



Original Research Article

Fine Needle Aspiration Cytology of Breast Lesions and Correlation with Histopathology- A 2 Year Study

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ABSTRACT

Background & Objectives: Fine needle aspiration cytology is an effective modality for diagnosis of breast lesions. It is a simple, rapid and safe method to diagnose breast lesions. It has high sensitivity and specificity. The aim of the study was to categorize breast lesions and correlate the fine needle aspiration cytology diagnosis with histopathological findings.

Methods: Two year prospective study was conducted in our institution and in that 106 patients underwent fine needle aspiration cytology of the palpable breast lump after thorough physical examination. The cytological diagnosis was classified as benign, suspicious, malignant and others. After this reporting all the patients were subjected to excision biopsy or mastectomy and its histopathological confirmation. Later diagnostic accuracy of cytology reporting was compared with that of histology.

Results: Of the 106 cases, 68 were benign, 24 malignant, 7 suspicious and 7 were other non neoplastic smears. Cytological and histological correlation found in 104 cases (98.11%) out of 106 cases. Fibroadenoma was the commonest benign lesion noted in the age group 21-30 years and infiltrating duct carcinoma was the most common malignant lesion. Accuracy of the present study as: sensitivity 96.77%, specificity 98.66%, positive predictive value 96.77%, negative predictive value 98.66% and efficiency 98.11%.

Conclusion: Fine needle aspiration cytology (FNAC) of breast lesions serves as rapid, economical and reliable tool for diagnosis of palpable breast lesions and the cytopathological examination of these lesions before operation or treatment serves as an important modality.

Key words: Fine needle aspiration cytology, Breast lumps, Carcinoma of breast, Fibroadenoma, Infiltrating duct carcinoma.

INTRODUCTION

In India Cancer of breast is a second most common cancer in the women. ⁽¹⁾ Breast lump is most common presentation in the most of the breast diseases. Most of the cases in breast lesions are benign. ⁽²⁾ Breast

mass in women causes anxiety to herself and her family member, which can be reduced by giving assurance that most of breast lumps are benign and early diagnosis by fine needle aspiration cytology. The FNA first introduced by the Martin and Ellis in 1930.

⁽³⁾ The FNAC is highly sensitive, easy to perform and cost effective that can be carried out at outpatient department. ^(4,5)

FNA has various benefits over the open tissue biopsy. ^[6]

- i. Rapid, Reliable.
- ii. Help in planning of treatment in breast lump.
- iii. Ability to perform molecular ancillary technique i.e. PR & ER, proliferation antigen (Ki67) & DNA pattern analysis.

Accuracy in the diagnosis can be increased by multiple sampling of appropriate sites by Ultrasonography guidance and / or mammographic localization. ^(7,8) That is why FNAC is regarded as preliminary diagnostic procedure, as a screening procedure with or without Ultrasonography or stereotactic guidance, ⁽⁹⁾ or as a follow-up procedure for post mastectomy or lumpectomy. ⁽¹⁰⁾ Fine Needle Aspiration Cytology can also use to diagnose lesions of male breasts such as gynaecomastia and carcinoma, accessory axillary breasts and their lesions, and status of the axillary lymph nodes. ^(11,12) Thus the FNAC have reduced the number of open breast biopsies. ⁽¹³⁾

The aim of this study was to find out the common causes of breast lump and to find out sensitivity and specificity of FNAC of breast lump in our institute.

MATERIALS AND METHODS

The present study was carried out in department of Pathology of Mahatma Gandhi Medical college Hospital and research Centre, Aurangabad, India from May 2010 to May 2012 after taking permission from ethical committee of institution. The patients with palpable breast lump referred from general surgery department in the institution for FNAC were involved in the study. The case history of

the patient was recorded, includes Detail history of pain, nipple discharge, ulceration of nipple and duration of lesion. The examination of breast lump was done with recording of size and site of lump, consistency, and fixation to skin and underline tissue, retraction of nipple along with regional lymph node involvement. Consent was taken after due explanation of the procedure and its benefit to the patients.

The skin over the breast was wiped with antiseptic solution and spirit, suspected lesion was held with one hand in a position favorable to fine needle aspiration. Procedure is done by using 20 gauge needle fitted on 10 ml disposable syringe in Syringe Holder. When needle had entered the lump area, the piston of the syringe was retracted thus creating a vacuum with the needle in a position to move back and fro, three or more times in a different direction of the lump. Throughout the procedure negative pressure was maintained in a syringe then before removing needle from the lump negative pressure is resolved. The needle withdrawn and air is filled in the syringe reconnected to the needle and material is smeared on glass slide with the help of cover glass gently. The wet smear fixed with Ether Alcohol mixture stained with Papanicolaou Stain. ⁽¹⁴⁾ The air dried smear fixed in Methyl Alcohol stained with May Grunewald Geimsa stain. ⁽¹⁵⁾ The smears were screened under low and high magnification and diagnosis was made as:

Unsatisfactory

Benign.

Atypical/Indeterminate.

Suspicious of malignancy.

Malignant.

Cases were further followed up for histopathology.

RESULTS

All the 106 patients underwent a diagnostic FNAC in our pathology department following which all underwent a

definitive excisional surgical procedure after admission to hospital. All excised specimens obtained were subjected to histopathology. The FNAC report was correlated with the final histopathology

report and statistical tests were used to interpret the results.

The observations and results of our study were tabulated and analyzed as below:

Table no. 1: Age & sex distribution (n=106)

Age in years	Males Cases	Males %	Females Cases	Females %
11-20	1	20	15	14.85
21-30	1	20	37	36.63
31-40	0	0	22	21.78
41-50	0	0	13	12.87
51-60	1	20	7	6.93
61-70	0	0	5	4.95
71-80	1	20	1	0.99
81-90	1	20	1	0.99
Total	5	100	101	99.97

In the present study males contribute 5 cases (4.71%) and females contribute 101 cases (95.28%). Male to female ratio in the study was 1:20.2. In the present study maximum number of cases was females. Amongst female, maximum cases were noted in 3rd decade i.e. 37 cases (36.6%) and were in reproductive age group.

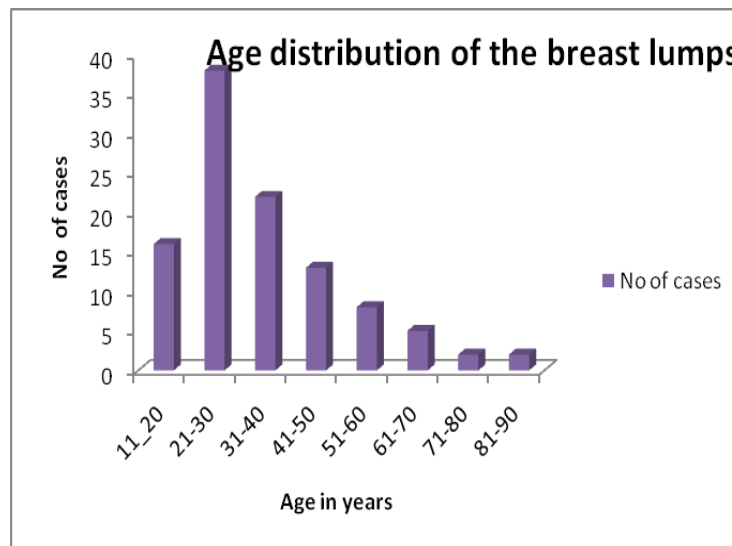


Fig no.1: Age distribution of breast lumps

Table no. 2: Cytological diagnosis

Sr no	Cytological diagnosis	No of cases	Percentage(%)
1.	Benign	68	64.15
2.	Malignant	24	22.64
3.	Suspicious of malignancy	7	6.60
4.	(Other)non neoplastic		
	Inflammatory	1	0.94
	Fibrocystic	2	1.88
	Galactocoele	1	0.94
	Gynaecomastia	2	1.88
	Non specific	1	0.94
	Total	106	

Amongst all the cases 68 cases (64.15%) were benign, malignancy was noted in 24 cases (22.64%), suspicious of malignancy in 7 cases (6.60%) and other nonneoplastic 7 cases. Fibroadenoma was the commonest benign diagnosis.

Table no 3: Cytological and histological correlation

Cytological diagnosis	No of cases	Fibroadenoma	Sclerosing adenosis	Tubular adenoma	IDC	ILC	DCIS	Mucinous Ca	Medullary Ca	Lactating adenoma	Gynaecomastia	Fibrocystic breast disease	Granulomatous mastitis	Chr. Nonspecific inflammatory tissue	Total
Benign	68	61	00	1	00	00	00	00	00	1	00	4	00	1	68
Malignant	24	00	00	00	21	1	1	00	1	00	00	00	00	00	24
Suspicious	7	1	1	00	4	00	01	01	00	00	00	00	00	00	7
Inflammatory	1	1	00	00	00	00	00	00	00	00	00	00	00	00	1
Fibrocystic	2	00	00	00	00	00	00	00	00	00	00	02	00	00	2
Galactocoele	1	00	00	00	1	00	00	00	00	00	00	00	00	00	1
Gynaecomastia	2	00	00	00	00	00	00	00	00	00	02	00	00	00	2
Non specific	1	00	00	00	00	00	00	00	00	00	00	00	1	00	1
Total	106	62	01	01	26	01	02	01	01	01	02	06	01	01	106

In the present study out of 68 smears diagnosed as benign on cytology showed 61 as fibroadenomas, 4 as fibrocystic disease, 1 as tubular adenoma, 1 as lactating adenoma, and 1 as chronic non specific inflammatory tissue. 24 cases were diagnosed as malignant on cytology which on histology showed infiltrating duct carcinoma in 21 cases, 1 as infiltrating lobular carcinoma, 1 as modularly carcinoma and 1 as intraductal carcinoma. Suspicious for malignancy was made in 7 smears of which 4 were diagnosed as infiltrating duct carcinoma, 1 as ductal carcinoma in situ, 1 as mucinous carcinoma and 1 as sclerosing adenosis. In remaining cases, gynaecomastia diagnosed in 2 cases on cytology and were confirmed on histology. One of the case diagnosed as galactocoele on cytology was diagnosed as infiltrating duct carcinoma on histology. One case diagnosed as non specific inflammatory smear on cytology was diagnosed as granulomatous mastitis on further histology.

Table no.4: Comparison of cyto-histological diagnosis

Cytology diagnosis	No of cases	Histopathology diagnosis		
		Consistent	Inconsistent	Total
Benign	68	68(100%)	0(00%)	68
Malignant	24	24(100%)	0(00%)	24
Suspicious of malignancy	7	6(85.71%)	1(14.28%)	7
Other	7	6(85.71%)	1(14.28%)	7
Total	106	104(98.11%)	2(1.88%)	106

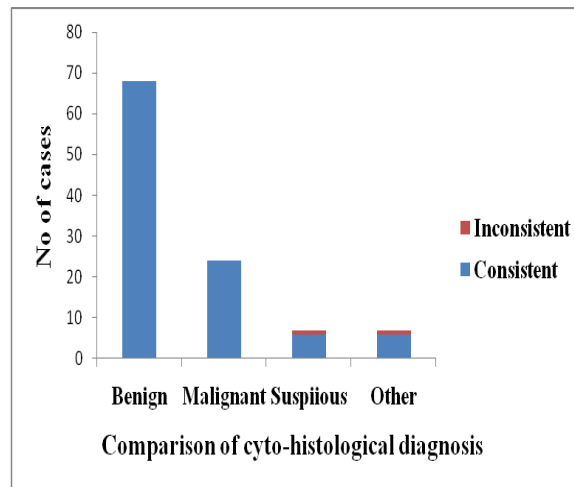


Fig no 2: Comparison of cytological and histological diagnosis

Amongst benign and malignant lesions cytological diagnosis and histopathological diagnosis were consistent in 100% of the cases. The lesions, which were diagnosed as suspicious for malignancy on cytology in 7 cases were found malignant in 6(85.71%) cases and benign in 1(14.28%) case. In remaining non neoplastic cases, consistency was found in 85.17%. Thus in the present study, cytological findings were consistent with histopathological findings in 104 out of 106 cases (98.11%) and inconsistent in 2 (1.88%) cases.

Table no.:5 Statistical analyses

Cytology \ Histopath	Positive	Negative
	Positive	1
Negative	1	74

True positive cases (TP) =30

False positive cases (FP) =1

True negative cases (TN) =74

False negative cases (FN) =1

$$\text{Sensitivity} = \frac{\text{TP}}{\text{TP} + \text{FN}} \times 100 = \frac{30}{30 + 1} \times 100 = 96.77\%$$

$$\text{Specificity} = \frac{\text{TN}}{\text{TN} + \text{FP}} \times 100 = \frac{74}{74 + 1} \times 100 = 98.66\%$$

$$\text{Positive predictive value} = \frac{\text{TP}}{\text{TP} + \text{FP}} \times 100 = \frac{30}{30 + 1} \times 100 = 96.77\%$$

$$\text{Negative predictive value} = \frac{\text{TN}}{\text{TN}+\text{FN}} \times 100 = \frac{74}{74+1} \times 100 = 98.66\%$$

$$\begin{aligned} \text{Efficiency} &= \frac{\text{TP}+\text{TN}}{\text{TP}+\text{FP}+\text{FN}+\text{TN}} \times 100 \\ &= \frac{30+74}{30+1+74+1} \times 100 = 98.11\% \end{aligned}$$

Thus in the present given study the sensitivity, specificity, positive predictive value, negative predictive value and efficiency of malignant cases is 96.77%, 98.66%, 96.77%, 98.66%, 98.11% respectively

DISCUSSION

The FNAC of breast lump is worldwide accepted and established method of choice to determine the nature of breast lump. Fibroadenoma was the commonest benign lesion in our study which was concurrent with the findings of Debra (1995) et al ^[16] and invasive duct carcinoma was the commonest malignant lesion which was similar to findings of study done by Quasim(2009) et al. ^[17]

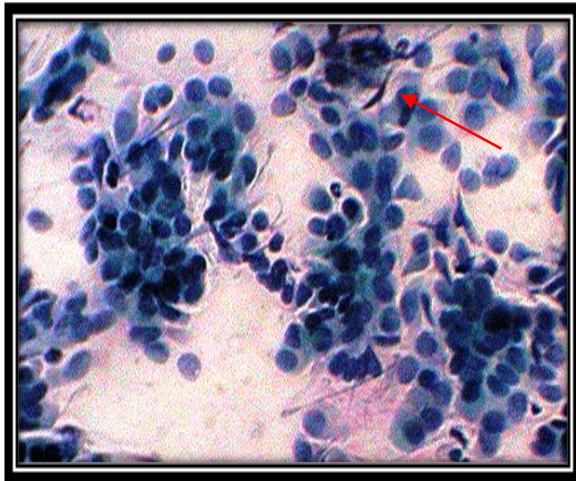


Fig3. Photomicrograph showing sheet of benign epithelial cells with monomorphic cells with regular nuclei with myoepithelial cells (Pap stain, 40 X) arrow shows myoepithelial cells

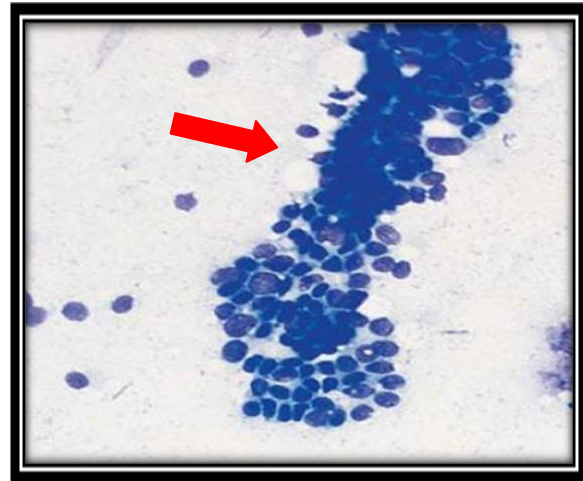


Fig 4. Photomicrograph showing staghorn cluster (arrow) of benign epithelial cell in fibroadenoma (Pap stain, 40 X)

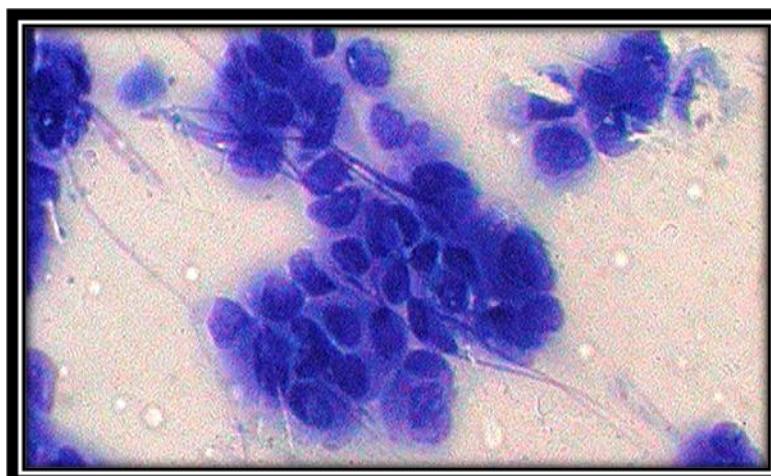


Fig5. Photomicrography of Malignant pattern on FNAC: Pleomorphic tumor cells, large hyperchromatic nuclei and altered N:C ratio. (Pap stain, 40 X)

Table no 6: Comparison of cytological diagnosis with other studies.

Author	Malignant	Suspicious For malignancy	Benign	Inadequate smear	Other	Total
Debra et al(1983)	131(7.79%)	300(8.92%)	1019(60.65%)	230(13.69%)	0	1680
Feither G et al(1995)	181(12.3%)	49(3.3%)	1003(68.1%)	239(26.6%)	0	1472
Premila De SR et al (1997)	92(15.33%)	15(2.50%)	486(81.0%)	7(1.16%)	0	600
Kuldeep Singh(2001)	35(14.58%)	5(2.08%)	200(83.33%)	0	0	240
Quasim et al(2009)	32(27.58%)	0	68(58.62%)	16(13.79%)	0	116
Sajid(2010)	58(47.5%)	0	64(52.5%)	0	0	122
Bukhari et al(2010)	120(28.23%)	32(7.52%)	271(63.76%)	0	2(0.47%)	425
Shreshta et al(2011)	152(10.83%)	175(12.47%)	618(11.97%)	27(1.92%)	431	1403
Tohuiddin(2011)	72(13.74%)	17(3.24%)	431(82.25%)	3(0.57%)	4(0.76%)	524
Present study	24(22.64%)	7(6.60%)	68(64.15%)	0	7(6.60%)	106

In the present study percentage of malignant cases was 22.64% on cytology; this was more or less similar findings to Bukhari et al (2010).⁽¹⁸⁾ This percentage was more than Debra et al (1983),⁽¹⁶⁾ Premila De SR (1997),⁽¹⁹⁾ Feitcher G et al (1995),⁽²⁰⁾ Kuldeep Singh et al (2001),⁽²¹⁾ Shreshta A et al (2011)⁽²²⁾ and Tohuiddin et al (2011)⁽²³⁾ and was less than Sajid H (2010)⁽²⁴⁾ and Quasim et al (2009).⁽¹⁷⁾ On cytology percentage of benign, in the

present study was 64.15 % (68 cases). This was similar to Bukhari et al (2010).⁽¹⁸⁾ The percentage was more as compared to Debra et al (1983),⁽¹⁶⁾ Quasim et al (2009)⁽¹⁷⁾ and Sajid et al (2010).⁽²⁴⁾ The percentage was less as compared to Premila De SR et al (1997),⁽¹⁹⁾ Feitcher et al (1995)⁽²⁰⁾ and Kuldeep Singh et al (2001).⁽²¹⁾ Amongst other non neoplastic lesions 7(6.60%) cases were observed in the present study. The

findings were less than Shreshta et al (2011).⁽²²⁾

M Amirjkachi et al (2001)⁽²⁵⁾ has found 10 cases of gynaecomastia on FNAC. Anuradha Joshi et al (1999)⁽²⁶⁾ has noted 70 cases of carcinoma and 295 cases of benign breast lesions amongst males. In the present study 2 cases were diagnosed as gynaecomastia and 3 cases as malignant among males. Diagnostic accuracy for gynaecomastia and malignancy in males was 100%.

Park IA et al (1997)⁽²⁷⁾ has observed that, the success of cytodiagnosis was varied according to histologic subtypes. FNAC tend to be inadequate and false negative in case of duct carcinoma of schirrous subtype. The main cause for inadequate smears may be due to lack of technical experience in performing FNA, preparation. Bukhari et al (2010)⁽¹⁸⁾ noted that FNA of ill defined masses like lesion or lesions with hyalinization and deeply situated lumps may also be contributed to the inconclusive diagnosis.

In the present case we noted 1 false negative case, which was seen in lactating female whose cytology was diagnosed as galactocoele, its further follow up on histopathology was found out to be invasive ductal carcinoma. Diagnosis of carcinoma breast on cytology during lactation is difficult as it may sometimes be presented as

obstructed galactophoreic duct and may be the reason for false negative diagnosis.⁽²⁸⁾

Criteria for adequacy during cytology reporting if cut off to 6 epithelial cell clusters reduces the false negative rates by approximately 50 %.⁽²⁹⁾

False positive diagnosis is always interpretation errors. They are highly undesirable, but in large volume institutions, they will occur from time to time in the process of evaluation of rare lesion, diagnostic pitfalls and look alike such as some fibroadenomas with myoepithelial hyperplasia, complex sclerosing lesions and sclerosing adenosis. False positive diagnosis should be avoided because mastectomy or other treatments may in certain centres be performed based entirely on FNA cytologic findings. In the present study we found 1 false positive case. It was diagnosed as suspicious for malignancy on cytology which further underwent simple mastectomy and histopathologically was diagnosed as sclerosing adenosis. Sclerosing adenosis cannot be clearly distinguished cytologically. Epithelial aggregates in smears may show an obvious microacinar pattern giving rise to differential diagnostic problem, particularly with tubular carcinoma. Apocrine metaplasia occurring in areas of adenosis can look extremely worrying and may be the cause of false positive diagnosis.

Table no 7: Comparison of accuracy of FNAC

Author	Sensitivity	Specificity	Positive predictive value	Efficiency	Negative predictive value
Kline TS et al(1979)	89.5%	92.5%	85.33%	91.63%	-
Francisco D et al(1995)	93.49%	95.73%	93.49%	98.75%	95.73%
Feichter et al(1997)	86%	99.3%	99.3%	93%	85%
Premila De SR et al(1997)	93.8%	98.21%	92.70%	97.40%	-
Zhang Qin(2004)	97.1%	97.3%	-	9.2%	-
Arjun Singh et al (2011)	84.6%	100%	-	92.3%	-
Khemka A et al(2011)	96%	100%	100%	-	95.12%
Bukhari et al(2011)	98%	100%	97%	98%	100%
Present study	96.66%	98.66%	96.77%	98.11%	98.66%

In the present study sensitivity was high as compared to Kline TS et al

(1979),⁽³⁰⁾ GE Feitcher et al (1997)⁽²⁰⁾ and Arjun Singh et al (2011)⁽³¹⁾ Specificity in

present study was similar to Premila De SR et al (1997) ⁽¹⁹⁾ and it was higher than Kline TS (1979), ⁽³⁰⁾ Francisco Dominez et al (1997) ⁽³²⁾ and Zhang Qin (2004).⁽³³⁾ The Positive predictive value of present study was similar study to Bukhari et al (2011) ⁽¹⁸⁾ and was higher than Francisco Dominez et al (1997) ⁽³²⁾ and Premila De SR et al (1997) ⁽¹⁹⁾ and Kline TS et al (1979). ⁽³⁰⁾ The negative predictive value was higher than Feitcher et al (1997), ⁽²⁰⁾ Francisco Dominez et al (1997). ⁽³²⁾ Efficiency was higher than all the series mentioned above.

Thus in the present given study the sensitivity, specificity, positive predictive value, negative predictive value and efficiency of malignant cases is 96.77%, 98.66%, 96.77%, 98.66%, 98.11% respectively.

The high specificity and predictive value of positive results allow for the early diagnosis, treatment and management of breast cancer.

CONCLUSION

The FNAC of breast is cheap, safe and highly accurate method for diagnosis of breast lump preoperatively to avoid undue surgery and inconvenience during biopsy. FNAC of breast lump should be used as preliminary investigation in outdoor patient department. The same aspirated can also be used for ancillary molecular testing.

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