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Research Paper

Diagnostic Accuracy of Sentinel Lymph Node Biopsy in Predicting The Axillary Lymph Node Status in Operable Breast Cancer

Medical Science

KEYWORDS : Carcinoma breast, axillary lymph node dissection (ALND), Sentinel lymph node biopsy (SLNB)

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ABSTRACT

Introduction: Carcinoma of breast is the commonest malignancy found in females, worldwide. The management of operable carcinoma breast is modified radical mastectomy (MRM) or breast conservative therapy (BCT). However, axillary lymph node dissection (ALND) is accompanied by numerous complications. Hence, if we can somehow determine the axilla to be free from metastatic disease, a significant morbidity can be avoided by omitting ALND. This study was performed to determine whether sentinel lymph node is a predictor of axillary lymph node status in operable breast cancer.

Methods and materials: A total of 70 patients operated for operable breast cancer between June 2014 and December 2015 were included in the study. A sentinel lymph node biopsy was performed using methylene blue dye. Surgery for the primary tumour was done along with ALND. The results of the histopathology examination of the two specimens were compared.

Results: In this study the use of methylene blue dye was found to accurately identify sentinel node in 91.43% cases with a sensitivity of 72.7% and specificity of 100%. The overall accuracy of sentinel lymph node biopsy found in this study was 90.6% which revealed that their status accurately predicts the status of the axillary nodes. However, it has a high false negative rate of 27.3%.

Conclusion: Methylene blue was found to be a cheaper and safer alternative for the sentinel lymph node biopsy. This procedure can be used with confidence in surgical practice after achieving the short learning curve in operable breast cancer. But a high false negative rate calls for caution in patients with negative sentinel nodes.

Introduction

Breast cancer is the most commonly occurring cancer in females worldwide[1]. It has an age-standardized incidence rate (ASR) of 39.0 per 100,000, which is more than double that of the second ranked cancer (cervical cancer ASR=15.2 per 100,000). It is the commonest cancer of urban Indian women and second commonest among the rural women. The axillary lymph nodes are the commonest site of metastasis in Ca breast[2]. The minimum standard treatment of the axilla in clinically positive lymph nodes is clearance of Level I and Level II nodes[4].

- However, the management of the clinically negative axilla is currently far from being uniform and includes :
- axillary node biopsy or sampling,
- sentinel lymph node biopsy,
- partial or lower axillary node dissection,
- complete axillary lymphadenectomy (CAL) and
- radiotherapy to the regional lymph nodes alone or in combination with a surgical procedure[3].

The treatment of operable breast carcinoma almost always involves lymph node dissection and prognostic information is gained from histological examination of all or most axillary nodes. If a non-invasive or minimally invasive diagnostic procedure could provide accurate preoperative staging of the axilla, axillary dissection could be avoided. *The sentinel lymph node is defined as the first lymph node that drains a primary tumour.*[5] SLNB results in less post operative morbidity in terms of subjective arm complaints and mid arm swelling. The existence of an orderly and predictable pattern of lymphatic drainage to a regional lymph node basin and the functioning of a first lymph node as an effective filter for tumor cells provides possibility of SLN biopsy. Important dictum can be where SLN is negative, extensive lymphadenectomy can be avoided.

Method and Materials

A total of 70 patients operated for operable breast cancer between June 2014 and December 2015 were included in this study. After induction of anesthesia 4 cc of 5% methylene blue was infiltrated in peri-tumoral tissue and breast massage was done for 5 minutes. All blue nodes and any node receiving a blue lymphatic channel were excised. Surgery for the primary tumour was done along with ALND. Both specimen were sent separately for histopathological examination. The results of the two specimens were compared and data analysed.

Results

Out of 70 patients, a SLN was identified in 64 (91.43%) patients (Table 1). After the histopathological evaluation of sentinel lymph node and axillary tissue, it was found that out of those patients in whom SLN was identified, 48 (68.53%) showed no metastases in sentinel node whereas 16 (22.86%) showed that SLN was involved with metastases (Table 2).

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Axillary evaluation showed that out of 70 patients, axilla was negative in 44 (62.86%) patients; whereas axilla was involved with metastases in 26 (37.14%) patients. 6 (8.57%) patients were identified in which the axilla was positive in spite of no metastasis being found in sentinel node. In our study, the sensitivity was found to be 72.7%, specificity was 100%, positive predictive value was 100% and negative predictive value was 87.5%. The false negative rate and false positive rates were 27.3% and 0% respectively. The overall accuracy of using SLN as a marker for axillary metastases was 90.6% (Table 3).

Discussion

Our study was a hospital based validation type of observation study which hypothesized the importance of the use of methylene blue dye as a single agent in identification of sentinel lymph node and diagnostic accuracy of sentinel lymph node biopsy in predicting the axillary lymph node status in operable breast cancer by histhopathological examination. The study was done to determine when axillary lymph node dissection could be avoided.

In the present study, methylene blue dye alone was used for lymphatic mapping and retrieval. The rate of identification of SLN using this technique was 91.43% (64 out of 70 patients). Literature reveals identification with blue dye alone in the range of 66-98% and slightly improved rates with combination of both radioactive colloid and blue dye[5]. The proposed reason for lower identification rate in different studies may be the initial experience of the surgeon, high body mass index of patients , the blockage of lymphatics by tumor infiltration or the skip metastasis to other nodes which has 3.5-12% reported incidence in literature[7,8]. Study done by *Ahmed S. et al (2001)*[9] have reported an identification rate of 93.4% in a series of 30 patients. In another study *Guenther et al*[10] has reported 71% identification rate in series of 145 patients using blue dye alone. However in recent studies *Edward et al*[11] and *Zerwes et al*[12] has even shown 100% identification rate.

Histopathology of nodal tissue indicated that in 62.86% cases axillary tissue was negative for metastasis whereas nodal positivity only seen in 37.14% cases. The histopathology of sentinel nodes showed that sentinel node was negative in 68.57% cases whereas metastasis was present in 22.86% of 70 cases. Thus, we had a sensitivity which was comparable to that of studies conducted by Veronesi et al (93.3%)[4], Ahmad et al (85.7%)[9] and *Giuiliano et al (88%)*[5] (Table 4).

In our study methylene blue dye was used because it was cheaper, safe, and readily available and did not need any hand held gamma camera to detect the radiation. The overall increase in cost of conducting the sentinel node using methylene blue was just 20 rupees, as compared to the costly isosulfan blue or radiolabelled colloid. H. T. Gold et al[13] while studying the cost effectiveness of various blue dyes for SLNB found out that the incremental cost of isosulfan blue is $108.29/case (SD+/-$43.4).

False negative rate in our study came out to be 27.3%. In the literature the false negative rate varies among surgeons between (0-15 percent). The reason for this variation may be the extensive tumor infiltration causing re-routing of the lymph fluid to the non sentinel nodes, a high body mass index or the initial experience of surgeon. Guiliano et al [5] in 1994 with 174 patients experienced a 65% identification rate and 12% false negative rates, but later the same group in next series in 1997[6] published 93% identification rate and 0% false negative rate, showing a better understanding of the procedure.

Conclusion

Methylene blue was found to be a cheaper and safer alternative for the sentinel lymph node biopsy. This procedure can be used with confidence in surgical practice after achieving the short learning curve in operable breast cancer. But a high false negative rate calls for caution in patients with negative sentinel nodes.

Tables

Table 1. Sentinel Lymph Nodes Identification

SLN identification	No. of patients	Percentage
Not identified	6	8.57
Identified	64	91.43

Table 2. Histopathology of Nodal tissue

Histopathology of Nodal tissue	No. of Patients	Percentage
Negative SLN	48	68.57
Positive SLN	16	22.86
Axilla Negative	44	62.86
Axilla Positive	26	37.14
SLN negative with Axilla Positive	6	8.57
SLN Positive with Axilla Negative	0	0.00%

Table 3. Sentinel Lymph node V/s Axillary Status

	Axillary Positive	Axillary negative	Grand Total
SLN positive	16 (25%)	0	16 (25%)
SLN negative	6 (9.34%)	42 (65.63%)	48 (75%)
Grand Total	22 (34.38%)	42 (65.62%)	64

Table 4. Comparision of our study with various studies

Study	SLN identification rate	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Overall Accuracy	Tracer/ Dye
Veronesi et al	98%	93.3%	100%	100%	94%	96.8%	Technetium Colloid
Guiliano et al	96%	88%	100%	100%	93.5%	95.6%	Isosulfan blue
Ahmad et al	93.4%	85.7%	71.4%	75%	83.3%	78.57%	Methylene blue
Present Study	91.43%	72.7%	100%	100%	87.5%	90.6%	Methylene blue

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