Sentinel Lymph Node Mapping with Gamma Probe in Carcinoma of Breast: Initial Experience in Evercare Hospital Dhaka

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ABSTRACT

Background: The sentinel lymph node (SLN) is the first draining node from a cancer-bearing area and therefore can manifest metastasis. In breast cancer SLN has been shown to predict the axillary nodal stage. Axillary dissection provides information determining prognosis and need for adjuvant therapy but often carries certain morbidities. Our aim was to determine the feasibility of detecting the SLN and whether the SLN accurately predicts the axillary status.

Materials and Methods: Twelve patients having mean age of 40.5 ± 10.9 years, ranging from 28 to 56 years with stage I and II breast cancer and non-palpable axillary nodes from November 2016 to December 2018 were included in this study. The sentinel node was detected with Tc-99m-labelled nano colloid (radiotracer). Dual Head SPECT Gamma Camera and Gamma Probe was used in the same sitting for identification and surface marking of the SLN. Surgical resection of SLN was done followed by frozen section biopsy.

Results: The tumor size ranged from <2cm to ≤5cm), SLNs were identified in 11 out of 12 cases, one SLN in 9 patients and two SLNs in remaining two patients during SLN mapping.

Conclusion: This was an initial experience in a single hospital, where SLN mapping and biopsy proved feasible and successful. By this method, patients who are negative on frozen section biopsy would be spared from axillary lymph node dissection. However, further practice is required to reach a firm conclusion and long term follow up is also essential.

***Key words*: Sentinel lymph node, Gamma probe, Breast Cancer.**

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INTRODUCTION

Breast cancer is a major health problem and is among the top three most common malignancies globally (1). It ranks fifth among the most common causes of cancer-related mortality worldwide, while it is the most frequent cause of cancer death in less developed countries (2). At present, almost 90% of patients diagnosed with breast cancer survive up to 5 years, with survival being strongly associated with the stage at time of diagnosis (3).

The axillary lymph nodal status is one of the most important prognostic factor in women with early stage breast cancer. Axillary dissection provides information, determining prognosis and need for adjuvant therapy, but often carries certain morbidities (4,5). Sentinel lymph nodes (SLN) are the regional nodes that directly drain lymph from the primary tumour. Thus, SLNs are the first nodes to receive lymph-borne metastatic cells (6). Since two decades, SLN mapping and biopsy have become routine techniques in breast cancer management, contributing to the development of less-invasive surgical procedures (7-14). This procedure has replaced routine staging axillary nodal dissection in patients with early-stage biopsy-proven breast carcinoma without cytologically or histologically proven axillary lymph node metastases (15,16). Our aim was to determine the feasibility of detecting the SLN and whether the SLN accurately predicts the axillary status.

PATIENTS AND METHODS

Twelve patients with mean age 40.5 ± 10.9 years, ranging from 28 to 56 years were selected, who had early stages (I and II) of breast cancer with non-palpable axillary lymph

nodes. The exclusion criteria were pregnancy, having history of previous axillary surgery and having advanced cancer with enlarged axillary nodes. The radiopharmaceutical used was nanocolloid, Nanoscan produced by Radiopharmacy Laboratory Ltd, Budaros, Hungary. Siemens E.CAM Dual Headed SPECT was used for SLN mapping and Capintec Gamma Probe (Europrobe) for identification and surface marking of the SLN.

In this study, 0.5 - 0.8mCi (20-30MBq) of nanocolloid was taken in a 1-ml syringe and was injected intradermally (Figure 1) in areola of the affected breast in approximately equal four divided doses in four quadrants of breast (Figure 2).

Figure 1: Intradermal injection with bleb formation in site I

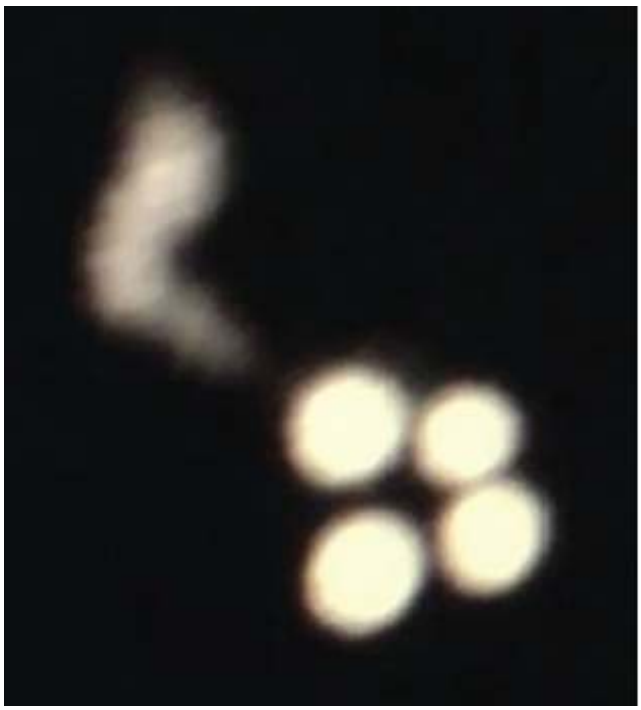

Figure 2: Immediately after injections at four sites around the nipple showed early lymphatic drainage towards axilla.

Dynamic sequential 10 sec images were obtained in anterior and lateral projections for 5 minutes immediately after injections. Then images were taken every 5 minutes for 1 minute till 45 minutes (Figure 3).

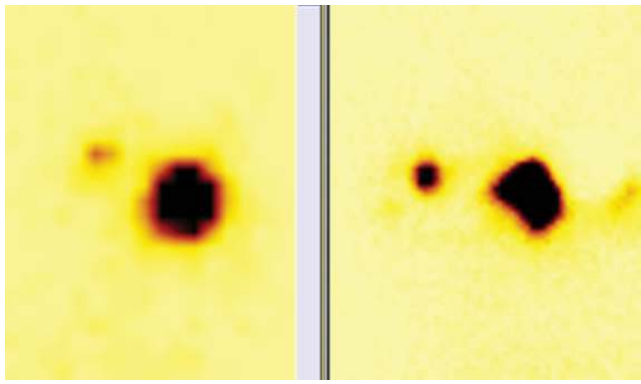

Figure 3: Injection sites with gradual prominence of the sentinel lymph node activity

If SLN was not visualized, delayed imaging was done after 2 hours. Radioactive marker was used to correspond with the SLN activity and location was marked on the skin. Gamma probe was used to reconfirm the SLN (Figure 4). Surgical resection of SLN was done (Figure 5, 6) followed by frozen section biopsy.

Figure 4: Confirmation of SLN with Gamma Probe before surface marking; high count rate is seen in the machine display.

Figure 5: Surgical exploration and extraction of SLN from axilla

Figure 6: Confirmation of SLN in excised sample by Gamma Probe

RESULTS

Among the 12 patients (the tumor size ranged from <2cm to ≤5cm), tumour lump was palpable in all 12 patients (6 on right & 6 on left breasts). SLNs were successfully identified in 11 out of 12 cases, one SLN in 9 patients and two SLNs in remaining two patients during SLN mapping (Table 1). Intra-operative Gamma probe findings were well correlated.

Table 1 : Demographic data, investigative findings & management

Pt. No.	Age (Yrs)	Stage	Preoperative Findings (Lump)	SLN Detected (number)	Intra-operative Surgical Correlation	Frozen Section Biopsy for metastasis of SLN	Management
1	56	I	Lt. breast	0	x	x	x
2	30	II	Rt. breast	1	Correlates	-ve	Lumpectomy
3	46	II	Rt. breast	2	Correlates	-ve	Lumpectomy
4	42	I	Rt. breast	1	Correlates	-ve	Lumpectomy
5	50	II	Lt. breast	1	Correlates	+ve	Mastectomy
6	30	I	Rt. breast	1	Correlates	-ve	Lumpectomy
7	52	II	Rt. breast	2	Correlates	-ve	Lumpectomy
8	54	II	Lt. breast	1	Correlates	+ve	Mastectomy
9	40	I	Rt. breast	1	Correlates	-ve	Lumpectomy
10	30	II	Lt. breast	1	Correlates	-ve	Lumpectomy
11	28	I	Lt. breast	1	Correlates	-ve	Lumpectomy
12	28	II	Rt. breast	1	Correlates	-ve	Lumpectomy

Frozen section biopsy to confirm metastases was positive in two cases. These two cases had mastectomy whereas the rest had only lumpectomy.

DISCUSSION

The presence of tumor cells in regional nodes is merely a sign of regional progression and an indicator of systemic dissemination of disease (17). Accurate lymph node staging is essential for both prognosis (of early-stage disease)

and treatment (for regional control of disease) in patients with breast cancer. Lymphoscintigraphy (LS) method helps the surgeon to easily identify and the biopsy of a SLN. No imaging modality is so accurate to detect lymph node metastases when a primary breast cancer is at an early stage, but SLN biopsy is a very reliable method for screening axillary nodes and for identifying metastatic and micrometastatic disease in regional lymphatic nodes (14, 18, 19).

The role of Axillary Lymph Node Dissection (ALND) in patients with N_0 disease has been scrutinized as most of them (70%–80%) will have pathologically free nodes (pN_0) (20). Thus, subjecting these patients to ALND exposes most of them to unnecessary morbid outcomes, such as arm lymphedema, axillary numbness, and shoulder abduction deficits (7,21)

SLN biopsy is a safe and reliable operation that gives an accurate assessment of nodal metastasis for the early breast cancer patients (22). Several ^{99m}-Tc based agents have been used for radioguided SLN biopsy in breast cancer including colloid particles e.g. (Antimony trisulphide commenly used in Australia and Canada; Nanocolloid Albumin in Europe; Sulphur Colloid in USA) (23). SLNs are generally visualized within 1–2 h, and the patient should be in the operation theater (O.T.) within 2–30 h of the injection of the colloid, depending on the facility's schedule (6, 15, 24). If surgery is scheduled for early morning, injection and imaging may be safely performed in the previous afternoon prior to the day of surgery (25).

Among the 12 patients this study, SLN was successfully identified in 11 patients; one SLN in 9 patients and two SLNs in remaining two patients during SLN mapping. All SLNs were identified within 45 minutes. No SLN was observed in the contralateral side. After SLN mapping these patients were sent to OT Gamma probe was used during surgery to identify the SLNs and surgical resection of SLN was done followed by frozen section biopsy, which showed positive metastases in two cases. Out of these 11 (91.7%) patients, two (16.7%) with metastases underwent mastectomy with axillary clearance; whereas only lumpectomy was done in the remaining 9 (75%) patients who had no metastasis.

Sentinel Lymph Node Biopsy (SLNB) is recommended for early staging in patients with T1-2 invasive breast cancer and clinically negative axillary nodes irrespective of surgical therapy on the breast (26). Inflammatory breast disease and patients with clinically positive axillary nodes are the two absolute contraindications for a SLNB (27). These patients would require axillary dissection. SLN biopsy has significantly lower morbidity than axillary lymphadenectomy (28), and it has nodal relapse rates at 5 years similar to those of axillary lymphadenectomy (29).

CONCLUSION

SLN mapping has been performed and tested in different countries since long, but there has not been any significant activity reported in Bangladesh. Although it was the initial experience in a single hospital, SLN mapping and biopsy proved feasible and successful. By this method, patients who are negative on frozen section biopsy would be spared from axillary node dissection. However, further work on this is required to reach a firm conclusion and long term follow up is also essential.

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