e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2022; 14(10); 315-320

Original Research Article

Comparative assessment of two techniques in terms of analgesia and sensory blockade in patients treated for modified radical mastectomy (MRM).

Rabindra Kumar[1], Hari Damodar Singh[2]

[1]Senior Resident, Department of Anaesthesia, DMCH, Laheriasarai Darbhanga, Bihar, India

[2]HOD, Department of Anaesthesia, DMCH, Laheriasarai, Darbhanga, Bihar, India

Received: 04-08-2022 / Revised: 10-09-2022 / Accepted: 02-10-2022
Corresponding author: Dr. Hari Damodar Singh
Conflict of interest: Nil

Abstract

Aim: We aimed to compare the techniques in terms of analgesia and sensory blockade in patients undergoing modified radical mastectomy (MRM).

Methods: The present study was conducted in the department of anesthesia DMCH Laheriasarai Darbhanga, Bihar, India for 1 year The study adheres to CONSORT guidelines. 100 American Society of Anesthesiologists (ASA) I/II patients between the age group 20 and 60 years, who were scheduled to undergo unilateral MRM under general anaesthesia, were screened. Out of these, 50 patients were allocated in one of the two groups.

Results: Morphine consumption within 24 h postoperative period in group I was 6.50 ±1.30 mg and in group II was 8.65 ±0.75mg. The difference was highly significant between the two groups ($P < 0.001$). The intraoperative fentanyl consumption (µg/kg) was more in group II (1.56 ±0.480), compared to the other group: 1.5 ±0.570

Conclusion: Injection of drugs deep to erector spinae muscle provides more cranio-caudal blockade of posterior and lateral chest wall than superficial group.

Keywords: Erector spinae plane block, Modified radical mastectomy, Postoperative pain

Introduction

The role of ultrasound-guided ESP blocks for breast surgeries has been established. [1,2] Preoperative block administration lowers opioid consumption and opioid-related adverse effects in modified radical mastectomy. [3] Erector spinae plane (ESP) blocks are a straightforward and safe myofascial plane block (MRM).

The level of analgesia delivered by this block varies on the volume of medication administered, site of injection, approach of block, and pattern of dissemination within the myofascial plane, as demonstrated by a case series in patients scheduled for MRM. [4] The block was initially described by Forero et al., who employed two methods: superficial and deep to the erector spinae muscle. [3]

The ESP block is a successful analgesic strategy in a range of therapeutic settings, according to the majority of published papers. Both acute and chronic pain can be effectively treated with it. Additionally, it has been successful for abdominal,

cervical, and thoracic analgesia. Other investigations showed that it can, if carried out at the high thoracic and lumbar levels, respectively, offer appropriate analgesia in the upper or lower limbs. [5]

ESP block significantly lessens post-operative pain following modified radical mastectomy, total radical mastectomy, and other breast surgeries, according to numerous other studies. [6-8] It also reduces the need for conventional analgesic treatment, which has a significant impact on lowering analgesic-related adverse drug reactions and helping to achieve a positive long-term outcome for pain-related morbidities.

Women with breast cancer frequently have the modified radical mastectomy (MRM) with axillary lymph node dissection. [9] Inadequate postoperative pain treatment may have detrimental physiological and psychological effects and be a contributing factor in the development of chronic pain.

In patients receiving MRM, our goal was to compare the analgesia and sensory blockage provided by these two procedures. The main goal was to compare patients undergoing MRM after superficial method to those undergoing the traditional deep technique of ESP block in order to determine the postoperative analgesic use. Preoperative sensory suppression and negative outcomes were secondary goals.

Materials and Methods

The present study was conducted in the department of anesthesia DMCH Laheriasarai Darbhanga, Bihar, India for 1 year. The study adheres to CONSORT guidelines. 100 American Society of Anesthesiologists (ASA) I/II patients between the age group 20 and 60 years, who were scheduled to undergo unilateral MRM under general anaesthesia, were screened. Out of these, 50 patients were allocated in one of the two groups.

Methodology

All the patients were explained about the procedure, made familiar with numerical rating scale and patient-controlled analgesia pump in the preoperative visit. Following this, an informed consent was taken from all these patients.

The exclusion criteria included patients with allergy to the drugs, coagulopathy, infection at puncture site, mental disorder, communication failure, unable to discriminate cutaneous pin prick, chronic use of analgesics, and having body mass index (BMI) >30 kg/m2.

Premedication in the form of alprazolam 0.5 mg was administered orally in the morning before shifting to operating room. The enrolment for the study was done by the primary investigator. The patients were randomised into two groups of 25 each using computer-generated randomised numbers by the statistician. The random allocation sequence was kept concealed in opaque, sealed envelopes till group was assigned.

The patients were shifted to preoperative holding area and monitors including noninvasive blood pressure, electrocardiography (ECG), and peripheral oxygen saturation (SPO2) attached. All the blocks were performed by the second author who refrained from perioperative management or data collection.

The blocks were performed with the patient in the sitting position at least 30 min before incision. A high-frequency linear probe (38 mm, 7–12 MHz frequencies) (Sonosite, Inc., Bothell, WA, USA) was placed in a transverse plane. The lateral tip of T4 transverse process was visualised as a hyperechoic structure. Trapezius, rhomboid major, and erector spinae muscles were superficial to the T4 process. Thereafter, the probe was turned 90° longitudinally.

A blunt tip, 22-gauge echogenic needle (Pajunk, sonoplexstim cannula, Geisingen, Germany; 80 mm) was inserted in plane in

a caudal direction after injecting 2 cc of 2% lignocaine locally.

In group I, the needle tip was kept in contact with the transverse process. We confirmed the needle tip position by injecting 0.5–1 mL of saline. It was followed by injection of 20 mL of 0.2% ropivicaine.

In group II, needle tip position was kept superficial to erector spinae muscle and drug (20 mL of 0.2% ropivicaine) was injected in the fascial plane between rhomboid major and erector spinae muscle. All the patients were blinded to the block technique as the entry point for both the block procedures was the same. The sensory level of block was assessed by a blinded observer who was not present at the time of performance of block. Pin-prick testing was done every 5 min in dermatomal distribution from T1 to T8 anteriorly in mid clavicular line (MCL), laterally in mid axillary line (MAL), posteriorly in posterior axillary line (PAL), axilla, and at medial side of upper arm.

The patient's ECG and SpO2 were monitored over a period of 30 min after procedure. Any decrease in blood pressure (>20%) or vascular puncture was documented. General anaesthesia was given in a standardised manner (propofol 2 mg/kg, fentanyl 2 μg/kg, and vecuronium 0.08 mg/kg). The HR and blood pressure were recorded at baseline, after induction, after laryngeal mask airway (LMA) insertion, at skin incision, and then every 15 min until the end of surgery. Anaesthesia was maintained with sevoflurane in air and oxygen, targeted to maintain bispectral index values between 40 and 60. Intravenous ondansetron 4 mg and 8 mg of dexamethasone were given to all the patients for prophylaxis of postoperative nausea and vomiting after start of surgery. All the patients received an infusion of normal saline at a rate of 5–8 ml kg/h during surgery. If two consecutive readings showed an increase in mean arterial pressure (MAP) of 20% above baseline, intravenous fentanyl 1.0 μg/kg bolus was given. At the end of surgery, the neuromuscular block was antagonised with neostigmine and atropine. The LMA was taken out once the patients became fully awake and breathing adequately. Intravenous paracetamol 1 gm was given before extubation and sixth hourly thereafter to all the patients. A patient-controlled analgesia pump was attached to the patient for rescue analgesia. No background infusion was given. A lockout interval of 5 min with a maximum of 10 doses (1 mg boluses) per hour was preset. Opioid consumption in 24 h and adverse effects (hypotension, respiratory depression, shivering, nausea/vomiting and urinary retention) were documented. Rescue antiemetic ondansetron 0.1 mg kg-1 i.v. was given if the patient complained of nausea.

Results

The present study did not find any significant difference in age, duration of surgery, and BMI in both the groups as shown in Table 1.

Table 1: Demographic data

	Group I Mean ±SD	Group II Mean ±SD	P
Age (years)	48.04 ±11.70	45.55 ±10.08	0.425
Duration of surgery (h)	128.09 ±18.78	126.80 ±17.70	0.820
Weight (BMI)	22.5 ±1.935	22.007 ±2.652	0.850

Morphine consumption within 24 h postoperative period in group I was 6.50 ±1.30 mg and in group II was 8.65 ±0.75mg. The difference was highly significant between the two groups (P

< 0.001). The intraoperative fentanyl consumption (μg/kg) was more in group II (1.56 ±0.480), compared to the other group: 1.5 ±0.570 [Table 2].

Table 2: Duration of analgesia and morphine requirement

	Group I Mean ±SD	Group II Mean ±SD	P
Morphine requirement (mg)	6.50 ±1.30	8.65 ±0.75	<0.001
Intraoperative fentanyl consumption (μg/kg)	1.5 ±0.570	1.56 ±0.480	<0.001

Discussion

The MRM is associated with moderate-to-severe acute postoperative pain. Failure to provide adequate acute pain control is associated with poor quality of recovery and chronic postsurgical pain. [2,10] Acute postoperative pain after MRM can be managed with either parenteral analgesic or regional analgesics techniques. The regional techniques obviate the need of parenteral analgesia, hence associated side effects are also minimized. However, an ideal method has not yet been identified and all of these blocks also have some associated drawbacks too.

ESP block is a newer block wherein the drug is deposited more superficial and far from midline compared to TEA and PVB. ESP block is a safer truncal block, and provides better cephalocaudal spread of LA. The analgesia of ESP because of drug diffusion into PVB space, hence it is also known as indirect PVB. The literature described that drug deposited has better craniocaudal spread as it is tight compartment and ESP fascia extend cranially from cervical level to caudally at sacral level. Several other randomized controlled trial results have shown significantly decreased morphine consumption for the first 24 h postoperatively in the ESP block group compared to the control group. [6,11]

The ESP block is a relatively new interfascial plane block that has gained popularity due to its ease and safety. Its use extends to various surgeries like MRM, laparotomy, hernia, pyeloplasty, etc. [12-14] Forero et al. were the first to describe it, wherein they used two techniques for the same block: i) Deep technique: Drug deposited deep to erector spinae muscle, ii) Superficial technique: Drug deposited superficial to erector spinae muscle at T5 level. In the superficial technique, the first patient had sensory blockade ranging from T2 to T9 in a cephalocaudad direction, and 3 cm lateral to the thoracic spine to the midclavicular line in an anterior–posterior direction. There was sensory blockade in axilla and medial aspect of the upper arm. Clinically, the patient had adequate pain relief. [15]

We used a dose of 20 mL at the level of T4 based on a study done by Gurkan Y, et al. They gave ESP (deep technique) block for MRM, which reduced the opioid consumption significantly. [11] The morphine consumption reduced from 16.6 ± 6.92 to 5.76 ± 3.8 mg in the ESP group compared to the control group. Our results are also comparable as the 24-h morphine consumption was 6.50 ±1.30 mg in the deep group. [16]

Other studies have used local anaesthetic ranging from 20 to 30 ml. Cassai et al. stated that the volume needed to cover one dermatome ranged from 2.5 to 6.6 mL, with a median value of 3.4 ml. [9] In our study, the spread ranged from 3 to 6 dermatomes with a volume of 20 ml.

In our study, the sensory blockade was more in deep technique, which could be explained by the same mechanism. In the deep group, there would have been more seepage of drug in the paravertebral space, while in the superficial group, the muscle might act as a barrier to the spread. The target of ESP block for mastectomy

patients is to block the ventral rami of the spinal cord. Depositing the drug deep to ESP muscle enables the drug to seep in the paravertebral space contrary to what would be seen in superficial block. Hence, deep technique is better in terms of analgesia and is the standard technique in mastectomy patients.

Conclusion

Injection of drugs deep to erector spinae muscle provides more cranio-caudal blockade of posterior and lateral chest wall than superficial group. The quality of analgesia following breast surgery is better on injecting the drug deep to erector spinae muscle.

References

1. Andersen KG, Kehlet H. Persistent pain after breast cancer treatment: a critical review of risk factors and strategies for prevention. The Journal of Pain. 2011 Jul 1;12(7):725-46.
2. Malawat A, Jethava D, Sachdev S, Jethava DD. Erector spinae plane block for breast oncological procedure as a surrogate to general anaesthesia: A retrospective study. Indian Journal of Anaesthesia. 2020 Apr;64(4):328.
3. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ. The erector spinae plane block: a novel analgesic technique in thoracic neuropathic pain. Regional Anesthesia & Pain Medicine. 2016 Sep 1;41(5):621-7.
4. Nair AS, Seelam S, Naik V, Rayani BK. Opioid-free mastectomy in combination with ultrasound-guided erector spinae block: A series of five cases. Indian Journal of Anaesthesia. 2018 Aug;62(8):632.
5. Kot P, Rodriguez P, Granell M, Cano B, Rovira L, Morales J, Broseta A, Andrés J. The erector spinae plane block: a narrative review. Korean J Anesthesiol. 2019 Jun;72(3):209-220.
6. Singh S, Kumar G. Ultrasound-guided erector spinae plane block for postoperative analgesia in modified radical mastectomy: a randomised control study. Indian journal of anaesthesia. 2019 Mar;63(3):200.
7. Orozco E, Serrano RE, Rueda-Rojas VP. Erector spinae plane (ESP) block for postoperative analgesia in total radical mastectomy: case report. Colombian Journal of Anestesiology. 2018 Dec; 46:66-8.
8. Aksu C, Kuş A, Yörükoğlu HU, Kılıç CT, Gürkan Y. Analgesic effect of the bi-level injection erector spinae plane block after breast surgery: a randomized controlled trial. Agri. 2019 Jul 1;31(3):132-7.
9. Gu X, Zheng R, Xia C, Zeng H, Zhang S, Zou X, Yang Z, Li H, Chen W. Interactions between life expectancy and the incidence and mortality rates of cancer in China: a population-based cluster analysis. Cancer communica tions. 2018 Dec;38(1):1-5.
10. Hussain N, Shastri U, McCartney CJ, Gilron I, Fillingim RB, Clarke H, Katz J, Juni P, Laupacis A, Wijeysundera D, Abdallah FW. Should thoracic paravertebral blocks be used to prevent chronic postsurgical pain after breast cancer surgery? A systematic analysis of evidence in light of IMMPACT recommendations. Pain. 2018 Oct 1;15 9(10):1955-71.
11. Gürkan Y, Aksu C, Kuş A, Yörükoğlu UH, Kılıç CT. Ultrasound guided erector spinae plane block reduces postoperative opioid consumption following breast surgery: a randomized controlled study. Journal of clinical anesthesia. 2018 Nov 1; 50:65-8.
12. Restrepo-Garces CE, Chin KJ, Suarez P, Diaz A. Bilateral continuous erector spinae plane block contributes to effective postoperative analgesia after major open abdominal surgery: a case report. A & A case reports. 2017 Dec 1;9(11):319-21.
13. Chin KJ, Adhikary S, Sarwani N, Forero M. The analgesic efficacy of pre-operative bilateral erector spinae plane (ESP) blocks in patients having

ventral hernia repair. Anaesthesia. 2017 Apr;72(4):452-60.
14. Munshey F, Rodriguez S, Diaz E, Tsui B. Continuous erector spinae plane block for an open pyeloplasty in an infant. Journal of Clinical Anesthesia. 2018 Mar 21; 47:47-9.
15. De Cassai A, Bonvicini D, Correale C, Sandei L, Tulgar S, Tonetti T. Erector spinae plane block: a systematic qualitative review. Minerva anestesiol-ogica. 2019 Jan 4;85(3):308-19.
16. Sanoussi M, N., Brahim B., Derkaoui A., Abdelkrim S., & Mohammed K. Facteurs De Risques Du Sepsis Chez Les Traumatises Craniens Graves. Journal of Medical Research and Health Sciences, 2022; 5(1): 1653–1657.