

# Comparison of Incision Local Infiltration Anesthesia and Quadratus Lumborum Block for Postoperative Analgesia after Cesarean Delivery Section

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## Abstract

**Objective:**To compare the analgesic effect of incision local infiltration anesthesia and quadratus lumborum block after cesarean section.**Methods:**a total of 90 cesarean section patients,aged 19 to 45 years old,with a BMI of 18 to 30 kg/m<sup>2</sup>, were randomly divided into 3 groups(n=30): incision local infiltration group(group I), quadratus lumborum block(group Q) and control group(group C).Group I received local infiltration with 0.75% ropivacaine 10ml by surgeon.Group Q received quadratus lumborum block with 0.3% ropivacaine 25ml by ultrasound guided for each side,while group C,neither local infiltration nor quadratus lumborum block was operated. All patients received sufentanil for self-controlled postoperative intravenous analgesia. VAS pain scores were evaluated at 6,12,24 and 48 hours after surgery under the resting state, respectively. Record the times of self-controlled analgesic pressure at each time point. The time of patients' first walking around the bed was recorded and patients' satisfaction score were observed. **Results:**Compared with group I, there was significant difference in VAS scores at 6 and 24 hours after operation in group Q.In group Q the times of self-controlled analgesic pressure were less than group I during the first 24 hour after surgery and in group Q the patients' satisfaction score was higher. **Conclusion:** Ultrasound-guided ropivacaine lumbar quadratus block is one of a methods of multi-mode analgesia, which can reduce the dosage of sufentanil and avoid the adverse reactions of opioids.

## Keywords

Ultrasound, Quadratus lumborum block, Local infiltration anesthesia, Cesarean section, Multi-mode analgesia.

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## 1. Introduction

With the opening of China's two-child policy, China has become one of the countries with significant cesarean section rate growth. More and more women are undergoing cesarean section. With the proposal of the comfort medical requirements, accelerated postoperative rehabilitation and multi-mode analgesia, more and more anesthesiologists pay attention to improve postoperative analgesia. Good postoperative analgesia can effectively relieve the pain response. Puerpera can get out of bed early, reduce the incidence of deep vein thrombosis, and is conducive to rapid recovery and lactation of puerpera [1]. Professor Liu Zhiqiang [2] pointed out that Quadratus Lumborum Block (QLB) and local infiltration anesthesia are also effective methods for multi-mode analgesia after cesarean

section. It has also been reported that Quadratus Lumborum Block has a better analgesic effect after cesarean section, enabling the puerpera to facilitate breast-feeding and take care of the newborn [3]. Telnes et al. [4] compared Transversus Abdominis Planeblock (TAP block) with local infiltration anesthesia in a randomized double-blind trial, which showed that TAP block did not reduce the total amount of morphine in patients after cesarean section, suggesting that blocking somatic fibers alone was not sufficient. Quadratus Lumborum Block (QLB) is a new trunk nerve block technology. Local anesthetics can spread to the thoracic paravertebral space to block sympathetic nerves, thus blocking visceral pain. Compared with the technique of abdominal wall nerve block, the analgesic effect is better and the duration of analgesia is longer. Sebbag et al [5] found that a single QLB operation after cesarean section did not require additional morphine for analgesia within 24h after obstetrics. Ultrasound-guided quadratus lumborum block is worth popularizing as a method of multi-mode analgesia after cesarean section [6]. As a third-class hospital, our hospital has more than 5,000 cesarean sections every year, with large operations and time-consuming and labor-intensive block of quadratus lumborum. It has been reported [7,8] that long-acting local anesthetics, local infiltration of wound anesthesia or subcutaneous injection can also provide effective postoperative analgesia. Postoperative local infiltration anesthesia is operated by the operator, time-consuming and quick turnover. In addition, studies [9] found that the quadratus lumborum block did not spread to the paravertebral vertebrae, and the quadratus psoas block had no analgesic effect on visceral pain. Therefore, we want to see whether the quadratus lumborum block is more suitable for postoperative analgesia after cesarean section than local infiltration anesthesia.

## 2. Materials and Methods

This study has been approved by the ethics Committee of our hospital and the informed consent of anesthesia has been signed with the patients. There were 90 cesarean section patients with gestational age of 37-42 weeks, age of 19 to 45 years old, BMI 18--30kg/m<sup>2</sup>, ASA grade I-II, no abnormal coagulation function, no puncture site infection, no history of mental illness or local anesthetic allergy. 90 cesarean section patients were randomly divided into three groups (n=30): local incision infiltration (group I) and quadratus lumborum block (group Q), and control group (group C).



**Fig 1** Quadratus lumborum

The peripheral vein access of the upper limb was established after entering the room, ECG, HR, BP and SpO<sub>2</sub> were monitored. After the operation, in group I the obstetrician completed local infiltration with 0.75% ropivacaine 10ml along both sides of the incision, in group Q the attending physician with more than three years of experience in ultrasound-guided nerve block performed ultrasound-

guided bilateral quadratus lumborum block. The patient was placed in the supine position for routine disinfection. A low-frequency curvilinear probe (4-12MHz) was selected and placed between the costal margin and the iliac spine. The probe was moved from the abdomen to the dorsal side. In the anterior or posterior axillary line, the external oblique, internal oblique and transverse abdominis were identified in sequence. Below the transverse abdominis we can see the quadratus lumborum joining the lateral margin of the transverse process. In front of it is the psoas major muscle and behind it is the erector spinalis muscle. As shown in figure 1. A 20G10mm needle was used to insert the skin from the lateral side of the patient, in-plane, reaching the lateral edge of the quadratus lumborum muscle, and the middle layer of the thoracolumbar fascia. 2ml normal saline was injected, and the liquid level was seen diffusing between the fascia to insure the position of needle tip. Then inject 25ml of 0.3% ropivacaine. This approach is described Q2. The contralateral was blocked in the same way. In group C neither local infiltration nor quadratus lumborum block was operated.

Three groups all received PCIA postoperative analgesia electronic pump. Another completely unknown observer evaluate VAS score at 6, 12, 24 and 48 hours respectively postoperative, resting state (0=painless, 10 =unbearable pain) and the pressing times during each point of self-control analgesia pump, record the patients' first walking time after the surgery, patient satisfaction, 0 means the most dissatisfied, 10 points to very satisfied.

SPSS statistical software was used for analysis. Measurement data were expressed as mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ), count data expressed as percentage, chi-square test, repeated measurement analysis of variance (ANOVA) was used for intra-group comparison, and one-way ANOVA was used for inter-group comparison.  $P < 0.05$  was considered statistically significant.

### 3. Results

There was no significant difference in age, body mass index and operation time between the two groups ( $P > 0.05$ , as shown in table 1).

**Tab1** General information of patients in three groups

group	n	BMI	age	Surgery time
Group C	30	26.78 $\pm$ 4.49	31.80 $\pm$ 5.82	1.04 $\pm$ .19
Group I	30	26.18 $\pm$ 2.79	32.73 $\pm$ 6.23	1.05 $\pm$ .18
Group B	28	26.94 $\pm$ 2.36	33.60 $\pm$ 4.99	1.02 $\pm$ .17
F	----	0.417	0.723	0.313
P	----	0.661	0.488	0.732

Compared with Group C, # $P < 0.05$ , Compared with Group I, \* $P < 0.05$

In group B VAS scores at 6 and 12 hours after surgery were lower than in group I, the difference was statistically significant ( $P < 0.05$ ) as shown in table 2

**Tab2** VAS score at different times in three groups

group	n	6hVAS	12hVAS	24hVAS	48hVAS
Group C	30	2.60 $\pm$ .56	2.67 $\pm$ .66	2.53 $\pm$ .51	2.37 $\pm$ .49
Group I	30	2.20 $\pm$ .48#	2.47 $\pm$ .51	2.40 $\pm$ .50	2.30 $\pm$ .46
Group B	28	2.14 $\pm$ .60#	2.21 $\pm$ .57#	2.32 $\pm$ .47	2.25 $\pm$ .44
F	----	6.121	4.376	1.369	0.457
P	----	0.003	0.016	0.260	0.635

Compared with Group C, # $P < 0.05$ , Compared with Group I, \* $P < 0.05$

PCA pressing time in group B was less than in group I within 24 hours after the operation, the difference was statistically significant ( $P < 0.05$ ). See table 3.

**Tab3** Times of self-controlled analgesic pressure in three groups

group	n	PCA pressing times			
		0-6h	6h-12h	12h-24h	24h-48h
Group C	30	1.17±.87	3.80±1.06	3.87±.73	2.60±.85
Group I	30	0.70±.59#	3.47±.82	3.80±.71	2.67±.88
Group B	28	0.54±.50#	2.82±.77#*	3.36±.56#*	2.50±.88
F	----	6.100	8.858	4.828	0.266
P	----	0.003	0.000	0.010	0.767

Compared with Group C, #P<0.05, Compared with Group I, \*P<0.05

The time for patients to get out of bed for the first time after surgery in the three groups was shorter in group B than in group I, and the satisfaction score was higher than group I, the difference was statistically significant(P < 0.05).See table 4.

**Tab 4** Time of first walking around bed and patients' satisfaction score

group	n	First walking time (h)	patients' satisfaction score
Group C	30	26.43±3.919	5.77±1.501
Group I	30	23.57±5.124#	6.93±1.202#
Group B	28	20.11±5.101#*	8.04±1.374#*
F	----	12.917	20.059
P	----	0.000	0.000

Compared with Group C, #P<0.05, Compared with Group I, \*P<0.05

#### 4. Discussion and Conclusion

QLB is an emerging nerve block, literatures reported local anesthetics injection around the waist quadratus can effectively relieve all kinds of postoperative pain after abdominal procedure and chronic pain.[10] Now QLB is mainly used for postoperative analgesia after cesarean section, gastrointestinal [11, 12] and [13]hip replacement surgery postoperative analgesia.Zhang Yuan [14] et al. believed that the improvement of the early postoperative cognitive function in elderly patients with QLB may be related to the reduction of postoperative pain and early postoperative inflammatory response.

Quadratus lumbago block was first proposed by Blanco in 2007. Blanco et al. [3] conducted a control study of 76 cases after cesarean section, showing that the QLB group could significantly reduce the amount of intravenous morphine after cesarean section than the TAP group.Bantel C [15] et al. found that TAP block did not reduce the morphine consumption during cesarean section, indicating that it is not enough to block somatosensory fibers alone, which requires a method that can block visceral sensory fibers.

The thoracolumbar fascia is a layer of mixed tissue on the back extending from the chest to the lumbar and surrounding the quadratus lumborum, psoas major, and sacrospinous muscles.The thoracolumbar fascia contains channels diffusing to the paravertebral space, high density sympathetic nerve fibers and rich mechanical stimulation receptors.The thoracolumbar fascia is divided into three layers. The anterior layer is located in front of the quadratus lumborum, also known as the fascia of the quadratus lumborum; the middle layer is located between the sacrospinous muscle and the quadratus lumboru,.The posterior layer covers the surface of the sacrospinous muscle.The middle layer has the anterior and posterior branches of the spinal nerve from which the plexus passes.Local anesthetic can diffuse through the thoracolumbar fascia to the paravertebral space by QLB2 and QLB3, block part of the sympathetic nerve, and provide relatively well analgesia [3].

There is a potential anatomical space between the quadratus psoas and lats dorsi, erector spine, psoas major and abdominal wall muscles.The quadratus lumbroum is a muscle in the lower back that forms part of posterior wall of the abdomimal cavity. QLB block can be divided into QLB1, QLB2 and QLB3 approaches according to different injection sites.QLB1 approach: the final needle position is located anterolateral to the quadratus lumborum and connects to the transverse abdominal fascia, also known as the external QLB.This is similar to a very posterior TAP block approach and will possibly

be the approach most familiar to anesthesiologists. QLB2 approach: the final needle position is located posterolateral to the quadratus lumborum, QLB3 approach: the final needle position is between the quadratus lumborum and latissimus dorsi, is known as posterior QLB. Local anesthetic can spread to the paraspinal area. We used QLB2 as a blocking method, where the needle tip was separated by the quadratus psoas away from the peritoneum, reducing the possibility of intraperitoneal injection damaging the bowel. QLB3 injection site is located between the anterior medial side of the quadratus psoas and the psoas major muscle, known as anterior QLB. Reports claim local anesthetic significant cephalad and paravertebral spread resulting in better and more extensive analgesia.

In this study, 0.3% ropivacaine was used to conduct by real-time ultrasound guided bilateral QLB block, which had an exact effect, reducing the amount of opioids after cesarean section, reducing the incidence of postoperative nausea and vomiting, and the patients got out of bed earlier after the procedure. It is worthy of promotion to improve patient satisfaction, which is beneficial to maternal lactation and newborn care.

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