



## Original Research Article

# EFFECTIVENESS OF ULTRASOUND GUIDED ERECTOR SPINAE PLANE BLOCK COMPARED TO SERRATUS ANTERIOR BLOCK IN MODIFIED RADICAL MASTECTOMY: A RANDOMIZED COMPARATIVE TRIAL

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**ABSTRACT**

**Background:** One of the most prevalent malignancies that females face is breast cancer. There are a few surgical interventions that can be considered as the management approaches used. One of them includes modified radical mastectomy (MRM). About 40% to 60% of patients face severe acute postoperative pain. To manage the acute perioperative pain, opioids have been considered as the cornerstone. Blanco et al. first described the ultrasound-guided serratus anterior place block (SAPB). This is used to control the procedures on the side of the chest wall and manage the pain after breast surgery. Another method, ultrasound-guided erector spinae plane block (ESPB), was introduced by Ferero et al. The objective is to compare the effectiveness and safety of SAPB and ESPB in females undergoing modified radical mastectomy. Study design is a randomised comparative study. This study was conducted at Civil Hospital Hyderabad, Liaquat University of Medical and Health Sciences (LUMHS) Jamshoro from August 2024 to August 2025

**Materials and Methods:** This is a randomised comparative analysis which was performed on 80 females who were undergoing radical mastectomy under general anaesthesia. All the participants were aged from 18 years to years. The BMI of all the patients was between 20 to 35 kg/m<sup>2</sup>. All of the females were divided into 2 groups with an equal number of patients in each group. One group was the SAPB group which received the serratus anterior plane block while the other group was the ESPB group which received the erector spinae plane block. Physical examinations were performed and patients' history was recorded. The Numeric Pain Rating Scale (NPRS) was used to measure the intensity of pain. SPSS version 23 was used to analyse the data. A significant p-value was considered to be less than 0.05.

**Results:** There were a total of 80 females included in this study. All the participants were aged from 18 years to years. The BMI of all the patients was between 20 to 35 kg/m<sup>2</sup>. All of the females were divided into 2 groups with an equal number of patients in each group (40 patients in each group). One group was the SAPB group which received the serratus anterior plane block while the other group was the ESPB group which received the erector spinae plane

block. There was no significant difference seen in both the groups in terms of demographic data.

**Conclusion:** In conclusion, we can say that ultrasound-guided spinae plane block is an effective and safer option for perioperative analgesia in patients undergoing modified radical mastectomy.

**Keywords:** breast cancer, surgical interventions, radical mastectomy, severe acute postoperative pain, erector spinae plane block (ESPB)

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## INTRODUCTION

One of the most prevalent malignancies that females face is breast cancer.<sup>[1]</sup> There are a few surgical interventions that can be considered as the management approaches used.<sup>[2]</sup> One of them includes modified radical mastectomy (MRM).<sup>[3]</sup> About 40% to 60% of patients face severe acute postoperative pain.<sup>[4]</sup> Moreover, about 10% to 50% of patients develop post mastectomy pain syndrome (PMPS) which leads to disabilities in the long term.<sup>[5]</sup> To manage the acute perioperative pain, opioids have been considered as the cornerstone.<sup>[6]</sup> However, the use of opioids comes with a number of side effects which include respiratory depression, itching, over sedation, vomiting, nausea, and urine retention. To lower the incidence of opioid side effects, multiple analgesic modalities had merged to achieve enough analgesia.<sup>[7]</sup> This includes regional blocks as well. For breast surgeries, the gold standard regional treatment is thoracic para vertebral block. However, serious complications such as spinal cord injury and pneumothorax can also occur. Over the years, several new fascial plane blocks have been developed to provide analgesia with less complications as compared to the traditional regional anaesthesia methods. Blanco et al. first described the ultrasound-guided serratus anterior place block (SAPB).<sup>[8]</sup> This is used to control the procedures on the side of the chest wall and manage the pain after breast surgery. Another method, ultrasound-guided erector spinae plane block (ESPB), was introduced by Forero et al.<sup>[9]</sup> They called it a new method that can manage both chronic and acute thoracic pain. Since both of these methods have been introduced, they have been used after breast surgeries to manage the pain.<sup>[10]</sup> These blocks are relatively safe and simple to perform. However, more research should be done to confirm their effectiveness and safety. Therefore, this study was performed to compare the effectiveness and safety of SAPB and ESPB in females undergoing modified radical mastectomy.

## MATERIALS AND METHODS

This is a randomised comparative analysis which was performed on 80 females who were undergoing radical mastectomy under general anaesthesia. All the participants were aged from 18 years to years.

The BMI of all the patients was between 20 to 35 kg/m<sup>2</sup>. All the patients were informed about this research and their consent was obtained. The Ethical Review Committee approved this research.

### Exclusion criteria

Patients with known hypersensitivity were not a part of this study. Moreover, those patients who were having any psychological disorders, pregnancy, chronic pain, or contraindications to study drugs or regional anaesthesia were also excluded.

All of the females were divided into 2 groups with an equal number of patients in each group. One group was the SAPB group which received the serratus anterior plane block while the other group was the ESPB group which received the erector spinae plane block. Physical examinations were performed and patients' history was recorded. The Numeric Pain Rating Scale (NPRS) was used to measure the intensity of pain. Score 0 means no pain and score 10 means worst pain. Monitoring and standard preoperative assessment was conducted on all the patients. Anaesthesia was induced with propofol, fentanyl, and rocuronium. It was maintained with sevoflurane. Multimodal analgesia, ketorolac and paracetamol) was given to both the groups. The ESPB was performed in the sitting position while the SAPB was performed in the supine position. Both were performed under ultrasound guidance using 30 mL of 0.25% levobupivacaine. After the surgery, patients' blood pressure, pain, and heart rate were monitored. When the NPRS score was 4 or more, morphine 3 mg IV was given to the patients as a rescue analgesia. SPSS version 23 was used to analyse the data. A significant p-value was considered to be less than 0.05.

## RESULTS

There were a total of 80 females included in this study. All the participants were aged from 18 years to years. The BMI of all the patients was between 20 to 35 kg/m<sup>2</sup>. All of the females were divided into 2 groups with an equal number of patients in each group (40 patients in each group). One group was the SAPB group which received the serratus anterior plane block while the other group was the ESPB group which received the erector spinae plane block. [Table 1] shows the demographic data of the study.

**Table 1**

| Demographics             | Group SAPB (n=40) |      | Group ESPB (n=40) |      |
|--------------------------|-------------------|------|-------------------|------|
|                          | N                 | %    | N                 | %    |
| ASA Physical Status      |                   |      |                   |      |
| II                       | 34                | 85.0 | 36                | 90.0 |
| III                      | 6                 | 15.0 | 4                 | 10.0 |
| Mean $\pm$ SD            |                   |      |                   |      |
| Age (yrs)                | 49.3 $\pm$ 10.7   |      | 46.3 $\pm$ 9.3    |      |
| BMI (kg/m <sup>2</sup> ) | 28.5 $\pm$ 4.2    |      | 28.3 $\pm$ 3.1    |      |

[Table 2] shows the intra and post operative opioid consumption.

**Table 2**

| Demographics                                        | Group SAPB (n=40) |      | Group ESPB (n=40) |      |
|-----------------------------------------------------|-------------------|------|-------------------|------|
|                                                     | N                 | %    | N                 | %    |
| Side of surgery                                     |                   |      |                   |      |
| Left                                                | 23                | 57.5 | 23                | 57.5 |
| Right                                               | 17                | 42.5 | 17                | 42.5 |
| Mean $\pm$ SD                                       |                   |      |                   |      |
| Intraoperative fentanyl consumption ( $\mu$ g)      | 160.0 $\pm$ 53.1  |      | 130.6 $\pm$ 44.4  |      |
| Postoperative Morphine consumption in 24 hours (mg) | 4.5 $\pm$ 3.1     |      | 1.7 $\pm$ 1.8     |      |

[Table 3] compares both the groups overall.

**Table 3**

| Parameters                                | Group SAPB (n=40) |      | Group ESPB (n=40) |      |
|-------------------------------------------|-------------------|------|-------------------|------|
|                                           | N                 | %    | N                 | %    |
| Time to 1st postoperative analgesia (hrs) |                   |      |                   |      |
| Immediate                                 | 7                 | 17.5 | 1                 | 2.5  |
| 2                                         | 7                 | 17.5 | 6                 | 15.0 |
| 4                                         | 6                 | 15.0 | 4                 | 10.0 |
| 8                                         | 6                 | 15.0 | 4                 | 10.0 |
| 12                                        | 1                 | 2.5  | 0                 | 0.0  |
| 16                                        | 0                 | 0    | 1                 | 2.5  |
| 20                                        | 1                 | 2.5  | 1                 | 2.5  |
| 24                                        | 4                 | 10.0 | 3                 | 7.5  |
| Nil                                       | 8                 | 20.0 | 20                | 50.0 |
| Postoperative Nausea and Vomiting         |                   |      |                   |      |
| Mild                                      | 13                | 32.5 | 11                | 27.5 |
| Moderate                                  | 4                 | 10.0 | 3                 | 7.5  |
| Severe                                    | 0                 | 0.0  | 0                 | 0.0  |
| No                                        | 23                | 57.5 | 26                | 65.0 |
| Overall satisfaction                      |                   |      |                   |      |
| Satisfied                                 | 30                | 75.0 | 36                | 90.0 |
| Unsatisfied                               | 10                | 25.0 | 4                 | 10.0 |

## DISCUSSION

Patients who undergo breast surgeries have a proportion of more than 50% related to suffering from pain after the surgery.<sup>[11]</sup> More than 30% of them experience this pain for a period of 6 to 12 months which is a condition named post-mastectomy pain syndrome (PMPS).<sup>[12]</sup> The pain becomes severe enough that it can lead to long term disabilities, affecting the quality of life of these patients. There are several analgesic techniques that can be used to manage perioperative pain conditions. This includes opioid and regional analgesia.<sup>[13]</sup>

In our study, we have compared SAPB with ESPB. Overall, the results showed that the performance of ESPB for modified radical mastectomy was better and effective. It reduced the consumption of opioids during and after the surgery. In another study by Gupta et al., there was a comparison of SAPB with

ultrasound-guided paravertebral block.<sup>[14]</sup> They concluded that SAPB is less effective than PVB. Both of the methods remain suitable alternatives even though neither block is the first choice in most cases, especially when there are significant risks with the gold standard technique.<sup>[15]</sup>

There are several studies conducted which compare SAPB with ESPB. According to Gad et al., ESPB offers superior analgesia.<sup>[16]</sup> Similarly, Sagar et al. also observed that ESPB is more effective as compared to SAPB.<sup>[17]</sup> Their findings suggest that ESPB provides better pain scores and longer-lasting analgesia. It also maintains comparable postoperative analgesic consumption. Due to this, ESPB turns out to be a potentially effective option to manage postoperative pain.<sup>[18]</sup>

According to the study of Bedwey et al., there are several advantages of using ESPB over SAPB.<sup>[19]</sup> According to their results, ESPB has a number of benefits which include providing better analgesia, reducing the consumption of morphine, decreasing

the incidence of vomiting and nausea after the surgery, and lowering cortisol levels. Due to these benefits, ESPB turns out to be a compelling choice for pain management after the surgery. Similarly, Niyima et al. also concludes that ESPB is more effective, giving lower VAS scores and lower morphine consumption.<sup>[20]</sup>

## CONCLUSION

In conclusion, we can say that ultrasound-guided spinae plane block is an effective and safer option for perioperative analgesia in patients undergoing modified radical mastectomy.

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