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RESEARCH ARTICLE

DIAGNOSTIC UTILITY OF FNAC IN EVALUATION OF BREAST MASSES

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ABSTRACT

Introduction: Breast cancer is the second commonest malignancy of females in our country. Given that 70% of all breast surgical procedures are performed for benign breast diseases, the importance of the role of FNAC is becoming immediately apparent. The combination of palpation, mammography & FNAC (Triple Test) has been found to considerably increase the diagnostic accuracy in breast lesions. Hence this study was undertaken to analyze the cyto-morphological features of palpable breast lesions and to classify them in to neoplastic and non-neoplastic and to co-relate with histopathological diagnosis.

Materials And Methods: This prospective study was undertaken on 413 patients during January 2004 to December 2005. The informed consent was taken from all the participants. All the palpable breast lumps were included in the study. Lesions difficult to localize on physical examination and patients who refused for the consent were excluded from the study.

The clinical data was elicited, examination of the patients performed meticulously. The slides were immediately wet-fixed in alcohol for Papanicolaou's and H & E stains and few air-dried for Giemsa stain. The various cytomorphological features of the breast lesions was studied, analyzed and placed in the appropriate category and histopathological correlation done wherever available.

Results: Based on cytological features the cases were classified in to benign in 319 cases (77.24 %), malignant in 76 cases (18.40 %), suspicious in 5 cases (1.21 %) and un-satisfactory in 13 cases (3.15 %). Histopathological correlation was available in 105 cases. There was a single false negative case in the study. The study revealed a sensitivity of 96.97 %, specificity of 100 % and a diagnostic accuracy of 99.05 %.

Conclusion: The present study confirms the view, that FNAC of breast is one of the most valuable diagnostic tool in the assessment and management palpable breast lumps on account of its low cost, minimal morbidity, rapid turnaround time, ability to differentiate benign from malignant lesions with high sensitivity, specificity and diagnostic accuracy.

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INTRODUCTION

For years, pathology was centered on diagnostic histopathology which in turn depends on surgical biopsy.¹ Aspiration cytology as a diagnostic procedure was introduced as a substitute of excision biopsy and is an interpretative art with histopathology as its scientific basis.²

The FNAC of breast lesions dates back to Martin & Ellis and since then a vast experience in diagnosis of breast lumps has accumulated.¹ Breast cancer is the second commonest malignancy of females in our country and is a leading cause of mortality in the prime of their lives.³ Today is the era where the cytologists are expected to make a "Surgical Path" type of diagnosis on breast aspirates. Given that 70% of all breast surgical procedures are performed for benign breast diseases, the importance of the role of FNAC is becoming immediately apparent.⁴ The combination of palpation, mammography &

FNAC (Triple Test) has been found to considerably increase the diagnostic accuracy in breast lesions.⁵

Hence this study was undertaken to analyze the cyto-morphological features of palpable breast lesions and to classify them in to neoplastic and non-neoplastic and to co-relate with histopathological diagnosis.

MATERIALS AND METHODS

This prospective study was undertaken in the Department of Pathology, M.R. Medical College, Gulbarga on the patients attending the OPD and IPD services and being referred for FNAC during the period of January 2004 to December 2005. The ethical clearance was obtained from the institutional ethical committee. The informed consent was taken from all the participants. The study was conducted on 413 patients. All the palpable breast lumps were included in the study. Lesions

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difficult to localize on physical examination and patients who refused for the consent were excluded from the study.

The clinical data was elicited, examination of the patients performed meticulously. FNAC procedure was performed on the patients under manual guidance with aseptic precautions. The slides were immediately wet-fixed in alcohol for Papanicolaou's and H & E stains and few air-dried for Giemsa stain. The various cytomorphological features of the breast lesions was studied, analyzed and placed in the appropriate category and histopathological correlation done wherever available.

RESULTS

Table 1 shows that the study included 401 females & 12 males and the most common pathology encountered in the breast was benign lesions in 319 cases (77.24 %).

Table 1 Type and Incidence of Breast Lesions

Sl. No.	Type of lesion	No. of cases				Total	%
		Female	%	Male	%		
1.	Benign	310	75.06	9	2.18	319	77.24
2.	Malignant	74	17.92	2	0.48	76	18.40
3.	Suspicious	5	1.21	0	0	05	1.21
4.	Unsatisfactory	12	2.91	1	0.24	13	3.15
	Total	401	97.1	12	2.9	413	100

The youngest and the oldest patients in the study were 8 yrs to 80 years. Table 2 shows that maximum numbers of benign lesions were encountered in the age range of 11- 40 years whereas the malignant lesions noted in age range of 31- 60 years.

Table-2 Age and Sex Incidence in Breast Lesions

Age in years	Benign		Malignant		Suspicious		Unsatisfactory		Total	%
	F	M	F	M	F	M	F	M		
≤10	1	--	--	--	--	--	2	--	3	0.73
11-20	72	4	--	--	--	--	--	--	76	18.40
21-30	125	2	4	--	1	--	3	--	135	32.69
31-40	74	--	21	--	3	--	5	1	104	25.18
41-50	25	1	25	--	1	--	1	--	53	12.83
51-60	8	2	13	--	--	--	--	--	23	5.57
61-70	4	--	8	2	--	--	1	--	15	3.63
71-80	1	--	3	--	--	--	--	--	4	0.97
Total	310	9	74	2	5	5	12	13	413	100

Table-3 Classification of Benign Lesions

Sl. No.	Lesion	No. of cases	Percentage
1.	Benign basic pattern	6	1.45
2.	Fibroadenoma	128	30.99
3.	Benign phyllodes tumor	3	0.73
4.	Fibrocystic change	91	22.03
5.	Duct papilloma	2	0.48
6.	Galactocoele	14	3.40
7.	Breast abscess	27	6.54
8.	Acute non-specific mastitis	7	1.69
9.	Granulomatous mastitis (TB)	6	1.45
10.	Fat necrosis	3	0.73
11.	Duct ectasia	3	0.73
12.	Epidermal cyst	7	1.69
13.	Accessory breast tissue	12	2.91
14.	Gynaecomastia	9	2.18
15.	Intramammary lymphnode	1	0.24
	Total	319	77.24

Left breast was most commonly involved in 210 cases (50.85 %) as compared to right breast which was involved in 180 cases (43.58 %). The cases with bilateral breast involvement were 23 cases (5.57 %). A satisfactory aspirate was obtained in 400 cases (96.85 %) and 13 cases (3.15 %) had unsatisfactory aspirate.

The benign lesions were further analyzed. The most common benign lesion was fibroadenoma (128 cases) to be followed by fibrocystic disease (91 cases). A few rare entities like microfilaria along with fibroadenoma and Intramammary lymphnode were also identified and depicted in table 3.

Table 4 depicts Duct carcinoma NOS type was the most common primary tumor diagnosed in 69 cases. Two cases had recurrences. No metastatic tumor to the breast was documented.

Out of 76 malignant cases, 10 cases showed metastatic tumor deposits in axillary lymphnodes while cervical lymphnodes were involved in only 2 cases.

Histopathological correlation was available in 108 cases (table 5). For calculation of statistical indices, the cases having unsatisfactory aspirates were excluded and suspicious cases were considered positive for malignancy, accounting to 105 cases. 104 cases correlated with cytological diagnosis and only one case diagnosed benign on cytology proved to be malignant (infiltrating duct carcinoma-NOS type) on histology – False negative.

Table-4 Classification of Malignant Lesions

Sl. No.	Lesion	No. of cases	Percentage
1.	Primary breast cancer		
	a) Duct carcinoma	69	16.71
	b) Mucinous carcinoma	3	0.73
	c) Lobular carcinoma	1	0.24
	d) Paget's disease	1	0.24
2.	Recurrence (chest wall)	2	0.48
	Total	76	18.40

Histo-pathological correlation of 105 cases

TP = True positive = 32
 TN = True negative = 72
 FP = False positive = 00
 FN = False negative = 01

Table-5 Cyto-histological Correlation

Cytological diagnosis	Total cases	%	Biopsy available	Positive cytology report	Accuracy	Negative cytology report
A) BENIGN						
Benign basic pattern	6	1.45	--	--	--	--
Fibroadenoma	128	30.99	47	46	97.87	2.13
Benign phyllodes tumor	3	0.73	2	2	100	--
Fibrocystic change	91	22.03	12	12	100	--
Duct papilloma	2	0.48	--	--	--	--
Galactocoele	14	3.40	1	1	100	--
Breast abscess	27	6.54	3	3	100	--
Acute nonspecific mastitis	7	1.69	--	--	--	--
Granulomatous mastitis	6	1.45	1	1	100	--
Fat necrosis	3	0.73	--	--	--	--
Duct ectasia	3	0.73	--	--	--	--
Epidermal cyst	7	1.69	1	1	100	--
Accessory breast tissue	12	2.91	2	2	100	--
Gynaecomastia	9	2.18	4	4	100	--
Intramammary lymphnode	1	0.24	--	--	--	--
B) MALIGNANT						
Duct carcinoma	69	16.71	29	29	100	--
Mucinous carcinoma	3	0.73	1	1	100	--
Lobular carcinoma	1	0.24	--	--	--	--
Paget's disease	1	0.24	1	1	100	--
Recurrence	2	0.48	--	--	--	--
C) SUSPICIOUS						
Suspicious	5	1.21	1	1	100	--
D) UNSATISFACTORY						
Unsatisfactory	13	3.15	3	--	--	--
Total	413	100	108			

Table - 6 Statistical results

Sl. No	Statistical indices	Result
1	Sensitivity	96.97 %
2	Specificity	100 %
3	Positive predictive value	100 %
4	Negative predictive value	98.63 %
5	False positive ratio	0 %
6	False negative ratio	3.03 %
7	Diagnostic accuracy	99.05 %

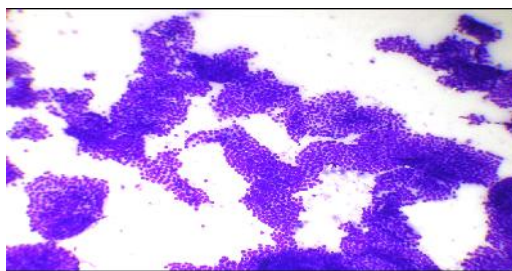


Fig. 1 Fibroadenoma (Giemsa x LP)

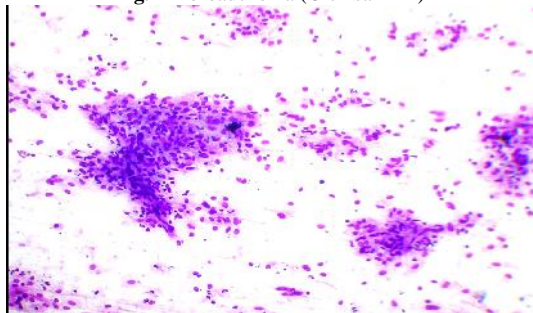


Fig. 2 Phyllodes tumor (Giemsa x LP)

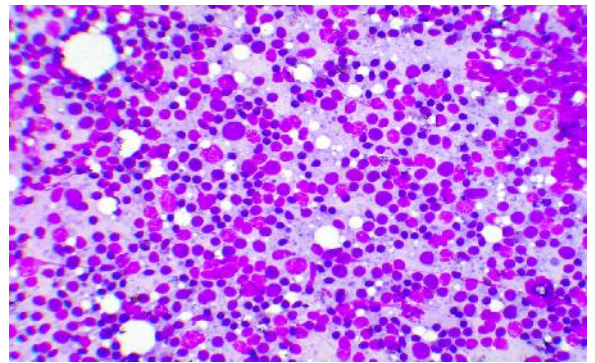


Fig. 3 Intramammary Lymphnode (Giemsa x HP)

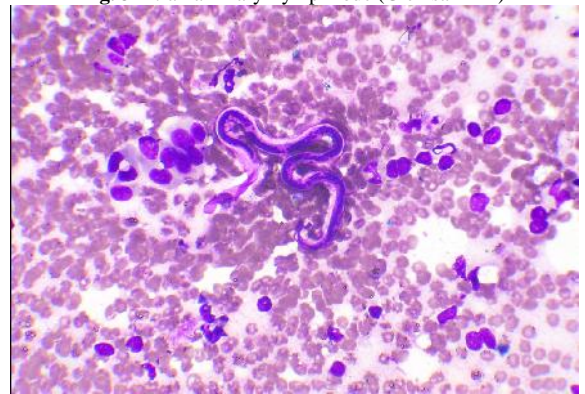


Fig. 4 Microfilaria (Giemsa x HP)

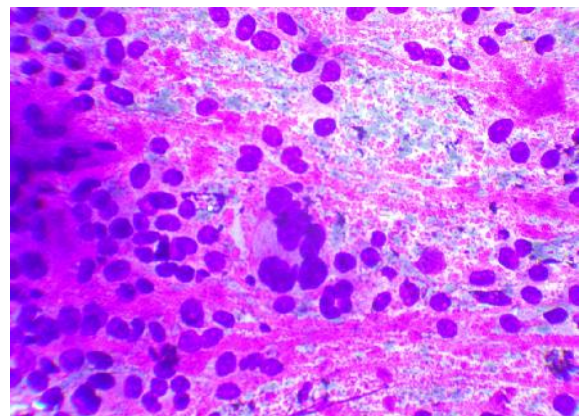


Figure 5 Mucinous carcinoma (Giemsa x HP)

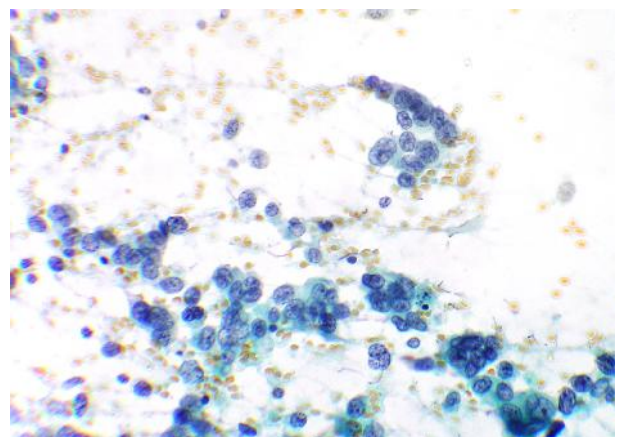


Figure 6 Lobular carcinoma (PAP x: HP)

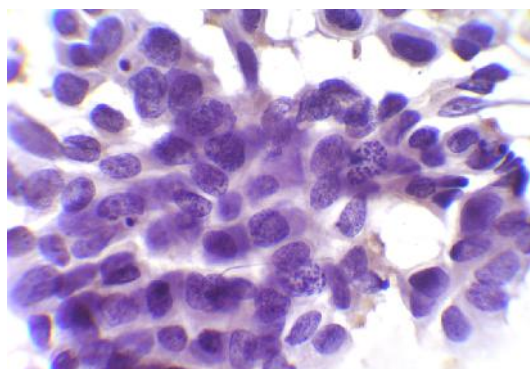


Figure 7 Duct carcinoma (H&E x HP)

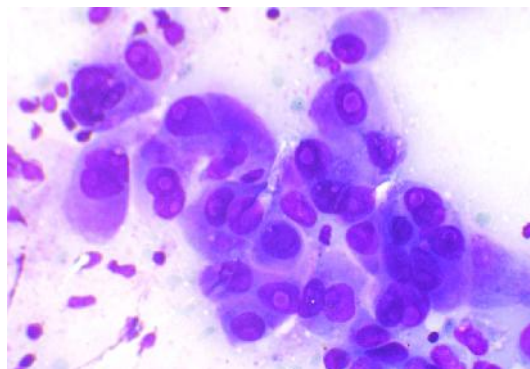


Figure 8 Duct carcinoma (Giemsa x HP)

Table-7 Comparative Analysis of Breast Lesions

Authors Name	Rocha ¹⁰ (1997)	Ishita Pant ¹⁴ (2003)	YD Choi ⁹ (2004)	Present study
Sl. No.	4 years	1 year	4 years	2 years
Breast Lesion				
Benign	641 (76.58%)	85 (68%)	981 (75.64%)	319 (77.24%)
Malignant	99 (11.83%)	25 (20%)	182 (14.03%)	76 (18.40%)
Suspicious	26 (3.11%)	2 (1.6%)	38 (2.93%)	5 (1.21%)
Unsatisfactory	71 (8.48%)	13 (10.4%)	96 (7.40%)	13 (3.15%)
Total	837 (100%)	125 (100%)	1297 (100%)	413 (100%)

Further sub-categorization of benign lesions in the present study were in comparison to the studies of RGW Pinto¹¹ et al and Srinivas¹⁵ et al as depicted in Table 8

Table-8 Comparative Analysis of Benign Lesions

Cytological diagnosis	Sreenivas ¹⁵ (1989) n=222		Rocha ¹⁰ (1997) n=837		RGW Pinto ¹¹ (2004) n=582		Present study n=413	
	No	%	No	%	No	%	No	%
Benign basic pattern	--	--	--	--	--	--	6	1.45
Fibroadenoma	69	31.08	177	21.15	166	28.52	128	30.99
Benign phyllodes tumor	--	--	--	--	5	0.86	3	0.73
Fibrocystic change	--	--	285	34.05	23	3.95	91	22.03
Duct papilloma	--	--	--	--	--	--	2	0.48
Galactocoele	5	2.25	--	--	--	--	14	3.40
Breast abscess	17	7.66	58	6.93	12	2.06	27	6.54
Acute nonspecific mastitis	--	--	--	--	--	--	7	1.69
Granulomatous mastitis	2	0.9	--	--	2	0.34	6	1.46
Filariasis	3	1.35	--	--	--	--	1*	0.24*
Fat necrosis	1	0.45	--	--	--	--	3	0.73
Duct ectasia	--	--	--	--	--	--	3	0.73
Epidermal cyst	--	--	--	--	--	--	7	1.69
Accessory breast tissue	--	--	--	--	--	--	12	2.91
Gynaecomastia	1	0.45	26	3.11	13	2.24	9	2.18
Intramammary Lymphnode	--	--	--	--	--	--	1	0.24
Total	98	44.14	546	65.24	221	37.96	319	77.24

Out of 413 cases in the present study, 69 cases (16.71 %) had duct carcinoma which was similar to results obtained by Ishita pant¹⁴ et al as shown in table 9

Table-9 Comparative Analysis of Malignant Lesions

Cytological diagnosis	F Dominguez ¹⁶ (1997) n=1398		Ishita Pant ¹⁴ (2003) n=125		RGW Pinto ¹¹ (2004) n=582		Present study n=413	
	No	%	No	%	No	%	No	%
1) Primary breast Cancer								
Duct Carcinoma	141	10.09	20	16	167	28.69	69	16.71
Mucinous carcinoma	1	0.07	02	1.6	3	0.52	3	0.73
Lobular carcinoma	4	0.29	--	--	1	0.17	1	0.24
Paget's disease	--	--	02	1.6	--	--	1	0.24
Inflammatory carcinoma	--	--	01	0.8	--	--	--	--
2) Recurrent Carcinoma	--	--	--	--	--	--	2	0.48
Total	146	10.45	25	20	171	29.38	76	18.40

The study revealed 32 cases which were truly positive, and 72 cases which were truly negative, one case was falsely negative and no false positive case was registered.

The study revealed a sensitivity of 96.97 %, specificity of 100 % and a diagnostic accuracy of 99.05 % which were similar to

DISCUSSION

Female breast is a complex anatomical structure which is extremely sensitive to endocrinal influences.⁶ Although rare complications like hematoma & pneumothorax have been reported in the literature^{7,8}, no complications were observed in the present study.

The incidence of un-satisfactory aspirates in breast FNAC varied in various studies.^{9,10} In the present study it was 3.15 % which was attributable due to the small size along with the nature of lesion & faulty technique.

Lesions of the breast are usually confined to females because male breast is a rudimentary structure, relatively insensitive to endocrinal influences and apparent resistant to neoplastic growth.⁶ In the present study there were 401 females & 12 males with a female to male ratio of 33.42 : 1 which was in comparison to other studies.^{11,12}

Out of 74 malignant cases in females, 26 cases (35.14 %) had menarche before 13 years & 49 cases (66.22 %) occurred in post-menopausal age group which is in accordance to the literature that early menarche and late menopause predispose to breast cancer.¹³ In this study no clear cut relationship was observed between the marital status and breast cancer.

The incidence of benign lesions in the present study were similar to the observations made by Y.D. Choi⁹ et al and Rocha¹⁰ et al, where as the incidence of malignant cases and suspicious cases were in comparison with the observations of Ishita Pant¹⁴ et al. as depicted in table 7

the results obtained by RGW Pinto¹¹ et al, M Sampat¹⁸ et al and JF Silverman¹⁷ et al as shown in table 10.

Table-10 Statistical Results – Comparative Analysis

Sl. No	Study	No. of FNAC	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Accuracy %
	JF Silverman ¹⁷ (1989)	80	96	100	100	98	99
	M Sampat ¹⁸ (1991)	1120	96	100	100	89.50	97
	Rocha ¹⁰ (1997)	837	93.80	98.21	92.70	--	97.40
	YD Choi ⁹ (2004)	1297	77.7	99.2	98.4	88	91.1
	RGW Pinto ¹¹ (2004)	582	97.8	100	100	98.6	99.1
	Present study	413	96.97	100	100	98.63	99.05

CONCLUSION

The present study confirms the view, that FNAC of breast in one of the most valuable diagnostic tool in the assessment and management palpable breast lumps on account of its low cost, minimal morbidity, rapid turnaround time, ability to differentiate benign from malignant lesions with high sensitivity, specificity and diagnostic accuracy.

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