

"COMPARATIVE STUDY OF ULTRASOUND GUIDED BILATERAL TRANSVERSUS ABDOMINIS PLANE BLOCK VERSES LUMBAR EPIDURAL BLOCK FOR ANALGESIA IN PATIENTS UNDERGOING LOWER ABDOMINAL SURGERY UNDER GENERAL ANAESTHESIA: A PROSPECTIVE RANDOMIZED STUDY"

Anaesthesiology

Dr. P. S. Malviya	Professor Department of Anaesthesiology & Critical Care, Moti Lal Nehru Medical College, Prayagraj.
Dr. Dharmendra Kumar Yadav	Associate Professor Department of Anaesthesiology & Critical Care, Moti Lal Nehru Medical College, Prayagraj.
Dr. Shreya Raj*	Junior Resident Department of Anaesthesiology & Critical Care, Moti Lal Nehru Medical College, Prayagraj. *Corresponding Author

ABSTRACT

Background: Pain remains a widespread trouble for many patients after lower abdominal surgeries. In addition to improving patient satisfaction and decreasing pain scores, enhanced perioperative pain control can improve clinical outcomes. A variety of techniques for postoperative analgesia following infra umbilical surgery were applied. Various regional anaesthesia techniques have been described. We have included single shot lumbar epidural analgesia and ultrasound guided bilateral transversus abdominis plane block in our study. **Method :** A total of 70 patients (35 in each group) belonging to American Society of Anaesthesiologists (ASA) physical status I – II in the age group of 18–60 years of either sex posted for Elective ileostomy closure or colostomy closure under general anaesthesia were recruited in the study. **Group E (epidural):** During post-operative period, when the patient complained of Pain, a 10ml solution of Bupivacaine 0.125% was injected in L2-L3 space for post-operative analgesia. **Group T (TAP Block):** each patient was given ultrasound guided 20ml 0.125% bupivacaine bilaterally stat in space between the internal oblique abdominal muscle and transversus abdominis muscle. Patients were assessed for pain at 1, 6, 12 hours. In addition blood pressure, heart rate and oxygen saturation were noted to assess hemodynamic stability. Assessment of the Pain was done using a Visual Analog Scale. **Result:** Regarding demographic data, intraoperative HR, SpO₂, onset of sensory block, there was no significant difference between both groups ($P > 0.05$). The duration of sensory block was higher in group-E as compared to group-T. A highly significant difference was observed in mean duration of sensory block among the groups [$p < 0.0001^*$]. The mean VAS was same at 1hr in both groups but was higher after 6hrs and 12 hrs in group-T as compared to group-E. **Conclusion:** In our study it was found that the onset of sensory block was comparable in both groups. The duration of analgesia was more in Group E (Epidural) patients. The VAS score was higher in group T patients.

KEYWORDS

INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. The advantage of appropriate post-operative analgesia are understandable and involve a decrease in the post-operative stress response, post-operative morbidity and improved surgical outcome in certain types of surgery. Controlling pain effectively not only facilitates recovery from surgery but also accelerates rehabilitation from surgery. Others advantages of appropriate technique of regional anaesthesia are there to decrease pain intensity, reduced chances of side effect from analgesia and also better comfort to patient.^[1,2,3]

For lower abdominal surgeries, epidural analgesia has been gold standard and time-tested method for post-operative analgesia. But contraindications for epidural analgesia would necessitate the use of other equally effective analgesia procedures.^[4,5] In abdominal surgery, transversus abdominis plane block could be a suitable and minimally invasive alternative to epidural analgesia. TAP based approaches have been employed as part of multimodal analgesia for abdominal surgery, caesarean delivery, abdominal hysterectomy, and prostatectomy.^[6,7,8]

AIMS AND OBJECTIVES

Aim of study was to compare effect of post-operative analgesia produced by two techniques – Single shot lumbar epidural analgesia or ultrasound guided bilateral transversus abdominis plane block in patients undergoing lower abdominal umbilical surgeries under general anaesthesia.

This was done by following observations:

- 1] To compare onset of sensory block.
- 2] To compare duration of analgesia

MATERIALS AND METHODS

A comparative study titled "Comparative study of Ultrasound guided Bilateral Transversus Abdominis Plane Block verses Lumbar Epidural Block for analgesia in patients undergoing lower abdominal surgery under General Anaesthesia: A prospective randomized study" was carried out in Swaroop Rani Nehru Hospital, attached to Moti Lal Nehru Medical College, Prayagraj.

Ethical clearance and informed consent were taken. After randomisation and blinding, patients undergoing ileostomy or colostomy closure were allocated either of two groups by sequentially numbered opaque sealed envelope.

Group E (epidural): Patients were explained about the procedure and in a sitting position. Patients in Group "E" had a lumbar epidural catheter (22-gauge, multi-orifice) placed at L2–L3 intervertebral space. The catheter was placed with the patient seated, before giving the general anaesthesia. "Loss of resistance to air" technique was used for confirmation of placement, with 18-gauge Tuohy needle was used and 5 cm of the catheter was left in situ. A test dose of 3 ml solution of 2% lidocaine with 5 µg/ml adrenaline was given to rule out intrathecal and intravascular placement of the catheter. However, the epidural catheter was not activated till the end of the surgery. During post-operative period, when the patient complained of Pain, a 10ml solution of Bupivacaine 0.125% was injected for post-operative analgesia.

Group T (TAP Block): Patients in this group received Ultrasound guided single shot Bilateral Transversus Abdominis Plane block post-operatively when Pain was complained. Patient was placed in supine position, linear ultrasound probe (high frequency probe 10–12 MHz) connected to a portable Ultrasound unit was placed in the mid-axillary plane midway between the lower costal margin and the highest point of iliac crest. After taking aseptic precaution, painting and draping, a 23-G 50-mm needle with an injection line was inserted into the plane with the probe. Once the tip of the needle was placed in the space between the internal oblique abdominal muscle and transversus abdominis muscle, and after negative aspiration, 20ml 0.125% bupivacaine was injected bilaterally stat. In both the groups, patients were operated under general anaesthesia.

The following parameters were assessed and recorded Hemodynamic monitoring, Assessment of post-operative Pain using visual analog scale score. Any case of the failed block recorded.

Monitoring

Patients were assessed for pain at 1, 6, 12 hours. In addition blood pressure, heart rate and oxygen saturation were noted to assess hemodynamic stability. Assessment of the Pain was done using a Visual Analog Scale given by Revell in 1976. It is an imaginary straight

line of 10 cm from 1 to 10. Patients were asked to point out the scale after test drug was given. 0 indicates no pain while 10 denotes worst pain imaginable.

A score noted for Pain. IV Paracetamol 1 gram infusion was first line rescue analgesic. Paracetamol was given when VAS was more than 3/10. Postoperative analgesia was measured by

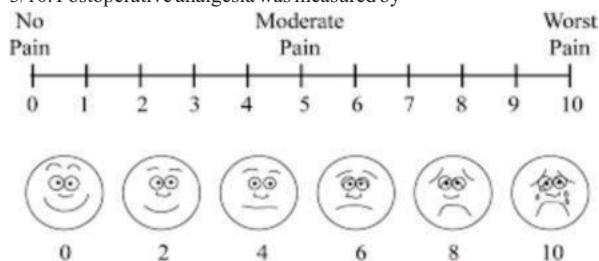


Figure 11 : Visual Analogue Scale

The patient was monitored for block progression. Patients were assessed for Pain till the analgesic effect wears off.

OBSERVATIONS AND RESULTS

TABLE-1: Distribution of study groups based on Height, and weight.

	GROUP-E		GROUP-T		P-value	Significance
	MEAN	SD	MEAN	SD		
Height	158.57	6.37	154.17	5.98	t=0.0172 p=0.9878	Non-significance
Weight	64.69	6.88	65.97	6.31	t=0.8112 p=0.4201	

As shown in Table 1 there was no difference in height and weight parameter in both groups. [TABLE-1]

Table-2: Distribution Of Study Groups Based On Asa Grade

ASA Grade	GROUP-E		GROUP-T		P-value	Significance
	N	%	N	%		
I	22	62.86%	15	42.85%	X=2.809 p=0.0937	Non-significance
II	13	37.14%	20	57.14%		
Grand Total	35	100.00%	35	100.00%		

Table-2: Graphical Representation Of Distribution Of Study Groups Based On Asa Grade

Most of patients in group-E was observed with ASA I grade [22(62.86%)] while in group-T majority of patients were observed with ASA grade II [20(57.14%)]. Statistically, a non-significant difference was observed in ASA grade among groups [p=0.0937]. [TABLE-2]

Table-3: Onset Time In Patients

Onset Time	GROUP-E		GROUP-T		P-value	Significance
	MEAN	SD	MEAN	SD		
	16.26	2.16	15.97	3.19	t=0.4453 p=0.6575	Non-Significant

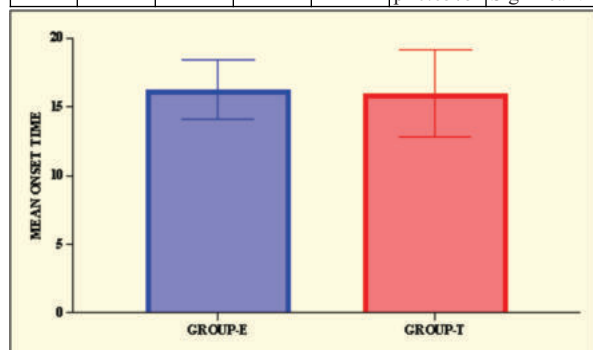


Figure-3: Graphical Distribution Of Mean Onset Time In Patients

The mean onset time was similar in both groups. Statistically, no significant difference was observed in onset time among groups [p=0.6575] [TABLE-3; FIGURE-3]

Table-4: Duration Of Sensory Block In Patients

Duration Of Sensory Block (Mins)	GROUP-E		GROUP-T		P-value	Significance
	MEAN	SD	MEAN	SD		
	493.71	47.84	419.46	33.28	t=7.538 p<0.0001*	Significant

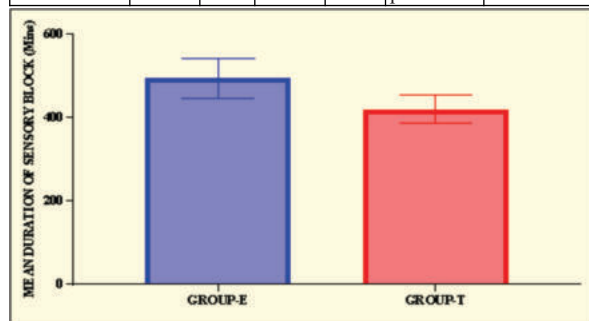


Figure-4: Showing Graphical distribution of Mean Duration of sensory block

The duration of sensory block was higher in group-E [493.71±47.84] and group-T [419.46±33.28]. Statistically, a highly significant difference was observed in mean duration of sensory block among the groups [p<0.0001*]. [TABLE-4; FIGURE-4]

Table-5: Visual Analogue Scale (VAS) Of Patients

VAS Score	GROUP-E		GROUP-T		P-value	Significance
	MEAN	SD	MEAN	SD		
1 HR	0.00	0.00	0.00	0.00	--	Significant
6 HRS	0.11	0.32	3.11	1.14	t=14.99 p<0.0001*	
12 HRS	4.13	0.50	5.46	0.60	t=10.07 p<0.0001*	

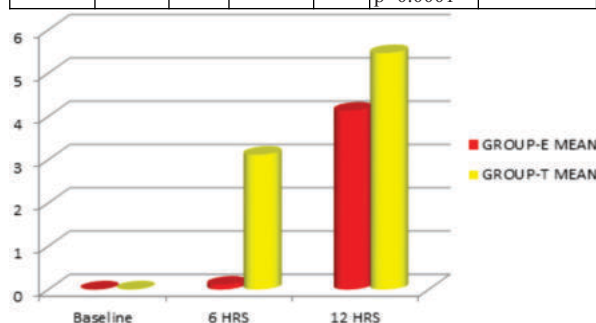


Figure-5: Graphical distribution of Mean Visual Analogue Scale (VAS) of patients.

The mean VAS was same at 1hr in both groups but was higher after 6hrs and 12 hrs in group-T [3.11±1.14], [5.46±0.60] as compared to group-E [0.11±0.32], [4.13±0.50] respectively. Statistically, a significant difference was observed in mean VAS score among the groups [p<0.0001*]. [TABLE-5; FIGURE-5]

DISCUSSION

Onset of sensory blockade, Duration of Analgesia in min and VAS score (Table 3,4,5):

In our study we found the mean onset time was similar in both groups. Statistically, no significant difference was observed in onset time among groups [p=0.6575]

In our study we found the mean duration of sensory Block higher in group E than group T. The mean duration of sensory block in group E was [493.71±47.84] as compared to group T [419.46±33.28]. Also, we observed the mean time for first rescue analgesia was higher in group-E [9.66±1.06] hours as compared to group-T [6.06±1.04] hours. Statistically a significant difference was observed in mean time for first rescue analgesia among groups (p<0.0001).

This result is supported by Kanazi *et al.*^[9] which compared subarachnoid morphine with TAP block in post-caesarean section pain. They evaluated the time to first request for analgesia while secondarily they assessed use of tramadol (rescue analgesia) in first 12 hours. The results favored intrathecal morphine wherein median (range) time to

first request for analgesic was 8 (2–36) h compared to 4 (0.5–29) h in the TAP group ($P = 0.005$). The median (range) time to first request for Analgesia was 8 (2–36) hours in the intrathecal morphine group, compared to 4 (0.5–29) hours in the TAP group ($P = 0.005$).

All patients were evaluated for postoperative pain at 1, 6, 12 hours and pain scores documented using a VAS. In our study the mean VAS (visual analog scale) at 1hr was same in group-E and group-T but the mean VAS was higher after 6hrs and 12 hrs in group-T [3.11 ± 1.14], [5.46 ± 0.06] as compared to group-E [0.11 ± 0.32], [4.13 ± 0.50] respectively. Further, significant difference was observed [$p < 0.0001^*$].

Our study is supported by Iyer SS *et al.*^[10], in which the VAS scores were comparable in both groups at 8 and 16 h post surgery. However, at the end of 24 and 48 hours, patients in epidural group had significantly better analgesia as compared to TAP group ($P = 0.001$ and 0.004 , respectively) with greater number having nil pain at rest and fewer patients reporting mild to moderate pain. Also Kanazi *et al.*^[9] favored use of intrathecal morphine wherein median (range) time to first request for analgesic was 8 (2–36) h compared to 4 (0.5–29) h in the TAP group ($P = 0.005$). In their study Canakci *et al.*^[11] found visual analogue scale (VAS) scores of the two groups were significantly different ($p < 0.001$). In single-dose EPI group, the VAS scores were lower as compared to TAP group.

CONCLUSION

- The present research aim was to assess the single shot lumbar epidural analgesia or ultrasound guided bilateral transversus abdominis plane block in surgical patients undergoing infra umbilical surgeries under general anaesthesia.
- The following observations were used –
- The onset of sensory block was comparable in both groups.
- The duration of analgesia was more in Group E (Epidural) patients. The VAS score were lower in Group E (Epidural) patients.
- Hence it is concluded that both groups received effective post operative analgesia. But single shot lumbar epidural block appears to be superior.

REFERENCES

1. Yeager MP, Glass DD, Neff RK, Brinck-Johnsen T. Epidural anaesthesia and Analgesia in high-risk surgical patients. *Anesthesiology*. 1987;66:729–36.
2. Tuman KJ, McCarthy RJ, March RJ, DeLaria GA, Patel RV, Ivankovich AD. Effects of epidural anesthesia and Analgesia on coagulation and outcome after major vascular surgery. *Anesth Analg*. 1991;73:696–704.
3. A. N. Rafi, "Abdominal field block: a new approach via the lumbar triangle," *Anaesthesia*, vol. 56, no. 10, pp. 1024–1026, 2001.
4. Hebbard P, Fujiwara Y, Shibata Y, Royse C. Ultrasound-guided transversus abdominis plane (TAP) block. *Anaesth Intensive Care* 2007;35:616–7
5. 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;104:193–7.
6. Abdallah FW, Halpern SH, Margarido CB. Transversus abdominis plane block for postoperative Analgesia after caesarean delivery performed under spinal anaesthesia? A systematic review and meta-analysis. *Br J Anaesth*. 2012;109:679–87.
7. Carney J, McDonnell JG, O'Chana A, Bhinder R, Laffey JG. The transversus abdominis plane block provides effective postoperative Analgesia in patients undergoing totalabdominal hysterectomy. *Anesth Analg*. 2008;107:2056–60.
8. O'Donnell BD, McDonnell JG, McShane AJ. The transversus abdominis plane (TAP) block in open retropubic prostatectomy. *Reg Anesth Pain Med*. 2006;31:91.
9. Kanazi, G. E., Aouad, M. T., Abdallah, F. W., Khatib, M. I., Adham, A. M., Harfoush, D. W., & Siddik-Sayid, S. M. (2010). The analgesic efficacy of subarachnoid morphine in comparison with ultrasound-guided transversus abdominis plane block after cesarean delivery: a randomized controlled trial. *Anesthesia & Analgesia*, 111(2), 475–481
10. Iyer SS, Bavishi H, Mohan CV, Kaur N. Comparison of epidural Analgesia with transversus abdominis plane analgesia for postoperative pain relief in patients undergoing lower abdominal surgery: a prospective randomized study. *Anesthesia, Essays and Researches*. 2017 Jul;11(3):670.
11. Canakci E, Gultekin A, Cebeci Z, Hanedan B, Kilinc A. The analgesic efficacy of transverse abdominis plane Block versus epidural Block after caesarean delivery: which one is effective? TAP Block? Epidural Block?. *Pain Research and Management*. 2018 Oct 17;2018.