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Original Research Article

Study of FNAC in Breast Lesions

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Abstract

Background: Fine needle aspiration cytology (FNAC) was described and practiced by Martin and Ellis in 1930. All detected breast lesions are not malignant and all the benign masses do not progress to cancer; nevertheless the precision of the final diagnosis can be greatly increased by radiological imaging (mammography, ultrasonography) and pathological diagnosis.6 Breast cancer accounts for the most common cause of cancer related death in women. Method - The study was designed at Department of Pathology, Siddhanta Red Cross Hospital, a tertiary health care center in urban area of central India. The study was carried during August 2018 to July 2020. The study was approved by ethical committee. Informed consent was obtained from the patient. 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: Mammography, Granulomatous mastitis, Nuclear Hyperchromasia.

Introduction

Fine needle aspiration cytology (FNAC) was described and practiced by Martin and Ellis in 1930. [1]

All detected breast lesions are not malignant and all the benign masses do not progress to cancer; nevertheless the precision of the final diagnosis can be greatly increased by radiological imaging (mammography, ultrasonography) and pathological diagnosis.6 Breast cancer accounts for the most common cause of cancer related death in women. 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. [2-3] This helps the clinician in planning the correct surgical or medical treatment. Nonetheless, some variation has been reported. [4-5]

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.

Although the final diagnosis is based upon histopathological examination of the excised tissue, it would be irrational to excise all breast lesions due to the fact that almost 80 % of lumps are benign.

Materials and Methods

The study was designed at Department of Pathology, Siddhanta Red Cross Hospital, a tertiary health care center in urban area of central India. The study was carried during August 2018 to July 2020. 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. Immuno-histochemistry was not carried out in any specimen due to non-availability of this facility in the centre

Results

In this prospective study comprising of 268 cases with complaints of breast lump, the age of the patients ranged between 10 to 70 years, among which 260 were females and 8 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 114 cases (42.54%) in upper outer quadrant, followed by 48 cases (17.91%) in central retro-aerolar region, 46 cases (17.16%) inner quadrant.

Two cases (0.75%) in axillary tail in and lesion involving the entire breast surface area was observed in 20 cases (7.46%). On cytological examinations diagnosis was divided into 5 groups – benign, malignant, suspicious for malignancy, non-neoplastic and inadequate to opine.

Total 152 (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).

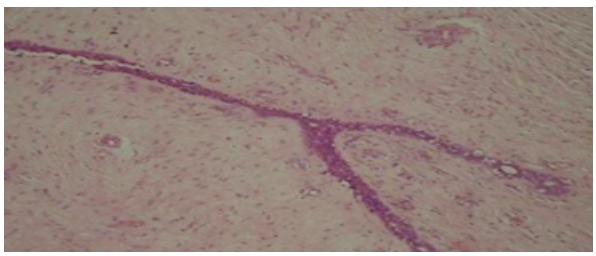

Figure 1: Intracanalicular pattern of fibroadenoma: slit like ductal lumen and stroma (H & E stain, 100X).

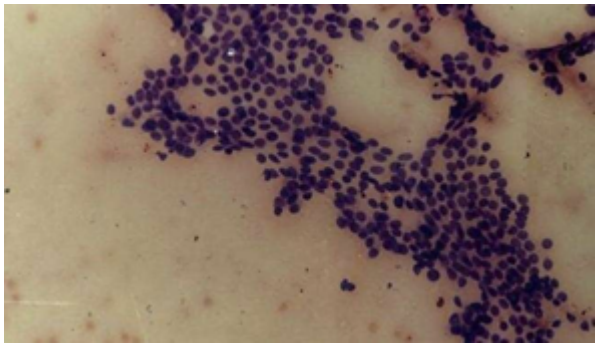

Figure 2: Cellular smear show branching, monolayered sheets of uniform benign ductal epithelial cells (Pap stain, 100x).

In 42 (31.50%) cases diagnosed as malignant where smears were highly cellular with single population of 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 histopatholgy (Figure 4)

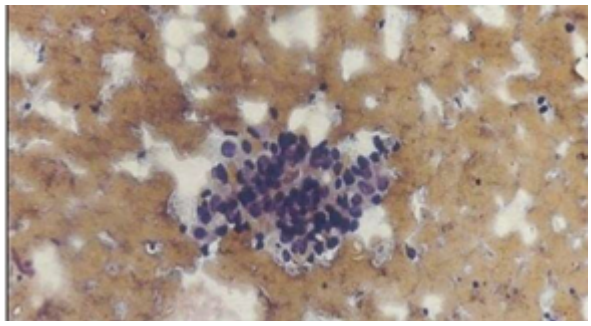

Figure 3: Atypical ductal epithelial cells arranged in clusters. Tumor cells are with enlarged hyper- chromatic nuclei and irregular nuclear

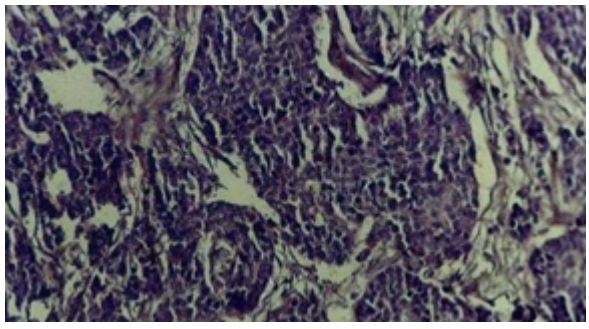

Figure 4: Tumor cell in sheets. The cells are large, moderate eosinophilic cytoplasm, conspicuous nucleoli and lymphocytic infiltration (H & E stain, 400X).

8 smears (03.00%) showed cytomorphological features not fulfilling the criteria of malignancy. Smears were hypercellular with cytogolgic 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 Rest of the non-neoplastic cases showed cyto- morphological features consisted with

gynaecomastia, 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).

Table 1 Cytological and histopathological diagnosis.

Cytological diagnosis	No. of cases	Histopathological diagnosis												
		Fibroadenoma	Intraductal papilloma	Phyllodes	Infiltrating duct ca.	Infiltrating lobular ca.	Ductal Ca. in situ	Granulomatous mastitis	Non sp. mastitis	Gynaecomastia	Fibrocystic disease	Galactocele	Hydatid cyst	Total
Benign	150	118	10	6	8	0	0	0	0	0	8	0	0	150
Malignant	84	0	0	0	80	2	2	0	0	0	0	0	0	84
Suspicious of malignancy	8	2	0	0	6	0	0	0	0	0	0	0	0	8
Fibrocystic disease	2	0	0	0	0	0	0	0	0	0	2	0	0	2
Granulomatous Mastitis	2	0	0	0	0	0	0	2	0	0	0	0	0	2
Non sp. inflammatory	4	0	0	0	0	0	0	0	4	0	0	0	0	4
Simple cyst	4	0	0	0	0	0	0	0	0	0	2	0	2	4
Gynaecomastia	6	0	0	0	0	0	0	0	0	6	0	0	O	6
Galactocele	2	0	0	0	0	0	0	0	0	0	0	2	0	2
Inadequate	6	0	2	0	2	0	0	0	0	0	2	0	0	6
Total	268	120	12	6	98	2	2	2	4	6	14	2	268	

The cytological diagnoses were correlated with histopathological diagnosis and consistency calculated (Table 2).

Table 2 Cytological and histopathological correlations.

Cytological diagnosis	No. of cases	Histopathological diagnosis		
		Consistent	Inconsistent	Total
Benign	150	142 (94.67%)	8 (5.33%)	150 (100%)
Malignant	84	84 (100%)	0	84 (100%)
Suspicious of malignancy	8	6 (75%)	2 (25%)	8 (100%)
Other	26	24 (92.31%)	2 (7.69%)	12 (100%)
Total	268	256 (95.52%)	12 (4.28%)	268 (100%)

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) = 90 [consistent: 84 malignant + suspicious for malignancy]

False positive cases (FP) = 00, True negative cases (TN)

= 166 [consistent: 142 benign + 24 others], False negative cases (FN) = 12 [inconsistent]

Sensitivity = TP X100/TP+FN = 90 X 100/ 90+12 = 88.24%

Specificity = TN X100/ TN+FP = 166 X 100/ 166 +00 = 100%

Positive predictive value= TP X 100/TP+FP= 90X100/ 90+00= 100%

Negative predictive value = TN X100/ TN+ FN

=166X100/ 166+06= 93.26%

Efficiency= TP+TN/TP+FP+FN+TN= 90+166/90+00+12+166=95.22%

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. [6-11]

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)

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. [12-18] This percentage was more as compared to Rocha PD2 . 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. [19-22] 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 scirrhous subtype. [16-22]

In the present study, sensitivity was high as compared to Hashemzadeh SH, Wollenberg, JA Zuk and GE Feichter. [7,10,18,23] 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. [18-24]

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.3,5,15,18 Specificity and positive predictive value of present study

was 100%, hence helps in early diagnosis of malignant breast lesions (Table 4).

Table 4 Statistical analysis.

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

Correlation of cytological and Histopathological diagnosis was seen in 256 out of 268 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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