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Original article

Analgesic Efficacy of Ultrasound-Guided Erector Spinae Plane Block versus Transversus Abdominis Plane Block for Post-Operative Pain Relief in Patients Scheduled for Abdominal Surgeries

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ABSTRACT

Background: Abdominal surgeries have been mostly done as open surgeries for several decades. But this concept has been changed in the past two decades and shifted towards closed and laparoscopic techniques. Thus, led to an adjustment of pain relief techniques and the development of new local or regional analgesic techniques. **Objective:** To compare between the efficacy of ultrasound guided erector spinae plane block (ESP) and transversus abdominis plane block (TAP), for postoperative pain relief in adult patients scheduled for various types of abdominal surgeries. **Patients and methods:** This study is a comparative study that compares between two equal groups undergoing various abdominal surgeries: Group A is subjected to ultrasound guided ESP block at the level of T9 with receiving 20 ml of bupivacaine 0.25% and group B is subjected to ultrasound guided TAP block posterior to the mid-axillary line with receiving 20 ml of bupivacaine 0.25%. **Results:** No significant difference in age of the patients among the two groups. Visual analogue scale was slightly higher in group B than group A, but not significantly different. The total preoperative morphine consumption along the first 24 hours was insignificantly different between the two groups. Duration of surgery, postoperative sedation score, and the incidence of adverse outcomes all were insignificantly different between the two groups. Hemodynamic changes in the form of mean arterial blood pressure and heart rate showed no significant difference between the two groups. **Conclusion:** The ESP block has a more analgesic effect, a longer duration of postoperative pain relief, delays the time to first requirement for analgesia, and reduces opioid consumption when compared with the TAP block and can be used in multimodal analgesia and opioid sparing regimens after abdominal surgeries.

Keywords: Transversus abdominis plane block; erector spinae plane block**;** abdominal surgeries.

Introduction

Postoperative pain is still a problem despite improvements in surgery and anaesthetic. Postoperative pain is complex, with varying degrees of intensity depending on several variables such as the kind and amount of the surgical trauma, the type of anaesthetic used, and the patient's physiology, psychology, emotions, and culture. Postoperative pain therapy seeks to eliminate or significantly decrease pain, speed up the healing process, and prevent any potential adverse consequences (3).

The use of ultrasound has made interfascial plane blocks, a kind of regional anaesthetic initially described using anatomical landmarks and pop-up, more safer and simpler to execute (6).

Abdominal surgeries cause both somatic pain from the abdominal area and visceral pain from surgical manipulation, and while there are many regional anaesthetic techniques for use in thoracic and abdominal procedures, very few of these techniques are appropriate for postoperative analgesia in abdominal surgeries (18).

By providing a direct view of the anatomical plane, needle placement, and the pattern of local anaesthetic dissemination, ultrasonography enhances the quality of regional blocks and provides a greater margin of safety. Donor hepatectomy, colorectal surgery, inguinal hernia repair, laparoscopic bariatric surgery, retro pubic prostatectomy, iliac crest bone graft, as well as patients experiencing somatosensory chronic abdominal pain where other forms of pain management had failed have all been reported to benefit from US-guided block (11).

Paravertebral block (PVB) and epidural anesthesia are the two most used regional methods today. Nevertheless, erector spinae plane (ESP) block has been employed for a wide variety of applications since its first description by Forero et al. in 2016 for thoracic analgesia. Nonetheless, further research is needed to determine the true applications and boundaries of this novel approach (8).

Some authors acknowledge that the mechanism of action is unclear. While some have hypothesized a paravertebral spread, Forero et al. (8) discovered that the local anaesthetic travelled down both the ventral and dorsal rami of spinal neurons. But another research released in the last several months found no spread to the

paravertebral area or the ventral rami. But a new research reports spread to the epidural and intercostal spaces (1).

In the postoperative phase, transversus abdominal plane (TAP) block is one of several methods utilized to alleviate discomfort. Anesthetic is deposited in the fascial plane superficial to the transversus abdominis muscle to numb the area. This is where the nerves that feed the anterolateral abdominal wall pass (10).

TAP block produces superior postoperative analgesia, reduces the need for opioids, and promotes healthy respiratory mechanics. These aid in early mobility and release, which in turn improves the patient's quality of life up to 6 months after surgery. However, if the fascial plane is targeted using the blind insertion approach, unusual consequences of TAP block , have been described including damage to the kidney, spleen, liver, and intestines(21).

2.Aim of The Work

The objective of this study is to evaluate the relative effectiveness of ultrasound guided erector spinae plane block (ESP) and transversus abdominis plane block (TAP) in relieving postoperative pain in adult patients undergoing different kinds of abdominal operations.

3.Methodology

Ethical considerations included obtaining written informed permission from 70 patients scheduled for abdominal procedures after explaining the goal of the research and promising absolute secrecy, which was approved by the institutional review board and the Ethics Committee of Benha University. People were given the opportunity to decline participation in the research if they wish.

Individuals included in the study: Patients between the ages of 18 and 70 years old who were scheduled to have abdominal surgery at Benha University Hospital. The study began in June 2019.

Methodological framework: Prospective, randomized, controlled clinical study. Seventy participants are anticipated. Distribution will be conducted in a random manner. Parallel two-arms make up the intervention model. Both the erector spinae plane block and the posterior transversus abdominis plane block were administered to one group. Single-blinded masking (Outcomes assessor). As for the masking, both the doctor and the patient could see what was going on.

Inclusion requirements: Ages above 18 years old. All genders are accepted to participate in the study. Accepted individuals willing to volunteer should be in a good health.

Patients older than 18 years old with an ASA Physical Status of I, II, or III who were about to have elective abdominal procedures were considered eligible for inclusion.

Patients were not eligible if they met any of the following exclusion criteria: they did not give written consent; they had an allergy to any of the drugs being tested; they were under the age of 18; they had a body mass index (BMI) of 40 or higher; they had an infection at the site where the needle would be inserted; pregnant females, and those with renal or hepatic diseases.

Observe Methods

Assignment at random (only in RCTs): Subjects were randomly assigned using a computer-generated random number.

The procedure for the research: Using a computer-generated random sequence number stored in sealed envelopes. Seventy patients have been randomly assigned to either group A (ESP block + conventional opioid analgesics; n= 35) or group B (TAP block + conventional opioid analgesics; n= 35). On the day of surgery, the participants' sealed envelopes were unwrapped, and the patients were given either an ESP block or a posterior TAP block.

Procedures involving anesthesia:

In the lead-up to surgery: Patients were evaluated with a complete blood count, blood sugar level, serum urea and creatinine, liver function tests, coagulation profile, and EKG as part of the local procedure (ECG). Patients have been briefed on the various nerve block techniques and analgesic medications that may be used during surgery, as well as on the VAS pain scale, which ranges from 0 (no pain) to 10 (the worst agony imaginable). The patients were brought into surgery after a 6-hour fasting period.

Preoperative planning:

The use of general anesthesia during surgery, accompanied with non-invasive arterial blood pressure, pulse oximetry, and capnography monitoring. A 22-gauge IV was placed, and a crystalloid solution was infused at a rate of 10 ml per kg per hour. Anesthesia was induced with 2 g/kg fentanyl and 2-3 mg/kg propofol after 3 minutes of preoxygenation with 100% oxygen; 0.5 mg/kg atracurium aided in endotracheal tube intubation. To prevent postoperative nausea and vomiting, all patients were given an IV containing 4 mg of ondansetron and 8 mg of dexamethasone. Isoflurane in a 50% oxygen/air mixture with a minimum alveolar concentration of 1.2 (which may be changed intraoperatively based on reaction) and breathing settings to maintain end-tidal CO2 of around 35-45 mmHg was used to maintain anesthesia throughout the procedure. Fentanyl was injected intravenously at a rate of 1 g/kg per hour, and the cumulative dosage was tracked.

Before induction, and at 5-minute intervals during the remainder of the procedure, hemodynamic data were collected. After

the skin closure was complete, the isoflurane was turned off, and 0.05 mg/kg neostigmine and 0.02 mg/kg atropine were administered intravenously to reverse the neuromuscular blockade. Additionally, standard procedures for recuperation were adhered to.

Patients were evaluated in the post-anesthesia care unit (PACU) for two hours after surgery to evaluate their hemodynamics, oxygen saturation (SPo2), level of consciousness (LC), and absence of nausea and vomiting before being released.

For bradycardia less than 50 beats per minute, atropine was administered intravenously (IV) at a dosage of 0.3-1 mg or 0.04 mg/kg every 5 minutes, with a maximum dose of 3 mg. More than 100 bpm tachycardia was controlled with a dosage of 1–3 mg of propranolol administered at a pace not exceeding 1 mg/min. After 2 minutes, if the heart rate didn't drop, a second dosage was administered. Treatment for hypotension (defined as a systolic blood pressure less than 80 mm Hg or a diastolic blood pressure less than 50 mm Hg) included a 500 ml saline bolus, with the option of adding 5 mg of ephedrine every 5 minutes if necessary.

The Blocking method: The investigated block in either group was conducted under perfect aseptic settings after induction of anesthesia immediately and 15 min before the skin incision with 100 mm 22 G needle under the direction of a linear US probe with a frequency range of 6–13 MHz.

For ESP block group: The ESP block was accomplished as patients were positioned on their side with the side to be blocked is superior. After the patient had been properly draped and sterilely prepared, a high-frequency ultrasonic probe wrapped in a hygienic plastic sleeve was positioned in a longitudinal parasagittal orientation 2.5-3 cm lateral to the T9 spinous process. Muscles belonging to the erector spinae were easily located just under the skin, above the T9 transverse process. Using the in-plane technique, the needle was inserted into the deep (anterior) erector spinae muscle fascial plane. On ultrasonographic images, the erector spinae muscle is shown to be lifted off the bony shadow of the transverse process, confirming the position of the needle tip. 20 cc of 0.25 percent bupivacaine was administered using a 22-gauge, 100-mm echogenic needle after negative aspiration.

Posterior TAP block was conducted using a high-frequency ultrasonic probe for the TAP block group. Positioning the patient laterally such that the intended block site faces upward. After passing the mid-axillary line, the ultrasonic probe will be positioned so that it is in the middle of the patient's back between the costal margin

and the iliac crest. Careful intermittent aspiration was performed after injecting 20 ml of 0.25 percent bupivacaine deep to the internal oblique muscle with a 22-gauge, 100-mm echogenic needle that had been advanced using the in-plane approach and had penetrated the external oblique and internal oblique muscles.

Patients who had either total or partial failure, block were not included.

The severity of pain was measured using a VAS, which consisted of a "10 cm" horizontal line with "no pain" and "most unbearable agony" at opposite ends. At the point where they felt it best captured the level of discomfort they experienced, patients made a mark on the line. After 30 minutes, 2 hours, 6 hours, 12 hours, 18 hours, and 24 hours, we recorded the postoperative line length to the patient's mark.

We employed a gradual intravenous infusion of 30 mg of ketorolac every 12 hours (Maximum daily dosage of 120mg / 24 hour) when the VAS level was more than 3, and we used 3 mg of intravenous morphine as a rescue analgesia when the VAS level was greater than 5. Every group kept track of their overall morphine intake over a period of 24 hours, as well as the time they needed to rescue dosage of morphine after surgery for the first time.

If the patient's oxygen saturation drops below 95%, or their respiratory rate drops below 10 breaths per minute, they become sedated (Ramsay sedation scale >2), they experience acute adverse effects (allergy, marked itching, excessive vomiting, and hypotension with systolic blood pressure falling below 20% of baseline values), or they reach an adequate level of analgesia, the morphine titration protocol is halted.

Quantitative and Qualitative Evaluations of Results:

First and foremost, we will be keeping an eye on the amount of morphine used for a whole day (for postoperative 24 hour) in both groups. First postoperative morphine rescue dosage intake and total consumption are documented. Postoperative sedation was evaluated using a 5-point Ramsay's scale at 2, 6, 12, and 24 hours (5, aroused only by shaking; 4, asleep, difficulty responding to verbal commands; 3, mostly sleeping but easily aroused; 2, drowsy or dozing intermittently; 1, awake). If the patient’s sedation score is higher than 4 and the respiratory rate is lower than 8 breaths per minute, then the patients is over-sedated. Patients suspected of having received too much sedative would be sent to the Intensive Care Unit (ICU) and Ondansetron 0.15 mg/kg intravenously over 15 minutes was used to treat individuals with nausea and vomiting.

Secondary Outcome Measures Included Reporting on Complications Associated with the Procedure (Nerve Injury,

Hematoma Formation, Local Anesthetic Toxicity, Intravascular Injection), and Reporting on Morphine-Related Side Effects (Nausea, Vomiting, Pruritus, and Excessive Sedation). Surgery time, postoperative analgesic satisfaction as measured by a four-point scale (bad = 0, fair = 1, good = 2, excellent = 3), and total postoperative hospital stay were additional secondary outcome variables. After 30 minutes, 2 hours, 6 hours, 12 hours, and 24 hours, hemodynamic measurements (heart rate and mean arterial blood pressure) were taken. Age, weight, height, body mass index (BMI), and operative time were recorded as demographic data.

Analysis of Statistics

Information was compiled, checked, coded, and put into IBM's Social Science Statistical Package (SPSS) Version 23. When the data were parametric, we showed the mean, standard deviation, and range; when the data were not, we showed the median and interquartile range (IQR). Quantitative and percentage representations of qualitative factors were also provided. Chi-square tests were used to compare groups based on qualitative data. The Independent t-test was used to compare the two groups based on quantitative data with a parametric distribution. While the Mann-Whitney test was used to compare two groups based on quantitative data with a non-parametric distribution. The margin of error allowed was 5%, and the confidence interval was 95%. Consequently, the following values for the p-value were considered: Insignificant ($p > 0.05$). At the 5% level of significance or below, anything is considered significant. $p = 0.01$ is statistically significant.

Results

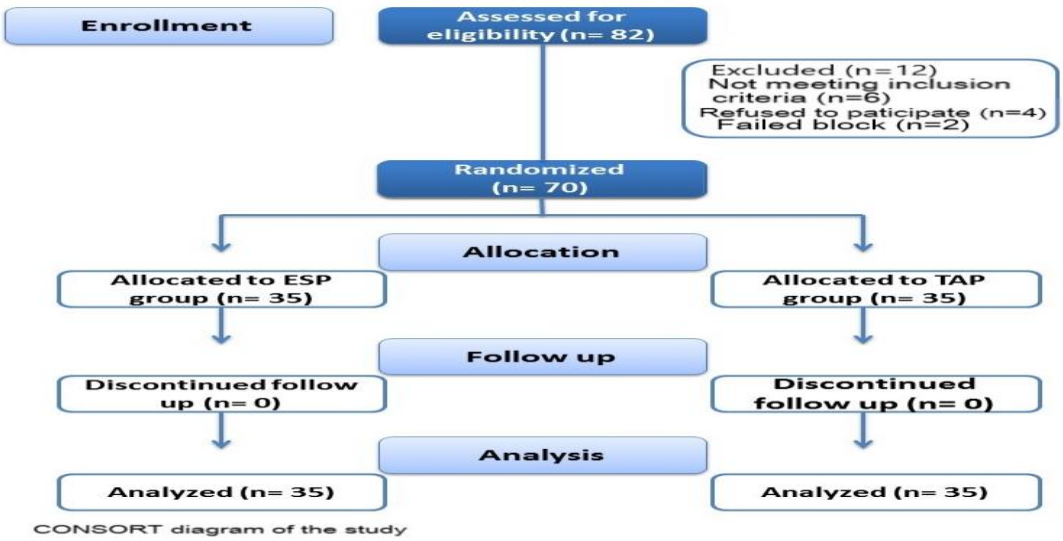

Fig. 1. A consort diagram showing the total number of studied patients allocated in two groups (total n= 70), (each group n=35), after exclusion of 12 patients who met one or more of exclusion criteria.

Table 1: Comparison between group A and group B regarding Age and total dose of morphine in 24 hours.

		Group A No. = 35	Group B No. = 35	*p*-value *	Sig.
Morphine dose in 24hr	Mean ± SD Range	4.65 ± 0.72 3 - 7	5.2 ± 0.79 3 - 7	0.009	**HS**

p< 0.01= highly significant (HS); *:Chi-square test

The previous table shows that the 24hr dose of morphine in group B was significantly higher than group A with *p*-value <0.009.

Table 2: Comparison between group A and group B regarding 24h postoperative heart rate (beat/min)

Heart rate (beat/min)		Group A No. = 35	Group B No. = 35	*P*-value •	Sig.
2 hr	Mean ± SD Range	73.57 ± 9.66 60 - 90	74 ± 9.98 60 - 90	0.89	**NS**
6 hr	Mean ± SD Range	74.42 ± 9.53 60 - 90	73.85 ± 9.40 60 - 90	0.53	**NS**
12 hr	Mean ± SD Range	74.14 ± 9.50 60 - 90	73.85 ± 9.24 60 - 90	0.67	**NS**
18 hr	Mean ± SD Range	74.28 ± 8.84 60 - 90	74.14 ± 9.11 60 - 90	0.90	**NS**
24 hr	Mean ± SD Range	75.42 ± 9.42 60 - 90	73.85 ± 9.63 60 - 90	0.55	**NS**

p>0.05= Non significant (NS); •: Independent t-test

The previous table shows that there was no statistically significant difference between group A and group B regarding heart rate (beat/min) at different times of measurements.

Table 3: Comparison between group A and group B regarding 24h systolic blood pressure (mmHg).

Systolic blood pressure (mm Hg)		Group A No. = 35	Group B No. = 35	*p*-value •	Sig.
2hr	Mean ± SD Range	132 ± 10.58 110 – 150	132.42 ± 9.65 110 – 150	0.95	**NS**
6hr	Mean ± SD Range	131.42 ± 10.88 110 – 150	131.85 ± 10.57 110 – 140	0.79	**NS**
12hr	Mean ± SD Range	131.28 ± 10.70 105 – 150	131.71 ± 10.70 110 – 150	0.68	**NS**
18hr	Mean ± SD Range	132.57 ± 11.006 110 – 150	128.28 ± 9.54 105 – 150	0.10	**NS**
24hr	Mean ± SD Range	131 ± 9.76 110 – 150	131.14 ± 10.78 110 – 140	0.95	**NS**

p>0.05= Non significant (NS); •: Independent t-test

The previous table shows that there was no statistically significant difference between group A and group B regarding systolic blood pressure (mmHg) at different times of measurements over 24 hours.

Table 4: Comparison between group A and group B regarding 24h diastolic blood pressure (mmHg).

Diastolic blood pressure (mm Hg)		**Group A No. = 35**	**Group B No. = 35**	***p*-value •**	**Sig.**
2hr	Mean ± SD	77.42 ± 7.98	76.14± 8.40	0.36	**NS**
	Range	65 – 90	65 – 90		
6hr	Mean ± SD	77.42 ± 7.98	76.28 ± 8.07	0.31	**NS**
	Range	65 – 90	65 – 90		
12hr	Mean ± SD	76.28 ± 7.79	76.42 ± 7.81	0.86	**NS**
	Range	65 – 90	65 – 90		
18hr	Mean ± SD	77.28 ± 8.43	75.28 ± 7.85	0.32	**NS**
	Range	65 – 90	65 – 90		
24hr	Mean ± SD	75.71 ± 8.50	76.57 ± 8.11	0.83	**NS**
	Range	65 – 90	65 – 90		

p>0.05= Non significant (NS); •: Independent t-test

The previous table shows that there was no statistically significant difference between group A and group B regarding diastolic blood pressure (mmHg) at different times of measurement.

Table 5: Comparison between group A and group B regarding 24h mean arterial blood pressure (mmHg).

Mean arterial blood pressure (mm Hg)		**Group A No. = 35**	**Group B No. = 35**	***p*-value •**	**Sig.**
2hr	Mean ± SD	95.17 ± 7.29	93.91 ± 7.47	0.30	**NS**
	Range	80 - 110	80 - 110		
6hr	Mean ± SD	94.34 ± 7.24	93 ± 7.26	0.25	**NS**
	Range	80 - 110	80 - 105		
12hr	Mean ± SD	94.34 ± 7.21	94.82 ± 7.73	0.89	**NS**
	Range	80 - 105	80 - 110		
18hr	Mean ± SD	95.17 ± 7.12	94.25 ± 7.68	0.59	**NS**
	Range	80 - 105	80 - 110		
24hr	Mean ± SD	94.94 ± 7.09	92.42 ± 6.57	0.12	**NS**
	Range	80 - 105	80 - 105		

p>0.05= Non significant (NS); •: Independent t-test

The previous table shows that there was no statistically significant difference between group A and group B regarding mean arterial blood pressure (mmHg) at different times of measurement.

Table 6: Comparison between group A and group B regarding visual analogue scale (VAS) score.

VAS score (/10)		**Group A No. = 35**	**Group B No. = 35**	***p*. Value ‡**	**Sig.**
30 minute	Mean ±SD	3.6 ± 0.54	4.14 ± 0.60	0.00	**HS**
	Median (IQR)	1 (3-2)	0.5 (4.5-4)		
	Range	3 - 5	3 – 5		
6hr	Mean ±SD	3.17 ± 0.38	3.74 ± 0.70	0.00	**HS**
	Median (IQR)	0.0 (3-3)	1 (4-3)		
	Range	3 – 4	3 - 5		
12hr	Mean ±SD	2.48 ± 0.74	3.45 ± 0.50	0.00	**HS**
	Median (IQR)	1 (3-2)	1 (4-3)		
	Range	1 - 4	3 – 4		
18hr	Mean ±SD	2.42 ± 0.60	3.11 ± 0.40	0.00	**HS**
	Median (IQR)	1 (3-2)	0.0 (3-3)		
	Range	1 – 3	2 – 4		
24hr	Mean ±SD	2.42 ± 0.65	2.6 ± 0.55	0.188	**S**
	Median (IQR)	1 (3-2)	1 (3-2)		
	Range	1 - 4	2 - 4		

p <0.05= Significant (S); *p*< 0.01= highly significant (HS); ‡: Mann Whitney test:

The previous table shows that there was statistically a significant difference between group A and group B regarding VAS score at 30 minutes with *p*-value = 0.00 while there was statistically significant increase in the VAS score in group B than group A at 2 hours, 4 hours, 6 hours, 8 hours and 12 hours with *p*-value = 0.00, <0.00, <0.00, <0.00 and <0.00; respectively. Finally, at 24 hours there was no statistically significant difference between both groups regarding VAS score with *p*-value = 0.188.

Table 7: Comparison between group A and group B regarding first time required postoperatively for a rescue dose analgesia by morphine.

		Group A No. = 35	**Group B No. = 35**	***p*-value •**	**Sig.**
Time required for rescue dose morphine (min)	Mean ± SD	254.42 ± 29.47	154.71 ± 21.21	3.4	**NS**
	Range	220 – 330	120 – 180		

p >0.05= Non significant (NS); •: Independent t-test

The previous table shows that there was marked mean and range differences regarding first time required postoperatively for a rescue dose analgesia by morphine between group A and group B. But with no statistically significant difference.

Table 8: Comparison between group A and group B regarding 24h postoperative sedation score.

Sedation score		**Group A No. = 35**	**Group B No. = 35**	***p*. Value •**	**Sig.**
2hr	Mean ±SD	1.4 ± 0.49	1.57 ± 0.50	0.154	**NS**
	Range	1 - 2	1 - 2		
6hr	Mean ±SD	1 ± 0.00	1 ± 0.00	1.00	**NS**
	Range	1 - 1	1 - 1		
12hr	Mean ±SD	1 ± 0.00	1 ± 0.00	1.00	**NS**
	Range	1 - 1	1 - 1		
24hr	Mean ±SD	1 ± 0.00	1 ± 0.00	1.00	**NS**
	Range	1 - 1	1 - 1		

p >0.05= Non significant (NS); •: Independent t-test

The previous table shows that there was no statistically significant difference between group A and group B regarding sedation score (5-point sedation Ramsay's score) at different times of measurement allover 24 hours.

Table 9: Comparison between group A and group B regarding duration of surgery.

		Group A No. = 35	**Group B No. = 35**	***p*-value •**	**Sig.**
Duration of surgery (min)	Mean ± SD	127.57 ± 69.68	125.43 ± 56.012	0.888	**NS**
	Range	60 – 320	60 – 240		

p >0.05= Non significant (NS); •: Independent t-test

According to the duration of surgery there was no statistically significant difference between both groups.

Table 10: Comparison between group A and group B regarding patient satisfaction

		Group A No. = 35	**Group B No. = 35**	**P-value •**	**Sig.**
Patient satisfaction	Very satisfied	30 (85.7%)	27 (77.14%)	1.0	**NS**
	Satisfied	4 (11.4%)	6 (17.14%)		
	Not very satisfied	1 (2.90%)	2 (5.72%)		
	Dissatisfied	0 (0.00%)	0 (0.00%)		

p >0.05= Non significant (NS); •: Independent t-test

The previous table shows that there was no statistically significant difference between group A and group B regarding patients' satisfaction.

Discussion

Performing abdominal surgery via an incision has been the norm for decades. There has been a movement in the last two decades toward closed and laparoscopic procedures. Because of this, traditional painkilling methods have been modified, and new local or regional analgesic treatments have been developed (17).

There has been a lot of progress made in the management of acute pain experienced by patients after surgery. Despite this progress, postoperative pain remains a difficulty and is often improperly addressed, causing patient concern, stress, and discontent. There may be physiological, psychological, financial, and social repercussions from inadequate pain treatment in addition to the obvious physical ones. It is considered that the management of pain in both developed and developing nations might be greatly improved if earnest efforts were made. These efforts are crucial because relieving pain is one of the most effective ways to reduce anxiety during surgery, which in turn improves patient outcomes (9).

Severe stomach discomfort after major abdominal surgery with an upper abdominal incision may lead to shallow breathing, atelectasis, secretion retention, and a lack of cooperation during physiotherapy if not properly handled. Because of this, patients are more likely to have complications after surgery, and as a result their healing time is lengthened. After major abdominal procedures, the main anesthesiologist in charge of the patient decides whether post-operative analgesic modality will be used. The anesthesiologist's preferred method and the accessibility of necessary medications and supplies will largely determine the final decision. Drug availability is inconsistent, and there may not be enough medical supplies to treat every patient (19).

The transversus abdominis plane block is perhaps the single most significant advance in the field of anesthesia (TAP). However, the use of epidural analgesia has been severely restricted by anticoagulant medicines, despite its continued significance in relieving pain after major abdominal procedures. In the elective context, this may not be a problem since surgeons would likely cease these medicines to let natural blood coagulation recover on its own. However, epidural analgesia is used less often than it formerly was because

of its unpredictability in terms of blood clotting and the prevalence of other regional block procedures (12).

In 2016, Forero et.al., reported the erector spinae plane (ESP) block, a new ultrasound-guided regional anaesthetic method. The ESP block is a kind of fascial plane block, in which a local anaesthetic is injected into the space between two layers of fascia and then travels down the plane to numb the nerves that are inside the fascial plane and any surrounding tissue compartments. The ESP block differs from other fascial plane blocks in that it is injected across the vertebral transverse processes rather than in the anterolateral thorax or abdomen, as is the case with the transversus abdominis plane (TAP) block or pectoral blocks (8).

Patient with chronic thoracic neuropathic pain of unknown cause radiating throughout the left chest from a spot around 3 cm to the T5 spinous process was the first to be reported with the ESP block. A region of intense analgesia and sensory loss across the full hemi thorax was generated by injecting local anaesthetic into the fascial plane superficial to the erector spinae muscle at this point (8).

Some writers have referred to the ESP and other paraspinal blocks (such as the retrolaminar or midway transverse process to pleura block) as "paravertebrals by proxy" because to their similarities to the thoracic paravertebral block. For its apparent usefulness in a variety of clinical circumstances and its seeming simplicity, the ESP block has attracted significant clinical and academic attention.

There are currently three hypothesized methods by which local anaesthetic injected by ESP might induce analgesia. Fenestrations in the connective tissues that cross neighboring transverse processes and ribs allow local anaesthetic to go anteriorly into the paravertebral and epidural region, which houses the spinal nerves and dorsal and ventral rami. Second, the local anaesthetic deposits in the ESP form a lake that the dorsal rami must swim across on their way up. Third, local anaesthetic spreading laterally within this plane has the ability to reach and anaesthetize lateral cutaneous nerve branches due to the ESP's continuous lateral relationship with the plane deep to the serratus anterior muscle and superficial to the ribs and intercostal muscles. Additionally, the ESP may have a similar mode of action to the posterior quadratus lumborum block

since, at low thoracic and lumbar levels, it is next to the plane between the quadratus lumborum and erector spinae muscle (15).

Because of its back-access requirements, the ESP block is often administered when the patient is seated, lying flat, or in the lateral position. The timing of the block may have some bearing on this decision. You may have the ESP block done before or after inducing anesthesia, depending on when you want to cut into the patient. Although the ESP block may be applied after surgery is done, it's important to think about whether or not the patient can be positioned appropriately and whether or not the presence of drains or wound dressings would hinder the block's function (5).

In 2001, Rafi pioneered the use of the triangle of Petit as a landmark-guided approach for achieving a field block in the transversus abdominis plane (TAP). A local anaesthetic solution is injected into the plane between the internal oblique and transversus abdominis muscles. The anterolateral abdomen wall receives sensory neurons from the thoracolumbar region (spinal roots T6 to L1), therefore anaesthetic dispersion in this plane may block the neural afferents and relieve pain in that area (14).

Improvements in ultrasonography equipment have made TAP blocks simpler and safer to execute. Consequently, TAP blocks have been more used as a therapeutic adjuncts for analgesia after abdominal procedures. Evidence demonstrating the usefulness of TAP blocks for a wide range of abdominal procedures, including caesarean section, hysterectomy, cholecystectomy, colectomy, prostatectomy, and hernia repair, has accumulated over the last decade. Although it is only effective for acute somatic pain, single-shot TAP block is an important part of multimodal analgesia. TAP blocks might solve the issue of short duration if continuous infusion or prolonged-release liposomal local anesthetics were used (9).

Because of the restricted sensory block, Shibata et al. recommended that lateral TAP block be reserved for lower abdomen surgery exclusively. When it comes to analgesia for surgery below the umbilicus, Hebbard et al. showed that a lateral TAP block is the way to go, whereas a subcostal TAP block is the way to go for the area above and around the umbilicus. Where the injection is made makes a

big difference in how much pain relief is achieved. As a result, if you need analgesia for your upper abdomen, you should think about using a subcostal technique (16).

The purpose of this research is to examine the similarities and differences between the two blocks in terms of their analgesic effects and any potential issues that could arise from using either technique.

Patients were divided into two equal groups, group (A) for the ESP block, and group (B) for the TAP block, based on the kind of block employed in the procedure.

Participants have been briefed on the VAS pain scale, the specifics of any planned block techniques, and any analgesics that may be supplied prior to surgery. The applicants in both groups benefited greatly from preoperative psychological assistance.

General anesthesia was optimized intraoperatively with the following protocol: intravenous (IV) fentanyl and propofol, endotracheal intubation was assisted with IV atracurium, and anesthesia was maintained using breathed isoflurane in oxygen-enriched air and top-up doses of atracurium as needed.

The investigated block in both groups was administered immediately after induction of general anesthesia, 15 minutes before to skin incision, under sterile circumstances guided by a linear ultrasound probe.

We found that the VAS was considerably lower in the ESP block group than in the TAP block group, particularly in the first 12 hours after surgery.

Time to first postoperative rescue dosage morphine was also significantly different between the two groups, with the TAP block group needing it less often (mean time: 155 min (TAP) vs. 255 min (ESP)). However, there was no variation between the two groups in terms of total morphine use in the first twenty-four hours after surgery. The volume-LA-spread-analgesia-potency-opioid-dose association needs further research.

Our findings indicated that there was no statistically significant difference between groups A and B across all measurements of mean arterial blood pressure (in mmHg). There was no discernible variation in heart rate (beats per minute) between groups A and B throughout the various time points examined.

In a study comparing ultrasound-guided ESP block to oblique subcostal TAP block following laparoscopic cholecystectomy, Altparmak et al.

reported that the former was more successful in reducing postoperative tramadol use and pain ratings. Our findings on the greater analgesic impact of ESP were also supported by a research that compared ESP to TAP block in obese individuals having sleeve gastrectomy. Instead of morphine, they employed tramadol and pethidine for postoperative pain management (2).

Boules et al. conducted a study contrasting the analgesic effects of erector spinae plane (ESP) block and transversus abdominis plane (TAP) block following elective caesarean section, and they found (consistent with our findings) that the ESP block provided longer-lasting relief from pain, delayed the onset of pain, and required less tramadol (4).

Elshazly et al. has released a research contrasting the use of ESP block and TAP block in 60 patients undergoing Bariatric procedures. They found (as we did) that ESP block is associated with less postoperative pain and a lesser need for opioids. Intestinal function, as measured by flatus or feces, also returned more quickly in the ESP group than in the TAP block group (22).

In addition, no patients in either groups had any problems from the regional anaesthetic, including pneumothorax, local anesthetics toxicity, nerve damage, or intravascular injection. When ESPB is done under ultrasound guidance, pneumothorax is not usually the consequence, but it might happen if the surgeon loses their hand-eye coordination or misjudge the depth of the chest cavity.

The three examples of problems with ESPB that were documented in the narrative study by Pablo et al. were pneumothorax, motor blockage, and inadequate analgesia (13).

The risk of problems with a TAP block is quite minimal. One patient with hepatomegaly and intrahepatic injection due to TAP inhibition has been documented, however, by Farooq et al (7).

The ability to see specific nerve structures and track how a local anaesthetic is being distributed is a huge help. Furthermore, in the case of maldistribution, ultrasound monitoring allows the anesthesiologist to adjust the needle. Therefore, it is reasonable to anticipate that anesthesiologists will learn to use ultrasound guidance in clinical settings. Portable ultrasound equipment with high-frequency probes make it possible to implement the method affordably. These devices are meant to normalize the use of

ultrasonic guidance during regional anaesthetic procedures.

Conclusion

Compared to the TAP block, the ESP block is more analgesic, provides longer-lasting postoperative pain relief, delays the time to initial necessity for analgesia, and minimizes opioid intake; hence, it may be employed in multimodal analgesia and opioid sparing regimes after abdominal procedures.

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