

The Role of Fine Needle Aspiration Cytology in Palpable Breast Lesion: A Comparative Analysis with Histopathology

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Conflict of interest: Nil

Abstract:

Background: Breast lumps or masses are very common, particularly among women of reproductive age. Over 25% of women are affected by breast disease in their lifetime, and the vast majority of these cases will present initially as a new breast mass in the primary care setting.

Objective: To evaluate fine needle aspiration cytology of palpable breast lesions with histopathologic correlation at a tertiary care centre.

Methods: This Observational study was conducted among all the samples received in Pathology Department of patients attending OPD and IPD of a Medical college and a tertiary care hospital in Eastern Maharashtra.

Results: The mean age was 37.28 ± 13.91 years. 55 cases were from the left side (58.51%) and 39 cases were of right-side mass (41.49%). The most common diagnosis on FNAC was fibroadenoma seen in 33 cases (35.11%). Followed by Ductal carcinoma in situ in 13 cases (13.83%). Atypical ductal hyperplasia was seen in 9 cases (9.57%). FNAC showed that we had 63 benign cases (67.02%) 22 were malignant cases (23.40%) and 9 were premalignant cases (9.57%). The most common diagnosis on histopathology was fibroadenoma seen in 29 cases (30.85%).

Conclusions: FNAC is a great tool for the screening of the breast lesions. It is less invasive, cheap and can be done even at peripheral centers. We observed that FNAC showed good sensitivity, specificity and accuracy in diagnosing breast lesions.

Keywords: Breast Screening, NPV (Negative Predictive Value), PPV (Positive Predictive Value), Specificity, Sensitivity, Histopathologic Correlation, Palpable Breast Lesions, Fine Needle Aspiration Cytology.

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Introduction

Breast cancer is second most common cancer in the women in India [1]. Palpable Breast lump is the most common presentation in most of the breast diseases. Increase in cases of breast cancer is related to late marriage, birth of child in later age, shorter period of breast feeding and multiparity or low parity [2-4].

A palpable breast mass is the most common symptom associated with both benign and malignant diseases of the breast. Palpable breast masses should accurately be classified preoperatively into benign and malignant masses for proper oncologic surgical management and for avoiding unnecessary surgical intervention [5]. Although benign breast lesions are common, every patient should be evaluated to exclude or confirm malignancy as malignancy is managed by more radical surgery and adjuvant therapy. Breast carcinoma is one of the leading

causes of malignancy in females [6]. The ideal diagnosis of palpable breast masses includes triple assessment, which includes clinical examination, imaging (mammography/ ultrasonography) and FNAC. The application of FNA (Fine Needle Aspiration) for the diagnosis of palpable breast masses was first introduced by Martin and Ellis in 1930 [7]. Fine needle aspiration cytology (FNAC) is a technique that is routinely done on palpable lesions such as superficial growths of the skin, subcutis, soft tissues, and organs such as the Thyroid, Breast, Salivary Glands, and superficial Lymph nodes. It is a simple procedure that can be easily repeated [8].

FNAC of the breast can be done on both palpable and non-palpable lesions, the latter with the help of imaging techniques like ultrasound and mammography. The main purpose of FNAC of

breast lesions is the investigation of any palpable lump and to avoid unnecessary surgery in specific benign conditions. The scope of cytology now extends into identifying the subtypes of benign and malignant breast lesions. It is also used in the detection of minimal residual disease to plan a therapeutic protocol and eventual follow-up. It plays a major role as an important preoperative assessment procedure along with clinical correlation and imaging which are referred to as the "Triple Test". FNAC still happens to be a popular modality of diagnosis because of its overall accuracy in experienced hands, least invasiveness, ability for repeat testing, and speed of giving results [9].

The overall accuracy of FNAC in diagnosis of Breast lesions is reported to be about 97.40%. Multiple factors affect the diagnostic accuracy of breast FNAC like skill, experience, preparation and reading of smears. Accuracy can be improved by experience. The best results can be achieved if the cytopathologists who read the FNAC also report histopathology as well [10,11].

Definitive diagnosis is sometimes not possible on FNAC alone, either due to indigenous limitations of FNAC or sometimes inability to obtain adequate material. In such cases FNAC can be presumptive. FNAC is not replacement of either trucut or open biopsy. For final diagnosis histological examination of tissue is required [12].

Hence this study was conducted to evaluate fine needle aspiration cytology of palpable breast lesions with histopathologic correlation at a tertiary care centre.

Materials and Methods

This Observational study was conducted among all the samples received in Pathology Department of patients attending OPD and IPD of a Medical college and a tertiary care hospital in Eastern Maharashtra. Duration of study was from January 2021 to June 2022. Ethical clearance for the study was taken from institutional ethics committee after discussion of the study protocol with committee.

Inclusion Criteria: All cases of Fine Needle Aspiration of Palpable Breast lesions during the study period.

Exclusion Criteria:

- Patients who do not give consent for the study.
- Cases where diagnosis is already known and undergoing treatment.

Cytopathological Procedure:

1. The procedure was explained to the patient and oral consent obtained.

2. The patient was laid supine and the lump was localized by palpation and cleaned with a sterile swab.
3. FNAC was done using 22–23-gauge needle. Needle was inserted into the mass and aspiration done under negative pressure.
4. Aspiration was uniformly spread over a clean slide and the smear was fixed using 100% alcohol.
5. The slides were stained with Papanicolaou Stains.
6. The slides were examined under the microscope in low power and high power and the smear was reported accordingly.

Haematoxylin and Eosin staining Procedure:

1. Deparaffinize in hot air oven.
2. Hydrate the section.
3. 3 dips in xylene (2 Min. each)
4. 3 dips in acetone / alcohol (2 Min. each)
5. In running tap water for 5 Minutes.
6. Mayer's haematoxylin for 15 minutes.
7. Wash in running tap water for 20 minutes.
8. Counter stain with eosin for 2 minutes.
9. Dehydrate the section in 95% and absolute alcohol/ acetone changes (2minutes each).
10. Clear in xylene 3 changes (2 minutes each).
11. Mount in Dibutylphthalate Polystyrene Xylene.

Results

- Nucleus - blue
- Cytoplasm and background - pink

Statistical Analysis: Data were collected using a semi-structured, pretested questionnaire and entered into Microsoft Excel. The data were presented in frequencies and percentages. Means and standard deviations of quantitative variables were calculated. Appropriate statistical tests were applied using SPSS software version 21. A p- value of less than 0.05 was considered statistically significant.

Results

We got 94 cases satisfying our study inclusion criteria in our study period; we included all of them in our observations. The mean age was 37.28 ± 13.91 Years, with the majority of the patients from age groups 21 to 30 years and 31 to 40 years with 27 cases each (28.72%) followed by 51 to 60 years with 15 cases (15.96%). 55 cases were from the left side (58.51%) and 39 cases were of right side mass (41.49%). The most common diagnosis on FNAC was fibroadenoma seen in 33 cases (35.11%) followed by Ductal carcinoma in situ in 13 cases (13.83%). Atypical ductal hyperplasia was seen in 9 cases (9.57%). (Table 1)

Table 1: Diagnosis In FNAC

Diagnosis In FNAC	Frequency	Percent
Fibroadenoma	33	35.11
Ductal Carcinoma In Situ	13	13.83
Atypical Ductal Hyperplasia	9	9.57
Fibroadenosis	6	6.38
Galactocele	4	4.26
Infiltrating Ductal Carcinoma	3	3.19
Invasive Ductal Carcinoma	3	3.19
Suspicious Of Malignancy	3	3.19
Phyllodes Tumour	2	2.13
Abscess	2	2.13
Granulomatous Mastitis	2	2.13
Gynaecomastia	2	2.13
Simple Cystic Lesion Of Breast	2	2.13
Fibroadenosis	1	1.06
Benign Breast Lesion	1	1.06
Fibrocystic Disease	1	1.06
Haemorrhagic Smear	1	1.06
Inflammatory Lesion	1	1.06
Intraductal Papilloma	1	1.06
Mucinous Carcinoma	1	1.06
Papillary Neoplasm	1	1.06
Phyllodes Tumour	1	1.06
Pyogenic Abscess	1	1.06
Total	94	100%

FNAC showed that we had 63 benign cases (67.02%), 22 malignant cases (23.40%) and 9 premalignant cases (9.57%) (Table 2).

Table 2: FNAC findings

FNAC findings	Frequency	Percent
Benign	63	67.02%
Malignant	22	23.40%
Premalignant	9	9.57%
Total	94	100%

Table 3: Histopathological Findings

Diagnosis In Histopathology	Frequency	Percent
Fibroadenoma	29	30.85
Infiltrating Ductal Carcinoma	13	13.83
Phyllodes Tumour	6	6.38
Ductal Carcinoma	4	4.26
Fibroadenosis	4	4.26
Medullary Carcinoma	4	4.26
Adenomyoepithelial Adenosis	3	3.19
Chronic Mastitis	3	3.19
Complex Fibroadenoma	3	3.19
Fibrocystic Disease Of Breast	3	3.19
Lobular Carcinoma	3	3.19
Fibroadenoma With Myxoid Change	2	2.13
Granulomatous Mastitis	2	2.13
Gynaecomastia	2	2.13
Atypical Ductal Hyperplasia With Fibrocystic Change	1	1.06
Duct Papilloma	1	1.06
Florid Adenosis	1	1.06
Galactocele	1	1.06
Infiltrating Ductal Carcinoma With Neuroendocrine Differentiation	1	1.06

Invasive Micropapillary Carcinoma	1	1.06
Invasive Breast Carcinoma (Ductal +Lobular)	1	1.06
Invasive Ductal Carcinoma	1	1.06
Lactating Adenoma	1	1.06
Papillary Carcinoma	1	1.06
Pheohyphomycosis	1	1.06
Sarcoidosis Of Left Breast	1	1.06
Sclerosing Adenosis	1	1.06
Total	94	100%

The most common diagnosis on histopathology was fibroadenoma seen in 29 cases (30.85%) followed by infiltrating Ductal carcinoma in 13 cases (13.83%). Phyllodes Tumour was seen in 6 cases (6.38%). (Table 3). Histopathological evaluation showed that we had 64 benign cases (68.09%), 29 malignant cases (30.85%) and 1 premalignant case (1.06%). (Table 4)

Table 4: Histopathology Findings

Histopathology Findings	Frequency	Percent
Benign	64	68.09%
Malignant	29	30.85%
Premalignant	1	1.06%
Total	94	100%

We found that the different diagnostic test evaluation parameters of FNAC in comparison with histopathological evaluation (Table 5).

Table 5:

	Histopathology (Malignant)	Histopathology (Benign)	Total
FNAC Malignant	21	1	22
FNAC Benign	8	64	72
Total	29	65	94
Evaluation of diagnostic test			
Parameter	Value	95% Confidence Interval	
Sensitivity	72.41%	52.76% - 87.27%	
Specificity	98.46%	91.72% - 99.96%	
Positive Predictive value	95.45%	74.78% - 99.33%	
Negative Predictive value	88.89%	81.59% - 93.52%	
Accuracy	90.43%	82.6% - 95.53%	

Sensitivity of FNAC in our study was 72.41% (95% CI - 52.76% to 87.27%). Specificity was 98.46% (95% CI - 91.72% to 99.96%). Positive predictive Value was 95.45% (95% CI - 74.78% to 99.33%). Negative Predictive Value was 88.89% (95% CI - 81.59% to 93.52%). Accuracy was 90.43% (95% CI - 82.60% to 95.53%).

Discussion

The mean age was 37.28 ± 13.91 Years, with the majority of the patients from age groups, 21 to 30 years and 31 to 40 years with 27 cases each (28.72%) followed by 51 to 60 years with 15 cases (15.96%). We observed that the mean age of patients with Benign lesions was significantly less than the mean age of patients with malignant lesions ($p < 0.05$). Shresth A et al [13] observed that most common age group was 21 - 40 years and benign breast lesions were common in the age group of 21-30 years and malignant breast lesion common in the age of 41-50 years of age, these findings were

similar to our study. David E. Ibikunle et al [14] observed that the FNAC aspirates were obtained from 275 (95.2%) females and 14 (4.8%) males. We had all females in our study (100%). The mean age of their participants was 35.2 years, similar to our study. Adetola Olubunmi Daramola et al [15] observed that mean age of their participants was 29.5 years, similar to our study. 55 cases were from the left side (58.51%) and 39 cases were of right-side mass (41.49%). Thresh A et al [13] observed that there were 55% cases from left side and 45% cases from right side. The most common diagnosis on FNAC was fibroadenoma seen in 33 cases (35.11%) followed by Ductal carcinoma in situ in 13 cases (13.83%). Atypical ductal hyperplasia was seen in 9 cases (9.57%). FNAC showed that we had 63 benign cases (67.02%), 22 malignant cases (23.40%) and 9 premalignant cases (9.57%). The most common diagnosis on histopathology was fibroadenoma seen in 29 cases (30.85%) followed by infiltrating Ductal carcinoma in 13 cases

(13.83%). Phyllodes Tumour was seen in 6 cases (6.38%). Histopathological evaluation showed that we had 64 benign cases (68.09%), 29 malignant cases (30.85%) and 1 premalignant case (1.06%). Thresh A et al [13] observed that fibroadenoma was most common benign lesion and ductal carcinoma was the most common malignant lesion. David E. Ibikunle et al [14] observed that the most common breast lesions were fibroadenoma (32%) similar to our study. Sahil I. Panjvani et al [16] observed that Benign breast lesions were found in 144 cases (64.87%); among which fibroadenoma (30.18%) was the commonest lesion which was observed. Malignancy was observed in 69 cases (31.08%); among them, ductal carcinoma was the predominant lesion (29.28%) which was seen. These findings are similar to our study. Aamir Sharif et al [17] observed

that spectrum of breast lesions on cytomorphological interpretation was 54% benign, 2% atypia/suspicious probably benign, 3% suspicious probably malignant and 41% malignant. In benign lesions, maximum cases were of fibroadenoma (24%) followed by fibrocystic disease (4%), lipoma (3%) while benign phyllodes tumor and galactocele were only 1% each. Breast mass was the chief presenting complaint. Breast cancer was commonest among all the morphological patterns of breast lesions followed by fibroadenoma. This study supports that cytological examination using fine needle aspiration cytology is an economical, rapid, easy and valuable diagnostic tool. We found that the different diagnostic test evaluation parameters of FNAC in comparison with Histopathological evaluation (Table 6).

Table 6:

Parameter	Our study Findings (2022)	Thresh A et al [13] (2010)	AdetolaOlubunmi Daramola et al [15] (2011)	Sahil I. Panjvani et al [16] (2013)	David E. Ibikunle et al [14] (2014)	Ramesh S. Waghmare et al [18] (2016)	Sajjad Khattak, et al [19] (2020)
Sensitivity	72.41%	98.2%	99.2%	97.8%	99.4%	88.2%	83.3%
Specificity	98.46%	98.5%	88.9%	100%	100%	100%	100%
Positive Predictive Value	95.45%	-	99.6%	100%	-	100%	100%
Negative Predictive Value	88.89%	-	90.8%	97.8%	-	93.2%	99.2%
Accuracy	90.43%	97.6%	92.7%	98.9%	96.3%	95.5%	99.3%

Sensitivity of FNAC in our study was 72.41% (95% CI - 52.76% to 87.27%). Specificity was 98.46% (95% CI - 91.72% to 99.96%). The positive Predictive Value was 95.45% (95% CI - 74.78% to 99.33%). Negative Predictive Value was 88.89% (95% CI - 81.59% to 93.52%). Accuracy was 90.43% (95% CI - 82.60% to 95.53%).

Thresh A et al [13] observed that the sensitivity and specificity of FNAC for malignancy were found to be 98.2% and 98.5% respectively. They concluded that the Fine needle aspiration cytology is highly sensitive and specific technique for diagnosis of most of the malignant and benign breast lesions. David E. Ibikunle et al [14] observed that the sensitivity of FNAC in determining the final histologic diagnosis was found to be 99.4% while the specificity was 100%. FNAC was able to determine final histologic diagnosis conclusively in 96.3% of cases. Thus, concluded that FNAC is a reliable diagnostic tool of breast lumps in our centre. Being a fast and cheap diagnostic tool as highlighted by previous studies, we advocate that clinician should continue to embrace this diagnostic technique in the surgical management of breast lumps. Adetola Olubunmi Daramola et al 15 observed that FNAC showed sensitivity of 99.2% (>90%), specificity of 88.9% (>65%), positive

predictive value of 99.6% (>99%), negative predictive value of 90.8% and accuracy of 92.7%. Sahil I. Panjvani et al [16] observed that Sensitivity and specificity of FNAC in breast lesions were reported to be 97.82% and 100% respectively, with 100% positive predictive value and 97.85% negative predictive value. Diagnostic accuracy of FNAC in the present study was found to be 98.90%. They mentioned that it is important to remember that a negative FNAC of a breast lesion does not preclude the diagnosis of a carcinoma, particularly in presence of a clinical suspicion of malignancy and/or an abnormal mammogram.

Ramesh S. Waghmare et al [18] observed that the FNAC showed sensitivity 88.24%, specificity 100%, positive predictive value 100%, negative predictive value 93.2% and accuracy of 95.5%. These findings were similar to our study. Sajjad Khattak, et al [19] observed that sensitivity of FNAC was (83.33%), specificity was (100 %), positive predictive value was (100 %), negative predictive value was (99.27%) and diagnostic accuracy was 99.30%.

Conclusions

FNAC is a great tool for the screening of the breast lesions. It is less invasive, cheap and can be done

even at peripheral centres. We observed that FNAC showed good sensitivity, specificity and accuracy in diagnosing breast lesions. The diagnostic accuracy that we got in our study was 90.43% which was comparable to previous studies. Our study concludes that FNAC should be performed on all breast lesions suspected of malignancy to plan further management of the patients which will lead to early diagnosis of malignancy and prevention of metastasis and further complications. FNAC should be promoted as it changes the course of the malignant breast lesions disease.

Additional Information

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. Swami Ramanand Teerth Rural Government College Institutional Ethics Committee issued approval SRTRGMC/PHARMA/IEC/DHR/17.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

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