

# Perioperative Pain Relief Modalities in Carcinoma Breast—A Retrospective Review

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## Abstract

With changing times, many different analgesic modalities are being adopted for perioperative analgesia in breast cancer surgeries. Perioperative pain is a serious concern in these patients. A comprehensive multimodal pain regimen can do wonders and not only minimize opioid use but may also decrease cancer recurrence. This study aimed to compare various pain relief modalities used in our institution for breast surgeries, compare their efficacy and side effects. This is a retrospective analysis of breast surgeries undertaken over last 2 years. Several perioperative factors like stage of surgical procedure done, intraoperative course and analgesic requirements were analysed and efficacy of different regimes were compared. VAS of  $\leq 4$  was taken as adequate pain relief in postoperative period. It was noted that there was a significant reduced requirement of additional analgesics in patients receiving regional block as compared to GA alone.

**Keywords:** Breast cancer ; perioperative pain-relief ; opioids ; paravertebral block ; intercostal nerve block

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## I. Introduction

Breast cancer is the most commonly encountered cancer among women worldwide and the leading cause of cancer-related morbidity and mortality. Treatment modalities include surgery, chemotherapy and radiotherapy. Breast cancer surgeries include simple procedures to long extended procedures. The associated pain with such treatments can negatively affect patients by triggering psychological, physical, metabolic, inflammatory, and immunological responses causing increased patient suffering, prolonged hospital stay, increase medical cost.

Various analgesic modalities are used for proper perioperative pain control<sup>1</sup>.

Aim of an onco- anesthesiologist is to follow an optimal and safe procedure with regard to immediate outcome, and also for long-term outcomes. During perioperative period, anesthesiologists attempt to induce a sense of comfort to offset the stress reaction secondary to triggers, frequently suffered by them. General anesthesia is most frequently used, with or without regional anesthetic interventions. Regional anesthesia in perioperative settings has several long term oncological beneficial outcomes including decreased need for opioids, decreased post-operative nausea vomiting, fewer post-operative pulmonary complications and decreased duration of post-anesthesia care and hospital stay. This study was designed to discuss different analgesic modalities for breast cancer surgery used in our institution with regards to their analgesic efficacy.

## II. Objectives

A retrospective observational analysis was undertaken to assess various pain relief modalities used in our institution, Lady Hardinge Medical College and Hospital, New Delhi over a period of 2 years from 2015-2017 for breast surgeries and compare their efficacy in terms of patient comfort by reviewing the preoperative and intraoperative anesthetic records and postoperative HDU notes. Various perioperative factors were taken into consideration for instance the stage of cancer, the surgical procedure done and the type of anesthetic analgesic modality used.

## III. Review Of Literature

For any surgical procedure pain relief is of utmost importance as it avoids emotional/mental suffering thus improving the quality of life. It aids in avoiding post-operative respiratory complications. There are also certain concerns related to recurrence with some techniques.

**Comprehensive multimodal pain regimen** offers the most complete pain control.

Since traditional times, general anaesthesia (GA) has been considered as the standard technique. Recently many alternatives to GA have been introduced that provide better peri-operative pain control, decrease postoperative complications, decrease postoperative analgesic requirements, decrease postop hospital stay as well as avoiding problems of GA.

Regional anaesthesia techniques have shown to reduce cancer progression by attenuation of surgical stress response, providing better analgesia, reduced opioid usage. Also, Local anaesthetics used have direct protective action on cancer cells migration<sup>2</sup>

Here listed are some of the most common methods used along with their pros and cons.

#### **Local Anesthetic Infiltration-**

Infiltration of local anesthetic drugs improved analgesia and ensures faster recovery with shorter hospital stay<sup>3</sup>. Simple mastectomy under LA & IV sedation is routinely utilised technique in high risk (ASA3/4) patients & elderly.

However, use of field block and LA infiltration cause pain on injection, tissue distortion, and risk of local anaesthetic toxicity.

#### **Brachial plexus block**

Initial efforts were aimed at blocking some or all of the peripheral nerves of brachial plexus origin that provide sensory innervation to the breast such as lateral and median pectoral nerves, thoracodorsal nerve.

**Fassoulaki A et al**<sup>4</sup> in as early as 1982 used the infraclavicular brachial plexus block approach in 47 patients having modified MRM at the completion of surgery. Compared to the control group, the time elapsed between the end of anaesthesia and requirement of the first analgesic was significantly longer when the brachial plexus was blocked (p less than 0.001). The efficacy, simplicity, and safety of blocking the brachial plexus at the completion of surgery following modified mastectomy demonstrate that this technique could be routinely used for the relief of postoperative pain in patients having modified radical mastectomies.

Subsequent efforts have aimed to utilise these novel blocks by combining them with the intercostal nerve blocks.

#### **ICNB (Intercostal Nerve Block)**

Local anaesthetics deposited near intercostal nerves to provide a band of anaesthesia targeted to a specific dermatomal area. Multiple intercostal nerves must be blocked to achieve coverage for breast surgery, depending on the tissue disrupted (eg, T2–T7).

Classically, 3 to 5 mL of local anaesthetic solution is injected at each thoracic level.

Intercostal blocks should be combined with other approaches if the surgery involves myofascial pain, as thoracic intercostal blocks do not anesthetize nerves derived from the brachial or cervical plexuses.

It offers advantages in being superior to GA with respect to duration of postop analgesia & analgesic drug request. However, as it causes ineffective axillary anaesthesia can lead to a problem with axillary LN dissection<sup>5</sup>

#### **Epidural Block – Thoracic level**

The most common levels for placement of epidural injections or catheters for breast analgesia is T3–5. Similar to intercostal blocks, thoracic epidural anaesthesia (TEA) without cervical spread would not be able to block the branches of the brachial or cervical plexus that may contribute to perioperative breast surgery pain. It provides adequate intraoperative analgesia but necessitates catheter maintenance.

#### **Thoracic Paravertebral Block (TPVB)**

The paravertebral space can be accessed to block the thoracic spinal nerves as they exit the intervertebral foramina. Local anaesthetic deposited in this space can spread multiple levels superior and/or inferior, as well as into the intercostal space laterally, the contralateral paravertebral space, and the epidural space medially.

This technique generally results in ipsilateral blockade of somatic and sympathetic nerves and can serve as the sole anaesthetic for breast surgery in some cases. It provides adequate anesthesia with low rates of conversion to GA & lower LA supplementation<sup>6</sup>

In another study<sup>7</sup>, administering TPVB reduced need for postoperative antiemetic (39% vs. 57%) and reduced opioid equivalent use ( $40.1 \pm 15.2$  vs.  $47.6 \pm 17.7$  morphine equivalents) when compared to local anaesthetic infiltration alone.

TPVB when done along with GA for unilateral or bilateral breast surgeries have shown to improve analgesia, decrease nausea and vomiting scores<sup>8</sup> and decrease the analgesic requirements by almost 3 times<sup>9</sup>

**Bhuvaneshwari V et al in 2017<sup>10</sup>** performed a study comparing the technique of thoracic paravertebral block with or without additives with local anaesthetic agent. Two groups were formed on the basis of the drug combination received.

Gr 1 - 0.25% bupivacaine Epi + fentanyl **or**

Gr 2 - 0.5% bupivacaine with Epi

It was found that group with opioid additive as fentanyl had significantly better post-operative analgesia

### **PECS BLOCK**

Certain novel blocks have recently been introduced in an effort to anaesthetize key nerves derived from the brachial plexus, avoid blocking the brachial plexus nerves that innervate the arm, and block the cutaneous branches of the intercostal nerves.

**Blanco<sup>11</sup>** was the first to describe a novel ultrasoundguided interfascial plane block, the Pecs I block, targeting the lateral and medial pectoral nerves via an injection between the pectoralis major and minor muscles (0.25% bupivacaine 0.4 mL/kg) with the goal of reducing postoperative muscle spasm and myofascial pain from the pectoralis muscles (eg, surgeries involving the pectoral muscles).

Pecs II block. In order to expand the utility of interfascial peripheral nerve blocks for breast surgery, Blanco et al<sup>12</sup> proposed a modification of the Pecs I block, called the Pecs II block. This block is performed with ultrasound guidance at the level of ribs 2–4.

Pecs II block consists of 2 injections, one deep injection between the pectoralis minor muscle and serratus anterior muscle with 20 mL bupivacaine 0.25% and one superficial injection identical to the Pecs I block with 10 mL bupivacaine 0.25%. The addition of the deep injection targets 3 distinct nerve groups: the anterior divisions of the lateral cutaneous branches of the intercostal nerves, the long thoracic nerve, and the thoracodorsal nerve in an effort to improve interfascial spread.

### **SERRATUS PLANE BLOCK (SPB)**

Blanco et al<sup>13</sup> with the goal of providing extended intercostal nerve coverage, performed a block more distal and lateral than Pecs II block, overlying the fifth rib at the midaxillary line.

Local anaesthetic can be deposited either superficial or deep to the serratus anterior muscle (SAM), in an attempt to provide sensory block of the T2–T9 dermatomes.

It is important to understand that SPB replaces only the deep injection of Pecs II block (between the Pm muscle and SAM), necessitating addition of a Pecs I block to cover the lateral pectoral nerve.

Similar to the Pecs II block, the SPB likely blocks only the lateral cutaneous branches of the intercostal nerves, thus failing to anesthetize the medial breast. Closer proximity to the intercostal nerves is one of the theoretical advantages of injection deep to the serratus anterior muscle, but this remains insufficiently studied.

Multimodal analgesic regimen of 2 or more non-opioids<sup>14</sup> :

When initiated preoperatively and continued intraoperatively & acute postoperative phase, has shown to have best patient outcomes.

Balanced GA + regional block may also prove to be protective for cancer recurrence<sup>15</sup>

### **METHODS**

We reviewed 101 breast surgery cases done over last 2 years and they were subdivided according to their surgical technique as follows :

- Wide Local Excision (n = 14)
- Simple Mastectomy (n = 4)
- MRM ± LN excision (n = 54)
- Radical Mastectomy (n = 15)

- Breast Conservative Surgery (n = 10)
- Redo Surgeries (n = 4)

**Anaesthetic Technique -**

Technique	n	Complications
LA + IV SEDATION	5	
GA	36	
GA + PVB	10	
GA + EPIDURAL	50	1 = dura puncture

In almost all the cases the standard technique utilised was a balanced GA with regional blocks. The regional blocks (neuraxial/paravertebral) were administered prior to the induction of GA in all cases. The combination of LA with narcotics (morphine or fentanyl or a combination of both) was used depending on the technique used :

**Epidural block** - Lumbar - 10 ml 0.25% bupivacaine + 30- 50 µg/ kg morphine.

**Paravertebral block** – Thoracic – 15 ml 0.25% bupivacaine + 30 µg/ kg morphine

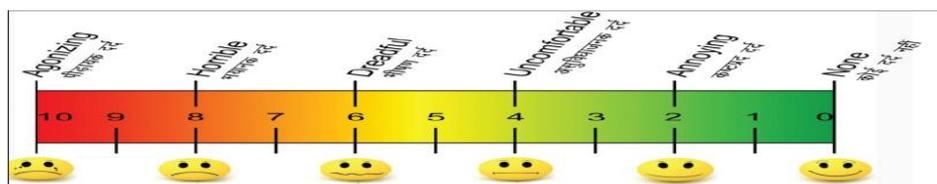
Intraoperative requirement of additional narcotics , inhalational agents and muscle relaxants were recorded.

**Postoperative –**

Results were analysed and efficacy of different regimes compared.

VAS of ≤ 4 was taken as adequate pain relief in postoperative period.

- Postoperatively, vitals were recorded at frequent intervals and monitored in HDU for 4-6 hours
- Pain scores were assessed using visual analogue scale at 12 and 24 hours post-operatively. (Aim score ≤4)
- With patients with catheter-in-situ 12 hourly top up was done using 0.125% bupivacaine with 20mcg/kg morphine for 48 hours.



**IV. Results**

A total of 101 patients underwent Breast surgeries in past 2 years

IV fentanyl 1-2 µg/kg given to all during induction of anaesthesia.

Addition of Morphine to LA gave most effective perioperative analgesia at both 12-24 hours (VAS < 4)

There was a significant reduced requirement of top-up analgesia in patients receiving regional block as compared to GA alone.

Duration of Pain Relief lasted for 24-48 hours.

Efficacy of blockade- **LA + morphine > LA + Fentanyl > local infiltration > GA.**

Time from completion of surgery to 1<sup>st</sup> dose of analgesic- longer with LA + Opioid

Discharge times were comparable in all groups.

## V. Conclusion

Perioperative pain is a serious concern in these patients. A comprehensive multimodal pain regimen can do wonders and not only minimize opioid use but may also decrease cancer recurrence.

Acute pain following breast surgery is common, and numerous options exist for perioperative analgesia. An understanding of the anatomy of the breast and the anatomic structures disrupted by various surgical procedures will aid in selecting the appropriate perioperative analgesic technique and evaluating new techniques as they are described in the literature. Both epidural and PVBs have been shown to provide effective analgesia for breast surgery.

Paravertebral block has consistently been demonstrated to enhance analgesia while improving additional aspects of postoperative recovery, but further RCTs comparing PVB directly to local anaesthetic infiltration are needed. Novel nerve blocks show promise as they may be easier to perform, may decrease risk, may be more suitable for outpatient procedures, and may even provide more complete analgesia by blocking both intercostal and brachial plexus-derived nerves. Although enticing, these assertions remain unproven. Further more randomized trials are needed to determine the safety and efficacy of the newer peripheral blocks, especially as compared with alternative analgesic techniques.

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