

Correlation of Fine Needle Aspiration Cytology with Histopathological Examination in the Diagnosis of Palpable Breast Lesions

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Abstract:

Background: The most common malignancy among women worldwide is breast cancer. For patient care, a precise preoperative assessment of breast masses is essential. The diagnostic technique known as FNAC is quick, accurate, and reasonably priced. Classifying breast lesions and assessing the relationship between FNAC and histology are the objectives of this study.

Methods: Over the course of six months (January–July 2024), this retrospective study was conducted in the pathology department of Dr. S.N. Medical College and Hospital in Jodhpur. FNAC was performed on 120 palpable breast lumps. The cytological findings were categorized using the IAC Yokohama Reporting System and compared with histopathological results where available.

Results: Among 216 FNACs performed, 132 cases were benign, 47 malignant, 21 equivocal, and 16 inadequate. Histopathological correlation was available in 72 cases (33.3%). FNAC demonstrated a sensitivity of 100% and a specificity of 97.4%. Most benign lesions occurred between ages 10–30, while malignant lesions predominated between 30–70 years. Duct ectasia and granulomatous mastitis presented as diagnostic pitfalls. For assessing breast lesions, FNAC is a dependable, minimally invasive diagnostic technique with excellent sensitivity and specificity. It significantly reduces the need for open biopsies when used alongside clinical and radiological assessment.

Keywords: FNAC, Breast Lesions, Histopathology, Triple Assessment, Cytology-Histology Correlation.

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Introduction

Since breast cancer is the most common malignancy in women globally, preoperative evaluation of breast lumps is crucial to the treatment of breast abnormalities [1] [2]. With an incidence peak in the fourth and fifth decades, breast lesions are prevalent in younger age groups. Usually, malignant tumors develop following menopause. A pathologist must distinguish between benign and malignant breast lesions since breast lumps are a typical diagnostic problem for surgeons [3]. Triple assessment, which consists of imaging, histological tests, and clinical examination, can provide a solid diagnosis in more than 95% of instances [4]. A simple, dependable, affordable, and cost-effective diagnostic method with high patient acceptance and quick results is fine needle aspiration cytology (FNAC) [5]. Roussel et al. (1989) showed that using 22-gauge needles for suction reduces the incidence of needle track seeding of cancer cells [6]. In the Triple Test, which evaluates breast lumps in conjunction with clinical examination and mammography, FNAC is essential for differentiating between benign and malignant

breast tumors [7]. Round to oval in shape, benign breast lesions usually have regular, straight edges, a homogeneous echo texture, and a hypoechoic appearance. On the other hand, malignant breast lesions may exhibit micro-calcifications and frequently have an uneven shape with ill-defined, spiculated edges [8]. Breast cancer has been detected and treated earlier thanks to improvements in screening and increased public awareness. Morbidity and mortality rates have consequently dramatically dropped, particularly for younger women [9]. For both screening and symptomatic patients, FNAC is the first-line pathological examination in the majority of nations [10]. Diagnostic accuracy is increased when FNAC is used with cell block preparations, especially in environments with restricted resources [11]. It has been shown that FNAC reduces the number of open biopsies due to its high diagnostic sensitivity and specificity. However, some facilities still employ open biopsy because of a lack of qualified cytologists [12]. Based on the histological analysis

of tissue samples, a biopsy of a palpable breast lesion gives surgeons and oncologists crucial information for creating cutting-edge, successful therapeutic approaches as part of a patient's treatment plan [13]. This strategy makes it possible to use neoadjuvant therapy, which in some situations can improve treatment results. Numerous studies indicate that FNAC is a valuable diagnostic tool because to its 80% to 98% sensitivity and 99% to 100% specificity ranges. These high sensitivity and specificity rates support FNAC as a reliable alternative to open biopsy for accurate diagnosis in breast lesion assessment [14].

Cytological assessment through FNAC helps to prevent unnecessary biopsies in the majority of cases by providing preliminary insights into the nature of breast lesions. While FNAC may not yield a definitive diagnosis in all instances, it facilitates disease categorisation and supports differential diagnosis. Histopathological analysis of a breast lesion from a tissue sample is frequently required to validate these results in order to ensure precise correlation, comprehensive diagnosis, and efficient patient care. The present study aims to categorise breast lesions and evaluate the diagnostic accuracy and correlation between FNAC findings and histopathological results, providing a comprehensive approach to breast lesion assessment.

Aim: The objective is to categorize and differentiate the breast lesions and examine the connection between FNAC and the histology of any perceived breast abnormalities.

Materials and Methods

Department of Pathology at Dr. S N Medical College and Hospital Jodhpur carried out this retrospective investigation over the course of six months, from January to July 2024. Patients of both sexes, ages 10 to 100, who were referred by surgeons and with symptoms such pain, palpable breast swelling with or without nipple secretion and ill-defined swelling. The study excluded patients with recurring tumors after prior operations or chemoradiotherapy, those receiving neoadjuvant chemotherapy, and those with breast cancer that had spread to the breast.

A 23-gauge needle connected to a 5-milliliter syringe was used to perform FNAC on 120 patients with different breast lesions. The sample material was carefully smeared onto two or three pristine glass slides after aspiration. Using a Coplin jar, the slides were instantly fixed in 99% isopropyl alcohol before being stained with Giemsa and pap stain. Sediment smears were made and stained with giemsa in situations where fluid was aspirated. If initial smears were inadequate, FNAC was repeated once more to obtain sufficient material. Radiological findings for each case were also recorded.

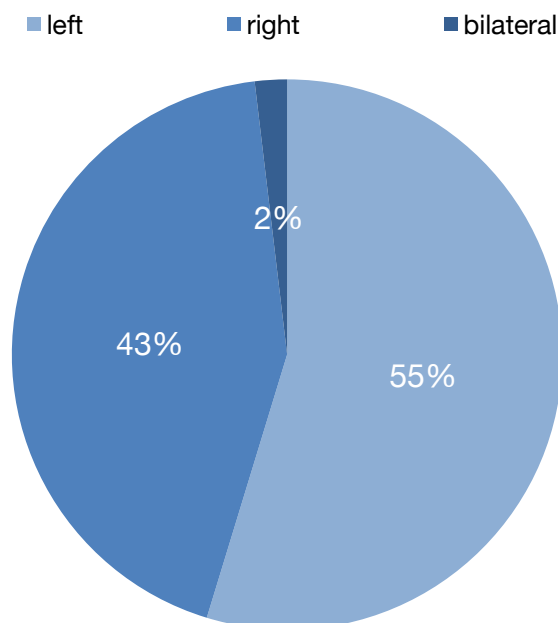
The stained slides were examined under a light microscope, and the breast lesions were categorized using the Yokohama Reporting System developed by the International Academy of Cytology (IAC). Insufficient, benign, atypical, suggestive of malignancy, and malignant are denoted by the letters C1, C2, C3, and C5, respectively.

Following processing and staining with the Hematoxylin and Eosin (H&E) procedure, specimens obtained for histopathological analysis were examined under a microscope. Histopathology and FNAC slides were both obtained, carefully examined, and linked. Every slide was carefully inspected, and the results were methodically documented.

Results

Over the course of the research, 216 breast tumors in total required FNAC. On cytology, male breast lesions are identified as gynecomastia; of them, 20 were male and the rest were female. Out of the total, 16 were insufficient, 21 were inconclusive, 47 were malignant, and 132 were benign. Biopsies were later performed on 72 of the total patients, representing a 33.3% biopsy rate. In our analysis, there were more left breast lesions (55%) than right breast lesions (43%). This study included the age range of 10 to 90 years, with the 30 to 50-year-old group being the most affected.

The age range of 10–30 had the highest rates of benign lesions, while women aged 30–70 had the highest rates of malignancy.

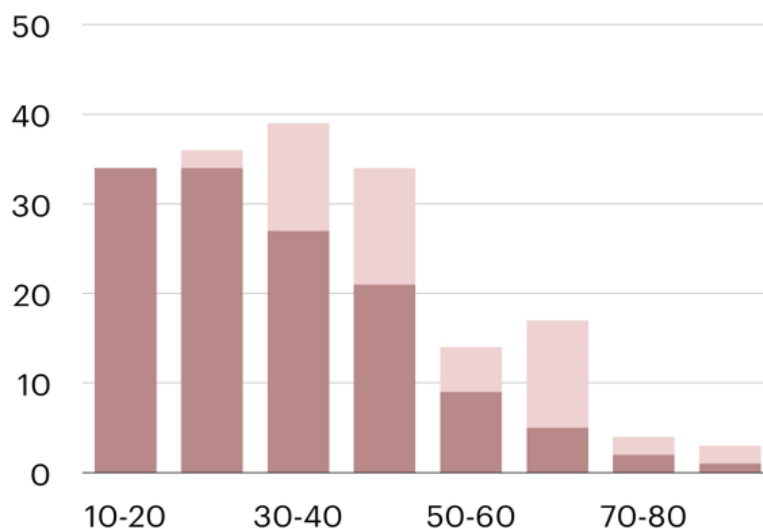


	Inadequate	Benign	Atypical	Suspicious	Malignant
10-20	2	34	0	0	0
20-30	4	34			2
30-40	3	27	1		12
40-50	2	21	2	2	13
50-60	7	9	1	1	5
60-70	1	5			12
70-80		2			2
80-90	1	1			2

Cytological diagnosis	HPE Malignant lesions	HPE Benign lesions	Total
Malignant lesion	27	1	28
Benign lesion	0	37	37
Total	27	38	

Of the 132 cases that FNAC classified as benign, 37 underwent biopsies, and all of the patients had histological examinations that revealed benign lesions. A tiny, freely moving breast lump (2–3 cm) without any accompanying symptoms was the clinical presentation of benign breast lesions in the current investigation; a limited number of individuals had a history of trauma and had localized pain.

A big breast lump (5–6 cm) that is adherent to the underlying tissue is the clinical presentation of the majority of malignant breast lesions; some also exhibit axillary lymphadenopathy and nipple retraction. Cases diagnosed as malignant on cytology (48 cases) out of which 28 were biopsied with 27 cases diagnosed as malignant on HPE but one case of 41 year female presenting with nipple retraction was diagnosed as Granulomatous mastitis on HPE.



In our study, it was seen that cases presenting with nipple retraction can also be benign. At least 8 cases of cohort, ages ranging from 30-60 years were diagnosed as Granulomatous mastitis, duct ectasia and also fibrocystic disease. Four instances were identified by cytology as having abnormal cells; one of these cases underwent biopsy and was found to have invasive duct carcinoma; the other cases did not.

3 cases which were reported as suspicious for malignancy on cytology were biopsied and reported as duct ectasia in 50 year female, infiltrating duct carcinoma in 60 year female and mesenchymal tumor in 67 year female. In our study it is found that duct ectasia cases present as diagnostic pitfalls in breast cytology.

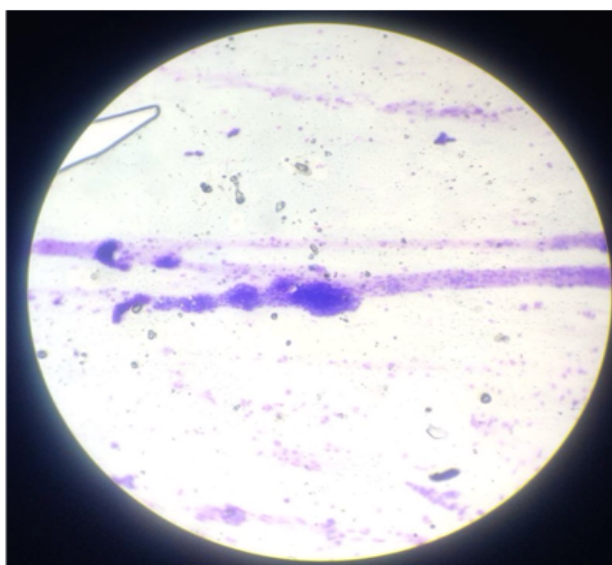


Figure 1: Fibroadenoma cytology (100x)

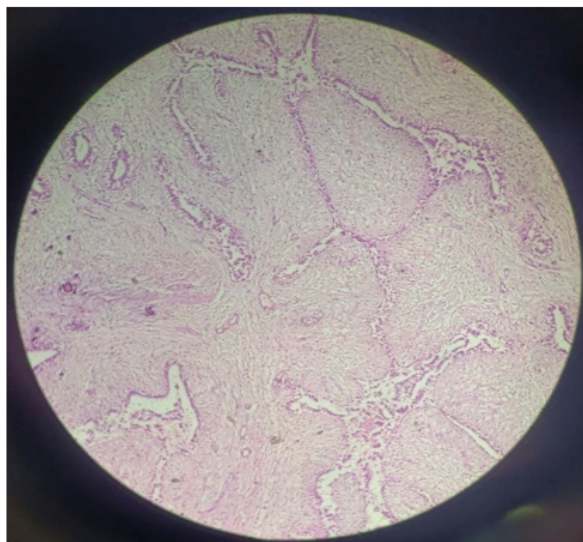


Figure 2: Fibroadenoma in low power (H and E 40x)

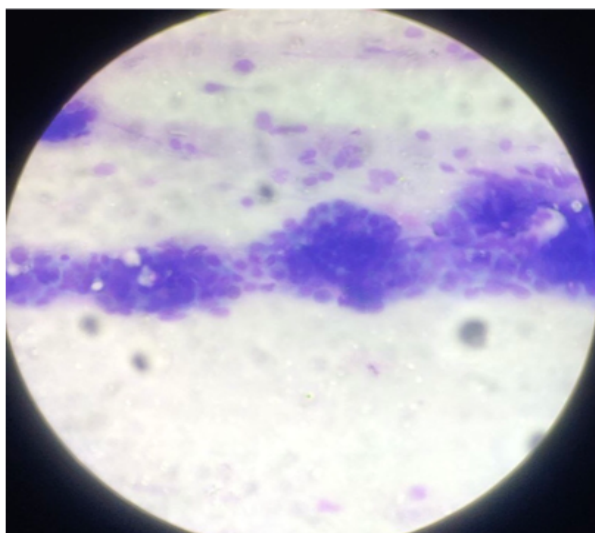


Figure 3: Fibroadenoma cytology (400x)

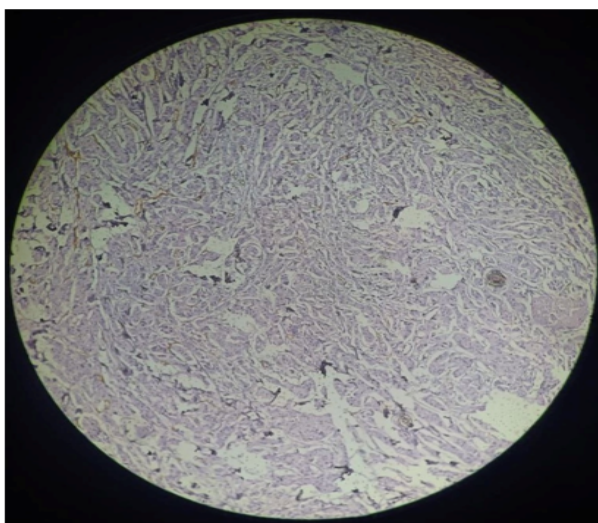


Figure 4: H and E image(100x) of infiltrative ductal carcinoma

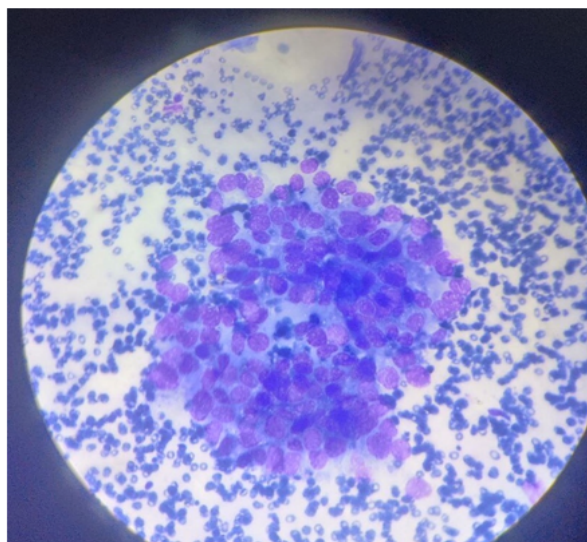


Figure 5: Malignant breast lesion on cytology in high power

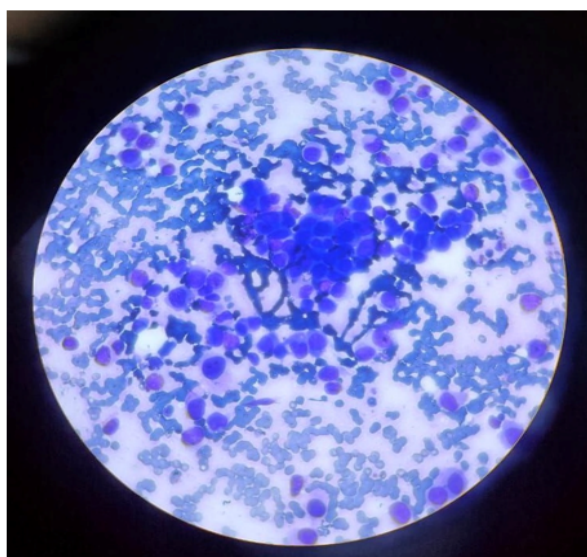


Figure 6: Suspicious for malignancy on FNAC smear (Atypical ductal epithelial cells with high N: C ratio, open chromatin, intranuclear inclusion)

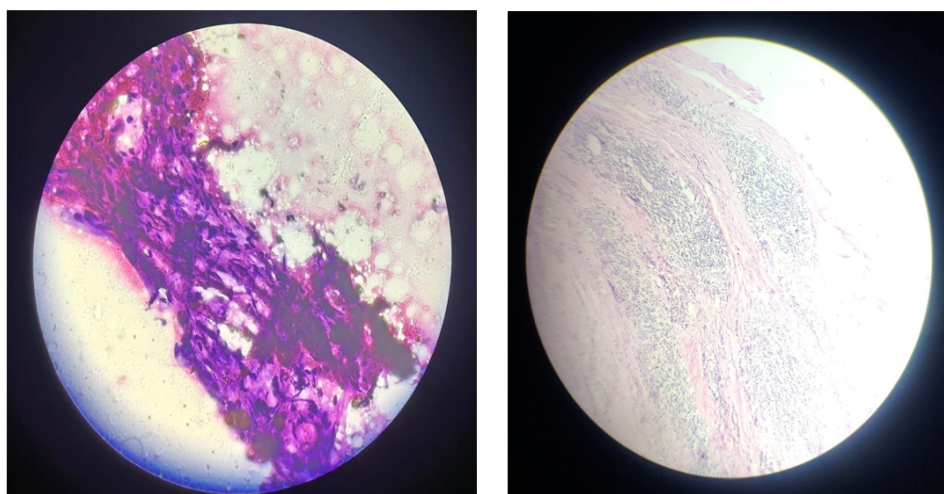


Figure 7: Granulomatous mastitis on FNAC and histopathology slide

Discussion

Changes in women's lifestyles and improvements in screening and diagnosis have increased the prevalence of breast cancer worldwide. An established and commonly used diagnostic method, FNAC of a palpable breast lump is renowned for its excellent accuracy in differentiating between benign and malignant lesions. In contrast to studies by Shrikanth et al. and Rupam et al., which found that the right breast was more prevalent, our study found that the left breast had a higher distribution of breast lesions than the right. This is consistent with research by Risaldar et al. and Clegg lemptev et al.

In line with studies by Tiwari, Qasim et al., Risaldar et al., and Dominique et al., fibroadenoma was the most common breast lesion in our group. The majority of benign breast lesions seen in our current study occurred in the age range of 10–40 years, which is consistent with Khemka et al. (15–44 years) and Rocha et al. (14–40 years). But most of the benign cases that MacIntosh et al. described were between the ages of 27 and 77. According to our study, malignant lesions were discovered in people aged 30–70, which is in line with findings from other studies like Shrikant (31–70 years), Khemka et al. (35–84 years), and Rocha et al. (41–75 years). This implies that breast cancer may develop as early as a person fourth decade of life. In our study as well, a woman in her 30s was diagnosed with malignancy for the first time. Histopathology revealed that one instance of an insufficient FNAC smear was infiltrating duct cancer. This resulted from improper use of FNAC and failure to repeat after surgery and treatment.

In breast lesions, the FNAC's sensitivity was 100%, per studies by Ibikunle et al. and Ariga et al. The FNAC's 97.4% specificity in breast lesions is consistent with research conducted by Sankhaye et al. False negative and false positive outcomes are both possible. The overlapping characteristics of several lesions pose the most challenge to diagnosis.

Conclusion

According to the study, FNAC is a useful, quick, and accurate diagnostic method for breast lesions. FNAC demonstrates high sensitivity and specificity with low rates of false positive and false negatives. FNAC cases reported as atypical cells correlate with a diagnosis of carcinoma breast in majority of cases. FNAC reported as suspicious of malignancy were confirmed as carcinoma breast in 66% of cases. Duct ectasia mostly present as a diagnostic dilemma on cytological evaluation. Triple assessment approach is least invasive and accurate tool based on which treatment can be started and invasive surgical procedures can be minimised.

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