

COMPARISON OF ULTRASOUND GUIDED POSTERIOR TRANSVERSUS ABDOMINIS PLANE BLOCK AND LATERAL TRANSVERSUS ABDOMINIS PLANE BLOCK FOR POSTOPERATIVE PAIN MANAGEMENT IN PATIENTS UNDERGOING CAESAREAN SECTION: A RANDOMIZED DOUBLE BLIND CLINICAL TRIAL STUDY

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Abstract

Background: Due to the importance of pain control after abdominal surgery, several methods such as transversus abdominis plane (TAP) block are used to reduce the pain after surgery. TAP blocks can be performed using various ultrasound-guided approaches. Two important approaches to do this are ultrasound-guided lateral and posterior approaches. This study aimed to compare the two approaches of ultrasound-guided lateral and posterior TAP blocks to control pain after caesarean section. **Materials and Methods:** In this double-blind clinical trial study, 60 patients scheduled for elective caesarean section were selected and randomly divided into two groups of 30 and underwent spinal anesthesia. For pain management – after the surgery, one group underwent lateral TAP block and the other group underwent posterior TAP block using 15ml of 0.5% Bupivacaine + 15ml of 2% lignocaine with adrenaline + 10ml of distilled water on both sides. Intensity of pain was evaluated based on Numerical Rating Scale (NRS) every hour till the first 12 hours and every 2nd hour for the next 12 hours after surgery. **Result:** The pain at rest in the posterior group at all hours post-surgery was lower than the lateral group, especially at 4, 8, 12 and 24 hours after the surgery and the difference was statistically significant ($p=0.014$, $p<0.0001$, $p<0.0001$, $p<0.0001$). **Conclusion:** The results of this study show that ultrasound-guided posterior TAP block compared with the lateral TAP block was more effective in pain control after caesarean section.

INTRODUCTION

Pain control and early mobilization after abdominal surgery are very important to avoid postoperative complications and to enhance recovery. Several methods such as transversus abdominis plane (TAP) block, Rectus sheath block, Quadratus Lumborum block, Epidural analgesia are used. Ultrasound-guided TAP blocks are used for postoperative analgesia after caesarean section. This study aimed to compare ultrasound-guided lateral and posterior TAP blocks to control pain after caesarean section.

Aim

To compare the analgesic efficacy of ultrasound-guided lateral and posterior TAP blocks after caesarean section.

Duration of analgesia (time from the end of block to the time when NRS is 4 or more)

Total dose of Tramadol consumed in the first 24 hours of the postoperative period Quality of analgesia (NRS).

MATERIALS AND METHODS

Study Design

Randomized double blind clinical study of 2 months duration.

Study Population

Patients of age group 18-45 years, undergoing LSCS under spinal anaesthesia, assessed under ASA PS I or II at Kanyakumari Government Medical College, Asaripallam.

Inclusion Criteria

Age: 18 to 45 years

ASA PS I or II

LSCS under spinal anaesthesia

Exclusion Criteria

Drug abuse

Allergic reactions to local anesthetics

BMI >35

Weight less than 50 kg

Coagulopathies

Requiring General anaesthesia

Methodology

Written informed consent was obtained from all patients. Patients were randomly assigned to either Posterior TAP group or Lateral TAP group using sealed envelope technique. Posterior TAP group (30 patients)

Patients in this group received ultrasound guided posterior TAP block after surgery. Lateral TAP group (30 patients)

Patients in this group received ultrasound guided Lateral TAP block after surgery.

SAMPLE SIZE CALCULATION

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times 2\sigma^2}{(\mu_1 - \mu_2)^2}$$

n=sample size required in each group
 μ_1 =mean pain score in posterior TAP block group
 μ_2 =mean pain score in lateral TAP block group
 $\mu_1 - \mu_2$ =clinically significant difference
 $Z_{\alpha/2}$: 5% level of significance (1.96)
 Z_{β} : 95% power (1.96)
standard deviation=1.195

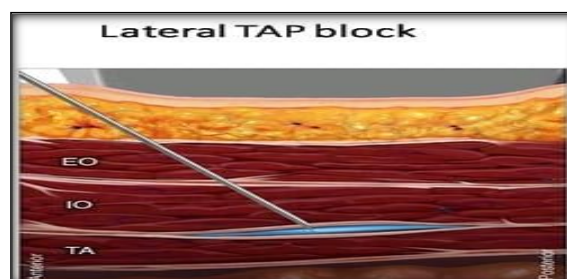
Methodology

Spinal anaesthesia was administered to all women and SpO₂ monitoring, noninvasive blood pressure, electrocardiogram and fluid therapy were carried out. Patients were turned to the left lateral position and were administered spinal anaesthesia in sterile conditions using 25-G needle with 0.5% Bupivacaine. The operation was started after attaining a T4 sensory blockade. In the event of a >20% decrease in systolic blood pressure or a systolic blood pressure <90 mm Hg, 6mg of Ephedrine was injected bolus. In case of a heart rate below 50 beats per minute, atropine 0.6 mg was injected as IV bolus. The patients were divided into two groups based on sealed envelope technique. After the end of surgery, for one group ultrasound guided bilateral lateral

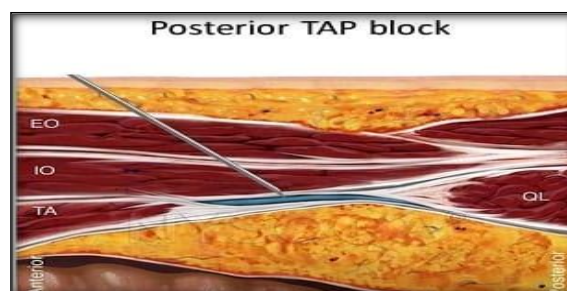
TAP block was performed and for the other group ultrasound guided bilateral posterior TAP block was

performed using linear probe with 15ml of 0.5% Bupivacaine + 15 ml of 2% Lignocaine with adrenaline + 10ml distilled water. The anesthesiologist performing the block was aware of the block type and recorded it but the patient and the interns were blinded to the intervention (lateral or posterior TAP block). The interns assessed the patients postoperatively, absolutely unaware of the block types.

For the lateral TAP block, a linear transducer was placed in the axial plane on the midaxillary line between the subcostal margin and the iliac crest. External oblique, internal oblique and transversus abdominis muscles were identified. Local anaesthetic was injected in the fascial plane between the internal oblique and the transversus abdominis muscles.



For the posterior TAP block, the linear transducer was placed in the axial plane in the midaxillary line and moved posteriorly to the most posterior limit of the TAP between the internal oblique and transversus abdominis muscles. The needle was inserted in the midaxillary line and advanced posteriorly until it reaches the posterior end of the TAP, where local anaesthetic was injected.



Parameters Monitored

- Demographic data: Age, weight, height.
- Total dose of Tramadol consumed in the first 24 hours
- Duration of analgesia (after the end of block)
- Numeric Rating Scale (NRS) – every hour for first 12 hours, every 2nd hour for next 12 hours

Numeric Rating Scale (NRS)

NRS is a unidimensional measure of pain intensity in adults in which a respondent selects a whole number from 0 to 10 that best reflects the intensity of pain. The 11 point NRS ranges from: 0 (no pain) to 10 (worst pain imaginable) NRS is measured

every hour till the first 12 hours postoperatively (time since the end of surgery) and every 2nd hour for the next 12 hours

Statistical Analysis

A pilot study of 10 patients using the same study design was conducted before this study. The pilot study revealed a mean difference of 100 minutes in the duration of analgesia postoperatively. The minimum required sample size was calculated to be 30 participants for each group. Data was collected in proforma and entered in microsoft excel sheet. Data were presented as mean, standard deviation, frequency and percentage. Continuable variables were compared using Independent sample t test. All analysis was performed using IBM SPSS version 21.0 using two tailed test. $P < 0.05$ being considered significant.

RESULTS

The duration of analgesia was prolonged in the posterior group compared to the lateral group, and the difference was statistically significant ($p < 0.0001$) The total dose of tramadol consumed was lesser in the posterior group compared to the lateral group and the difference was statistically significant ($p = 0.009$) The pain at rest in the posterior group at all hours post-surgery was lower than the Lateral group especially at 4, 8, 12 and 24 hours after the surgery and the difference was statistically significant ($p = 0.014$, $p < 0.0001$, $p < 0.0001$, $p < 0.0001$).

Table 1: Duration of analgesia and total dose of Tramadol (mg)

	PB		LB		P value
	Mean	SD	Mean	SD	
Duration of Analgesia (mins)	354.2	61.2	258.17	49.2	<0.0001
Total dose of Tramadol (mg)	127	24	154	50	0.009

DISCUSSION

According to the results of previous studies, after caesarean section and Hysterectomy, TAP block reduced the pain scores and improved recovery of these patients. Based on the results of this study, ultrasound-guided posterior TAP Block compared with the lateral TAP block was more effective in pain control after caesarean section and created a longer analgesia.

In a study by Walter CJ et al.^[1] it concluded that preoperative TAP blocks in patients undergoing

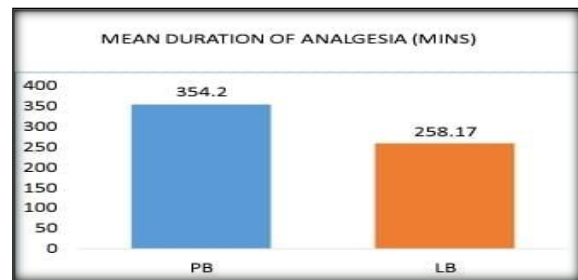


Figure 1: Mean duration of analgesia (Mins)

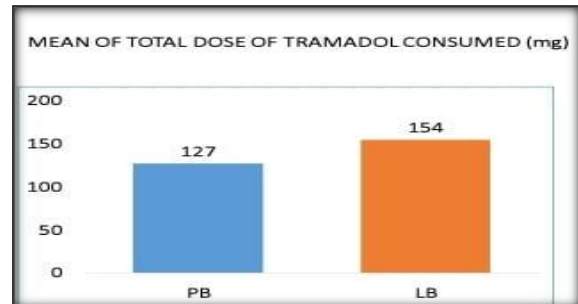
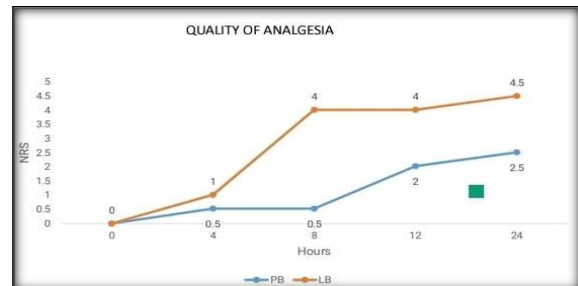


Figure 2: Mean consumption of total dose of Tramadol (mg)



QUALITY OF ANALGESIA

TIME (HOURS)	MEAN NRS IN PB GROUP	MEAN NRS IN LB GROUP	P value
0	0	0	N/A
4	0.5	1	0.014
8	0.5	4	<0.0001
12	2	4	<0.0001
24	2.5	4.5	<0.0001

laparoscopic colorectal resection reduced opioid use in the first postoperative day. Similarly patients in our study also the posterior TAP block group required lower dose of Tramadol in the first 24 hours after the caesarean section. The mean values of pain score of posterior TAP block were lower in all intervals after surgery.

In a study by Paul F White.^[2] it concluded that use of non-opioid analgesic techniques can lead to an improved quality of recovery for surgical patients. This result is in consensus with our study.

In a study by John G McDonnell, Brian O'Donnell, Gerard Curley, et al.^[3] it concluded that, TAP block provided highly effective postoperative analgesia in the first 24 postoperative hours after major abdominal surgery. This result is consistent with our study.

In a study by John G McDonnell, Gerard Curley, John Carney, et al.^[4] it concluded that TAP block, as a component of a multimodal analgesic regimen, provided superior analgesia when compared with placebo block up to 48 postoperative hours after elective cesarean delivery. The pain at rest in the posterior group at all hours post surgery was lower than the Lateral group especially at 4, 8, 12 and 24 hours after the surgery and the difference was statistically significant.

In a study by Sakatoshi Yoshiyama et al.^[5] the study concluded that posterior TAP block provided more effective analgesia than the lateral TAP block in patients undergoing laparoscopic gynaecologic surgery. This result is consistent with our study.

In a study conducted by Abdallah et al.^[6] the length of analgesic effect in the posterior and lateral approaches of the transversus abdominal blocks in the surgery of the lower transverse abdominal sections were evaluated. Both posterior and lateral approaches were examined. The researchers found that the posterior approach was more effective in reducing postoperative pain at rest after surgery and in the dynamic state and provided longer analgesia than the lateral approach. In addition, it reduced morphine consumption 48 hours after the surgery. The results of the above study are consistent with the results of the present study.

TAP block was conducted by anatomical landmark technique resulting in a better analgesia in lower parts of the abdomen; however, using anatomical landmarks for this block method has a higher risk of complications such as nerve and organ damage. Due to the use of ultrasound in blocks, truncal blocks can be performed with low frequency of side effects. TAP block provides somatic analgesia of the abdominal wall including the parietal peritoneum. According to one theory, local anesthetic used in posterior TAP block approach enters para-vertebral space and blocks sympathetic pathway resulting in relieved visceral pain.

Probable reasons for superior analgesia in posterior TAP block

1. Injection in posterior areas probably results in the transversus abdominal block of lateral

cutaneous branches of thoracolumbar nerve before branching or anastomosis and entering the Transverse abdominal plane.

2. Posterior approach and not the lateral approach spreads the local anesthetic regionally and in a retrograde fashion in paravertebral space covering from T4 to L1 and blocks a few degrees along the thoracolumbar sympathetic system resulting in faster and longer analgesic effect.
3. Posterior injection probably causes the formation of a depot for local anesthetic in the neurofascial TAP plane resulting in better effect of the posterior approach.

CONCLUSION

Ultrasound-guided posterior TAP block in a multimodal approach for pain control after caesarean section is more suitable than the lateral TAP block and creates a longer duration of analgesia, with lesser consumption of Tramadol.

REFERENCES

1. Walter CJ, Maxwell-Armstrong C, Pinkney TD, et al. A randomised controlled trial of the efficacy of ultrasound-guided transversus abdominis plane (TAP) block in laparoscopic colorectal surgery. *Surg Endosc.* 2013 Jul;27(7):2366-72. doi: 10.1007/s00464-013-2791-0. Epub 2013 Feb 7.
2. White PF. The changing role of non-opioid analgesic techniques in the management of postoperative pain. *Anesth Analg.* 2005;101(5 Suppl):S522.
3. McDonnell JG, O'Donnell B, Curley G, Heffernan A, Power C, Laffey JG. The analgesic efficacy of transversus abdominis plane block after abdominal surgery: a prospective randomized controlled trial. *Anesth Analg.* 2007;104(1):193-197.
4. McDonnell JG, Curley G, Carney J, et al. The analgesic efficacy of transversus abdominis plane block after caesarean delivery: a randomized controlled trial. *Anesth Analg.* 2008;106(1):186-191.
5. Yoshiyama S, Ueshima H, Sakai R, Otake H. A Posterior TAP Block Provides More Effective Analgesia Than a Lateral TAP Block in Patients Undergoing Laparoscopic Gynecologic Surgery: A Retrospective Study. *Anesthesiol Res Pract.* 2016;2016:4598583. doi: 10.1155/2016/4598583. Epub 2016 Jan 28.
6. Abdallah FW, Laffey JG, Halpern SH, Brull R. Duration of analgesic effectiveness after the posterior and lateral transversus abdominis plane block techniques for transverse lower abdominal incisions: a meta-analysis. *Br J Anaesthes.* 2013;111(5):721-735.