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Comparison of Bilateral Ultrasound-Guided Erector Spinae Plane Block and Thoracic Epidural Analgesia in Open Heart Surgery

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Abstract

Objective: In our study, it was aimed to compare the postoperative analgesic efficacy of bilateral USG-guided erector spinae plane block (ESP) block and thoracic epidural analgesia (TEA) in patients who underwent open heart surgery.

Methods: No interventional multimodal analgesia technique was applied to the patients in the control group, only iv patient-controlled analgesia (iv PCA) device was inserted at the end of the operation. The duration of postoperative mechanical ventilation (MV), the amount of opioid consumed in the first 24 hours, and the visual analog scale (VAS) scores during postoperative 1st, 2nd, 4th, 6th, 12th, 24th hours while resting/coughing were recorded.

Results: There was a notable difference there among the groups in terms of the amount of postoperative opioid consumption (p=0.001). There was a notable difference there among the groups in the resting VAS scores at the postoperative 1st, 2nd, 4th, 12th, and 24th hours (p<0.001, p=0.002, p=0.002, p=0.051, p=0.001, p=0.021 respectively). There was a notable difference there among the groups in the VAS scores while coughing at the postoperative 1st, 2nd, 4th, 6th, and 24th hours (p<0.001, p<0.001, p<0.001 p=0.008, p=0.051, p=0.006 respectively).

Conclusion: We think that ESP block is a good alternative to TEA, which is shown as the gold standard in pain control after open heart surgery

Keywords: Erector spinae plane block, thoracic epidural analgesia, postoperative analgesia management

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INTRODUCTION

More than 800.000 open heart surgeries are performed worldwide each year (1). Coronary artery bypass grafting surgery and valve surgery are traditionally performed through median sternotomy, with severe damage to soft tissues and bone tissue during the dissection stage. Moderate to severe pain occurs in 30-75% of patients after cardiac surgery. In 4-10% of patients, chronic pain syndrome may develop postoperatively (2,3).Hemodynamic stability, improvement of myocardial oxygenation, immune modulation and bleeding control can be achieved with adequate pain treatment. This may reduce the duration of mechanical ventilation, cardiac ischemic events and arrhythmias in the postoperative period. Improved pain control has a notable impact on hospital stay and patient satisfaction, as well as reducing surgery-related complications. Therefore, providing adequate intraoperative and postoperative analgesia should be a primary priority for the anesthesiologist (3).

Ultrasound (USG) guided erector spinae plane (ESP) block is applied by injecting a solution containing local anesthetic into the fascia under the erector spinae muscle (4-6). Because of the application site of the ESP block is far from the pleura and neuraxial tissues, it reduces the risk of complications owing to injury to these structures. The sonoanatomy is easy to view, and the get around of the local anesthetic is clearly visible (7-9). Cadaver studies have indicated that the injection get rounds to the ventral and dorsal roots of the spinal nerves and formed sensory blockade in both the anterolateral thorax and the posterior hemithorax (4). In the literature, it was stated that efficient analgesia was derived in randomized controlled studies looking into the effectiveness of ESP block for postoperative analgesia management after open heart surgery, breast surgery and ventral hernia repair (7-9).

Thoracic epidural analgesia (TEA) is the perfect option in thoracotomy surgeries, but it has important undesirable side effects for instance hypotension, dural puncture and contralateral block (10). Epidural analgesia has been using in cardiac surgery for many years. However, the use of TEA is limited for fear of increased risk of epidural hematoma due to preoperative and intraoperative anticoagulation therapy. Since epidural catheterization is a controversial technique, it is very important to update the risk-benefit ratio of epidural catheterization in cardiac surgery (11,12). A recent review described the benefits and risks associated with thoracic epidural analgesia and concluded that “the put upon of epidurals in cardiac surgery is no more dangerous than non-cardiac surgery” (13).

In this study, it is aimed to compare the postoperative analgesic efficacy of USG-guided bilateral ESP block and TEA in patients conducting open heart surgery.

METHODS

The study started after getting approval from Ordu University Clinical Research Ethics Committee (the ethics committee decision dated 06.05.2022 and with registration number 2022/191).

Following the ethics committee approval, patients there among the ages of 18-80, with ASA (American Society of Anesthesiologist) score III-IV and pain assessment cooperation who underwent elective open heart surgery in the cardiovascular surgery operating room of Ministry of Health, Ordu University Training and Research Hospital were included in the study .Our study was carried out between 1 June 2022 and 01 February 2023. The patients who wanted to quit the study voluntarily, had local anesthetic allergy, substance abuse, chronic pain syndrome, cooperation disorder, pregnant or breast feeding, peripheral nerve disease and emergency open heart surgery were not included in this study. Written and verbal informed consent was obtained from all patients participating in the study by giving detailed information about the procedure before the operation. Group selection was performed based on the patient's preference. The groups were randomized as follows: When the patient was taken to the operating table, She/he was asked to choose one of the 3 sealed envelopes. The analgesia method written in the envelope was applied to the patient. According to the type of postoperative analgesia, 3 groups were formed as the control group (Group Control), Group ESP and Group TEA. Postoperative results such as VAS scores and the amount of opioid consumed were performed by a different anesthetist who did not know the patient groups. The study was performed as a single-blind, randomized controlled and prospective study.

Power analysis was performed for our study. Considering the postoperative 1st hour VAS values, it was concluded that a total of 48 cases, 16 in each group, should be included in the study with 95% confidence (1-α), 95% test power (1-β), f=0.597 effect size (14). 68 cases, including 22 control group, 23 TEA, 23 ESP block group, were included in our study.

After electrocardiography (ECG), noninvasive blood pressure measurement, blood oxygen saturation (SpO2) and temperature monitoring, the patients were intubated after anesthesia induction with 2-3 mg/kg iv propofol, 1.5 mcg/kg fentanyl and 0.6 mg/kg rocuronium bromide. Anesthesia was maintained with 2% sevoflurane, 40% O2-air mixture and 0.05 mcg/kg/min fentanyl infusion. The fresh gas flow of the anesthesia device was set to 4 lt/min. Intraoperative invasive blood pressure monitoring was performed by radial artery cannulation. At the end of the operation, an i.v patient-controlled analgesia device (i.v PCA) was connected to all patients without basal infusion by pressing the button when they felt pain. The patient-controlled analgesia device was set with no basal infusion, with a 10-

minute lock-in time to give a bolus dose of 20 mg Tramadol (Ramadex 100 mg/2 ml, Haver İlaç, Istanbul, Turkey) when the patient pressed the button.

No interventional multimodal analgesia technique was applied to the patients in the control group, only iv PCA device was used at the end of the operation.

In the ESP block group, the patient was seated on the operating room table after monitoring. USG-guided bilateral ESP block was performed in the sitting position. After asepsis-antisepsis was achieved, the high-frequency linear USG probe was placed rough 2-3 cm lateral to the T5 vertebra in the transverse plane, and the T5 transverse process was visualized on USG. By advancing the block needle parallel to the probe in the cranio-caudal direction with an in-plane technique, it was felt to touch the transverse process at approximately 4 cm, passing first the trapezius, then the rhomboid major and erector spinae muscle. Confirmation was performed by observing the opening of the muscle fascia with 5 ml of saline. Afterwards, 0.5% bupivacaine 10 cc and 0.9% saline 10 cc were mixed and a total of 20 ml of solution was given in this plane. The same process was repeated for the other side. A total of 40 ml of 0.25% bupivacaine, 20 ml right and 20 ml left, was given for analgesia. The USG device we use is Clarius L7 HD3 Linear Ultrasound scanner (Clarius, AG Healthcare, Istanbul, Turkey), and for ESP block, sonovisible 80 mm BBraun (BBraun, Stimuplex, Melsungen, Germany) branded block needle was used. At the end of the operation, an i.v PCA device was used.

In the TEA group, the patient was seated on the operating room table after monitoring. A thoracic epidural catheter was inserted in the sitting position. After asepsis-antisepsis was achieved, median intervention was made through the T6-7 intervertebral space, and the epidural space was reached with the hanging drop technique. The catheter (Perifix, 18 G Tuohy needle, BBraun, Melsungen, Germany) was placed in the epidural space approximately 4-5 cm. A test dose was administered with 3 ml of 2% lidocaine containing 5 μg/ml adrenaline (1:200.000). Invasive blood pressure and heart rate response were monitored. After the location of the epidural catheter was confirmed, 20 ml of local anesthetic solution prepared with 0.25% bupivacaine was administered through the catheter. Likewise, 20 ml of bupivacaine, prepared at a concentration of 0.25%, was administered during sternal closure. A total of 40 ml of diluted local anesthetic was administered to the patient. When the surgery is over, the epidural catheter was removed and an i.v PCA device was inserted. Demographic characteristics of the cases, Euroscore scores, ASA scores, mean arterial pressures (MAP) after intubation, before and after perfusion and pulse values were recorded. Similarly, postoperative mechanical ventilation (MV)

duration, visual analogue scores (VAS) while resting and coughing after extubation at 1st, 2nd, 4th, 6th, 12th, and 24th hours, postoperative opioid (tramadol) amount consumed were recorded.

Statistical analysis:

Data were analyzed with IBM SPSS v23. Conformity to the normal distribution was evaluated using the Shapiro-Wilk test. Chi-square test was used to compare categorical variables according to groups. One-way analysis of variance was used to compare the normally distributed data according to the groups. The Kruskal Wallis test was used to compare the data that were not normally distributed according to the groups, and multiple comparisons were examined with the Dunn test. The Friedman test was used to compare data that were not normally distributed over time within the group. Analysis results were presented as mean ± standard deviation and median (minimum – maximum) for quantitative data, and frequency (percent) for categorical variables. Significance level was taken as $p<0.05$.

RESULTS

There was no statistical difference there among the groups in terms of gender, ASA risk class, type of surgery and smoking. The results are shown in Table 1.

The analysis results of the groups regarding age, weight, height, EF (Ejection Fraction), operation time, postoperative MV duration and postoperative opiod consumption are shown in Table 2.

Table 1. Comparison of gender, ASA, type of surgery, smoking variables according to groups

	Control	TEA	ESPB	Total	Test stat.	p
Gender						
Female	11 (50)	10 (43.5)	7 (30.4)	28 (41.2)	1.853	0.396
Male	11 (50)	13 (56.5)	16 (69.6)	40 (58.8)		
ASA						
3	15 (68.2)	13 (56.5)	15 (65.2)	43 (63.2)	0.716	0.699
4	7 (31.8)	10 (43.5)	8 (34.8)	25 (36.8)		
Surgery Type						
Valve surgery	5 (22.7)	2 (8.7)	5 (21.7)	12 (17.6)	4.905	0.297
Coronary	11 (50)	17 (73.9)	16 (69.6)	44 (64.7)		
Valve and coronary	6 (27.3)	4 (17.4)	2 (8.7)	12 (17.6)		
Smoking						
None	14 (63.6)	10 (43.5)	9 (39.1)	33 (48.5)	3.058	0.217
Yes	8 (36.4)	13 (56.5)	14 (60.9)	35 (51.5)		

*Chi-square test, frequency (percent)

There was a notable difference there among the groups in terms of postoperative opioid consumption (p=0.001). There was no difference there among the groups in terms of postoperative MV duration.

Comparisons made in terms of mean arterial pressure (MAP) and pulse, which are intraoperative vital signs, are shown in Table 3.

Table 2. Comparison of age, height, weight, Ejection Fraction (EF), Euroscore, operation time, postoperative mechanical ventilation (MV) time, postoperative opioid amount by groups

	Control	TEA	ESPB	Total	Test stat.	p
Age	61.86±8.50	65.22±10.00	62.13±10.38	63.09±9.66	0.845	0.434*
	61.50 (47.00 - 77.00)	64.00 (47.00 - 84.00)	62.00 (42.00 - 86.00)	62.00 (42.00 - 86.00)		
Weight	77.55±11.38	78.91±11.39	79.74±11.88	78.75±11.42	0.206	0.814*
	76.50 (60.00 - 105.00)	78.00 (59.00 - 100.00)	82.00 (55.00 - 105.00)	79.00 (55.00 - 105.00)		
Height	165.45±9.35	164.83±8.66	168.48±8.35	166.26±8.81	1.131	0.329*
	165.00 (150.00 - 185.00)	165.00 (150.00 - 180.00)	169.00 (152.00 - 183.00)	166.00 (150.00 - 185.00)		
EF	0.52±0.08	0.51±0.07	0.55±0.06	0.53±0.07	5.287	0.071**
	0.55 (0.25 - 0.60)	0.55 (0.35 - 0.60)	0.55 (0.45 - 0.65)	0.55 (0.25 - 0.65)		
Euroscore	2.55±2.46	2.04±2.14	2.13±1.74	2.24±2.11	0.468	0.791**
	2.00 (0.00 - 9.00)	2.00 (0.00 - 7.00)	2.00 (0.00 - 5.00)	2.00 (0.00 - 9.00)		
Operation Duration	3.62±0.98	3.28±0.82	3.13±0.53	3.34±0.81	4.928	0.085**
	3.50 (2.00 - 6.00)	3.00 (2.00 - 5.50)	3.00 (2.45 - 4.00)	3.00 (2.00 - 6.00)		
Postoperative MV duration	11.48±11.35	10.91±5.05	7.70±1.42	10.01±7.23	4.786	0.091**
	8.00 (4.00 - 55.00)	10.00 (5.50 - 28.00)	8.00 (4.50 - 11.00)	8.00 (4.00 - 55.00)		
Postoperative opioid amount (mg)	118.18±113.96	21.78±42.15	30.57±87.52	55.94±95.20	13.912	**0.001****
	100.00 (0.00 - 400.00)a	0.00 (0.00 - 100.00)b	0.00 (0.00 - 400.00)b	0.00 (0.00 - 400.00)		

*One-way analysis of variance, **Kruskal Wallis test, a-b: No difference between groups with the same letter, mean ± standard deviation, median (minimum – maximum)

In terms of intraoperative vital signs, no notable difference was found in all measured time periods.

The comparison of the VAS score resting values according to the groups is presented in Table 4.

Except for the postoperative 6th hour, a notable difference was found thereamong the groups in the other time periods (postoperative 1st, 2nd, 4th, 12th, 24th hours). Obtained p values were determined as p<0.001, p=0.002, p=0.002, p=0.051, p=0.001, p=0.021 in the time frame, respectively. The p value obtained at the sixth hour all groups was 0.051, which is very close to the level of significance.

The line graph of the resting VAS values is presented in Figure 1.

The line graph of the coughing VAS values is presented in Figure 2.

Table 3. Comparison of MAP and pulse values by groups

	Control	TEA	ESPB	Total	Test stat.	p
Preoperative MAP	117.95±18.25	108.78±17.95	110.43±20.11	112.31±18.95	3.821	0.148**
	121.00 (83.00 - 155.00)	108.00 (80.00 - 145.00)	111.00 (81.00 - 176.00)	112.50 (80.00 - 176.00)		
MAP after intubation	80.27±18.75	83.87±25.48	78.00±20.06	80.72±21.48	0.429	0.653*
	77.50 (51.00 - 115.00)	81.00 (38.00 - 137.00)	70.00 (45.00 - 124.00)	78.50 (38.00 - 137.00)		
MAPjust before the perfusion	67.91±14.06	59.39±12.32	65.96±10.09	64.37±12.60	5.059	0.080**
	64.50 (51.00 - 111.00)	58.00 (40.00 - 83.00)	63.00 (51.00 - 84.00)	63.00 (40.00 - 111.00)		
MAP just after the perfusion	72.68±12.11	70.04±13.06	66.26±14.79	69.62±13.45	1.312	0.276*
	71.00 (55.00 - 108.00)	69.00 (50.00 - 100.00)	68.00 (40.00 - 100.00)	69.50 (40.00 - 108.00)		
Preoperative pulse	85.59±18.13	86.13±22.17	84.09±16.49	85.26±18.83	0.071	0.932*
	83.00 (54.00 - 112.00)	81.00 (55.00 - 144.00)	83.00 (60.00 - 122.00)	82.50 (54.00 - 144.00)		
Pulse after intubation	76.09±11.08	82.13±20.98	75.09±15.49	77.79±16.48	1.065	0.587**
	74.00 (55.00 - 102.00)	78.00 (62.00 - 144.00)	73.00 (53.00 - 114.00)	75.00 (53.00 - 144.00)		
Pulse just before the perfusion	78.05±12.67	79.35±23.17	78.61±13.21	78.68±16.86	0.134	0.935**
	78.00 (54.00 - 101.00)	77.00 (48.00 - 144.00)	76.00 (55.00 - 109.00)	77.50 (48.00 - 144.00)		
Pulse just after the perfusion	79.95±12.42	77.78±18.91	73.52±11.07	77.04±14.60	3.267	0.195**
	78.00 (61.00 - 101.00)	70.00 (57.00 - 134.00)	71.00 (55.00 - 101.00)	71.50 (55.00 - 134.00)		

The comparison of the VAS score values when coughing according to the groups is presented in Table 5. Except for the postoperative 12th hour, there was a notable difference between the groups in all other time periods (1st, 2nd, 4th, 6th, 24th hours) evaluated. The p values obtained were determined as $p<0.001$, $p<0.001$, $p<0.001$ $p=0.008$, $p=0.051$, $p=0.006$ in the time frame, respectively. The p value obtained in 12th hour all groups was 0.051, which is very close to the level of significance.

Table 4. Comparison of VAS score ***resting*** values according to groups

	Control	TEA	ESPB	Total	Test stat.	p*
VAS score 1st hour of rest	4.32±1.84 4.00 (1.00 - 9.00)a	2.17±1.47 2.00 (0.00 - 4.00)b	2.52±1.93 2.00 (0.00 - 9.00)b	2.99±1.97 3.00 (0.00 - 9.00)	16.780	**<0.001**
VAS score 2nd hour of rest	4.14±2.03 4.00 (1.00 - 9.00)a	2.26±1.66 2.00 (0.00 - 5.00)b	2.22±1.28 2.00 (0.00 - 4.00)b	2.85±1.88 3.00 (0.00 - 9.00)	12.717	**0.002**
VAS score 4th hour of rest	3.95±2.03 3.50 (1.00 - 9.00)a	2.04±1.46 2.00 (0.00 - 4.00)b	2.17±1.37 2.00 (0.00 - 4.00)b	2.71±1.84 3.00 (0.00 - 9.00)	12.785	**0.002**
VAS score 6th hour of rest	3.55±1.82 3.50 (0.00 - 7.00)	2.96±4.43 2.00 (0.00 - 22.00)	2.65±2.25 3.00 (0.00 - 11.00)	3.04±3.04 3.00 (0.00 - 22.00)	6.333	0.051
VAS score 12th hour of rest	3.59±1.62 3.00 (1.00 - 8.00)a	1.83±1.44 2.00 (0.00 - 5.00)b	2.39±1.34 2.00 (0.00 - 4.00)ab	2.59±1.62 2.50 (0.00 - 8.00)	13.151	**0.001**
VAS score 24th hour of rest	3.36±1.68 3.00 (1.00 - 8.00)a	2.00±1.38 2.00 (0.00 - 5.00)b	2.26±1.57 2.00 (0.00 - 6.00)ab	2.54±1.64 2.00 (0.00 - 8.00)	7.760	**0.021**
Test stat.	20.685	4.312	2.678			
p**	0.051	0.505	0.750			

*Kruskal Wallis test, **Friedman test, a-b: No difference between groups with the same letter, mean ± standart deviation, median (minimum – maximum)

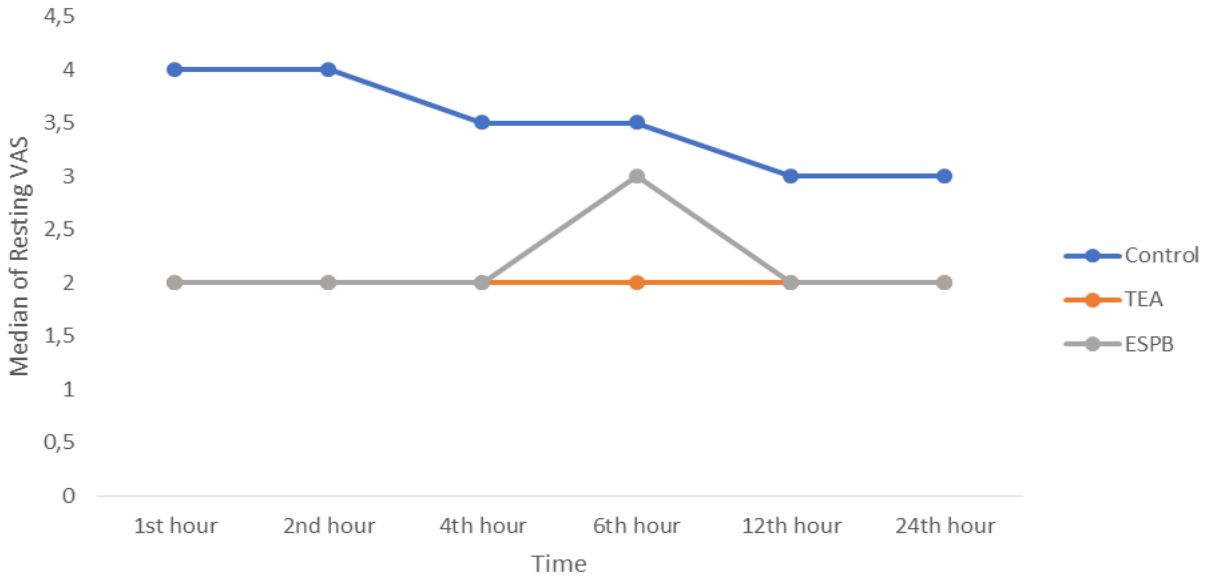

Figure 1. Line graph of resting VAS values

Table 5. Comparison of VAS score values when ***coughing*** according to groups

	Control	TEA	ESPB	Total	Test stat.	p*
VAS score 1st hour when coughing	5.18±1.71 5.00 (2.00 - 8.00)a	3.00±1.68 3.00 (0.00 - 6.00)b	2.87±1.32 3.00 (0.00 - 5.00)b	3.66±1.88 3.00 (0.00 - 8.00)	19.929	**<0.001**
VAS score 2nd hour when coughing	4.82±1.82 5.00 (2.00 - 8.00)a	2.91±1.56 3.00 (0.00 - 6.00)b	2.78±1.09 3.00 (0.00 - 5.00)b	3.49±1.76 3.00 (0.00 - 8.00)	17.029	**<0.001**
VAS score 4th hour when coughing	4.68±1.94 4.00 (2.00 - 9.00)a	2.91±1.41 3.00 (0.00 - 6.00)b	2.70±1.22 3.00 (0.00 - 5.00)b	3.41±1.76 3.00 (0.00 - 9.00)	15.742	**<0.001**
VAS score 6th hour when coughing	4.45±1.90 4.00 (2.00 - 9.00)a	3.00±1.68 3.00 (0.00 - 7.00)b	2.87±1.32 3.00 (1.00 - 5.00)b	3.43±1.77 3.00 (0.00 - 9.00)	9.671	**0.008**
VAS score 12th hour when coughing	4.23±1.93 4.00 (2.00 - 9.00)	2.91±1.59 3.00 (0.00 - 6.00)	2.91±1.56 3.00 (0.00 - 6.00)	3.34±1.78 3.00 (0.00 - 9.00)	7.098	0.051
VAS score 24th hour when coughing	4.41±1.87 4.00 (2.00 - 9.00)a	2.77±1.60 3.00 (0.00 - 6.00)b	2.87±1.66 2.00 (0.00 - 6.00)b	3.34±1.85 3.00 (0.00 - 9.00)	10.094	**0.006**
Test stat.	12.338	0.462	2.677			
p**						

*Kruskal Wallis test, **Friedman test, a-b: No difference between groups with the same letter, mean ± standart deviation, median (minimum – maximum)

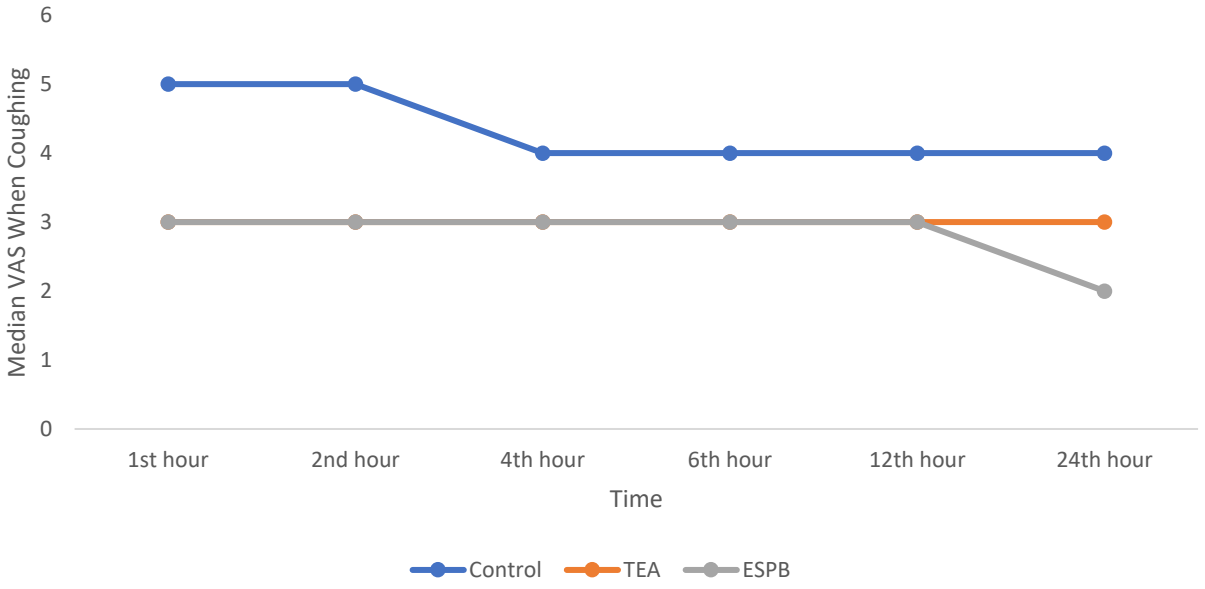

Figure 2. The line graph of the coughingVAS values is presented in Figure 2.

DISCUSSION:

As a result of our study, a notable difference was found between the TEA group, ESP group and control group in terms of postoperative opioid consumption. It was determined that less opioids were consumed in the postoperative period in the TEA group and ESP block group. However, when the TEA and ESP block groups

were compared in terms of opioid consumption, no notable difference was found. Similarly, between resting and coughing VAS scores, much lower VAS scores were obtained in the TEA and ESP block group compared to the control group. According to our results, USG-guided ESP block may be an alternative analgesic method to TEA in the analgesia of open heart surgery.

In a randomized controlled study conducted by Nagajara et al. in 2018, the analgesic efficacy of TEA and bilateral continuous ESP block were compared in 50 patients who had undergone cardiac surgery with median sternotomy. Postoperative pain assessment using VAS at rest and during coughing was performed at 0th, 3rd, 6th, 12th, 24th, 36th and 48th hours, and if VAS at rest >4, rescue analgesia was administered with iv fentanyl 1 mcg/kg. It was observed that both groups had similar VAS scores at 0th, 3rd, 6th and 12th hours both at rest and during coughing. However, it was determined that the ESP group had lower VAS scores at 24th, 36th and 48th hours. There was no notable difference there among the groups in terms of intraoperative fentanyl consumption, the need for rescue analgesics in the first postoperative hour and during the 48-hour follow-up of the patients. The authors found no difference there among the groups in terms of the duration of postoperative mechanical ventilation (7). In our study, a notable difference was found between resting and coughing VAS scores. In addition, in our study, a difference was found there among the groups in terms of the amount of tramadol consumed postoperatively. The amount of tramadol consumed postoperatively was low in the TEA and ESP block groups. Similarly, we did not detect any difference in terms of postoperative mechanical ventilation time.

In a prospective, randomized, controlled study performed by Piskin et al. (15) in 2021, the analgesic effect of USG-guided continuous ESP block after VATS (Video Associated Trans Thoracic Surgery) surgery was researched. Eighty patients between the ages of 18-75, ASA score I-III, who would undergo VATS surgery were included in the study, and the patients were divided into 2 groups as continuous ESP block and control group. Patients in both groups were given tramadol via an i.v PCA device. Tramadol and pethidine consumption there among the groups, VAS values at postoperative 0th, 1st, 4th, 8th, 12th, 24th, 36th and 48th hours, and opioid-related side effects were recorded, and the 0th hour VAS score was statistically lower in the continuous ESP block group. It was determined that the use of continuous ESP block in VATS significantly reduced the amount of tramadol used in the first 48 hours postoperatively, and the amount of pethidine rescue analgesia used in the continuous ESP block group was found to be statistically significantly lower (15). Our

results are significantly similar to the results of the study of Piskin et al. (15). A continuous ESP block catheter was not used in our study. The catheter inserted for TEA was also removed at the end of the operation to ensure homogenization of the groups. In our study, the amount of postoperative tramadol was found to be low in the TEA and ESP block groups. Our VAS scores were found to be low in the block groups in almost all the time periods measured.

In a retrospective study performed by Kukreja P. et al. in 2021, the analgesic efficacy of TEA, continuous ESP block, and continuous paravertebral block applied for analgesia after thoracic surgery in various procedures were compared. Patients who had undergone thoracotomy, VATS, oesophagectomy or pectus repair surgery and who had TEA (n=50), continuous ESP block (n=20) and continuous paravertebral block (n=34) preoperatively were included in the study. The groups were compared in terms of VAS values there among 0th-6th hours, 6th-12th hours, 12th-24th hours, postoperative morphine requirement, postoperative nausea, vomiting and hospital stay in the postoperative intensive care unit. There was no notable difference in terms of 0th-6th hour, 6th-12th hour and 12th-24th hour VAS values. When the amount of morphine used there among 0-6 hours, 6th-12th hours and 12th-24th hours postoperatively was compared, a difference was found there among the 3 groups in each time period. While the need for morphine was the lowest in the TEA group in each period, it was found to be the highest in the continuous paravertebral block group. When the TEA group and the continuous ESP block group were compared independently of the continuous paravertebral group, no difference was found there among the two groups in terms of morphine use there among 6th-12th hours postoperatively. The amount of morphine used there among 0th-6th hours and 12th-24th hours postoperatively was found to be higher in the continuous ESP block group than in the TEA group, and this difference was statistically significant (16). In our study, no difference was found thereamong the two groups in the pairwise comparison of TEA and ESP block postoperative opioid consumption. There was no difference there among TEA and ESP block groups there among our VAS scores at rest and coughing. A notable difference was found when triple comparison was made for both parameters. Our results are partially in agreement with the results of Kukreja P et al.

In a study conducted by Erturk et al., the postoperative analgesic efficacy of TEA in open heart surgery was investigated. IV PCA device was inserted in the control group, epidural PCA device was inserted in the TEA group. Tramadol amount consumed in the first 24 hours and rest and pain scores were evaluated. The amount of tramadol consumed for the first 24 hours was found to be lower in the TEA group compared to the control group

(14). Similarly, VAS scores at rest/coughing were lower than the control group. Our results are in perfect agreement with the results of the study of Erturk et al. (14). Our tramadol amounts consumed in the first 24 hours and our VAS scores were found to be lower in the TEA group compared to the control group.

Our study has some limitations. Although PCA continued for an average of 48 hours in patients, pain scores were followed in the first 24 hours postoperatively. Therefore, the long-term effects of the methods used on pain scores and complications could not be evaluated. A homogenization could not be established there among the groups because the socioeconomic and educational levels and ages of the patients were different, and pain is a subjective concept.

CONCLUSION

Consequently, we think that ESP block is a good alternative to TEA, which is shown as the gold standard in pain control after open heart surgery. We think that randomized controlled studies with larger populations are needed to support the findings of our study and to evaluate the postoperative analgesia and long-term effects of TEA and ESP block. .

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