DIAGNOSTIC UTILITY OF FINE NEEDLE ASPIRATION CYTOLOGY IN CARCINOMA BREAST A SURGICAL PERSPECTIVE FROM THANJAVUR MEDICAL COLLEGE

Original Research Article

Jeevaraman Solaiappan[1], Sumathi Ravikumar[2], Deepa Arumugam[3]

[1-3]Thanjavur Medical College, India.

ABSTRACT

Background: Fine Needle Aspiration (FNA) is a widely used, minimally invasive diagnostic procedure for the evaluation of breast lumps. Accurate classification of FNA cytology is crucial for determining the appropriate clinical management. The IAC Yokohama System, developed by the International Academy of Cytology (IAC), provides a standardized framework for reporting breast pathology, aiming to improve diagnostic accuracy and consistency across different healthcare settings. **Objective**: This study aims to classify breast lump fine needle aspirates using the IAC Yokohama System and evaluate its effectiveness in distinguishing benign, malignant, and indeterminate lesions. **Materials and Methods**: A retrospective analysis was conducted on a series of breast lump FNAs performed at THANJAVUR MEDICAL COLLEGE. The cytology slides were classified according to the IAC Yokohama System, which includes categories such as benign, suspicious, malignant, and non-diagnostic. The histopathological correlation was established where available, and the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of the system were calculated. **Result**: A total of 569 breast FNAs were analysed. The majority of cases were classified as 68.5% benign, 18.2% malignant, and (6.6%) atypical. The sensitivity and specificity of the IAC Yokohama System in predicting malignant lesions were found to be 95.16% and 100%, respectively. The system demonstrated a high concordance with histopathological findings, suggesting its reliability in clinical practice. **Conclusion:** The IAC Yokohama System provides a valuable framework for the classification of breast lump FNAs, facilitating consistent and accurate reporting. Its application enhances diagnostic precision, which is critical for patient management. The study supports the integration of the IAC Yokohama System into routine breast pathology practice for better clinical outcomes. Further prospective studies are recommended to refine its diagnostic utility across diverse populations and healthcare settings.

INTRODUCTION

Breast cancer remains one of the leading causes of morbidity and mortality among women worldwide. Early detection and accurate diagnosis are crucial in improving patient outcomes, particularly in terms of treatment selection and prognosis. One of the primary diagnostic tools used in the evaluation of breast lesions is Fine Needle Aspiration (FNA) cytology, a minimally invasive procedure that allows for the collection of cellular material from breast lumps for diagnostic examination. FNA offers several advantages, including rapid results, minimal patient discomfort, and cost-effectiveness, making it an important tool in clinical practice.[1]

However, despite its widespread use, the interpretation of FNA samples can be challenging due to the overlap in cytological features between benign, malignant, and atypical lesions. To address these challenges, various standardized systems have been developed to classify and report the cytological findings in a structured and consistent manner. One such system is the IAC Yokohama System for Reporting Breast Pathology, which provides a comprehensive framework for the classification of breast cytology specimens based on their malignancy risk, diagnostic accuracy, and histopathological correlation.[4,5]

The IAC Yokohama System offers a systematic approach to categorize breast lesions into distinct groups, facilitating communication among clinicians, pathologists, and patients. It is designed to improve the reproducibility of diagnoses, guide management decisions, and ultimately contribute to better clinical

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outcomes. Despite its advantages, the adoption of this system has not been universally widespread, and its effectiveness and reliability in the context of breast FNA cytology remain subjects of ongoing evaluation. This study aims to classify Fine Needle Aspirates (FNAs) of breast lumps according to the IAC Yokohama System and evaluate its diagnostic performance in a clinical setting. By doing so, the research seeks to assess the practical applicability of the system in routine diagnostic workflows, explore potential areas of improvement, and provide insights into its role in enhancing the accuracy of breast cancer diagnosis. The results of this study will contribute to the growing body of knowledge surrounding the use of standardized reporting systems in breast pathology and provide valuable information for clinicians and pathologists in the management of breast lumps.[8]

The objectives of the study include

1. To classify breast lumps based on their Fine Needle Aspiration cytology using the IAC Yokohama System.
2. To assess the diagnostic accuracy, sensitivity, and specificity of the system in identifying malignant lesions.
3. To evaluate the concordance between cytological diagnoses and histopathological findings.
4. To discuss the advantages and limitations of the IAC Yokohama System in routine clinical practice.

Through this research, it is hoped that the role of structured reporting in FNA cytology will be better understood, and that it will aid in the development of more reliable diagnostic tools for breast cancer detection.

REPORTING OF BREAST CYTOLOGY USING IAC YOKOHAMA SYSTEM

S. No.	Cytological categories	Explanation
1.	C1	Inadequate/Insufficient
2.	C2	Benign
3.	C3	Atypical
4.	C4	Suspicious of malignancy
5.	C5	Malignant

Aim

The main aim and objectives of our study were to classify breast fine needle aspirates according to the IAC Yokohama system and assess the risk of malignancy, sensitivity, specificity, positive predictive value, negative predictive value, and accuracy.

MATERIALS AND METHODS

Study Design: Retrospective Study
Study Period: Jan 2023 To Dec 2023
Study Place: Thanjavur Medical College

All breast FNAs done in the above period were retrieved and classified into five categories according to the Yokohama system. Histopathological diagnosis was also retrieved.

Using a histopathological diagnosis as the gold standard, sensitivity, specificity, PPV, NPV, and diagnostic accuracy were calculated. For each of the five categories, the risk of malignancy was also assessed.

RESULTS

Totally 569 FINE NEEDLE ASPIRATES were done during period of 1 year. Age group of patients is between 15 years to 79 years. The 569 breast FNAs were categorized according to the IAC Yokohama System as follows:
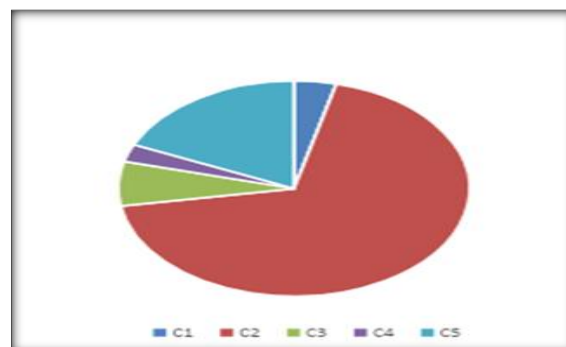
C1. Insufficient- 22 cases (3.8%)
C2. Benign- 390 cases (68.5%)
C3. Atypical- 38 cases (6.6%)
C4. Suspicious of malignancy- 15 cases (2.6%)
C5. Malignant- 104cases (18.2%).[6]

Histopathological correlation was available in 251 cases (44.1%). The histopathological diagnoses for the breast lesions in different cytological categories were evaluated and are summarized with cytohistological

In above distribution, and histological correlation done on 251 cases

- True positive cases- 59
- True negative cases-132
- False positive cases-0
- False negative cases-3

Table 1: DISTRIBUTION OF BREAST DISEASES BASED ON IAC YOKOHAMA SYSTEM

	Insufficient	Benign	Atypical	Suspicious of Malignancy	Malignant
Histological Benign diagnosis	18 (Fibrocystic disease-7, Inflammatory lesion- 2, Gynaecomastia-2, Benign pyllodes-3, Fibroadenoma- 4)	132(Fibroadenoma- 88, Abscess- 12, Galactocele- 6, Granulomatous mastitis- 2, Fibrocystic disease- 15, Fat necrosis- 2, Gynecomastia- 7)	21 (Cellular FA- 6, Benign phyllodes- 7, Benign papillary lesion- 4, Fibroadenoma with	3 (Cellular FA- 3)	0

			usual ductal hyperplasia- 4)		
Histological Malignant diagnosis	1 (Invasive ductal carcinoma- 1)	3 (DCIS- 2, Invasive ductal carcinoma- 1)	5 (Invasive ductal carcinoma- 3, Papillary DCIS- 2)	9 (Invasive ductal carcinoma- 7, DCIS- 2)	59 (DCIS- 2, Invasive ductal carcinoma- 50, Invasive lobular carcinoma- 7)
Risk of Malignancy	5.20%	2.20%	19.20%	75%	100%

Table 2: DISTRIBUTION BASED ON BENIGN AND MALIGNANT DISEASES

	HPE BENIGN	HPE MALIGNANT	TOTAL
INSUFFICIENT C1	18	1	19
BENIGN C2	132	3	135
ATYPICAL C3	21	5	26
SUSPICIOUS OF MALIGNANCY C4	3	9	12
MALIGNANCY C5	0	59	59
TOTAL	174	77	251

Table 3: DIAGNOSTIC ACCURACY CALCULATION

Sensitivity	TP/(TP+FN)	**95.16**
Specificity	TN/(FP+TN)	100
False Positive Rate	FP/(FP+TN)	0
False Negative Rate	FN/(FN+TP)	4.83
Positive Predictive Value (PPV)	TP/(TP+FP)	100
Negative Predictive Value (NPV)	TN/(TN+FN)	97.77
Overall Diagnostic Accuracy	TP+TN/(TP+TN+FP+FN)	98.44

DISCUSSION

Fine Needle Aspiration Cytology (FNAC) continues to play a pivotal role in the evaluation of breast lesions, particularly in resource-limited settings such as government medical colleges in India. In the present study conducted at Thanjavur Medical College, the diagnostic utility of FNAC was assessed using the **IAC Yokohama System of Reporting Breast Cytopathology**, which provides a standardized framework for categorization.

Our results demonstrated that FNAC, when interpreted according to the IAC Yokohama guidelines, yielded high diagnostic accuracy in differentiating benign from malignant breast lesions. This finding is consistent with previous studies by Wong et al. and Maleki et al., who also reported that the standardized categorization improves inter-observer reproducibility and enhances diagnostic confidence.

From a surgical perspective, FNAC offers significant advantages. It is a minimally invasive, rapid, and cost-effective technique that aids in preoperative planning. Particularly in carcinoma breast, the ability to obtain an early diagnosis is crucial for deciding the extent of surgery and the need for neoadjuvant therapy. Our findings reaffirm that FNAC, when combined with clinical and radiological assessment (triple test), provides a reliable basis for therapeutic decisions.

However, the study also acknowledges certain limitations. Sampling errors, inadequate smears, and cytological overlap between atypical hyperplasia and low-grade carcinoma remain challenges. False negatives may arise in sclerotic or well-differentiated carcinomas, while false positives can occur in lesions with marked atypia. Hence, correlation with histopathology remains the gold standard, and FNAC should be considered complementary rather than exclusive.

The adoption of the IAC Yokohama system in our institution has improved clarity in reporting and facilitated better communication between pathologists and surgeons. This has led to more precise surgical planning and reduced diagnostic ambiguity. Future studies with larger sample sizes and integration of ancillary techniques, such as immunocytochemistry and molecular profiling, may further enhance diagnostic precision.

In conclusion, the present study highlights that FNAC, especially when guided by the IAC Yokohama system, remains a highly useful diagnostic tool in carcinoma breast. Its role in surgical decision-making is invaluable, particularly in tertiary care hospitals catering to large patient populations.

CONCLUSION

- Breast FNAC is a reliable test for diagnosing breast lesions, especially malignant breast lesions.
- Sensitivity, specificity, negative predictive value, positive predictive value, and diagnostic accuracy were all statistically significant in this investigation.
- Utilizing the IAC Yokohama breast cytology reporting system then aids in standardizing reporting across numerous institutes and stratifying cases according to the risk of malignancy to guide clinicians for appropriate follow-up management

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