International Journal of
Regional Anaesthesia

Observational Study

# Ultrasound Guided Regional Anaesthesia for Breast Surgery in High Risk Patients- A Retrospective Observational Study

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## Abstract

**Introduction:** Modified radical mastectomy (MRM) or breast conservative surgery (BCS) done under general anaesthesia (GA) in high-risk patients may be associated with significant morbidity, Intensive Care Unit stay and increased hospital stay leading to cost issues. In this case-series, we describe our experience with regional anesthesia for MRM or BCS and sentinel/complete axillary clearance in 61 patients with breast carcinoma who were high risk for perioperative complications in view of their co-morbidities. None required ICU or increased hospital stay postoperatively.

**Material methods:** Sixty-one ASA III/IV patients operated under regional anaesthesia for carcinoma of the breast were included. Multiple level USG guided thoracic paravertebral block (PVB), PECS block (1/2), Pecto-intercostal fascial block (PIFB), Serratus-anterior plane block (SAPB), brachial plexus block, Superficial cervical plexus blocks (SCPB), Erector spinae block (ESB) were given in different combinations.

**Results:** There were 60 female patients (Age: 30-97 years) and 1 male patient (59 years) (Left side- 27 patients, right side- 34 patients). Of the total 61 patients, 23 patients underwent BCS with axillary dissection, 36 patients underwent MRM with axillary dissection, 2 patients had MRM with Pectoralis Major muscle resection. Patients received different combinations of blocks PVB or ESB, PECS1/2 and SAPB. 43 patients received the PVB, 61 got the PECS1/2, 12 patients received ESP, 32 patients required SCPB, 1 infra-clavicular block and 35 patients got PIFB. All procedures were completed under regional anaesthesia with 51 patients getting intravenous midazolam (0.01-0.02 mg/kg), 59 patients were given IV fentanyl (1-3 ug/kg, 43 patients were given IV propofol (1-2 mg/kg), These were given in small aliquots during the duration of the procedure. 2 patients had IV ketamine (0.5 mg/kg) and 1 patient had IV dexmeditomidine (0.2-0.3 ug/kg/hr). IV paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDS) ie. Inj Diclofenac Sodium IV in the dose of 1mg/kg (max. 75 mg) were given when not contraindicated.
There was single case of axillary hematoma with no other complications. No patient required ICU care postoperatively and were discharged as routine.

**Conclusion:** A combination of blocks may be an option for surgical anaesthesia for breast surgeries in high risk patients. Careful planning,patient counseling and attention to toxic dose of local anaesthetics must always be considered.

**Keywords:** Paravertebral block, thoracic wall blocks, PECS block, Serratus Anterior plane block, Pecto-intercorstal fascial block, Superficial cervical plexus, Modified radical mastectomy, Breast conservative surgery.

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Submitted: February 28-05-2022; Reviewed: 12-06-2022; Accepted: 27-07-2022; Published: 10-09-2022

DOI: 10.13107/ijra.2022.v03i02.061 | www.ijrajournal.com |

## Introduction

Breast cancer is the most frequent cancer in women [1]. Along with the decrease in mortality, over the years the morbidity and pain associated with breast surgery has become important. Modified radical mastectomy (MRM) or Breast conservative surgery (BCS) is the mainstay of surgical intervention. These surgeries can be safely performed under general anaesthesia (GA) only, or in combination with regional anaesthesia. Despite the latest advances, GA is frequently associated with significant postoperative pain, nausea and vomiting [2, 3] which may lead to increased patient suffering, prolongation of hospital stay and related costs. High opioid use is frequently associated with increased risk of complications like nausea and vomiting in 50% of the cases [4]. Paravertebral nerve block (PVB) is considered as a valuable adjunct to general anaesthesia as it offers benefits of enhancing surgical anaesthesia and postoperative analgesia. Recently described thoracic wall fascial plane blocks like the PECS [5, 6], SAP [7] and PIFB [8, 9] are being increasing employed for pain relief following breast surgeries.

In this case-series, we describe our experience with use of ultrasound-guided PVB and thoracic wall plane blocks to provide surgical anaesthesia for MRM or BCS in 61 patients who were high risk for general anaesthesia because of multiple co-morbidities.The patients included are from the year 2015 to 2021. All patients provided consent and Institutional Ethics Committee approval was taken for publication of this report.

## Methods

The following is a retrospective analysis done at a tertiary health care centre. Written informed consent for publication was obtained from all the 61 patients operated from 2015 to 2021.

**Inclusion criteria**

1. Patients with breast cancer undergoing BCS or MRM with axillary lymph node dissection.
2. ASA grade III or IV
3. Patients who had regional anaesthesia as main anesthetic technique.

**Exclusion criteria**

1. Revision surgery, multiple procedures
2. Allergy to local anaesthetics (ropivacaine), opioids, propofol, paracetamol, antiemetics
3. Pregnancy
4. Coagulapathies and coagulation disorders.
5. Patients who had general anaesthesia with LMA or Intubation.

These patients underwent MRM/BCS and sentinel lymph node biospy (SLNB) or complete axillary lymph-node dissection (ALND). Multiple level USG guided thoracic paravertebral block (PVB), PECS block (PEC1/2), Pecto-intercostal fascial block (PIFB) and serratus anterior block (SAPB), brachial plexus, superficial cervical plexus blocks (SCPB), Erector spinae block (ESB) were given in various combinations.

The perceived risk of perioperative complications were higher due to the cormorbidities and ASA physical status III/IV. Therefore they were offered the regional anaesthesia as the sole anaesthetic with sedation. The patients and their families were counseled in detail regarding the procedure, risks and benefits. The surgical team was also made aware about the possibility of patient movement as well muscle contractions during the use of cautery.

Standard intraoperative monitoring with electrocardiography, pulse oximetry, and noninvasive blood pressure measurement were used for the regional anaesthesia technique. Anxiolysis with midazolam was done for majority of the patients. The patients were turned to lateral position with the side to be operated upward. Ultrasound-guided PVB was performed using a linear probe 10-13 MHz. Average volume of local anaesthetic was 10 to 12 ml at each level. Usg guided PECS 1, PECS 2 and SAP block were done in supine position. The injections of the PECS 2 and the SAP block were done at the level of the 3rd rib and 5th rib respectively but the LA was deposited in the plane below and

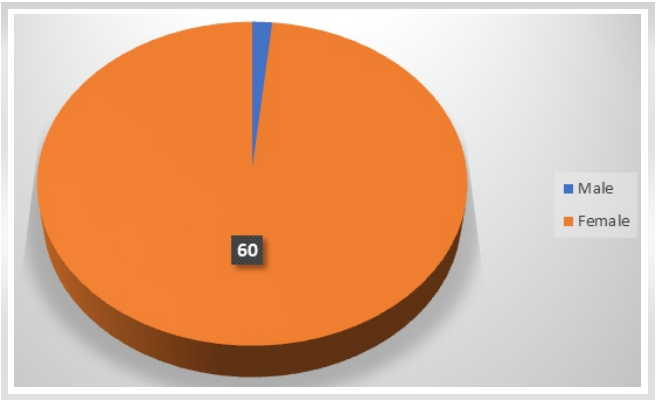


**Figure 1:** Number and sex of patients

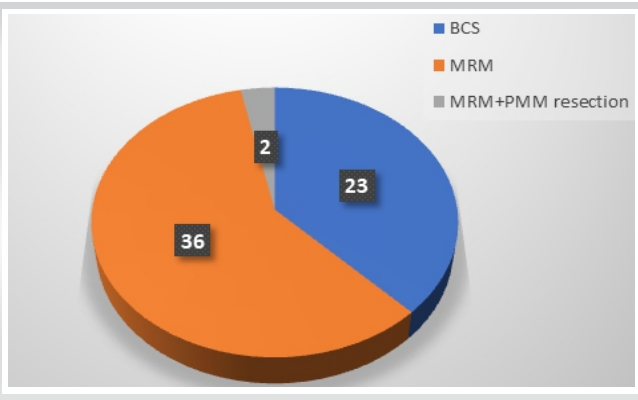


**Figure 2:** Type of procedure

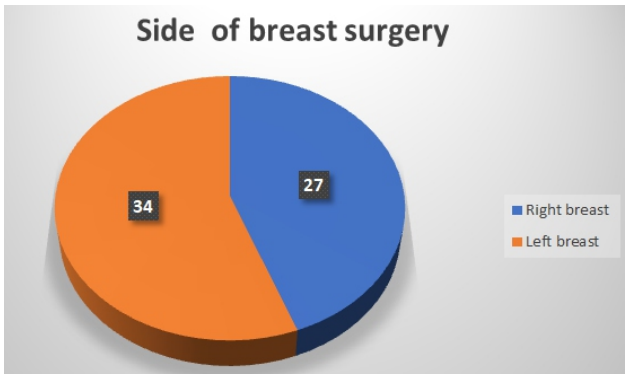


**Figure 3:** Side of breast surgery

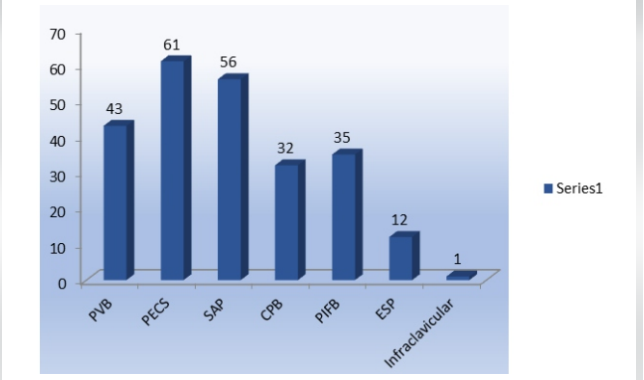


**Figure 4:** Type of regional anaesthetic

above the serratus anterior muscle. PIFB was done in few cases to cover the nerve supply medially and the superficial cervical plexus block was done to cover the surgical incision below the clavicle. Maximum toxic dose of the LA was always considered.

## Results

There were 60 females (Range: 30-97 years) 1 male patient (59 years). Left side-27 patients, right side- 34 patients; BCS with axillary dissection was done in 23 patients and 36 underwent MRM with ALND, 2 patients underwent pectoralis major muscle resection with MRM. Maximum 40 ml of ropivacaine (maximum concentration- 0.375%) and 20 ml of preservative free lignocaine (1%) were used. Patients received different combinations of blocks PVB or ESB, PECS1/2 and SAPB. 43 patients received the PVB, 61 patients got the PECS1/2, 56 patients got the SAP, 12 patients received ESP, 32 patients required SCPB, 1 infra-clavicular block and 35 PIFB in addition. All procedures were completed under regional anaesthesia with 51 patients getting intravenous midazolam, 59 patients had fentanyl, 43 patients had propofol, 2 patients had ketamine and 1 patient had dexmeditomidine. IV paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDS) were given when not contraindicated.

Maximum dose of midazolam was 2 mg, maximum dose of fentanyl was 200 ug and maximum propofol was 150 mg which were given in small aliquots along the duration of the entire procedure.

51 patients getting intravenous midazolam (0.01-0.02 mg/kg), 59 patients were given IV fentanyl (1-3 ug/kg , 43 patients were given IV propofol (1-2 mg/kg), These were given in small aliquots during the duration of the procedure. 2 patients had IV ketamine (0.5 mg/kg) and 1 patient had IV dexmeditomidine (0.2-0.3 ug/kg/hr). IV paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDS) ie. Inj Diclofenac Sodium IV in the dose of 1mg/kg (max. 75mg) were given when not contraindicated. One patient had an axillary hematoma which did not any intervention. All patients were sent to ward postoperatively and did not require any additional stay in hospital.

## Discussion

A randomized control trial validated the use of USG for paravertebral block to increase the accuracy of PVB to 100%. This retrospective study describes the use of propofol based total intra-venous anaesthesia in addition to PVB intra-operatively which improved post-operative analgesia, quality of recovery and expedites discharge [10]. The addition of pectoral nerve blocks have been shown to improve efficacy of

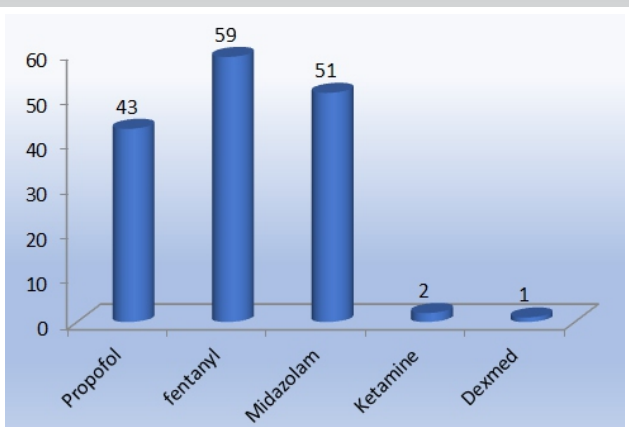


**Figure 5:** Type of sedation used

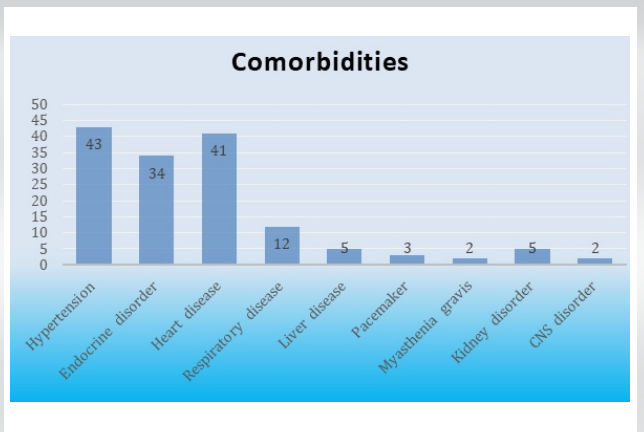


**Figure 6:** Co-morbidities

PVB as compared to only giving PVB [11, 12]. In our study we have utilized USG guided PVB in combination of chest wall blocks and supplemented it with intra-operative intravenous analgesia to achieve optimal results. Our experience showed PVB to be much better and denser block than ESP block. ESP was effective as a postoperative pain relief modality rather than for surgical anaesthesia.

Single shot PVB is believed to be inadequate for extensive surgeries like MRM and axillary dissection [13]. Multiple level PVB was described to get over this inadequacy. Accordingly a meta-analysis of 15 randomized control trials has reported that multiple-level PVB is more effective than single level [14].

Regional anaesthesia as the sole anaesthetic requires multiple needle pricks, with uncomfortable muscle twitching during use of cautery. Hence the use of regional anaesthesia as the sole anaesthetic may require proper counselling and justification for use in patients who are not high risk for having a general anaesthetic.

Long term follow up of the patients to record the effect on long term pain outcomes, difference in recurrence rates were also not done. Future studies would be directed towards developing an algorithm of desired regional anesthesia techniques for desired surgery. Limitations of the study include lack of a control group and randomization and statistical analysis.

We are in agreement with the 3 interconnected elements described [15]: Breast innervation, Surgical Type and Evidence of Analgesic blocks. Furthermore, gaps in knowledge should be researched as claimed [15].

**Conclusion**

Though a plethora of chest wall blocks are available, block in various combinations may be an attractive alternative for surgical anaesthesia during modified radical mastectomy or breast conservation surgery in high-risk patients. Sufficient time for patient counseling to get maximum cooperation and meticulous surgery are crucial for the success of the technique. Careful attention needs to be paid to the toxic dose of local anaesthetics as the volume required for the blocks is high. The exact combination of the regional techniques as the sole anaesthetic for breast surgeries with axillary dissection will probably require more studies. Good communication and co-ordination between the anaesthesia team, surgical team and the patient is of paramount importance.

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**Abbreviations:** MRM= Modified radical mastectomy, BCS= Breast Conservative Surgery, PVB = paravertebral block, PECS = Pectoral block, SAPB-serratus anterior plane block, PIFB=Pectointercostal fascial block,SCPB-Superficial cervical plexus block ESPB-Erector Spinae block.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

**Conflict of interest:** Nil **Source of support:** None

**How to cite this article: Wagh HD, Pendalya S, Nadkarni M | Ultrasound Guided Regional Anaesthesia for Breast Surgery in High Risk Patients- A Retrospective Observational Study | International Journal of Regional Anaesthesia | July-December 2022; 3(2): 93-97.**