Journal of
Anesthesia and Surgical Care

Research Article Open Access

Dexmedetomidine Added to Bupivacaine Versus Bupivacaine Alone in Ultrasound-Guided Erector Spinae Block in Spine Surgeries for Post-Operative Pain Management: A Randomized Controlled Study

Manar Mahmoud ElKholy[1], Ahmed Karim Mohammed[2], Alaa Abd El Aziz Nyazi[1] and Asmaa Ahmed Youssef Mohamed[1,*]

[1]Department of Anesthesiology, ICU and Pain Management, Faculty of Medicine, Cairo University
[2]Department of Anesthesiology, ICU and Pain Management, Faculty of Medicine, Cairo University

[*]**Corresponding Author:** Asmaa Ahmed Youssef Mohamed, Department of Anesthesiology, ICU and Pain Management, Faculty of Medicine, Cairo University, Tel: 01096288817; E-mail: Doctoralis.minor95@gmail.com

Received Date: February 28, 2023 **Accepted Date:** March 29, 2023 **Published Date:** April 04, 2023

Citation: Manar Mahmoud ElKholy, Ahmed Karim Mohammed, Alaa Abd El Aziz Nyazi, Asmaa Ahmed Youssef Mohamed (2023) Dexmedetomidine Added to Bupivacaine Versus Bupivacaine Alone in Ultrasound-Guided Erector Spinae Block in Spine Surgeries for Post-Operative Pain Management: A Randomized Controlled Study. J Anesth Surg Care 4: 1-13

Abstract

Background: During spine surgery, mechanical and thermal trauma can cause muscle ischemia and damage to nerves innervating the paraspinal muscles. Therefore, it is often characterized by severe and diffuse pain in the postoperative period, so adequate postoperative analgesia is essential to allow early mobilization, reducing the incidence of postoperative respiratory complications, and decrease the risk of chronic pain syndrome.

Objective: To investigate the effectiveness of a mixture of dexmedetomidine and bupivacaine versus bupivacaine alone for ESB for postoperative analgesia in spine surgery.

Methodology: The study was conducted at Neurosurgery Operation Theater at Souad Kafafi University Hospital-Misr University of science and Technology (MUST). 70 Patients aged above 21 years, scheduled for spine surgery, 35 patients in each group equally.

Results: Intra operative Fentanyl Consumption (μg/kg) there was significantly lower in Bupivacaine& Dexmedetomidine group (P<0.003). Postoperative pain (VAS-10) among both study groups there weren't significantly lower in Bupivacaine&Dexmedetomidine group throughout follow up time points, but the differences were statistically significant at hour 8, 12 and 24. Post-operative morphine consumption there was significantly lower in Bupivacaine& Dexmedetomidine

group. Time to first postoperative dose was significantly longer in Bupivacaine& Dexmedetomidine group. Post-operative complications related to morphine consumption (nausea, vomiting and pruritus) were less frequent in Bupivacaine& Dexmedetomidine group, but the differences were statistically significant only in nausea.

Conclusion: The addition of dexmedetomidine to bupivacaine in US-guided Erector Spinae block during spine surgery reduce both intra operative fentanyl consumption and post-operative morphine consumption, significantly prolong time to first postoperative morphine dose and reduces post-operative Nausea, vomiting (PONV) and pruritis owing to lowering the total opioid consumption compared with bupivacaine alone.

Keywords: Post-Operative Nausea; Vomiting; Transversus Abdominis Plane

Introduction

Postoperative pain management in spine surgery usually includes administration of extensive amounts of opioids. Which can cause many side-effects, such as respiratory depression, sedation, nausea, vomiting, and constipation. which can lead to a longer hospital stay and a worse patient experience [1,2]. however, with opioids, pain is not always sufficiently managed. Inadequate pain control increases cardiac and respiratory complications, delays mobilization, increases the length of hospital stay and may increase the risk of developing a chronic pain syndrome [3]. These complications indicate the need for increasing role for novel regional anesthesia techniques.

The nature of the motor and sensory anatomy and function of the spinal cord minimizes the role of spinal and epidural analgesia as suitable pain treatments. Novel interfacial plane blocks, such as the erector spinae plane (ESP) block [4], generate regional analgesia without interference of spinal cord function and are therefore suitable for spinal surgery pain management [5].

Ultrasound Guided Erector Spinae Plane Block consist of a recent Block that targeting the ventral rami, dorsal rami, and rami Communicants of spinal nerves [6]. It has been known that this block provides good post-operative analgesia after Breast, visceral abdominal, Bariatric and thoracic surgery. it also used after thoracic spine surgery [7]. For breast and thoracic surgery [8-10] it is performed at the T4-T5 level, and for abdominal surgery at T7. We hypothesized that if the block is performed at the level of T10 it could provide effective analgesia after lumbar spine surgery. This is possible because the erector spinae fascia extends from the nuchal fascia cranially

To the sacrum caudally ventral rami. It may spread to the intervertebral foramina to the origin of spinal nerves [11].

Regarding ESP block Vs paravertebral block, ESP has a very low risk of complications, as Sonoanatomy is easy recognized and transverse process acts as an anatomical barrier, it also avoids needle insertion into the pleura or vessels, thus preventing a pneumothorax or hematoma. Moreover, the needle is relatively far from the vertebral canal, which means the risk of spinal cord injury is very low [12].

Dexmedetomidine is highly specific and highly selective α2-adrenoceptive agonist with a high ratio of a2 / a1 activity (1620: 1) compared with clonidine (220:1), thus this ensures that it's action is selective to the CNS without the unwanted effect on the CVS that would result from α activation [13].

Adding Dexmedetomidine to Bupivacaine in ESP has a highly effective sedative and analgesic effect [14]. It has been found that, in many experimental and clinical regional block practices, the addition of dexmedetomidine(0.5μg/kg) to the local anesthetic reduces tissue and nerve damage, increases duration of sensory and motor block, and reduces postoperative pain. for example, Transversus abdominis plane (TAP) block done by ropivacaine combined with dexmedetomidine [15].

Aim of the Work

The aim of this study is to investigate the effectiveness of a mixture of dexmedetomidine and bupivacaine ver-

sus bupivacaine alone for ESB for postoperative analgesia in spine surgery.

Methodology

Ethical considerations: After the approval of research ethical committee. Informed written consent was obtained from study participants or their legally authorized representative.

Study Design: Double blinded randomized controlled trial.

Study Setting and Location: The study was conducted at Neurosurgery Operation Theater at Souad Kafafi University Hospital-Misr University of science and Technology (MUST).

Study population: Patients aged above 21 years, scheduled for spine surgery.

Both Groups received ultrasound Guided Erector Spinae Block after Induction of general Anesthesia with the following difference:

Group A: was done with Bupivacaine alone. **Group B:** was done with Bupivacaine and dexmedetomidine

Eligibility Criteria

Inclusion criteria: Patient's age >21, ability to sign the consent, patients scheduled for spine surgery, ASA classification I, II:

ASA I: Normal Healthy Patient, ASA II: Patient with mild systemic controlled disease; Current smoker, social alcohol drinker, pregnancy, obesity (30 < BMI < 40), well-controlled DM/HTN, mild lung disease.

Exclusion criteria: Patient refusal, coagulation disorders that affect the blood's clotting activities e.g.: Hemophilia, skin lesions or infection at site of proposed needle, known allergy to local anesthetics or dexmedetomidine, patients suffering from mental disease as cannot Assess the Visual Analogue Scale (VAS) that measures pain intensity as, mental retardation & psychosis. ASA III, IV: ASA III: A patient with severe systemic disease; Poorly controlled DM or HTN, Chronic Obstructive Lung Disease (COPD), morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, End Stage Renal Disease (ESRD) undergoing regularly scheduled dialysis, ASA IV: A patient with severe systemic disease that is a constant threat to life; Recent (<3 months) myocardial infarction (MI), Cerebrovascular accident (CVA), Transient Ischemic Attack (TIA) or coronary artery disease (CAD/stents), ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, shock, sepsis, Disseminated Intravascular Coagulation (DIC), acute respiratory distress syndrome (ARDS) or ESRD not undergoing regularly scheduled dialysis.

Study Procedures

Randomization: Patients was randomly allocated by a computer-generated table into one of the study groups; the randomization sequence was being concealed in sealed opaque envelopes.

Study Protocol

All Patients have had a pre-operative assessment visit, which included history taking, complete physical examination and review of all the results of the routine investigations. On Arrival to the preparation room, they received the following premedication via intravenous (IV) route: Midazolam 0.03 mg\kg, Metoclopramide 10mg&Ranitidine 50mg. Upon Arrival to the operating room, the standard Monitoring was applied which include Pulse Oximeter, Noninvasive Blood Pressure & Six-lead electrocardiogram (ECG). The General Anesthesia was induced using: Propofol 1-2mg/kg, Fentanyl1-2 µg/kg and Atracurium 0.5 mg\kg.it will be maintained using Sevoflurane 2 MAC, Incremental doses of Atracurium. Fentanyl incremental doses (0.5 µg/kg) was given when the mean blood pressure, heart rate or both increased by more than 20% from the baseline (signs of inadequate analgesia). The fluid replacement managed properly according to each patient body weight, fasting hours, blood loss, and duration of the operation

So, after the patient has been put in the prone position, we did the ESBP with the following technique: Under

complete Aseptic technique which was done by wearing sterile gown and sterile gloves, then the skin was sterilized using chlorhexidine. The block performed at level of Thoracic vertebrae T10 under ultrasonography {Mindray, Model: DC-N2} and marked on the skin. After placing a 5–12 MHz linear probe parallel to the vertebral axis the probe was moved from the lateral side to medial side transversely to identify any change in shape that transited the rib and transverse process (TP). When the round shadow of the rib was shifted into the rectangular shape of the TP, an echogenic nerve block needle 8-cm 22-G block needle (Contiplex; B Braun, Melsungen, Germany) was inserted toward the trapezius and Erector Spinae and the TP of T10 using the plane technique in a cephalad-to-caudal direction. When the needle was in contact with the TP, we confirmed that this fascial plane is well separated by injecting 2 ml of saline. Then, we injected our medications according to the group: **Group A patients:** A total of 30mL bupivacaine 0.25% was injected.

Group B patients: A total of 30mL bupivacaine 0.25% +2ml Dexmedetomidine (0.5 μg/kg) was injected.

For both groups, after finishing the Block, the skin incision was delayed 15-20 minutes to ensure its spread and efficacy. Postoperatively, all patients received IV paracetamol 1gm every 8 hours, (Ketorolac) IM every 8 hours. Patients of both groups will have their pain severity evaluated using Visual Analogue Scale (VAS) Numeric pain distress scale graded from 0 to 10 at 1st hr,4,8,12, and 24 hours postoperatively.

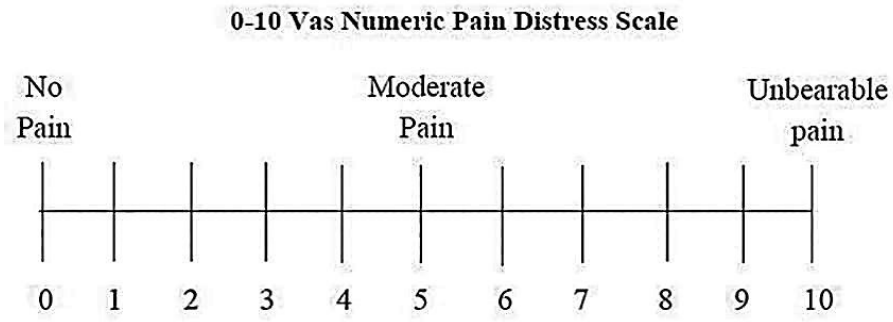

Figure 1: Vas Numeric pain distress scale

Supplementary analgesia was being given when VAS ≥ 4 in the form of morphine 0.05 mg/kg with maximum dose morphine 0.4 mg/kg within 24 hrs. The time to rescue analgesia will be recorded and Total morphine consumption in 24 hrs. will be also recorded. Morphine replaced with another form of analgesia if complications has recorded such as: Nausea, vomiting and Rash.

To ensure double blinded study, one investigator was responsible for the preparation of the drugs administered which was coded according to computer-based system: giving numbers and litters. Another investigator was responsible for giving the ESP Block. A third investigator observed and collected the data; hemodynamics, VAS score, etc.

Data interpretation was done after completion of the study and the results was obtained.

Study Outcomes

Primary outcome: Comparing postoperative total morphine consumption over 24 hours between the two groups.

Secondary outcome(s): Complications (Hematoma formation, Intravascular injection, Pruritus, nausea, vomiting). Measuring Hemodynamics (Blood Pressure, Heart rate) at: T0 (Just Before induction of general Anesthesia, T1 (Just Before Starting the Block) & T2 (30minutes after doing the block). Intra operative Fentanyl Consumption.

Statistical methods

The collected data were coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 28.0, IBM Corp., Chicago, USA, 2021. Quantitative data tested for normality

using Shapiro-Wilk test, then described as mean±SD (standard deviation) as well as minimum and maximum of the range, after then compared using independent t-test. Qualitative data described as number and percentage and compared using Chi square test as well as Fisher's Exact test for variables with small, expected number. Bonferoni test used for post hoc comparisons. The level of significance was taken at p-value ≤0.050 was significant, otherwise was non-significant.

Results

Table 1: Demographic characteristics among the study groups

Variables	Measures	Bupivacaine& Dexmedetomidine(Total=35)	Bupivacaine(Total=35)	p-value
Age (years)	**Mean±SD**	41.9±4.3	42.5±5.3	^0.655
	Range	35.0–52.0	33.0–52.0	
Sex(n, %)	**Male**	24 (68.6%)	22 (62.9%)	#0.614
	Female	11 (31.4%)	13 (37.1%)	
Weight (kg)	**Mean±SD**	81.7±13.4	83.9±11.6	^0.473
	Range	57.0–114.5	62.5–111.0	
ASA(n, %)	**I**	22 (62.9%)	20 (57.1%)	#0.626
	II	13 (37.1%)	15 (42.9%)	

^Independent t-test. #Chi square test.

Table (1) showed that: No statistical significant differences between the study groups regarding demographic characteristics; age, sex, weight and ASA.

Table 2: Operation characteristics among the study groups

Variables	Measures	Bupivacaine& Dexmedetomidine(Total=35)	Bupivacaine(Total=35)	p-value
Operation duration (minutes)	**Mean±SD**	143.1±10.5	144.4±9.6	^0.594
	Range	122.0–167.0	125.0–165.0	
Anesthesia duration (minutes)	**Mean±SD**	155.2±10.6	156.7±10.2	^0.544
	Range	136.0–179.0	134.0–178.0	

^Independent t-test.

Table (2) showed that: No statistical significant differences between the study groups regarding operation duration and anesthesia duration.

Table 3: Heart rate (beat/minute) among the study groups

Time	Measures	Bupivacaine& Dexmedetomidine(Total=35)	Bupivacaine(Total=35)	p-value	Relative effect	
					Measures	Values
T0	Mean±SD	78.2±5.2	79.7±5.9	^0.279	Mean±SE	-1.5±1.3
	Range	67.0–91.0	66.0–95.0		95% CI	-4.1–1.2
T1	Mean±SD	73.9±5.3	75.1±5.9	^0.352	Mean±SE	-1.3±1.3
	Range	62.0–86.0	63.0–90.0		95% CI	-3.9–1.4
T2	Mean±SD	62.9±5.6	70.5±6.2	**^<0.001***	Mean±SE	-7.6±1.4
	Range	50.0–75.0	58.0–86.0		95% CI	-10.4–-4.8

^Independent t-test. *Significant. Relative effect: Effect in Bupivacaine& Dexmedetomidine group relative to Bupivacaine group. SE: Standard error. CI: Confidence interval.

Table (3) showed that: No statistical significant differences between the study groups regarding T0 and T1 heart rate. T2 heart rate was significantly lower in Bupivacaine& Dexmedetomidine group

Table 4: Mean blood pressure (mmHg) among the study groups

Time	Measures	Bupivacaine& Dexmedetomidine(Total=35)	Bupivacaine(Total=35)	p-value	Relative effect	
					Measures	Values
T0	Mean±SD	99.2±8.7	98.8±8.7	^0.848	Mean±SE	0.4±2.1
	Range	77.0–112.0	82.0–117.9		95% CI	-3.8–4.6
T1	Mean±SD	87.9±8.6	85.6±9.0	^0.271	Mean±SE	2.3±2.1
	Range	67.0–100.0	66.0–107.0		95% CI	-1.9–6.6
T2	Mean±SD	74.7±6.9	80.1±9.3	**^0.008***	Mean±SE	-5.3±2.0
	Range	59.0–82.0	60.0–103.0		95% CI	-9.2–-1.4

^Independent t-test. *Significant. Relative effect: Effect in Bupivacaine& Dexmedetomidine group relative to Bupivacaine group. SE: Standard error. CI: Confidence interval.

Table (4) showed that: No statistical significant differences between the study groups regarding T0 and T1 Mean blood pressure. T2 Mean blood pressure was significantly lower in Bupivacaine& Dexmedetomidine group

Table 5: Intra operative Fentanyl Consumption (µg/kg) among the study groups

Measures	Bupivacaine& Dexmedetomidine(Total=35)	Bupivacaine(Total=35)	p-value	Relative effect	
				Measures	Values
Mean±SD	1.7±0.8	2.5±1.3	**^0.003***	Mean±SE	-0.8±0.3
Range	0.0–3.0	0.0–5.0		95% CI	-1.3–-0.3

^Independent t-test. *Significant. Relative effect: Effect in Bupivacaine& Dexmedetomidine group relative to Bupivacaine group. SE: Standard error. CI: Confidence interval.

Table (5) showed that: Intra operative Fentanyl Consumption was significantly lower in Bupivacaine& Dexmedetomidine group

Table 6: Postoperative pain (VAS-10) among the study groups

Time	Measures	Bupivacaine& Dexmedetomidine(Total=35)	Bupivacaine(Total=35)	p-value	Relative effect	
					Measures	Values
Hour-1	**Mean±SD**	1.5±0.7	1.8±0.7	^0.134	**Mean±SE**	-0.3±0.2
	Range	0.0–2.0	1.0–3.0		**95% CI**	-0.6–0.1
Hour-4	**Mean±SD**	2.3±0.6	2.6±0.9	^0.077	**Mean±SE**	-0.3±0.2
	Range	1.0–3.0	1.0–4.0		**95% CI**	-0.7–0.0
Hour-8	**Mean±SD**	2.8±0.7	3.3±1.0	**^0.013***	**Mean±SE**	-0.5±0.2
	Range	2.0–4.0	2.0–6.0		**95% CI**	-0.9–-0.1
Hour-12	**Mean±SD**	4.1±0.7	5.2±1.2	**^<0.001***	**Mean±SE**	-1.1±0.2
	Range	3.0–5.0	3.0–7.0		**95% CI**	-1.5–-0.6
Hour-24	**Mean±SD**	3.2±0.8	3.9±0.9	**^<0.001***	**Mean±SE**	-0.8±0.2
	Range	2.0–4.0	3.0–5.0		**95% CI**	-1.2–-0.4

^Independent t-test. *Significant. Relative effect: Effect in Bupivacaine& Dexmedetomidine group relative to Bupivacaine group. SE: Standard error. CI: Confidence interval.

Table (6) showed that: Postoperative pain (VAS-10) was non-significantly lower in Bupivacaine& Dexmedetomidine group throughout follow up time points, but the differences were statistically significant at hour-8, 12 and 24.

Table 7: Post-operative morphine consumption among the study groups

Measures	Bupivacaine& Dexmedetomidine(Total=35)	Bupivacaine(Total=35)	p-value	Relative effect	
				Measures	Values
Total 24-hours morphine dose (mg/kg)					
Mean±SD	0.11±0.04	0.20±0.13	**^<0.001***	**Mean±SE**	-0.10±0.02
Range	0.05–0.20	0.05–0.40		**95% CI**	-0.14–-0.05
Time to first postoperative dose (hours)					
Mean±SD	10.1±1.4	7.5±2.5	**^<0.001***	**Mean±SE**	2.6±0.5
Range	8.0–12.0	4.0–12.0		**95% CI**	1.6–3.6

^Independent t-test. *Significant. Relative effect: Effect in Bupivacaine& Dexmedetomidine group relative to Bupivacaine group. SE: Standard error. CI: Confidence interval.

Table (7) showed that: Total 24-hours morphine dose was significantly lower in Bupivacaine& Dexmedetomidine group. Time to first postoperative dose was significantly longer in Bupivacaine& Dexmedetomidine group.

Figure (1) showed that: Rate of need to first postoperative morphine dose was significantly slower in Bupivacaine& Dexmedetomidine group.

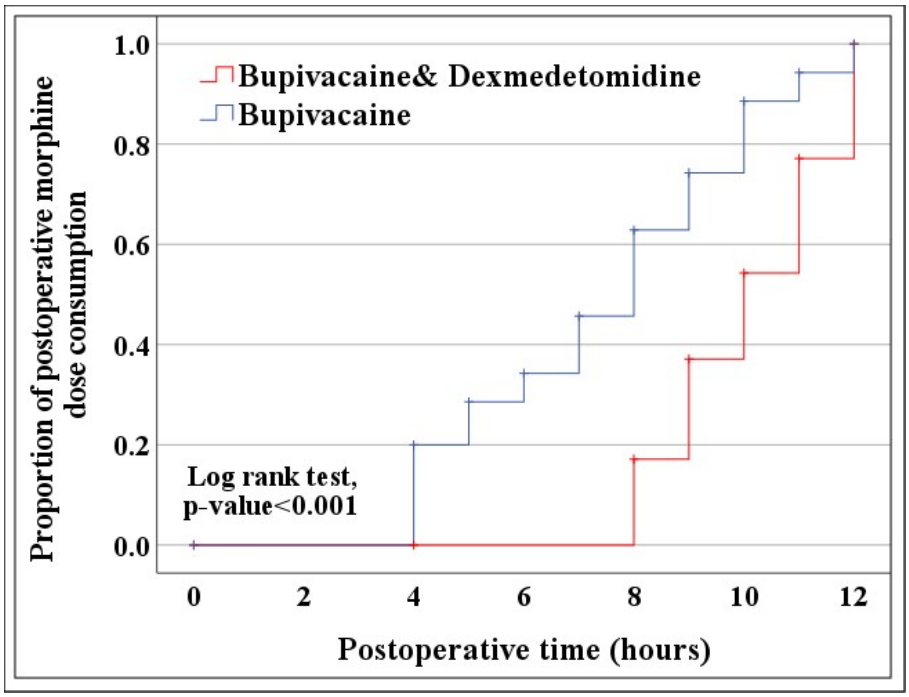

Figure 2: Kaplan-Meier curve for rate of first postoperative morphine dose

Table 8: Post-operative complications related to morphine consumption among the study groups

Complications	Bupivacaine& Dexmedetomidine(Total=35)	Bupivacaine(Total=35)	p-value	Relative effect	
				Relative risk	95% CI
Nausea	2 (5.7%)	9 (25.7%)	**#0.022***	0.22	0.05–0.96
Vomiting	1 (2.9%)	4 (11.4%)	§0.356	0.25	0.03–2.13
Pruritus	1 (2.9%)	2 (5.7%)	§0.999	0.50	0.05–5.27

#Chi square test. §Fiisher's Exact test *Significant. Relative effect: Effect in Bupivacaine& Dexmedetomidine group relative to Bupivacaine group. CI: Confidence interval.

Table (8) showed that: post-operative nausea, vomiting and pruritus were less frequent in Bupivacaine& Dexmedetomidine group, but the differences were statistically significant only in nausea.

Discussion

Lumbar spine surgeries are performed to relieve pain and provide functional improvement in patients with spinal canal stenosis, spine fracture and degenerative spine disease. During surgery, mechanical and thermal trauma can cause muscle ischemia and damage to nerves innervating the paraspinal muscles. Therefore, it is often characterized by severe and diffuse pain in postoperative period [16] So, adequate postoperative analgesia is essential to allow early mobilization, reducing the incidence of postoperative respiratory complications and decrease the risk of chronic pain syndrome [17].

Patients undergoing spine surgeries require a multimodal postoperative pain management that provides high quality analgesia with minimal side effects. Until now, spine surgeries are performed by general anesthesia (GA). However, GA cannot provide adequate postoperative pain control plus routine use of parenteral opioids aggravate nausea, emesis, impaired oxygenation, and depressed ventilation. Many studies were conducted to find a different analgesic modality as nerve blocks [17].

Paravertebral block became the gold standard techniques to achieve this goal, but due to its anatomical proximity to pleura, central neuraxial system and major vascular structure, so it is a challenging one and not every anesthesiologist is comfortable performing these procedures [18].

Erector spinae plane block was first described by Forero et al. [17]. clinical experiences indicate that the optimal plane for injection in the ESP block is deep to the erector spinae muscle rather than superficial to it [18].

Erector Spinae used to manage thoracic neuropathic pain in a patient with metastatic disease of the ribs and rib fractures [19]. Since then, the block has been reported to have been used successfully in a multitude of procedures including thoracotomies, percutaneous nephrolithotomies, ventral hernia repairs, and even lumbar fusions [20,21] with success rates providing visceral and somatic analgesia.

Three theories have been proposed to clarify the prolonged analgesic effect of adding dexmedetomidine to perineural LA beside its central action after systemic absorption. The first one is vasoconstriction mediated by action of vascular α2 adrenoceptor at injection site, which delays the absorption of LA and prolongs its efficacy [22,23]. Second, dexmedetomidine blocks hyperpolarization-activated cationic currents and reduces acute local anesthetic-induced perineural inflammation without causing nerve damage [24]. Finally, dexmedetomidine itself has analgesic effect, and peripheral α2A-ARs are the mechanism of dexmedetomidine in the treatment of peripheral nerve block pain [25].

Dexmedetomidine when used as adjuvant to Bupivacaine in regional blocks prolongs the duration of the block and reduces the need for rescue analgesia as been proved in many studies before [26,27].

Regarding demographic characteristics in this study, age, sex, weight and ASA, operation duration and anesthesia duration, there were no statistical significant differences between the two study groups.

There were no statistical significant differences between both study groups regarding heart rate (T0) and (T1) but T2 heart rate was significantly lower in Bupivacaine& Dexmedetomidine group (Group B) ($P < 0.001$).

Regarding, Mean Blood Pressure there was No statistical significant differences between the study groups regarding T0 and T1 Mean blood pressure but T2 Mean blood pressure was significantly lower in Bupivacaine& Dexmedetomidine group (Group B) ($P<0.008$).

In agreement with our results, Esmaoglu and his colleagues [28] found that adding 100 μg dexmedetomidine to the local anesthetic in axillary brachial plexus blockade during elective forearm and hand surgeries caused obvious declining in systolic blood pressure, diastolic blood pressure and heart rate.

In our study, Regarding Intra operative Fentanyl Consumption (μg/kg) was significantly lower in Bupivacaine& Dexmedetomidine group (Group B) ($P<0.003$).

With our study, Mohta et al. [29] assessed the impact of the use of dexmedetomidine as an additive to bupivacaine in the paravertebral block during breast cancer surgery. the mean intraoperative fentanyl requirements were lower in (bupivacaine with dexmedetomidine group) (54.6 μg) than (bupivacaine alone group) (58 μg).

While against our results, Gad and El-Metwally [30] assessed the Efficacy of adding dexmedetomidine as adjuvant with levobupivacaine in ultrasound-guided serratus plane block for modified radical mastectomy surgery, the total intraoperative fentanyl requirement was insignificantly different between levobupivacaine alone and levobupivacaine-dexmedetomidine groups. This difference may be due to the difference in the type of surgery or LA used.

As Demonstrated in this study, Postoperative pain (VAS-10) among both study groups was non-significantly lower in Bupivacaine& Dexmedetomidine group throughout follow up time points, but the differences were statistically significant at hour-8, 12 and 24.

Going with our study Wang Q et al [31], proved that adding 1 of μg/kg dexmedetomidine to 0.375% ropivacaine in ultrasound-guided erector spinae plane block in thoracotomy had a better analgesic effect at 12, 24 and 48 h after surgery, while there was no significant difference in the analgesic effect between his two groups at 2 and 4 h after surgery. The main reason was that ropivacaine nerve

block alone had difficulty maintaining a good anesthesia effect after 6–8 h.

Also, our study showed that, post-operative morphine consumption was significantly lower in Bupivacaine& Dexmedetomidine group. Time to first postoperative dose was significantly longer in Bupivacaine& Dexmedetomidine group (Group B) range 8-12hr, P-value (<0.001).

Going with our study Xu et al [32], the authors found that adding 0.5 μg/kg dexmedetomidine to 0.25% ropivacaine for transversus abdominis plane block and rectus sheath in patients undergoing emergency abdominal surgeries reduced the total amount of opioids consumptions in the first 24 hours after abdominal surgery.

With our study, Abdelaal et al [33], showed that the addition of dexmedetomidine (100 μg) to levobupivacaine (20 ml of 0.375%) in transverse abdominis plane block after abdominoplasty delayed the time to the first analgesia request compared with levobupivacaine alone (205±10.2 min vs. 181±12.6 min; P<0.001) and also decreased total 24-h pethidine consumption (136±13.4 vs. 172±15.8 mg; P<0.001).

In agreement with these results, Manzoor et al. [34] demonstrated that addition of dexmedetomidine to bupivacaine (30 ml of 0.25%) in Pectoralis Nerve Block (Pecs II) significantly prolonged the duration of postoperative analgesia by ~ 40% compared with the use of bupivacaine alone (1024.0±124.9 vs. 726.4±155.3 min; P<0.001).

With our results, Zhixin Gao and his colleagues [35] showed that Dexmedetomidine, which was used as an adjuvant of Erector Spinae Block with ropivacaine, prolonged sensory block duration, provided effective acute pain control after surgery, and reduced the need for rescue analgesia for patients undergoing video-assisted thoracoscopic lobectomy surgery.

Also with this study, Xunxun Wang and his colleagues [36] founded that dexmedetomidine combined with 0.33% ropivacaine Erector spinae plane block in patients undergoing modified radical mastectomy can better provide postoperative analgesia than without dexmedetomidine performance, thus improving postoperative analgesia and comfort level.

In our study, Regarding Post-operative complications related to morphine consumption (nausea, vomiting and pruritus) were less frequent in Bupivacaine& Dexmedetomidine group, but the differences were statistically significant only in nausea.

With our results, Aksu and his colleagues [37] showed that addition of dexmedetomidine to bupivacaine on transverse abdominis plane block in patients undergoing Abdominal surgeries that PONV was significantly lower in the group with dexmedetomidine. This may be owing to the use of less postoperative opioids in the group with dexmedetomidine.

Conclusion

The addition of dexmedetomidine to bupivacaine in US-guided Erector Spinae block during spine surgery reduce both intra operative fentanyl consumption and post--operative morphine consumption, significantly prolong time to first postoperative morphine dose and reduces post--operative Nausea, vomiting (PONV) and pruritis owing to lowering the total opioid consumption compared with bupivacaine alone.

References

1. Cozowicz C, Olson A, Poeran J, Mörwald EE, Zubizarreta N et al. (2017) Opioid prescription levels and postoperative outcomes in orthopedic surgery. Pain 158: 2422-30.

2. Soliman IE, Apuya JS, Fertal KM, Simpson PM, Tobias JD (2009) Intravenous versus epidural analgesia after surgical repair of pectus excavatum. American journal of therapeutics 16: 398-403.

3. Thepsoparn M, Sereeyotin J, Pannangpetch P (2018) Effects of combined lower thoracic epidural/general anesthesia on pain control in patients undergoing elective lumbar spine surgery: a randomized controlled trial. Spine 43: 1381-5.

4. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ (2016) The erector spinae plane block: a novel analgesic technique in thoracic neuropathic pain. Reg Anesth Pain Med 41: 621-7.

5. Celik M, Tulgar S, Ahiskalioglu A, Alper F (2019) Is high volume lumbar erector spinae plane block an alternative to transforaminal epidural injection? Evaluation with MRI. Reg Anesth Pain Med 44: 906-7.

6. Forero M, Adhikary SD, Lopez H et al. (2016) The erector spinae plane block: a novel analgesic technique in thoracic neuropathic pain. Reg Anesth Pain Med 41: 621-7.

7. Ueshima H, Otake H (2017) Clinical experiences of ultrasound—guided erector spinae plane block for thoracic vertebrae surgery. J Clin Anaesth 38: 137.

8. Chin KJ, Malhas L, Perlas A (2017) The erector spinae plane block provides visceral abdominal analgesia in bariatric surgery: a report of 3 cases. Reg Anesth Pain Med 42: 372-6.

9. Chin KJ, Adhikary S, Sarvani N et al. (2017) The analgesic efficacy of preoperative bilateral erector spinae plane (E-SP) blocks in patients having ventral hernia repair. Anaesthesia 72: 452-60.

10. Hamilton DL, Manickam B (2017) Erector Spinae Plane block for pain relief in ribfractures. Br J Anaesth 118: 452-60

11. Tomov M, Tou K, Winkel R et al. (2018) Does subcutaneous infiltration of liposomal bupivacaine following single level transforaminal lumbar interbody fusion surgery improve immediate postoperative pain control Asian Spine J 12: 85-93.

12. Talawar P, Kumar A, Bhoi D, Singh A (2019) Initial experience of erector spinae plane block in patients undergoing breast surgery: A case series. Saudi J Anaesth 13: 72-4.

13. Nasr DA, Abdelhamid HM (2013) The efficacy of caudal dexmedetomidine on stress response and postoperative pain in pediatric cardiac surgery. Ann Card Anaseth 16: 109-14

14. Virtanen R, Savola JM, Saano V, Nyman L (1988) Characterization of the selectivity, specificity and potency of medetomidine as an alpha 2-adrenoceptor agonist. Eur J Pharmacol 150: 9-14.

15. Sarvesh B, Shivaramu BT, Sharma K, Agarwal A (2018) Addition of Dexmedetomidine to Ropivacaine in Subcostal Transversus Abdominis Plane Block Potentiates Postoperative Analgesia among Laparoscopic Cholecystectomy Patients: A Prospective Randomized Controlled Trial. Anesth Essays Res 12: 809-13.

16. Mathiesen O, Dahl B, Thomsen BA, Kitter B, Sonne N et al. (2013) A comprehensive multimodal pain treatment reduces opioid consumption after multilevel spine surgery. Eur Spine J 22: 2089-96.

17. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ (2016) The erector spinae plane block: a novel analgesic technique in thoracic neuropathic pain. Regional Anesthesia & Pain Medicine 41: 621-7.

18. Talawar P, Kumar A, Bhoi D, Singh A (2019) Initial experience of erector spinae plane block in patients undergoing breast surgery: A case series. Saudi J Anaesth 13: 72-4.

19. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ (2016) The Erector Spinae Plane Block: A Novel Analgesic Technique in Thoracic Neuropathic Pain. Reg Anesth Pain Med 41: 621-7.

20. Yoshizaki M, Murata H, Ogami-Takamura K, Hara T (2019) Bilateral erector spinae plane block using a pro-

grammed intermittent bolus technique for pain management after Nuss procedure. J Clin Anesth 57: 51-2.

21. Raft J, Chin KJ, Belanger ME, Clairoux A, Richebé P et al. (2019) Continuous Erector Spinae Plane Block for thoracotomy analgesia after epidural failure. J Clin Anesth 54: 132-3.

22. Yoshitomi T, Kohjitani A, Maeda S, Higuchi H, Shimada M et al. (2008) Dexmedetomidine enhances the local anesthetic action of lidocaine via an alpha-2A adrenoceptor. Anesth Analg 107: 96-101.

23. Zhang X, Bai X (2014) New therapeutic uses for an alpha2 adrenergic receptor agonist–dexmedetomidine in pain management. Neurosci Lett 21: 7-12.

24. Brummett CM, Hong EK, Janda AM, Amodeo FS, Lydic R (2011) Perineural dexmedetomidine added to ropivacaine for sciatic nerve block in rats prolongs the duration of analgesia by blocking the hyperpolarization activated cation current. Anesthesiology 115: 836–43.

25. Kimura M, Saito S, Obata H (2012) Dexmedetomidine decreases hyperalgesia in neuropathic pain by increasing acetylcholine in the spinal cord. Neurosci Lett 529: 70-4.

26. Liu L, Qian J, Shen B et al. (2019) Intrathecal dexmedetomidine can decrease the 95% effective dose of bupivacaine in spinal anesthesia for cesarean section. Medicine (Baltim) 98: e14666

27. Abdallah FW, Brull R (2013) Facilitatory effects of perineural dexmedetomidine on neuraxial and peripheral nerve block: A systematic review and meta-analysis. Br J Anaesth 110:915-25.

28. Esmaoglu A, Yegenoglu F, Akin A et al. (2010) Dexmedetomidine added to levobupivacaine prolongs axillary brachial plexus block. Anesth Analg 111: 1548-51.

29. Mohta M, Kalra B, Sethi AK et al. (2016) Efficacy of dexmedetomidine as an adjuvant in paravertebral block in breast cancer surgery. J Anesth 30: 252-60.

30. Gad M, El-Metwally M (2019) Efficacy of adding dexmedetomidine as adjuvant with levobupivacaine in ultrasound-guided serratus plane block for modified radical mastectomy surgery. Research and Opinion in Anesthesia and Intensive Care 6: 234.

31. Wang Q, Li H, Wei S, Zhang G, Ni C et al. (2021) Dexmedetomidine added to ropivacaine for ultrasound-guided erector spinae plane block prolongs analgesia duration and reduces perioperative opioid consumption after thoracotomy: a randomized. Controlled Clinical Study Clin J Pain 38: 8-14.

32. Xu L, Hu Z, Shen J et al. (2018) Efficacy of US-guided transversus abdominis plane block and rectus sheath block with ropivacaine and dexmedetomidine in elderly high-risk patients. Minerva Anestesiol 84: 18-24.

33. Abdelaal W, Metry AA, Refaat M, Ragaei M, Nakhla G (2015) Comparative study between levobupivacine versus levobupivacaine plus dexmedetomidine for transversus abdominis plane block 'tap' in post-operative pain management after abdominoplasty. Enliven J Anesthesiol Crit Care Med 2: 004.

34. Manzoor S, Taneja R, Sood N, Puri A, Kadayaprath G (2018) Comparative study to assess the quality of analgesia of bupivacaine and bupivacaine with dexmedetomidine in ultrasound-guided pectoral nerve block type I and II in breast surgeries. J Anaesthesiol Clin Pharmacol 34: 227.

35. Gao Z, Xiao Y, Wang Q, Li Y (2019) Comparison of dexmedetomidine and dexamethasone as adjuvant for ropivacaine in ultrasound-guided erector spinae plane block for video-assisted thoracoscopic lobectomy surgery: a randomized, double-blind, placebo-controlled trial. Ann Transl Med 7: 668.

36. Wang X, Ran G, Chen X, Xie C, Wang J et al. (2021) The Effect of Ultrasound-Guided Erector Spinae Plane Block Combined with Dexmedetomidine on Postoperative Analgesia in Patients Undergoing Modified Radical Mastectomy: A Randomized Controlled Trial. Pain and Therapy 1-10.

37. Aksu R, Patmano G, Biçer C, Emek E, Çoruh AE (2018) Eficácia de bupivacaína e associação com dexmedetomidina em bloqueio do plano transverso abdominal guiado por ultrassom na dor após cirurgia abdominal [Efficiency of bupivacaine and association with dexmedetomidine in transversus abdominis plane block ultrasound guided in post-

operative pain of abdominal surgery]. Rev Bras Anestesiol 68: 49-56.