Original Article

Role of Para Vertebral Blocks after Unilateral Modified Radical Mastectomy for Breast Cancer

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ABSTRACT

Objective: To study the Role of Paravertebral Blocks after Unilateral Modified Radical Mastectomy for Breast Cancer.

Study Design: Descriptive case series

Place and Duration of Study: This study was conducted at the Department of Surgical Unit 2, Jinnah hospital Lahore from 1st February 2017 to 31th January 2018.

Materials and Methods: The study was conducted among 100 female breast cancer patients undergoing unilateral modified radical mastectomy. Paravertebral blocks were given by 0.5% bupivacaine from 2nd to 7th paravertebral spaces. Patients were observed for Pain scorein first 24hour periodby Visual Analogue Scale(VAS). The VAS scoring at first rescue analgesic, duration of post-operative analgesia, frequency of analgesia administration and mean consumption of analgesia in first 24 hours period were calculated.

Results: Out of 100 patients, 65% of the patients belong to age group 35-50 years and only 35% of the patients belong to age group 51-65 years age group. The mean of the VAS scoring at first rescue analgesic was 5.58 ±0.781.The duration of post-operative analgesia was 5.15±1.104 hours (309±66.42 min). The frequency of analgesic administration was 3.53± 1.104. The mean consumption of analgesic given to all patients was 88.22 ±22.32.

Conclusion: The study has demonstrated that the paravertebral blocks lead to prolonged post op analgesia with marked reduction in post op analgesic requirement. **Key words**: Para vertebral Blocks, Modified Radical Mastectomy, Breast Cancer. Visual Analogue Score.

Key Words: Para Vertebral Blocks, Unilateral Modified Radical Mastectomy, Breast Cancer

Citation of articles: Zishan MS, Ali T, Rafiq S, Khan MS, Khan AS, Amjad HM. Role of Para Vertebral Blocks after Unilateral Modified Radical Mastectomy for Breast Cancer. Med Forum 2019;30(4):15-19.

INTRODUCTION

The Breast cancer (BC) is a common global health problem among women. It is fifth leading cause of death worldwide while it is most common cause of death among women in the developing countries[1]. Breast cancer accounts for one third of all cancer cases followed by oral cavity & ovarian cancers[2]. Oneout of 10 women suffer from breast cancer at any stage of their lives[3].

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Received: December, 2018
Accepted: February, 2019
Printed: April, 2019

About 80% of invasive breast cancer occur in women above 45 years [3].In England && Wales, 1 in 12 women develop the disease during their life time. About 39620 patients estimated to die of breast cancer inUSA[4].The incidence of breast carcinoma in Pakistan is 50/10000 whereas in India it is 19/100000[5]. Approximately 1 in 9 of Pakistani women usually suffer from breast cancer at some stage in their lives [6]. The frequency of breast cancer in Karachi was 69.1 per 100,000 from 1998-2002[7].Advanced age, obesity, family history, hormonal or contraceptive exposure, smoking and lack of physical exercise are considered important risk factors for breast cancer[1,3].

Paravertebral blocks (PVBs) involve injection of anesthetic agent into the paravertebral space. This is a safe & effective procedure with fewer complications. It is useful for carrying out various procedures like breast surgeries, thoracic surgeries and various abdominal surgeries[8, 9].

The para vertebral space is a wedge-shaped space near vertebral bodies. The spinal roots emerge from the intervertebral foramen into this space & divide into dorsal & ventral rami. The sympathetic chain lies in the same fascial plane & communicates with it via the communicants rami. Hence, PVBs produce unilateral sensory, motor & sympathetic blockade[9].The spinal

nerves are devoid of a fascial sheath in this region that make them exceptionally susceptible to local anesthetics.

For breast surgeries, the PVB should be administered from T2 to T7 spinal levels corresponding to the nerve supply of breast[9,10]. Firstly, points corresponding to 2.5 to 3cm lateral to the T2-T7 spine are marked with skin marker. Under aseptic measures, the marked skin site is infiltrated with local anesthetic agent i.e. lignocaine 2%. A specialized Tuohy needle is advanced perpendicular to the skin, posteroanteriorly, until contact with the pars intervertebralis, articular column, & the transverse process of the particular vertebra is established[9,10]. While continuously testing for loss of resistance to air, the needle is "walked off" the structure in lateral & caudal direction & advanced approximately 1 cm. As the costotransverse ligament is penetrated, a "pop" is felt, & there is a loss of resistance to air. This indicates paravertebral space where 0.5% bupivacaine isinjected for providing PVBs[9].

PVB is technically feasible and easy to learn with a high success rate[11]. The failure rate associated with PVBS is <13%.Other complications include inadvertent vascular puncture (6.8%), hypotension (4%), epidural or intrathecal spread (1%), vascular puncture (0.8%), pneumothorax (0.5%). Likelihood of vascular puncture & pneumothorax is higher in bilateral blocks compared with unilateral block. Burlacu et al have reported contralateral harlequin & ipsilateral Horner's syndrome due to spread to ipsilateral stellate ganglion[12].

MATERIALS AND METHODS

Sample size of 100 cases was calculated with 95% confidence lend, d=0.01 and taking expected mean +/- S.D of mean consumption of analgesia i.e. 0.105 +/- 0.0246 g with paravertebral blocks after breast cancer surgery. Sampling technique was Non-probability purposive sampling.

The inclusion criteria were following

1. All consenting female patients of age 18 to 55 years undergoing unilateral modified radical mastectomy for biopsy proven breast cancer
2. Patients fit for surgery (ASA 1 to 3).
3. The exclusion criteria were following
4. Patients refusing to participate
5. Benign breast diseases like fibroadenoma and duct ectasia etc.
6. Obesity i.e. body mass index > 35kg/m2.
7. Pregnancy and lactating females
8. Bleeding disorders diagnosed by raised PT/APTT>6 seconds
9. Diabetes Mellitus diagnosed by BSF>126mg/dl.
10. Kyphoscoliosis clinically diagnosed
11. Herpes Zoster clinically diagnosed
12. Allergic to the bupivacaine
13. Chronic pain syndrome clinically diagnosed
14. chronic analgesic abuse
15. Not fit for surgery (ASA grade >3)

Paravertebral blocks were given by 0.5% diluted bupivacaine (2.5mg per kg body weight) 2 cc in each Paravertebral space from 2nd to 7th intercostal spaces corresponding to nerve supply of the breast. Patients were observed for Pain score in first 24hour period by Visual Analogue Scale(VAS).Rescue Analgesic (Tramadol) was given 0.025g at any time if pain scoring was greater than 4. The VAS scoring at first rescue analgesic, duration of post-operative analgesia, frequency of analgesic administration and mean consumption of analgesicin 24 hours period were calculated.

RESULTS

The mean age of the patients was 48.54±6.306 with minimum age of 36 years and maximum age of 62 years. Out of hundred patients, 65% of the patients belong to age group 35-50 years and only 35% of the patients belong to age group 51-65 years age group. (Table 1, Figure 1).

The time of first dose of analgesic (tramadol) given after surgery was calculated among all the patients and it was labeled as the **Duration of post-operative analgesia**. The duration of post-operative analgesia was 5.15±1.104 hours (309±66.42 min). The minimum duration of post op analgesia was 3 hours (180 min) and the maximum duration of post op analgesia was 8 hours (480 min). (Table 2).

The mean VAS scoring for first rescue analgesic was 5.58 ±0.781. The minimum VAS scoring for first rescue analgesic was 4 while the maximum VAS scoring was 7. (Table 3).

The total number of times the dosage of analgesic to be repeated in 24 hours was labeled as **Frequency of analgesic administration**& it was 3.53± 1.104. The maximum frequency of analgesic administration was 5 and the minimum was 2. (Table 4).

Table No: 1 Age of subjects

	Statistics	**Age of subjects**	
N		100	
Mean		48.54	
Median		48.00	
Mode		45	
Std. Deviation		6.306	
Minimum		36	
Maximum		62	
		Frequency	Percent
	35 - 50 years	65	65.0
	51 - 65 years	35	35.0
	Total	100	100.0

The mean consumption of analgesic (tramadol) was 88.22 ± 22.32. The maximum consumption of analgesic in 24 hours was 125 mg and the minimum consumption was 50 mg. (Table 5).

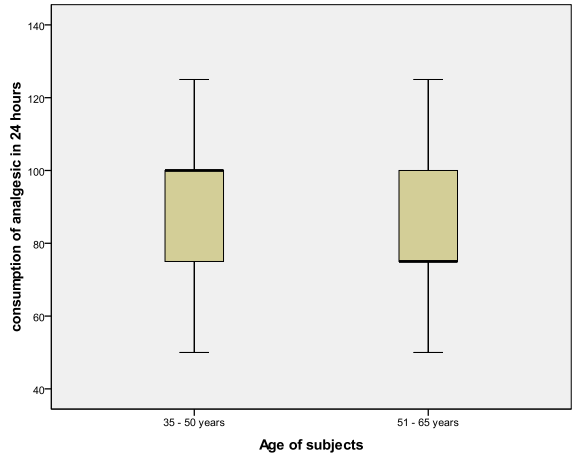

Figure No.1: Consumption of analgesic by patients.

Table No: 2 Duration of post-operative analgesia

Descriptive Statistics						
		N	Min.	Max.	Mean	Std. Deviation
The duration of post op analgesia		100	3	8	5.15	1.104
Duration of post-operative analgesia		Frequency			Percent	
	3 hours	5			5.0	
	4 hours	25			25.0	
	5 hours	33			33.0	
	6 hours	25			25.0	
	7 hours	11			11.0	
	8 hours	1			1.0	
	Total	100			100.0	

Table no: 3 VAS Score at first rescue analgesic

Descriptive Statistics						
		N	Min.	Max.	Mean	Std. Deviation
VAS scoring for first rescue analgesic		100	4	7	5.58	.781
VAS Score		Frequency			Percent	
	4	7			7.0	
	5	39			39.0	
	6	43			43.0	
	7	11			11.0	
	Total	100			100.0	

Table No: 4 Frequency of analgesic administration

Descriptive Statistics					
	N	Min.	Max.	Mean	Std. Deviation
Frequency of analgesic administration	100	2	5	3.53	.893
		Frequency		Percent	
	2	14		14.0	
	3	32		32.0	
	4	41		41.0	
	5	13		13.0	
	Total	100		100.0	

Table No: 5 Mean consumption of analgesic in 24 hours (mg).

	N	Min.	Max.	Mean	Std. Deviation
The consumption of analgesic in 24 hours (mg)	100	50	125	88.25	22.320
		Frequency		Percent	
Valid	50	14		14.0	
	75	32		32.0	
	100	41		41.0	
	125	13		13.0	
	Total	100		100.0	

DISCUSSION

Paravertebral blocks are used in a wide variety of surgeries including thoracic, breast and abdominal surgeries. Most of the elective breast surgeriescan be performed effectively with marked safetyunder paravertebral blocks[13].

The benefits of paravertebral blocks include prolonged post-operative analgesia&marked reduction in post-operative nausea and vomiting (PONV) with the shortened hospital stay that leads to enhanced recovery after surgery[8,9].

Dabbagh A et al (2007) suggested PVBs as a suitable alternative to general anesthesia in selected breast surgical patients regarding postoperative pain[14].

Batra RK, Krishnan et al (2011), published an article regarding efficacy of PVBs & proved it to be efficacious & safe for BC surgeries[15].

Suzanne B. Coopey et al. (2013), conducted a retrospective study regarding efficacy of PVBs in the patients undergoing mastectomies with immediate reconstructive breast reconstructive surgeries & concluded that PVBs lead to markedly shortened hospital stay & improved patient outcome[16].

Syal K. et al has reported that PVBs are superior to wound infiltration with local anesthetic agents in terms of prolonged post op analgesia and little need for rescue analgesic [17].

The post-operative analgesia associated with paravertebral blocks depends on following factors[18]

- The type of anesthetic agent and its dosage.
- Presence of additives like clonidine, fentanyl.
- Single or multiple injection techniques.
- Continuous infusion or bolus injection techniques.
- Ultrasonographic or neuro stimulation guided paravertebral block.
- Use of patient-controlled analgesia (PCA) in the post-operative regimen.
- The age of the patient.

In our study, all the selected 100 patients were given paravertebral blocksby injecting 0.5% diluted bupivacaine (2.5mg/Kg) 2 cc in each paravertebral space about 2.5 cm lateral to spinous processes of T2-T7 vertebrae corresponding to the nerve supply of the breast.

The mean age of the patients was 48.54±6.306 with minimum age of 36 years and maximum age of 62 years. Out of hundred patients, 65% of the patients belong to age group 35-50 years and only 35% of the patients belong to age group 51-65 years age group. Shahida Parveen et al conducted a study in from 2007 to 2010 &found mean age of the patients 41.9 ±10.9 years with majority of the patients lying in third and fourth decades of life in contrary with the western countries where majority of the patients lie in 5th and 6th decades of life[6]. This indicates early age presentation of CA breast in Pakistan with poor prognosis.

The time of first analgesic given after surgery was calculated among all the patients and it was considered as the Duration of post-operative analgesia. The duration of post-operative analgesia was 5.15±1.104 hours (309±66.42 min). The minimum duration of post op analgesia was 3 hours (180 min) and the maximum time was 8 hours(480 min). The results are similar to a study conducted by Sabyasachi Das et al. in which the duration of post-operative analgesia with paravertebral blocks was 303.97±76.08 min[9]. This is due to longer duration of post op analgesia achieved with paravertebral blocks contrary with conventional techniques.

The mean consumption of tramadol as a rescue analgesic was 88.22mg ±22.32mg**.** The maximum consumption of rescue analgesic was 125 mg and the minimum was50 mg. Sabyasachi Das et al. showed similar results regarding consumption of rescue analgesic with paravertebral blocks (about 105.17mg±20.46 mg in 24 hours)[9].

Back up analgesic in the form of NSAIDS (Diclofenac Sodium) was not needed in any of the patients similar to Sabyasachi Das et al[9].

The meanfrequency of analgesic administration was 3.53± 1.104. The maximum frequency of analgesic administration was 5 and the minimum was 2.

The mean VAS scoringfor first rescue analgesic was 5.58 ± 0.781 that is comparable with a study conducted by Sabyasachi Das et al. who showed mean VAS scoring as 4.24±0.58.The minimum VAS scoring was 4 while the maximum VAS scoring was 7.[9]

The non-availability of a patient-controlled analgesia device (PCA) at the time of study resulted in more fluctuation in the VAS scores & thus a difference of VAS scoring in the early post-operative period can be explained in this way.

High speed of injection promotesthe contralateral spread & leads to more complications like hypotension. Beyaz SG et al reported epidural thoracic spread with paravertebral blocks leading to hypotension[19].

The single injection technique provides more patient comfort by lowering the need for sedation during performance of the PVB while multiple injection does improve the duration and quality of analgesia but at the cost of more possible complications[9,18.] It was also found that multiple injection PVB (T3-T6) resulted in adequate analgesia for breast surgeries but without axillary clearance. However, extended block level of T1 to T6 provided adequate analgesia for breast surgeries with axillary clearance like modified radical mastectomy.

Ultrasonographic & neuro stimulation guided technique increases the safety and the success of technique as compared with the conventional loss of resistance technique[18,20]. But it was not used in our study because it had been proved that it didn't affect the actual outcome.

The failure rate associated with paravertebral blocks is <13% & mostly it is associated with single injection paravertebral blocks due to technical difficulty in localizing paravertebral space [9].

The reduction in the dosage of post op analgesia with excellent analgesic effect of paravertebral blocks in early post-operative period leads to decreased occurrence of post op nausea and vomiting (PONV), early recovery, mobilization and discharge of the patient from hospital[8,9]. Simultaneously, paravertebral blocks can be used as an alternative to the general anesthesia and the breast surgeries can be performed locally at the day case basis. The inconsistent bock and the failure rate of paravertebral blocks leads to hesitation in its use by our consultants but taking care of patient's benefit with its use and also with the help of ultrasonographic and neurostimulation guided techniques, we can get better results with more patient satisfaction[20].

CONCLUSION

The presented study concludes that the unilateral paravertebral blocks are efficacious in terms of prolonged post op analgesia with marked reduction in post op analgesic requirement, thus, reducing morbidities in the patients undergoing unilateral breast cancer surgeries.

Acknowledgment: We would like to acknowledge our teachers Dr.Abul Fazal, Dr. Zakir, & Dr. Mamoon for their valuable guidance, encouragement and constant supervision during the study.

Author's Contribution:

Concept & Design of Study:	Muhammad Saddique Zishan
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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