Retrospective Evaluation of Fine Needle Aspiration Accuracy and Factors Influencing Upgrade Rates in Diagnosing Axillary Lymph Node Metastasis in Breast Cancer Patients

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INTRODUCTION

Fine-needle aspiration (FNA) is a widely used technique for assessing axillary lymph node involvement in breast cancer, recognized for its minimally invasive nature and cost-effectiveness. Although FNA demonstrates high specificity, its sensitivity is often lower compared to core-needle biopsy (CNB), which has shown superior diagnostic accuracy. This disparity prompts our investigation at our institution to evaluate not only the diagnostic performance of FNA but also the factors influencing upgrade rates in the diagnosis of axillary lymph node metastasis. By identifying these factors, we aim to enhance the accuracy of preoperative staging in breast cancer patients.

METHODS

This retrospective study reviewed medical records of new diagnosed breast cancer patients aged 18 and older who underwent FNA of the axillary lymph node under ultrasound guidance followed by axillary surgery for surgical biopsy evaluation at our institution from 2022 to 2024. Exclusion criteria included patients with prior axillary surgery or radiation, those who received neoadjuvant chemotherapy post-FNA, incomplete medical records due to pursuing surgical intervention at other institutions, or patients not eligible for surgery.

RESULTS

Of the 163 FNA axillary lymph nodes initially reviewed, 97 patients were excluded, leaving 69 patients with metastatic lymph nodes in the FNA that met the criteria for neoadjuvant chemotherapy or chemotherapy for stage 4 disease. (Table 1)

A total of 66 patients were ultimately enrolled in the study, with 41 having a negative FNA result and 25 a positive FNA result. Among the 41 patients with negative FNA results, 14 showed different types of lymph node involvement in the final surgical biopsy, including 11 with macrometastasis (mean number of positive nodes 1.14, with an average macrometastasis tumor size of 6.1 mm) and 4 patients with either isolated tumor cells (ITC) or micrometastasis.

RESULTS

The FNA of lymph nodes showed a sensitivity of 64.1%, specificity of 100%, positive predictive value of 100%, negative predictive value of 65.9%, and an overall accuracy of 78.8%. When ITC were categorized as a negative upgrade, the sensitivity increased to 69.4%, with maintained specificity of 100%, positive predictive value of 100%, negative predictive value of 73.2%, and an overall accuracy of 83.3%. Among the patients with negative FNA results who underwent upgrades, one had micrometastasis and three had ITC in the final surgical biopsy, which describes the limitations of FNA in detecting smaller or less obvious metastases.

Younger age and lymphovascular invasion were significant predictors of lymph node upgrade ($p<0.05$), whereas lymph node size, capsule thickness and biomarkers were not significantly associated with upgrade status.

The macrometastasis significantly increases the likelihood of a positive FNA lymph node result, while micrometastases and ITC do not show a significant effect. One patient with a negative FNA, who had an irregular and lobulated lymph node, underwent core-needle biopsy, which revealed positive results that correlated with the surgical biopsy findings

CONCLUSION

Younger age and lymphovascular invasion were identified as significant predictors of lymph node upgrade in breast cancer patients with negative FNA results. These findings highlight the importance of considering these factors to improve the diagnostic accuracy, highlighting the benefits of using alternative diagnostic modalities, such as core-needle biopsy, for potentially more reliable results.

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TABLE 1

Table 1: Clinical and Pathological Characteristics of Patients with Axillary Lymph Node Metastasis, Stratified by Tumor Upgrade Status

Characteristics		Tumor upgrade		P value
		Yes (n=11)	No (n=30)	
Age (Mean ± SD)		50.9 ± 15	63 ± 13.4	**0.02**
LN size (cm ± SD)		1.32 ± 0.42	1.07 ± 0.43	0.13
LN cortical thickness (mm ± SD)		4.61 ± 1.86	4.33 ± 1.56	0.3
Multifocal (n, %)		3 (27.3)	3 (10%)	0.16
Lymphovascular invasion		4 (36.3%)	2 (6.7%)	**0.03**
Family history of breast or ovarian cancer		4 (36.3%)	16 (53.3%)	0.44
Biomarkers	ER (Mean %, SD)	95.5 ± 9.2	84.1 ± 32.7	0.27
	PR(Mean %, SD)	78.09 ± 35.1	49.8 ±43.4	0.06
	HER2 (0/1)	0	0.13 ± 0.35	0.20
	Ki67 (Mean %, SD)	14.4 ± 9.3	24.1 ± 25.0	0.22

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