# The Effect of Different Surgical Approaches of Ultrasound-Guided Quadratus Lumborum Block on the Analgesic Effect in Cesarean Section

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**Objective To study the effect of different surgical approaches of ultrasound-guided quadratus lumborum block on the analgesic effect in cesarean section. Methods 150 parturients underwent elective caesarean section in our hospital from February 2017 to February 2020 were enrolled in this study. They were divided into observation group and control group according to the method of random number table, with 75 cases in each group. In control group, anterior QLB was used, while in observation group, posterior QLB was used. The operation process was performed by the same anesthesiologist. If the injection situation was not ideal, the position of needle tip was timely adjusted. Both groups were given sufentanil 100 μg/kg (diluted with 100 mL normal saline) and a single addition of morphine 50 mg (diluted with 100 mL normal saline) for self-controlled analgesia after operation. The postoperative time to first water intake, the time to first discharge from bed, hospital stay and satisfaction degree of labor pain were compared between the two groups. The numerical pain score (NRS) and visual analogue scale (VAS) scores of rest and movement at different time after operation were compared. The dosage of sufentanil and morphine in perioperative period and the occurrence of postoperative adverse reactions were compared between the two groups. Results The time to first water intake, the time to first discharge from bed and hospital stay in the observation group were significantly shorter than those in the control group ($P < 0.05$), and the satisfaction score of analgesia in the observation group was significantly higher than that in the control group ($P < 0.05$). The NRS score of observation group at T0, 1, 2, 3 and 4 after operation was significantly lower than that of control group ($P < 0.05$). There was no significant difference in VAS score of rest and movement at 4 and 8 h after operation between the two groups ($P > 0.05$); the VAS score of rest and movement at 12 and 24 h after operation in observation group was significantly lower than that in control group ($P < 0.05$). The amount of sufentanil and morphine used in the perioperative period in the observation group was significantly less than that in the control group ($P < 0.05$). The total incidence rate of adverse reactions in observation group was not significantly different from that in control group ($P > 0.05$). Conclusion Both anterior and posterior QLB can provide analgesia after cesarean section, but posterior QLB can better relieve the postoperative pain of parturients, which is worth popularizing in clinic.**

**Key words: Quadratus lumborum block; Cesarean section; Analgesia; Satisfaction**
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Cesarean section is one of the most common surgical procedures in clinic. The postoperative pain stimulation mainly comes from abdominal pain caused by uterine contraction and wound pain caused by incision. Meanwhile, the postoperative pain caused by cesarean section will have a great effect on the parturients. For example, the pain stimulation will make the parturient unable to recover quickly, so postoperative analgesia has become a hot topic in clinical research [1-3]. At present, the main choice for the management of

severe pain after cesarean section is the use of opioids, but there are many adverse reactions caused by opioids, which are not conducive to the postpartum recovery of parturient. Therefore, some experts put forward that it is feasible to use the trunk nerve block technique to reduce the postoperative abdominal pain of parturients after cesarean section, i.e., quadratus lumborum block (QLB). QLB is divided into multiple approaches, such as lateral approach, posterior approach and anterior approach, which has the advantages of simple operation [4-6]. Therefore, we discussed the approaches of QLB and observed the effect of different approaches of ultrasound-guided QLB on the analgesia in cesarean section.

## INFORMATION AND METHODS

The basic information 150 parturients who underwent elective caesarean section in our hospital from February 2017 to February 2020 were included as the study subjects, and were divided into observation group and control group according to the method of random number table, with 75 cases in each group. The observation group was (38 ± 1) weeks pregnant, incuding the American Society of Anesthesiologists (ASA) class I 43 cases and class II 32 cases, age 20 ~ 39 years old, constitution 50 ~ 80 kg. The control group was (39 ± 1) weeks pregnant, including ASA class I 42 cases and class II 33 cases, age 21 ~ 40 years old, constitution 52 ~ 83 kg. The difference in general data between the two groups had no statistical significance ($P > 0.05$) and was comparable. This study was reviewed and approved by the Ethics Committee of our hospital.

### Inclusion criteria

(1) ASA certification class I or II [7]; (2) age between 19 and 65 years; (3) Parturients and their family were informed and participated voluntarily, and agreement can be signed.

### Exclusion criteria

(1) patients who are contraindicated for block and spinal anesthesia; (2) patients with a history of drug abuse and allergy to relevant analgesic drugs; (3) patients with abnormal structure of puncture site; (4) patients with preoperative abnormal coagulation function or local infection; (5) patients who cannot effectively cooperate with the trial due to mental or physical problems.

### Methods

Parturients were deprived of water and food for 4 hours before operation. After entering the room, the non-invasive blood pressure, heart rate ECG and pulse rate of paturients were measuerd. After normality confirmation, subarachnoid anesthesia was performed. The parturients were given fentanyl and ropivacaine mixture into the lumbar intervertebral space for anesthesia. The parturients were given the transverse incision and were kept warm with thermal insulation blanket. (1) In the control group, the parturients received anterior QLB: lying with lateral position, using ultrasound 2 ~ 5MHz probe to keep the lateral image from the dorsal side to clearly display the triangular structure formed by psoas major and vertical spinal muscle, moving the needle from the waist to the dorsal side to reach the space between quadratus lumborum (QL) and psoas major fascia, injecting 0.9% normal saline to confirm the position through water separation technique, drawing back the blood and injecting 24ml 0.35% ropivacaine (Chengdu Tiantai Mountain Pharmaceutical Co., Ltd., batch number: 20150817); The contralateral side was completed in the same manner. (2) The observation group received posterior QLB: lying with supine position, using ultrasonic instrument 5 ~ 8MHz probe to look backward along the three layers of abdominal wall muscles of the parturient until QL. After the probe clearly imaged the QL and the psoas major, moving the needle to reach the space between the QL and the psoas major, then the needle was introduced from inside to outside to the fascia between QL and vertical spinal muscle. Injecting 0.9% normal saline, withdrawing shows no blood, and 24 ml of 0.35% ropivacaine was injected (Chengdu Tiantai Mountain Pharmaceutical Co., Ltd., batch number:20150817); The operation was performed by the same anesthesiologist, and the position of

needle tip shall be timely adjusted in case of pharmaceutical diffusion during injection. Both groups were given sufentanil 100 μg/kg (diluted with 100 mL normal saline) and a single dose of morphine 50 mg (diluted with 100 mL normal saline) for self-controlled analgesia after operation. The urinal catheter was removed after the effect of lumbar anesthesia disappeared. Observing the adverse reaction of parturients and encouraging the parturients to eat early.

### Observation indicators

(1) Comparison of postoperative recovery and analgesia satisfaction in the two groups: postoperative recovery included time to first water intake, time to first discharge from bed and hospital stay; Analgesia satisfaction was evaluated with reference to the Analgesia Satisfaction Scale in the study by Wang Fengjuan [8], among which 0 was unsatisfied (pain intolerable, low mood and even irritable), and 10 was very satisfied (no pain or pain negligible, mood very stable). (2) Comparison of NRS scores at different time points after operation in the two groups [9]: NRS scores were evaluated at the time of immediate extubation (T0),10 minutes after extubation (T1), 20 minutes after extubation (T2), 30 minutes after extubation (T3), and 40 minutes after extubation (T4), among which 1-3 scores were mild pain; 4-7 scores were moderate pain; 8-10 scores were severe pain. (3) Comparison of postoperative visual analogue scale (VAS) scores of rest and movement between the two groups [10]: the VAS score of rest was evaluated when the patient was in bed, and the VAS score of movement was evaluated when the patient was out of bed; 0 point was no pain; 1 ~ 3 points was mild pain; 4 ~ 6 points was moderate pain; 7 ~ 9 points was severe pain; 10 points was severe pain. The evaluations ware conducted at 4, 8, 10 and 24 hours after the operation. (4) The dosages of sufentanil and morphine in perioperative period were statistically analyzed and compared between the two groups. (5) The incidence of adverse reactions during postoperative hospitalization between the two groups were compared.

### Statistical methods

SPSS19.0 software was used to process the data; the measurement data were expressed as ($\bar{x} \pm s$); t test was used for the comparison between the two groups; the enumeration data were expressed as (%), and $X^2$ test was used. $P < 0.05$ indicated that the difference had statistical significance.

## RESULTS

### The postoperative recovery and the analgesia satisfaction

The time to first water intake, the time to first discharge from bed and the hospital stay in the observation group were significantly shorter than those in the control group (P < 0.05), and the analgesia satisfaction score in the observation group was significantly higher than that in the control group (P < 0.05). See Table 1.

Table 1.
Postoperative recovery and analgesia satisfaction ($\bar{x} \pm s$) in the two groups

| Group | Number of cases | Time to first water intake (d) | Time to first discharge from bed (d) | Hospital stays (d) | Satisfaction with analgesia (points) |
|---|---|---|---|---|---|
| Observation group | 75 | 3.23±0.75 | 2.33±0.72 | 10.12±1.52 | 8.58±0.85 |
| Control group | 75 | 3.82±0.82 | 2.92±0.73 | 12.10±2.35 | 7.59±1.12 |
| *t* | | 4.598 | 4.983 | 6.127 | 6.098 |
| *p* | | 0.000 | 0.000 | 0.000 | 0.000 |

### Comparison of NRS scores at different time points after operation between the two groups

The NRS scores at T0, 1, 2, 3 and 4 time points after operation in observation group were significantly lower than that in control group (P < 0.05). See Table 2.

Table 2.
Comparison of NRS scores at different time points after operation in two groups [points, ($\bar{x} \pm s$)]

| Group | Number of cases | T0 | T1 | T2 | T3 | T4 |
|---|---|---|---|---|---|---|
| Observation group | 75 | 1.25±0.85 | 1.62±0.52 | 2.25±0.84 | 2.02±0.23 | 1.15±0.50 |
| Control group | 75 | 2.16±0.89 | 1.83±0.68 | 3.16±0.58 | 2.56±0.71 | 1.35±0.63 |
| *t* | | 6.404 | 2.125 | 7.720 | 6.266 | 2.153 |
| *p* | | 0.000 | 0.036 | 0.000 | 0.000 | 0.033 |

### Comparison of VAS scores of rests and movement after operation between the two groups

There was no significant difference in VAS scores of rests and movement at 4 and 8 h after operation between the two groups (P > 0.05); the VAS score of rest and movement at 12 and 24 h after operation in observation group was significantly lower than that in control group (P < 0.05). See Table 3.

### Comparison of dosages in the perioperative period

The dosage of sufentanil and morphine in the perioperative period in the observation group were significantly less than that in the control group (P <0.05). See Table 4.

### The adverse reactions in two groups

The total incidence rate of adverse reactions in observation group was not significantly different from that in control group (P > 0.05). See Table 5.

Table 3.
Comparison of postoperative VAS for rest and movement [h, ( $\bar{x}$ ± s)]

| indicators | Number of cases | Group | 4 h post-op | 8 h post-op | 12 h post-op | 24 h post-op |
|---|---|---|---|---|---|---|
| VAS at rest | 75 | Observation group | 1.42±0.65 | 2.31±0.75 | 1.78±0.81 | 1.02±0.51 |
| | | Control group | 1.53±0.58 | 2.23±0.74 | 2.06±0.85 | 1.28±0.83 |
| | | *t* | 1.094 | 0.658 | 2.065 | 2.311 |
| | | *p* | 0.276 | 0.512 | 0.040 | 0.022 |
| VAS at movement | 75 | Observation group | 2.35±0.85 | 2.52±0.96 | 2.32±1.02 | 1.53±0.35 |
| | | Control group | 2.54±0.83 | 2.63±0.95 | 2.72±0.71 | 2.02±0.52 |
| | | *t* | 1.385 | 0.705 | 2.787 | 6.770 |
| | | *p* | 0.168 | 0.482 | 0.006 | 0.000 |

Table 4.
Comparison of dosages in the perioperative period ( $\bar{x}$ ± s)

| Group | Number of cases | Sufentanil (μg/kg) | Morphine (mg/kg) |
|---|---|---|---|
| Observation group | 75 | 0.58±0.19 | 20.62±3.54 |
| Control group | 75 | 0.65±0.15 | 24.42±4.59 |
| *t* | | 2.504 | 5.677 |
| *p* | | 0.013 | 0.000 |

Table 5.
Comparison of adverse reactions in the two groups [n, (%)]

| Group | Number of cases | Nausea and vomiting | Hypotension | Dizziness | Chest tightness | Total incidence rate |
|---|---|---|---|---|---|---|
| Observation group | 75 | 2（2.67） | 1（1.33） | 0（0.00） | 1（1.33） | 4（5.33） |
| Control group | 75 | 1（1.33） | 2（2.67） | 1（1.33） | 1（1.33） | 5（6.67） |
| $x^2$ | | | | | | 0.118 |
| *p* | | | | | | 0.731 |

## DISCUSSION

QLB is a body nerve block analgesia technique which has been discovered and applied in recent years. It can effectively ensure local anesthesia and spread to the paravertebral space along the connection between fascias. QLB is relatively strict in operation and has different approaches. It is widely used and has good application prospect [11]. At the same time, QLB analgesia is safe, with few adverse reactions for patients, and it can also ensure the safety of the lives of the patients. However, the disadvantage is that QLB analgesia is difficult to be located in traditional way, so it needs professional operators to use ultrasound guidance for positioning, and this increases the difficulty of operation [12]. Cesarean section is a common surgical method in obstetrics and gynecology. At the same time, intra-operative and post-operative analgesia is a difficult problem in clinic. In order to find an effective analgesic method in cesarean section, this study used QLB in perioperative anesthesia to observe the analgesic effect of anterior and posterior QLB on parturients after cesarean section.

The results of this study showed that the time to first water intake, time to first discharge from bed and hospital stay in observation group were significantly shorter than that in control group, and the score of analgesia satisfaction in observation group was significantly higher than that in control group. It is suggested that the posterior QLB can provide better analgesia for cesarean section parturients. There was no significant difference in VAS scores of rest and movement at 4 and 8 h after operation between the two groups in the study, and the NRS scores did not exceed 4 at 40 min after

extubation in both groups, suggesting that both anterior and posterior QLB can provide effective analgesia after cesarean section. The main evaluation effect of this study was the dosage of morphine added for analgesia. The VAS score of rest and movement increased at 4-8 h after operation in both groups. Therefore, analgesia was additionally applied. However, the dosage of sufentanil and morphine in the observation group was significantly less than that in the control group, indicating that the effect of posterior QLB was better than that of anterior QLB [13]. In the study of postoperative analgesia in caesarean section, Wang Min et al. [14] concluded that class I (posterior) approach of QLB can effectively relieve the postoperative pain of parturients undergoing caesarean section, with good clinical safety.

In this study, anterior and posterior QLB were used for postoperative analgesia after cesarean section. The results showed that both approaches can provide analgesia for the parturients in cesarean section, and there was no significant difference in the incidence rate of adverse reactions between the two groups, suggesting that both methods can meet the parturients' needs [15]. However, for the anterior QLB, the anesthetic was injected between the quadratus lumborum and the psoas major, in which the puncture site is deep, and it is relatively difficult to form the triangle structure between the quadratus lumborum and the psoas major, and the parturient is lying on the side when the QLB is performed. It is necessary to reposition the lateral side when the contralateral QLB is performed, thus prolonging the corresponding operation time. The parturients were more satisfied with the analgesic effect after the posterior QLB, and the amount of additional analgesic used when the pain returned was less than that of the anterior QLB group, so the posterior QLB was more effective. Zhang Longsheng [16], et al. discussed the effect of ultrasound-guided quadratus lumborum block on postoperative analgesia after cesarean section, and found that the satisfaction rate was higher after the parturient used posterior quadratus lumborum block for analgesia. The results show that the posterior QLB can effectively relieve the postoperative pain of parturients and promote the rapid recovery of parturients at the same time.

The complications such as infection and organ damage occurred in both groups in this study, suggesting that QLB is safe and effective for postoperative analgesia after cesarean section under standard operation. Both the anterior and posterior QLB can effectively relieve pain within 4 minutes after operation, but the morphine dosage used by the parturient in the posterior QLB group is lower than that in the anterior QLB group when the pain regresses between 4 and 8 hours after operation, so the posterior QLB can effectively reduce the use of additional analgesic after operation, which is safer.

In conclusion, both anterior and posterior QLB can provide analgesia after cesarean section, but posterior QLB can better relieve the postoperative pain of parturient, which is worth popularizing in clinic.

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