Section: Pathology

Original Research Article

UNVEILING BREAST FNAC TRENDS WITH THE YOKOHAMA SYSTEM: A TERTIARY CARE HOSPITAL'S PERSPECTIVE

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Abstract

Background: Efficient and accurate diagnosis of breast cancer plays a crucial role in its management. Fine Needle Aspiration Cytology (FNAC) is a widely accepted procedure for obtaining tissue samples for diagnosis. Over the past year, an extensive study was conducted at a tertiary care hospital, focusing on categorizing breast FNAC cases in accordance with the Yokohama System. This article aims to elucidate the significance of the Yokohama System, the methodology employed during the study, and the resulting implications for clinicians and patients. **Materials and Methods:** A retrospective study spanning over a period of one year and results analysed based on provided epidemiological details. The final diagnosis classified according to Yokohama system. **Result:** Maximum number of cases were female in the age group of 21-30 years with predominantly benign conditions belonging to IAC Yokohama category 2. **Conclusion:** Using a standardized classification system ensures consistency and reliability in reporting breast lesions and improves overall patient care.

INTRODUCTION

Breast carcinoma stands as the most prevalent cancer among females globally and is a leading cause of cancer-related deaths, particularly in developing nations. In developed countries, it ranks second only to lung cancer in terms of cancer-related mortality. In India, the incidence rate is notably high at 26 per 100,000 women, with a mortality rate of 13 per 100,000 women.[1] Despite this, there has been a significant 40% decline in mortality since 1989, attributed to widespread screening, early detection, and prompt treatment.[2] Fine-needle aspiration biopsy (FNAB), as part of a triple assessment, emerges as a crucial diagnostic tool for both palpable and impalpable breast lumps offering high sensitivity and specificity for both benign and malignant cases.. It is recognized for its simplicity, rapidity, cost-effectiveness, and minimal invasiveness. However, there is a contemporary shift towards core needle biopsy due to its ability to evaluate histological grade and hormonal status, including estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor (Her2). For breast cancer diagnosis, FNAC demonstrates a high sensitivity ranging from 90% to 95% and an impressive positive predictive value of approximately 100%.[3] Its low false-negative rate is associated with challenges in detecting low-grade ductal and lobular carcinoma, while the false-positive rate remains very low, typically attributed to fibroadenomas and papillary lesions. Optimizing FNAC usage involves ultrasonography (USG) guidance and rapid on-site evaluation (ROSE). The integration of cytological findings with clinical and radiological information in the "triple test" enhances FNAC's sensitivity and specificity, comparable to core needle biopsy when following the triple test parameters. The International Academy of Cytology (IAC) Yokohama Breast FNAC Reporting system, developed by expert cytopathologists in collaboration with surgeons, oncologists, and radiologists, aims to standardize reporting and improve the interpretation of breast cytology.[4] This system intends to enhance communication between cytopathologists and clinicians by linking reporting

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with management options. It emphasizes the importance of skilled biopsy techniques and proper smear preparation. It recommends using both air-dried Giemsa-stained direct smears and alcohol-fixed Papanicolaou-stained slides. The reporting system consists of five categories based on the risk of malignancy (ROM): Insufficient, Benign, Atypical, Suspicious of malignancy, and Malignant. The structured report should provide a diagnostic heading, a brief cytological description, and a conclusion. An "atypical" category is included to maximize the negative predictive value, while a "suspicious of malignancy" category maximizes the positive predictive value. Management decisions should consider the ROM for each category, linking them with local medical resources and practices.[5]

The IAC System aims to enhance communication between cytopathologists and clinicians, emphasizing consistent categories and clear diagnoses. Future research may refine these risk assessments, similar to the evolution of reporting systems in other medical fields.

This article presents the findings of a one-year study conducted in a tertiary care hospital, categorizing breast FNAC cases according to the Yokohama System. The risk of malignancy for each category is derived from recent literature, with management algorithms provided based on local resources.

MATERIALS AND METHODS

This is a retrospective study performed in a tertiary care hospital. FNAC was performed by a pathologist or a radiologist in case of ultrasound guided FNAC including a total of 360 cases, spanning various ages, genders, and lesion sites. Each case was analyzed based on the provided data, which included age, sex, site, and diagnosis. The FNAC diagnoses were classified according to the Yokohama System categories.

Inclusion criteria:

Both ultrasounds guided and direct breast FNAC of all age groups and both sexes were included in the study.

Exclusion criteria:

Previously treated or recurrence/repeat FNAC were excluded from the study.

RESULTS

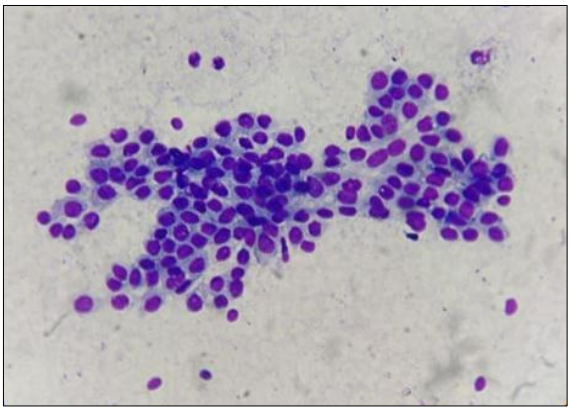

Figure 1: Lieshman stained (at 40X) showing presence of benign duct epithelial cells and bipoar cells – Category 2: Benign as per IAC Yokohama breast classification

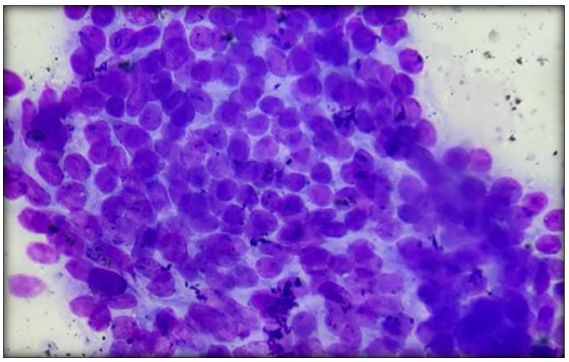

Figure 2: Lieshman stained(at 40X)showing presence of few atypical cells having irregular nuclear membrane and nuclear overlapping at places- Category 3: Atypical as per IAC Yokohama Breast classification

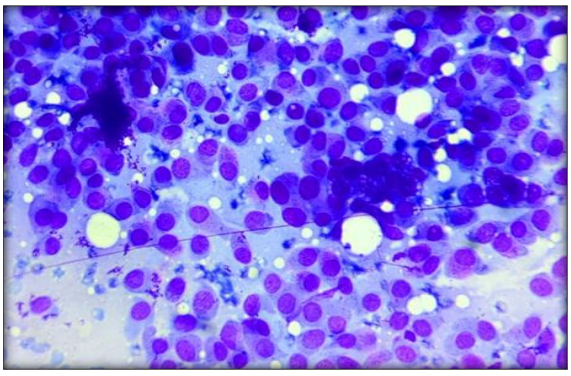

Figure 3: Lieshman stained (40X) showing presence of atypical cells having high N:C ratio, moderate basophilic cytoplasm with presence of granules.- Category 3: Aypical

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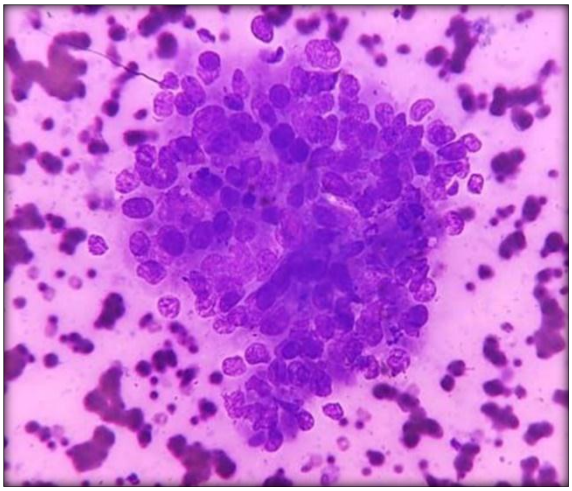

Figure 4: Pap stain (40X) showing malignant cells in clusters having high N:C ratio, irregular nuclear membrane and scant cytoplasm: Category 5 Malignant as per IAC Yokohama Breast

The study included a broad age range from 12 to 85 years with maximun cases in the age group of 21-30 years followed by 31-40 years suggesting that breast-related issues are not limited to a specific age group and affect individuals across different stages of life. Maximum number of cases is females (93.8%). Lesions were most frequently found on the left side. Diagnoses varied from benign conditions such as fibroadenoma and benign proliferative mammary lesions to malignant conditions including carcinoma breast and metastatic carcinoma with benign lesions comprising of 67.8%. Among the benign lesions the most common is fibroadenoma constituting 47% of all benign cases followed by benign proliferative mammary lesion with atypia (8%). Remaining 45% of benign cases include cystic lesions, inflammatory lesions, fibrocystic disease, granulomatous lesion, tubercular mastitis, galactocele and gynecomastia. Though carcinoma is prevelant in all the age groups, it is most common in older patients. The youngest patient in our data set with carcinoma breast is of 28 years. On categorizing the 360 cases of breast fnac as per the International Academy Of Cytology Yokohama System For Reporting Breast fine needle aspiration cytology – 33 cases were diagnosed as inadequate, 244 cases as benign, 11 cases as atypical, 2 cases as suspicious and 70 cases as malignant.

Table 1: Age Distribution

Age Group	No.	Percentage
11-20	36	10%
21-30	87	24.1%
31-40	85	23.6%
41-50	76	21.1%
51-60	33	9.1%
61-70	28	7.7%
71-80	12	3.3%
81-90	2	0.5%

Table 2: Gender Distribution

Gender	No. of Cases	Percentage
Male	22	6.2
Female	338	93.8

Table 3: Site Distribution

Site	No. of Cases	Percentage
Right	165	45.8
Left	180	50.0
Bilateral	15	4.2

Table 4: Diagnosis

IAC Category	No. of Cases	Percentage
Insufficient	33	9.2
Benign	244	67.8
Atypical	11	3.0
Suspicious	2	0.5
Malignant	70	19.5

DISCUSSION

Breast lesions encompass a broad spectrum, ranging from benign to malignant, with a majority being benign. The triple assessment approach, combining clinical, radiological, and pathological information, is crucial for accurate diagnosis and patient management, where Fine-Needle Aspiration Biopsy (FNAC) plays a vital role. Despite a decline in FNAC usage, its reconsideration is warranted, especially in resource-constrained countries, given its cost-effectiveness and simplicity.[2)] The International Academy of Cytology (IAC) introduced the Yokohama System, offering a standardized approach with five reporting categories, each associated with a risk of malignancy (ROM) and a suggested management algorithm. Categories include: 1.) Insufficient/Inadequate: Smears lacking cellular

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density or proper fixation for a diagnosis. Adequacy may not require epithelial material in certain conditions. 2.) Benign: Unequivocally benign cytological features, possibly without specific diagnosis. 3).Atypical: Features uncommon in benign lesions but not definitively malignant. Management involves reviewing clinical findings and repeating FNAC, with consideration for excisional biopsy if needed. 4.) Suspicious of Malignancy: Features suggestive of malignancy but insufficient for a definitive diagnosis. CNB is mandatory, followed by excision biopsy if necessary. 5). Malignant: An unequivocal malignant diagnosis, specifying the type of malignancy identified.

In the present study, 360 fine needle aspirates from the breast were retrospectively categorized according to the Yokohama reporting system. Our study had 9.2% insufficient, 67.8% benign, 3.0% atypical, 0.5% suspicious and 19.5% malignant lesions respectively similar to the results obtained by Kamatar et al.who had 5%C1, 71% C2,1%C3,2%C4, 21%C5 and study conducted by Ahuja et al who had 3.6%C1, 69.5%C2, 6.3%C3, 2.3%C4 and 18.2%C5 lesions respectively.[1,6]

FNAB smears are categorized as adequate or inadequate based on material assessment on the slides Considerable variations exist in defining insufficient/inadequate and associated rates, influenced by factors such as practitioner skill, direct smear preparation quality, lesion nature, and the number of FNAB passes.[7] Reduction of insufficient rates can be achieved through improved training, increased case load for experience, ultrasound guidance, immediate feedback through ROSE or cytopathologist-performed FNAB, and rapid correlation with imaging and clinical findings. Practitioners with experience should aim for an insufficient rate below 5%, particularly with ROSE utilization, while a rate of 10–20% requires procedure review. Rates exceeding 20% demand urgent review of practitioner techniques. If technical issues cause insufficient smears, FNAB repetition to a maximum of three passes is recommended. If the insufficiency results from inadequate cellularity to explain the expected diagnosis, repetition is necessary. Further management is determined by correlating with clinical and imaging findings in the triple test, facilitated by ultrasound guidance and ROSE. In cases where imaging is indeterminate or suspicious, repeat FNAB or CNB is mandatory. For benign or low-risk imaging, some practices may opt for follow-up with clinical or imaging review at 3–6 months. In settings lacking imaging, close correlation of clinical and FNAB findings is essential, with repeat FNAB usually recommended. Cytological features characteristic of benign lesions include predominantly large cohesive three-dimensional tissue fragments, flat monolayered sheets of evenly spaced ductal epithelial cells with myoepithelial cells creating a "bimodal" pattern, and "bare bipolar nuclei" representing stripped myoepithelial nuclei. Common benign lesions diagnosed through FNAB encompass acute mastitis, granulomatous mastitis, foreign body reactions, fat necrosis, cysts, fibrocystic changes, lactational changes, usual epithelial hyperplasia, fibroadenomas, intraductal papillomas, and intramammary lymph nodes. While FNAB directed by palpation has historically provided accurate diagnostic workups, the current best practice involves pre-FNAB imaging, utilizing ultrasound or other imaging for guidance, and correlating clinical, imaging, and cytological findings in the triple test. A benign FNAB diagnosis that correlates with clinical and imaging findings typically require no further biopsy, and no specific recommendation is needed in the report. However, in cases of indeterminate or suspicious clinical or imaging assessments, a benign FNAB diagnosis should be reported, and follow-up biopsy, usually by CNB, is recommended. An associated ROM reported in the range of 1–3%. Recent studies have reported an NPV ranging from 97.1 to 98.97%.[8]

In breast FNAB cytology, "atypical" is defined as the presence of cytological features predominantly seen in benign processes or lesions but accompanied by additional features uncommon in benign conditions and indicative of potential malignancy. The ROM (Risk of Malignancy) for an atypical diagnosis varies in the literature, ranging from 22 to 39%, with recent studies applying the IAC Yokohama System reporting ROMs of 13 and 15.7%. Poor FNAB technique, such as low cellularity, blood or ultrasound gel obscuration, and crush artifacts due to forceful smearing, can contribute to atypical diagnose .Overlapping cytological features among proliferative breast lesions, low-grade in situ lesions, and invasive carcinomas can also pose interpretative challenges. Recognition of features related to low-grade lesions versus proliferative lesions is crucial. Repeat FNAB is recommended if the atypical diagnosis results from a technical problem. Application of the triple test (clinical, imaging, and cytological findings) is essential. If clinical or imaging findings are indeterminate or suspicious, repeat FNAB or CNB is mandatory.[9]

Similar to the term "atypical," the definition and use of "suspicious of malignancy" vary, reflected in a published range of Positive Predictive Value (PPV) from 60 to 95%.[10,11] Recent studies applying the IAC Yokohama System reported ROMs for a "suspicious of malignancy" diagnosis of 97.1 and 84.6%.Causes for a "suspicious of malignancy" diagnosis align with those of the atypical category and include technical issues related to the operator's skill during FNAB, smear preparation, material handling, the interpreting cytopathologist's experience, and the nature of the breast lesion. It necessitates a review of imaging findings, and further biopsy, typically core needle biopsy (CNB), is mandatory. If CNB is unavailable, surgical excision biopsy is required before specific treatment.[12]

A malignant cytological diagnosis in breast FNAB is a definitive statement indicating the presence of malignancy. Whenever possible, the specific type of

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malignancy should be identified. The Positive Predictive Value (PPV) of a malignant breast FNAB ideally approaches 100%, with a reported range from 92 to 100% in various studies, including recent ones utilizing the IAC Yokohama Reporting System.[3,7,8] The recommendation is to mention or suggest the type of malignancy in the report whenever possible. Ancillary studies, like E-cadherin for lobular carcinoma, can be applied to cell blocks or liquid-based cytology for further characterization. A malignant FNAB diagnosis requires correlation with clinical and imaging findings. If the triple test is concordant and cell block material is available, definitive therapy, including neoadjuvant chemotherapy and surgery, can commence. Some centers proceed to surgical excision with markers performed on the excised lesion based on a positive triple test. However, many centers and protocols require core needle biopsy (CNB) before definitive treatment. If there's a lack of correlation with the triple test, CNB or simple excision biopsy is mandatory before initiating definitive treatment. In cases of palpable or suspicious axillary lymph nodes, FNAB is recommended for staging, followed by CNB if necessary. Sentinel lymph node biopsy is required based on the cytology findings.[13]

CONCLUSION

In conclusion, the IAC Yokohama system is user-friendly and universally accepted. Its incorporation into clinical practice, along with checklists, can enhance laboratory workflow. Linking it with management algorithms facilitates clinician understanding and guides the use of FNAC, affirming its high sensitivity and specificity, making it a valuable first-line investigation for breast lesions.

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