Research Paper

A Study of Sentinel Lymph Node Biopsy with Methylene Blue Dye in Carcinoma Breast in a Tertiary Care Centre of Northeast, India

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ABSTRACT
Introduction: *It is well established that axillary lymph node status is very important prognostic factor in breast carcinoma patients. axillary lymph node dissection (ALND) results in significant morbidity. Hence, the technique of Sentinel Lymph Node Biopsy (SLNB) was developed to reduce the morbidity associated with axillary surgery while still providing accurate staging information. We have done this study to find out whether the sentinel lymph node initially receives malignant cells from a breast carcinoma and whether a clear sentinel node reliably forecasts a disease-free axilla.* ***Methodology:*** *40 female patients with primary diagnosis of early breast cancer, clinical stage T1/T2N0M0 admitted in State Cancer Institute,GMC from June 2022 to October 2023 were selected for this study.* ***Results:*** *Sentinel Lymph Node was identified in 33 cases out of a total of 40 cases in which the procedure was performed with an identification rate of 83%. the overall sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of SLNB in predicting axillary node status was 86.67%, 94.44%, 92.86% and 89.47% respectively. A false negative rate of 13.33% was observed with an overall accuracy of 90.91 %.*
CONCLUSION*: Our results show that this simplified technique of SLNB by using subareolar methylene blue has sufficiently high identification rate (83%). Our study describe our initial experience with the SLNB technique, hence a false negative rate of 13.33% and negative predictive value of 89.47 %, both of which are modifiable variables.*

I. INTRODUCTION

Breast cancer is the commonest malignancy among women globally. It has now surpassed lung cancer as the leading cause of global cancer incidence in 2020, with an estimated 2.3 million new cases, representing 11.7% of all cancer cases[1]. As per the Globocan data 2020, in India, BC accounted for 13.5% of all cancer cases and has become the most common cancer pushing cdervical cancer to the econd spot. It is reported that 1 in 22 women in India is likely to suffer from breast cancer during their lifetime. Hence, breast carcinoma has a major impact on human society and this problem has been increasing exponentially.

On the otherhand, survival rates in women with breast cancer have steadily improved over the last several decades might be the result of increase in public awareness and screening programs that has led to its early detection and cure.There has also been a sea change in the management of breast cancer and it rests on a

multidisciplinary team effort involving basic researchers, radiologists, pathologists, surgeons, radiation oncologists, medical oncologists and psychologists.

For most of the twentieth century Halsted radical mastectomy was the "established and standardized operation for cancer of the breast in all stages, early or late". New information about tumor biology and its behavior suggested that less radical surgery might be just as effective as the more extensive one. Eventually, with the use of adjuvant therapy like radiation and systemic therapy, the extent of surgical resection in the breast and axilla has been reduced further and led to an era of breast conservation. It is well established that axillary lymph node status is very important prognostic factor in breast carcinoma patients. Furthermore, axillary nodal metastasis is an important parameter that indicates the need for adjuvant regional and systemic treatment.

However, axillary lymph node dissection (ALND) results in significant morbidity i.e acute pain,parasthesia, prolonged need for a drain at the surgical site, lymphadema, numbness, chronic pain and reduced range of motion at the shoulder joint. Hence, the technique of Sentinel Lymph Node Biopsy (SLNB) was developed to reduce the morbidity associated with axillary surgery while still providing accurate staging information.

The 'sentinel node' is the first lymph node to metastasise from a primary tumour. Introduction of the technique has also resulted in more accurate staging, better regional disease control and improved survival of patients. Hence, ALND has been replaced by SLNB in women with early clinically node-negative breast cancer, providing adequate axillary nodal staging information with minimal morbidity, and has become the standard of care in the management of breast cancer.

II.   AIMS AND OBJECTIVE:

To findout:
1. Specificity and sensitivity of sentinel lymph node biopsy with methylene blue as a single modality in early breast Ca.

2. Whether the sentinel lymph node initially receives malignant cells from a breast carcinoma and whether a clear sentinel node reliably forecasts a disease-free axilla.

III.   MATERIALS AND METHOD

40 female patients with primary diagnosis of early breast cancer, clinical stage T1 admitted in State Cancer Institute, GMC from June 2022 to October 2023 were selected for this study. Patients who were pregnant/lactating or with previous breast surgery or chemotherapy or radiotherapy, patients with multicentric or multifocal tumour or allergic to methylene blue dye were excluded from the study. With all the necessary metastatic work up and preoperative evaluations , informed consent from all participating patients were taken for SLNB.

Methylene blue dye (5 cc of 1% dye) was injected in subareolar region 15 -20 minutes prior to surgery and after induction of general anesthesia. The breast was then massaged for 5 minutes. Dissection of axillary tissue to identify stained lymph node was done. All blue nodes and any node receiving a blue lymphatic channel were considered as sentinel nodes. After excising the stained lymph nodes,the primary surgery either MRM or BCS was carried accordingly as planned pre-operatively with complete clearance of the remaining axillary tissue . Lymph nodes were divided into two groups: the dye stained lymph node as sentinel node and the rest of the lymph nodes removed by axillary clearance. These along with the breast specimen were subjected to histopathological examination.

After collection of the post operative histopathology reports sensitivity, specificity, false negative, positive predictive value, negative predictive value and accuracy of the sentinel lymph node biopsy were done report in comparison with rest of the axillary lymph nodal status to assess the efficacy of sentinel lymph node biopsy in detecting axillary metastasis.

IV.   RESULTS

Average age of the patients was 45.3 yrs (range 31–68 years).All the 40 patients had Invasive Ductal Carcinoma. On clinical staging, 17 cases (51%) had tumors in T2 stage and 16 cases (49%) were classified as T1 stage tumors. In none of the cases axillary lymph nodes were clinically palpable and no evidence of distant metastasis was seen. Sentinel Lymph Node was identified in 33 cases out of a total of 40 cases, in which the procedure was performed with an identification rate of 83%. The mean number of sentinel lymph nodes detected was 1.76. Total number of cases with positive axillary nodes was 15. Among these , in 13 cases (86.67%), both SLN and the axillary nodes were positive for metastases.In 2 cases(13.33%) SLN was negative for metastases where axillary nodes were positive for metastasis and in 17 cases both the sentinel nodes and axillary nodes were negative for metastasis.With above mentioned results the overall sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of SLNB in predicting axillary node status was 86.67%,

94.44%, 92.86% and 89.47% respectively. A false negative rate of 13.33% was observed with an overall accuracy of 90.91%.

V. DISCUSSION

Chemical agents used for lymphatic mapping fall into two categories. In the first category there are various vital dyes that are used in SLNB, vizlymphazurin (isosulfan) blue, patent blue, methylene blue, and indigo carmine. In the second category, there are radiolabelled large molecules, the most common of which are various colloids, albumin, and dextran.

Optimal SLN biopsy technique using an intradermal and/or subareolar injection of radioactive colloid and blue dye can improve SLN identification rates. Many previous studies have demonstrated lowest identification rates in utilizing blue dye alone (65%-88%) and the highest rates in using either radioactive colloid alone (81%-94%) or in combination with blue dye (81%-100%).

Authors	Mapping Method	Identification Rate (%)	False Negative (%)
Cox et al[2]	BD+COL	94.1	01
Paganelli et al[3]	COL	98	06
Veronesi et al[4]	COL	99	07
Villa et al[5]	BD+COL	98	14
Noguchi et al[6]	BD+ COL	94	10
McMasters et Al[7]	BD or COL	86	12
	BD or COL	90	06
Kern et al [8]	BD	97.5	0
Our Study	BD	83	13.33

BD: blue dye. Col: radio-colloid.

In 2 similar Indian series published ealier, one by Parmaret al[9] using blue dye (isosulphan blue) alone reported an identification rate of 77%, false negativity rate of 16.6% and a negative predictive value of 90.3%.
The other series by Deo et al[10] using blue dye alone reported sensitivity, specificity and accuracy of SLNB in predicting the axillary node status being 84.2%, 100% and 91.3% respectively.

Author	Identification Rate (%)	False Negative Rate (%)
Parmar et al[9]	77	16.6
Deo et al[10]	90.4	08
Yu et al[11]	86	09
Our study	83	13.33

VI. CONCLUSION

The identification rate of our study is comparable with other similar studies with a false negative rate of 13.33% which tallies with other similar studies. Our study describe our initial experience with the SLNB technique, hence a false negative rate of 13.33% and negative predictive value of 89.47 %, both of which are modifiable variables. Among numerous factors affecting the false negative rate, increasing surgeons experience with the procedure along with careful selection of patients, selecting appropriate technique of SLNB and finally meticulous pathological examination of sentinel lymph nodes may help to bring down the false negative rate to an acceptable minimum.

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