

## Research Article

# Fine needle aspiration cytology of breast lesions and correlation with histopathology

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## ABSTRACT

**Background:** Breast carcinoma is the leading cause of death due to cancer in women. It is difficult to determine whether a lump is benign or malignant from clinical assessment. Fine needle aspiration cytology (FNAC) is a convenient and rapid procedure. Hence the present study was carried out to correlate fine needle aspiration cytology and histopathology of breast lesions.

**Methods:** A study consisting of fine needle aspiration cytology (FNAC) 134 of breast lesions and their histopathological correlation was conducted at tertiary health center in rural area, over a period of three years. The diagnostic accuracy of this series was assessed and compared with data obtained from the Indian and international literature. Statistical analysis like sensitivity, specificity, positive predictive value, efficiency, and negative predictive value were carried out.

**Results:** The diagnostic accuracy of this series i.e. sensitivity 88.24%, specificity 100%, positive predictive value 100%, efficiency 95.52%, and negative predictive value 93.2% was compared with similar studies in literature.

**Conclusions:** FNAC is an effective modality for the diagnosis of breast lesions. It is a safe, simple, and cost effective outpatient procedure associated with negligible complications. It helps the clinicians for early diagnosis and specific management thus reducing morbidity and mortality.

**Keywords:** Breast lesions, Cytology, Histopathology, Fine needle aspiration cytology

## INTRODUCTION

Fine needle aspiration cytology (FNAC) was described and practiced by Martin and Ellis in 1930.<sup>1</sup>

It is a well-accepted procedure and is a valuable tool in the diagnosis and patient management of breast lesions. It has high diagnostic accuracy.<sup>2-3</sup> This helps the clinician in

planning the correct surgical or medical treatment. Nonetheless, some variation has been reported.<sup>4-5</sup>

This study was initiated to correlate fine needle aspiration cytology diagnosis and histopathology diagnosis of the breast lesions also to calculate statistical data like Sensitivity, specificity, positive predictive value, negative predictive value, and efficiency FNAC procedure.

## METHODS

The study was designed at Department of Pathology, Shri Shankarrao Chavan Government Medical College and Shri Guru Govind Singhji Memorial Hospital, Nanded, a tertiary health care centre in rural area of central India. The study was carried during August 2000 to July 2003. The study was approved by ethical committee. Informed consent was obtained from the patient. FNAC was performed on 526 cases that came with history of breast lump. Out of these only 134 cases in which we received specimen for surgical histopathology examination, so included in the study. Remaining cases were lost to follow up, hence excluded from study.

Detailed history was obtained, followed by clinical examination. FNAC procedure was explained to the patient. Lesion fixed with one hand, with a quick single motion 24 G needle with 20 ml disposable syringe was inserted in the mass through skin. As needle enters in the mass, a change in consistency was felt. The piston of the syringe was withdrawn to apply full suction; needle was moved back and forth in the mass 3-4 passes, in different direction keeping needle in the mass. Aspirated material was taken on labeled glass slides by pushing plunges and smears were prepared. These smears were stained with Papanicolaou method.

FNAC diagnosis given in following categories: 1) Benign, 2) Malignant, 3) Suspicious of malignancy, 4) other (non-neoplastic lesions) and 5) Inadequate to opine. Surgical specimens obtained were incisional biopsy, total excisional biopsy or modified radical mastectomies. Detailed histopathologic examination done to establish a diagnosis.

Statistical analysis carried out such as sensitivity, specificity, positive predictive value, negative predictive value and efficiency were calculated. Immunohistochemistry was not carried out in any specimen due to non-availability of this facility in the rural centre.

## RESULTS

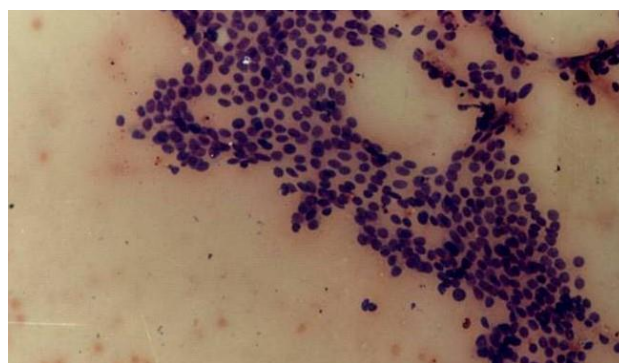
In this prospective study comprising of 134 cases with complaints of breast lump, the age of the patients ranged between 10 to 70 years, among which 130 were females and 4 were males. Cases presented with chief complaints of lump in breast, pain, skin redness, nipple retraction, nipple erosion, and nipple discharge.

The anatomical locations were 57 cases (42.54%) in upper outer quadrant, followed by 24 cases (17.91%) in central retro-aerolar region, 23 cases (17.16%) inner quadrant.

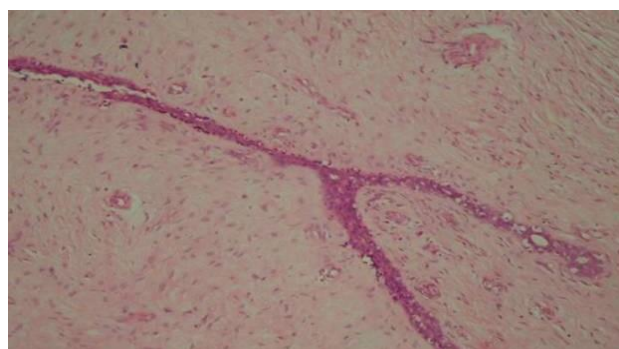
One case (0.75%) in axillary tail in and lesion involving the entire breast surface area was observed in 10 cases (7.46%). On cytological examinations diagnosis was

divided into 5 groups – benign, malignant, suspicious for malignancy, non-neoplastic and inadequate to opine.

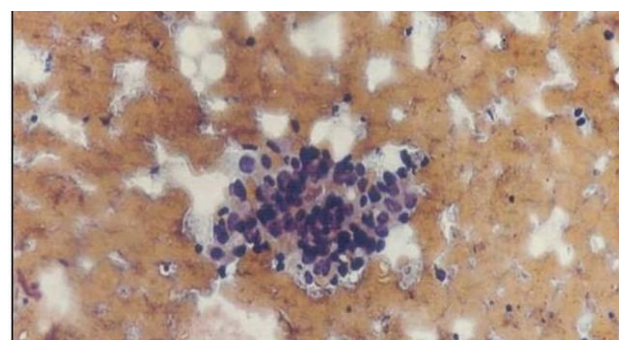
Total 76 (56.25%) cases were reported as benign in which smears were highly cellular and showed large, branching, monolayered sheets of uniform benign ductal epithelial cells. Numerous single, bare bipolar nuclei of benign type and fragments of fibromyxoid stroma were seen (Figure 1) which were showed features of fibroadenoma on histopathology (Figure 2).



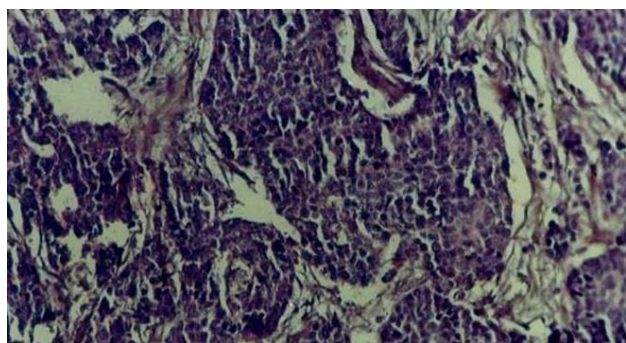
**Figure 1: Cellular smear show branching, monolayered sheets of uniform benign ductal epithelial cells (Pap stain, 100x).**



**Figure 2: Intracanalicular pattern of fibroadenoma: slit like ductal lumen and stroma (H & E stain, 100X).**



**Figure 3: Atypical ductal epithelial cells arranged in clusters. Tumor cells are with enlarged hyperchromatic nuclei and irregular nuclear membrane (Pap stain, 400X).**



**Figure 4: Tumor cell in sheets. The cells are large, moderate eosinophilic cytoplasm, conspicuous nucleoli and lymphocytic infiltration (H & E stain, 400X).**

atypical ductal epithelial cells, irregular angulated clusters of atypical cells, nuclear enlargement, nuclear hyperchromasia and membrane irregularity of variable degree. Cells were with intact cytoplasm, absence of single bare nuclei of benign type and presence of necrosis were also noted in the smear from these cases (Figure 3) and infiltrating duct carcinoma after histopathology (Figure 4).

In 42 (31.50%) cases diagnosed as malignant where smears were highly cellular with single population of

4 smears (03.00%) showed cytomorphological features not fulfilling the criteria of malignancy. Smears were hypercellular with cytologic pattern of monotonous ductal epithelial cells with mild to moderate high nuclear / cytoplasmic ratio and nuclear hyperchromasia and cells arranged in loosely cohesive groups with nuclear crowding. Diagnosis was offered as suspicious for malignancy in those cases.

**Table 1: Cytological and histopathological diagnosis.**

Cytological diagnosis	No. of cases	Histopathological diagnosis													
		Fibroadenoma	Sclerosing adenosis	Cystosarcoma phyllodes	Infiltrating duct ca.	Infiltrating lobular ca.	Ductal Ca. in situ	Granulomatous mastitis	Non sp. mastitis	Gynaecomastia	Fibrocystic disease	Galactocele	Hydatid cyst	Total	
Benign	75	59	5	3	4	0	0	0	0	0	0	4	0	0	75
Malignant	42	0	0	0	40	1	1	0	0	0	0	0	0	0	42
Suspicious of malignancy	4	1	0	0	3	0	0	0	0	0	0	0	0	0	4
Fibrocystic disease	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Granulomatous Mastitis	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Non sp. inflammatory	2	0	0	0	0	0	0	0	2	0	0	0	0	0	2
Simple cyst	2	0	0	0	0	0	0	0	0	0	1	0	1	2	
Gynaecomastia	3	0	0	0	0	0	0	0	0	3	0	0	0	0	
Galactocele	1	0	0	0	0	0	0	0	0	0	0	1	0	1	
Inadequate	3	0	1	0	1	0	0	0	0	0	1	0	0	3	
<b>Total</b>	<b>134</b>	<b>60</b>	<b>6</b>	<b>3</b>	<b>49</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>134</b>		

**Table 2: Cytological and histopathological correlations.**

Cytological diagnosis	No. of cases	Histopathological diagnosis		
		Consistent	Inconsistent	Total
Benign	75	71 (94.67%)	4 (5.33%)	75 (100%)
Malignant	42	42 (100%)	0	42 (100%)
Suspicious of malignancy	4	3 (75%)	1 (25%)	4 (100%)
Other	13	12 (92.31%)	1 (7.69%)	6 (100%)
<b>Total</b>	<b>134</b>	<b>128 (95.52%)</b>	<b>6 (4.28%)</b>	<b>134 (100%)</b>

**Table 3: Topographical distribution.**

Author	Lesions of the breast						
	UO	C	UI	LO	LI	T	WB
Zuk JA	42.20	31.6	6.4	5.3	4.3	5.3	0.5
Rocha P D	45.20	30.4	7.6	5.2	4.4	2.3	0.3
Michael B	60	12	12	10	06	--	--
Present study	42.54	17.91	17.16	11.19	2.99	0.74	7.46

(UO- upper outer, C- central, UI- upper inner, LO- lower outer, LI- lower inner, T- tail, WB- whole breast)

Rest of the non-neoplastic cases showed cytomorphological features consisted with gynecomastia, inflammatory lesion, simple cyst, fibrocystic disease, granulomatous mastitis, and galactocele. In three cases sample was inadequate even after repeat FNAC, on histology diagnosed as infiltrating duct carcinoma, fibrocystic disease and sclerosing adenosis respectively.

This is because of deep seated small lesion, only cystic fluid was aspirated and sclerosing component of the lesion respectively. All 134 cases were correlated with histopathology findings (Table 1). The cytological diagnoses were correlated with histopathological diagnosis and consistency calculated (Table 2)

#### Statistical analysis

Accuracy of FNAC is described in terms of sensitivity, specificity; positive predictive value is described for malignant cases as following -

True positive cases (TP) = 45 [consistent: 42 malignant + suspicious for malignancy]

False positive cases (FP) = 00, True negative cases (TN) = 83 [consistent: 71 benign + 12 others], False negative cases (FN) = 06 [inconsistent]

Sensitivity =  $TP \times 100 / TP + FN = 45 \times 100 / 45 + 06 = 88.24\%$

Specificity =  $TN \times 100 / TN + FP = 83 \times 100 / 83 + 00 = 100\%$

Positive predictive value =  $TP \times 100 / TP + FP = 45 \times 100 / 45 + 00 = 100\%$

Negative predictive value =  $TN \times 100 / TN + FN = 83 \times 100 / 83 + 06 = 93.26\%$

Efficiency =  $TP + TN / TP + FP + FN + TN = 45 + 83 / 45 + 00 + 06 + 83 = 95.22\%$

**Table 4: Statistical analysis.**

Authors	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Efficiency (%)	Negative predictive value (%)
Stavric GD <sup>17</sup>	95.30	97.10	---	---	---
Kline TS <sup>5</sup>	89.95	92.95	85.33	91.63	---
Frable WJ <sup>3</sup>	89.0	97.0	95.0	94.0	---
Wollenberg <sup>23</sup>	65.0	100.0	100.0	---	89.0
Palombini <sup>15</sup>	95.70	89.60	95.90	94.0	---
Zuk JA <sup>10</sup>	70.60	87.50	95.20	---	---
Sheryl LW <sup>14</sup>	90.0	98.0	98.0	---	---
Rocha PD <sup>2</sup>	93.80	98.21	92.70	97.40	---
Feichter GE <sup>18</sup>	86.0	99.30	99.30	93.0	85.0
Hashemzadeh <sup>7</sup>	89.79	93.47	97.77	---	89.36
Present study	88.24	100.0	100.0	95.52	93.26

## DISCUSSION

There are several reports in literature on fine needle aspiration cytology, and a good correlation between FNAC and histology has been recorded in many series.

Majority cases in the study were in reproductive age group, the youngest patient was 10 years old female child. In present study maximum numbers of lumps were present in upper outer quadrant followed by central, upper inner, lower outer, lower inner quadrants, and



axillary tail respectively. Lump involving whole breast contributes 7.46% cases. Malignant lesions were common in the upper quadrant (table no.3). These findings were consistent with the studies.<sup>6-11</sup>

The percentage of malignancy on cytology was 31.50%, the findings were similar to findings Wang HH, Gupta S K and it was less as compared to series Sheryl L W, Palombini L, Kher AV, Stavric GD and Feichter GE.<sup>12-18</sup> This percentage was more as compared to Rocha PD.<sup>2</sup> In our study one of the cases was diagnosed as malignant, three cases as gynacomastia amongst male cases.

Diagnostic accuracy for gynaecomastia & malignancy in males was, 100% similar findings also noticed by other series.<sup>19-22</sup> The success of cytology diagnosis was varied according to histologic subtypes. FNAC tends to be inadequate and false negative in cases of duct carcinoma of scirrhus subtype.<sup>16-22</sup>

In the present study, sensitivity was high as compared to Hashemzadeh SH, Wollenberg, JA Zuk and GE Feichter.<sup>7,10,18,23</sup> Specificity in the present study was similar to Wollenberg and it was higher than other series. Positive predictive value of present study was higher than other series & it was similar to Wollenberg et al. Negative predictive value of present study was higher than Wallenberg & GE Feichter.<sup>18-23</sup>

Efficiency of fine needle aspiration cytology in the present study was higher than in the study by Kline TS and it were less than findings by WJ Frable, Palombini and GE Feichter.<sup>3,5,15,18</sup> Specificity and positive predictive value of present study was 100%, hence helps in early diagnosis of malignant breast lesions (Table 4). Correlation of cytological and Histopathological diagnosis was seen in 128 out of 134 cases (95.52%). Sensitivity, specificity, positive predictive value, negative predictive value, efficiency was 88.24%, 100%, 100%, 93.26%, and 95.22% respectively.

## CONCLUSION

FNAC is an effective modality for the diagnosis of breast lesions. It is a safe, simple, and cost effective outpatient procedure associated with negligible complications. It helps the clinicians for early diagnosis and specific management thus reducing morbidity and mortality.

### Advantages of FNAC

It is safe, simple, and less expensive method. It does not require any special instrument or anesthesia. Lower rates of false positive cases are achieved, if pathologist performed the FNAC and cytology diagnosis.

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