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Original Research Article

Role of fine needle aspiration cytology in diagnosis of breast lumps

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ABSTRACT

Background: Breast cancer is the most common cancer in women worldwide. Fine needle aspiration cytology is a cost effective, easy procedure in the diagnosis of breast lump.
Methods: This was a one year retrospective study between January 2016 and December 2016. Needle aspiration was done in 100 patients presenting with breast lump. Histopathology correlation was done in 33 cases.
Results: Fibroadenoma were most common lesions. Malignancy was reported in 13 cases. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were found to be 85%, 100%, 100%, 96.3% and 97% respectively.
Conclusions: Fine needle aspiration cytology is a simple, easy, OPD based, cost effective procedure with high sensitivity, specificity and accuracy in diagnosis of breast lumps.

Keywords: Breast, Cancer, Cytology, Fibroadenoma, Lump

INTRODUCTION

Breast lump is the most common presentation of breast diseases. Although most of the cases of breast lump are benign it causes anxiety regarding possible malignancy. Preoperative diagnosis helps in planning the correct surgical and therapeutic treatment.

Breast cancer is the most common cancer in women worldwide, with nearly 1.7 million new cases diagnosed in 2012 and second most common cancer overall.[1] Breast cancer is now the most common cancer in Indian women; having recently overtaken cervical cancer in this respect.[2] Early diagnosis can improve the survival rate among breast cancer.

The diagnostic process in breast cancer involves the "Triple test" consisting of clinical examination, mammography and fine needle aspiration cytology (FNAC).[3] FNAC is a quick, simple, reliable and inexpensive procedure in diagnosing breast lumps. It is reported in different studies that FNAC have 80% to 98% sensitivity and more than 99% specificity.[4] The main purpose of fine needle aspiration cytology (FNAC) of breast lumps is to confirm cancer pre-operatively and to avoid surgery in specific benign conditions.

The present study is designed to study utility of FNAC in diagnosis of breast lumps and to correlate cytological findings with histopathological findings.

METHODS

This study was carried out in a tertiary care hospital providing medical services to the rural population. This was a retrospective study between January 2016 and December 2016. The study was approved by institution ethics committee. All the patients presenting with breast lump were included in the study. The patients were counselled about the procedure, informed consent was

taken. Detailed clinical history and meticulous physical examination including the duration, size, consistency and mobility were considered.

In procedure for FNAC FNA was performed using 22-24G needles attached to 10cc syringes. One to two passes were given and the aspirated material was smeared onto glass slides. Smears were fixed in 95% ethyl alcohol and stained with Papanicolaou and Hematoxylin and Eosin (H and E) stains. Giemsa stain was done on air dried smears. Ziehl-Neelson (ZN) staining was done whenever a cytological diagnosis of granulomatous disease was made. In cases where fluid was aspirated on FNA, the fluid was centrifuged and smears were prepared from the sediment followed by the above staining methods.

Criteria for adequacy was at least six clusters of ductal cells on each smear comprising 10 cells per cluster. National cancer institute consensus conference on breast FNA5 (1997) guidelines were followed for categorizing lesions (Table 1).

Table 1: Categories of lesion.

Category	Cytomorphological findings
Benign	No evidence of abnormalities
Atypical/ indeterminate	Cellular findings are not diagnostic, and should be correlated with clinical and mammographic data
Suspicious/probably malignant	Findings are suggestive but not unequivocally diagnostic of cancer
Malignant/ positive	Conclusive evidence of cancer
Unsatisfactory	Scant cellularity, smearing artefacts, obscuring blood, or inflammation

Procedure for histopathology involved the biopsy specimens were fixed in 10% formalin for 24 hours. Then gross examination was done in the department of pathology by consultant histopathologists. The gross and cut section findings were noted. Several bits were taken from appropriate sites for processing and paraffin embedding. From each block, sections were cut at 4-5 microns thickness and stained with H and E.

Statistical analysis

Cytological diagnosis was correlated with the histopathological diagnosis and sensitivity, specificity, positive predictive value, negative predictive value and accuracy were assessed.

- Sensitivity = True positive/(True positive + False negative)
- Specificity = True negative/(True negative + False positive)
- Positive predictive value = True positive/(True positive + False positive)
- Negative predictive value = True negative/(True negative +False negative)
- Accuracy = True positive + True negative/(True positive + True negative + False positive + false negative).

RESULTS

Total 646 FNAC were performed during the 1 year study period. Breast FNAC involved 100 cases (15.5%). Youngest patient was 16 years and oldest was 70 years. Aspiration for male breast lump was done in 4 cases. Aspirations in 12 cases were reported as unsatisfactory due to scant cellularity. Hence, final study included 88 cases for stastical analysis. Wide varieties of lesion were seen in females which included inflammatory, traumatic, benign and malignant lesions. Benign lesions were most common findings (Table 2). Fibroadenoma were most common lesions. Malignancy was reported in 13 cases (Table 2).

Table 2: Different categories of lesion.

Category	Total no.
Benign	68
Atypical/ indeterminate	7
Suspicious/ probably malignant	6
Malignant	7
Unsatisfactory	12
Total	100

Table 3: FNAC diagnosis.

Sex	Diagnosis	No.
Women	**Inflammatory lesions**	
	Acute mastitis	5
	Suppurative lesion	3
	Chronic granulomatous mastitis	3
	Traumatic lesions	
	Fat necrosis	1
	Benign proliferative disorders	
	Cystic lesions	1
	Fibrocystic disease	3
	Benign neoplasms	
	Fibroadenoma	47
	Fibroadenoma with atypia	7
	Galactocele	2
	Carcinomas	
	Ductal carcinoma insitu	1
	Suspicious for malignancy	6
	Positive for malignancy	6
Men	**Gynaecomastia**	3
	Total	88

Gynecomastia was reported in 3 cases (Table 3). Benign lesions were more common in early age group as compared to malignant lesions. 86.4% of benign lesions were reported in 2nd-3rd decade. Malignancies were seen in in 4th-7th decade (Table 4). Only 33 cases underwent a surgical procedure and could be correlated with histopathological examination (Table 5).

Table 4: Age wise distribution of lesions.

Age group	Benign	Atypical	Suspicious	Malignant	Total
11-20	10	0	0	0	10 (11.4%)
21-30	24	2	0	0	26 (29.5%)
31-40	25	1	2	1	29 (32.9%)
41-50	5	2	1	3	11 (12.5%)
51-60	2	1	0	2	5 (5.8%)
61-70	2	1	3	1	7 (7.9%)
Total	68 (77.3%)	7 (7.9%)	6 (6.9%)	7 (7.9%)	88 (100%)

Table 5: Cytological and histopathological correlation.

Cytological diagnosis	Histopathological diagnosis								
	AM (1)	GM (1)	F (18)	UDH (1)	FCD (3)	DA (1)	BDA (1)	DCIS (1)	IDC (6)
AM (2)	-	1	1	-	-	-	-	-	-
CL (1)	-	-	-	-	1	-	-	-	-
F (22)	-	-	18	-	2	1	1	-	-
FA (2)	-	-	-	1	-	-	-	1	-
S (3)	-	-	-	-	-	-	-	-	3
P (3)	-	-	-	-	-	-	-	-	3

AM: Acute mastitis; GM: granulomatous mastitis; CL: cystic lesion; FCD: fibrocystic disease; F: fibroadenoma; FA: fibroadenoma with atypia; UDH: usual ductal hyperplasia; DA: duct adenosis; BDA: blunt duct adenosis; DCIS: ductal carcinoma insitu; IDC: infiltrating duct carcinoma; S: suspicious for malignancy; P: positive for malignancy.

Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were calculated from Table 6 and were found to be 85%, 100%, 100%, 96.3% and 97% respectively.

- Sensitivity = 6 / (6 + 1) = 85%
- Specificity = 26 / (26 + 0) = 100%
- Positive predictive value = 6 / (6 + 0) = 100%
- Negative predictive value = 26 / (26 + 1) = 96.3%
- Accuracy = 6+26 / (6+26+0+1) = 97%.

Table 6: Diagnostic accuracy of FNAC in 33 histologically correlated cases.

Cytological diagnosis	Histopathological diagnosis		
	Malignant	Benign	Total
Malignant	6 (TP)	0 (FP)	6
Benign	1 (FN)	26 (TN)	27
Total	7	26	33

TP: true positive; FP: false positive; FN: false negative; TN: true negative.

DISCUSSION

Breast lump is very common presentation in surgery and gynaecology outpatient department. There is increasing awareness and the associated anxiety and stress among women, who perceive every symptom in breast as carcinoma, compels the patients to seek medical advice. Early diagnosis of carcinoma can reduce significant morbidity and mortality.

FNAC of breast lumps is an important part of triple assessment (clinical examination, imaging, and FNAC) of palpable breast lumps. The application of FNAC for the diagnosis of palpable breast masses was first introduced by Martin and Ellis in 1930.[6] FNAC is simple, cost effective and less traumatic as well as highly sensitive and specific method for assessment of breast lumps.

FNAC of breast lumps accounted for 15.5% of total FNAC in our department. This was like studies from Tiwari M and Sangita Singh et al which reported 16% and 12% respectively.[7,8] This represents the common presentation of breast lump in outpatient department.

In present study, patients were reported in the age range 16-70 years which included both men and women. Lesions were more common in 3rd-4th decade accounting for 62.4%. Benign lesions were common in 3rd-4th decade. Malignant lesions were reported in 4th-7th decade. Jarwani PB et al reported high incidence of benign lesions in 4th decade and malignant lesions in 5th decade.[9] In another study, Likhar KS et al reported high incidence of benign lesions in 2nd decade and malignant lesions above 50 years.[10] Thus, benign lesions are common in reproductive age group and risk of malignancy increases with advancing age.

Fibroadenoma was the most common lesion (61.4%) in this study. Atypia in the form of clusters or scattered epithelial cells with markedly enlarged nuclei containing visible and enlarged nucleoli was seen in 7 cases. Different studies also found fibroadenoma to be most common lesion.[10-12] FNAC in men was done in 4 cases. Gynaecomastia was reported in 3 cases and 1 was reported as unsatisfactory. Tiwari M reported gynaecomastia in 2% of total FNAC.[7] Thus, breast lumps in men have low incidence and they are usually gynaecomastia. Benign and atypical lesions accounted for majority of lesions (85.2%). Malignant lesions were reported in 13 cases (14.8%) as DCIS, suspicious or positive for malignancy. Different studies conducted by Iqbal M et al and Modi P et al also showed higher incidence of benign lesions.[4,11]

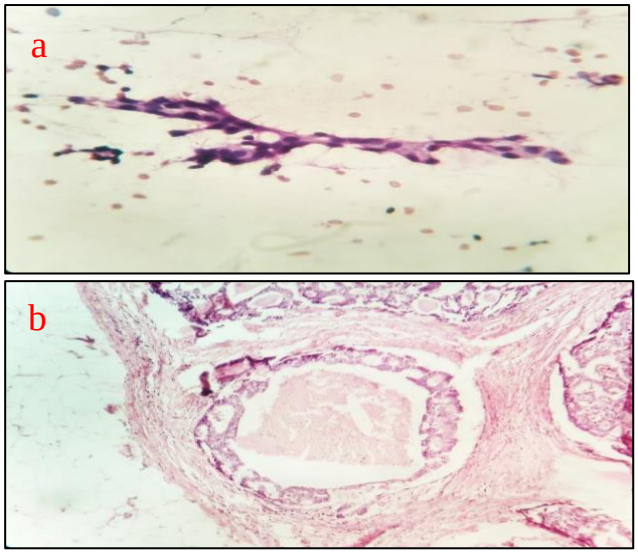

Figure 1: a) Ductal epithelial cells arranged loosely in irregular sheet against haemorrhagic background, reported as atypical. (H and E, x40).
b) On histopathology, same lesion turned out to be ductal carcinoma insitu showing comedo pattern. (H and E, x40).

In current study, histopathological correlation with cytological diagnosis was done in 33 cases. In two cases, cytological diagnosis of acute mastitis was given. On histopathology, one was reported as granulomatous mastitis and other as fibroadenoma. An aspirate from acute mastitis shows abundant neutrophils occasional groups of reactive ductal cells with enlarged nuclei and prominent nucleoli. This discordance in cytology and histopathology report can be attributed to the experience of cytopathologist and the time between aspiration and surgery. In one case, cystic lesion was reported on cytology, which after surgery was diagnosed as fibrocystic disease. Fibroadenoma was reported in 22 cases on cytology. On histopathology, diagnosis was confirmed in 18 cases. Remaining 4 cases were reported as fibrocystic disease (2 cases), duct adenosis (1 case) and blunt duct adenosis (1 case). In cytopathology, fibroadenoma smears are hypercellular with a relatively monomorphic population of ductal cells, some forming monolayered sheets along with numerous bipolar cells (myoepithelial cells) in the background. Different studies have documented fibroadenoma as being one of the most commonly misdiagnosed lesions that appear as the grey zone lesions.[14,15] Fibroadenoma with atypia was reported in 2 cases. These on histopathology were diagnosed as usual ductal hyperplasia and duct carcinoma in situ (Figure 1a and 1b). Some degree of atypia, nuclear enlargement, and cellular decohesion is often associated with the aspirates of fibroadenoma. The cases termed as "fibroadenoma with atypia," have the potential to be diagnosed as low-grade malignancies.[14] Cases which were reported as suspicious for malignancy (3 cases) and positive for malignancy (3 cases) were confirmed as malignancy on histopathology (Figure 2a and 2b).

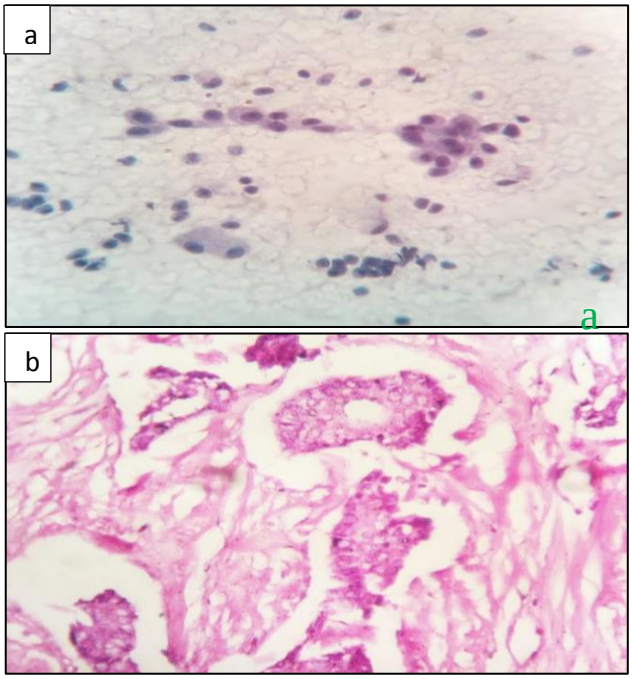

Figure 2: a) Positive for malignancy, singly scattered and loose clusters of pleomorphic tumour cells showing hyperchromatic nuclei. (H and E, x40).
b) On histopathology, it was confirmed to be IDC showing tubular and trabecular pattern with desmoplasia. (H and E, x40).

There are numerous factors that contribute to the indefinite, FN and FP categories.[15] These include: (1) technical difficulties where the smears are limited by cellularity or obscured by drying artefact and or blood, (2) inexperience or unfamiliarity of the pathologist with the cytologic features of breast FNAs and (3) the overlap of cytologic features of certain benign and malignant conditions due to the nature of the lesion (true grey zone).

In current study, sensitivity, specificity, positive predictive value, negative predictive value and accuracy were found to be 85%, 100%, 100%, 96.3% and 97% respectively. This was very much like Panjvani S et al Modi P et al and Saraf S et al (Table 7).[11,12,17] This reflects the efficiency of FNAC in diagnosing breast lumps.

Table 7: Statistical comparison with different studies.

	Panjvani S et al[16]	Modi P et al[11]	Iqbal M et al[4]	Saraf S et al[12]	Present study
Sensitivity	97.8	94	83.3	98.2	85
Specificity	100	98.5	87.1	99.4	100
Positive predictive value	100	97	73.5	98.9	100
Negative predictive value	97.8	97	92.4	97.8	96.3
Accuracy	98.9	97	-	-	97

CONCLUSION

Breast lump is a common clinical presentation with wide differential diagnosis including malignancy which has increased incidence in recent times. Early diagnosis can significantly reduce the morbidity and mortality associated with malignancy. FNAC is a simple, easy, OPD based, cost effective procedure with high sensitivity, specificity and accuracy in diagnosis of breast lumps.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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