FREQUENCY OF SENTINEL NODE IDENTIFICATION BY SCINTIGRAPHY IN BREAST CANCER PATIENTS WITH CLINICALLY NON-PALPABLE AXILLARY LYMPH NODES

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ABSTRACT

OBJECTIVE: To determine the frequency of sentinel lymph node identification using scintigraphy in breast cancer patients with clinically non-palpable axillary lymph nodes. **STUDY DESIGN:** This was a cross-sectional descriptive study. **PLACE AND DURATION OF STUDY:** The study was conducted in the Department of Radiology, Aga Khan University Hospital Karachi, Pakistan from 25-11-2011 to 28-12-2012 for a total duration of 13 months. **PATIENTS & METHODS:** Hundred and forty nine (149) newly diagnosed patients with breast cancer having clinically non-palpable axillary lymph nodes, referred for sentinel node scintigraphy were included in the study. These patients underwent sentinel lymph node mapping one day before surgery. **RESULTS:** Sentinel lymph node was identified in 139 patients (93.3%) and could not be identified in 10 patients (6.7%). All female patients in this study had a mean age of 54.2 years (range 23 to 80 years). Family history was positive for breast cancer in 67 (45%) patients and negative in 82(55%) patients. Duration of disease ranged from 04 to 30 days. No significant effect of age, family history or disease duration was seen on the identification of sentinel lymph node. **CONCLUSION:** Substantially good identification of the sentinel lymph nodes was seen in the breast cancer patients with clinically non-palpable axillary lymph nodes.No significant effect of age, family history or disease duration was seen on sentinel lymph node identification.
Key words: Breast cancer, scintigraphy, axillary lymph nodes, sentinel node biopsy.

Introduction

Primary breast cancer is the commonest malignancy of women worldwide[1] and its incidence is rising every year.It is responsible for 21% of new cancer cases worldwide.[2] Pakistan has a higher burden of breast cancer as compared to other Asian countries.[3,4] Approximately, one in every nine woman in Pakistan suffers from breast cancer, the highest incidence rates in Asia.[3] Breast cancer has been reported to be the most common cancer (34.6%) among females in Pakistan by the Karachi cancer registry[3] with an estimated incidence rate in Pakistani women reported as 50/100,000.[5] This incidence rate poses a major health care issue with rising burden of the disease every passing year. Early detection of breast cancer can decrease the disease burden by decreasing the morbidity and mortality.

Axillary lymph nodes are the commonest site of metastasis in breast carcinoma.[6] Axillary node status is one of the most important prognostic indicators in breast cancer. The frequency of axillary nodal metastasis in patients of breast cancer is reported to be 35- 40%.[7] Sentinel node is the first node that is draining the primary breast tumor, its correct iden-tification and biopsy will accurately predict regional nodal status.[8]

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Sentinel lymph node scintigraphy is a modern technique that helps in the early identification of disease spread into the axillary node, for the preoperative assessment of disease, staging of the disease and planning of neo adjuvant chemotherapy.[9] The concept of sentinel node was initially introduced by Cabanas in 1977 who described the orderly progression of tumor cells within the lymphatic system.[8] This concept has been largely used for the stratification of the patient for appropriate surgical therapy.[10]

The aim of sentinel lymph node (SLN) scintigraphy is to correctly identify the sentinel lymph node, if sentinel node is correctly identified then early diagnosis and detection of axillary lymph node status can be done and it saves surgeon's time for doing axillary nodal dissection and also prevents the patients from complications of axillary nodal dissection. It has been seen that patients undergoing SLN biopsy have a significantly lower rate of arm edema, pain and improved arm mobility in comparison to patients undergoing ALND.[11] In underdeveloped countries ALND also comes with additional financial and morbidity burden on the patient and the treating institute which can be avoided by using SLN biopsy.

A pilot study was conducted in our institute[12] which showed excellent identification rate of 96.9%. This current study validates the result of our pilot study with a larger sample size and evaluation of new variables. This study will help us to estimate the magnitude of sentinel node mapping in breast cancer patients and help the other institutions for utilizing scintigraphy for preoperative evaluation of breast cancer patients with clinically non-palpable axillary nodes.

Methods

The study was conducted in the Department of Radiology, Aga KhanUniversity Hospital, Karachi, Pakistan from 25-11-2011 to 28-12-2012 for a total duration of 13 months. The sample size was calculated on WHO software version of sample size determination in health studies; the sample size thus calculated was 149 patients. It was a cross sectional descriptive study with non probability, purposive sampling.

The patients included in the study were all female more than 18 years old newly diagnosed (disease duration less than 1 month) with evidence of breast cancer on biopsy (breast cancer cells seen on biopsy specimen as having hyper chromatic nuclei and abnormal bizarre shape)[13] and having clinically non-palpable axillary lymph nodes.

Patients who were operated for breast cancer or had undergone axillary lymph node dissection were excluded from the study. Pregnant and lactating females or patients whose histopathology reports were not available or who did not undergo surgery were not included in the study.

Patients meeting inclusion criteria and referred from consulting clinics to the Radiology department of Aga Khan University Hospital for scintigraphy were included in the study. Informed consent and brief history regarding breast cancer, family history and duration since diagnosis was obtained from all the patients prior to performing sentinel node lympho-scintigraphy.

Imaging was performed with 37MBq (Mega Becquerel) of Technetium-99m labeled nannocolloid (Nannocol, Amersham GE Healthcare) injected subcutaneously as 4 aliquot of 0.25 cc at 0, 3, 6 and 12 o'clock position around the areola of involved breast.The patients were scanned under a dual head digital gamma camera (Ecam, Siemens Germany) at 15 mins, 1 hour and 24 hours depending on whether the sentinel node is seen or not seen on the gamma camera. The sentinel node appeared as a black spot on grey and white background and was marked on the skin with the help of hand held gamma probe. The marked node was operated on the next day under guidance of gamma probe. The study was interpreted by one experienced nuclear physician with at least five years clinical experience. The nuclear physician documented the observations separately on data collection Performa. Consequently, forms were edited by principle investigator to finalize them for data entry.

The statistical analysis was done using statistical package for social scientists (SPSS v.19). Descriptive analysis was conducted i.e. frequencies and percentages for categorical variables like sentinel node identification. Mean and standard deviation for con-

tinuous variables like age and duration of disease. Stratification was done with regards to age, family history of the patient, duration of the disease andthe effect of these on the outcome was seen through Chi-Square test. P- value of < 0.05 was taken as significant.

Results

A total of 149 patients underwent sentinel lymph node scintigraphy during the study period. Sentinel lymph nodes were identified in 139 (93.3%) patients whereas in 10 (6.7%) patients sentinel lymph node was not identified on scintigraphy even after 24 hours after radiotracer injection.

All female patients in this study had a mean age of 54.2 years ± 12.5 SD with an age range of 23 to 80 years. Duration of the disease in these patients ranged from 4 to 30 days with mean duration of 26 days ± 7.3 SD. The patients were stratified according to age, duration of disease and family history. No significant effect of these variables was found on the identification of the SLN as elaborated in (Tab. 1 to 3).

		SLN		Total
		Seen	Not Seen	
Duration of	1-7	17	1	18
disease ranges	8-14	51	6	57
	15-21	37	2	39
	22-30	34	1	35
Total		139	10	149

Pearson chi-square P-value 0.503 (not significant)
Table 1: Duration of disease in ranges

		SLN		Total
		Seen	Not Seen	
Age	20-29	3	0	3
ranges	30-39	14	0	14
	40-49	36	0	36
	50-59	34	5	39
	60-69	36	3	39
	70-79	15	2	17
	80-89	1	0	1
Total		139	10	149

Pearson chi-square P-value 0.324 (not significant)
Table 2: Stratification in age ranges

Family History	SLN		Total
	Seen	Not Seen	
Positive	64	3	67
Negative	75	7	82
Total	139	10	149

Pearson chi-square P-value 0.295 (not significant)
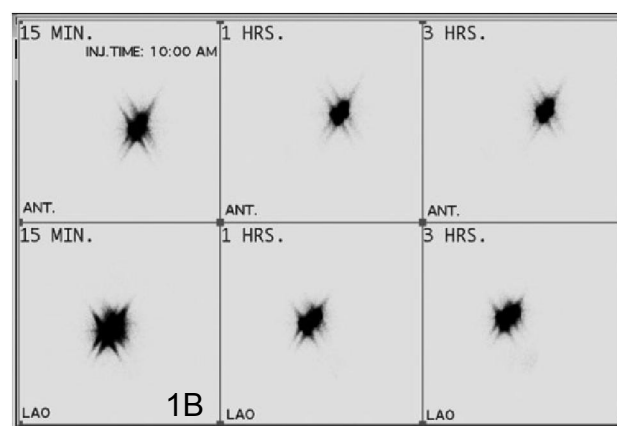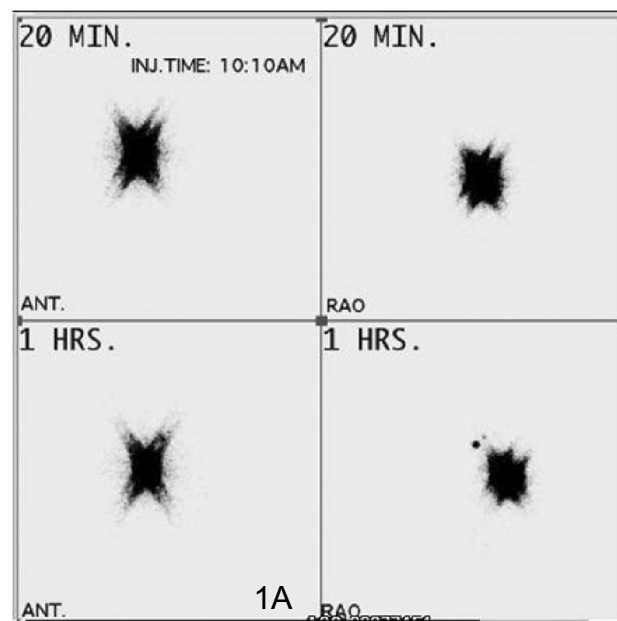**Table 3:** Family history

Figure 1(A): Sentinel lymph node scintigraphy image showing uptake of radiotracer in the left sentinel node at 01 hour.
(B): Imaging in another patient with breast cancer showing no uptake of tracer at 03 hours.

Discussion

Our study has shown a good SLN identification rate of 93.3 % and this is higher than what is recommended by American Society of Clinical Oncology

(ASCO) guidelines to abandon axillary dissection.[14] Our success rate is lower than Veronesi et-al study[6] that had an identification rate of 97.5%. On the other hand our identification rate is better than results of study conducted by Giuliano et-al[1] with a reported identification rate of 65.5%. The reasons for this disparity between these studies and our results are the use of different radiopharmaceutical (colloid particle size), injection technique and imaging time.[14] We have used Technetium-99m labeled Sulfur Nano colloid in our study, which results in good identification rate of sentinel lymph nodes. In our study SLN was not identified in 10 patients (6.7%) and plausible explanation could be tumor size, lymphatic blockage due to tumor cells or inadequate injection technique.[15]

Our study did not show any significant correlation between patient's age at the time of presentation and family history for breast cancer. To the best of our literature search our study is the first one which has explored such possible correlation. However, we still feel that these results must be scrutinized by well-designed studies with good sample size in future.

It is a well-established fact that increased duration of disease can result in blockage of the breast lymphatics via the cancer cells and result in poor visualization or non-visualization of SLN.[15]

Based on this fact we have attempted to find out the any such significant correlation but failed to find so. The primary reason for lack of such significant association could be shorter duration of disease in our studies cohort.

A limitation of our study is small sample size; in the future a study with a larger sample can further validate our results. Another limitation is that we have not calculated the false negative rate. We aim to address these limitations in the future.

Conclusion

Our study showed a significantly higher identification rate of sentinel lymph node in breast cancer patients with clinically non palpable axillary lymph nodes. Precise identification of sentinel node ensured unnecessary axillary lymph nodal dissection. Age, family history or disease duration were not found to have

any significant correlation with identification rate of sentinel lymph node.

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