Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

Ultrasound guided transversus abdominis plane block in lower abdominal gynaecological surgery-Effect of Dexmedetomidine as an adjuvant to levobupivacaine

Dr Madhusmita Hembram[1], Dr Bharat Chandra Sahoo[2], Dr Shankar Prasad Hatei[3], Dr Aniruddha Mishra[4], Dr Kamala Kanta Pradhan[5]

[1]Assistant Professor. Dept of Obstetrics and Gynaecology. S.C.B Medical College, Cuttack

[2]Assistant Professor. Department of Radio-diagnosis. S.C.B Medical College, Cuttack

[3] Assistant Professor. Department of Anaesthesiology. Govt Medical College, Sundargarh

[4] Assistant Professor. Department of Anaesthesiology. S.C.B Medical College, Cuttack

[5]Associate Professor. Department of Anaesthesiology, Govt Medical College, Sundargarh

Corresponding Author: Dr Aniruddha Mishra. Assistant Professor, Department of Anaesthesiology. S.C.B Medical College, Cuttack

Abstract

Objectives:

Transversus abdominis plane (TAP) block is commonly used for postoperative analgesia in abdominal surgeries. This study was done to evaluate the analgesic efficacy of dexmedetomidine when used as adjuvant to levobupivacaine for TAP block in patients undergoing lower abdominal gynaecological surgery.

Methods:

A randomised, double-blind trial was conducted in 60 American Society of Anaesthesiologists (ASA) I /II patients of 20–60 years undergoing lower abdominal gynaecological surgery. Patients were randomised to receive a total volume of 20ml of 0.25% levobupivacaine (L group) or 20 ml of 0.25% levobupivacaine with 1μg/kg dexmedetomidine (LD group) for performing bilateral TAP block postoperatively. Time to first rescue analgesic was primary aim of our study. Secondary aims were total analgesic consumption, VAS score, hemodynamic and any complications.

Results:

First rescue analgesic demand was significantly longer in LD group versus L group which was statistically significant. Total analgesics consumption in first 24 h was more in L group compared to LD group which was statistically significant. VAS scores were significantly lower in LD group compared to L group postoperatively.

Conclusion:

Dexmedetomidine, when added to levobupivacaine in TAP block prolongs the time to first analgesic requirement along with reduced total analgesic consumption in postoperative period in lower abdominal gynaecological surgery

Keywords: Dexmedetomidine, levobupivacaine, transverses abdominis plane block, gynaecological

Introduction

Postoperative pain is one of the worst nightmare of patients posted for infraumbilical gynecological surgeries. Alleviation of postoperative pain is very important to provide early ambulation, decrease analgesic requirement, duration of hospitalization and to reduce postoperative morbidity. Many pharmacological and

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

nonpharmacological methods are there to manage the postoperative pain but none has been found ideal.[1] In last few years transversus abdominis plane (TAP) block has been used for postoperative pain management in patients undergoing lower abdominal surgeries under general anaesthesia.[2] In a recent meta analysis by Sidiqui et al[3], they concluded that TAP block reduces the dose of opioids used in the postoperative period, prolongs the duration of analgesia, and provides excellent pain relief, while decreasing opioid related side effects such as sedation and post-operative nausea and vomiting. Now a days levobupivacaine, the widely used local anesthetic in regional anesthesia because of central nervous system (CNS) and cardiovascular toxic effects of bupivacaine,but it has shorter duration of action compared to bupivacaine.[4]Adjuvants like opioids, dexamethasone, magnesium sulphate ,ketamine and dexmedetomidine have been used for prolonging the sensory and motor blockade, but each one had its own side effects like sedation, nausea & vomiting etc.[5] α2 – adrenergic receptors agonist like dexmedetomidine have been the focus of interest for their sedative, analgesic, and perioperative sympatholytic effects. Dexmedetomidine has proved its efficacy in prolonging the duration of local anaesthetics in various regional blocks.[6]There were few studies in literature using dexmedetomidine as adjuvant to levobupivacaine in TAP block.This study was designed to evaluate the efficacy of dexmedetomidine when used as adjuvant to levobupivacaine in TAP block for post operative pain management. Time to first rescue analgesic was primary aim of our study. Secondary aims were total analgesic consumption, no of patients requiring rescue analgesics,VAS score,sedation and any complications.

Methods

After getting approval from the institutional research and ethical committee & written informed consent from the patient, a prospective, randomized ,double blinded study was conducted on 60 patients belonging to ASA grade I & II, which were scheduled for lower abdominal gynecological surgeries at a tertiary care hospital in Odisha from April 2022 to April 2023. The study population were randomly divided using computer generated randomization in to 2 groups of 30 patients in each group. Allocation concealment was done by serially numbered opaque envelop method. Group L received (n=30) 20 ml of 0.25% Levobupivacaine and Group LD(n=30) received 20 ml of 0.25% Levobupivacaine + (1 µg/kg dexmedetomidine diluted up to 1ml of normal saline. Patient refused for inclusion, any history of allergy to local anesthetic or dexmedetomidine,BMI >25kg/m^2,coagulation disorders, pregnancy, chronic renal diseases and local block site infection were excluded from the study.Pre anesthetic check up was done one day prior to the day of surgery. Patients were evaluated for any systemic disease and all routine laboratory investigations were checked. The TAP block procedure was explained to the patient and consent for the same was obtained. The patients were given Tab Alprazolam 0.5 mg and Tab Ranitidine 150 mg at bed time on the night before surgery. All the patient's pulse rate ,blood pressure and SPO2 in room air were recorded. A peripheral 18 G IV cannula was secured in one of the upper limbs and Ringers Lactate IV drip was started. Multipara monitor were connected to record heart rate,non Invasive Blood Pressure (NIBP),continuous ECG,SP02 and end tidal CO_2..All patients received standard general anesthesia in supine position. Patients were premedicated with inj Glycopyrrolate 0.005mg/Kg IV, Inj Midazolam 0.05 mg/Kg IV and Inj Pentazocin 0.5 mg/Kg IV.Anesthesia was induced with Inj Propofol 2 mg/Kg IV and endotracheal

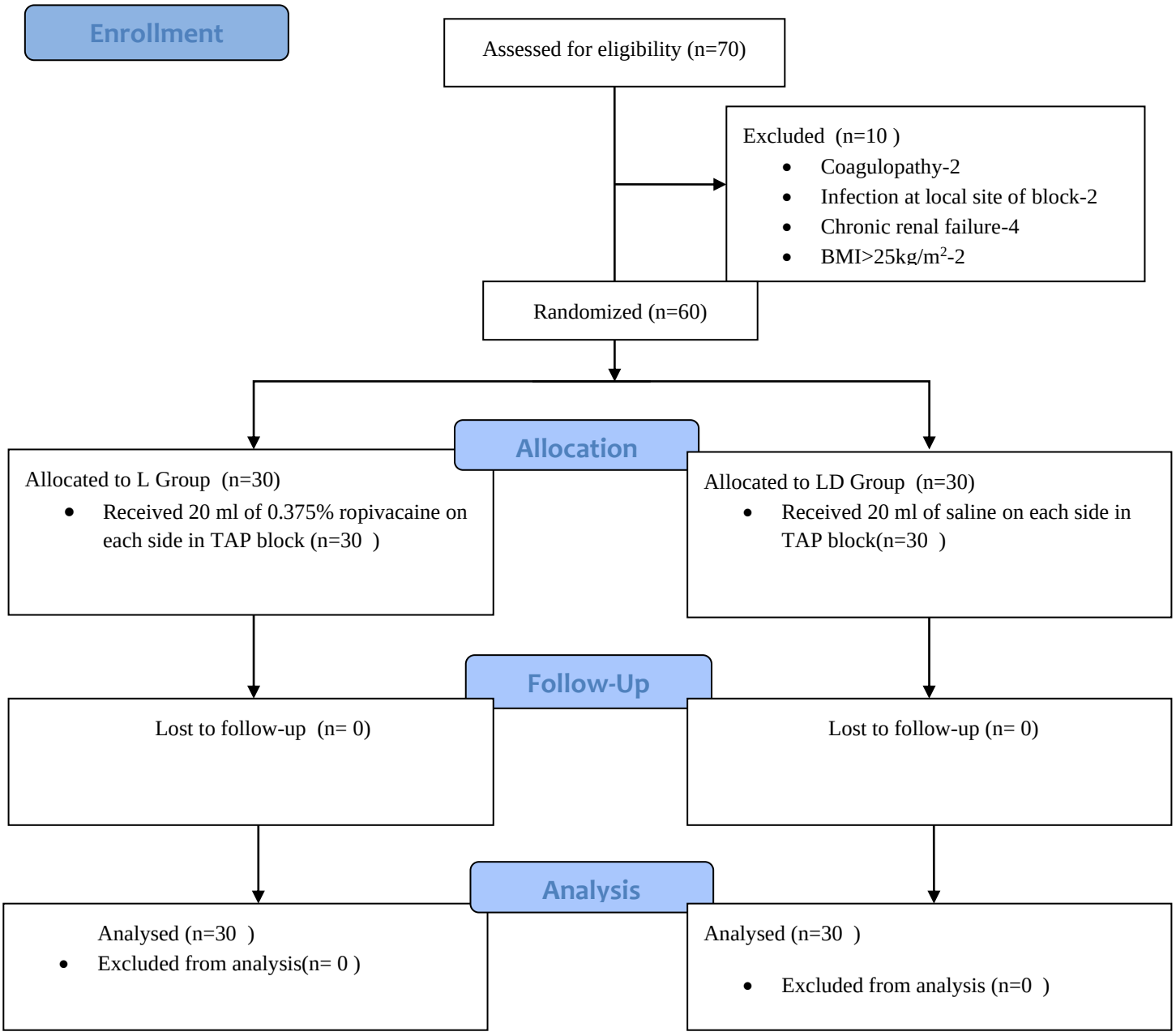
ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

intubation facilitated with Inj Vecuronium 0.1 mg/Kg IV. Anesthesia was maintained with N2O and O2. Isoflurane inhalation was titrated to maintain adequate depth of anesthesia and surgery was allowed. At the end of surgery, skin antiseptic was provided with 2 % povidone iodine solution following anesthesia induction. TAP block using midaxillary approach was performed in all cases. A high –frequency (5-10MHz) ultrasound linear probe was transversely located on the anterolateral abdominal wall between the lower costal margin and the iliac crest, and neurovascular plane between the internal oblique and transverse abdominis muscle were identified. A 50 mm nerve block needle was concurrently located on the area and pre-prepared agent was injected after negative aspiration. The injected liquid was observed on ultrasound to be distributed in a dark oval form in TAP. Anesthesia was discontinued following surgical operation and residual block was reversed with Inj Neostigmine 0.05mg/kg IV & Inj Glycopyrrolate 0.2mg per 1mg of Neostigmine. When the patient recovered from anesthesia and had spontaneously gained sufficient tidal volume and motor function, they were transferred to the post nesthesia care unit (PACU). Time to request first analgesics,rescue analgesia requirements were recorded. Heart Rate (HR),Systolic Blood Pressure (SBP),Diastolic Blood Pressure (DBP),Mean Arterial Pressure (MAP),SPO2 and VAS Score were monitored.Pain score on visual analogue scale “VAS” was recorded using a 10cm ruler where (0=no pain and 10= worst possible pain). All the patients were administered IV Paracetamol (15mg/kg) as rescue analgesic when postoperative VAS score > 4 . It was recorded at 20min,40min,1hr,3hr,6hr,9hr,12hr,15hr,18hr,21hr and 24th hr in postoperative period. All the patients were assessed using Ramsay Sedation Score where Score 1- anxious, agitated, restless ,Ramsay 2-cooperative,oriented, Ramsay 3-responsive to commands only. The above score applies to awake patients, whereas in patients who are asleep-Ramsay 4- brisk response to light glabellar tap, Ramsay 5- sluggish response, Ramsay 6-no response. Patients were assessed at different time interval in the postoperative period. Any complications like Post operative nausea vomiting (PONV) were recorded. A MAP decrease of more than 20 percent from the baseline was considered to be hypotension. In such cases, isoflurane concentration was reduced and 6mg ephedrine was intravenously administered. Slowing down of the heart rate to less than 60 beats per minute was considered to be bradycardia, and 0.6 mg of atropine IV was administered in such cases. Sample size calculation was based on an initial pilot study involving ten patients with 'time needed for first rescue analgesic' as the primary end point of the study. Time to first analgesic request was 3.29 ± 0.51hrs in levobupivacaine group and 6.72 ± 0.49 hrs in levobupivacaine-dexmedetomidine group. With Ω± error of 0.05 and power of the study (1− Ω^2) at 80%, to detect a minimum of 120 min difference in time needed for rescue analgesia between the two groups, the sample size was calculated to be approximately 28 in each group. We included thirty patients in each group to compensate for possible dropouts. The patients, who were part of the pilot study, were not included in the study. The patients' characteristics and block profile were categorized and analyzed appropriately using student's unpaired *t*-test and Chi-square test. A $P < 0.05$ was considered as statistically significant.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

Results

Figure 1- flow chart of the study



A total of 70 patients posted for gynaecological laparoscopic surgery were included in the study. 10 patients were excluded for not meeting inclusion criteria. 60 patients were enrolled in the study.(Fig1)The demographic profile, block performing time and duration of surgery were comparable in both the groups. The mean time to first analgesic request 4.5± 0.73hrs hours in group L and 7.84± 0.62 hours in group LD.($P < 0.05$) The total dose of paracetamol

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

consumed in 24 hours was 3.9± 0.45 gm in group L group and 2.12± 0.6gm in group LD.($P < 0.05$) (Table 1)At different time intervals, VAS scores were significantly lower in the Group LD compared to the group L. ($p < 0.05$)(figure 2) There was no remarkable difference regarding nausea, vomiting, and sedation between the two groups. (Table 2)

Table 1: Total analgesic consumption in 24 hrs and time to first analgesia request

Parameters	Group L(n=30)	Group LD(n=30)	P value
Time to 1st rescue analgesia request (hrs)	4.5± 0.73	7.84± 0.62	0.025
Total analgesic consumption(Paracetamol in gm)	3.9± 0.45	2.12± 0.6	0.028

Values expressed as Mean±SD, SD: Standard deviation. Student's t-test and Chi-square test applied. P<0.05 is significant

Figure 2: Post operative VAS scores

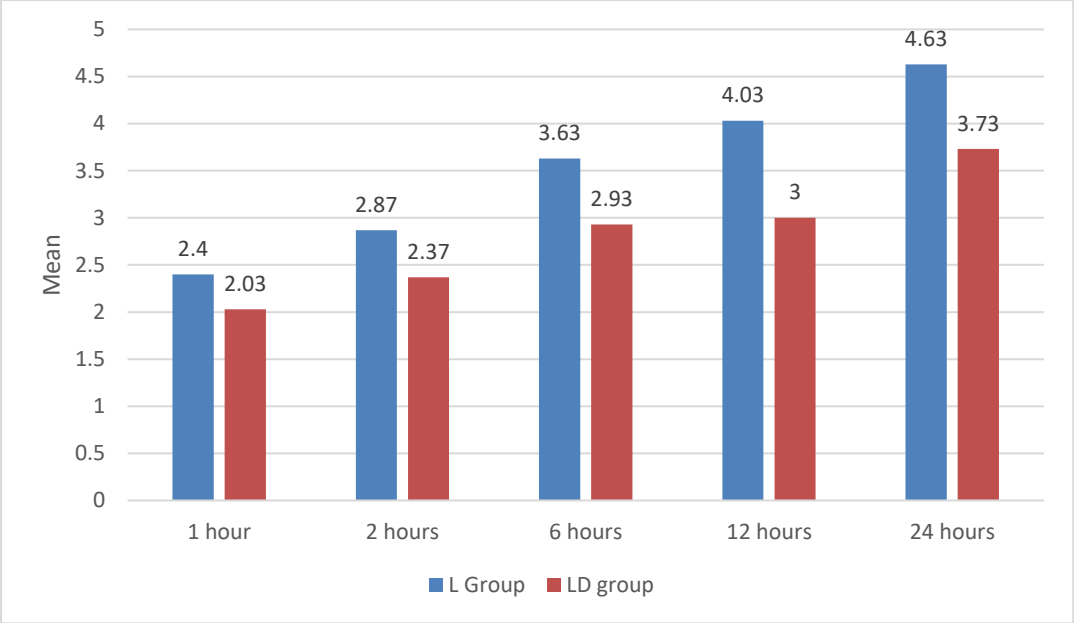


Table 2: Incidence of PONV and sedation

	GroupL (n=30)	Group LD (n=30)	P value
Nausea	2	2	0.258
Vomiting	1	1	0.209
Sedation	2	3	0.213

Discussion

We found that supplementation of levobupivacaine with 1 µg/kg of dexmedetomidine in TAP block provided longer postoperative analgesia, lower VAS score, and lower analgesic consumption than levobupivacaine alone over postoperative 24 hours compared with with fewer side effects. Abdallah et al.[7] conducted a systematic review and meta-analysis to examine whether TAP block could decrease intravenous morphine usage in the first 24 h post

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

caesarean delivery. They concluded that there was a reduction in the mean 24 h morphine consumption in the TAP block. TAP block was found to decrease the VAS pain scores with quality analgesia. In a randomized controlled trial McDonnell et al.[8] studied 50 women undergoing elective caesarean delivery under spinal anaesthesia, and evaluated the usefulness of transversus abdominis plane(TAP) block in providing analgesia over the first 24 h postoperatively. The VAS scores, total morphine requirement and incidence of sedation, decreased in the first 24h postoperatively in favour of TAP block with ropivacaine. Singh et al [9] used bupivacaine alone and clonidine with bupivacaine for TAP block following caesarean delivery. They reported longer duration of postoperative analgesia, lesser consumption of rescue analgesia and higher satisfaction score in patient who received TAP block with 1 mcg/kg of clonidine added to bupivacaine. In a study by Neethirajan et al.[10] they concluded that the addition of dexmedetomidine to bupivacaine in TAP block produces more postoperative pain-free time, provides better analgesia, and reduces rescue analgesic requirements in comparison with bupivacaine alone. In their study, Chen et al.[11] compared the effect of adding dexmedetomidine or fentanyl into ropivacaine in TAP block on analgesic efficacy and recovery quality in elective gynaecological patients. They concluded that consumption of dexmedetomidine as a supplement to TAP blocks might facilitate postoperative analgesia and advance the value of recovery. Almarakbi et al.[12] in his study of TAP block in abdominal hysterectomy concluded that VAS was significantly lower in the experimental group in comparison with the control group in the first eight postoperative hours, both while resting and coughing. Shehab et al.[13] in his study of TAP block in abdominal and pelvic cancer surgery, revealed that the use of dexmedetomidine in TAP block provided a deeper postoperatively analgesia and lesser extra analgesic consumption. Ramya et al [14] in his study of TAP block after caesarean section under spinal anaesthesia, concluded that the addition of dexmedetomidine to bupivacaine in TAP block could prolong the time to request the first dose of rescue analgesia and also reduced the total dose of opioid requirement in the first 24-h after caesarean section. Aksu et al.[15] in his study of TAP block showed that the VAS score was lower in the dexmedetomidine group than in the control group during the 1st 8 hours after the operation. All the above studies were in agreement with our study. Therefore, dexmedetomidine can be a effective adjuvant with levobupivacine in transversus abdominis plane block for effective and prolonged post-operative analgesia in lower abdominal gynaecological surgeries.

Conclusion

Dexmedetomidine when used as adjuvant to levbupivacaine in TAP block in lower abdominal gynecological surgeries, prolonged the time to 1st rescue analgesia requirement and reduced total analgesic consumption during postoperative 24 hours.

References

1. Prabhakar A, Mancuso KF, Owen CP, Lissauer J, Merritt CK, Urman RD, et al. Perioperative analgesia outcomes and strategies. Best Pract Res Clin Anaesthesiol 2014;28:105-15.
2. Petersen PL, Mathiesen O, Torup H and Dahl JB. The transversus abdominis plane block: Avaluable option for postoperative analgesia? A topical review. Acta Anaesthesiol Scand 2010;54:529-35.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

3. Siddiqui MR, Sajid MS, Uncles DR, Cheek L, Baig MK. A meta-analysis on the clinical effectiveness of transversus abdominis plane block. J Clin Anesth 2011;23:7-14.
4. Acharya R, Baksi R, Mohapatra P. Comparative analysis of duration of postoperative analgesia between levobupivacaine and levobupivacaine with clonidine after ultrasound-guided transversus abdominis plane block in patients undergoing lower segment cesarean section. Anesth Essays Res. 2018;12(4):943–8.
5. Imani F, Zaman B, De Negri P. Postoperative pain management: Role of dexmedetomidine as an adjuvant. Anesth Pain Med. 2021;10(6):e112176.
6. Xue Y, Yuan H, Chen Y. Effects of dexmedetomidine as an adjunct in transversus abdominis plane block during gynecological laparoscopy. Exp Ther Med. 2018;16(2):1131–6.
7. Abdallah FW, Halpern SH, Margarido CB. Transversus abdominis plane block for postoperative analgesia after caesarean delivery performed under spinal anaesthesia? A systematic review and meta-analysis. Br J Anaesth 2012;109:679-87.
8. McDonnell JG, Curley G, Carney J, Bentone A, Costello J, Maharaj CH, et al. The analgesic efficacy of transversus abdominis plane block after cesarean delivery: A randomized controlled trial. Anesth Analg 2008;106:186-91.
9. Singh R, Kumar N, Jain A, Joy S. Addition of clonidine to bupivacaine in transversus abdominis plane block prolongs postoperative analgesia after cesarean section. J Anaesthesiol Clin Pharmacol 2016;32:501-4.
10. Neethirajan SGR, Kurada S, Parameswari A. Efficacy of dexmedetomidine as an adjuvant to bupivacaine in ultrasound-guided transverse abdominis plane block for laparoscopic appendicectomy: A randomised controlled study. Turk J Anaesthesiol Reanim. 2020;48(5):364–70.
11. Chen Q, Liu X, Zhong X, Yang B. Addition of dexmedetomidine or fentanyl to ropivacaine for transversus abdominis plane block: evaluation of effect on postoperative pain and quality of recovery in gynecological surgery. J Pain Res. 2018;11:2897-2903.
12. Almarakbi WA, Kaki AM. Addition of dexmedetomidine to bupivacaine in transversus abdominis plane block potentiates post-operative pain relief among abdominal hysterectomy patients: A prospective randomized controlled trial. Saudi J Anaesth. 2014;8(2):161–6.
13. Shehab NN, El-Helaly MK, Ghoneim AA, Nabih GM. Comparative study between bupivacaine versus bupivacaine with dexmeditomidine in ultrasound guided transversus abdominis plane block for postoperative analgesia in cancer patients undergoing major pelviabdominal surgeries. Med J Cairo Univ. 2018;86(6):1955–62.
14. Ramya Parameswari A, Udayakumar P. Comparison of efficacy of bupivacaine with dexmedetomidine versus bupivacaine alone for transversus abdominis plane block for post-operative analgesia in patients undergoing elective caesarean section. J Obstet Gynaecol India. 2018;68(2):98–103.
15. Aksu R, Patmano G, Bicer C, Emek E, Coruh AE. Efficiency of bupivacaine and association with dexmedetomidine in transversus abdominis plane block ultrasound

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

guided in postoperative pain of abdominal surgery. Rev Bras Anestesiol. 2018;68(1):49–56.