

The Analgesic Effect of Ultrasound Guided Quadratus Lumborum Block Versus Transversus Abdominis Plane Block Following Cesarean Section

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Original Article

Summary

Postoperative pain, including acute postoperative pain and persistent chronic postoperative pain, remains a main clinical problem. Without timely and effective treatment, acute postoperative pain can turn into persistent chronic postoperative pain. We aimed to compare the analgesic effect of ultrasound guided Quadratus lumborum block versus Transversus Abdominis plane block following Cesarean Section. A prospective randomized study included 100 pregnant women at the time of delivery was carried out in the obstetrics and gynecology operation theatre of our hospital for 4 months duration (from Jan 2021 to the end of March 2021) on all the parturient with American Society of Anesthesiologists (ASA) Physical Status Class I and II, and a normal singleton pregnancy with a gestation of a minimum of 37 weeks; scheduled for elective CS under general anesthesia. We found the mean of time for rescue analgesic effect in QL group was (65.4±1.9) hours and (14.7±1.3) hours for TAP group, with highly significant increase in QL group than TAP group regarding time for rescue analgesic requirement in hours ($P < 0.001$). In Group QL, the requirement for analgesic over 72 hours reduced significantly as compared to Group TAP. In QL group, only 17 patients required a single dose of analgesic and 33 (66.0%) patients required no analgesic, while 6, 7 and 8 doses of analgesic were required by 1, 37 and 12 patients, respectively, in TAP group, which was statistically significant ($P < 0.001$). The VAS was significantly reduced in the QL group than in the TAP group, taking into account VAS at rest and with movement at all times post-CS. The current study concludes long lasting analgesia with the administration of quadratus lumborum block than that by transversus abdominis plane (TAP) block

Keywords: Caesarean delivery, Quadratus lumborum block, transversus abdominis plane block, analgesic effect

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1. INTRODUCTION

Postoperative pain, including acute postoperative pain and persistent chronic postoperative pain, remains a main clinical problem. Without timely and effective treatment, acute postoperative pain can turn into persistent chronic postoperative pain. (1) Previous studies showed that 10–50% of patients undergoing surgery suffered from postoperative pain lasting more than 1 month, and 2–10% of these patients continued to experience moderate to severe chronic pain. Furthermore, inadequate postoperative analgesia continues to occur despite advances in analgesia techniques. (2,3)

Inadequate management of postoperative pain can lead to serious consequences, such as poor immediate postoperative effect, prolonged stay and/or hospital readmission, poor patient satisfaction, increased burden on patients and health systems. Therefore, effective prevention and control of postoperative pain is of great significance. (3,4)

The truncal nerve blocks, as a part of perioperative pain management, were introduced into clinical practice over 40 years ago. Primarily these were the ilioinguinal–iliohypogastric (II–IH) block and the rectus sheath block, mostly used in the pediatric anesthesia population. In the early years of the 21st century, the transversus abdominis plane (TAP) block was introduced in everyday practice, providing a much wider field of analgesia. At first, these blocks were performed without ultrasound guidance, using landmark techniques. However, the clinical use of truncal block techniques has developed over time and their expansion was driven by introducing ultrasound into anesthesiology practice. Although the anatomical markers are reliably detected by ultrasound, the blocks of the anterior abdominal wall vary in both the distribution of the local anesthetics and the field of coverage. In the search for the wider analgesia coverage and long-lasting postoperative analgesia, the transversalis fascia plane block and the quadratus lumborum block (QLB) have been developed. (5)

TAP block

The transversus abdominis plane (TAP) block has been used for post-operative pain relief in various abdominal surgeries as part of the multimodal analgesic approach. It creates satisfactory somatic analgesia with insignificant or no visceral blockade. While the quadratus lumborum (QL) block was currently performed as one of the perioperative pain management procedures for all generations (pediatrics, pregnant, and adult) undergoing abdominal surgery. However, disagreement regarding the best approach for administering the block prevails

because of unclear mechanisms responsible for the effects and complicated nomenclature system. (6)

Ultrasound Identification of QL

After recognizing three layers of abdominal wall muscles, transversus abdominis is traced more posteriorly until the transversus aponeurosis appears. At this region, usually we can find the peritoneum curves away from the muscles from anterior to posterior and the retroperitoneal fat lies behind the peritoneum and deep to the transversalis fascia. The retroperitoneal fat is generally scanty above the iliac crest and more prominent closer to the iliac crest. Tilting the probe slightly caudal into the pelvis thus improves the view of the retroperitoneal fat and the tapered end of transversus aponeurosis. QL is usually identified medial to the aponeurosis of transversus abdominis muscle. (7)

2. PATIENTS and METHODS

This was a prospective randomized study included 100 pregnant women at the time of delivery was carried out in the obstetrics and gynecology operation theatre of our hospital for 4 months duration (from Jan 2021 to the end of April 2021) on all the parturient with American Society of Anesthesiologists (ASA) Physical Status Class I and II, and a normal singleton pregnancy with a gestation of a minimum of 37 weeks; scheduled for elective CS under general anesthesia.

Exclusion criteria were the inability to comprehend or participate in pain scoring system, systemic coagulopathy, anatomic abnormalities, allergy to study medication and localized infection. Written and informed consent was obtained from each patient. The protocol adhered to 2013 Declaration of Helsinki. Thereafter, random allocation of patients was done into two equal groups - Group QL: Each patient received bilateral posterior approach QL block and Group TAP: Each patient received bilateral TAP block.

Lateral Tap block

For the lateral TAP nerve block, a linear transducer is placed in the axial plane on the midaxillary line between the subcostal margin and the iliac crest. The three layers of abdominal wall muscles are visualized: external and internal oblique as well as the transversus abdominis muscles. The target is the fascial plane between the internal oblique and the transversus abdominis muscles. The needle is inserted in the anterior axillary line,

and the needle tip is advanced until it reaches the fascial plane between the internal oblique and transversus abdominis muscles approximately in the midaxillary line. A total of 0.2% ropivacaine 0.2ml/kg was injected after hydro dissection. The same procedure was repeated on the other side. (8)

Type 1 QL block

For the type 1 QL (QL1) nerve block, a linear transducer is placed in the axial plane in the midaxillary line and moved posteriorly until the posterior aponeurosis of the transversus abdominis muscle becomes visible as a strong specular reflector. The target is just deep to the aponeurosis but superficial to the TF at the lateral margin of the QL muscle. This is just lateral to the pararenal fat compartment. The QL1 nerve block is identical to the fascia transversalis plane nerve block. The needle is inserted from either the anterior or the posterior end of the transducer and advanced until the needle tip just penetrates the posterior aponeurosis of the transversus abdominis muscle. Local anesthetic is injected between the aponeurosis and the TF at the lateral margin of the QL muscle. The main effect is anesthesia of the lateral cutaneous branches of the iliohypogastric, ilioinguinal, and subcostal nerves (T12–L1). (8)

Statistical analysis

All patients' data entered using computerized statistical software; Statistical Package for Social Sciences (SPSS) version 25 was used. Descriptive statistics presented as (mean \pm standard deviation) and frequencies as percentages. Chi-square used for categorical variables. In all statistical analysis, level of significance (p value) set at ≤ 0.05 and the result presented as tables and/or graphs.

3. RESULTS

One hundred women indicated for caesarean section, divided into two groups, with no significant differences regarding baseline characteristics (age, BMI, and duration of surgery. The mean of time for rescue analgesic effect in QL group was (65.4 \pm 1.9) hours and (14.7 \pm 1.3) hours for TAP group, with highly significant increase in QL group than TAP group regarding time for rescue analgesic requirement in hours (P<0.001). In Group QL, the requirement for analgesic over 72 hours reduced significantly as compared to Group TAP. In QL group, only 17 patients required a single dose of analgesic and 33 (66.0%) patients required no analgesic, while 6, 7 and 8 doses of analgesic were required by 1, 37 and 12

patients, respectively, in TAP group, which was statistically significant ($P < 0.001$). The VAS was significantly reduced in the QL group than in the TAP group, taking into account VAS at rest and with movement at all times post-CS. (Tables 1, 2, 3)

Table 1: Baseline characteristics of the studied groups

Variable	TAP Group (n = 50)	QL Group (n = 50)	P value
Age (years)	26.4±3.7	26.1±4.5	0.7 Ns
BMI	29.7± 2.8	29.2±3.1	0.3 Ns
Duration of surgery (min)	45.0±10.5	44.8±9.5	0.9 Ns
NS: not significant			

Table 2: Difference in Time for rescue analgesic requirement in hours between the studied groups.

	QL Group (n = 50)	TAP Group (n = 50)	P value
Time in hours (mean ± SD)	65.4±1.9	14.7±1.3	<0.001 sig
SD: standard deviation of mean Sig: significant			

Table 3: Total number of analgesic doses in 72 hours

Analgesic doses	QL		TAP		P value
	No.	%	No.	%	
0 dose	33	66.0	0	-	<0.001
1 st dose	17	34.0	0	-	
6 dose	0	-	1	2.0	
7 dose	0	-	37	74.0	
8 dose	0	-	12	24.0	
Total	50	100.0	50	100.0	

4. DISCUSSION

In 2012, Abdallah et al in his systemic review revealed that the reduction in consumption of morphine after cesarean delivery when TAP block was done to them were found in 3 of 6 randomized controlled studies. Later Champaneria et al, published a meta-analysis studied in 2016 established that the use of TAP blocks for cesarean delivery can be effective for acute pain relieve. (9)

The first trial to detect the effect of QL block after cesarean delivery was carried by Blanco et al, in which the injection of bupivacaine in a dose of (0.2 mL/kg 0.125%) on the posterolateral border of the QL muscle, found that a significant decrease in the dose of morphine and significant reduction in the visual analogue scores during 48 hours after QL block. (10)

In the current study we found that time for rescue analgesic requirement in hours was significantly decreased in QL group than that in TAP group. Similarly, the secondary outcomes presented that there was reduction in analgesic number doses given to patients with QL block in comparison to those received TAP block during the next 72 hours with significantly decreased of VAS scores at each observation time. This is same that mentioned by Verma K et al, in a randomized clinical trial carried on 2019. (11) Our study found that a significant higher effect of QL group than that of TAP block group which is in agreement with many previous studies: Blanco et al, 2016 in their

study noticed that QL block was better than TAP block in post-caesarean pain relief with long duration of analgesia effect extending beyond 24 hours and with taking less doses of opioid. (12) Oksuz et al, in their study that conducted to compare the effect of QL block and TAP block in 53 pediatric patients after lower abdominal surgery and observed a significant analgesia of up to 24 hours with QL block ($P < 0.05$), and higher FLACC (Face, Legs, Activity, Cry, Consolability) scores postoperatively in TAP block group when compared to QL group ($P < 0.05$) with significantly reduced number of patients receiving rescue analgesia in QL group ($P < 0.05$). (13) In a study conducted by Yousef N et al, in 2018 that compare the effectiveness of both type of block (QL, and TAP) for patients undergoing total abdominal hysterectomy and observed that duration of postoperative analgesia was higher in QL group than in TAP group with highly significantly reduction for opioid ingestion in. (14)

5. CONCLUSIONS

The current study concludes long lasting analgesia with the administration of quadratus lumborum block than that by transversus abdominis plane (TAP) block

Ethical Clearance: Ethical clearance and approval of the study are ascertained by the authors. All ethical issues and data collection were in accordance with the World Medical Association Declaration of Helsinki 2013 of ethical principles for medical research involving human subjects. Data and privacy of patients were kept confidentially.

Conflict of interest: Authors declared none

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