Comparison between Continuous Thoracic Epidural and Ultrasound Guided Continuous Thoracic Paravertebral Block on Perioperative Analgesia and Hemodynamic Stability in Patients Undergoing Thoracotomy

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Abstract:

Objectives: The aim of this study was to evaluate efficacy of both continuous thoracic epidural and continuous paravertebral block on perioperative analgesia, hemodynamic stability in patients undergoing thoracotomy.

Patients and methods: This prospective, randomized, single blind and clinical study was conducted on 60 patients underwent thoracotomy. These patients were randomly allocated into two equal groups: **Group I Thoracic paravertebral analgesia (TPVA)**: received ultrasound guided thoracic paravertebral catheter and **Group II Thoracic epidural analgesia (TEA)**: received ultrasound guided thoracic epidural catheter. In Both groups a bolus dose of 0.5% bupivacaine then continuous infusion of bupivacaine 0.25% intraoperative followed by postoperative continuous infusion of bupivacaine 0.25% plus 2mcg/ml fentanyl. Visual analogue pain score (VAS) was measured at rest, deep breath and coughing every 6 hrs postoperative and Haemodynamic parameters in form of heart rate and invasive blood pressure were recorded as follow: before block, 10min and 20 min after block, 10 minutes after induction, after lateral position, after skin incision and after rib retraction then postoperative were recorded every 6 hrs.

Results: Current study showed no significant differences between both groups as regards VAS at rest, deep breathing and coughing. As regards comparing mean arterial blood pressure (MAP) between both groups, current study showed a significant lower MAP values in TEA group at 10 minutes from bolus dose injection, 20 minutes from bolus dose injection, 10 minutes after induction of general anaesthesia, after lateral

position, after skin incision, after rib retraction and six hours postoperative compared to TPVA group. There were no significant differences as regards respiratory rate, spo2, arterial blood base analysis (pH, PaO2 and PaCo2) and peak expiratory flowmeter at1h, 12hrs and 24hrs postoperative. Also there were no significant differences as regards. Total bupivacaine consumption in 24 hrs and Pain rescue analgesia consumption. There was lower nausea, vomiting, itching and no urine retention in TPVA group

Conclusion: We recommend that The TPVB is safe and effective and should be always considered as a TEB alternative.

Keywords: Thoracic Epidural, Thoracic Paravertebral Block, Ultrasound, Perioperative Analgesia, Hemodynamic Stability, Thoracotomy.

Introduction:

Thoracotomy is a procedure usually associated with severe postoperative pain. The subsequent thoracotomy pain is due to trauma to the chest wall, rib fractures, intercostal nerve injury, and central nervous system sensitization. [(1)] Pain after standard thoracotomy is often present and associated with severe complications, such as atelectasis. This can also develop into a severe pneumonia due to retention of secretions. Pain prevents effective coughing, deep breathing, and a patient's mobility. [(2, 3)] Generally, strong pain after surgery increases perioperative morbidity and may lead to chronic pain. [(4, 5)] Although currently various methods of post thoracotomy pain relief are available none has matched the requirement of an ideal pain relief technique. Regional techniques have received much attention because they are associated with less sedation and early ambulation. [(6)] Thoracic Epidural analgesia (TEA) with local anaesthetic, opioid, or both has become commonplace and has been regarded as the 'gold standard'. [(7)] Epidural blockade has been shown to reduce the intraoperative surgical stress response and has possible advantages for cardiovascular, respiratory, coagulation, gastrointestinal, metabolic and immune function. [(8)] However, thoracic epidurals can cause hypotension, neurological injury, and are contra-indicated

in the presence of coagulopathy or local sepsis. [9] Thoracic Paravertebral block (TPVB), both single injection and continuous infusion, has been reported to be comparable to thoracic epidural with regard to analgesia while avoiding the possibility of hypotension and urinary retention in the postoperative period. Despite these advantages, it should be noted that percutaneous paravertebral catheter placement carries the same contraindications with regard to anticoagulation as epidural analgesia. [10] TPVB and thoracic epidural block (TEB) are frequently performed using surface anatomical landmarks and loss of resistance. Recent advances in ultrasound (US) technology have made it possible to image TPV and TE spaces and accurately determine their distance which may be translated into improved technical outcomes, higher success rates and reduced needle related complications. [11]

Patients and methods:

After local ethical committee approval of Benha university hospital and patient informed written consent, this prospective randomized single blinded clinical study was conducted on 60 patients above 18 years old ASA I, II and III undergoing elective thoracotomy. These patients were randomly allocated by an online randomization program into two equal groups:

Group I Thoracic paravertebral analgesia (TPVA): Received ultrasound guided thoracic paravertebral catheter followed by a bolus dose of 0.5% bupivacaine then continuous infusion of bupivacaine 0.25% intraoperative followed by postoperative continuous infusion of bupivacaine 0.25% plus 2mcg/ml fentanyl .

Group II Thoracic epidural analgesia (TEA): Received ultrasound guided thoracic epidural catheter followed by a bolus dose of 0. 5% bupivacaine then continuous infusion of bupivacaine 0.25% intraoperative followed by postoperative continuous infusion of bupivacaine 0.25% plus 2mcg/ml fentanyl.

Patients with empyema, neoplastic mass occupying paravertebral space, kyphoscoliosis, BMI <18.5 or >30 kg m^2, history of cerebro-vascular disease, seizure

disorders, central nervous system diseases, coagulation disorders, local skin infection at the side of injection and patients with known allergy to one of the used drugs were excluded of the study.

One day before surgery all patients were interviewed to explain visual analogue scale (VAS) and how to use peak flowmeter and a baseline measurement of peak expiratory flow rate (PEFR) was taken.

In the preoperative room, wide pore I.V line was inserted and midazolam (0.01-0.02 mg/kg) were given to all patients, then arterial line was inserted after doing Allen's test to confirm adequacy of circulation. Patients were transported to operation room and routine monitoring was applied.

In both groups Thoracic paravertebral space (TPVS) and Thoracic epidural space (TES) were identified with ultrasound. Once the best image of structures was captured the transducer was stabilized and the skin was marked at the midpoints of the cephalad and caudate aspects and at the midpoints of the right and left aspects of the transducer. The transducer was removed, and lines were drawn to connect these marks. The puncture site was determined by the intersection of these two lines and under sterile conditions, the defined insertion point was infiltrated with lidocaine 1%.

In both groups under sterile conditions An 18 gauge epidural needle (Perifix. B.BRAUN Melsungen AG) was utilized for locating the thoracic paravertebral space and thoracic epidural space by the loss of resistance to air technique by. Once the loss of resistance was established, the depth of the needle was marked and recorded using the markings on the needle. A 20-gauge multiple side holes epidural catheter (B. Braun) was inserted 5 cm passed the loss of resistance depth. After securing the catheter in place and establishing negative aspiration, a test dose was given which included a 3 ml of Lidocaine 1% mixed with epinephrine 1:200,000.

In both groups with patients in the supine position and after 3 minutes of the test dose (proven negative), bupivacaine 0.5% (15-20 ml) and (5-8 ml) in TPVA group and

TEA group respectively was given. In both groups continuous infusion of bupivacaine 0.25% was given at a rate of (0.1 ml/kg/hr) and maintained throughout the whole operation.

General anaesthesia was induced after 20 minutes from bolus dose with propofol 1–3 mg/kg followed by rocuronium 0.6 mg/kg to facilitate endotracheal intubation. Anaesthesia was maintained with isoflurane 1.5% and rocuronium 0.15mg/kg as a maintenance dose every 30 minutes till the end of the procedure. Ventilation parameters will be adjusted as follows: TV = 5-8 ml/kg, respiratory rate = 14/min. and peak inspiratory pressure 30- 35 cm H2O. End tidal CO2 was monitored and maintained between 35-40 mmHg.

Postoperative analgesia will be provided immediately after surgery by an infusion of 0.25% bupivacaine at rate of 0.1ml/kg/h plus 2mcg/ml fentanyl. If VAS was higher than 4, the infusion was increased up to (10 ml/hr). If pain score exceed 4 despite the maximum infusion rate of bupivacaine, rescue analgesia 5mg bolus of morphine was administered intravenous to achieve satisfactory pain control, can be repeated every 4-6 hours.

Measurements:

Main outcome measures: The primary target of this current study was measuring Visual analogue pain score (VAS) at rest, deep breath and coughing every 6 hrs postoperative and Haemodynamic parameters in form of heart rate and invasive blood pressure were recorded as follow: before block, 10min and 20 min after block, 10 minutes after induction, after lateral position, after skin incision and after rib retraction then postoperative were recorded every 6 hrs.

The secondary measurements include: age, sex, weight, height, ASA status, operative time, site of surgery, hospital stay, blood loss, Respiratory parameters in the form of respiratory rate, spo2, arterial blood base analysis (pH, PaO2 and PaCo2) and

peak expiratory flowmeter at1h, 12hrs and 24hrs postoperative, total bupivacaine consumption and Pain rescue analgesia consumption.

- **Data Management and Statistical Analysis:**
  - Analysis of data was done by using SPSS version 16.
  - Quantitative data was presented as mean ± Standard deviation.
  - Qualitative data was presented as numbers and percentages.
  - Quantitative data was analyzed by using unpaired student t-test.
  - Quantitative data in the same group was analyzed by using repeated measure ANOVA test.
  - Qualitative data was analyzed by using Chi-square test and Z test.
  - P – Value < 0.05 was considered statistically significant.
  - P – Value < 0.01 was considered statistically highly significant.
  - A sample size of at least ten patients was needed to have a power of least 80%, the two-sided ά error of 5% level, and on the basis that from our previous studies we would expect a difference in Visual analogue score at rest after 6 hrs.

Results:

There were no significant differences between groups as regarding the demographic characteristics of patients. **(Table 1)**

Table (1): Demographic characteristics of patients {mean ± SD and n (%)}

		Group I (TPVA)	Group II (TEA)	Test of significance	p- value
Age(years)		49.36± 11.73	48.53± 9.43	t=0.30	0.76
Weight(Kg)		78.36 ± (9.47)	78.06 ± 7.52	t=0.13	0.89
Height(Cm)		168.03± (7.26)	168.56 ± 7.30	t=0.28	0.77
Gender	males	21(70%)	24(80%)	X^2 = 0.8	0.37
	females	9(30%)	6(20%)		
ASA Status	I	7(23.3%)	3(10%)	X^2 = 2.35	0.3
	II	20(66.7%)	25(83.3%)		
	III	3(10%)	2(6.7%)		

As regards type of surgery, site of surgery, blood loss, duration of surgery and hospital stay, current study showed no significant differences between both groups. **(Table 2)**

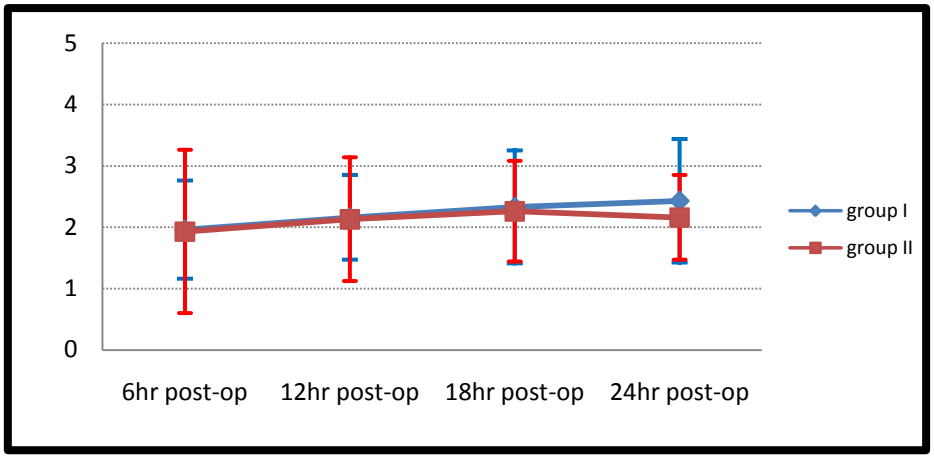
Table (2): operative data and hospital stay of both groups {mean ± SD and n (%)}

		Group I (TPVA)	Group II (TEA)	Test of significance	p-value
Type of surgery	Bilobectomy	4 (13.3%)	2 (6.7%)	Z =0.86	0.38
	Lobectomy	20(66.7%)	23(76.7%)	Z=0.85	0.39
	segmentectomy	0(0%)	1(3.3%)	Z=1.008	0.31
	bronchtomy	6(20%)	4(13.3%)	Z=0.69	0.48
Site of surgery	right	17(56.7%)	20(66.7%)	X^2=0.63	0.42
	left	13(43.3%)	10(33.3%)		
Blood loss (ml)		591.66(124.62)	651.66(171.9)	t=1.54	0.12
Duration of surgery (min)		166.83 (32.25)	165.33 (28.03)	t=0.19	0.84
Hospital stay (day)		10.63 (2.87)	10.53 (2.75)	t=0.13	0.89

Current study showed no significant differences between both groups as regards VAS at rest **(Fig. 1)**, deep breathing **(Fig. 2)** and coughing **(Fig. 3)** at every six hours postoperative. But generally TEA group showed lower but not significant values in comparison with TPVA group. **(Table 3)**

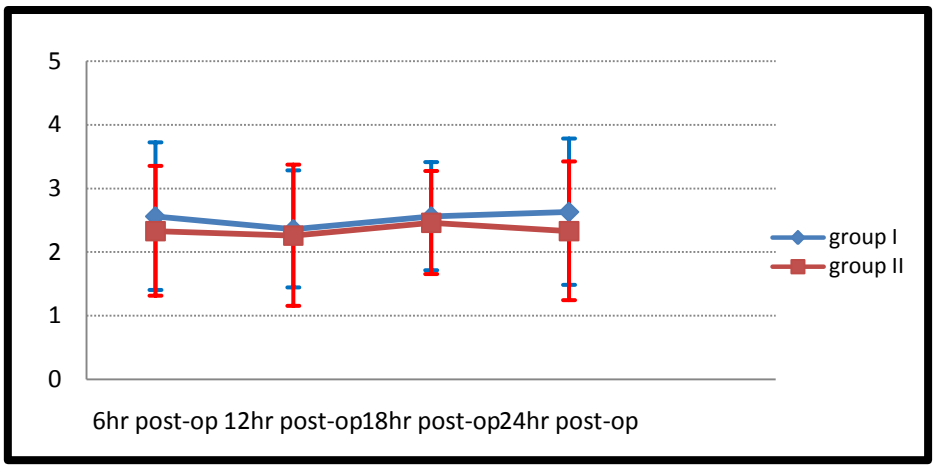
Table (3): visual analogue score (VAS) of both groups {mean ± SD}

Post-operative		Group I (TPVA)	Group II (TEA)	Test of significance	p-value
6hr	At rest	1.96±0.80	1.93±1.33	t=0.10	0.91
	Deep breath	2.56±1.16	2.33±1.02	t=0.81	0.41
	coughing	2.73±1.17	2.53±1.07	t=0.69	0.49
12hr	At rest	2.16±0.69	2.13±1.008	t=0.13	0.89
	Deep breath	2.36±0.92	2.26±1.11	t=0.37	0.70
	coughing	2.53±0.89	2.46±1.008	t=0.28	0.77
18hr	At rest	2.33±0.92	2.26±0.82	t=0.31	0.75
	Deep breath	2.56±0.85	2.46±0.81	t=0.46	0.64
	coughing	2.73±1.01	2.63±0.96	t=0.39	0.69
24hr	At rest	2.43±1.006	2.16±0.69	t=1.21	0.23
	Deep breath	2.63±1.15	2.33±1.09	t=1.03	0.30
	coughing	2.83±0.87	2.63±1.03)	t=0.81	0.41

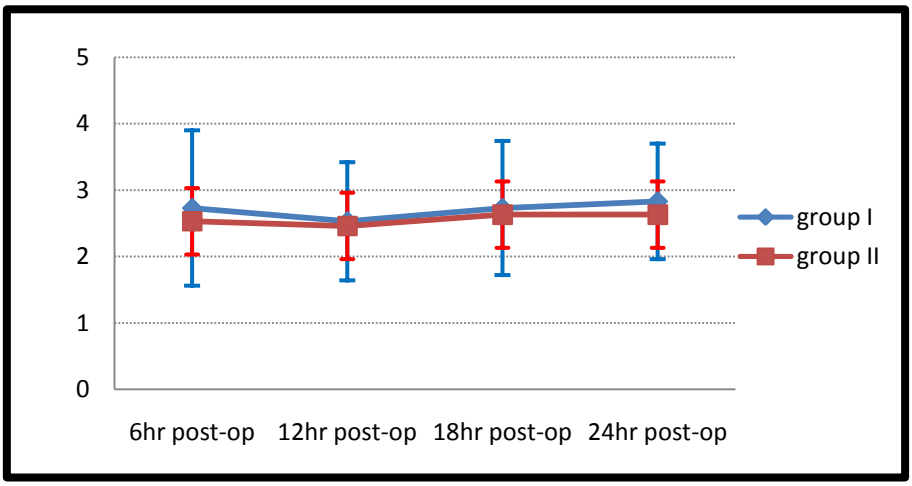


(Figure 1): comparison between both groups as regards VAS at rest

As regards comparing heart rate between both groups current study showed a significant lower heart rate values in TEA group at 20 minutes from bolus dose injection, 10 minutes after induction of general anaesthesia, after lateral position, after skin incision and after rib retraction compared to TPVA group. **(Table 4)**



(Figure 2): comparison between both groups as regards VAS at deep breathing



(Figure 3): comparison between both groups as regards VAS at coughing

(Table 4): Heart rate (HR) of both groups {mean ± SD}

HR(beat/min)		Group I (TPVA)	Group II (TEA)	Test of significance	P-value
Before block		82.26±7.82	82.93±7.92	t=0.32	0.74
After bolus dose	10 min	81.63±6.29	80.63±5.76	t=0.64	0.52
	20 min	80.83±4.84	78.13±5.89	t=1.93	**0.05***
10 min after induction		79.83±4.98	75.83±4.82	t=3.16	**<0.001****
After lateral position		79.73±4.79	74.76±4.76	t=4.03	**< 0.001****
After skin incision		80.86±4.84	76.43±5.36	t=3.35	**< 0.001****
After rib retraction		81.93±6.41	78.23±4.98	t=2.49	**0.01****
Post-operative	6hr	80.13±4.93	78.166±5.05	t=1.52	0.13
	12hr	80.26±5.41	79.63±5.22	t=0.45	0.64
	18hr	82.06±6.41	81.46±5.70	t=0.38	0.70
	24hr	82.16±5.93	81.86±6.31	t=0.18	0.85
f- value		0.86	6.42		
p- value		0.56	**< 0.001****		

significant** * Highly significant**

As regards comparing mean arterial blood pressure (MAP) between both groups, current study showed a significant lower MAP values in TEA group at 10 minutes from bolus dose injection, 20 minutes from bolus dose injection, 10 minutes after induction of general anaesthesia, after lateral position, after skin incision, after rib retraction and six hours postoperative compared to TPVA group. **(Table 5) (Fig. 4)**

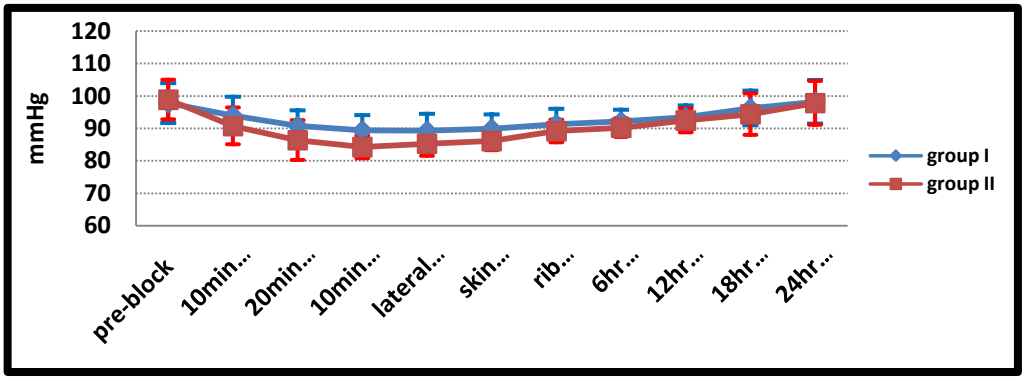
(Table 5): Heart rate (HR) of both groups {mean ± SD}

		Group I (TPVA)	Group II (TEA)	t-value	p-value
Before block		97.76±6.15	98.86±6.11	t=0.69	0.48
After bolus dose	10 min	93.96±5.75	90.73±5.68	t=2.18	**0.03***
	20 min	90.76±4.76	86.36±6.14	t=3.10	**<0.001****
10 min after induction		89.43±4.62	84.23±3.49	t=4.91	**<0.001****
After lateral position		89.33± 5.12	85.26±3.75	t=3.51	**<0.001****
After skin incision		89.86±4.40	86.13±2.89	t=3.88	**<0.001****
After rib retraction		91.33± 4.67	89.16±3.50	t=2.03	**0.04***
Post-operative	6hr	92.16±3.55	90.23±2.90	t=2.30	**0.02***

	12hr	93.46±3.58	92.43±3.68	t=1.09	0.27
	18hr	96.26±5.35	94.36±6.40	t=1.24	0.21
	24hr	98.16±6.72	97.83±6.76	t=0.18	0.85
f- value		f = 11.16	f = 33.56		
p- value		**< 0.001****	**<0.001****		

***significant** ** **Highly significant**

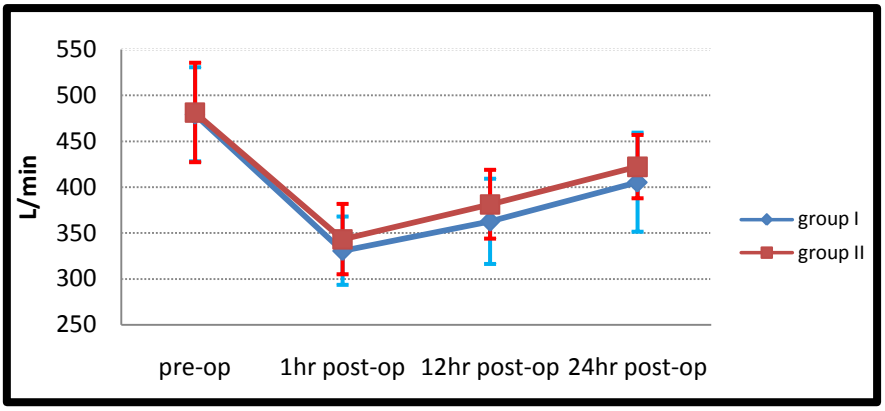
As regards comparison between both groups in peak expiratory flow rate (PEFR) current study showed no significant differences but values were better in TEA group. As regards comparing postoperative PEFR from preoperative basal values in each group current study showed lower significant values in both groups. **(Table 6) (Fig. 5)**



(Figure 4): comparison between both groups as regards mean BP (MAP)

(Table 6): PEFR of both groups {mean ± SD}

PEFR (L/min)		Group I (TPVA)	Group II (TEA)	Test of significance	p-value
Pre-operative		479.33± 51.25	481.33± 54.18	t=0.14	0.88
Post-operative	1hr	330.66± 37.22	343.33±38.35	t=1.29	0.19
	12hrs	362.66± 46.45	381.33± 37.48	t=1.71	0.09
	24hrs	405.33± 53.99	422.33± 43.52	t=1.34	0.18
f- value		54.25	55.03		
p- value		**< 0.001****	**< 0.001****		



(Figure 5): comparison between both groups as regards mean peak expiratory flow rate (PEFR)

As regards comparing mean arterial blood gases analysis (ABG), PH, PaO2 and PaCO2 between both groups current study showed no significant differences. **(Table 7)**

As regards comparison of total bupivacaine consumption and Pain rescue analgesia consumption between both groups current study showed that there were no significant differences between both groups. **(Table 9)**

(Table 8): arterial blood gases analysis of both groups {mean ± SD}

			Group I (TPVA)	Group II (TEA)	Test of significance	p-value
PH	Pre-operative		7.373 ±0.019	7.377±0.023	t=0.84	0.40
	Post-operative	1hr	7.364±0.015	7.363±0.012	t=0.27	0.78
		12hr	7.367 ±0.011	7.365 ± 0.014	t=0.09	0.92
		24hr	7.379 ±0.0147	7.3767 ±0.016	t=0.57	0.57
Pao2 (mmHg)	Pre-operative		86.53 ±4.31	86.23 ± 4.93	t=0.22	0.82
	Post-operative	1hr	139.03 ±8.71	141.20 ±5.83	t=1.13	0.26
		12hr	86.66 ±4.27	86.03 ± 4.32	t=0.56	0.57
		24hr	85.50 ±4.83	86.76±4.08	t=1.09	0.27
Paco2 (mmHg)	Pre-operative		40.03±2.57	40.46±1.97	t=0.72	0.47
	Post-operative	1hr	40.16±2.52	39.86±2.68	t=0.44	0.65
		12hr	39.66 ±2.36	40.16±2.16	t=0.85	0.39
		24hr	40.03 ±2.55	39.30±2.35	t=1.15	0.25

(Table 9): bupivacaine and morphine consumption of both groups {mean ± SD}

	Group I (TPVA)	Group II (TEA)	t-test	P Value

Total bupivacaine consumption (ml)	187.16±11.67	183.16± 9.34	t=1.46	0.14
Pain rescue analgesia consumption (mg)	1.83 ±2.45	1.16± 2.15	t=1.12	0.26

As regards comparison of complication between both groups, they showed non significant differences as regards nausea, vomiting and itching but generally were lower in TPVA group. while there was a significant differences as regards urine retention as follow 5 patients (16.6%) in TEA group and there was no patient in TPVA group **p= 0.01**

(Table 10): complication in both groups {n (%)}

complications	Group I (TPVA)	Group II (TEA)	Test of significance	P Value
Nausea	5(16%)	9(30%)	z=1.22	0.2
Vomiting	0 (0%)	3 (10%)	z=1.77	0.07
Urine retention	0 (0%)	5 (16.6%)	Z=2.33	0.01*
Itching	2(6.6%)	5(16.6%)	Z=1.2	0.22

*** significant**

Discussion:

In current study, Pain scores as assessed by the visual analogue scale at rest, deep breath and coughing every 6 hrs postoperative, were lower in the TEA group, however the difference was not statistically significant (P>0.05). The two groups showed similar total volume of bupivacaine infused over 24 hours (P=0. 0.14). Current study goes with ***Pintaric et al.,*** [12] ***Gulbahar et al.,*** [13] ***Hitham et al.,*** [11] ***Messina et al.,*** [14] they founded no significant differences between TEA and TPVA as regards VAS but doesn't go with ***Richardson et al.,*** [15] ***they*** founded that significantly lower VAS pain scores both at rest and on coughing in PVB group compared to TEA group (P=0.02 and P=0.0001, respectively). The statistically significant difference in the VAS scores between the two groups can be explained by; their studied population was heterogenous in comparison to our study. They included patients undergoing oesophagectomy and anti-reflux measures, beside lung resection surgery, and this might be responsible for the greater difference between the two groups. Also current study doesn't go with ***Debreceni et al.,*** [16] They founded that thoracotomy pain management with continuous epidural analgesia was superior to continuous thoracic paravertebral analgesia, in the early postoperative period. The statistically significant difference in the VAS scores between the two groups can be explained by; the large volume injected into the epidural space (0.2 ml/kg). The extent of the sensory blockade in each group was not recorded for further statistical analysis in their study. Also current study doesn't go with ***Federico et al.,*** [17] they founded statistical significance VAS in favour of the PA group (P = 0.002) which can be explained by higher concentration of local anaesthetic in PA group.

As regard mean arterial blood pressure (MAP) current study showed a significant decrease in MAP in Group II (TEA) compared with Group I (TPVA) at 10 minutes from bolus dose, 20 minutes from bolus dose, at 10 minutes after induction of general anaesthesia, after lateral position**,** after skin incision**,** after rib retraction and 6 hr postoperative. Current study goes with ***Maitreyee et al.,*** [18] ***Ahmed and Nadeen,*** [19]

(Casati et al., [20] ***Dalim et al.,*** [21] they founded that there were a statistically significant difference existed between the MAP and mean *P* among the groups which were lower in TED group but doesn't go with ***Santhosh and Rajendran,*** [22] they founded that there was no fall in blood pressure after the first hour and the mean MAP between the two groups was not statistically significant. This can be explained by; in both groups only 8 ml of 0.25% bupivacaine after the completion of the surgical procedure and patient doesn't receive intraoperative opioid analgesia while intraoperative analgesia was maintained with N2O only. Also doesn't go with ***Pintaric et al.,*** [12] they founded that both groups did not differ significantly in heart rate, mean arterial blood pressure, or systemic vascular resistance indices. This can be explained by; a greater volume of colloid infusion and phenylephrine were required in the epidural than in the paravertebral group to maintain the targeted oxygen delivery index. Also doesn't go with ***Dhole et al.,*** [23] they founded that no significant differences as regards haemodynamic parameters, HR and MAP while cardiac index at 4 hours and 6 hours was significantly higher in the TEA group than TPA group. Systemic vascular resistance was lower in the TEA group throughout the study period, although there was no statistical difference.

AS regard peak expiratory flowmeter (PEFR) at 1h, 12hrs and 24hrs postoperative current study showed no significant differences but values were better in TEA group. In TPVA group there was a significant lower PEFR values as compared to basal preoperative values at 1hr postoperative it was dropped 31.01%, 12hrs postoperative it was dropped 24.34% and 24hrs it was dropped 15.43%. In TEA group there was a significant lower PEFR values as compared to basal preoperative values at 1hr postoperative it was dropped 28.67%**,** 12hrs postoperative it was dropped 20.77% and 24hrs it was dropped 12.25%. Current study goes with ***Gulbahar et al.,*** [24] they founded that FEV1 and PEFR had declined compared with the preoperative values in each group. However, there was no difference in FEV1 and PEFR between both groups. But doesn't go with ***Kaiser et al.,*** [25] they founded that there was a significant

decrease in FVC and FEV1 and this reduction was more marked in TED group**.** This can be explained by; in their study ornipressin was added to the thoracic paravertebral infusion which most likely prevented the systemic reabsorption of bupivacaine and contributed to the prolonged local effect, this fact may partially explain the better pulmonary function results obtained in this study. Also doesn't go with ***Messina et al.,*** [14] they founded that Spirometer measurements three days after surgery indicated the better performance of the patients in the epidural group. This can be explained by; the observed difference in pulmonary functions was suggested to be due to a statistically significant (P=0.003) increase in median (25th-75th percentiles) patient-controlled use of morphine. This increase in morphine usage in the paravertebral group was statistically significant at 6, 24, 48, and 72 hours after surgery. Also doesn't go with ***Hitham et al.,*** [11] they founded that there was a reduction in the spirometric measurements at 24 and 72hrs which was marked in TPV group. This can be explained by; the differences in opioid consumptions between both groups.

As regards comparison of complication between both groups current study showed a non significant lower; nausea 5 patients(16%), vomiting no patients (0%) and itching 2 patients (6.6%) in TPVA group as compared to TEA group, nausea 9 patients (30%), vomiting 3 patients (10%) and itching 5 patients (16.6%) while there was a significant differences as regards urine retention as follow 5 patients (16.6%) in TEA group and there was no patient in TPVA group **p= 0.01**. current study goes with ***Xibing et.,*** [26] they founded that PVB resulted in significantly less incidence rates of urinary retention nausea and vomiting, and hypotension.

Conclusion:

There was no statistically significant difference between TPVA and TEA in terms of efficient analgesia but TPVB showed greater hemodynamic stability than epidural analgesia in patients having thoracotomy also TPVB was associated with less side effects. We recommend that The TPVB is safe and effective and should be always considered as a TEB alternative.

Study limitation:

The possible shortcomings of our paper; the study did not include a placebo control group. VAS and other measured parameter were compared between both groups for only 24 hrs.

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