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POSTOPERATIVE PAIN MANAGEMENT OF PATIENTS UNDER-GOING MODIFIED RADICAL MASTECTOMY USING PECTORALIS NERVE BLOCK: COMPARISON OF ROPIVACAINE VS ROPIVACAINE WITH DEXMEDETOMIDINE CASE SERIES

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ABSTRACT

Aim: The aim of the present study was to compare Pectoralis nerve block using Ropivacaine and Ropivacaine with dexmedetomidine for postoperative analgesia in case of modified radical mastectomy, with respect to time for first analgesic requirement and total rescue analgesia consumption in the first 24hrs.

Methods: Ten patients were enrolled for the study. All patients of female sex, belonging to ASA II and ASAIII, undergoing elective modified radical mastectomy were included. All the patients were administered Pectoralis nerve block. 10 patients were randomized into two groups: GROUP R and GROUP RD, to receive either Ropivacaine or Ropivacaine with dexmedetomidine respectively.

Results: Vitals of all 10 patients were measured at intervals of 0mins, 5mins, 10mins, 15mins 30mins 60mins, 120mins and 180mins after giving the block and also the end of the surgery. Patients belonging to Group RD showed less variability of heart rate when compared to Group R. Patients belonging to Group RD showed less variability of systolic blood pressure, when compared to Group R. Patients belonging to Group RD showed less variability of diastolic blood pressure, when compared to Group R Group.

Conclusion: As per our study design, we concluded that Ropivacaine with dexmedetomidine used in PEC block along with general anaesthesia provided effective anaesthesia for modified radical mastectomy. It prolonged the duration, provides high quality of analgesia, and the incidence of nausea and vomiting was less.

Keywords: Pectoralis nerve block, Ropivacaine, dexmedetomidine, postoperative analgesia, modified radical mastectomy

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1. INTRODUCTION

Female breast cancer has now surpassed lung cancer as the leading cause of global cancer incidence in 2020, with an estimated 2.3 million new cases, representing 11.7% of all cancer cases.[1] Surgery is one of the mainstay treatment options, which includes breast conserving surgery, simple mastectomy, modified radical mastectomy, skin sparing mastectomy, and nipple sparing mastectomy. Though recent advances in breast surgery have led to the evolution of surgical options with less morbidity, modified radical mastectomy (MRM) is still the most common surgical approach adopted for invasive breast cancer. Despite advances in both surgical and anaesthesia techniques, postoperative pain remains a significant concern for patients undergoing breast cancer surgery. Severe post-operative pain following breast surgery not only increases the risk of persistent pain and affects recovery, it also increases hospitalisation and increases healthcare costs.[2] Non-steroidal anti-inflammatory drugs (NSAIDs) and opioids are the two most commonly administered analgesic alternatives following any surgery, not excluding MRM. However, this frequently leads to ineffective post-operative pain management, which may even result in chronic pain syndrome, significantly lowering quality of life. Also, opoids are commonly associated with adverse effects such as nausea, vomiting, respiratory complications, hyperalgesia, and immunosuppression.[3] With the advancement in the field of anaesthesia, the latest analgesic adjuncts in the armamentarium include regional anaesthesia such as thoracic intercostal block, paravertebral block, and thoracic epidural injection. Regional anaesthesia attenuates surgical stress-response, provides superior analgesia, promotes early mobilisation, decrease hospital length of stay, and improves patient satisfaction score [4]. Thoracic epidural lock is associated with major complications like intrathecal spread, nerve damage, epidural haematoma, and inadvertent intravascular injection.[5]

When compared to central neuraxial blocks like thoracic epidural anaesthesia, regional anaesthesia, particularly peripheral nerve blocks and interfascial plane blocks, is thought to be safer and has fewer complications. Interfascial plane blocks, which include pectoral nerve blocks type I ("PECs I Block") and type II ("PECs II Block"), are novel approaches for blocking the pectoral nerves, long thoracic nerves, and intercostal nerves in the third-to-sixth intercostal, as first described by Blanco and colleagues in 2011.[6] Unlike paravertebral, epidural, and thoracic paravertebral blocks, PECs blocks do not lead to sympathetic blockade, hypotension, pneumothorax, or spinal cord trauma.[7,8] PECs block is typically achieved with the patient in the supine position, under ultrasound guidance, with a recommended local anaesthetic dose of 0.4 ml/kg of 0.25% levobupivacaine.[9]

While providing complete analgesia for lumpectomy, modified radical mastectomy (MRM), and axillary clearance, the advantages of PECs blocks comprise sympathetic-sparing effect, better T2-dermatomal spread (unlike paravertebral block), allowance for more liberal anticoagulant use, and dense motor and sensory nerve-blockade (unlike wound infiltration).[10] The PECs block has been reported to significantly reduce the visual analgesic pain (VAS) score and analgesic requirement postoperatively.[11,12] Despite the multitude of reported superior short- and long-term outcomes, the acceptance of PECs block within the anaesthetic community has been slow. Further adding to the scepticism about the clinical utility of PECs block, two recent studies reported that PECs block does not effectively block the sensory nerves, nor does it exert additional analgesic effects.[13,14]

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE8, 2024

The aim of the present study was to compare Pectoralis nerve block using Ropivacaine and Ropivacaine with dexmedetomidine for postoperative analgesia in case of modified radical mastectomy, with respect to time for first analgesic requirement and total rescue analgesia consumption in the first 24hrs.

2. MATERIALS AND METHODS

Ten patients were enrolled for the study. All patients of female sex, belonging to ASA II and ASAIII, undergoing elective modified radical mastectomy were included. All the patients were administered Pectoralis nerve block. 10 patients were randomized into two groups: GROUP R and GROUP RD, to receive either Ropivacaine or Ropivacaine with dexmedetomidine respectively.

INCLUSION CRITERIA

- ASA II and III patients of female sex
- Patients aged between 35 to 70 years
- Patients undergoing elective modified radical mastectomy

EXCLUSION CRITERIA:

- Patient ‘s refusal paravertebral block.
- Inability to obtain informed consent
- Patients with a history of allergic to local anaesthetics and alpha 2 adrenergic agents
- Patients with history of mental dysfunction, spine deformity
- Patients with morbid obesity, coagulopathy Coagulation Disorders and significant cardiovascular, respiratory, renal, hepatic or metabolic disease or CNS disorders
- Infection at the site of procedure
- Pregnancy
- Spinal Deformities

Methodology

Pre-operative evaluation:

After obtaining the Institution’s Ethical Committee approval, 10 patients in the age group of 35-70yrs, belonging to ASA II and III, and who were scheduled for modified radical mastectomy procedure were enrolled in this randomized control study. The patients were selected based on the inclusion criteria. They underwent a detailed pre anaesthetic check-up including history, clinical examination and all routine investigations like complete blood count, blood sugar, Liver Function Test, Renal Function Test, Serum electrolytes, ECG and Chest X ray.

Echocardiography and pulmonary function tests were done if required. An informed written consent was obtained from all the patients.

Pre-operative orders

On the night before surgery all patients were premedicated with tablet alprazolam 0.25mg, injection ranitidine 50mg and injection ondansetron 4mg. Patients were instructed to stay nil per oral after 10pm. And on the day of surgery injection ranitidine 50mg and injection ondansetron 4mg was given before shifting the patients to operation theatre.

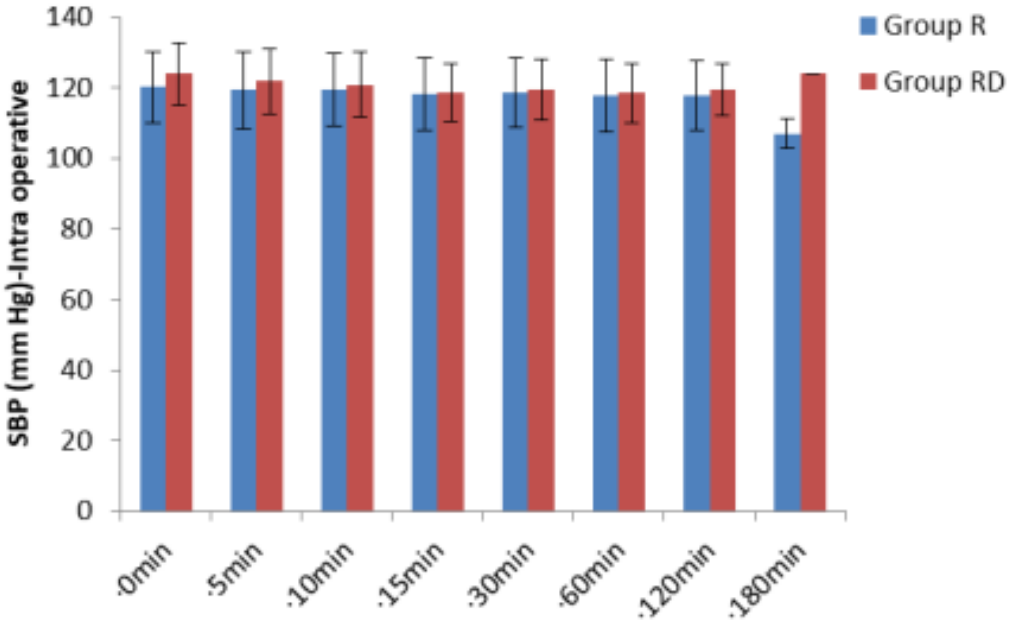
ISSN: 0975-3583, 0976-2833 VOL15, ISSUE8, 2024

Anaesthesia
After obtaining informed written consent from patients, they were randomly assigned to one of the two groups by using open labelled single blinded technique.
Group "R": Ropivacaine 0.75% (20ml): 05 patients.
Group "RD": Ropivacaine 0.75% with dexmedetomidine (1microgram/kg) (20 ml):05 patients.
On arrival to the anaesthetic room Pulse oximetry, Non-invasive blood pressure monitoring, and Electro-cardiogram monitoring were connected to the patients. Base line vitals were recorded and 18 G intravenous line was secured and patients were preloaded with Ringers lactate solution 10ml/kg over 20minutes prior to surgery.
Group R: Patients received 20ml of 0.75% Inj Ropivacaine through pectoralis nerve block USG guided.

Group RD: Patients received 20ml of 0.75% Inj Ropivacaine with injection dexmedetomidine (1microgram/kg) through Pectoralis Nerve block USG guided.
The success of the block was tested by decreased pin prick sensation at the expected dermatomal level. Patient's vitals were observed at regular intervals after the procedure.
ASSESMENT OF SENSORY BLOCKADE: Tested by pinprick with hypodermic needle.

3. RESULTS

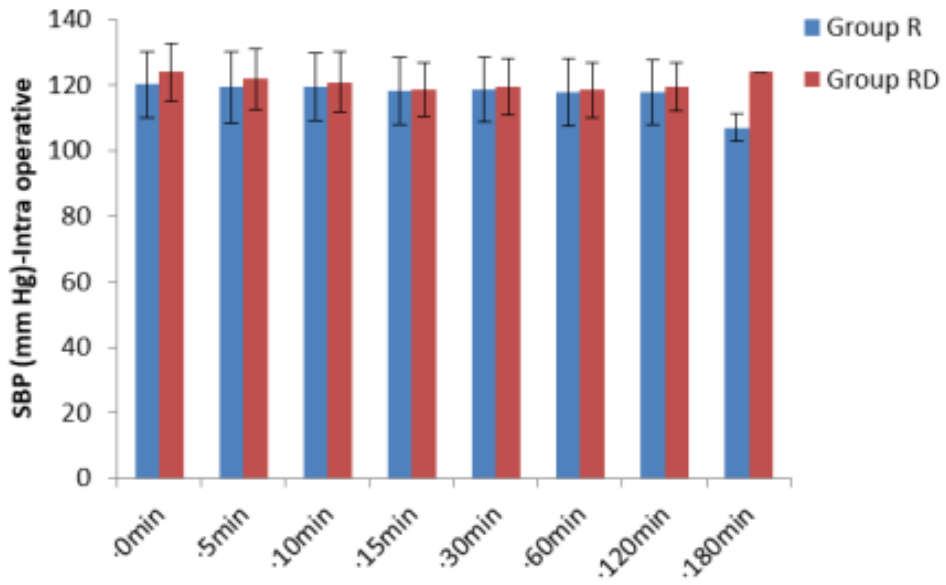
Garph 1: INTRA-OPERATIVE HEART RATE



Vitals of all 10 patients were measured at intervals of 0mins, 5mins, 10mins, 15mins 30mins 60mins, 120mins and 180mins after giving the block and also the end of the surgery. Patients belonging to Group RD showed less variability of heart rate when compared to Group R.

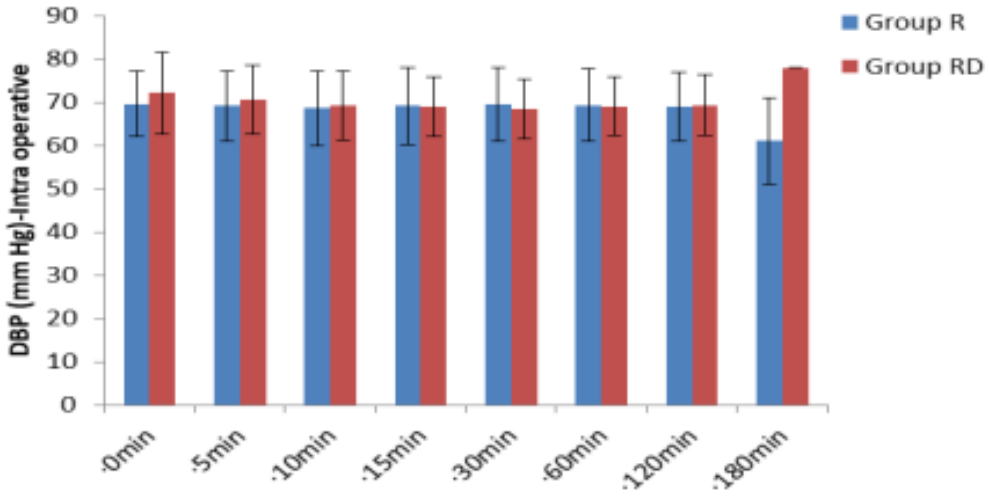
ISSN: 0975-3583, 0976-2833 VOL15, ISSUE8, 2024

Graph 2: INTRA-OPERATIVE SYSTOLIC BLOOD PRESSURE



Patients belonging to Group RD showed less variability of systolic blood pressure, when compared to Group R.

Graph 3: INTRA-OPERATIVE DIASTOLIC BLOOD PRESSURE



Patients belonging to Group RD showed less variability of diastolic blood pressure, when compared to Group R Group.

Post-operative details

Vitals of the 10 patients were measured at intervals of 0mins, 30mins, 1hr, 2hrs, 4hrs, 6hrs, 12hrs, and 24hrs after the surgery. Patients belonging to Group RD showed less variability of heart rate, when compared to Group R. Patients belonging to Group R showed less variability of systolic blood pressure, when compared to Group RD. Patients belonging to Group RD showed less variability of diastolic blood pressure, when compared to Group R. Post-operative

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE8, 2024

pain assessment was done using the Visual Analogue Scale in all the 10 patients at the time intervals of 0hrs, 2hrs, 2hrs, 4hrs, 6hrs, 8hrs, 12hrs and 24hrs. Both the groups had good post-operative analgesia which was for about 12hrs of surgery in group R and 22hrs in group RD. Post-operative sedation was assessed using the Modified Observers Assessment of Alertness/Sedation scale in all the 10 patients at time intervals of 0hrs, 2hrs, 2hrs, 4hrs, 6hrs, 8hrs, 12hrs and 24hrs.

TIME FOR FIRST ANALGESIA

Time for first analgesia, was assessed in all the 10 patients post operatively, shows that patients from Group RD required more time for the need for first analgesia post operatively when compared to patients from Group R. Patients from Group RD required less analgesia in the first 24hrs when compared to patients from Group R.

DURATION OF ANALGESIA

Duration of analgesia was assessed in all 10 patients post operatively. In Group R about 3 patients showed duration of analgesia between 600- 1200 min. In Group RD in 4 patients the duration of analgesia was >1200min.

Rescue Analgesia

The requirement of the rescue analgesia was assessed in both the groups post operatively at time intervals 2hrs, 4hrs, 6hrs, 8hrs, 12hrs, and 24hrs respectively.

Total Analgesic requirement

Total Analgesic Requirement in first 24hrs post operatively was assessed in both the groups. In Group R 2 patients required inj tramadol 50mg, 1 patients required inj tramadol 100mg, and 1 patient inj tramadol 150mg, whereas in Group RD 1 patients required inj tramadol 50mg.

4. DISCUSSION

Breast cancer accounts for 1 in 4 cancers diagnosed among women worldwide.[15] Analyzing the data from the National Cancer Institute (INCA), which estimates new cancer cases for the triennium 2020-2022, an incidence of 66,000 new breast cancer cases in Brazil was observed.[16] In Alagoas, the rate of new breast cancer cases follows the global profile, with a high incidence rate corresponding to 35.20 new cases for every 100,000 women in 2018.[17]

Vitals of all 10 patients were measured at intervals of 0mins, 5mins, 10mins, 15mins 30mins 60mins, 120mins and 180mins after giving the block and also the end of the surgery. Patients belonging to Group RD showed less variability of heart rate when compared to Group R. Patients belonging to Group RD showed less variability of systolic blood pressure, when compared to Group R. Patients belonging to Group RD showed less variability of diastolic blood pressure, when compared to Group R Group. The blockade of the lateral and median pectoral nerves in an inter-fascial plane between the musculus pectoralis major and musculus pectoralis minor muscles, the long thoracic nerve, the thoracic intercostal nerves from T2 to T6, and the thoracodorsal nerve are the goals of the PECs II Block.17,18 The PECs block is safer, easier, and faster to work with, and has longer analgesia than a paravertebral nerve block or epidural nerve block in MRM for carcinoma. The PECs block applied to MRM can not only reduce postoperative use of analgesics but also provides stable hemodynamics and better patient satisfaction. Thus, for patients with hypertension and coronary heart disease undergoing breast cancer surgery, this strategy greatly reduces the risk of postoperative complications and improves the postoperative quality of life of patients.[2] However, whether this strategy can lower the prevalence of persistent pain after breast cancer treatment is not known. Recent studies have shown that the PECs II block can prevent chronic pain 3 months after breast surgery.[19]

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE8, 2024

Vitals of the 10 patients were measured at intervals of 0mins, 30mins, 1hr, 2hrs, 4hrs, 6hrs, 12hrs, and 24hrs after the surgery. Patients belonging to Group RD showed less variability of heart rate, when compared to Group R. Patients belonging to Group R showed less variability of systolic blood pressure, when compared to Group RD. Patients belonging to Group RD showed less variability of diastolic blood pressure, when compared to Group R. Post-operative pain assessment was done using the Visual Analogue Scale in all the 10 patients at the time intervals of 0hrs, 2hrs, 2hrs, 4hrs, 6hrs, 8hrs, 12hrs and 24hrs. Blanco et al[6] employed the PECs block in 50 patients and found that following a modified radical mastectomy, the patients had acceptable postoperative analgesia for 8 h. Bashandy and Abbas[20] compared patients receiving the PECs with patients receiving only general anaesthesia and reported lower VAS scores and reduced postoperative morphine doses in patients receiving the PECs along with general anaesthesia. Consistent with the findings in our study, Bashandy et al. reported that in the patients receiving pectoral blocks, opiate consumption was reduced both intraoperatively and for 12 h postoperatively, and pain scores were reduced for 24 h postoperatively.
Both the groups had good post-operative analgesia which was for about 12hrs of surgery in group R and 22hrs in group RD. Post-operative sedation was assessed using the Modified Observers Assessment of Alertness/Sedation scale in all the 10 patients at time intervals of 0hrs, 2hrs, 2hrs, 4hrs, 6hrs, 8hrs, 12hrs and 24hrs. The mean time to first request of analgesia was 310.4 ± 12.7 min in the study by Ahmed[21] in the PECs group in their study as compared to 540 ± 135.03 min in our study. This shorter duration of analgesia is possibly due to the very fact that the block was given preoperatively in their study. Ultrasound-guided PECs block provided perioperative analgesia but reduced the duration of postoperative analgesia. Furthermore, because our block was placed at the end of the resection and after washing, the local anaesthetic solution was more likely to be contained within the tissue plane in which it was deposited than a preoperatively deposited solution, which could leak intraoperatively during tissue dissection.

5. CONCLUSION

As per our study design, we concluded that Ropivacaine with dexmedetomidine used in PEC block along with general anaesthesia provided effective anaesthesia for modified radical mastectomy. It prolonged the duration, provides high quality of analgesia, and the incidence of nausea and vomiting was less. Time for first analgesic was prolonged in patients who received ropivacaine with dexmedetomidine when compared to patients who received Ropivacaine. The VAS scores and the total rescue analgesic requirement were less in ropivacaine with dexmedetomidine when compared to ropivacaine alone. Hence Dexmedetomidine, used as an additive provides longer duration of analgesia post-operatively with minimal cardiovascular and respiratory side effects.

6. REFERENCES

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209–249.
2. Deng W, Fu D, He L. Evaluation of pectoral nerve block in modified radical mastectomy: comparison of three concentrations of Ropivacaine. Clin Interv Aging. 2020;22(15):937–944.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE8, 2024

3. Gonzales J, Lovald ST, Lau EC, Ong KL. Risk of opioid-related adverse events after primary and revision total knee arthroplasty. J Surg Orthop Adv. 2018;27(2):148–54.
4. Senapathi TGA, Widnyana IMG, Aribawa IGNM, Jaya AAGPS, Junaedi IMD. Combined ultrasound-guided Pecs II block and general anesthesia are effective for reducing pain from modified radical mastectomy. J Pain Res. 2019;12:1353–8.
5. Freise H, Van Aken HK. Risks and benefits of thoracic epidural anaesthesia. Br J Anaesth. 2011;107(6):859–868.
6. Blanco R, Fajardo M, Maldonado TP. Ultrasound description of Pecs II (modifiedPecsI): a novel approach to breast surgery. Rev Esp Anestesiol Reanim. 2012;59(9):470–475.
Westbrook AJ, Buggy DJ. Anaesthesia for breast surgery. Br J Anaesth. 2003;8(5):151–154. [Google Scholar]
7. Gonzales J. PECS versus PVBS for perioperative analgesic management in breast surgery. ASRA News. 2016;16(3):41–44.
8. Jin Z, Li R, Gan TJ, He Y, Lin J. Pectoral Nerve (PECs) block for postoperative analgesia-a systematic review and meta-analysis with trial sequential analysis. Int J Physiol Pathophysiol Pharmacol. 2020;12(1):40–50.
9. Kulhari S, Bharti N, Bala I, Arora S, Singh G. Efficacy of pectoral nerve block versus thoracic paravertebral block for postoperative analgesia after radical mastectomy: a randomized controlled trial. Br J Anaesth. 2016;117:382–386.
10. Bashandy GMN, Abbas DN. Pectoral nerves I and II blocks in multimodal analgesia for breast cancer surgery: a randomized clinical trial. Reg Anesth Pain Med. 2015;40(1):68–74.
11. Eldeen HMS. Ultrasound guided pectoral nerve blockade versus thoracic spinal blockade for conservative breast surgery in cancer breast: a randomized controlled trial. Egypt J Anaesthesia. 2016;32(1):29–35.
12. Desroches J, Belliveau M, Bilodeau C, Landry M, Roy M, Beaulieu P. Pectoral nerves I block is associated with a significant motor blockade with no dermatomal sensory changes: a prospective volunteer randomized-controlled double-blind study. Can J Anaesth. 2018;65(7):806–812.
13. Kamiya Y, Hasegawa M, Yoshida T, Takamatsu M, Koyama Y. Impact of pectoral nerve block on postoperative pain and quality of recovery in patients undergoing breast cancer surgery: a randomised controlled trial. Eur J Anaesthesiol. 2018;35(3):215–223.
14. GLOBOCAN 2020: New Global Cancer Data | UICC [Internet] Uicc.org; 2020.
15. INCA 2021 - INSTITUTO NACIONAL DE CÂNCER JOSÉ ALENCAR GOMES DA SILVA. Estimativa 2021: incidência de câncer no Brasil. Rio de Janeiro: INCA; 2021.
16. INCA 2018 - INSTITUTO NACIONAL DE CÂNCER JOSÉ ALENCAR GOMES DA SILVA . Estimativa 2018: incidência de câncer no Brasil. Rio de Janeiro: INCA; 2018.
17. Kim D, Kim S, Kim CS, et al. Efficacy of pectoral nerve block type II for breast-conserving surgery and sentinel lymph node biopsy: a prospective randomized controlled study. Pain Res Manag. 2018;2018:1–8.
18. Blanco R, Barrington MJ. Pectoralis and serratus plane blocks. In: Hadzic A, editor. Hadzic's Textbook of regional anesthesia and acute pain management. 2. New York: McGraw-Hill Education; 2017. pp. 650–660.
19. De Cassai A, Bonanno C, Sandei L, Finozzi F, Carron M, Marchet A. PECS II block is associated with lower incidence of chronic pain after breast surgery. Korean J Pain. 2019;32(4):286–291.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE8, 2024

20. Bashandy GM, Abbas DN. Pectoral nerves I and II blocks in multimodal analgesia in breast cancer surgery: a randomized clinical trial. Reg Anesth Pain Med. 2015;40(1):68–74.
21. Abdelaziz Ahmed AA. Efficacy of pectoral nerve block using Bupivacaine with or without magnesium sulfate. Anesth Essays Res. 2018;12(2):440–5.