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Ultrasound guided quadratus lumborum block for postoperative analgesia after caesarean section under spinal anesthesia

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Abstract

Background and Aims: Postoperative analgesia after caesarean section is important because it enables early ambulation. Several case reports have shown that local anaesthetic injection around the quadratus lumborum muscle is effective in providing pain relief after various abdominal operations and in patients with chronic pain. The aim of our trial was to access the analgesic efficacy of transmuscular quadratus lumborum block (TQLB) after caesarean section.

Methods: This study was done in 80 women posted for caesarean section who were divided into two groups of 40 each.TQLB was given bilaterally, in group R with 20 ml of 0.375% ropivacaine and in group S with 20 ml saline. Patients were operated under spinal anaesthesia and were examined for pain at different time points postoperatively. Time required for first analgesic demand was our primary endpoint. Secondary endpoints were total rescue analgesia (paracetamol)required in 24 hrs, pain scores, nausea, vomiting, sedation and any other complications.

Results: The time required for first analgesic demand was 5.9± 0.8hrs in R group and 2.1± 0.2 hrs in group S which was statistically significant. The total paracetamol consumption in 24 hours was 2.2± 0.4gm in group R and 3.9± 0.7gmin group S, the difference being significant.

Conclusion: Transmuscular quadratus lumborum block can produce quality analgesia after caesarean section. TQLB not only improves the visual analogue scale (VAS) score but also decreases the rescue analgesic consumption without any complications.

Key words-Transmuscular quadratus lumborum block, caesarean section, postoperative analgesia

Introduction

Abdominal blocks like transverse abdominal plane (TAP) block and transmuscular quadratus lumborum block(TQLB) are continuously under investigation for postoperative analgesia.[1]

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Earlier trials on TAP blocks have not shown any positive resultsas it only blocks somatic pains, withoutblocking visceral pain as local anaesthetics fails to spread to the paravertebral space.[2]The TQLB can produce better analgesia after caesarean section. Local anaesthetics block the nerves transmitting visceral pain in the thoracic paravertebral spacewhich includes T4–L1 dermatomes. In TQLB, local anaesthetics spread between the psoas major and the quadratus lumborum to the fascial interspace posterior to the transverse fascia.[3] TQLB was first described by Borglum et al and they concluded that TQLBcould provide better postoperative analgesia.[4]In few cadaveric trials of the TQLB, dye was seen spreading in the paravertebral space which surrounds the somatic nerves, and the thoracic sympathetic trunk.[5]In literature few studies have concluded that TQLBcan provide good postoperative analgesia in abdominal surgery.[6,7]As literature is silent on any data on TQLB incaesarean sectionwe have done this trial to assess the efficacy of TQLB in caesarean sectionfor postoperative analgesia.

Methods

This is a prospective randomised double blind trial which was undertaken after approval from our Institutional ethics committee. Informed consent was obtained from all patients.Study was conducted during the period from Sept 2022 to Sept 2023.A total of 80 women posted for caesarean sectionunder spinal anaesthesia were included in our study. Patients having history of allergy to local anaesthetics, coagulopathy, chronic renal failure, BMI>25kg/m^2,block site infection, and cardiorespiratory diseases were excluded. All the patients were randomly split sequentially into group R and group S using a computer generated random numbers. The allocated sequence was put in sealed opaqueenvelopes and were opened in the operation theatre. Group R received ropivacaine in TQLB and group S received saline in TQLB.Study drug was prepared in 2 syringes of 20 ml containingeither 40 ml saline or 40 ml 0.375% ropivacaine by an investigator who was blinded to the study. The anaesthesiologist who administered the blocks and recorded pain characteristics were blinded to the group allocation. In the operation theatre, IV access wasestablished using an 18-gauge IV cannula and ringers lactate was started. Electrocardiograph (ECG), non-invasive bloodpressure (NIBP) monitor, and pulse oximeter were attached and base linedata were recorded. Ultrasound (US) guided TQLB was given as described by Jodan.[8] IV midazolam 0.03mg/kg and fentanyl 1mcg/kg was administered. Then all patientswere put in the left and right lateral decubitus position and block was given. A low-frequency 18–6 MHz curvilinear ultrasound transducer was put just above the anterior and posterior iliac crest and below the rib cage. Structures like the transverse process, vertebral body, erector spinae muscle, quadratus lumborum muscle ,and the psoas muscle making up the “shamrock” sign was identified.[8] Tip of the needle was directed between the psoas muscle and the quadratus lumborum muscle and 20 ml of either of 0.375% ropivacaine or normal saline was injected into the interfascial plane on each sideas per the allocated group. All the patients were tested for successful block and patients with successful block were allowed for surgery. In all patients, spinal anaesthesia was performed. With the patient in the sitting position the midline and level of the L3–4 and L4–5 intervertebral spaces were identified. Spinal anaesthesia was administered with a 26- gauge Quinke needle using hyperbaric bupivacaine 15 mg. Patients were immediately placed in the supine position with left uterine displacement. Spinal anaesthesia was considered successful when a bilateral block to T6, assessed by loss of cold

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(ice cube) and touch (blunt pin) discrimination, was established 5 min after the spinal injection.The pain was measured by the Visual AnalogueScore (VAS) [9] on the scale of 0-10 (0 - no pain and10 - worst imaginable pain).Complications like pruritus, sedation, nausea, and haemodynamic abnormalities were assessed in boththe groups at 20min, 40min,1hrs,3hrs, 6hrs,9hrs, 12hrs,15hrs, 18hrs,21hrs and 24 hours after thesurgery. Rescue analgesia (iv paracetamol15mg/kg) was given when VAS score>4.Severity of PONV was measured on the 4-pointscore (0 - absent, 1 - mild, 2 - moderate and 3 -severe or vomiting). Patients were evaluated for the level ofsedation by using a 4-point sedation scale (1- awake,2- response to verbal command, 3 - response to touch, 4 - deeply sedated and response topain). Primary outcome was the time required for firstanalgesic request. Secondary outcome were total dose of paracetamol requiredin 24 hours,VAS scores, and any other complications. Sample size was calculated after doing a pilot study. Assuming 50% increase in the time of request for analgesia request as significant, keeping the power of the study at 80% and significancelevel of 95%, a total of 28 subjects were required in each group. Keeping in mind about possible dropouts we have included 32 patients in each group. Continuous data was analysed for normality using the"Kolmogorov-Smirnov test" of normality. Normal distributed data was represented as mean ± SD and wasassessed using the student's t-test. Non-normally distributed data was analysed using the Mann-Whitney U-test. A P value < 0.05 wasconsidered significant.

Results

A total of 80 women posted for caesarean section were included in the study. The demographic profile, block performing time and duration of surgery were comparable in both the groups. (Table1)

Table 1: Descriptive variables of groups.

Variables	Group R(n=30)	Group S(n=30)	P value
Age(years)	57.13±18.65	55.78±19.98	0.151
Female: Male(n)	26:4	26:4	0.531
ASA I/II (n)	19/11	18/12	0.321
Surgical time (mins)	46.55±10.25	47.9±11.34	0.171
Block performing time (mins)	8.34±2.84	8.28±2.82	0.154
BMI (kg/m^2)	23.14±2.36	22.25±3.16	0.268

Values expressed as Mean±SD and No, SD: Standard deviation. Student's t-test and Chi-square test applied. P<0.05 is significant

Table 2: Total analgesic consumption in 24 hrs and time to first analgesia request

Parameters	Group R(n=30)	Group S(n=30)	P value
Total analgesic consumption (Paracetamol in gm)	2.2± 0.4	3.9± 0.7	0.03
Time to 1^{st} rescue analgesia request (hrs)	5.9± 0.8hrs	2.1± 0.2	0.02

Values expressed as Mean±SD, SD: Standard deviation. Student's t-test and Chi-square test applied. P<0.05 is significant

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

Fig 1;Time (in hrs) for first request for analgesia

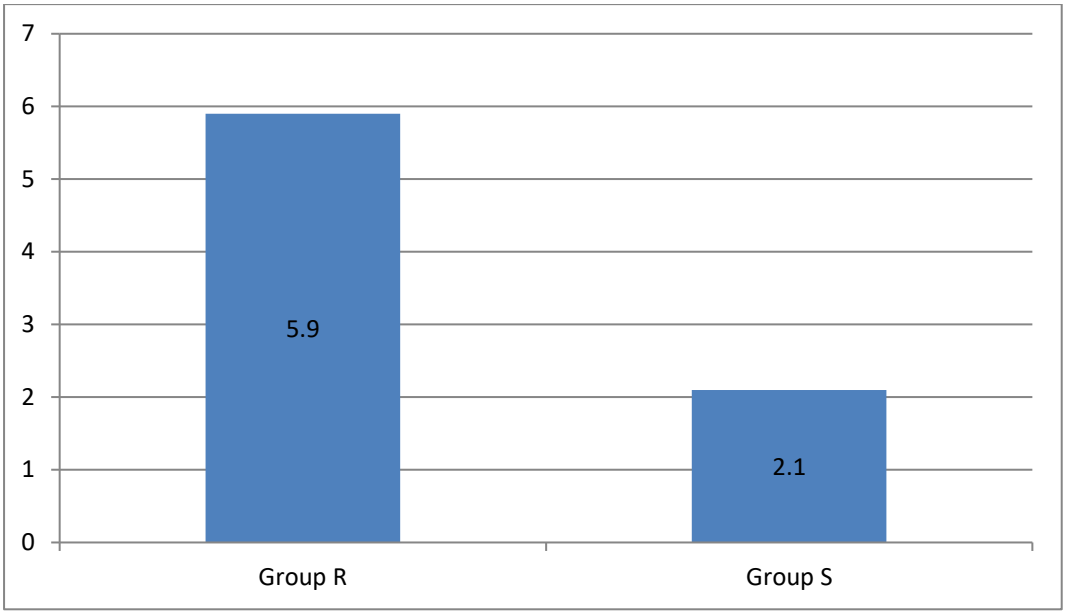

Table 3: Post operative VAS scores

Times of Measurement	Group R(n=30)	Group S(n=30)	P value
20th min	1.31±2.16	3.14±2.55	0.01
40th min	1.57±2.15	3.45±1.98	0.01
1st h	1.68±1.9	3.39±1.85	0.02
3rd h	1.34±1.5	3.38±1.58	0.02
6th h	1.48±1.5	3.58±1.73	0.02
9th h	1.44±1.67	3.95±1.59	0.01
12th h	2.12±1.8	3.55±1.28	0.03
15^{th} h	2.61±1.9	3.58±1.28	0.01
18th h	2.42±1.6	3.95±1.74	0.01
21^{st} h	2.24±1.5	3.38±1.63	0.01
24th h	2.75±0.94	3.55±1.25	0.01

Values expressed as Mean±SD, SD: Standard deviation.

The mean time to first analgesic request 5.9± 0.8 hrs hours in group R and 2.1± 0.2 hours in group S.($P < 0.05$) (fig 1)The total dose of paracetamol consumed in 24 hours was2.2± 0.4 gm in group R and 3.9± 0.7gm in group S.($P < 0.05$) (Table 2) At different time intervals, VAS scores were significantly lower in the Group R compared to the group S. ($p < 0.05$)(Table 3) There was no remarkable difference regarding PONV scores, and sedation between the two groups. (Table 4)

Table 4:Incidence of PONV and sedation

	Group R (n=30)	Group S (n=30)	P value
Nausea	5	4	0.183

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Vomiting	4	3	0.284
Sedation	3	2	0.292

Discussion

TQLB is a superficial fascial block between the posterior abdominal wall muscles and is not technically difficult to perform. In our study we found that TQLB produced efficient pain relief compared to saline group. Patients in the group R had remarkably delayed the time for first analgesia request, reduced the analgesia requirement in 24 hours and produced lower VAS scores compared to group S. Abdominal wall blocks like TAP block have been used for postoperative analgesia in different abdominal surgeries.[10] But there is controversy regarding its efficacy as the number of studies with poor efficacy is increasing.[11] Most of the abdominal wall blocks, like TAP and fascia transversalis block, only affect somatic pain,not visceral pain.[12] Spread of the local anaesthetic to the paravertebral space is mandatory for controlling visceral pain. In TQLB, the local anaesthetic spreads between psoas major and quadratus lumborum, which block the ventral rami of the spinal nerve thereby controlling visceral pain.[13,14]Abduallah, et al[15] in their study opined that the use of TQLB decreased post-operative analgesic consumption and post-operative pain score in patients undergoing total hip replacement. Xia et al,[16] in their study found that the combined TQLB and fascia iliaca compartment block produced prolonged postoperative analgesia after total hip arthroplasty. He et al,[17] in their study concluded that ultrasound-guided TQLB provided efficient postoperative analgesia after total hip arthroplasty. Zhu et al,[18] in their study opined that the ultrasound-guided TQLB produced efficient postoperative analgesia in patients undergoing laparoscopic nephrectomy and it reduced the consumption of opoids postoperatively. Jadon et al,[19] opined that the ultrasound-guided TQLB provided prolonged and effective postoperative analgesia after laparoscopic hysterectomy surgery. It not only reduced the fentanyl consumption but also improved the visual analogue scale (VAS) score postoperatively. Coppens et al,[20] in their study opined that TQLB provided efficient postoperative analgesia when compared to controlled intravenous analgesia with morphine alone. In their study by Deng et al,[21] they found that the TQLB provided better postoperative analgesia in comparison to transverses abdominal plane block in patients undergoing laparoscopic colorectal surgery. Blanco et al [22] in their study found that the QLB after caesarean section was effective and provided satisfactory analgesia in combination with a typical postoperative analgesic regimen. Though all above studies were in agreement with our study,we suggest further large scale studies to validate our study findings.

Conclusion

Ultrasound guided TQLB with ropivacaine provides efficient postoperative analgesia and prolongs the first request of analgesia in women undergoing caesarean section. It reduces the VAS score and total analgesic consumption without any complications in post operative period.

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