Journal of Cardiovascular Disease Research
ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 11, 2024

A Prospective Randomized Comparative Study Of Ultrasound Guided Erector Spinae Plane Block Versus Ultrasound Guided Intercostal Nerve Block In Thoracoscopic Procedures.

Dr. Shaik Yasmin[1], Dr B. Praveen Kumar [2], Dr. Vamshi Krishna B[3], Dr. Janakiramulu Ramavath[4], Dr. Sandhya[5]

[1]Assistant Professor, Department of Anesthesiology, Government medical College mahabubnagar Telangana.
[2]Assistant professor, Department of Anesthesiology, Government medical College mahabubnagar Telangana.
[3]Assistant Professor, Department of Anesthesiology, Government medical College mahabubnagar Telangana.
[4]Assistant Professor, Department of Anesthesiology, Government medical College mahabubnagar Telangana.
[5]Consultant, Department of Anesthesiology, Bright Multi Speciality Hospital, Hyderabad, Telangana.

***Corresponding Author:** Dr. Janakiramulu Ramavath
*Assistant Professor, Department of Anesthesiology, Government medical College mahabubnagar Telangana. Address: H. No: 4-75/16/A, Shiva sai nagar, Opposite HDFC bank, Badangpet, Hyderabad-58.

Abstract:
INTRODUCTION: Thoracoscopic procedures have been used widely as it has several advantages over conventional thoracotomy, such as less postoperative complications, less postoperative pain and shorter hospital stay. Intercostal nerve block has been reported to be effective for pain control after thoracotomy. More recently, a novel interfacial plane block, ultrasound guided erector spine plane block has been described as an effective postoperative analgesia technique in thoracoscopic procedures. Therefore, we designed the study to determine the postoperative analgesic efficacy of ultrasound guided erector spine plane block in comparison with ultrasound guided intercostal nerve block in patients undergoing thoracoscopic procedures.
MATERIALS AND METHODS ;A prospective, randomized, comparative study was done in 60 patients in a tertiary care centre in patients posted for thoracoscopic procedures. Institutional ethics committee clearance and patient's written informed consent was obtained. Under strict aseptic precautions, all the patients received either ultrasound guided erector spinae plane block or intercostal nerve block by an experienced Anaesthesiologist. Group 1 – receiving erector spinae plane block. Group 2 – receiving intercostal nerve block. Pain was assessed by using verbal numeric rating scale (VNRS). The anaesthesia record will be maintained and changes in heart rate, blood pressure, Spo2 will be noted at 2, 4, 6, 8, 10,12, hours and so on post-operatively till patient regained normal sensations. Any adverse effects and complications were recorded. Statistical analysis was done using chi-square test if the data was categorical and for continuous data Unpaired T test, if data passed normality test or Mann-Whitney Test, if data failed normality test. P value less than 0.05 is taken as significant.
Results: The patients in two groups were comparable with respect to age, gender, height, BMI, ASA grade, indication and duration for thoracoscopic procedures. No significant difference with respect to haemodynamic variables between group 1 and group 2. There is no significant difference with respect to appearance of block related complications between group 1 and group 2.
Conclusion: We recommend the use of both usg ESPB and usg ICNB in thoracoscopic procedures in terms of duration of analgesia.

Keywords: ultrasound guided erector spinae plane block, ultrasound guided intercostal nerve block, thoracoscopic procedures, Haemodynamic variables, Analgesia.

INTRODUCTION:

Thoracoscopic procedures have been used widely as it has several advantages over conventional thoracotomy, such as less postoperative complications, less postoperative pain and shorter hospital stay. (1)

Even though it is considered as a less invasive procedure, patients after thoracoscopic procedures experience moderate to severe pain. Inadequate analgesia will increase patients suffering and make patients unable to breathe normally and have an ineffective cough, which will increase respiratory complications and affect postoperative recovery.

In recent years, regional anaesthesia techniques have played an important role in multimodal analgesia. It has reduced post operative pain and opioids usage and related side effects. These include epidural analgesia, paravertebral block and intercostal nerve block.

Though epidural analgesia was once considered as gold standard for post thoracotomy pain management, it is not recommended for pain control after thoracoscopic procedures, because it is associated with potential risks of dural puncture, nerve injuries, epidural hematoma and hypotension. Thoracic paravertebral block can provide comparable analgesia to epidural analgesia with lesser side effects. (2) However; it is not in regular use because of technical challenges and potential risks.

Intercostal nerve block has been reported to be effective for pain control after thoracotomy. (3-5). More recently, a novel interfacial plane block, ultrasound guided erector spine plane block has been described as an effective postoperative analgesia technique in thoracoscopic procedures (6-9). Local anaesthetic after ESP spreads in a cephalocaudal distribution, reaching mainly the dorsal rami and rarely the ventral ramus of the spinal nerves helps to achieve a multi-dermatomal sensory block of the anterior, posterior, and lateral thoracic and abdominal walls. It is suggested mainly due to its technical safety and simplicity. Therefore, we designed the study to determine the postoperative analgesic efficacy of ultrasound guided erector spine plane block in comparison with ultrasound guided intercostal nerve block in patients undergoing thoracoscopic procedures.

OBJECTIVES

PRIMARY OBJECTIVE: To study and compare analgesic efficacy of erector spine plane block versus intercostal nerve block.

SECONDARY OBJECTIVE:

1. Hemodynamic variables (Heart rate (HR), mean arterial pressure (MAP) and oxygen saturation (SPO2)).
2. Visual analogue score (VAS) at rest and cough over 12hrs.
3. Incidence of any adverse events.
4. Duration of analgesia

MATERIALS AND METHODS

A prospective, randomized, comparative study was done between January 2021 – April 2022 in a tertiary care centre in patients posted for thoracoscopic procedures. Institutional ethics committee clearance was obtained for this study. Informed written consent was taken from all the patients after explaining the procedure, risks and benefits.

INCLUSION CRITERIA:

1. Male / Female
2. Age: 18 – 80 years
3. Physical status ASA – I, II, III
4. Patient willing to sign written informed consent

EXCLUSION CRITERIA:

1. Morbid Obesity
2. Neuropsychiatric diseases
3. Allergic to local anaesthetics
4. Abuse of Opioids
5. Uncooperative patient or patient refusal
6. History of bleeding disorders.
7. Pregnancy

SAMPLE SIZE CALCULATION:

Sample size was calculated based on the pilot study that showed proportion of the patients required rescue analgesia in ultrasound guided intercostal nerve block is 55% and in ultrasound guided erector spine plane block is 20% in 12 hours of post-operative period, by using the following formula.

$n = (Z_{\alpha/2}+Z_{\beta})^2 * (p_1(1-p_1) +p_2(1-p_2)) / (p_1-p_2)^2$,

where $Z_{\alpha/2}$ is the critical value of the Normal distribution at $\alpha/2$ (e.g. for a confidence level of 95%, α is 0.05 and the critical value is 1.96), Z_{β} is the critical value of the Normal distribution at β (e.g. for a power of 80%, β is 0.2 and the critical value is 0.84) and p_1 and p_2 are the expected sample proportions of the two groups.

p1 = 55% and p2 = 20%. Hence sample size required with 10% loss to follow up was 30. So, the sample recruited for the study is 30 patients in each group.

Randomization was done by using "physical method" where 60 folded papers were placed in a container, each one labelled either Group 1 or Group 2 with 30 labels in each container.

Group 1 – receiving erector spinae plane block.

Group 2 – receiving intercostal nerve block.

All necessary equipment and drugs needed for administration of general anaesthesia and resuscitation will be kept ready in order to manage failure of procedure and any complications.

METHOD

PRE-ANAESTHETIC EVALUATION:

Patients were assessed prior to the surgery. Detailed history was taken, systemic and physical examination was done. Demographic data and relevant investigations were done. Patients were informed about the anaesthesia procedure, drugs that would be used, its effects and side effects

Verbal numeric rating scale (VNRS) was explained to the patient.

PROCEDURE:

Patient were ensured on NBM status. Intravenous access was secured with 20 G cannula and IV Ringer Lactate was started. Pulse oximeter, non-invasive blood pressure monitor and three lead ECG monitor were connected to the patients in the operating room. Heart rate (HR), mean arterial pressure (MAP) and oxygen saturation (SPO2) were recorded at the interval of 5 minutes in the first hour and thereafter at 90,120,150,180 minutes. Local anaesthetic solution (0.375% ropivacaine 20 to 30 ml) was used.

Under strict aseptic precautions, all the patients received either ultrasound guided erector spinae plane block or intercostal nerve block by an experienced Anaesthesiologist.

TECHNIQUE:

The patient is positioned in a sitting, lateral decubitus or prone position.

For ERECTOR SPINAE PLANE BLOCK,

1. Target transverse process for the block was selected.
2. Transducer was placed in a paramedian sagittal orientation, approximately 2cm away from the midline (spinous processes), to visualize the transverse process.
3. Needle was inserted in cranial to caudad direction until the needle tip contacts the transverse process.

4. 1-3ml of local anaesthetic was injected after confirming plane by visualizing the spread deep to the erector spinae muscles and superficial to the transverse process.

For INTERCOSTAL NERVE BLOCK:

1. Posterior intercostal space was scanned posterolateral to the costal angle in the axillary line. 2. After skin and transducer preparation, a 38mm linear transducer was placed, obliquely in the back at right angles to two palpable ribs. Appropriate depth of field, focus range and gain was selected.
3. The intercostal neurovascular bundle is identified, with the patient lying prone, a 22G, 10cm needle is advanced to penetrate the external and internal intercostal muscles ensuring that the needle tip remains superficial to the parietal pleura.
4. A post block ultrasound scan was performed to rule out pneumothorax.

ASSESMENT:

Sensory block was assessed by pinprick with 23G hypodermic needle. Sensory onset was considered when there was a dull sensation to pin prick along the distribution of dermatomes. Complete sensory block was considered when there was complete loss of sensation to pin prick.
Sensory block was graded as; Grade 0 – sharp pin prick is felt Grade 1 – dull sensation is felt Grade 2 – no sensation
Pain was assessed by using verbal numeric rating scale (VNRS) in which a score of "0" indicates "no pain" and a score of "10" indicates the "worst pain imaginable." The VNRS measurements was obtained at baseline (before placement of the block), at the time of skin incision, at the completion of the surgical procedure, and at 30mins,60mins,90mins,120mins,3,4,5,6,7,8,9,10,11,12 hours till the time patient asked for rescue analgesia (VNRS>3).
Duration of post-operative analgesia was taken till the time patient asked for rescue analgesia (VNRS>3). Inj. TRAMADOL 100mg was given by slow IV infusion.
The anaesthesia record will be maintained and changes in heart rate, blood pressure, Spo2 will be noted at 2, 4, 6, 8, 10,12, hours and so on post-operatively till patient regained normal sensations.
Adverse effects: Patients were monitored for any signs of central nervous system toxicity (tingling and numbness in perioral region, tinnitus, convulsions, loss of consciousness) and cardiovascular toxicity (like changes in heart rate, rhythm, arrhythmia, hypotension, and hypertension).
Bradycardia defined as heart rate less than 50 beats per minute, to be treated with inj. Atropine 0.6 mg i.v.
Tachycardia defined as heart rate above 100 beats per minute.
Hypertension defined as systolic blood pressure above 20% of baseline.
Hypotension defined as systolic blood pressure less than 90mm Hg or less than 30% of baseline, to be treated with I.V. fluids and inj. Ephedrine boluses of 6mg.
Complications monitored
1.Nausea, vomiting
2.Sedation
3.Respiratory depression
4.pneumothorax.
5. vascular puncture.

Statistical analysis: Data entry was done in Microsoft Excel. Data analysis was done with the help of SPSS version 21. Qualitative data is presented with the help of Frequency and Percentage table and association among study group has been assessed with the help of Chi-Square test. . Quantitative data is presented with the help of mean, standard deviation and median. Comparison among study group has been done with the help of Unpaired T test, if data passed normality test or Mann-Whitney Test, if data failed normality test. P value less than 0.05 is taken as significant.

RESULTS

Overall, 60 patients were studied in age group of 18 - 70 years in group 1 and group 2. The mean age of patients in group 1 were 52 ±11.9years and group 2 were 57 ± 8.58years respectively (p > 0.05). In group 1, there were (16) 53.3 % males and (14)46.7 % females and in group 2, there were (19)63.3 % males and (11)36.7 % females (p> 0.05). The mean height of patients were 160 ± 7.98 kg and 168.5 ± 6.82 kg in group 1 and 2 respectively (p >0.05). The mean body mass index (BMI) of patients was 23.6 ± 2.15 kg and 23.5 ± 2.29 kg in group 1 and 2 respectively (p >0.05). There was no statistically significant difference between two groups with respect to ASA grading of patients (p> 0.05). Pleural effusion of indeterminate origin, diffuse lung disease and staging of lung cancer with pleural effusion were indications for thoracoscopic procedures. Thus, the patients in two groups were comparable with respect to age, gender, height, BMI, ASA grade, indication and duration for thoracoscopic procedures. (shown in table 1)

Table 1: Distribution by Patient's characteristics

Patient characteristic		Group 1(N=30)	Group 2(N=30)	$\chi 2$ or T value/ P value
Mean ±SD of age (in years)		52.7±11.9	56.8±8.58	1.531/ 0.131
Sex (n/%)	Male	16(53.3%)	19 (63.3%)	0.617/ 0.432
	Female	14(46.7%)	11 (36.7%)	
Mean ±SD of height (in centimeters)		164.2±7.98	166.6±6.82	0.216/ 0.1252
Mean ±SD of BMI (kg/ m^2)		23.8±2.15	23.4±2.29	0.488/ 0.698
ASA Grade (n/%)	I	5(16.7%)	4(13.3%)	0.033/ 0.984
	II	14(46.7%)	16(53.4%)	
	II	11(36.6%)	10(33.3%)	
Thoracoscopic procedure (n/%)	Pleural effusion of indeterminate origin	22(73.3%)	24(80%)	0.022/ 0.989
	Diffuse lung disease	2(6.7%)	1(3.3%)	
	Staging of lung cancer with pleural effusion	6 (20%)	5(16.7%)	
Duration of procedure in minutes (mean±SD)		48.9± 5.65	51.9± 6.36	1.932/ 0.058

The baseline mean heart rate was 93.2± 5.59 bpm in group 1 and 92.5±5.73 bpm in group 2 and this difference was statistically not significant. (p > 0.05). The mean heart rate was maintained throughout the surgery in both the groups. None of the patients developed bradycardia (heart rate< 50 bpm). The difference between the mean heart rate of two groups was statistically not significant at all the respective intervals. (p > 0.05). (shown in figure 1)

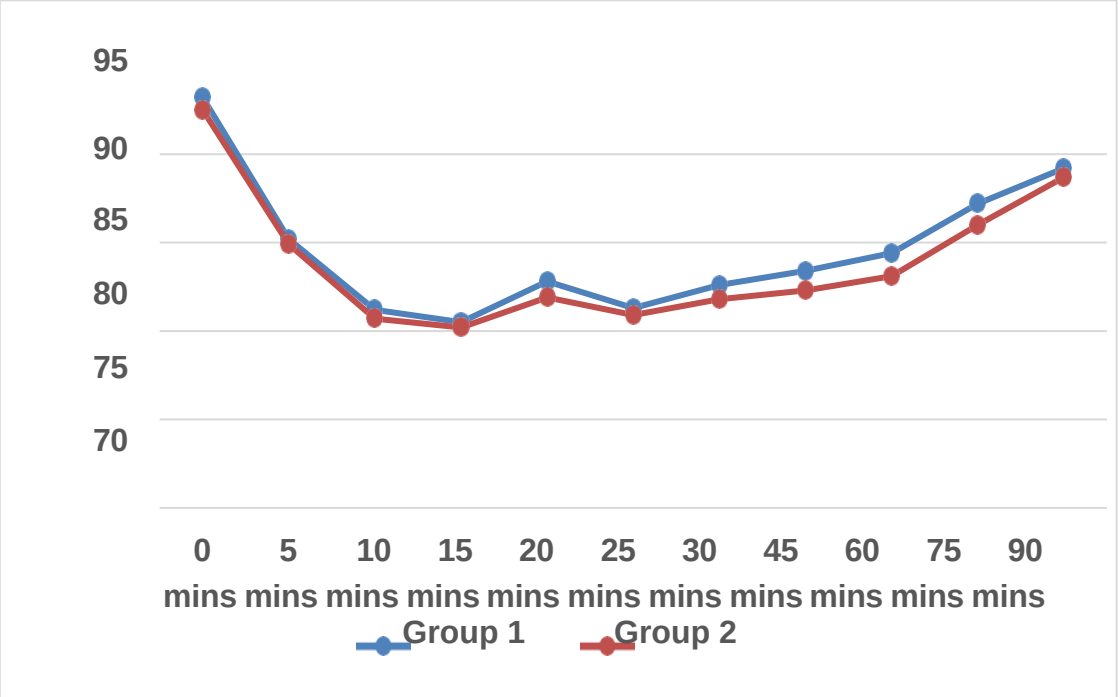


Figure 1: Distribution of groups by mean heart rate

The difference in baseline mean arterial blood pressures of two groups was statistically not significant (97.4±5.89mmHg and 96.4±4.00 mmHg) in group 1 and group 2 respectively. (p >0.05). There was no statistically significant difference in mean arterial blood pressure of the two groups at all respective intervals. (p > 0.05). (shown in table 2)

Table 2: Distribution by mean arterial pressure in two groups

Time	Group 1 (Mean ± SD)	Group 2 (Mean ± SD)	p-value
0 mins	97.4±5.89	96.4±4.00	0.445; NS
5 mins	98.9±6.34	98.2±5.66	0.654; NS
10 mins	88.6±5.72	89.1±6.07	0.744; NS
15 mins	87.1±5.58	87.1±5.33	1.000; NS
20 mins	80.5±5.74	81.2±5.76	0.639; NS
25 mins	76.3±6.08	76.6±5.60	0.843; NS
30 mins	73.4±5.51	73.6±5.70	0.891; NS
45 mins	75.4±5.63	75.7±5.61	0.837; NS
60 mins	80.7±5.71	81±5.53	0.837; NS
75 mins	87.1±5.94	85.8±6.21	0.411; NS
90 mins	89±5.23	87.9±5.63	0.436; NS

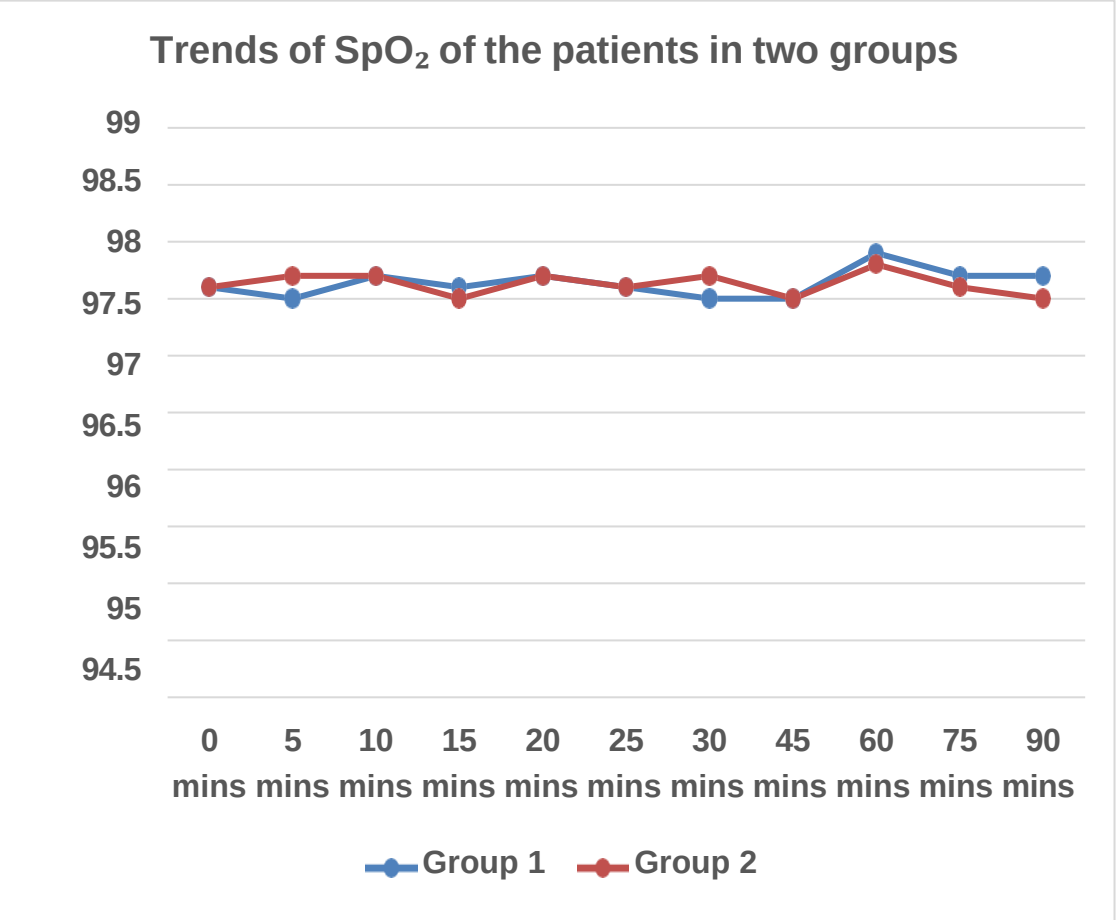
In both the groups mean respiratory rate changes equally with time. At any point of time the difference between the groups were not significant statistically. (p>0.05) (shown in table 3)

Table 3: Distribution by RR in two groups

Time	Group 1 (Mean ± SD)	Group 2 (Mean ± SD)	p-value
0 mins	18.2±1.21	18.6±1.35	0.232; NS
5 mins	19.0±1.40	19.1±1.31	0.776; NS
10 mins	18.7±1.34	18.9±1.41	0.576; NS
15 mins	18.5±1.28	18.8±1.33	0.377; NS
20 mins	18.3±1.05	18.6±1.30	0.329; NS
25 mins	18.0±1.14	18.4±1.07	0.167; NS
30 mins	17.9±1.22	18.1±1.18	0.521; NS
45 mins	17.7±1.08	17.8±1.26	0.743; NS
60 mins	17.3±0.99	17.5±1.17	0.478; NS
75 mins	17.5±1.07	17.7±1.12	0.482; NS
90 mins	17.1±1.01	17.3±1.02	0.448; NS

The mean SpO2 was comparable at all the respective intervals between group 1 and 2 and it was statistically insignificant (p >0.05). (shown in figure 2)

Figure 2: SpO2 changes of the groups



No significant difference in two groups with respect to duration of analgesia and need for rescue analgesia (table 4).

Table 4: Distribution by duration of analgesia and need for rescue analgesia in two groups

Parameter		Group 1	Group 2	t test or $\chi 2$-value /P value
Duration of analgesia in hours	Mean	11.4	10.9	0.7/0.487 (not significant)
	Median	12	11.5	
	Std. Deviation	3.09	2.4	
Need for rescue analgesia	Yes (n/%)	5(16.7%)	7(23.3%)	0.417/ 0.518 (not significant)
	N0 (n/%)	25(83.3%)	23(76.7%)	

No significant difference in VAS score in both the groups at rest and dynamic. (shown in table 5 and 6).

Table 5: VAS score at rest in both the groups

VAS scores at rest	Group 1	Group 2	Median difference	95% CI	p-value
	Median (IQR)	Median (IQR)			
0 mins	1.00 (0.00-1.25)	0.50 (0.00-2.00)	0.50	0.74-1.53	0.561; NS
30 mins	1.00 (1.00-2.00)	1.00 (0.00-1.25)	0.00	0.96-1.74	0.151; NS
60 mins	1.50 (1.00-2.00)	1.00 (0.00-2.00)	0.50	1.16-1.87	0.121; NS
90 mins	2.00 (1.00-2.25)	1.00 (1.00-2.00)	1.00	1.31-1.92	0.136; NS
120 mins	2.00 (1.00-2.25)	1.00 (1.00-2.00)	1.00	1.45-2.05	0.126; NS
3 hours	2.00 (1.00-3.00)	2.00 (1.00-2.00)	0.00	1.53-2.10	0.189; NS
4 hours	2.00 (1.00-3.00)	2.00 (1.00-2.00)	0.00	1.58-2.15	0.213; NS
5 hours	2.00 (1.00-3.00)	1.50 (1.00-3.00)	0.50	1.73-2.20	0.223; NS
6 hours	2.00 (1.00-3.25)	1.50 (1.00-3.00)	0.50	1.85-2.45	0.120; NS
9 hours	2.00 (1.75-3.00)	2.00 (1.00-3.00)	0.00	2.01-2.65	0.529; NS
12 hours	2.00 (2.00-3.00)	2.00 (1.00-3.00)	0.00	2.18-2.85	0.402; NS

Table 5: VAS score on coughing in both the groups

VAS scores on coughing	Group 1	Group 2	Median difference	95% CI	p-value
	Median (IQR)	Median (IQR)			
0 mins	2.00 (1.00-3.00)	1.50 (0.00-3.25)	0.50	1.55-2.39	0.355; NS
30 mins	2.00 (1.00-3.00)	1.50 (0.00-3.25)	0.50	1.71-2.59	0.288; NS
60 mins	2.00 (1.00-3.00)	1.50 (0.00-3.25)	0.50	1.82-2.75	0.099; NS
90 mins	2.00 (1.00-3.25)	1.50 (1.00-3.25)	0.50	1.94-2.86	0.134; NS
120 mins	2.00 (1.00-3.25)	2.00 (1.00-3.25)	0.00	2.00-2.96	0.164; NS
3 hours	2.00 (2.00-4.00)	2.00 (1.00-3.25)	0.00	2.22-3.05	0.068; NS
4 hours	2.00 (2.00-4.00)	2.00 (1.00-3.25)	0.00	2.35-3.11	0.120; NS
5 hours	2.50 (2.00-4.00)	2.00 (1.00-3.25)	0.50	2.47-3.19	0.111; NS
6 hours	3.00 (2.00-5.00)	2.00 (2.00-3.25)	1.00	2.58-3.32	0.126; NS
9 hours	3.50 (2.00-5.00)	2.00 (2.00-3.25)	1.50	2.77-3.46	0.088; NS
12 hours	3.00 (2.00-4.00)	2.00 (2.00-3.25)	1.00	2.45-3.05	0.121; NS

There is no significant difference with respect to appearance of block related complications between group 1 and group 2. In group 1, around 5 (16.7%) patients experienced nausea and vomiting and in

group 2, around 3 (10%) subjects experienced nausea and vomiting (3.3%). None of the patients in both the groups had pneumothorax, pruritus and urinary retention. (shown in table 5)

Table 5: Distribution of the groups by block related complications

Block related complications	Group 1 (n=30)	Group 2 (n=30)	p-value
Hematoma	0 (0%)	0 (0%)	1.000 (NS)
Nausea & vomiting	5 (16.7%)	3 (10%)	0.704 (NS)*
Local anaesthesia toxicity	0 (0%)	0 (0%)	1.000 (NS)
Pneumothorax	0 (0%)	0 (0%)	1.000 (NS)
Pruritus	0 (0%)	0 (0%)	1.000 (NS)
Urinary retention	0 (0%)	0 (0%)	1.000 (NS)

*p-value with Yate's correction; S=Significant; NS=not significant

Discussion: The erector spinae plane (ESP) block is a newer regional anaesthetic technique that can be used to provide analgesia for a variety of surgical procedures or to manage acute or chronic pain. The technique is relatively easy to perform on patients, and it is performable with minimal or no sedation in the pre-operative holding area. The ESP block is possible either using a single- injection technique or via catheter placement for continuous infusion. Here in this study, comparison is done between ultrasound guided erector spine plane block and ultrasound guided intercostal nerve block in thoracoscopic procedures.

In our study there was no statistical significant difference with respect to age, weight, height , gender, ASA grade, body mass index and duration of procedure. Which is similar to Nan Chen et al(10) study, where there was no significant difference with respect to age, weight, height, gender, ASA grade, body mass index and duration of procedure.

The difference in median value of basal VNRS at rest and also on coughing, was statistically not significant in both groups ($p > 0.05$) in this study.

The mean duration of analgesia was 11.4 ± 3.09 hrs in ESP block group, while in ICN block group, it was 10.9± 2.40hours and the difference was statistically not significant between the two groups ($p < 0.05$) in the current study.

In our study lower VAS scores < 4 while coughing may be due to careful manipulation of surgeons, different pain perception of patients in different culture backgrounds.

K J Chin et al (11) in their study showed that highest and lowest median pain scores in the first 24hrs were 3.5(3.0-5.0) and 2.5(0.0-3.0) as on 11-point VNRS in patients receiving ESP block group with no significant difference which was similar to our study.

Krishna et al (12) showed that median pain scores at rest in group 1 who received ESPB (3mg/kg 0.375% ropivacaine) were 0,3,4,4 at 6,8,10,12 hrs respectively. These were significantly less in comparison with group 2 ($p=0.0001$). Patients in group 1 had a significantly higher mean duration of analgesia (8.98 +/- 0.14 hours), during which NRS was < 4 of 10, compared with group 2 (4.60 +/- 0.12 hours) ($p=0.0001$).

Jonnavinthula N et al (13) found in their study that the time to first rescue analgesia was significantly longer in group I, who received ICN block compared to patients who received peritubal infiltration (13.22 ± 4.076 h vs 7.167 ± 3.92 h P - 0.001). The number of demands and the amount of analgesic tramadol consumed were less in Group I.

Wang et al (14) in their study showed VAS scores in group A (ICN Block) were significantly lower compared to group B (control) $p < 0.05$ for 24 hrs in esophageal cancer patients undergoing thoracotomy. They showed that use of ICN block and ropivacaine improves post operative cognitive dysfunction and enhanced analgesia in thoracotomy patients.

Ibrahim et al (15) showed that patients received ESP block (30ml 0.25 % bupivacaine will have lower postoperative numerical rating scale scores at 2 and 12 hrs 3 and 2 respectively as opposed to the control group. (Median 4 and 3 respectively. $P = 0.02$) in patients undergoing PCNL.

Altimarpark et al(16) showed in the study that NRS scores at the postoperative 15th, 30th min, 12th hour and 24th hour were significantly lower in ESP group ($p<0.05$). NRS score variation over time was significantly varied between ESPB and control groups ($F[1,39]=24.061$, $p< 0.0005$).
Nan chen et al(10) found in their study received 20 ml 0.375% ropivacaine .PVB group had significantly lower VAS scores at rest and while coughing than ESP block and ICN block at 0,2,4,8hrs postoperatively. There was no significant difference in the VAS scores between ICN block and ESP block group at all times (VAS 4).
Aman malawat et al(17) showed that duration of post operative analgesia was 41.73hrs in patients receiving ESP block (25ml 0.5 %bupivacaine plus dexamathasone 8 mg)following MRM.

Heart rate
The baseline mean heart rate 93.2± 5.59 bpm in group A and 92.5±5.73 bpm in group B and this difference was statistically not significant. ($p > 0.05$).
The mean heart rate was maintained throughout the surgery in both the groups. None of the patients developed bradycardia (heart rate< 50 bpm) .
The mean heart rate at 90 mins was 89.2±6.18 in group A and 88.7±5.75 in group B and this difference was statistically not significant ($p > 0.05$).
The difference between the mean heart rate of two groups was statistically not significant at all the respective intervals. ($p > 0.05$).

MAP
The difference in baseline mean arterial blood pressures of two groups was statistically not significant (97.4±5.89mmHg and 96.4±4.00 mmHg) in group A and group B respectively. ($p >0.05$).
The difference at 180 minutes mean arterial blood pressures of two groups was statistically not significant (89±5.23mmHg and 87.9±5.63mmHg in group A and group B respectively ($p >0.05$).
There was no statistically significant difference in mean arterial blood pressure of the two groups at all respective intervals. ($p > 0.05$).

SPO2
The mean SpO2 was comparable at all the respective intervals between group A and B and it was statistically insignificant ($p >0.05$).

RESPIRATORY RATE
Gil bolotin et al (18) showed in the study that, mean heart rates (77 ± 6 vs 89 ± 12 beats per minute, $p < 0.001$), respiratory rates (15 ± 2 vs 18 ± 3 respirations per minute, $p < 0.01$) showed a significant difference, where as there was no significant difference in blood pressures in intercostal nerve block and control groups
Chen J et al (11) showed in the study that hemodynamics like MAP and heart rate were comparable in general anesthesia (Group A); general + INB anesthesia (Group B); or, general + epidural anesthesia (Group C). There were no differences in MAP, heart rate in all groups. Administration of INB with general anesthesia enhanced analgesia, led to stable hemodynamics, and reduced anaesthetic consumption and postoperative stress response.

SIDE EFFECTS/ COMPLICATIONS
In the present study, in group 1, around 5 patients experienced nausea and vomiting and in group 2, around 3 patients experienced nausea and vomiting. Other side effects like bradycardia, hypotension, nausea, vomiting, etc. were not observed. Also, complications like vascular puncture, pneumothorax, etc. were not seen in any of the group.
Seelam et al (19) study none of the patients had Post operative nausea vomiting and complications like vascular puncture, pneumothorax, or respiratory depression in patients receiving ESPB and control groups.

Richardson J et al (20) showed in their study that Vomiting, pruritus, and urinary retention occurred only in the epidural group, whereas nausea, vomiting occurred significantly less frequently in the intercostal nerve block group.
Sheets NW et al (21) stated in their study that, Minor complications occurred in 26% of patients that received an epidural catheter for rib fractures. No complications occurred in the patients receiving intercostal nerve block. (liposomal bupivacaine).
In study by Nan chen et al(10) hematoma was noted in ICNB and none in ESPB .Three and five patients had nausea and vomiting in ICNB and ESPB respectively.

Conclusion
We recommend the use of both usg ESPB and usg ICNB in thoracoscopic procedures in terms of duration of analgesia.

Recommendations: Our results could provide a basis for future trials and the relationship between volume or concentration of LA with analgesic effect of ESPB should be further studied.

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