into two groups; QLB group and WI group. Although we aimed to perform QLB in all patients during the abovementioned period, postoperative analgesia via WI was provided to the patients who had skin lesions on the block area, had coagulopathy and had no family approval. Patient's postoperative FLACC pain scores at 1st., 6th, 12th and 24th hours, postoperative analgesic doses and complications like nausea, vomiting, hypotension, infection at the site of the block and hematoma were evaluated from the patient's records.

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Surgical technique

The surgical procedure was performed in the position of 45° lateral decubitus. In addition to the 5 mm umbilical optical port, two 3 mm working ports which were used in the iliac quadrant and below the last rib in the midclavicular line were used for the laparoscopic procedure. Pneumoperitoneum was maintained at a flow rate of 0.5 L/min and a pressure of 8-12 mmHg with CO₂ insufflation. After laparoscopic dissection of the ureteropelvic (UP) junction, renal pelvis extracted from a tiny flank incision (1-2 cm) then pyeloplasty was performed extracorporeally by monofilament absorbable sutures. An appropriately sized ureteral stent (double J stent) was placed into the ureter.

QLB Administration

After the ultrasound probe was covered and the area to be blocked was sterilized, the probe was placed on the crista iliaca anterior superior. After the external oblique, internal oblique and transversus abdominis muscles were seen, the probe was moved to the posterior then quadratus lumborum muscle was observed. A 22-gauge, 80 mm insulated Quince type needle (Uniplex; Pajunk, Geisingen, Germany) moved from anterolateral plane to posteromedial plane, confirmation made with 0,5 saline, and after negative aspiration 0.7ml/kg of bupivacaine (0,25%) was applied to the posterior of quadratus lumborum muscle; thoracolumbar fascia in between quadratus lumborum muscle and latissimus dorsi muscle.

Statistical Analysis

Statistical analysis was performed using the SPSS program for Mac, version 17.0 (SPSS, Chicago, IL). Descriptive statistics are presented as the mean and standard deviation (SD) for normal variables, as the median and IQR (Inter Quartile Range) for non-parametric variables, as the number of cases (n) and the corresponding percentage (%) for nominal variables. The normality distribution of the variables was tested using the Shapiro–Wilk test. Levene test was applied to test variance

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homogeneity. Independent two-samples T-tests were performed for normally distributed continuous variables. The Mann-Whitney U test was used for non-normally distributed variables. A value of $p < 0.05$ was considered statistically significant.

Results

A total of 31 patients who underwent LAP were identified from the records. Of those 31 patients, 14 (8 male, 6 female) had QL, and 17 (12 male, 5 female) had WI. The mean age of the patients was $5,57 \pm 3,5$ in QLB group and $6,35 \pm 2,9$ in WI group ($p=0.57$). The mean body weight at operation was $22,35 \pm 9,9$ kg and $25,47 \pm 8,6$ kg in QLB group and WI group, respectively ($p=0.36$). (Table1) FLACC scores on 1st, 6th,12th and 24th hours were significantly lower in the QLB group. Postoperative 24-hour total paracetamol consumption was significantly lower in the QLB group ($p<0.001$). (Table 2) The mean operation time was $176,42 \pm 25,06$ and $196,7 \pm 33,2$ minutes in group 1 and 2, respectively ($p=0,07$). No block complications were seen in both groups.

Discussion

In this study, it was found that the 24-hour analgesic consumptions and the FLACC scores at every hour were significantly lower in the patients who underwent LAP with QLB treatment. We have not seen any studies presenting QLB application in laparoscopic or laparoscopy-assisted pyeloplasty operations in the literature.

Baidya et al. reported that they had applied QLB on five children who underwent open pyeloplasty operation and provided effective analgesia ⁷. Lee et al. reported that they used paracetamol and ketorolac in every 3 hours to provide analgesia without using narcotic drugs in children with robotic pyeloplasty and provided effective and sufficient analgesia with low dose narcotics ⁸.

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In our clinic, pain management in patients undergoing LAP, which is less invasive and less painful compared to open surgery, is usually attempted to be managed without the use of narcotic analgesics. In our study, no analgesic medication was given to the patients until the first time they complain about pain and FLACC>3, and then intravenous 15mg/kg of paracetamol was given to patients who described the pain. Notably, patients in the QLB group had no analgesic requirement for 17 hours on average. QLB is a newly defined block that can be applied to upper and lower abdominal surgeries. Blanco and colleagues suggested that the trunk nerve block defined as the QL2 block which is applied between the posterior margin of quadratus lumborum muscle and thoracolumbar fascia is effective in between T6 and L1 and local anesthetic spreads to the paravertebral area³. In our previous study, we have reported that QLB is more effective when compared to the transversus abdominis plane (TAP) block in children with lower abdominal surgery and analgesic consumption and pain scores are significantly lower.⁵

Visoiu et al. reported that they successfully performed postoperative analgesia by performing a continuous quadratus lumborum block via catheter application in their case who was a child with colostomy repair⁹. In this study, QLB administered as a single injection, and the efficacy continued for 16-24 hours. We think that catheter application in pyeloplasty operations is a suitable method for patients who may have pain for up to 48 hours. Baidya et al. used a transmuscular QLB whereas they administered 0.2% 0.5 ml/kg local anesthetic between the psoas major and quadratus lumborum muscles in 5 children who underwent open pyeloplasty and reported that the patient's postoperative pain management was successful⁷.

In this study we applied 0.7 ml/kg of 0.25% bupivacaine on the posterior of quadratus lumborum muscle; the middle layer of thoracolumbar fascia which is inserting on the quadratus lumborum muscle on the interfacial triangle that appears hyperechogenic. We prefer the QL2 block

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approach because it is safe and comfortable to perform than the other approach and effective in postoperative pyeloplasty pain. Although the extent of the local anesthetic is not fully understood in the QLB, complications seen in the paravertebral and lumbar plexus blocks such as hypotension and muscle weakness may be encountered. The anterior, posterior, lateral and intramuscular methods of QLB have been described ¹⁰¹¹. In a study examining QLB complications, transient quadriceps muscle weakness was reported, and also found to be higher in the anterior (transmuscular) approach ¹². In our clinic, we practice the posterior approach of QLB. In the present study, there were no complications found in any of our patients in both QLB and WI groups.

The fact that there is no randomization concerning patients who were retrospectively scanned limits our study. We think that QLB is a good alternative for postoperative analgesia in pediatric patients with LAP, and randomized controlled prospective studies are needed in this area.

Conclusion

According to this study, QLB provides longer and more effective postoperative analgesia than WI in pediatric patients with LAP.

No funding to declare.

Ahmet Burak Doğan declares that he has no conflict of interest.

Gözen Öksüz declares that she has no conflict of interest.

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

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References

1. Morrison K, Herbst K, Corbett S, Herndon CDA. Pain management practice patterns for common pediatric urology procedures. *Urology*. 2014;83(1):206-210. doi:10.1016/j.urology.2013.08.041
2. Finnerty O, Carney J, McDonnell JG. Trunk blocks for abdominal surgery. *Anaesthesia*. 2010;65 Suppl 1(8):76-83. doi:10.1111/j.1365-2044.2009.06203.x
3. Blanco R, Ansari T, Girgis E. Quadratus lumborum block for postoperative pain after caesarean section. *Eur J Anaesthesiol*. 2015;32(11):812-818. doi:10.1097/EJA.000000000000299
4. Öksüz G, Gürkan Y, Urfaloğlu A, Arslan M. Ultrasound-guided quadratus lumborum block for postoperative analgesia in a pediatric patient. *J Turkish Soc Anesth*. 2018;(Article in press). doi:10.5505/agri.2017.05935
5. Öksüz G, Bilal B, Gürkan Y, et al. Quadratus Lumborum Block Versus Transversus Abdominis Plane Block in Children Undergoing Low Abdominal Surgery. *Reg Anesth Pain Med*. 2017;42(5):674-679. doi:10.1097/AAP.0000000000000645
6. Manworren RCB, Hynan LS. Clinical validation of FLACC: preverbal patient pain scale. *Pediatr Nurs*. 2003;29(2):140-146. <http://www.ncbi.nlm.nih.gov/pubmed/12723828>.
7. Baidya DK, Maitra S, Arora MK, Agarwal A. Quadratus lumborum block: an effective method of perioperative analgesia in children undergoing pyeloplasty. *J Clin Anesth*. 2015;27(8):694-696. doi:10.1016/j.jclinane.2015.05.006
8. Lee Z, Schulte M, DeFoor WR, et al. A Non-Narcotic Pathway for the Management of Postoperative Pain Following Pediatric Robotic Pyeloplasty. *J Endourol*. 2017;31(3):255-258. doi:10.1089/end.2016.0846

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9. Visoiu M, Yakovleva N. Continuous postoperative analgesia via quadratus lumborum block - an alternative to transversus abdominis plane block. *Paediatr Anaesth*. 2013;23(10):959-961. doi:10.1111/pan.12240
10. Kadam V. Ultrasound-guided quadratus lumborum block as a postoperative analgesic technique for laparotomy. *J Anaesthesiol Clin Pharmacol*. 2013;29(4):550. doi:10.4103/0970-9185.119148
11. Murouchi T. Quadratus lumborum block intramuscular approach for pediatric surgery. *Acta Anaesthesiol Taiwan*. 2016;54(4):135-136. doi:10.1016/j.aat.2016.10.003
12. Ueshima H, Hiroshi O. Incidence of lower-extremity muscle weakness after quadratus lumborum block. *J Clin Anesth*. 2018;44:104. doi:10.1016/j.jclinane.2017.11.020

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TABLE 1. Demographic and Clinical Data

	QL group (n=14)	WI group (n=17)	P
Age,y	5,57 (3,5)	6,35 (2,9)	0,57
Weight,kilo	22,35 (9,9)	25,47 (8,6)	0,36
Sex,M/F	8/6	12/5	0,26
Operation, Time	176,42(25,06)	196,7(33,2)	0,07

Data are presented as mean and standart deviation(SD)
QL:Quadratus Lumborum group, WI: Wound infiltration group

TABLE 2. Pain scores (FLACC) Across Postoperative Time Points and Total Analgesic Consumption

	QL group (n=14)	WI group (n=17)	P
1 h	3(2-4)	2(1-2)	0,001*
6 h	3(2-3)	2(1-2)	0,001*
12 h	3(2-3)	1(1-2)	0,001*
24 h	30(2-3)	1(1-1)	0,001*
Paracetamol (mg/kg)	45(45-45)	15(15-30)	0,001*

Data are presented as median and IQR values (25%-75%) *Indicate $p < 0.05$ when comparing QL and WI groups
QL: Quadratus Lumborum group; WI:Woud infiltration group
IQR: Inter Quartile Range

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