ORIGINAL RESEARCH

Evaluation of efficacy of Erector spinae plane block against that of Oblique subcostal Transversus abdominis plane block under ultrasound guidance for post operative analgesia following abdominal surgeries

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ABSTRACT

Background: Acute Post operative pain interfere with the rehabilitation. Management of postoperative pain relieve suffering and leads to earlier mobilization, shortened hospital stay, reduced hospital costs, and increased patient satisfaction. The major goal in the management of postoperative pain is to minimize the dose of medications to lessen side effects & provide adequate analgesia. Effective postoperative pain control is an essential & humanitarian need of every surgical procedure. Inadequate pain control may result in increased mortality. The advantages of effective postoperative pain management include patient comfort and therefore satisfaction, earlier mobilization, fewer pulmonary and cardiac complications, a reduced risk of deep vein thrombosis, faster recovery with less likelihood of the development of neuropathic pain, and reduced cost of care. Pain control methods in the recent advances include Erector Spinae planeblock and Transversus abdominis plane block. Erector spinae plane (ESP) block is an interfascial plane block given at the paraspinal region and provides effective visceral and somatic analgesia. Transversus abdominis plane (TAP) block is also an interfascial block that provides adequate somatic pain control. Advancements in ultrasonography (USG) techniques have improved rehabilitation methodologies. USG has improved the specificity and sensitivity of these pain control methods. Material & methods: This Prospective Randomised comparative study was conducted in the department of Anaesthesiology with the study group of 60 scheduled for Abdominal surgeries divided equally in two groups. Group A received 40ml of 0.25% Bupivacaine in erector spinaeplane block .Patients in Group B received 40ml of 0.25% Bupivacaine in Transversusabdominis plane block under ultrasound guidance following strict asepticprecautions. Results :There was no significant difference in mean distribution of age between the two groups. Group A patients are hemodynamically more stable in terms of SBP, DBP, HR, MAP than Group B patients. Duration of analgesia is more for Group A than Group B with mean duration of analgesia for 641min for Group A & 548min for Group B with p value of <0.001. Minimum VAS score in group A compared to group B. In our study ESPB patients were more comfortable than OSTAPB patients with VAS of 2 till 10hrs. Conclusion : The present study demonstrated the efficacy of ESPB and OSTAPB under ultrasound guidance for postoperative analgesia following abdominal surgeries showedGroup A (ESPB) patients were found to be comfortable both in terms of visual analogue score and hemodynamic stability i.e SBP, DBP, HR, MAP than the Group B (OBSTAP) with mean duration of analgesia for 641min for Group A and 548min for Group Bwith p value of <0.001. It can be concluded that the ESPB is better than OSTAPB in providing more duration of analgesia in abdominal surgeries.

Keywords: Erector spinae plane block, Oblique subcostal Transversus abdominis plane block, abdominal surgeries, Bupivacaine

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INTRODUCTION

Pain is described as unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage¹. Postoperative pain is considered a form of acute pain

due to surgical trauma with an inflammatory reaction and initiation of an afferent neuronal barrage. Modern day anaesthesia is not just concerned with relieving pain during surgeries but also during post operative period. Therefore, anesthesiologists should provide adequate anesthesia. An ideal analgesic modality compromising effective, reliable, and safe analgesia is mandatory after a abdominal surgeries as the majority of patients report a moderate-to-severe intensity of pain affecting the overall quality of life.²Ineffective postoperative pain management may lead to deep vein thrombosis, pulmonary embolism, coronary stress, atelectasis, pneumonia, poor wound healing, insomnia, and demoralization. Effective postoperative analgesia may facilitate recovery and reduce morbidity in surgical patients by blunting autonomic, somatic, and endocrine reflexes³. Various regional analgesic techniques have been developed for postoperative pain relief; however, all of them have several limitations; for example, thoracic epidural anaesthesia is technically challenging thoracic paravertebral block is frequently associated with complications like accidental pneumothorax, vascular puncture, risk of sympathetic blockade, pectoral blocks and serratus anterior plane blocks cause intercostobrachial and supraclavicular nerves sparing with disruption of surgical planes. The reason for such extensive anaesthesia and prolonged analgesia with ESPB can possibly be due to the profound craniocaudal spread of local anaesthetic to the intercostal spaces, epidural and neural foraminal⁷ and attainment of a paravertebral coverage of three and four vertebral levels both cranially as well as caudally blocking both the ventral and dorsal branches of the spinal nerves^{8,9} along with the communicating branches augmenting the sympathetic chain which contributes to sympathetic block¹⁰ and to extensive somatic and visceral analgesia. The postoperative analgesic efficacy of the transversus abdominis plane (TAP) block has already been used as a component of the multimodal analgesic approach in cesarean patients.[2] It provides adequate somatic analgesia with little or no visceral blockade.[3] Erector spinae plane block is a relatively novel approach to pain management for a variety of surgical procedures, as well as for acute and chronic pain. It is performed as a single injection block, or a catheter is placed for continued relief, and the procedure is most often performed with ultrasound guidance. Bupivacaine HCL (1-butyl-2', 6' pipecoloxylidide hydrochloride)* is a long acting amide local anesthetic Bupivacaine is highly bound to non-albumin plasma proteins..It acts by obstructing the inward flow of sodium ions through the nerve membrane, thus preventing the generation of an action potential. Also acts by Competitive binding to calcium sites is postulated to occur in the external lipid layer of the nerve membrane with resultant secondary interference of mobile phosphate groups. In this study we compare effectiveness of Erector spinae plane block versus Oblique subcostal Transversus abdominis plane block for postoperative analgesia following abdominal surgeries with the Primary Objective -Post operative analgesia assessed by Visual Analogue Scale (VAS) and Secondary Objective -Hemodynamic stability as

assessed by Systolic Blood Pressure, Diastolic Blood Pressure, Mean Arterial Pressure, and Heart Rate.

MATERIAL & METHODS

The study was conducted after obtaining approval from the institutional ethics committee, and informed written consent. 60 patients were randomly allocated into two groups of 30 each.30 cases of ESPB(Group A) and 30 cases of OSTAP(Group B) for abdominal surgeries

INCLUSION CRITERIA

- 1. ASA physical status- I,II,III.
- 2. Age Group All adults <70 years.
- 3. Both Males & Females.

EXCLUSION CRITERIA

- 1. Patients with allergy to Study Drugs, psychiatric illness. coagulation disorders.
- 2. Infection at the site of injection.
- 3. Surgery exceeding > 3hrs.
- 4. Patients who do not give consent.

METHOD OF STUDY

A prospective randomised double blind comparative study is planned, Randomisation sequence was computer-generated and prepared in a double-blind manner. Pre-anaesthetic evaluation of all patients was performed by an anaesthesiologist a day before surgery. Patients were classified into two groups as follows: Group A : Patients undergoing Erector spinae plane block. Group B : Patients undergoing Transversus abdominis plane block. Sample size-30 patients for each group.Patients in group A received 40ml of 0.25% Bupivacaine in erector spinaeplane block .Patients in group B received 40ml of 0.25% Bupivacaine in Transversusabdominis plane block under ultrasound guidance following strict asepticprecautions.Patients were monitored in post operative period for pain using visualanalogue scale & also post operative hemodyanamic stability.Rescue analgesic was given in the form of systemic analgesia (Inj.Tramadol 1mg/kg) when the VAS >3 & the time was noted. Vitals were closely monitored .All the observations were tabulated and statistically analysed.

STATISTICAL ANALYSIS

All the Quantitative data was tested using Student ttest and qualitative data by chi-square test. P <0.05 were statistically significant when variables are continuous variables for equivalence design, the formula is

$$= n > 2 \left[\frac{\left(z_{1-\alpha/2} + z_{1-\beta} \right) \sigma}{\delta} \right]^2.$$

Where n= size per group

 $Z_{1-\alpha/2}$ & $Z_{1-\beta}$ =standard normal deviation

- σ = clinically acceptable margin
- δ = standard deviation of both comparison groups
- n = 2265.99/81 = 27.97 approx. 30 for each group

RESULTS
Following are the observations and results of my study
Table 3: Comparison of Age in both groups

	Gro	Jup
Age (Years)	A (n=30) n (%)	B (n=30) n (%)
≤ 30	5 (16.7)	3 (10.0)
31-40	6 (20.0)	8 (26.7)
41-50	11 (36.7)	7 (23.3)
51-60	4 (13.3)	6 (20.0)
>60	4 (13.3)	6 (20.0)
Mean (SD)	44.83 (14.41)	47.27 (14.26

Graph 1: Comparison of Age in both groups.



Table 4: Comparison of gender in both groups

Gre	oup	
A (n=30) n (%)	B (n=30) n (%)	
17 (56.7)	15 (50.0)	
13 (43.3)	15 (50.0)	
	A (n=30) n (%) 17 (56.7) 13 (43.3)	A B (n=30) (n=30) n (%) n (%) 17 (56.7) 15 (50.0) 13 (43.3) 15 (50.0)



Graph 2: Comparison of gender in both groups.

Gender both male and female are comparable in both groups.

	Table 5: Comparison	of ASA Ph	ysical status in	both groups.
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	Gro	oup
ASA	A (n=30) n (%)	B (n=30) n (%)
I	11 (36.7)	14 (46.7)
П	17 (56.7)	12 (40.0)
Ш	2 (6.7)	4 (13.3)

Graph 3: Comparison of ASA Physical status in both groups.



ASA Physical status is comparable in both groups.

	Gro	up	P Value
Parameter	A (n=30) Mean (SD)	B (n=30) Mean (SD)	
Weight (kg)	71.80 (5.40)	73.93 (7.06)	0.533
Height (cm)	159.93 (6.73)	158.93 (5.57)	0.194

Table 6: Comparison of weight and height in both groups.

Graph 4: Comparison of weight and height in both groups.



Weight and Height are comparable in both groups.

Table 7: Comparison of SBP in both groups.

	Group		P Value
SBP	A (n=30) Mean (SD)	B (n=30) Mean (SD)	
30 min	131.07 (7.83)	129.70 (7.74)	0.500
60 min	128.93 (8.70)	127.17 (8.29)	0.424
90 min	122.53 (19.74)	123.37 (18.72)	0.807
120 min	123.70 (7.47)	124.20 (8.30)	0.033*
180 min	117.73 (7.51)	122.43 (9.06)	0.027*
4 hrs	115.07 (8.19)	119.97 (8.55)	0.002*
8 hrs	112.13 (8.74)	119.63 (9.00)	< 0.001*
12 hrs	109.40 (8.41)	118.53 (9.48)	0.272
24 hrs	125.47 (5.38)	127.20 (6.66)	0.182





Group A patients are hemodynamically more stable in terms of SBP than Group B patients.

Table 8: Comparison	of DBP in	both groups.
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Group			P Value
DBP	A (n=30)	B (n=30)	
	Mean (SD)	Mean (SD)	
30 min	86.47 (10.82)	82.27 (13.15)	0.182
60 min	83.33 (9.60)	81.33 (12.64)	0.493
90 min	81.07 (9.46)	79.03 (13.38)	0.500
120 min	78.37 (9.83)	78.30 (11.89)	0.981
180 min	73.23 (8.94)	76.83 (12.83)	0.213
4 hrs	71.23 (8.53)	76.20 (11.63)	0.064
8 hrs	69.27 (8.73)	75.63 (12.11)	0.023*
12 hrs	68.07 (8.50)	75.33 (12.05)	0.009*
24 hrs	86.70 (9.31)	82.30 (10.78)	0.096
	Unpaired T Test, P V	alue *Significant	

Graph 6: Comparison of DBP in both groups.



Group A patients are hemodynamically more stable in terms of DBP than Group B patients.

	Group		P Value
Heart Rate	A (n=30) Mean (SD)	B (n=30) Mean (SD)	
30 min	84.70 (9.65)	86.30 (9.50)	0.520
60 min	80.93 (10.99)	84.43 (10.00)	0.202
90 min	76.77 (11.14)	83.03 (10.75)	0.031*
120 min	74.73 (10.07)	81.33 (9.90)	0.013*
180 min	72.67 (6.86)	79.20 (9.22)	0.003*
4 hrs	73.87 (7.26)	79.00 (8.85)	0.017*
8 hrs	74.13 (6.76)	78.70 (8.76)	0.028*
12 hrs	79.10 (7.45)	77.90 (7.51)	0.537
24 hrs	83.53 (7.41)	82.67 (7.25)	0.649
	Unpaired T Test, P V	alue *Significant	

Table 9: Comparison of HR in both groups.

Graph 7: Comparison of HR in both groups.



Group A patients are hemodynamically more stable in terms of HR than Group B patients.

Table 10: Comparison of MAP in both groups.

	Gr	oup	P Value
MAP	A (n=30) Mean (SD)	B (n=30) Mean (SD)	
30 min	123.17 (9.82)	119.69 (11.40)	0.210
60 min	98.53 (8.53)	96.61 (10.32)	0.435
90 min	94.88 (9.75)	93.81 (12.49)	0.711
120 min	93.47 (8.02)	93.60 (9.58)	0.957
180 min	88.06 (7.17)	92.03 (10.34)	0.090
4 hrs	85.84 (7.22)	90.78 (9.36)	0.026*
8 hrs	83.55 (7.67)	90.30 (10.15)	0.005*
12 hrs	81.84 (7.69)	89.73 (10.21)	0.001*
24 hrs	99.62 (7.17)	97.26 (8.66)	0.256



Graph 8: Comparison of MAP in both groups.

Group A patients are hemodynamically more stable in terms of MAP than Group B patients.

Table 11:	Comparison	of duration of	f Analgesia in	both groups.

Duration (in min)	Group		P Value
	A (n=30) Mean (SD)	B (n=30) Mean (SD)	
Of Surgery	92.17 (25.04)	86.17 (24.79)	0.355
Of Analgesia	641.00 (96.00)	548.00 (50.40)	< 0.001*

Table 12: Comparison of VAS in both groups.

VAS	Group		P Value
	A (n=30) Mean (SD)	B (n=30) Mean (SD)	
30 min	0.00 (0.00)	0.00 (0.00)	-
60 min	0.00 (0.00)	0.00 (0.00)	-
90 min	0.00 (0.00)	0.00 (0.00)	-
120 min	0.00 (0.00)	0.00 (0.00)	-
180 min	0.20 (0.40)	0.47 (0.50)	0.029*
4 hrs	0.40 (0.62)	1.00 (0.78)	0.002*
8 hrs	1.67 (0.71)	2.03 (0.76)	0.059
12 hrs	3.23 (0.67)	4.20 (0.66)	< 0.001*
24 hrs	4.57 (0.77)	5.07 (0.98)	0.032*
	Unpaired T Test, P V	alue *Significant	



Graph 9: Comparison of duration of Analgesia in both groups.

Duration of analgesia is more for Group A than Group B with mean duration of analgesia for 641min for Group A & 548min for Group B with p value of < 0.001.





We can see a minimum score of VAS in group A compared to group B.

DISCUSSION

With a P value of 0.64 Age distribution has no statistical significance. With a P value of 0.605 Gender distribution has no statistical significance. With a P value of 0.389 ASA Physical status has no statistical significance. Adverse events like nausea, vomiting, shivering were not seen in any of the participants in both groups. With a P value of 0.194 weight and height distribution has no statistical Hemodynamic significance. fluctuations are comparatively lower in group A than group B in terms of SBP,DBP,HR,MAP. Mean duration of analgesia for Group A is 641.0 min with standard deviation of 96.0 min and Mean duration of analgesia for Group B is 548.0 min with standard deviation of 50.40 with a P value of <0.001 which is statistically significant .In our study ESPB patients were more comfortable than OSTAPB patients with VAS of 2 till 10hrs.

Systolic Blood pressure :We have a significant P values of 0.033, 0.027, 0.002, <0.001 at 120min, 180min, 4hrs, 8hrs respectively signifying hemodynamic fluctuations are comparatively lower in group A than group B.

Diastolic Blood pressure: We have a significant P values of 0.023, 0.009 at 8hrs, 12hrs respectively signifying hemodynamic fluctuations are comparatively lower in group A than group B.

Heart Rate :We have a significant P values of 0.031, 0.013, 0.003, 0.017, 0.028 at 90min, 120min, 180min, 4hrs, 8hrs, 12hrs respectively signifying hemodynamic fluctuations are comparatively lower in group A than group B.

Mean Arterial pressure: We have a significant P values of 0.026, 0.005, 0.001 at 4hrs, 8hrs, 12hrs respectively signifying hemodynamic fluctuations are comparatively lower in group A than group B.

Duration of Analgesia: Mean duration of analgesia for Group A is 641.0 min with standard deviation of 96.0 min and Mean duration of analgesia for Group B is 548.0 min with standard deviation of 50.40 with a P value of <0.001 which is statistically significant.

Visual Analogue score: Mean visual analogue score along with (standard deviation) in group A are 0 till 120 min and are 0.2 (0.4), 0.4 (0.62), 1.67 (0.71), 3.23 (0.67), 4.57 (0.77) at 180min, 4hrs, 8hrs, 12hrs, 24hrs respectively.Mean visual analogue score along with (standard deviation) in group B are 0 till 120 min and are 0.47 (0.5), 1.0 (0.78), 2.03 (0.76), 4.20 (0.66), 5.07 (0.98) at 180min, 4hrs, 8hrs, 12hrs, 24hrs respectively.We have a significant P values of 0.029, 0.002, <0.001, 0.032 at 180 min, 4hrs, 12hrs, 24hrs respectively signifying hemodynamic fluctuations are comparatively lower in group A than group B.To summarise USG guided ESPB reduced pain scores more effectively than USG guided OSTAPB in terms of VAS.

CONCLUSION

The present study demonstrated the efficacy of ESPB and OSTAPB under ultrasound guidance for postoperative analgesia following abdominal surgeries showed Group A (ESPB) patients were found to be comfortable both in terms of visual analogue score and hemodynamic stability i.e SBP, DBP, HR,MAP than the Group B (OBSTAP) with mean duration of analgesia for 641min for Group A and 548min for Group Bwith p value of <0.001. It can be concluded that the ESPB is better than OSTAPB in providing more duration of analgesia in abdominal surgeries.

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