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Original Research Article

Comparative Efficacy of Ultrasound-Guided Bilateral Quadratus Lumborum Block vs. Conventional Analgesia in Cesarean Section: A Randomized Controlled Trial

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Abstract:

Background and Aim: Ultrasound guiding speeds up peripheral nerve blocks, improves quality, lowers local anaesthetic doses, and reduces complications. This study was done with an aim to compare the post-operative analgesic effect of USG guided bilateral quadratus lumborum block with conventional analgesic technique in elective caesarean section patients by total requirement of post-operative analgesic drugs.

Material and Methods: We studied 80 patients who were scheduled for caesarean section. All the Patients were given spinal Anaesthesia. At the end of the surgery, the patients were divided into two groups. QLB group (GROUP A): Patients received USG guided Bilateral Quadratus Lumborum Block with 20 ml of 0.25% Ropivacaine on each side(n=40) and Control Group (GROUP B): Patients who did not receive the QLB block and were given Injection Tramadol on demand for post-operative analgesia as per institutional protocol(n=40). Analgesic efficacy of QLB block in caesarean section was assessed by time to first requirement of rescue analgesic drug (Tramadol), VAS scores, and total dose requirement of Tramadol in 24 hrs. Any adverse effects or complications were also observed.

Results: QLB block increases the duration of time to first rescue analgesic drug (Tramadol) with significant difference ($P < 0.0001$) between QLB group (1068.25±157.331 min) and the CONTROL group (222.75±56.27 min). There is a significant decrease in the VAS score in the postoperative period in the QLB group as compared to the control group. It also reduces the total Analgesic requirement (Tramadol) in the first 24 hours with significant difference between the QLB group (105±45.00 mg) and the CONTROL group (357.5±84.39 mg).

Conclusion: USG guided Bilateral Quadratus Lumborum block when compared with a standard spinal anaesthetic is associated with a significant decrease of systemic analgesics demand and is a good choice for postoperative pain management in surgery like caesarean section as a part of multimodal analgesia.

Keywords: Analgesic Requirement, Caesarean Section, Peripheral Nerve Block, Quadratus Lumborum Block.

Introduction

The IASP defines pain as "an unpleasant sensory or emotional experience associated with or resembling that associated with, actual or potential tissue damage." Anaesthesia involves pain avoidance. Safe and effective regional anaesthetic treatments for post-caesarean analgesia are in demand. Effective postoperative analgesia after caesarean section allows early ambulation and breastfeeding. [1]Caesarean birth can cause pain from the surgical incision site, visceral tissues, and dynamic pain from coughing, straining, or mobilising. However, the incision site causes most post-C-section pain. Intraoperative infiltration of local anaesthetic into the subcutaneous tissue around the wound is often insufficient to control this pain. Patients may need additional opioid analgesia in the immediate and medium-term post-operative period and prolonged morphine-based PCA. [2,3] While opioids can relieve post-operative pain, they also increase the risk of drowsiness, nausea, vomiting, constipation, and paralytic ileus. Epidural anaesthesia can relieve visceral discomfort; however infection and

coagulopathy contraindicate its use. Given its morbidity, epidural anaesthesia may not be possible in some circumstances. As a result, it is important to consider the benefits and risks of different approaches to post-operative pain management and choose the most appropriate option for each individual patient. [4] Peripheral nerve blocks are becoming more popular because they reduce pain as measured by visual analogue scores, numerical rating pain scores postoperatively, and opioid-induced side effects like respiratory depression, nausea, vomiting, NSAID-induced gastritis, etc. [2,3] Nerve blocks inhibit peripheral nerve nociceptive impulses, which reduces their impact on the body's physiology and shortens the post-anesthesia care unit stay and patient satisfaction.

Ultrasound guiding speeds up peripheral nerve blocks, improves quality, lowers local anaesthetic doses, and reduces complications. Rafael Blanco4 introduced the Quadratus Lumborum (QL) block in 2007. Local anaesthetic injection around the quadratus lumborum muscle relieves pain after abdominal surgeries and in chronic pain patients, according to several case reports. The quadratus lumborum block (QLB) uses a fascial compartment channel to provide local anaesthesia into the posterior abdominal wall and paravertebral region near the surface. The central effect can be crucial for treating visceral pain after caesarean section. [5-7]

We began routinely performing surgical quadratus lumborum blocks for caesarean section patients in 2020. This retrospective case note research compares women who received and did not get the surgical quadratus lumborum block. This study was done with an aim to compare the post-operative analgesic effect of USG guided bilateral quadratus lumborum block with conventional analgesic technique in elective caesarean section patients by total requirement of post-operative analgesic drugs.

Material and Methods

Present Randomized Controlled Trial was done at Department of Anaesthesiology, G.M.E.R.S Medical College and Hospital Sola, Ahmedabad from October 2020 to September 2022 in Patients undergoing elective caesarean section as per inclusion criteria.

Inclusion Criteria:

1. Age group of 18-40 years who give consent.
2. Elective caesarean section & normal singleton pregnancy with a gestation of at least 37 weeks.
3. BMI <30 kg/m2

Exclusion Criteria:

1. Patient refusal
2. Coagulopathy or Anti-coagulation treatment
3. History of allergy to the study drug
4. Infection at the site of injection
5. Neurological and Psychiatric disorders
6. ASA III or higher

Sample size was calculated using formula $N = [Z\alpha + Z\beta]^2 \times [Sx + Sy]^2 \div d^2$ $Sx^2 + Sy^2 = n \times d^2 \div [Z\alpha + Z\beta]^2$

Total sample size was calculated was 80 and patients were randomly allocated into two groups,

- One group to undergo spinal anaesthesia and ultrasound guided bilateral Quadratus lumborum block with 0.25% Ropivacaine (plain) (Group Q, n = 40)
- One group to undergo spinal anaesthesia without bilateral Quadratus lumborum block. (Group C, n=40)

Ethical approval was taken from the institutional ethical committee and written informed consent was taken from all the participants.

Preoperatively: A thorough history and examination will be done on all patients. Investigations including complete blood count, Renal function test, liver function test, coagulation profile, ECG, ultrasonography of abdomen and medical fitness will be done on all patients. Patients will be randomly assigned to receive a USG guided bilateral Quadratus lumborum block with 40 ml of 0.25% ropivacaine (study group) or conventional rescue analgesic protocol (control group).

Intraoperatively: After gaining IV access, monitoring devices will be attached which include Non-invasive blood pressure, ECG with heart rate, Spo2 and Urine output. All patients will be given ringer lactate as preloading fluid in the dose of 8-10ml/kg. All the patients will be given premedication with Injection Ranitidine and Injection Ondansetron 0.15mg/kg.

With the patient in the sitting position and spine in midline and at level of L3-L4 or L4-L5 spinal anaesthesia27 was administered with 25gauge quinke's needle using Induction agents consist of Injection bupivacaine heavy 0.5% 1.8 ml to 2.2 ml according to patient's height. Patient immediately placed in supine position. Spinal anaesthesia is considered successful when a bilateral block to T6 is level achieved and surgery is started.

After the surgery USG guided QLB will be performed on the study group. The entire procedure will be carried out in an aseptic manner. During the block performance, the patient is in lateral position. The probe is tilted down the needle (22gauge spinal needle) is inserted in plane from medial (anterior) to lateral (posterior). The optimal point of injection is determined using hydro-dissection by normal saline. After a negative aspiration & confirmation by normal saline 20 ml of 0.25% ropivacaine on the

lateral side of QLM in the area of its contact with the transversalis fascia, at the level where transversus abdominis muscle (TAM) tapers off into its aponeurosis. This procedure will be performed bilaterally and total 40 ml of 0.25% ropivacaine will be injected.

The patients in the control group (Group B) will receive rescue analgesic agent Tramadol 100mg Iv postoperatively while the patients in the study group (Group A) will receive this rescue analgesic on request for pain breakthrough.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2019) and then exported to data editor page of SPSS version 19 (SPSS Inc., Chicago, Illinois, USA).

Quantitative variables were described as means and standard deviations or median and interquartile range based on their distribution.

Qualitative variables were presented as count and percentages. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

Table 1: Demographic Data

	QLB	Control	P Value
Age(Years)	27.95±4.893	28.75±4.645	0.4555
Height(Cm)	159.58±3.73	160.35±3.86	0.3642
Weight(Kg)	59.47±4.635	59.5±4.132	0.9798
BMI (Kg/M²)	23.36±1.683	23.15±1.543	0.5625

(*Using unpaired student's t test) P> 0.05, Values are expressed as mean±SD and numbers

Both groups were comparable in terms of age, weight, height and BMI. No significant difference was observed between two groups in terms of demographic data.

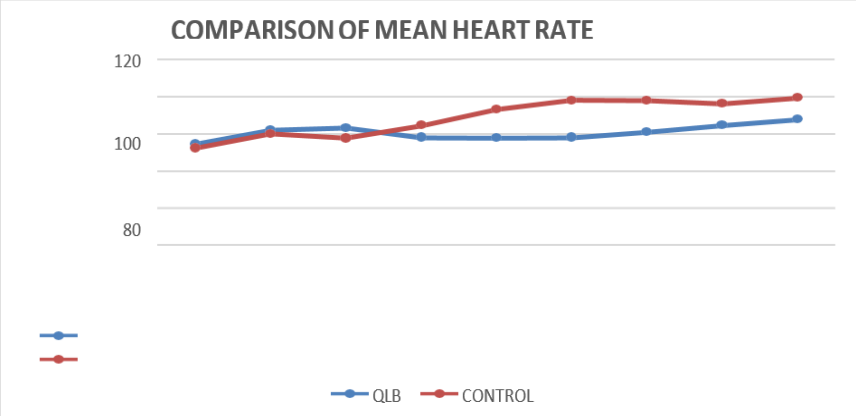

Figure 1:

Heart rate in both the groups were significantly decreased in the QLB group (P<0.05) at all time intervals except at 0 hour post-operatively.

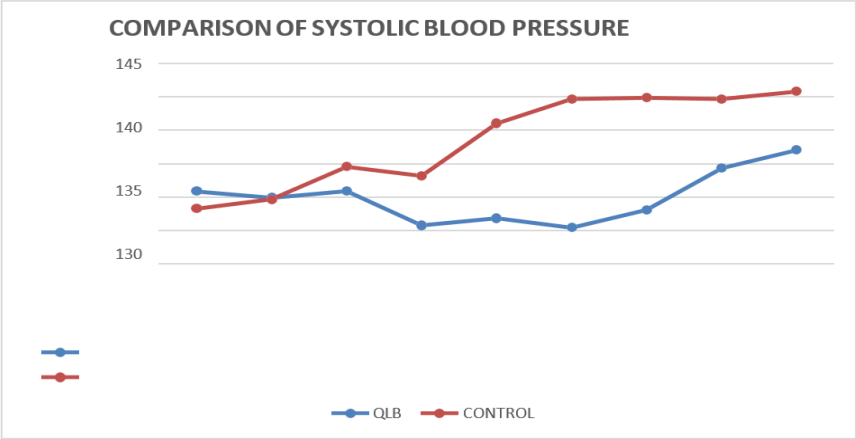

Figure 2:

We observed that there was a significant difference in Systolic Blood Pressure in both the groups at all the time (P value <0.05) except at 0 hour postoperatively.

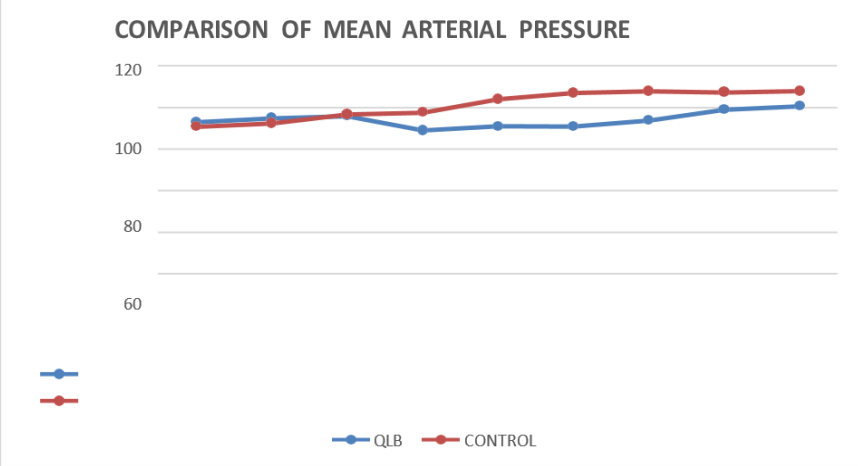

Figure 3:

We observed that there was a significant difference in MAP in both the groups at all the time (P value <0.05) except 0 hour postoperatively.

Table 3: Comparison of VAS Score

Group	Post-OP						
	0 Hour	2 Hours	4 Hours	6 Hours	12 Hours	18 Hours	24 Hours
QLB	0.15±0.36	0.55±0.59	0.85±0.69	1.325±0.83	2.075±0.86	2.95±1.44	3.15±1.27
Control	0.65±0.86	1.7±0.88	3.85±0.89	4.175±1.28	3.525±1.062	3.73±1.13	4.25±1.21
P Value	0.0011	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0086	0.0002

(*using unpaired student's t test) P> 0.05, Values are expressed as mean±SD and numbers

VAS score was significantly higher in control group as compared to the QLB group at all the time post operatively.

Table 4: Tramadol Consumption in 24 Hours

Group	Tramadol Dose in Mg
QLB	105±45.00
Control	285±36.162
P Value	< 0.0001

(*using unpaired student's t test) P> 0.05, Values are expressed as mean±SD and numbers

Total dose of TRAMADOL consumption in QLB group was 105±45.00 mg and in control group it was 285±36.162 mg, which showed that TRAMADOL consumption was significantly decreased in QLB group.

Table 5: Time Taken for First Dose of Rescue Analgesia

Group	Time for first dose of rescueanalgesia in minute
QLB	1068.25±157.331
Control	230.75±56.27
P Value	< 0.0001

First dose of rescue analgesia required in QLB group was at 1068.25±157.331 minutes and in control group was 230.75±56.27 minutes which was statistically significant.

Table 6: Cumulative Consumption of Tramadol

Group	Post Op						
	0 Hour	**2 Hours**	**4 Hours**	**6 Hours**	**12 Hours**	**18 Hours**	**24 Hours**
QLB	0±0	0±0	0±0	0±0	5±22.07	50±50.64	50±50.63
Control	2.5±15.81	5±22.072	67.50±47.43	70±46.41	40±49.61	47.50±50.57	52.50±50.57
P Value	0.3204	0.1559	< 0.0001	< 0.0001	< 0.0001	0.8257	0.8257

(*using unpaired student's t test) P> 0.05, Values are expressed as mean±SD and numbers

Quadratus Lumborum block with 0.25% Ropivacaine reduces requirement of TRAMADOL in QLB group compared to control group at all times except 18 hours and 24 hours.

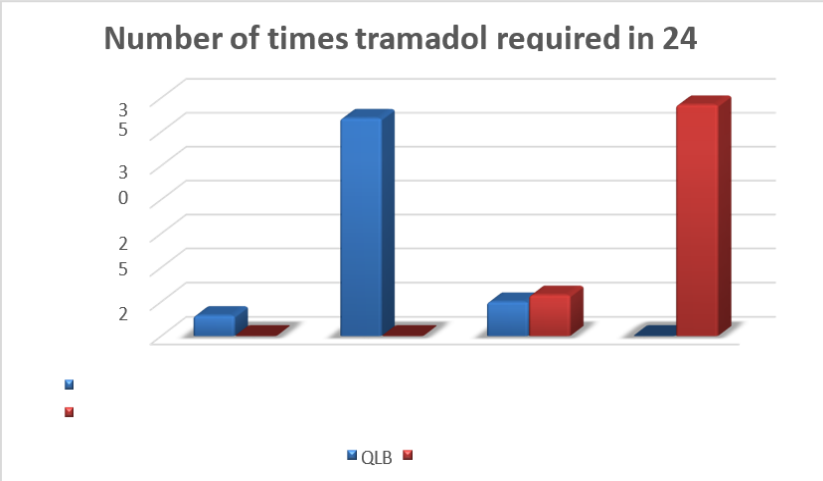

Figure 4:

Tramadol requirement in QLB group was one time in 32 patients and two times in 5 patients and zero patients needed a third dose which was significantly less as compare to control group in which Tramadol requirement was one time in zero patient and two times in 6 patients and three times in 34 patients in 24 hours. In our study none of the patients developed any complications. USG guided Quadratus lumborum block was given so placement of drug in proper plane was achieved resulting in zero failure of block. Also, no adverse reactions like neurotoxicity, cardiac toxicity, respiratory and other complications were seen in any patients.

Discussion

Postoperative pain management is a crucial part of the perioperative process. Effective pain management can reduce postoperative stress, improve patient satisfaction and minimize the risk of side effects. It is important to prioritize patient safety and continually evaluate and optimize analgesic techniques to ensure optimal pain relief. Thus, the development of safe and well tolerated analgesic techniques that provide optimal postoperative pain relief is of utmost importance. [8] In Our study, we studied 80 patients undergoing caesarean section. At the end of Surgery 40 ml of 0.25% Ropivacaine was deposited on the lateral side of QLM in the area of its contact with the transversalis fascia, at the level where transversus abdominis muscle (TAM) tapers off into its aponeurosis. Ropivacaine was deposited bilaterally using ultrasonography in QLB group and the Control group were given Inj. Tramadol on request. Both the groups showed no statistically significant difference in Weight, Age, Height and BMI. In our study the total duration of analgesia i.e. the time taken for first dose of rescue analgesic the QLB group was 1068.25±157.331 Minutes while that in the control group was 230.75±56.27 minutes (P value < 0.0001) which was similar to study

conducted by Anders Krohg in 2017 [3] and Blanco et al [5].

In our study, in the QLB group VAS score is 0.15, 0.55, 0.85, 1.325, 2.075, 2.95 and 3.15 respectively. In control group VAS score is 0.65, 1.7, 3.85, 4.175, 4.225, 3.978 and 4.55 respectively. Throughout 24 hours VAS scores were less in the QLB group as compared with the control group. YOUSEF et al [6] sixty adult female patients (ASA I-II), posted for total abdominal hysterectomy were randomized into two equal groups – Transversus Abdominis block (TAP) and Quadratus Lumborum (QL) group. Each patient in both groups received general anesthesia plus bilateral Transversus Abdominis Plane block or bilateral Quadratus Lumborum block.

The postoperative total dose of morphine used for a period of 24 hours, Visual Analogue Pain Scales (VAS) at 30 min, 2, 4, 6, 12, and 24 hours postoperatively, duration of postoperative analgesia, total dose of fentanyl use intraoperatively, number of patients needed the rescue analgesia and any incidence of side effects were noted. The postop VAS scores, total morphine requirements, number of rescue analgesic requirements were lower Quadratus Lumborum Block group. In our study VAS scores in Quadratus Lumborum block group was less than Control group. The total Tramadol consumption in the QLB group was 105±45.00 mg. In comparison, in the control group which did not receive the block Tramadol consumption in first 24 hours was 357.5±84.39 mg. (p value <0.0001) In a study conducted by Blanco et al 20165, the use of quadratus lumborum block was compared to transversus abdominis plane block for postoperative analgesia in 76 patients undergoing caesarean section under subarachnoid block. Both groups received 0.125% bupivacaine, with the quadratus lumborum group receiving it via ultrasound-guided injection and the transversus abdominis plane group receiving it through posterior injection as determined by magnetic resonance imaging. Patient controlled analgesia was used to measure morphine consumption at various time intervals after the surgery, and it was found that the quadratus lumborum group had lower morphine demands than the transversus abdominis plane group at 12, 24 and 48-hours post-surgery (differences of 37.5%, 55%, and 48% respectively). Similarly in our study the total tramadol consumption in Quadratus Lumborum block group was less than Control group. In our study the hemodynamic parameters like HR, SBP and MAP remained stable in both the groups. The Heart rate, Systolic blood pressure & Mean Arterial pressure were significantly lower in the QLB group as compared to the control group which was similar to study conducted by Anders Krohg [3], Blanco et al. [5], Ueshima H et al [9] and Nair A. [10] In our study none of the patients developed any complications. Quadratus lumborum block was given under ultrasound guidance so placement of drug in proper plane was achieved resulting in zero failure of block. Also, no adverse reactions like neurotoxicity, cardiac toxicity, respiratory and other complications were seen in any patients. Incidence of nausea and vomiting was comparatively very low in patients receiving quadratus lumborum block. Since the study was conducted in a single institute, care should be taken while inferring the result to the general population.

Conclusion

USG guided Bilateral Quadratus Lumborum block when compared with a standard spinal anaesthetic is associated with a significant decrease of systemic analgesics demand and is a good choice for postoperative pain management in surgery like caesarean section as a part of multimodal analgesia.

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