

## Analgesic efficacy of ultrasound guided transverse abdominal block for post operative pain management after cesarean delivery

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### Abstract

**Background:** Postoperative pain is the most important concern following cesarean delivery as it interferes with the recovery of mother as well as her interaction with the new born. A multimodal analgesic regimen is most likely to achieve these goals. Present study was aimed to study analgesic efficacy of ultrasound guided transverse abdominal block for post operative pain management after cesarean delivery at a tertiary hospital. **Material and Methods:** Present study was single-centre, comparative study, conducted in patients undergoing elective lower segment caesarean section under spinal anaesthesia, ASA physical class I and II. **Results:** In present, study 80 pregnant women were enrolled & 40 pregnant women each were allotted to Group A (TAP block of 40 ml of 0.25% bupivacaine bilaterally) & Group B (received only routine postoperative analgesia). Baseline maternal characteristics such as age, weight, height, pulse rate, systolic BP, diastolic BP & duration of surgery were comparable in both groups & difference was not significant statistically. We noted that mean duration of postoperative effective analgesia ( $5.6 \pm 1.1$  hours vs  $2.9 \pm 0.5$  hours) & first analgesic request in ( $6.2 \pm 2.1$  hours vs  $3.1 \pm 0.9$  hours) were significantly higher in group A as compared to group B, and the difference was statistically significant. Complications such as headache, nausea and vomiting, dry mouth were noted in present study, difference was not statistically significant. **Conclusion:** Ultrasound guided transverse abdominal block for post operative pain management after cesarean delivery is easy to perform and effective as a component of multimodal analgesic regimen after caesarean section without any major complications.

**Keywords:** Ultrasound guided transverse abdominal block, post operative analgesia, post cesarean delivery, multimodal analgesia

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### Introduction

Postoperative pain is the most important concern following cesarean delivery as it interferes with the recovery of mother as well as her interaction with the new born. The aim of postoperative pain management in this setting is to inhibit trauma-induced nociceptive impulses by blunting autonomic and somatic reflex responses to pain with subsequent restoration of function.<sup>1</sup> This allows the patient to breathe, cough, move more easily and take proper care of the newborn.

A multimodal analgesic regimen is most likely to achieve these goals. However, the optimal components of this regimen continue to evolve. Opioids have been the mainstay of treatment in form of intravenous patient-controlled analgesia but inhibit only one component of the pain pathway.<sup>2</sup> Opioid-mediated side effects, like nausea, pruritus, sedation and respiratory depression, limit their use. Various studies have shown that local anaesthetics have improved recovery via better pain relief and opioid sparing effect.<sup>3,4</sup>

An important component of pain and discomfort is expected from the abdominal wall incision.<sup>1</sup> Regional anesthetic techniques such as local anesthetic infiltration, ilioinguinal nerve blocks, abdominal field blocks, and transversus abdominis plane (TAP) blocks have been described to alleviate pain from the abdominal wall incision. Peripheral nerve block like transversus abdominis plane (TAP) block is an effective component of multimodal analgesia after cesarean.<sup>5</sup> Present study was aimed to study analgesic efficacy of ultrasound guided transverse abdominal block for post operative pain management after cesarean delivery at a tertiary hospital.

### Material And Methods

Present study was single-centre, comparative study, conducted in department of anaesthesiology with help from Obstetrics and gynaecology department, at KIMS Koppal, India. Study duration was from November 2020 to May 2022. Study approval was obtained from institutional ethical committee.

#### Inclusion criteria

- Patients undergoing elective lower segment caesarean section under spinal anaesthesia, ASA physical class I and II, willing to participate in present study

#### Exclusion criteria

- Patients not willing for TAP block,
- Patients allergic to any medication in the study,
- Patients weighing less than 50 kg to limit the maximum bupivacaine dose to 2 mg/kg,
- Patients with unsatisfactory view of abdominal layers as seen in the ultrasound

Study was explained to patients in local language & written consent was taken for participation & study. The patients were recruited by computer-generated random sequence of numbers into two equal groups by closed envelope technique.

Group A patients received bilateral TAP block using high frequency linear probe, 20 ml of 0.25% bupivacaine on each side

Group B control patients received only routine postoperative analgesia.

All patients received spinal anaesthesia using bupivacaine heavy 0.5% 1.8–2 ml as per standard protocol. All patients received diclofenac suppository 100 mg 12th hourly and iv paracetamol 1g 8th hourly after surgery.

Ultrasound-guided TAP block using high frequency linear probe performed in the operating room by a senior consultant anaesthetist after surgery, prior shifting to recovery room using a portable ultrasound machine. Block was performed under strict aseptic precautions with an ultrasound probe in the transverse plane to the lateral abdominal wall. After visualizing the external and internal oblique, transverse abdominis muscle and fascia, a 23G, 90-mm-long spinal needle was introduced in the plane of the ultrasound probe directly under the probe and advanced until it reaches the plane between the internal oblique and the transverse abdominis muscle. After aspiration to rule out intravascular injection, the drug was injected under ultrasound guidance. The procedure was performed bilaterally.

During the postoperative period, when the pain score recorded was more than 4, a rescue therapy with intravenous tramadol 1 mg/kg was given along with 4 mg ondansetron as antiemetic. The patients were monitored in the recovery room & postoperative parameters

recorded were blood pressure, heart rate, nausea and vomiting, sedation score, and pain score. These parameters were recorded at 0, 2, 4, 6, 8, 10, and 12 hours after wound closure up to the time when rescue analgesia was administered or whichever was earlier.

Any local complications associated with TAP block were noted. Patients were given rescue analgesia for pain scale rated four or above. The study was terminated once the patient was administered rescue analgesia. The parameters were recorded up to the time when rescue analgesia was administered. The time to rescue analgesia was also noted for all the three groups.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

## Results

In present, study 80 pregnant women were enrolled & 40 pregnant women each were allotted to Group A (TAP block of 40 ml of 0.25% bupivacaine bilaterally) & Group B (received only routine postoperative analgesia). Baseline maternal characteristics such as age, weight, height, pulse rate, systolic BP, diastolic BP & duration of surgery were comparable in both groups & difference was not significant statistically.

**Table 1. Baseline Information & Vitals of Study Groups**

Characteristics	group A (mean $\pm$ SD)	group B (mean $\pm$ SD)	p value
Age (years)	25.23 $\pm$ 5.2	26.1 $\pm$ 4.3	0.82
Weight (kgs)	64.6 $\pm$ 8.7	65.5 $\pm$ 3.5	0.86
Height (cms)	155.3 $\pm$ 5.3	153.5 $\pm$ 5.1	0.73
Pulse Rate (per min)	81.6 $\pm$ 11.2	79.6 $\pm$ 10.1	0.78
Systolic BP (mm Hg)	120.4 $\pm$ 10.5	118.3 $\pm$ 11.6	0.81
Diastolic BP (mm Hg)	76.3 $\pm$ 7.9	74.6 $\pm$ 8.2	0.83
Duration of surgery (minute)	38.9 $\pm$ 13.1	37.8 $\pm$ 12.1	0.75

We noted that mean duration of postoperative effective analgesia (5.6  $\pm$  1.1 hours vs 2.9  $\pm$  0.5 hours) & first analgesic request in (6.2  $\pm$  2.1 hours vs 3.1  $\pm$  0.9 hours) were significantly higher in group A as compared to group B, and the difference was statistically significant.

**Table 2: Comparison of sensory parameters in two groups.**

Characteristics	group A (mean $\pm$ SD)	group B (mean $\pm$ SD)	p value
Mean duration of postoperative effective analgesia (hours)	5.6 $\pm$ 1.1	2.9 $\pm$ 0.5	<0.001
First analgesic request in hours	6.2 $\pm$ 2.1	3.1 $\pm$ 0.9	<0.001

Complications such as Headache, nausea and vomiting, Dry mouth were noted in present study, difference was not statistically significant.

**Table 3: Complication**

Complications	group A (n=40)	group B (n=40)
Headache	0	1
Nausea and vomiting	2	2
Dry mouth	1	2

## Discussion

Systemic or neuraxial opioids are the mainstay for treating postoperative pain, as they are effective against both the components. However, they are associated with several undesirable side effects such as nausea, vomiting, pruritus, constipation, and respiratory depression.<sup>6,7</sup> Nonsteroidal anti-inflammatory drug alone may be insufficient to treat post-caesarean pain. Currently, multimodal analgesic technique involving abdominal nerve block with parenteral analgesics is becoming popular for these patients.

Transversus abdominis plane (TAP) block is an effective method of blocking the sensory afferents supplying the anterior abdominal wall. There are two types of TAP blocks described: posterior and subcostal. Single-shot posterior TAP blocks have been shown to provide analgesia after lower abdominal surgery.<sup>1,8</sup> Meta-analyses have also shown that it provides effective analgesia for somatic pain and reduces the opioid consumption.<sup>9</sup>

Leeladharan SP et al.,<sup>10</sup> divided post LSCS patients in 3 groups as Group A (TAP block of 40 ml of 0.25% bupivacaine bilaterally). Group B (TAP block using 20 ml of 0.25% bupivacaine with clonidine 2 µg/kg) & Group C (no block). Patients who received TAP block had prolonged analgesia. The mean time to rescue analgesia was  $8.6 \pm 2.8$ ,  $7.9 \pm 3.8$ , and  $3.5 \pm 3.1$ h for groups A, B, and C, respectively. The pain scores in group A and B were less than group C. Comparison of pain score between group A and B did not show any statistical difference. Ultrasound-guided TAP block is a safe and effective method of providing postoperative analgesia in caesarean patients. Addition of clonidine does not provide any additional benefit.

Sriramka B et al.,<sup>11</sup> noted that, in the TAP group, postoperative morphine requirements up to 24 hours were significantly reduced (median 18.0 mg) compared with the placebo group (median 33 mg). Patients in the TAP group reported lower visual analogue scale scores than patients in the placebo group. Fewer patients required antiemetic in the TAP group. There were no local complications attributable to the TAP block.

In study by Srivastava U et al.,<sup>12</sup> use of tramadol was reduced in patients given TAP block by 50% compared to patients given no block during 48 h after surgery ( $P < 0.001$ ). Pain scores were lower both on rest and activity at each time point for 24 h in study group ( $P < 0.001$ ), time of first analgesia was significantly longer, satisfaction was higher, and side effects were less in study group compared to control group. Transverse abdominis plane block was effective in providing analgesia with a substantial reduction in tramadol use during 48 h after caesarean section when used as adjunctive to standard analgesia.

In study by Kakade A,<sup>13</sup> duration of postoperative analgesia in hours was significantly longer in the TAP block group compared with the control group ( $5.14 \pm 1.63$  vs  $2.61 \pm 0.89$ ,  $p < 0.001$ ). There was no reported complication of the surgical technique or any adverse effect of the used drug. They concluded that Surgical TAP block via the transperitoneal route is a safe, easy and effective mode of providing postoperative analgesia after Cesarean section. This technique does not need any costly specialist equipment, overcomes the technical limitations of ultrasound-guided TAP block and can be used in obese patients also. It has almost no side effects, and the technique can be easily mastered.

Blind TAP blocks are associated with complications like accidental intraperitoneal, intravascular injections. Ultrasound guidance allows accurate deposition of local anesthetic in the correct neurovascular plane and avoids procedure related complications. In present study, we did not observe any serious complications like accidental intra peritoneal and intra vascular injection as we carried out study under USG guidance and transversus abdominis plane has less vascularity.

## Conclusion

Ultrasound guided transverse abdominal block for post operative pain management after cesarean delivery is easy to perform and effective as a component of multimodal analgesic regimen after caesarean section without any major complications. In the future, in cases, where epidural analgesia is restricted TAP block can be an important alternative.

**Conflict of Interest:** None to declare

**Source of funding:** Nil

## References

1. McDonnell JG, Curley G, Carney J, Benton A, Costello J, Maharaj CH, et al. The analgesic efficacy of transversus abdominis plane block after cesarean delivery: A randomized controlled trial. *Anesth Analg* 2008;106:186- 91.
2. Belavy D, Cowlshaw PJ, Howes M, Phillips F. Ultrasound guided transversus abdominis plane block for analgesia after cesarean block. *Br J Anaesth* 2009;103:726-30.
3. White PF. The changing role of non-opioid analgesic techniques in the management of postoperative pain. *Anesth Analg* 2005;101:S5-22.
4. Bell EA, Jones BP, Olufolabi AJ, et al. Iliohypogastric–ilioinguinal peripheral nerve block for post-cesarean delivery analgesia decreases morphine use but not opioid-related side effects. *Can J Anaesth* 2002;49:694-700.
5. Jadon A, Jain P, Chakraborty S, et al. Role of ultrasound guided transversus abdominis plane block as a component of multi-modal analgesic regimen for lower segment cesarean section: a randomized double-blind clinical study. *BMC Anesthesiol*.2018;18:53.
6. Belavy D, Cowlshaw PJ, Howes M, Phillips F. Ultrasound guided transversus abdominis plane block for analgesia after Caesarean delivery. *Br J Anaesth* 2009;103:726-30.
7. Tan TT, Teoh WH, Woo DC, Ocampo CE, Shah MK, Sia AT. A randomised trial of the analgesic efficacy of ultrasound guided transversus abdominis plane block after caesarean delivery under general anaesthesia. *Eur J Anaesthesiol* 2012;29:88-94.
8. McDonnell JG, O'Donnell BD, Curley GCJ, Heffernan A, Power C, Laffey JG. The analgesic efficacy of transversus abdominis block after abdominal surgery: a prospective randomized controlled trial. *Anesth Analg*.2007;104:193-197.
9. Madadi P, Ross CJ, Hayden MR, et al. Pharmacogenetics of neonatal opioid toxicity following maternal use of codeine during breastfeeding: a case-control study. *Clin Pharmacol Ther*.2009;85:31-5
10. Leeladharan SP, Puthenveetil N, Rakhi B, Nair SS, Kumar L. Analgesic efficacy and safety of ultrasound guided transverse abdominis plane block in postcesarean section patients—A randomized control trial. *J Obstet Anaesth Crit Care* 2020;10:16-20.
11. Sriramka B, Sahoo N, Panigrahi S. Analgesic Efficacy of Ultrasound-guided Transversus Abdominis Plane Block following Caesarean Section. *Int J Periop Ultrasound Appl Technol* 2012;1(1):5-8.
12. Srivastava U, Verma S, Singh TK, Gupta A, Saxena A, Jagar KD, et al. Efficacy of trans abdominis plane block for post cesarean delivery analgesia: A double-blind, randomized trial. *Saudi J Anaesth* 2015;9:298-302.
13. Kakade A, Wagh G. Evaluate the Feasibility of Surgical Transversus Abdominis Plane Block for Postoperative Analgesia After Cesarean Section. *J Obstet Gynaecol India*. 2019 Aug;69(4):330-333.