Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/60am8158

CONSUMPTION OF ANALGESIA WITH PARAVERTEBRAL BLOCKS AFTER BREAST CANCER SURGERY

Muhammad Kamil Zulfiquar[1], Muhammad Saulat Naeem[2*], Usama Rafi[3], Zeeshan Ahmad[4], Ayesha Farooq[5], Muhammad Adil Zulfiquar[6], Muhammad Awais[7]

[1,2*,3,6,7]Post Graduate Trainee, General Surgery Department, Services Hospital, Lahore, Pakistan.
[4]Assistant Professor, General Surgery Department, Lahore Medical and Dental College, Lahore, Pakistan.
[5]Post Graduate Trainee, General Surgery Department, Mayo Hospital, Lahore, Pakistan.

***Corresponding Author:** Muhammad Saulat Naeem
*Email: slt_nm@yahoo.com

ABSTRACT

Breast cancer is a life-threatening condition, affecting one in eight women and it is the second leading cause of mortality among females. Most breast surgeries are performed under general anesthesia, with postoperative pain management through opioids.

However, around 40% of patients still experience significant pain after surgery, and up to 50% may develop chronic pain due to improper pain management.

Paravertebral blocks, administered with 0.5% bupivacaine, offer an alternative for managing postoperative pain by targeting nerves associated with the breast. The aim of this study was to evaluate the effectiveness of paravertebral blocks in reducing the need for opioids post-surgery, which could improve patient outcomes by lowering costs and minimizing opioid-related side effects such as nausea and extended hospital stays.

Methodology: The prospective cohort study was conducted in Services hospital Lahore, from October 2018 to December 2019. After approval from ethical review board of institute, total of 93 female patients, aged 18–55 and scheduled for unilateral modified radical mastectomy, were enrolled through convenient sampling technique. Postoperative pain was assessed using the Visual Analogue Scale, with patients administered intravenous tramadol when their VAS score exceeded 3. The primary outcomes measured were VAS scores, duration of analgesia, frequency of analgesic use, and total tramadol consumption over 24 hours.

Results: Of the 93 patients, 60.2% were aged 35–50, and 39.8% were aged 51–65. The average Visual analogue score at the time of the first rescue analgesic was 5.58 ± 0.78, with a mean duration of postoperative analgesia lasting 5.15 ± 1.1 hours (309 ± 66.4 minutes). The frequency of analgesic administration within 24 hours was 3.53 ± 1.1 times, and the mean total tramadol consumption was 88.22 ± 22.3 mg.

Conclusion: Our study revealed that unilateral paravertebral blocks provide prolonged postoperative analgesia. It significantly decreases the need for opioids in patients undergoing breast cancer surgeries. This reduction in analgesic consumption lowers the risk of opioid-related side effects, promoting good recovery, early discharge, and overall improved patient satisfaction.

Keywords: Paravertebral blocks, Breast cancers, Visual analogue score, Analgesia.

INTRODUCTION

The paravertebral block (PVB) has emerged as a favored technique for managing pain in patients undergoing breast cancer surgery, yet its effectiveness in reducing the mean consumption of analgesics postoperatively remains a topic of study. The efficacy of PVB in reducing chronic pain after breast cancer surgery has been scrutinized extensively. For instance, a double-blind randomized trial investigated whether PVB could reduce the incidence of chronic pain three months after surgery, highlighting its potential benefits in pain management(1). However, conflicting results have emerged from systematic analyses, with some studies questioning the long-term benefits of PVB in preventing chronic postsurgical pain (CPSP)(2).

Most breast surgeries are performed under general anesthesia, with postoperative pain managed through opioids. However, around 40% of patients still experience significant pain after surgery, and up to 50% may develop chronic pain due to insufficient pain control. Paravertebral blocks (PVBs), administered with 0.5% bupivacaine, offer an alternative for managing postoperative pain by targeting nerves associated with the breast. Paravertebral blocks (PVB) are commonly used regional anesthesia techniques for breast cancer surgeries, known for their effective pain control and reduction in postoperative analgesic consumption. However, like all medical procedures, PVBs come with potential complications and side effects.

This study aims at identifying the consumption of analgesia after mastectomy among patients who are given paravertebral blocks for pain management. This will help in reducing pain, early patient recovery and reduced morbidity after surgery.

LITERATURE REVIEW

Additionally, another study examined the hypothesis that PVB analgesia might improve recurrence-free survival and overall survival in breast cancer patients, suggesting that the impact of PVB extends beyond immediate postoperative pain control(3). Despite these potential advantages, the literature also highlights the complexity of breast innervation and the difficulties anesthesiologists face in managing postoperative pain effectively. This has led to comparisons of PVB with other techniques such as pectoral nerve block and erector spinae plane block(4). Meta-analyses focusing on PVB have sought to clarify its role in CPSP prevention, often yielding mixed results. These studies evaluate various outcomes, including CPSP at different intervals and PVB-related complications(5). Such comprehensive analyses underline the need for high-quality, methodologically sound research to resolve the uncertainties surrounding the effectiveness of PVB in reducing the mean consumption of analgesics after breast cancer surgery(2).

The effectiveness of paravertebral blocks (PVBs) in reducing postoperative pain and the mean consumption of analgesia after breast cancer surgery has been a subject of considerable debate. One notable study conducted on this topic was a double-blind randomized trial aimed at determining whether PVBs could decrease the incidence of chronic pain three months following breast cancer surgery(6). The primary hypothesis of the study suggested that the implementation of PVBs might offer significant advantages over traditional pain management techniques, which typically rely on systemic analgesics and opioids. Traditional pain management techniques often involve the use of systemic analgesics such as acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), and opioids. These methods, while effective in managing acute pain, are frequently associated with a higher incidence of side effects such as nausea, vomiting, and the potential for opioid dependency(7).

In contrast, PVBs aim to provide targeted regional anesthesia by blocking the transmission of pain signals from the surgical site, potentially leading to a reduction in the overall consumption of systemic analgesics. According to the findings of the aforementioned trial, patients who received a preoperative PVB exhibited a marked decrease in the mean consumption of analgesics in the immediate postoperative period(7, 8). Additionally, the incidence of chronic pain three months after surgery was significantly lower in the PVB group compared to those who received traditional pain management(9). This suggests that PVBs not only improve immediate postoperative pain outcomes but also have a long-term benefit in reducing chronic pain, thereby potentially improving the overall quality of life

for breast cancer surgery patients(10). The use of PVBs represents a promising alternative to conventional pain management strategies, highlighting the importance of regional anesthesia techniques in surgical pain management protocols. Further studies are required to solidify these findings and to explore the optimal implementation strategies for PVBs in various surgical settings. A systematic review and meta-analysis comparing the perioperative analgesic efficacy and adverse events of pectoral (PECs) block and paravertebral block (PVB) indicates that PECs block, originally described by Blanco et al., is proposed to be a simpler and safer alternative to thoracic epidural or PVB for postoperative analgesia in breast surgery(11). Another study focusing on the efficacy of pectoral nerve block type II versus thoracic paravertebral block for analgesia in breast cancer surgery found that both techniques are effective; however, PVB remains widely used due to its established efficacy over decades(12). Furthermore, research comparing the erector spinae plane block (ESPB) and PVB for postoperative analgesia in breast surgery showed that while ESPB is effective, the longstanding usage and effectiveness of PVB for reducing acute postoperative pain make it a reliable choice. This consistent finding across multiple studies highlights that PVB may be superior in certain aspects, particularly in its ability to provide sustained pain relief and reduce postoperative opioid consumption, despite the emerging popularity of alternative techniques like PECs and ESPB(13).

METHODOLOGY

The prospective cohort study was conducted in surgical unit Services Hospital Lahore, for 6 months after ethical review board approval, from 5th October 2018 to 4th December 2019. Sample size of 93 cases was calculated $n=(Z\times\sigma/d)^2$ with 95% confidence level, margin of error 0.01 and taking expected mean±2S.D, of mean consumption of analgesia i.e. 0.105±0.0429 with paravertebral blocks after breast cancer surgery(14). All female patients of age 18 to 55 years undergoing unilateral modified radical mastectomy for breast cancer were included in study through convenient sampling technique, after taking informed consent. During pre op visit on the before surgery patients were thoroughly explained about the procedures to be undertaken and associated risks and benefits. They were made well conversant with visual analogue scale for post op pain measurement. "0" meant for no pain and "10" described the worst form of pain feeling according to the visual analogue scale.

Patients were given general anesthesia and prepared for surgery. At the end of surgery, with patient lying in lateral decubitus position with operative site nondependent, the relevant anatomical landmarks were identified and marked with a permanent skin marker. Points corresponding to 2.5 cm (1 inch) lateral to upper boundaries of spinous processes of T2 -T6 vertebrae were marked as needle insertion sites. Each space was infiltrated with 0.5% of diluted bupivacaine (2.5 mg per kg), 2 cc in each space after repeated negative aspiration for CSF or blood.

Time of arrival in the ward was considered as Zero. Severity of pain was assessed on the basis of visual analogue scale. Patients were given inj. tramadol 0.025g intravenously each time when they complained of pain scoring >3 postoperatively. Patients were monitored for 24 hours post operatively. Comfortable patients with pain score <3 at 24 hours were discharged and the total consumption of Tramadol in 24 hours period was measured.

Data was entered and analyzed in SPSS 26. Numerical Variables like age, total consumption of (tramadol) analgesia were presented as mean ± standard deviation. Categorical variables like age range and VAS score were presented in percentages after stratification.

RESULTS

A total of 93 female patients undergoing modified radical mastectomy for unilateral breast cancer who fulfilled the inclusion criteria were included in the study. The mean age of the patients was 48.54 ± 6.306 years, with a minimum age of 36 years and a maximum age of 62 years. It was found that approximately 60.2% of the patients belong to the age group of 35-50 years, while 39.8% belong to the age group of 51-65 years.

The time of the first dose of analgesic (tramadol) given after surgery was calculated among all the patients and labeled as the Duration of Postoperative Analgesia. The duration of postoperative

analgesia was 5.15 ± 1.104 hours (309 ± 66.42 minutes) shown in table 1. The minimum duration of postoperative analgesia was 3 hours (180 minutes), and the maximum duration was 8 hours (480 minutes) shown in Table 2.

The mean Visual Analog Scale (VAS) score for the first rescue analgesic was 5.58 ± 0.781, indicating a good analgesic effect of the paravertebral blocks. The minimum VAS score for the first rescue analgesic was 4, while the maximum score was 7(figure 1).

The total number of times the dosage of analgesic was repeated in 24 hours was labeled as the Frequency of Analgesic Administration, which was 3.53 ± 1.104. The maximum frequency of analgesic administration was 5, and the minimum was 2. The mean consumption of analgesic (tramadol) was 88.22 ± 22.32 mg. The maximum consumption of analgesic in 24 hours was 125 mg, and the minimum consumption was 50 mg.

Table 1: Duration of post operative analgesia

Variable	Minimum	Maximum	Mean	Std. Deviation
Duration of Postoperative Analgesia	3	8	5.15	1.104

Table 2: Frequency distribution of post operative analgesia

Duration	Frequency	Percent
3 hours	5	5.40%
4 hours	25	26.90%
5 hours	33	35.50%
6 hours	25	26.90%
7 hours	11	11.80%
8 hours	1	1.10%
Total	93	100.00%

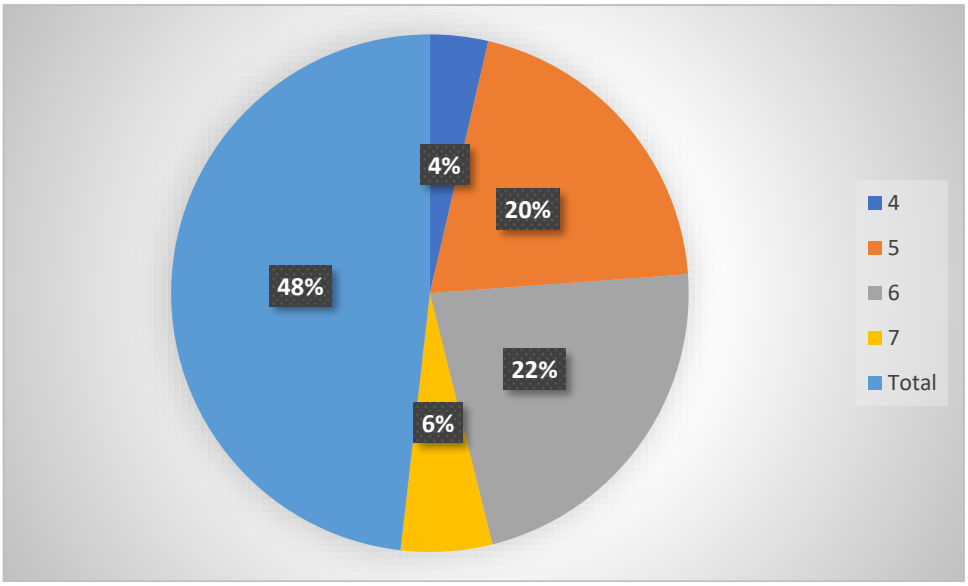

Figure 1: Frequency of VAS score at first rescue analgesic within 24 hours

DISCUSSION

In this study, 93 patients were given paravertebral blocks to assess postoperative pain management. Outcomes measured were duration of analgesia, VAS score at the first rescue analgesic, analgesic administration frequency, and total 24-hour analgesic consumption. Paravertebral blocks (PVB) are widely utilized for many surgeries, including thoracic, breast, and abdominal procedures. Different studies showed their effectiveness and safety in elective breast cancer surgeries, such as radical and modified radical mastectomies, full axillary dissections, breast implants, reconstructive procedures,

and both augmentation and reduction mammoplasty, all performed successfully under PVB regional anesthesia(15).
The average patient age was 48.54±6.3 years, ranging from 36 to 62 years, with 60.2% between ages 35-50 and 39.8% between 51-65. Studies show an earlier average age of presentation compared to Western data, so there is a need for increased awareness and early screening programs.(16)
The mean duration of postoperative analgesia was approximately 5.15±1.1 hours (309±66.4 minutes), with a range of 3 to 8 hours, aligning with findings regarding prolonged analgesia with PVB. Average analgesic (tramadol) use in 24 hours postoperatively was 88.22±22.3 mg, with no additional NSAIDs required, consistent with similar research findings(9).

The frequency of analgesic administration was 3.53±1.1 times per 24 hours, and the mean VAS score at the first rescue analgesic administration was 5.58±0.8. Factors influencing the effectiveness of PVB include anesthetic type and dosage, use of additives like clonidine or fentanyl, injection techniques, ultrasonographic guidance, and patient-controlled analgesia (PCA) availability.
In this study, high injection speeds increased the likelihood of contralateral spread and complications, such as hypotension(17). While single-injection PVBs are more comfortable for patients, multiple injections improve analgesia but can increase complication risks. An extended PVB (T1–T6) provided adequate analgesia for surgeries involving axillary clearance, like modified radical mastectomies(18). Ultrasound and neurostimulation guidance enhanced the safety and effectiveness of PVBs, though they were not used here due to limited impact on outcomes. Although additives like clonidine and fentanyl may modestly increase PVB efficacy, they were excluded from this study for lack of strong supporting evidence(19, 20).
Paravertebral blocks reduce postoperative analgesic needs, helping decrease pain and promoting quicker patient recovery, mobility, and discharge. They can also be a local anesthesia alternative for day-case breast surgeries. However, variability in PVB success rates and concerns about inconsistent blocks affect consultant preferences. Improved outcomes and patient satisfaction can be achieved with ultrasound or neurostimulation-guided techniques.

CONCLUSION

This study concludes that unilateral paravertebral blocks provide effective, prolonged postoperative analgesia with reduced analgesic requirements, thus minimizing morbidities in patients undergoing unilateral breast cancer surgeries.

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