



BREAST CYTOPATHOLOGY REPORTING USING THE NEWLY PROPOSED IAC YOKOHAMA SYSTEM: A SINGLE INSTITUTIONAL RETROSPECTIVE STUDY OF THE APPLICATION OF THE SYSTEM AND UTILITY OF BREAST FNAC.

Pathology

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ABSTRACT

Breast carcinoma is the second most common cancer in females in developing and developed countries. Recently the International academy of cytology (IAC) proposed a new reporting system for breast fine needle aspiration cytology. We aimed to categorize the breast FNAC samples according to the IAC Yokohama guidelines and obtain the cyto-histopath correlation.

Breast FNAC specimens (n=603) received at our institution from 1st January 2017 to 31st December 2017 were reclassified according to the newly proposed IAC Yokohama reporting system. Among 603 aspirates, 448 cases were reported as benign breast lesions. 21 cases were reported as atypia and 16 cases as suspicious and 41 cases were of malignancy. Histopathological confirmation was obtained in 100 cases. Statistical analysis was done.

FNAC is an effective modality for the diagnosis of breast lesions. It is safe, simple and cost effective outpatient procedure with high sensitivity, specificity and accuracy.

KEYWORDS

Breast cancer, Fine needle aspiration, Yokohama system.

INTRODUCTION

Breast carcinoma is common cancer in females in developing and developed countries. Breast cancer has ranked number one cancer among Indian females with age adjusted rate as high as 25.8 per 100,000 women and mortality of 12.7 per 100,000 women (1). There is a significant increase in the incidence and cancer-associated morbidity and mortality in Indian subcontinent as described in global and Indian studies (2-5). The lower breast cancer survival rates are associated with lack of early detection programs, advanced stage of disease at the time of presentation, lack of functional diagnostic and treatment facilities and limited accessibility to professional care (6).

Clinical assessment alone cannot distinguish the benign and malignant lesions. In a country like ours, with limited resources and large, remote, rural populations at the periphery having limited access to the centralized health care, breast FNAC has significant value as a first line of investigation. This is probably due to its simplicity, minimal invasiveness, cost efficiency and fast turnaround time. Therefore, patients presenting with breast lump at a peripheral health center can initially be evaluated by FNAC and rapid on site evaluation (ROSE). Suspicious lesions can be referred to higher centers for a multidisciplinary approach for accurate diagnosis.

Most of the breast lesions are benign, but sometimes it is difficult to determine whether a proliferative lesion in the category of atypia is benign or malignant. In these circumstances the new Yokohama guidelines help. It enhances the use of FNAB by the clinician and use of core needle biopsy (CNB) only when needed/guided by report.

Aims and Objectives

The study was conducted with the aim to find out the utility of standardized reporting system (IAC Yokohama guidelines 2019) for reporting breast cytology, to correlate the cytological findings of breast FNAC with the histopathological examination and to determine the accuracy of FNAC in the diagnosis of breast lesions.

MATERIAL AND METHODS

This study was retrospective observational type, carried out at SMS medical college, Jaipur. 603 cases of breast aspirate were retrieved and were blindly reviewed and reclassified according to the standardized system using the new proposed Yokohama guidelines (year 2019). The cytological diagnosis was given in the following categories.

C1 Insufficient

C2 Benign

C3 Atypia, probably benign

C4 Suspicious for malignancy

C5 Malignant

A comparison of the standardized reporting system being followed in our department according to the National cancer institute (NCI) guidelines 1996 and the newly proposed IAC Yokohama system for reporting breast cytology was done.

Histopathological slides of corresponding cytological cases were correlated. Insufficient and gynaecomastia cases were excluded from the study. Based on these findings, statistical analysis was performed and sensitivity, specificity, positive predictive value, negative predictive value and accuracy of FNAC as a test were determined.

RESULTS

The age of the patients in the present study ranged between 16 to 88 years.

Majority of patients were in the age group of 21 to 40 years (51%), followed by patients in the age group of 41 to 60 years (23.2%) and those in the age group of 1 to 20 years (18.4%). There were 6.3% and 1.1% cases in the age group of 61 to 80 years and 81 to 100 years respectively (Figure 1)

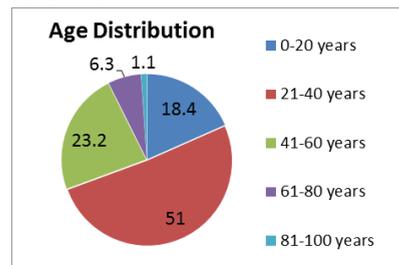


Figure 1. Age distribution of the breast FNAC cases

The cytological diagnosis of breast lesions by FNAC revealed maximum 448 (74%) cases in the category 2- benign, 21 (3%) cases in category 3- atypia. Sixteen (2%) cases in the category 4- suspicious for malignancy and 41 (7%) cases in category 5- malignant (Table 1).

Table 1. Cytological Diagnosis of Breast lesions by FNAC (n = 603)

Insufficient	77
Benign	448

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Atypia	21
Suspicious	16
Malignant	41

Category 2 included fibroadenoma, benign breast disease, benign cystic disease, fibroadenoma with usual ductal hyperplasia (UDH), gynecomastia, inflammatory, granulomatous mastitis, lipoma, simple cyst and epidermal cyst (Table 2).

Table 2. Category 2- Benign (n = 448)

Fibroadenoma	154	Fibroadenoma with UDH	16
Benign breast disease	116	Lipoma	6
Benign Cystic	42	Simple cyst	6
Gynecomastia	68	Epidermal cyst	1
Inflammatory	27	Tubercular	2
Granulomatous mastitis	10		

There were 21 (3%) cases in category 3 – atypia that included proliferative breast lesion along with papillary lesions and phyllodes (Table 3).

Table 3. Category 3- Atypia (n = 21)

ADH (proliferative breast lesion)	16
Papillary lesion	3
Phyllodes	2

This study acknowledged the fact that the most benign breast lesions were seen in young females, among which fibroadenoma was the commonest. The most common malignant lesion was infiltrating duct carcinoma seen more frequently in females in fourth and fifth decades of life.

On comparing the conventional reporting with standardized Yokohama system, we found that there is an absolute concordance in reporting of benign lesions but there is some difference in the grey zone lesions which were called atypia more by us (Figure 2)

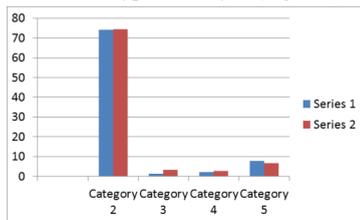


Figure 2. Comparison of conventional and standardized reporting (IAC Yokohama). Series 1 is the conventional reporting followed in our department and Series 2 is the classification following the IAC Yokohama guidelines.

Table 4 shows comparison between the cytological and histopathological diagnosis with discrepancy found in 3 cases: 2 cases malignant on histology were reported as atypia on cytology (false negative) and one case of fibrocystic disease was reported as suspicious on cytology (false positive). Thus out of 100 cases there were consistent findings in 97 cases and 3 cases had inconsistent findings (Table 5).

Table 4 -Cytological Histopathological Diagnosis

Cytological Diagnosis	Histopathological Diagnosis					
	No. of cases	Granulomatous mastitis	Fibroade noma	Fibroc ystic	Phyllo des	Maligna ncy
Benign	64	0	62	2	0	0
Fibrocystic	4	1	0	3	0	0
Granulomatous mastitis	2	2	0	0	0	0
Atypia	4	1	0	1	0	2
Phyllodes	1	0	0	0	1	0
Suspicious	4	0	0	1	0	3
Malignancy	21	0	0	0	0	21
Total	100	4	62	7	1	26

Table 5- Cytological Histopathological correlation

Cytological diagnosis	Histopathological diagnosis		
	No. of cases	Consistent	Inconsistent
28	International Journal of Scientific Research		

Benign	64	64	0	64
Malignant	21	21	0	21
Suspicious	4	3	1	4
Other	11	9	2	11
Total	100	97	3	100

The statistical analysis showed high sensitivity (88.88%) and high specificity (100%) of FNAC in breast lesions with a positive predictive value of 100% and negative predictive value of 96%. The diagnostic accuracy was found to be 97% (Figure 3).

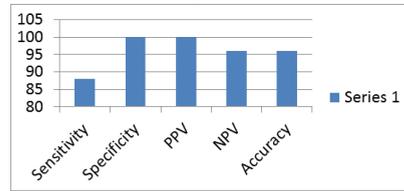


Figure 3. Statistical Analysis

FNAC Images

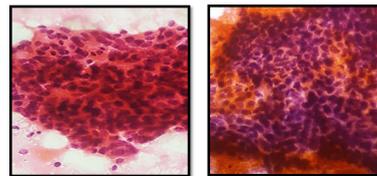


Figure 4. Crowded sheets of ductal epithelial cell with nuclear overlap and mild hyperchromasia/ nuclear membrane irregularity. Category 4-Suspicious (H & E stain 400X)

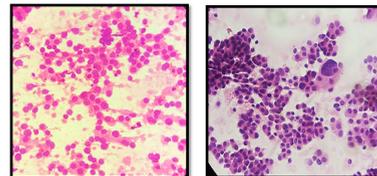


Figure 5. Cohesive clusters of tumor cells with irregular margins, pleomorphic cells with enlarged and hyper chromatic nuclei. Category 5-Malignant (H& E stain 400X)

DISCUSSION

The spectrum of breast lesions is very wide. It includes not only malignancy but many benign and proliferative lesions. As evident from our study, most cases of breast lesions are benign. The triple assessment approach for breast lesions that combines the clinical, radiological and pathologic information is used to ensure the accurate diagnosis and patient management. FNAC is an important component of this “triple approach”.

Despite its many benefits, there has been a diminished use of FNAC in recent years. We need to reconsider the value of breast FNAC not only in the under resourced countries, like ours, due to its cost effectiveness and simplicity but also in the developed nations. In our study we retrospectively recategorized 603 breast FNAC cases in accordance with the newly proposed IAC Yokohama reporting system and also determined the histopathological correlation. The international academy of cytology (IAC) system for reporting breast FNAC has been developed following an initial meeting at the Yokohama International Congress of cytology in 2016, by a group of cytopathologists, radiologists, surgeons and oncologists expert in management of breast lesions (7). This IAC Yokohama system defines five categories for reporting breast cytology, each with a clear descriptive term for the category, a definition, a risk of malignancy (ROM) and a suggested management algorithm (7).

The five categories of the IAC Yokohama system are:

1. Insufficient/ Inadequate
2. Benign
3. Atypical
4. Suspicious of malignancy
5. Malignant

The IAC reporting categories are also linked with the management

algorithms depending on the availability of local medical resources and local practices (7).

Category 1: Insufficient/Inadequate includes the smears that are too sparsely cellular or too poorly smeared or fixed to allow a cytomorphological diagnosis (7). It is recommended that seven tissue fragments each consisting of 20 or more epithelial cells to allow assessment of the architecture and the presence or absence of myoepithelial cells, should be a measure of adequacy (8). In certain conditions the assessment of adequacy may not require the epithelial material, like pus is consistent with abscess; a proteinaceous background with or without histiocytes is consistent with cyst and presence of fat tissue fragments in case of lipoma. Management includes to review the clinical and imaging findings, If the material does not explain the clinical or imaging findings then repeat FNAC up to a total of 3 times, ideally using ultrasound guidance; if FNAC is still insufficient then proceed to CNB. For the low and middle income countries review the clinical findings and if suspicious then repeat FNAC

Category 2: Benign.

A benign breast FNAC diagnosis is made in cases that have unequivocal benign cytological features, which may or may not be diagnostic of a specific benign lesion (7). The key cytological features of benign lesions include a pattern of predominantly large cohesive three dimensional tissue fragments and flat monolayered sheets consisting of evenly spaced, ductal epithelial cells creating a "bimodal" pattern, as well as "bare bipolar nuclei" representing stripped myoepithelial nuclei in the background (8). Management recommendations for this category include reviewing the clinical findings: If benign, nothing further but if suspicious then repeat.

Category 3: Atypical

The term atypical in breast FNAC is defined as the presence of cytological features seen predominantly in benign process or lesions, but with the addition of some features that are uncommon in benign lesions and which may be seen in malignant lesions (7). The specific cytomorphological features that are considered atypical include high cellularity, increased dispersal of single intact cells, enlargement and pleomorphism of nuclei, presence of necrosis or mucin, and complex micropapillary or cribriform architecture of epithelial tissue fragments (8).

Management includes reviewing the clinical and imaging findings and repeating FNAC, managing based on FNAC category. If repeat FNAC is still atypical then consider excisional biopsy.

Category 4: Suspicious of malignancy

This category includes the cases that show presence of some cytomorphological features which are usually found in malignant lesions but these features are inadequate either in number or quality, to make a definitive diagnosis of malignancy (7).

Management includes review of clinical and imaging findings and CNB is mandatory. If no CNB is available then excision biopsy should be done.

Category 5: Malignant

A malignant cytological diagnosis is an unequivocal statement that the material is malignant and the type of malignancy identified should be stated whenever possible (7). The cytological features include high cellularity, prominent dispersal of single cells having nuclear enlargement, anisonucleosis, pleomorphism, hyperchromasia and prominent nucleoli.

Management recommendation for this category are to review the clinical and imaging findings, if any discrepant findings then CNB and in case of concordant findings, proceed to definitive management.

In this study we recategorized the 603 FNAC cases in accordance with the new proposed IAC Yokohama reporting system. The histopathologic correlation was done and we determined the utility of FNAC.

Our results correlated with the other previously reported studies, with high sensitivity, specificity, PPV and NPV for breast FNAC.

CONCLUSION

IAC Yokohama system is simple and easy to use and is universally

acceptable by clinician and pathologists. Incorporation of checklist in addition will improve quality and workflow of the laboratory and cytopathologist. Linking with the management algorithm will enhance the use of FNAB by the clinician and use of CNB only when needed/guided by report. Our study concludes that breast cytology has high sensitivity and specificity with high PPV and NPV.

It can be used as first line of investigation; suggestion of the management will give a better message to the clinician and will improve the pickup rate of malignancy in atypical lesions.

REFERENCES

1. Malviya S, Bagadi SA, Dubey US, Saxena S. Epidemiology of breast cancer in Indian women. *Asia-Pac J Clin Oncol.* 2017;13(4):289-95. PMID: 28181405 DOI: 10.1111/ajco.12661.
2. Babu GR, Lakshmi SB, Thiagarajan JA. Epidemiological correlates of breast cancer in South India. *Asian Pac J Cancer Prev.* 2013;14:5077-83. PMID: 24175779 DOI: 10.7314/apjcp.2013.14.9.5077
3. Ali I, Wani WA, Saleem K. Cancer scenario in India with future perspectives. *Cancer Therapy.* 2011;8:56-70.
4. Srinath Reddy K, Shah B, Varghese C, Ramadoss A. Responding to the threat of chronic diseases in India. *Lancet.* 2005;366(9498):1744-9. PMID: 16291069 DOI: 10.1016/S0140-6736(05)67343-6
5. Balasubramaniam SM, Rotti SB, Vivekanandam S. Risk factors of female breast carcinoma: a case control study at Puducherry. *Indian J Cancer.* 2013;50(1):65-70. PMID: 23713049 DOI: 10.4103/0019-509X.112307
6. WHO. Breast cancer prevention and control: breast cancer burden [cited 2010 July]; Available from <http://www.who.int/cancer/detection/breastcancer/en/index1.html>.
7. Field AS, Raymond WA, Rickard M, Arnold L, Brachtel EF, Chaiwan B, Chen L, Di Bonito L, Kurtycz DFI, Lee AHS, Lim E, Ljung BM, Michelow P, Osamura RY, Pinamonti M, Sauer T, Segara D, Tse G, Vielh P, Chong PY, Schmitt F. The international academy of cytology Yokohama system of reporting breast fine needle aspiration biopsy cytopathology. *Acta Cytologica* 2019;63(4):257-73. PMID: 31112942 DOI: 10.1159/000499509.
8. Field AS. Chapter 5, Fine needle aspiration biopsy cytology of breast: a diagnostic approach based on pattern recognition. In: *Practical Cytopathology: A diagnostic approach to Fine Needle Aspiration Biopsy.* Edited by Field AS and Zarka MR, Amsterdam: Elsevier; 2017.