Original research article

Study of Fine Needle Aspiration Cytology of Neoplastic Breast Lesions with Histopathological Correlation

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Abstract

Background: The study aimed to know the efficiency of cytological examination with histopathological correlation and to test the utility of F.N.A.C.in clinically suspected breast lesions.

Methods: The present cross-sectional study was done in a tertiary care teaching hospital on 122 cases. All clinically suspected cases of lump in the breast attending the cytology OPD followed with histopathological examination referred from the surgery OPD.

Results: Out of 122 study subjects it was found that 64.75% of the lesions were benign neoplastic in nature,9.84%were atypical /intermediate,2.84%lesions had suspicious for malignancy,22.95%were malignant.

Conclusion: The sensitivity specificity, PPV, NPV of FNAC in our study was found to be 96.66%,100%,100%,98.92%respectively.

Keywords: Breast lesions, cytohistopathogical correlation, Fine needle aspiration cytology (FNAC), Biopsy.

Introduction

Breast cancer is the most common non skin malignancy in women and it is second only to the lung cancer as a cause of cancer death[1]. Incidence of breast cancer increases with age like that of other epithelial tumours. Previously, this involved invasive methods, such as an excision biopsy as an inpatient, under anaesthesia. The delay in procuring the histopathology report was added to the woes of the patient.[2] FNA can be done on palpable lesions either solid or cystic, or deep seated non palpable lesions with the help of ultrasound and mammography. It allows a number of ancillary studies such as hormone receptor analysis, flow cytometry and molecular diagnostic studies.[3]

FNAC has superseded the use of frozen section examination in the diagnosis and management of patients with breast cancer, and plays a major role as an important preoperative assessment along with clinical correlation and mammography which are referred to as the 'Triple test'.[4] In settings like ours where resources are poor, FNAC comes readily useful for its obvious advantages such as accurate, easy to perform and reproducible.

The present study has been taken up to study the diagnostic value of FNAC in the lesions of the breast, and it has been compared with the available histopathology thus verifying the accuracy of FNAC in detecting the lesions of the breast & differentiating benign from malignant lesions to aid in the further management of the disease.

Material & Methods:
The present study was conducted during January 2021 to December 2022 in the Department of Pathology of a tertiary care hospital. The present hospital-based survey was carried out amongst all clinically suspected cases of lump in the breast attending the cytology OPD referred from Surgery OPD. A Predesigned form was used for collection of data. After a detailed cytological and histopathological examination correlation of cases was done. Sample size was estimated considering prevalence of breast carcinomas as 83% in the study, confidence interval of 95 %, with allowable error 10%, minimum sample size to achieve desired objectives came to be 98 or more. Thus, finally we studied 122 study subjects.

Data regarding the age of the patient, site of involvement, size of lesion and relevant clinical history were recorded. FNA was done using a 22-to-23-gauge needle and 10ml disposable syringe mounted on Franzen's handle. Slides are stained with Hematoxylin & Eosin stain and slides were examined and microscopic finding were noted. For Histopathological tissue processing the gross histopathological tissue sampling was done as per the standard procedures. Tissue processing and staining was done by automatic tissue processor. Sections are now examined and microscopic findings were noted.

Results:
A detailed cytological and histopathological examination correlation amongst 122 study subjects was done and analysed.

Table 1: Distribution of patients according to cytological diagnosis.

Cytological Diagnosis	Frequency	Percentage
Fibroadenoma	63	51.64%
Positive for malignant cases	26	21.31%
Proliferative breast lesions	8	6.56%
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Benign epithelial lesions	5	4.10%
Duct ectasia	3	2.46%
Infiltrating ductal carcinoma	2	1.64%
Fibroadenoma with apocrine changes	2	1.64%
Cellular Fibroadenoma	2	1.64%
Atypical ductal hyperplasia	1	0.82%
Benign Epithelial Lesion with proliferation	1	0.82%
Benign epithelial hyperplasia with ductal hyperplasia	1	0.82%
Benign hyperplasia	1	0.82%
Fibroadenoma with cystic change	1	0.82%
Fibroadenoma with mild atypia	1	0.82%
TOTAL	**122**	**100.00%**

Table no. 1 shows that the common diagnosis found on cytology was fibroadenoma seen in 51.64% of the study subjects followed by positive for malignant cells seen in 21.31% of study subjects .and proliferative breast lesion seen in 6.56% of the participants. Gynecomastia and benign epithelial lesion were found in 4.10% of the subjects.

Table 2: Distribution of patients according to histological diagnosis and their frequency

Category	Histology	Frequency	Percentage
Benign	Fibroadenoma	74	60.64%
	Benign phyllodes	7	5.74%
	Gynecomastia	5	4.10%
	Duct ectasia	3	2.46%
	Complex fibroadenoma	1	0.82%
	Lactating adenoma	1	0.82%
	Sclerosing adenosis	1	0.82%
	Tubular adenoma	2	0.82%
Malignant	Infiltrating ductal carcinoma	16	13.11%
	Invasive papillary carcinoma	7	5.74%
	Ductal ca in situ	3	2.46%
	Angiosarcoma of breast	1	0.82%
	Tubular ca breast	1	0.82%
TOTAL		122	100.00%

Table no.2 shows that the most common diagnosis made histologically was fibroadenoma seen in 59% of the study subjects followed by infiltrating ductal carcinoma seen in 13% of the study subjects. Duct ectasia and benign phyllodes was seen in 5.74% of the subjects.

Table 3: Cytological categories with histopathological correlation.

Cytological Categories	**Cytological Diagnosis**	**Histopathological Diagnosis**
Benign Neoplastic Lesions (92)-75.00%	Fibroadenoma (77) N=77	Fibroadenoma (76) Infiltrating Ductal Carcinoma (1) N=76(Fibroadenoma)+1 (IDC)
	Fibroadenoma With Apocrine Changes (1)	Complex Fibroadenoma (1)
	Gynecomastia (5)	Gynecomastia (5)
	Duct Ectasia (3)	Duct Ectasia (3)
	Proliferative Breast Lesions (8)	Benign Phylloides (5) Sclerosing Adenosis (1) Tubular Adenoma (2)
	Benign Epithelial Lesion With Proliferation (1)	Benign Phylloides (1)
Suspicious For Malignancy (2)-2.00%	Atypical Ductal Hyperplasia (1)	Infiltrating Ductal Carcinoma (1)
	Fibroadenoma With Mild Atypia (1)	Fibroadenoma (1)

Malignant Lesions-(28)-23.00%	Positive For Malignant Cells (28) N=28	Fibroadenoma (2) Angiosarcoma (1) Infiltrating Ductal Ca (13) Invasive Papillary Carcinoma (7) DCIS (2) Lactating Adenoma (1) Tubular Carcinoma (1) N=25 (Malignant) +3 (Benign)

Table no.3 shows that on FNAC one case of Atypical ductal hyperplasia was found to be infiltrating ductal carcinoma and one case of Benign epithelial lesion with proliferation was found to be Benign phyllodes on histology. Another case of Benign epithelial hyperplasia with ductal hyperplasia was found to be Fibroadenoma on Histology. Also, on FNAC five cases of Benign epithelial lesion was found to be Fibroadenoma on Histology. On FNAC one case of benign hyperplasia was found to be Fibroadenoma on Histology. On FNAC two cases of cellular fibroadenoma was found to be Fibroadenoma on Histology. On FNAC three cases of duct ectasia was found to be duct ectasia on Histology. On FNAC sixty-two cases of Fibroadenoma was found to be fibroadenoma on histology, one case of fibroadenoma on FNAC was found to be Infiltrating ductal carcinoma on Histology.

On FNAC Two cases of Fibroadenoma with apocrine changes was found to be complex Fibroadenoma and Fibroadenoma on Histology respectively. On FNAC five cases of Gynecomastia was found to be Gynecomastia on Histology. On FNAC Two cases of Infiltrating ductal carcinoma was found to be Fibroadenoma on Histology respectively. Among the 26 cases of positive for malignancy on FNA, 1 was found to be angiosarcoma of breast 2 were found to be ductal carcinoma in situ, 13 were found to be Infiltrating ductal carcinoma and 7 were found to be invasive papillary carcinoma ,1was found to be lactating adenoma and 1 was found to be duct ectasia and 1 was found to be tubular ca on Histology .On FNAC 8 cases of proliferative breast lesion was found, Out of which 2 cases were cyst sarcoma, 3 cases were Benign Phyllodes ,1 case was sclerosing adenosis and 2 case were tubular adenoma on Histology.

Table 4: Correlation of FNAC and Histopathology in accordance to Sensitivity and Specificity.

	Histopathology	
FNAC	Malignant	Benign
Malignant	29 (TP)	0 (FP)
Benign	1 (FN)	92 (TN)
TOTAL	30	B92=122

Sensitivity TP/TP+FN=29/30=**96.66%,** Specificity = TN/TN+FP= 92/92 =**100%**
PPV= TP/TP+FP =29/29=**100%,** NPV=T/TN+FN= 92/93=**98.92%**
Accuracy=(TP+TN)/(TP+TN+FP+FN) X100=29+92/29+92+1+0= **99.18%**

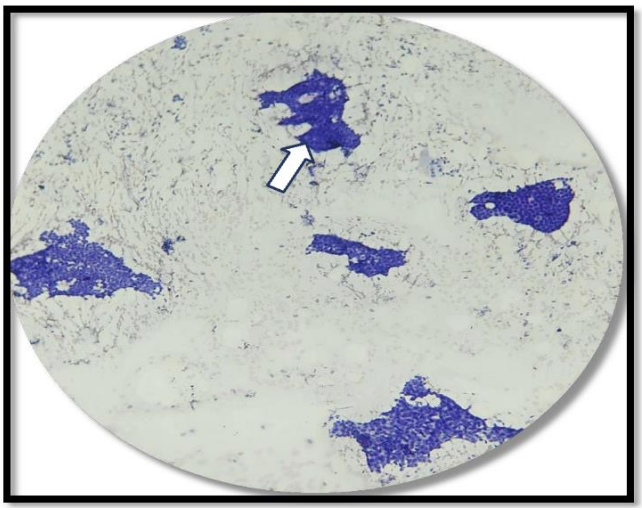

Figure 1: 10x (low power) Microphotograph of FA Cytopathology (H&E) showing monolayered sheet.

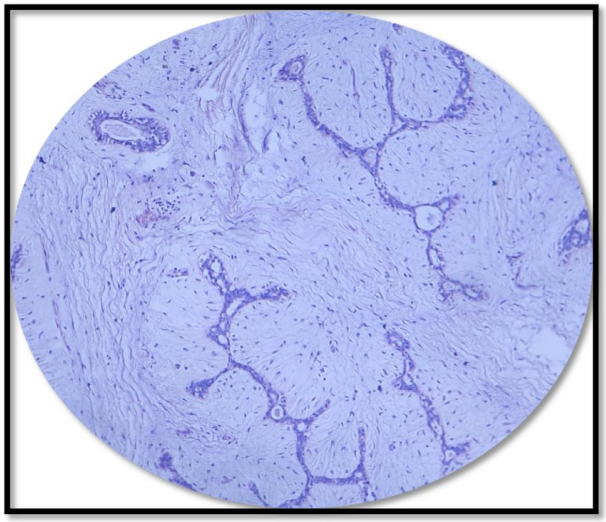

Figure 2: 40x Microphotograph of FA Histopathology (H&E) showing multiple ducts compressed to slits likes spaces due to abundant proliferation of dense fibro myxoid stroma.

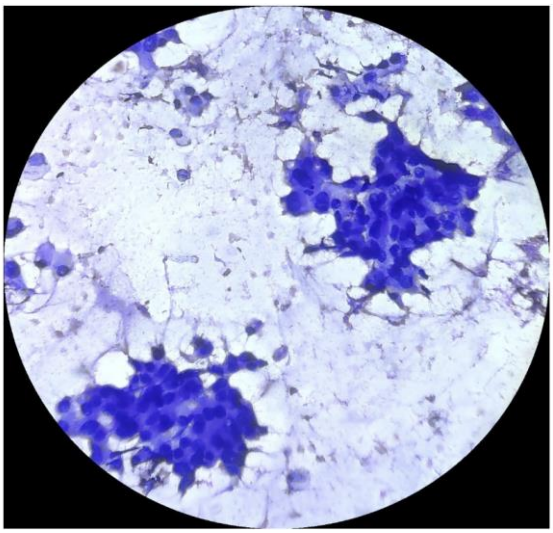

Figure 3: 40 x microphotograph showing Infiltrating Ductal Carcinoma cytopathology showing dyscohesive large cells with nuclear pleomorphism.

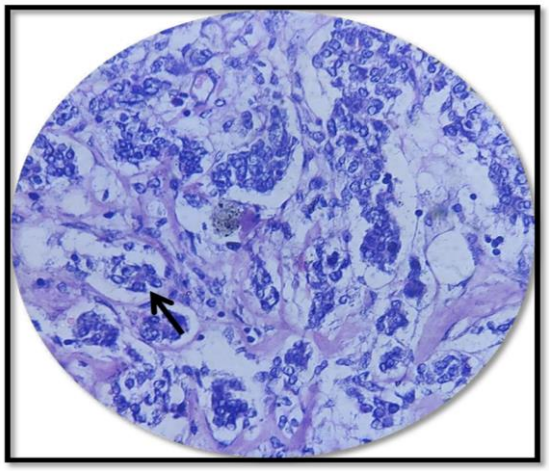

Figure 4: 40x Histopathology (H&E) of Infiltrating Ductal Carcinoma microphotograph showing sheets & tubules of tumour cells(□) separated by scanty fibro collagenous stroma.

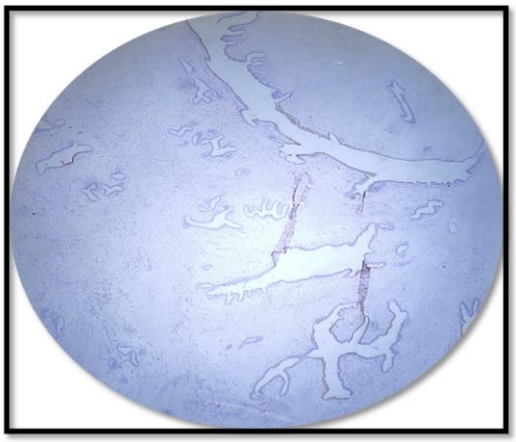

Figure 5:10x benign phyllodes tumour microphotograph Histopathology (H&E) showing leaf like epithelial pattern with low stroma to epithelium.

Discussion:

The most common age in our study was found to be in the age group of 14-20 years, followed by 21-30 years and 31-40 years. The mean age of the study subjects was found to be 17.42 $\pm$ 14.5 years. Majority of the patients 41.80% presented with less than 3 months duration, 35.25% of the patients presented with less than 6 months duration. The side of preponderance was to the right in our study (51.64%).78.69% of the patients did not have nipple retraction.73.77% of the patients did not present with the painful lump. The most common quadrant involved is upper outer quadrant (30%), followed by upper inner (23%) lower inner (18.85%) and lower outer (14%) quadrants.

The common diagnosis found on cytology was fibroadenoma seen in 51.64% of the study subjects followed by positive for malignant cells seen in 21.31% of study subjects .and proliferative breast lesion seen in 6.56% of the participants. It is found that 64.75% of the lesions were Benign neoplastic in nature, 9.84% were atypical / intermediate, 2.46% lesions had suspicion for malignancy, 22.95% were malignant the most common diagnosis made histologically was fibroadenoma seen in 59% of the study subjects followed by Infiltrating ductal carcinoma seen in 13% of the study subjects. The sensitivity specificity, PPV, NPV of FNAC in our study was found to be 96.66%.100%,100%,98.92% respectively.

Table no. 5: Our Study Compared With Other Study

Different Study / Different parameters	Most common in Our study	M/C In Pandit S et al study group	M/C IN Siddique et al study group
Age predominance	14-20 Yrs.	21-30 yrs.	41-50 yrs.
Side predominance	Right >left breast	Right >left breast	Right >left breast
Quadrant predominant	Upper outer	Upper outer	Upper outer
Illness of duration	4-6 months	2-6 months	2-6 months
M/c cytological diagnosis	Benign breast lesions>positive for malignant lesions	Benign breast lesions>positive for malignant lesions	Benign breast lesions<positive for malignant lesions
Sensitivity & Specificity	96.66%&100%	95.7%&90.4%	94.3%&100%

Our study compared with as Pandit s et al study (2016)[5] gives same result for age groups i.e.,14-20 years but differs for Siddique et al study[6] i.e., 41-50 years. Right side predominance is more than left side of breast in all three side groups Right side predominance is same as that of study of DR Vasundhara Gardas et al[7].

Upper outer quadrant is more predominant in all three side groups. Compared with another done by Dr Samir shah et al [8] (2020) majority of the lump were located in upper outer quadrant.

In our study illness of duration is 4-6 months and that varies in Pandit s et al study and Siddique et al study i.e.,2-6 months. Most common cytological diagnosis in our study and Pandit S et al study is benign breast lesion more than positive for malignant cases that varies from Siddique et al study. Sensitivity and specificity for our study, Pandit s et al, Siddique et al group is accordingly 96.66%&100%, 95.7%&90.4%, 94.3%100% respectively. As compared with Sharma et al(2020)[9] and Kulkarni V P et al (2020)[10] the sensitivity & specificity varies from 96.00% & 80.00% . In another study done by Kulkarni V P et al (2020)[10] the sensitivity & specificity varies from 90.47% & 99.54%.

Conclusion:
The goal of this article was to investigate the correlation between cytology and histopathology of breast lesions. The FNAC was found to be a reliable and accurate method for the diagnosis of breast neoplasms, with a sensitivity of 96.6% and a specificity of 100%. Overall, the study concludes that FNAC is a valuable tool for the diagnosis of neoplastic lesions in the breast, and can be used in conjunction with histopathology to achieve high diagnostic accuracy. In summary, this article highlights the importance of combining cytological and histopathological analysis in the diagnosis of neoplastic lesions in the breast.

Abbreviations:
FNA - Fine Needle Aspiration
DCIS - Ductal carcinoma in situ

H & E - Haematoxylin and Eosin
HPF - High power field
FNAC - Fine Needle Aspiration Cytology
HPE - Histopathological Examination
F A - fibro adenoma
I.D.C - Infiltrating Duct Carcinoma
OPD - Out patient department
PPV - Positive Predictive value
NPV - Negative Predictive value

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