

Post Mastectomy Upper Limb Lymphoedema: A Tertiary Care Hospital Experience

Mukta Sukhadia¹, Deepak Sethi^{2*}, Anjali Sethi³

¹Assistant Professor, Department of Surgery, RNT Medical College, Udaipur, Rajasthan, India

²Consultant Surgeon & Senior Specialist (Surgery), RNT Medical College, Udaipur, Rajasthan, India

³Associate Professor, Department of Surgery, Ananta Institute of Medical Sciences, Village Kaliwas Tehsil Nathdwara, District Rajsamand, Rajasthan, India

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*Corresponding author

Deepak Sethi

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Abstract: It is known that breast cancer is most common cancer in women of developed countries and is on rise in developing countries. Besides recurrence, one of the major complications is lymphoedema. This study was done on women who presented with lymphoedema after primary surgical treatment of breast cancer. A detail history was recorded with special emphasis on irradiation to axilla, chemotherapy and hormonal therapy. They were specifically asked regarding the mode of onset of lymphoedema. A detailed physical examination was done with special emphasis on diagnosis of lymphoedema. The data were then analyzed based on Exploratory Data Analysis. Out of 1047 patients who underwent surgical intervention, the occurrence of lymphoedema is 6.017% with maximum occurrence in age group 56-65 years (8.3%) with maximum occurrence of lymphoedema observed in 2nd year after primary surgical treatment. Maximum occurrence of lymphoedema was observed in T2 subgroup (8.15%), N1 subgroup (7.33%), and in MRM subgroup (6.67%). Patients who were irradiated after surgery showed higher occurrence of lymphoedema (13.64%). Maximum occurrence of lymphoedema was seen within 1-2-year post mastectomy (47.62%) and in patient with T2, N1 stage. There was consistent increase in occurrence of lymphoedema with increase in BMI & patient with history of radiation post mastectomy.

Keywords: Mastectomy, Lymphoedema, Breast Cancer, Post Mastectomy Lymphoedema.

INTRODUCTION

Breast cancer is the most common cancer in women of developed countries and is on rise in developing countries [1]. Besides recurrence, one of the major complications is lymphoedema.

Lymphoedema can cause severe physical and psychological morbidity in breast cancer survivors and measurable reduction in quality of life in respect to functional, emotional, physical and social wellbeing. Studies have shown that women who develop lymphoedema exhibit higher levels of psychological, social, sexual and functional morbidity than those who do not develop this complication. Keeping this in mind I would like to throw some light on this clinical entity.

It is not a new topic of consideration for practitioners and researchers concerned with skin and wound care. In 1587, the noted Ming Dynasty Physician Gong Tingxian described 'phlegm-damp' accumulation and treatment. More recently King and DiFalco [2] discussed the rise of lymphoedema in an ageing population. They highlighted the array of skin problems associated with lymphoedema and noted that such

conditions lead to cellulitis which further damages the lymphatic system. They state that "... most lymphoedema is the result of surgical treatment of malignant disease. Because malignancy is increasingly curable, the latent potential for developing lymphoedema is growing medical problem."

Lymphoedema following breast cancer treatment is traditionally attributed to lymphatic obstruction with venous obstruction as an infrequent complicating factor. The lymphatic system also known as 'Third Circulation' consists of thin walled, low pressure vessels, nodes that occur along the course of lymphatic vessels. By regulating fluid absorption from the interstitium, the lymphatic system maintains plasma drainage routes by surgery, radiotherapy, and disturbances in Starling forces in the skin and

subcutaneous tissue contributes to post mastectomy lymphoedema.

When lymphoedema remains untreated, protein rich fluid continues to accumulate, leading to an increase of swelling and a hardening or fibrosis of tissue. In this state, the swollen limb becomes a perfect culture medium for bacteria and subsequent recurrent lymphangitis. Moreover, untreated lymphoedema can lead into a decrease or loss of functioning of the limb(s), skin breakdown, chronic infection and, sometimes, irreversible complications. In the most severe cases, untreated lymphoedema can develop into rare form of lymphatic cancer called lymphangiocarcinoma (most often in secondary lymphoedema).

Lymphoedema that results from chronic lymphatic insufficiency is a chronic debilitating disease that is frequently misdiagnosed, treated too late, or not treated at all. There are, however, effective therapies for lymphoedema that can be implemented, particularly after the disorder is properly diagnosed. Primary care physicians could successfully provide follow –up care.

It is not only important to put days into life but also to put life into the days. In awe of treating dreaded cancer we tend to overlook the sequel of the same. The present work is undertaken to analyze post-surgical morbidity in breast cancer patients with our thrust on lymphoedema, its occurrence, morbidity and its prevention.

Aims and Objectives

This descriptive study was aimed at study of Occurrence of lymphoedema after primary surgical treatment of breast cancer and focus on the risk factors of lymphedema.

MATERIALS AND METHODS

This Descriptive study was done on women who presented with lymphoedema after primary surgical treatment of breast cancer. These patients were registered in breast clinic, attended the surgical outdoor and admitted in surgical wards at Maharana Bhupal Government Hospital, Udaipur attached to Rabindra Nath Tagore Medical college, Udaipur (Rajasthan).

A detailed history was recorded with special points including marital status, obstetrical and menstrual history and malignancy in first degree relatives, duration of disease, treatment modalities including irradiation to axilla, chemotherapy and hormonal therapy. They were specifically asked regarding the mode of onset of lymphoedema, their routine lifestyle, any history of trauma in affected arm, about the complains related to arm like pain, numbness, swelling, shoulder mobility and their psychological impact on them.

A detailed physical examination was done with special emphasis on both arms and diagnosis of lymphoedema. Difference of circumferential measurements was taken at 4 points: the metacarpal-phalangeal joint, the wrists, and 10 centimeters distal to the lateral epicondyles and 15 centimeters proximal to lateral epicondyles.

Height was measured in meters against a calibrated wall in standing erect posture with bare feet. Weight was measured in kilograms. Body mass index was calculated from these measurements using formula:

$$\text{BMI} = (\text{weight in Kg} / \text{height in meters}).$$

The data were then analyzed based on Exploratory Data Analysis.

RESULTS

A total of 1250 patients of carcinoma breast had been registered from January 1992 to January 2011. Out of them 1047 patients underwent surgical intervention. So, the occurrence of lymphoedema is 6.017%. Maximum occurrence of lymphoedema was seen in age group 56-65 year. Mean age of the patients having lymphoedema was 59.73 ± 48.63 . Maximum occurrence of lymphoedema observed in 2nd year (47.62%) followed by < 1 year (17.46%) after primary surgical treatment. (Table 1).

There wasn't any significant variation of lymphoedema in relation to size of primary tumor. Maximum occurrence was seen in T₂ subgroup T₂ (Tumor 2.5 centimeters). Baring Tx subgroup (Tumour couldn't be assessed) (Table 2).

Maximum occurrence was seen in Nodal Stage N₁. Baring Nx subgroup 1 (Nodal status couldn't be assessed) (Table 3).

Occurrence was high when radical surgery was performed as compared to breast conserving surgery. Majority of patients with lymphoedema underwent modified radical mastectomy. (Table 4)

On analyzing records of significant difference was observed among patients in whom axilla has been irradiated as compared to those who didn't receive radiotherapy. (Table 5).

Higher Occurrence of lymphoedema was observed in patients who have body mass index more than 25. This observation was consistent as we approach to higher BMI (Table 6).

In most of the patients (66.67%) 16-25 lymph nodes were retrieved during axillary dissection (Table 7).

Table-1: Distribution of all post-surgical patients and patients with lymphoedema in different age group

Age in Years	Total Post-Surgical Patients	%	Patients with Lymphoedema	Lymphoedema Occurrence
≤ 35	159	15.2%	0	0%
36-45	316	30.18%	18	5.70%
46-55	297	28.41%	23	7.74%
56-65	191	18.28%	16	8.3%
> 65	84	7.93%	6	7.14%
Total	1047	100	63	6.017%

Table No 2: Distribution of all post-surgical patients and patient with lymphoedema according to Tumor Size

Tumor Size	Total Post-Surgical Patients	%	Patients with Lymphoedema	Lymphoedema Occurrence
T _{1S}	81	7.7%	0	0%
T ₁	46	4.4%	2	4.3%
T ₂	417	39.87%	34	8.15%
T ₃	401	38.32%	26	6.48%
T ₄	89	8.59%	0	0%
T _X	13	1.1%	1	7.69%
Total	1047	100%	63	6.017%

Table-3: Distribution of all post-surgical patients and patients with lymphoedema according to Nodal Status

Nodal Size	Total Post-Surgical Patients	%	Patients with Lymphoedema	Lymphoedema Occurrence
N ₀	489	46.7%	26	5.31%
N ₁	472	45.15%	32	6.78%
N ₂	63	7.05%	4	6.35%
N ₃	11	1.1%	0	0
N _X	13	1.1%	1	7.69%
Total	1047	100%	63	6.017%

Table-4: Distribution of all post-surgical patients and patients with lymphoedema according to type of surgery performed

Type of Surgery	Total Post-Surgical Patients	Patients with Lymphoedema	Lymphoedema Occurrence
MRM	854	57	6.67
BCT + Simple mastectomy with ALND + Salvage mastectomy	193	6	3.11
Total	1047	63	6.017%

Table-5: Distribution of all post-surgical patients and patients with lymphoedema according to Radiotherapy

Radiotherapy	Total Post-Surgical Patients	Patients with Lymphoedema	Lymphoedema Occurrence
Yes	242	33	13.64%
No	805	30	3.72%
Total	1047	63	6.017%

Table-6: Distribution of all postsurgical patients and patients with lymphoedema according to Body Mass Index

BMI	Total Post-Surgical Patients	Patients with Lymphoedema	Lymphoedema Occurrence
<25	501	23	4.59%
25-30	483	31	6.42%
>30	63	9	17.46%
Total	1047	63	6.017%

Table-7: Distribution of Lymphoedema patients according to number of gross lymph node retrieval

No. of Lymph Node Retrieval	Patients Lymph Node	%
<15	19	30.16%
16-25	42	66.67%
>25	1	1.59%
Not Assessed	1	1.59%
Total	63	100%

DISCUSSION

Lymphoedema is a vestige which surprise women 'cured' of their cancer. The process from malignant disease to recovery of health by radio-chemo-surgical treatment is interrupted by onset of lymphatic disease.

Epidemiology

Keil and Radmacker reported the incidence of 39% in a prospective study [3]. Petrek and Heelan reported on the incidence of lymphoedema after breast cancer treatment in a review of 7 retrospective studies published since 1990, the incidence of lymphoedema ranged from 6% to 30% [4]. In present study, out of 1250 patients registered in breast clinic 1047 patients underwent surgical interventions and 63 patients were found to have lymphoedema. So the occurrence of lymphoedema was 6.017%.

Pezner et al (California, US) have reported that the incidence of lymphoedema was 25% at age greater than 60 years and 7% at age under 60 years [5] whereas Kiel and Radmacker reported an incidence of 56% for age over 55 years and 23% for age under 55 years [3]. Armur J Fu (US) conducted a study on 102 patients treated and followed. He reported that lymphoedema occurrence was relatively higher i.e. 41.2% in patients younger than 60 years than those older than 60 years i.e. 30% [1]. In present study higher occurrence was observed in age group 56-65 years (8.3%) followed by in age group in 46-55 years (7.74%) as compared to overall occurrence (6.017%), which is statistically insignificant.

Dennis (US) reported only 9 patients but observed a large variability in the time between surgery and onset of lymphoedema i.e. between 2 months and 3 years [6]. In present series maximum number of patients i.e. 30 patients (47.62%) developed lymphoedema between 1 to 2 years after surgery followed by 15 patients (23.81%) who developed lymphoedema between 2-3 years.

Risk factors

Kasse et al from univariate analysis elaborated risk factors for lymphoedema of arm after mastectomy for breast cancer which include big size of tumor ($p=0.005$), clinically involved axillary lymph nodes ($p=0.001$) [7]. Kiel and Rademacker reported that the presence of axillary metastasis increased the risk of development of lymphoedema [3]. A Turkish study

conducted by Cihangir Ozaslan et al. reported that Axillary radiotherapy and body mass index were found to increase the incidence of the lymphoedema. Women who had the combination of full axillary dissection and axillary radiotherapy carry a significant risk of lymphoedema [8]. Of 332 patients with Sentinel Lymph Node Biopsy (SLNB), 134 had SLN positivity, and 116 of them further underwent completion axillary dissection. Patients with T2 tumors, or tumors with lymphovascular invasion, or invasive ductal cancer were more likely to have a positive Sentinel Lymph Node [9]. With the knowledge of axillary dissection's complicate nature, efforts are concentrated on avoiding it when applicable [10].

In present study maximum occurrence of lymphoedema was observed in subgroup T2 (tumor size 2-5) followed by sub group T3 (tumor size >5cm) which were 8.15% and 6.48% respectively but not statistically significant. Among all post-surgical patients, nodal metastases were seen in 52.20% of patients whereas maximum occurrence of lymphoedema was seen in N1 subgroup (6.78%) followed by N2 subgroup (6.35%). Thus, higher occurrence of lymphoedema was seen in N1 subgroup, but it was not of statistical significance. Least occurrence was seen in N0 subgroup (5.77%).

Nikkanen T.A. et al. (UK) studied 76 patients of cancer breast for arm swelling, mobility of shoulder and muscle strength. Marked arm swelling was found on the operated side in 31% patients operated by radical mastectomy and in 18% patients who had undergone total mastectomy [11]. Kuno et al. (US) observed variation in incidence of lymphoedema with type of surgery performed, the more the radical the surgery is, the higher are the incidence. He reported the incidence of moderate and severe edema is 2.5% for 637 patients with modified radical mastectomy, 7.7% for 440 patients with standard radical mastectomy and 10.5% for 38 patients with extended radical mastectomy [12]. As these radical surgeries are not being performed these days the comparison was drawn between modified radical mastectomy and breast conserving treatment. A higher occurrence was observed in MRM group (6.67%) as compared to breast conserving surgery sub group (3.11%). In 63 patients who suffered lymphoedema in present study 57 were operated for MRM and 6 patients underwent BCT.

In univariate analysis by Stephane Vignes, et al. factors associated with lymphoedema volume are

duration of lymphoedema, Body Mass Index, mastectomy, and past history of cellulitis [13], though obesity is not directly related to breast cancer [14]. Helyer L K *et al.* (San Francisco) performed a study on "obesity a risk factor developing post-operative lymphoedema". The study of BMI by multivariate analysis revealed that patients with BMI >30 had an odd ratio of 2.93 with those of BMI <25 of having lymphedema [15]. Edward TL reported that body weight or BMI are important factor that increase the risk of lymphedema [16]. In present study there was consistent trend of increase in occurrence of lymphoedema with increase in BMI, in subgroups of <25, 25-30, >30.

Edwards found that the number of lymph nodes removed was not correlated with lymphoedema [16]. Roses *et al.* stated that the number of removed lymph nodes was not a risk factor in multivariate analysis, but in univariate analysis it increased the risk [17]. In present series patients were assigned into three categories with respect to number of lymph nodes removed i.e. <15, 15-25, and >25. Out of 63 patients 42 patients (66.07%) belong to the group where the number of removed lymph nodes were between 16-25, 19 patients (30.16%) rest in group where number of removed lymph nodes were <15.

Nikanen's study supports an increase in incidence of edema in patients irradiated post operatively [11]. A study conducted by Schuemann (San Diego, US) showed the highest incidence of edema was among patients who had received radiotherapy in high doses with few fractions to the axilla (60%) [18]. Radiologyinfo.org reviewed that radiation therapy given to the axillary lymph nodes can increase the risk of patients developing arm swelling ("lymphoedema") following axillary (armpit) dissection [19].

In present study occurrence of lymphoedema was higher in the patients who were irradiated (13.64%) as compared to those who didn't receive radiotherapy (3.72%). Out of 63 patients who developed lymphoedema, 33 patients were given postoperative radiotherapy.

CONCLUSION

- The occurrence of lymphoedema in patients registered in breast clinic was found to be 6.017%.
- Maximum occurrence of lymphoedema was seen within 1-2 years i.e. 47.62% after primary surgical treatment followed by 23.80% seen between 2-3 years. Then there was decrease in occurrence of lymphoedema with increase in duration after surgery.
- Patients, who received radiotherapy where axillary dissection was performed, had increased risk of lymphoedema (13.64%).

- 53.96% of patients having lymphoedema were having tumor size ranging from 2-5 cm with overall incidence of 8.15%.
- 57.14% of patients having lymphoedema were node positive, with maximum incidence of lymphoedema.
- There was consistent increase in occurrence of lymphoedema with increase in BMI. The occurrence of lymphoedema was 4.59%, 6.42% and 17.46% in BMI categories < 25, 25-30 and > 30 respectively.

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