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ORIGINAL ARTICLE

Outcome of Intercosto-brachial nerve preservation during axillary dissection in female patients with breast cancer

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ABSTRACT

Background: It is assessed that more than 50 % of ladies experience pain after the treatment for breast malignancy by surgery. Neuropathic pain is the most common kind of pain. The accurate component of post mastectomy pain syndrome is obscure. During axillary evacuation Intercostobrachial nerve (ICBN) is usually yielded. Either incomplete or complete cut of the ICBN can cause sensory loss and pain. In this study we planned to improve the personal satisfaction for female patients with breast cancer by decreasing post-operative symptoms, neuralgia and preserving sensation.

Methods:Totally, 26 patients with breast cancer underwent axillary dissection. The patients were randomized between preservation (n=13) and cut (n=13) of ICBN.

Results:Early post-operative pain post-operative admission (D0, D &D2); patients in group A showed significant decrease in neuropathic pain with only 3 patients suffering from neuropathic pain . On the other hand patients in group B 10 patients suffered from neuropathic pain. Chronic post-operative pain evaluated after 3 month decreased in the two groups more in group A (preservation), only one patient still complaining from pain in group A and 7 patients in group B.

Conclusion:Intercostobrachial nerve preservation is a simple and safe procedure without much increase in operative time but greatly improving the quality of life for breast cancer female patients treated with surgery (either modified radical or conservative) including axillary evacuation though preserving sensation in the axillary skin and medial aspect of upper arm and significant decrease in post-operative acute and chronic pain.

Keywords
Breast cancer, Intercostobrachial nerve, Neuropathic pain.

INTRODUCTION

Breast malignancy is the most frequent reason for disease related mortality among females around the world. In Egypt, carcinoma of the breast is the most pervasive malignancy among Egyptian females and comprises 29% of National Cancer Institute cases and majority of patients are premenopausal. More often, breast malignancies need surgical interference. In spite of the adequacy of the surgical management of breast malignancy, many problems have been accounted for after surgery; postoperative pain is one of the most well-known and significant of these problems [1].

The Intercostobrachial nerve (ICBN) is traditionally the lateral cutaneous part of the second thoracic nerve, and punctures the intercostal muscle and serrates anterior muscle along the axillary line,

At that point it turns over the axilla and offer branches to the posterior cutaneous nerve, the front and outer side of the axilla, the inner side of the arm, and the medial antebrachial nerve [2].

Either complete or inadequate division of the ICBN can bring about pain and loss of

sensation. Be that as it may, sensory manifestations can't be particularly credited to protection or cut of the ICBN because of certain patients with archived nerve cut not suffering from side effects while others with intact nerve did [3].

Anatomy of the intercostobrachial nerve is extraordinarily changeable. It could be assembled by saw during medical procedure into the six varieties as following

Type 1 – starts from T2 alone and does not radiate any branches.

Type 2 – starts from T2 alone and partitions into an enormous fundamental trunk and an a lot littler branch.

Type 3 – starts T2 alone and partitions similarly into two branches.

Type 4 – created as two equivalent measured branches from T1 and T2 nerves. No significant branches all through its course through the axilla.

Type5 – starts from two separate T2 radicals to shape a solitary nerve which does not emit branches in the axilla.

Type 6 – starts from T2 alone and separates into a huge primary trunk and at any rate two littler branches [4]. Although the different modalities in beast malignancy surgical procedures have strongly improved, yet various problems still pursue these kinds of surgery. Post mastectomy torment disorder (PMPS) is considered to be a critical difficulty that influences personal satisfaction through the joined effect of substantial handicap and passionate pain [5].

One of the main reasons for PMPS is Intercostobrachial neuralgia. The higher rate of intercostobrachial neuralgia in both modified radical mastectomy and breast conservation means that this kind of pain isn't identified with the sort of mastectomy, yet to the way to deal with the axilla where the intercostobrachial nerve can be harmed [6].

As of late intercostobrachial neuralgia (ICN) is a more reasonable term than PMPS for the neuropathic torment disorder that seems to result from harm to the intercostobrachial nerve. This term can be connected to patients who have neuropathic torment brought about by harm to the intercostobrachial nerve regardless of the kind of surgery that has been performed [7].

Neuropathic agony shows a paradox outcome of the damage to the somatosensory nervous system, as one can expect decrease of sensations originating from the denervated zone [8].

Many studies have showed up on scales to confirm the power of the neuropathic agony and polls to separate among neuropathic and nonneuropathic torment. The more current scales have likewise been abbreviated to be proper for a bustling clinical practice [9].

The most recent scale was settled by the French Neuropathic Pain Group and called the DN4 (Douleur Neuropathique 4 or Neuropathic Pain 4 inquiries in French). The DN4 is a basic poll that likewise attempts to separate among neuropathic and nonneuropathic torment [10].

MATERIALS AND METHODS

This prospective randomized control clinical trial was conducted at surgical oncology unit – Department of surgery – Faculty of Medicine – Zagazig University and Surgical Oncology department, El Minia Oncology Center between June 2018 and June 2019. Approved by the Institutional Review Board (IRB) Faculty of Medicine, Zagazig University and local ethical committee of El Minia Oncology center.

Totally, 26 patients were diagnosed with breast cancer by complete history taking, clinical evaluation and full investigations and the diagnosis was proved histopathologically.

Written informed consent was obtained from all participants and the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University. The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Inclusion criteria:

Female patients presented with stage 1 & 2 breast cancer.

Patients undergo conservative breast surgery or MRM.

Exclusion criteria:

Patients previously exposed to radiotherapy on axilla.

Patients with advanced breast cancer (specially advanced axilla N2).

Patients with D.M (neuritis).

Patient refusal.
Patients missed in follow up.
No patients were excluded from the study.
The 26 patients were included in the study and randomized into two groups: group A comprised patients (n=13) in whom ICBN was preserved and group B comprised patients (n=13) in whom ICBN was cut.
All patients were followed up early postoperatively for sensation of axillary skin and upper part of the arm and neuropathic pain and during 3 months after surgery.

DN4 Questionnaire used to evaluate the pain as following:

The patient is asked to complete this questionnaire by ticking yes or no for each item
Question 1: Does the pain have one or more of the following features?
Burning
Painful cold
Electric shocks
Question 2: Is the pain combined with one of more of the following symptoms in the same area?
Tingling
Pins and needles
Numbness
Itching
EXAMINATION OF THE PATIENT
Question 3: Is the pain found in an area where the physical examination may expose one or more of the following characteristics?
Hypoesthesia to touch
Hypoesthesia to prick
Question 4: In the painful site, can the pain be produced or augmented by:
Brushing
The total score is calculated as the sum of the 10 items and the cut-off value for the diagnosis of neuropathic pain is a total score of 4/10.
This questionnaire was filled by the patient in every visit.

Statistical analysis of the data

Results were expressed as means ± SD. Statistical comparisons were performed by independent sample student t-test for quantitative data and Chi-squared test and Fischers exact test for qualitative data. Differences with p value < 0.05 were considered significant. Statistical Package for Social Science (SPSS 17th version) was used for statistical calculations.

RESULTS

Totally, 26 patients were included in this study
In group A 10 patients underwent MRM and 3 conservative surgery.
In group B 13 patients underwent MRM.
All patients in the two groups underwent axillary node clearance.
Tumor and patient features of our study given in **table 1.**
Age in group A ranges from 35-75 y.
Age in group B ranges from 32-65 y.
Comparison between age in the two groups shown in **table 2**.

Intra-operative:

The mean operative time in group A was 97.3 ± 9.3
The mean operative time in group B was 78.8 ± 10.4
The difference is about 18 min
Comparison between operative time in the two groups shown in **table 3**.

Early post-operative :

Sensation in the axillary skin and upper arm was intact in all patients in group A.
Sensation in the axillary skin and upper arm was lost in all patients in group B as shown in **Table (4).**
Acute post-operative pain during admission (D0, D1 & D2) evaluated by DN4 pain score showed significant decrease in neuropathic pain in group A (preservation) **table 5**.

Follow up

Sensation in the axillary skin and upper arm was intact in all patients in group A.
Sensation in the axillary skin and upper arm was lost in all patients in group B.
Chronic post-operative pain decreased in the two groups but more in group A **(table 5).**
In group A only one patient (7.69 %) still complaining from neuropathic pain.
In group B 7 patients (53.84 %) was complaining from neuropathic pain.
All patients had no local or axillary recurrence during follow up.

Table (1): Demographic and clinical characteristics data

		Group A	Group B
Type of surgery	MRM	10	13
	BCS	3	0
Sensation	Lost	0	13
	Intact	13	0
Clinical stage	T 1	4	0
	T 2	8	11
	T 3	1	2
Pathological type	IDC	11	9
	IDC + ILC	0	3
	DCIS	1	0
	ILC	1	1

Analysis of quantitative data by independent sample student t-test, analysis of qualitative data by Chi-squared test and Fischers exact test. P-value was considered significant at <0.05.*: significant difference between studied groups at <0.05. ***: significant difference between studied groups at <0.001

Table (2): Age between the two groups

	Groups	Mean ± SD	t p value
Age	A (13)	51.4 ± 12.6	0.73 - 0.349
	B (13)	49.8 ± 10.9	

Analysis of quantitative data by independent sample student t-test, analysis of qualitative data by Chi-squared test and Fischers exact test. P-value was considered significant at <0.05.*: significant difference between studied groups at <0.05. ***: significant difference between studied groups at <0.001

Table (3): Comparison between the 2 groups regarding operative time

	Groups	Mean ± SD	t p value
Operative time	A (13)	97.3 ± 9.3	**0.0001***
	B (13)	78.8 ± 10.4	**- 4.768**

Analysis of quantitative data by independent sample student t-test, analysis of qualitative data by Chi-squared test and Fischers exact test. P-value was considered significant at <0.05.*: significant difference between studied groups at <0.05. ***: significant difference between studied groups at <0.001

Table (4): Comparison between sensation in the two groups

		Group		χ^2 P value
		Cut (13)	Preserved (13)	
Sensation	Lost (13)	13 (100%)	0	**26**
	Intact (13)	0	13 (100%)	**0.0001***

Analysis of quantitative data by independent sample student t-test, analysis of qualitative data by Chi-squared test and Fischers exact test. P-value was considered significant at <0.05.*: significant difference between studied groups at <0.05. ***: significant difference between studied groups at <0.001

Table (5): Comparison between the 2 groups regarding acute and chronic post-operative pain with the values are for the mean pain score.

	Groups	Mean ± SD	t p value
Pain D 0	A (13)	3 ± 1.5	**0.0001*** **4.745**
	B (13)	6.2 ± 1.9	
Pain D 1	A (13)	2.4 ± 1.3	**0.0001*** **4.831**
	B (13)	5.4 ± 1.8	
Pain D 2	A (13)	2 ± 0.9	**0.0001*** **5.916**
	B (13)	5.3 ± 1.8	
Pain 3 months	A (13)	0.3 ± 1.1	**0.0001*** **(Mann Whitney test)** **7**
	B (13)	4.7 ± 1.8	

Analysis of quantitative data by independent sample student t-test, analysis of qualitative data by Chi-squared test and Fischers exact test. P-value was considered significant at <0.05.*: significant difference between studied groups at <0.05. ***: significant difference between studied groups at <0.001

DISCUSSION

PMPS was first discussed in the time of 1970s [11]; and it is characterized by the International Association for Study of Pain (IASP) as constant torment in the front side of the chest wall, axilla, and additionally upper portion of the arm beginning after mastectomy or breast conservation surgical management and enduring for over a quarter of a year after the surgical procedure [12].

Late investigations recommended that visualization of PMPS is superior to expected, with a decrease in the pervasiveness over years. Proposed primary hazard components are: young age, cut of the intercostobrachial nerve and axillary evacuation [12].

In our study, all patients in group A with ICBN preservation had intact sensation in the axillary skin and skin of the upper arm post-operative, during admission and through follow up.

All Patients in group B had lost sensation in the axillary skin and skin of the upper arm post-operative, during admission and through follow up.

Regarding post-operative neuropathic pain, early acute pain during post-operative admission (D0, D &D2); patients in group A showed significant decrease in neuropathic pain with only 3 patients (23.07 %) suffering from neuropathic pain . On the other hand patients in group B 10 patients (76.92%) suffered from neuropathic pain.

Chronic post-operative pain evaluated after 3 month decreased in the two groups more in group A (preservation), only one patient (7.69 %) still complaining from pain in group A and 7 patients (53.84 %) in group B.

These results were in accordance with randomized controlled trial in 2003 which presumed that the occurrence of neuropathic torment was factually noteworthy distinctive between the two groups, danger of occurrence of neuropathic agony being 3.46 times higher after division of the nerve (RR proportion 3.46 on 42nd day appraisal). The appraisal of the different sensory manifestations on three progressive assessments suggested that the tactile manifestations diminished with the progression of time and were essentially lower in the intercostobrachial nerve preservation group than the cut group [13].

Another trial in 2017 expressed that (40%) in the ICB nerve preservation group and (72%) in the ICB cut group were suffering from post-mastectomy sensory symptoms after surgery [14].

According to the results in our study and other previous studies we found that ICBN should be preserved as it is a safe maneuver and effective in reducing post-operative pain and preserving sensation in arm and axillary skin.

CONCLUSION

Intercostobrachial nerve preservation is a simple and safe procedure without much increase in operative time but greatly improving the quality of life for breast cancer female patients treated with surgery (either modified radical or conservative) including axillary evacuation though preserving sensation in the axillary skin and medial aspect of upper arm and significant decrease in post-operative acute and chronic pain.

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Conflicts of interest:
There are no conflicts of interest.

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