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Original Research Article

Correlation between Intraoperative Imprint Cytology and Histopathological Diagnosis of Sentinel Lymph Nodes in Clinically Node Negative Breast Carcinomas

R Thangam[1*], Venu Anand[2], T Vincy[2]

[1]Department of Pathology, Government Sivagangai Medical College, Tamil Nadu
[2]Department of Pathology, Government Kilpauk Medical College, Tamil Nadu
*Correspondence: Dr. R Thangam (thangam.1988@gmail.com)

ABSTRACT

Introduction: Sentinel lymph node imprint cytology is a reliable method of assessment of axillary lymph node status in clinically node-negative breast cancers.This technique is advantageous in resource-poor settings where cryostats are not available. The results are obtained in a short time, and hence they can be used intra operatively to arrive at a conclusive evidence of metastatic disease in axillary lymph nodes, thereby guiding further treatment. The objective of this study was to compare imprint cytology and histopathological diagnosis of sentinel lymph node in clinically node-negative breast cancers.

Methods: This was a cross-sectional study conducted among 53 female patients with clinically node- negative breast cancer who had undergone mastectomy with sentinel lymph node sampling. Imprint smears of the sentinel node were prepared and interpreted either as positive or negative based on the presence of metastasis. The results were compared with histopathological diagnosis, and the sensitivity and specificity of the procedure were determined.

Results: Out of the 53 cases, 6 cases were diagnosed with metastatic carcinomatous deposit in the axillary nodes, both by imprint cytology and histopathology. Only one case which was reported as negative for metastatic deposit in the lymph node by imprint cytology was diagnosed later by histopathology to have metastatic carcinomatous deposit. 46 cases were negative for metastatic carcinoma, both by imprint cytology and histopathology of axillary lymph node. Based on the above results, the sensitivity of Sentinel lymph node imprint cytology was 85.71% and specificity was 100%.

Conclusion: Intraoperative imprint cytology of axillary lymph nodes was found to have high sensitivity and specificity in diagnosing metastatic disease in resource-poor settings.

Keywords: imprint cytology, sentinel lymph node, breast cancer

INTRODUCTION

Breast cancer is the most frequently diagnosed cancer among women. The burden of breast cancer is estimated to cross 2 million cases by the year 2030.[1] In India, carcinoma breast accounts for 13.5% of all cancer cases and 10.6% of all deaths.[2] Early detection can improve the treatment outcome as well as the survival of patients. One of the most important prognostic factors of breast cancer is the regional lymph node status.[3] Sentinel lymph node imprint cytology has come up as one of the diagnostic techniques for assessing lymph node status for clinically node negative carcinomas.[4] It is a simple and cost-effective method for detecting metastasis in nodes.

Prolonged estrogen stimulation has been implicated to be an important risk factor in the development of breast carcinomas.[5] Nulliparity, late first child birth, obesity; OCPs and family history of breast carcinoma in first-degree relatives have all been strongly

associated with development of breast carcinoma. BRCA1 and BRCA2 are two important genes implicated in hereditary breast cancers.[6] Several factors have been shown to determine the outcome of the disease; the most important ones being patient's age, size of the tumor, histomorphologic type and grade of the tumor, hormonal status, and axillary node metastases.[7]

Axillary node metastasis has an important role in determining the prognosis of the disease. There is significant survival difference between patients with positive and negative axillary nodes.[8] Intra-op sentinel lymph node evaluation has become one of the widely used methods for determination of lymph node status in patients without clinical suspicion of nodal involvement.[9]

Sentinel lymph nodes are the first lymph nodes to which cancer cells drain and spread from a primary tumor. To identify the sentinel lymph node, the operative surgeon injects a blue dye near the tumor intraoperatively. The dye is then followed visually to see the first node which takes up the color and is dissected out. Sentinel lymph node biopsy was introduced in the early 70s to identify patients with or without lymph node metastasis and to avoid unnecessary lymphadenectomy.[10]

Different methods have been employed in evaluation of sentinel lymph nodes, including imprint cytology techniques and frozen section techniques. Both frozen section and imprint cytology analysis are rapid and equally accurate in diagnosing the nodal status.[11,12] Imprint cytology is comparatively more advantageous in that the tissue specimen can be preserved fully for further formalin fixation and histopathological examination.

Intra operative imprint cytology results are very much beneficial, as positive result will help surgeons to continue with axillary lymph node dissection, thereby eliminating the need for second surgery for axillary clearance. Similarly, if imprint cytology results are negative, patients may be spared of extensive surgery.[13]

The objective of this study was to compare the imprint cytology with histopathology for sentinel lymph nodes in breast cancers. This study aimed to compare imprint cytology and histopathological diagnosis of sentinel lymph node in clinically node-negative breast cancers.

MATERIALS AND METHODS

This is a cross sectional study conducted in the Department of Pathology, Government Royapettah Hospital from July 2021 to December 2022 for 18 months. Clinically node-negative breast carcinomas for which sentinel lymph node dissection was done were included in the study. A total of 53 cases were collected during this period.

The excisional lymph node biopsies were received in normal saline and gross findings were noted. The nodes received were bisected and imprints were taken from their cut surface with glass slides. The smears were fixed in alcohol and stained with haematoxylin and eosin. Then the lymph node was fixed in 10% formalin for further histopathological examination. After processing the paraffin blocks were sectioned at 3-4 microns thickness and stained with H and E.

The imprint smear results were compared with the HPE slides to rule out false positive or false negative results.

RESULTS

Out of the total 53 cases, 33.96% (18 cases) of carcinomas occurred in the age group 41-50 years and also in the age group 51-60 years followed by 16.99% (9 cases) of cases in the age group 31-40 years. 15.09% (8 cases) of breast carcinoma patients were in the age group of more than 60 years. (Table 1)

Table 1: Age wise distribution of breast carcinoma

Age	No. of Cases	Percentage
31-40 years	9	16.99%
41-50 years	18	33.96%
51-60 years	18	33.96%
>60 years	8	15.09%
	53	100%

The most common type of breast cancer was Invasive breast carcinoma No Special Type-Ductal (83.01%). Invasive lobular carcinoma was reported in 5.66% of cases. DCIS was reported in 3.77% of cases. One

case each of Mucinous carcinoma (1.89%), Low grade adenosquamous carcinoma (1.89%), Microinvasive carcinoma (1.89%) and Solid papillary carcinoma (1.89%) was also reported. (Table 2)

Table 2: Distribution based on histopathologic types of breast carcinoma

Histological Type	No. of Cases	Percentage
Invasive breast carcinoma-NST(Ductal)	44	83.01%
Invasive lobular carcinoma	3	5.66%
Mucinous carcinoma	1	1.89%
Metaplastic carcinoma (Low grade adenosquamous cancer)	1	1.89%
Microinvasive carcinoma	1	1.89%
Solid papillary carcinoma	1	1.89%
DCIS	2	3.77%
Total	53	100%

Among the 53 clinically node-negative cases that were sent for sentinel lymph node examination, 6 cases were diagnosed with metastatic carcinomatous deposits in the axillary nodes both by imprint cytology and histopathology. Only one case which was reported as negative for metastatic deposit in the lymph node by imprint cytology was diagnosed later by histopathology to have metastatic carcinomatous deposit. 46 cases were negative for metastatic carcinoma both by imprint cytology and histopathology of axillary lymph node. (Table 3)

Table 3: Correlation of imprint cytology of sentinel lymph node with histopathological diagnosis

		HPE Diagnosis		
		Positive	Negative	Total
Imprint Cytology	Positive	6	0	6
	Negative	1	46	47
	Total	7	46	53

Overall, the number of false negative case was one, and not even a single false positive case was reported by imprint cytology. On the basis of the analysis done, the sensitivity of imprint cytology was 85.71% due to one false negative case reported and the specificity was 100% with an overall accuracy of 98.11%.

Microscopic picture showed clusters and sheets of malignant duct epithelial cells showing increased nuclear cytoplasmic ratio and pleomorphism. (Figure 1) Histopathologic sections of the same node showed nodal tissue with nests of malignant duct epithelial cell deposits. (Figure 2)

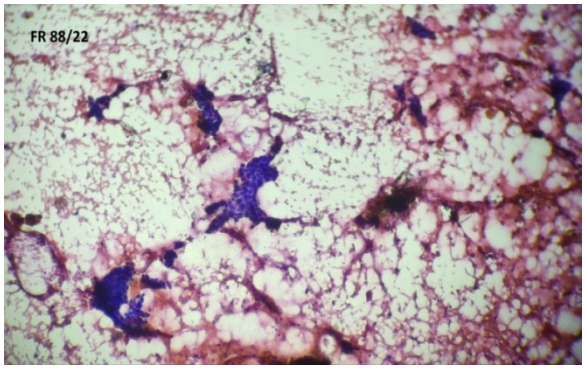

Figure 1: Imprint smear showing tumor cells; H and E stain (Fr 88/22)

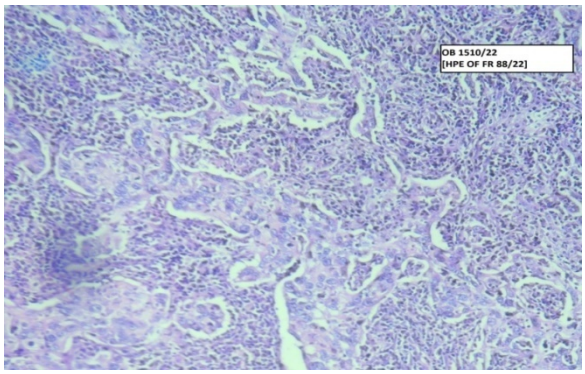

Figure 2: HPE image showing metastasis in sentinel lymph node; H and E stain (OB 1510/22; Fr 88/22)

DISCUSSION

Management of breast cancer has been undergoing drastic changes in the recent decade. Nodal metastasis has an important implication, especially in deciding the treatment with adjuvant chemotherapy. Identification of sentinel lymph node involvement in patients without clinically detectable nodes (cN0) will help the clinician in deciding further treatment.[14]

Imprint cytology is a rapid method of determining the lymph node status intra-operatively, which will aid the surgeon to take on-table decisions for further complete axillary lymph node dissection.[15]

Several factors have been suggested to influence the sensitivity and specificity of imprint cytology results. The most important cause of false negativity in imprint cytology is due to the presence of micro metastases (< 2 mm).[16] Sometimes metastatic lobular carcinomas can also be missed by imprint cytology examination because of the resemblance of the neoplastic cells to mature lymphocytes of the lymph node.[17]

In the present study, all cases with axillary lymph node metastasis including the case missed by imprint cytology were of the histomorphological type, Invasive breast carcinoma - No special type (Ductal) and all had macro metastatic deposits(>2mm). In the current study, due to one false negative case, the sensitivity and specificity of imprint cytology in diagnosing sentinel lymph nodes were 85.71% and 100 % respectively.

The results obtained were similar to the study by Khanna R et al who showed a sensitivity of 98.4% and a specificity of 100 %.[18] A similar study by Marano et al which compared sentinel node imprint cytology with biopsy diagnosis showed a sensitivity of 68.4% and specificity of 98.7%.[19] (Table 4)

Table 4: Comparison with other studies

Study	Sensitivity	Specificity	Accuracy
Current study	85.71%	100%	98.11%
Ranabhat et al[13]	86.7%	100%	-
Khanna R et al[14]	98.4%	100%	-
Pertursson et al[20]	68.6%	99.8%	-
Marano et al[15]	68.4%	98.7%	89.7%

CONCLUSIONS

The current study has shown that a reliable and precise diagnosis regarding the sentinel lymph node status can be done intraoperatively in breast carcinomas within a short time by imprint cytology. It is highly specific and sensitive and can be routinely employed in all clinically node-negative breast cancer patients. Negative sentinel lymph node cytology may spare the patient from the morbidity of unnecessary axillary lymph node dissection while a positive result may upstage the disease and help the surgeon in providing appropriate management.

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