



PROSPECTIVE EVALUATION OF ACCURACY OF FINE-NEEDLE ASPIRATION BIOPSY FOR BREAST LESIONS USING THE INTERNATIONAL ACADEMY OF CYTOLOGY YOKOHAMA SYSTEM

Pathology

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ABSTRACT

Background: Diseases of breast are showing a rising trend worldwide and they can range from inflammatory to malignant lesion. Carcinoma of breast is the most common malignant tumor, an estimated 2.3million women were detected with breast cancer and 6,70,000 deaths in the year 2022 worldwide. Breast cancer is the most common cancer in India, accounting for 28.2% of all female cancers, with an estimated 216,108 cases by 2022. Being an easy and cost effective procedure, FNAC allow us to diagnose benign and malignant lesions. **Aim And Objectives:** To classify and evaluate the accuracy of IAC Yokohama System in reporting FNAC of breast lesions using histopathological correlation as gold standard. **Methods:** This was a one year prospective study from August 2022 to July 2023 conducted at Department of Pathology, Jhalawar Medical college, Jhalawar. Total 247 cases were studied out of which 81 cases were used for comparative study between cytopathology and histopathology diagnosis. **Results:** Maximum number of cases were found to be of Yokohama Category C2 that is benign, followed by C5, C1, C3 and C4. Out of 247 patients, 81 were followed by histopathological examination. True positive cases were observed to be 69, True negative 10, False positive and false negative were one each. Sensitivity was found to be 98.57%, specificity was 90.9%, PPV was 98.57%, NPV was 90.90% and accuracy was 98.57% **Conclusion:** FNAC is a reliable, fast and accurate diagnostic method for the assessment of breast lumps. Furthermore, recent advances in both these techniques like Immunocytochemistry, imaging guided FNAC and Doppler in sonomammography may increase their accuracy. However, in diagnostically challenging cases and clinically malignant masses histopathological examination should be done, which is the gold standard for tissue diagnosis.

KEYWORDS

Breast, International Academy of Cytology Yokohama system, fine needle aspiration cytology.

INTRODUCTION

Diseases of breast are showing a rising trend worldwide and they can range from inflammatory to malignant lesion. Carcinoma of breast is the most common malignant tumor, an estimated 2.3million women were detected with breast cancer and 6,70,000 deaths in the year 2022 worldwide [1]. Breast cancer is the most common cancer in India, accounting for 28.2% of all female cancers, with an estimated 216,108 cases by 2022[2]. The technique and diagnostic interpretation of fine needle aspiration cytology (FNAC) of the breast has developed over the past 60 years into an extremely useful, accurate, highly specific and sensitive, and cost-effective test for the diagnosis of benign and malignant breast lesions. The IAC Yokohama Breast FNAC Reporting System has been developed by a group of experts in cytopathology assisted by oncologists, radiologists and surgeons. The rationale for the development of this international reporting system is to have a standardized reporting system, which will improve the performance, interpretation and reporting of breast FNAC cytology and clarify communication between cytopathologists and clinicians by linking the reporting system with suggested management options. Ultimately, the system will benefit patient care and facilitate research and the ongoing utilization of FNAC breast cytology. [3,4]

The IAC Yokohama system has categorised breast lesions in five categories [5]:

- C1- Insufficient
- C2- Benign
- C3- Atypical
- C4- Suspicious for malignancy
- C5- Malignant

The present study is to evaluate the breast lesions according to clinical evaluation of breast lesions using international academy of cytology Yokohama system and evaluation of its accuracy using histopathology as Gold standard.

Aim

The present study is to evaluate the breast lesions according to clinical evaluation of breast lesions using international academy of cytology Yokohama system and evaluation of its accuracy using histopathology as Gold standard.

Objectives

- To classify breast lesions using FNAC under International academy of cytology Yokohama system.
- To evaluate the accuracy of international academy of cytology Yokohama system in reporting fine needle aspiration cytology of breast lesions using histopathological correlation as Gold standard.

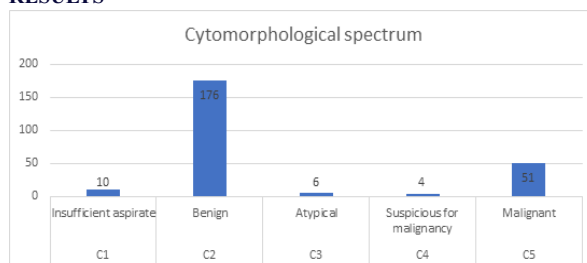
MATERIAL AND METHODS [6]

It was a one year prospective study done at Department of Pathology, Jhalawar medical college, from August 2022 to July 2023. All female patients above the age of 10 year, who presented with complain of breast lump were included in the study. FNAC was performed in the department and stained with Field stain or Papanicolaou stain as per requirement, field stain provides better cytoplasmic details and Papanicolaou stains provides better nuclear details. The smears were reported according to the IAC Yokohama system of breast cytology and categorised under C1, C2, C3, C4 and C5 category.

The samples (trucut biopsies, lumpectomy, mastectomy) which were received in histopathology sections were processed and stained with hematoxylin and eosin and studied under microscope.

Results from cytopathology and histopathology were compared and recorded to find out the true positive, true negative, false positive and false negative cases and derive further data.

RESULTS



It was observed that Out of total 247 cases maximum number of cases were C2 (benign) 71.2% followed by C5 (malignant) 20.6%, C1 (insufficient aspirate) 4.2%, C3 (atypical) 2.4% and C4 (suspicious for

malignancy) were 1.6%

A total of 247 cases were studied in cytopathology section out of which 81 cases were followed up by histopathological examination.

Table 1: Cyto-histopathological correlation of breast lesions

Cyto category	Cytopathological diagnosis	No.	Histopathological diagnosis	No.
C2 Benign	Acute mastitis	1	Acute on chronic inflammatory lesion	1
	Benign phyllodes	3	Benign phyllodes	3
	Fibrocystic disease	8	Fibrocystic disease	5
			Complex fibroadenoma	1
			Phyllodes	1
			Fibroadenoma	1
	Fibroadenoma	41	Fibroadenoma	34
			Fibrocystic disease	1
			Benign phyllodes	5
			Mammary hamartoma	1
C3 Atypical	Duct ectasia	1	Duct ectasia	1
	Lipoma	1	Lipoma	1
	Gynaecomastia	2	Gynaecomastia	2
	Proliferative breast lesion with atypia	2	Borderline phyllodes	1
			Infiltrating lobular carcinoma	1
C4 Suspicious for malignancy	Suspicious for malignancy	1	Infiltrating duct carcinoma	2
	Low grade carcinoma	1		
C5 Malignant	Malignant lesion	20	Infiltrating duct carcinoma	12
			Infiltrating lobular carcinoma	2
			Invasive lobular carcinoma	3
			Papillary carcinoma	1
			Mixed invasive carcinoma	1
			Granulomatous mastitis	1
Total		81		81

Table 2: True positive, true negative, false positive and false negative cases observed

	DETECTED	MISSED	TOTAL
POSITIVE	TP – 69 (A)	FP – 1 (B)	TEST POSITIVE
NEGATIVE	FN – 1 (C)	TN – 10 (D)	TEST NEGATIVE
TOTAL	70	11	81

Sensitivity = $A/(A+C) \times 100 = 98.57\%$

Specificity = $D/(D+B) \times 100 = 90.9\%$

Positive Predictive Value (PPV) = $A/(A+B) \times 100 = 98.57\%$

Negative Predictive Value (NPV) = $D/(D+C) \times 100 = 90.90\%$

Accuracy = $(A+D)/(A+B+C+D) \times 100 = 97.53\%$

A total of 81 cases were observed. Out of 70 cases with 69 true positive and 1 false negative diagnosis. 11 cases were missed with 10 cases true negative and 1 false positive. Sensitivity of FNAC was observed to be 98.57%, specificity 90.9%, PPV 98.57%, NPV 90.90% and accuracy 97.53%.

DISCUSSION AND CONCLUSION

In this study we observed that out of 247 cases the maximum number of cases were of C2 category which is benign lesions (71.2%), followed by C5 category (malignant) 20.6%, C1 (insufficient aspirate) 4.2%, C3 (atypical) 2.4% and C4 (suspicious for malignancy) were 1.6%.

Similar results were observed in study by Ibikunle DE et al. and Mohan BP et al. observed that there were 87 benign cases (43.5%), 105 malignant cases (99 cases diagnosed as carcinoma and 6 cases as suspicious of malignancy) (Total 52.5%), 5 proliferative lesions with atypia (2.5%) and 3 inadequate cases (1.5%).[7]

In present study, A total of 81 cases were observed. Out of 70 cases with 69 true positive and 1 false negative diagnosis. 11 cases were missed with 10 cases true negative and 1 false positive. Sensitivity of FNAC was observed to be 98.57%, specificity 90.9%, PPV 98.57%, NPV 90.90% and accuracy 97.53%.

Mohan BP et al. observed similar findings. The sensitivity of FNAC was 98.8% in benign lesions and 96.3% in malignant lesions in the present study. The specificity and positive predictive value of benign cases were 96.3% and 95.6% respectively. The specificity and positive predictive value of malignant lesions in FNAC were 98.8% and 99% respectively.[8]

The diagnostic accuracy of FNAC in our study was 97.45%. Similar results were obtained in study conducted by Anand V et al. Sensitivity, specificity and accuracy are 90.1%, 96.5% and 94.1% which proves the efficacy and reliability of FNA in the field of breast lesions.[9]

FNAC is a reliable preoperative diagnostic tool with high diagnostic accuracy in palpable breast lesions and helps in the proper surgical management of patients. However, lesions categorized by FNAC as C1, C3, C4 and papillary lesions (of any category) need confirmation by histopathology to eliminate false positive and false negative cases and histopathology remains the gold standard in such cases.

FNAC is a reliable, fast and accurate diagnostic method for the assessment of breast lumps. It has few manageable complications and can be done on outpatient basis. It is our conclusion therefore that the surgeons and pathologists should continue to deploy the procedure towards the early detection of breast cancer. This will also significantly reduce patient's waiting time for incision/excision biopsy.

Furthermore, recent advances in both these techniques like Immunocytochemistry, imaging guided FNAC and Doppler in sonomammography may increase their accuracy. However, in diagnostically challenging cases and clinically malignant masses histopathological examination should be done, which is the gold standard for tissue diagnosis.

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