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Effectiveness of Ultrasonography Guided Pectoral Nerve Block for Post-Operative Analgesia in Modified Radical Mastectomy

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Abstract **Original Research Article**

Background*:** Modified radical mastectomy surgery results in high morbidity and patient dissatisfaction due to incomplete postoperative pain relief. The most frequent malignancy among women worldwide is breast cancer. ***Objectives: The aim of this study was to assess effectiveness of ultrasonography-guided Pectoral nerve block for postoperative analgesia after Modified radical mastectomy. ***Methods*:** This descriptive type of cross-sectional study was carried out in the Department of Anaesthesia, Analgesia, Palliative and Intensive Care Medicine in collaboration with department of surgery, Dhaka Medical College & Hospital, Dhaka during July 2021 to June 2022. A total of 28 patients were participate in this study. Purposive sampling technique was followed. After taking consent and matching eligibility criteria, data were collected from patients using the predesigned structured questionnaire by interview. Statistical analyses of the results were obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-25). ***Results*:** Mean age of patient was 54.7 ± 7.3 years majority belonged to 50-59 years of age (39.2%). Maximum patient had ASA Class II (60.7%). In case of staging of the cancer 39.2% were in stage I and 60.8% were in stage II. Average duration of surgery was 119.4 ± 14.2 minutes. The mean VAS score of the patients at 2^{nd} hrs was 0.52±0.2, at 4^{th} hrs was 0.65±0.3, at 6^{th} hrs was 1.12±0.6, at 8^{th} hrs was 2.31±1.35, at 10^{th} hrs was 3.34±1.45, at 12^{th} hrs was 4.83±1.40, at 14^{th} hrs was 2.24±1.30, at 16^{th} hrs, at 18^{th} hrs 2.74±1.65, at 20^{th} hrs was 4.48±1.70 and at 24^{th} hrs was 2.28±1.80. the mean 1^{st} analgesic demand (hour) was 12.2±2.1 and the Total opioid consumption (mg) was 165.7±18.2. ***Conclusion*:** For postoperative pain management after breast surgery, various procedures have been employed, including local anesthetic infiltration, intercostal nerve block, thoracic epidural block, and paravertebral block. They might not be appropriate for all breast procedures as they are not blocking medial and lateral pectoral nerves. So, pectoral nerve block is very effective for postoperative analgesia in patients undergoing modified radical mastectomy.

Keywords: Pectoral Nerve, Mastectomy, Ultrasonography.

INTRODUCTION

Modified radical mastectomy surgery results in high morbidity and patient dissatisfaction due to incomplete postoperative pain relief. The most frequent malignancy among women worldwide is breast cancer [1]. Historically, the mainstay of therapy for early-stage invasive breast malignancies has been a modified radical mastectomy. Worse postoperative pain results from a modified radical mastectomy performed under general anesthesia [2]. A significant risk factor for the development of chronic pain following breast surgery is acute postoperative discomfort carried out by insufficient control of pain. 20–50% of women who have breast surgery experience this condition, which includes paresthesia, intercostobrachial neuralgia, neuroma pain, and phantom breast pain [3]. Postoperative pain following breast surgery prolongs the hospital stay and delays patient mobilization [4]. General anaesthesia with postoperative NSAIDs and opioids is a usually used technique for postoperative analgesia after breast surgeries [5]. After breast surgery, a standard method for postoperative analgesia combines general anesthesia

with postoperative NSAIDs and opioids [6]. It has been suggested that morphine and tramadol have differing effects on the immune system in humans. The use of analgesics without immunosuppressive side effects could be a useful substitute for morphine in the management of postoperative pain [7]. NSAIDs, cyclooxygenase-2 inhibitors, acetaminophen, and localized blocking with local anesthetics are among the multimodal analgesic techniques that the American Society of Anaesthesiologists Task Force advises being used regularly [8]. Recent innovative techniques to block the pectoral, intercostobrachial, third to sixth intercostals, and long thoracic nerves include Blanco's ultrasonography (USG)-guided interfacial plane block and the pectoral nerve block [9]. They are straightforward, safe, and simple to administer blocks that give effective analgesia and have no known adverse effects during or after breast surgery. Other benefits of pectoral nerve block include absence of sympathetic block, which is connected to paravertebral, and reduced need for opioids [10]. The Pectoral nerve block Pec I [local anesthetic infiltration between the Pectoralis major and Pectoralis minor muscles] and Pec II [local anesthetic infiltration between the Pectoralis minor and the serratus anterior muscle] favors mastectomy and axillary clearance because it blocks the long thoracic and thoracodorsal nerves in addition to the lateral branches of the intercostal nerves that exit at the level of the mid-axillary line to innervate the mammary gland and the skin from T2 to T6 11]. So, this study outlined to observe the effectiveness of ultrasonography-guided Pectoral nerve block for postoperative analgesia after Modified radical mastectomy.

METHODOLOGY

This descriptive type of cross-sectional study was carried out in the Department of Anaesthesia, Analgesia, Palliative and Intensive Care Medicine in collaboration with department of surgery, Dhaka Medical College & Hospital, Dhaka during July 2021 to June 2022. A total of 28 patients were participate in the study. Adult female patients who will be assigned for a Modified radical mastectomy and under the criteria of American Society of Anaesthesiologists' physical status I, II and III were included in the study. Patients with known allergy or sensitivity to local anaesthetic agents, those having a history of treatment for a chronic pain condition, analgesics for more than 4 weeks or any psychiatric disorders, patients having chest wall and spine deformity, those with infection at the site of injection and patient who refuse to give informed consent were excluded from the study. Purposive sampling technique was followed. After taking consent and matching eligibility criteria, data were collected from patients on variables of interest using the predesigned structured questionnaire by interview, observation, clinical examination of the patients. Statistical analyses of the results were obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-25), where required.

RESULT

Table I: Distribution of the patients by demographic characteristics, stage of cancer and duration of surgery

Characteristics		n (%)
Age	30-39 years	2(7.1)
	40-49 years	10 (35.7)
	50-59 years	11(39.2)
	60 year and above	5 (17.9)
	Mean±SD	54.7±7.3
Weight (kg)		56.8±4.1
Height (meter^2)		1.49±0.3
ASA	Class I	6(21.4)
	Class II	17 (60.7)
	Class III	5 (17.8)
Stage	I	11 (39.2)
	II	17 (60.8)
Duration of Surgery(min)		119.4±14.2

Mean age of patient was 54.7 ± 7.3 years in with majority belonged to 50-59 years of age (39.2%). Maximum patient had ASA Class II (60.7%). In case of staging of the patients 39.2% were in stage I and 60.8% were in stage II. Average duration of surgery was 119.4 ± 14.2 minutes.

Table II: Perioperative heart rate of the patients

Heart rate (beat/min)	Mean ± SD
Baseline	77.3±7.6
After block	72.8±6.2
After intubation	80.6±7.9
After extubation	89.1±9.8
2nd hrs	73.9±4.9
4th hrs	73.2±5.6
6th hrs	74.4±5.8
8th hrs	74.7±7.3
10th hrs	77.3±6.8
12th hrs	80.39±6.7
14th hrs	76.2±5.1
16th hrs	74.1±6.4
20th hrs	82.4±6.1
24th hrs	75.6±5.9

Values are expressed as Mean ± SD

At baseline perioperative heart rate of the patients was 77.3±7.6, after block it was 72.8±6.2, after intubation 80.6±7.9 and after extubation 89.1±9.8. Maximum rate was at 20th hours (82.4±6.1).

Table III: Perioperative systolic blood pressure of the patients

SBP (mmHg)	Mean ± SD
Baseline	135±8.1
After block	132±8.2
After intubation	129±8.5
After extubation	138±8.3
2nd hrs	128±7.6
4th hrs	125±7.3
6th hrs	124±7.4
8th hrs	123±7.2
10th hrs	125±7.1
12th hrs	127±7.2
14th hrs	124±6.9
18th hrs	125±6.5
20th hrs	127±6.8
24th hrs	124±6.9

Values are expressed as Mean ± SD

At baseline perioperative systolic blood pressure of the patients was135±8.1, after block it was 135±8.2, after intubation 129±8.5 and after extubation 138±8.3. Maximum systolic blood pressure was at 2nd hours (128±7.6).

Table IV: Perioperative mean arterial pressure of the patients

MAP (mmHg)	Mean ± SD
Baseline	88.3±5.9
After block	88.5±6.1
After intubation	88.9±6.3
After extubation	89.3±6.8
2nd hrs	88.3±5.6
4th hrs	89.3±5.5
6th hrs	88.7±5.3
8th hrs	88.3±5.2
10th hrs	89.2±5.6
12th hrs	90.5±5.2
14th hrs	91.8±4.7
18th hrs	93.2±4.8
20th hrs	93.5±4.9
24th hrs	93.4±4.4

Values are expressed as Mean ± SD

At baseline perioperative mean arterial pressure of the patients was 88.3±5.9, after block it was 88.5±6.1, after intubation 88.9±6.3 and after extubation 89.3±6.8. Maximum systolic blood pressure was at 20th hours (93.5±4.9).

Table V: VAS score of the patients

VAS score	Mean ± SD
2nd hrs	0.52±0.2
4th hrs	0.65±0.3
6th hrs	1.12±0.6
8th hrs	2.31±1.35
10th hrs	3.34±1.45
12th hrs	4.83±1.40
14th hrs	2.24±1.30
16th hrs	1.95±1.35
18th hrs	2.74±1.65
20th hrs	4.48±1.70
24th hrs	2.28±1.80

Values are expressed as Mean ± SD.

The mean VAS score of the patients at 2nd hrs was 0.52±0.2, at 4th hrs was 0.65±0.3, at 6th hrs was 1.12±0.6, at 8th hrs was 2.31±1.35, at 10th hrs was 3.34±1.45, at 12th hrs was 4.83±1.40, at 14th hrs was 2.24±1.30, at 16th hrs, at 18th hrs 2.74±1.65, at 20th hrs was 4.48±1.70 and at 24th hrs was 2.28±1.80.

Table VI: Assessment of time of 1st dose of analgesic demand and total opioid consumption of the patients

Criteria	Mean ± SD
1st analgesic demand (hour)	12.2±2.1
Total opioid consumption (mg)	165.7±18.2

Values are expressed as Mean ± SD.

Here, the mean 1st analgesic demand (hour) was 12.2±2.1 and the Total opioid consumption (mg) was 165.7±18.2.

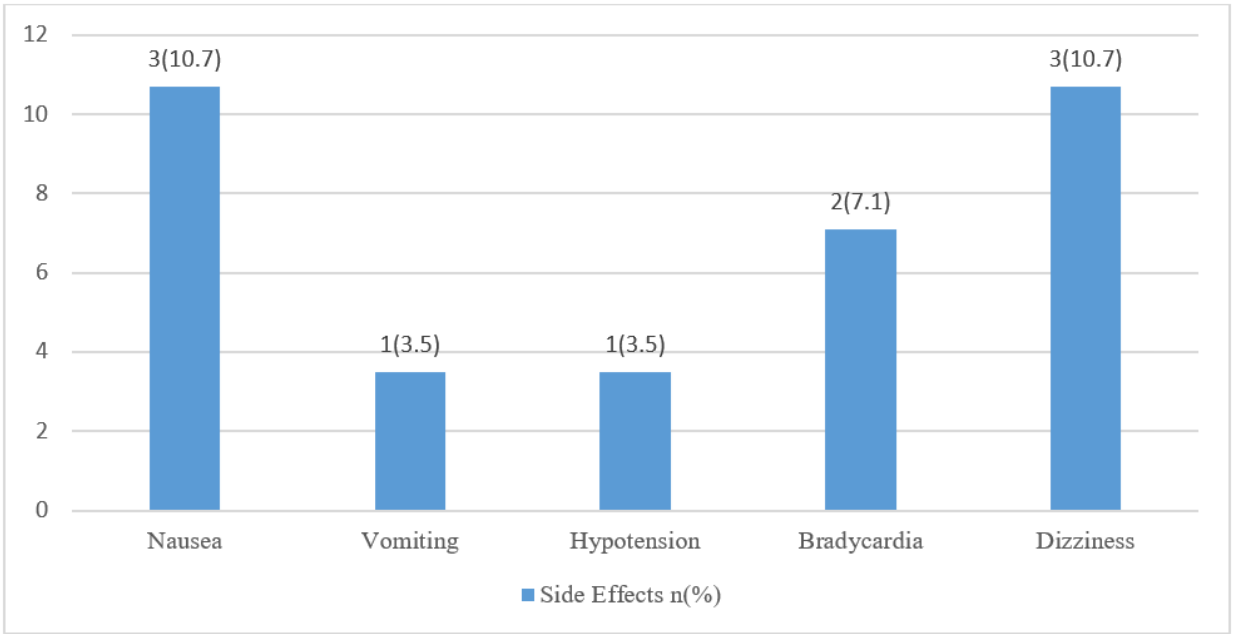

Figure I: Postoperative side effects of the patients between two groups

About 10.7% of the patient had complaints of nausea, 3.5% of patient had vomiting, 10.7% had Dizziness, 3.5% had Hypotension and Bradycardia respectively.

DISCUSSION

This study was conducted among 28 patients from July 2021 to June 2022 at Dhaka Medical College & Hospital to assess the effectiveness of Pectoral nerve

(Pecs) block in patient underwent Modified radical mastectomy.

In this study the mean age of patients were 54.7 ± 7.3 years with majority belonged to 50-59 years of age (39.2%). A previous study shows the mean age of patients was 30.54 ± 4.08 which was not in line with our patients mean age [12]. Maximum patients had ASA Class II (60.7%). In case of staging of the patients 39.2% were in stage I and 60.8%) were in stage II. Average duration of surgery was 119.4 ± 14.2 minutes.

This study showed that mean VAS score was low in Pecs block group at all-time interval except at 12th hours and 20th hours. VAS score was low at 8th hour, 16th hours and 24th hours. A study showed that patient had significantly lower pain score at 1st hour, 6th hour, 12th hour in Pectoral nerve block group [13]. In this current study the mean 1st analgesic demand (hour) was 12.2±2.1 and the total opioid consumption (mg) was 165.7±18.2.

Kulhari *et al.*, showed that prolonged duration of first analgesic demand after breast surgeries in patients receiving Pecs II block (197.5 ± 31.35 min), and total opioids consumption was signifcantky lower in Pecs block [14]. Wahba and Kamal, also found that duration of analgesia was significantly longer in the Pecs block group 175 (155–220) min [13].

In our study, about 10.7% of the patient had complaints of nausea, 3.5% of patient had vomiting, 10.7% had Dizziness, 3.5% had Hypotension and Bradycardia respectively. A previous study revealed that, Pectoral nerve block is a less invasive technique and; hence, it is devoid of these complications [15]. After a mastectomy, conventional pharmacological pain management with opioids and non-steroidal anti-inflammatory medications (NSAIDS) has been shown to result in 20%–40% of instances with insufficient pain control [16]. For the management of pain following breast surgery, a variety of localized procedures have been employed, including local anesthetic infiltration, intercostal nerve block, thoracic epidural block, and paravertebral block [17-19]. but since they are not blocking the medial and lateral pectoral nerves, they might not be appropriate for all breast procedures.

CONCLUSION

The long thoracic, intercostal III-VI, and pectoral nerves are all targeted by the PecS II block, a novel procedure. To completely anesthetize patients during breast surgery, these nerves must be inhibited. So, pectoral nerve block is very effective for postoperative analgesia in patients undergoing modified radical mastectomy.

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