



Role of Fine-Needle Aspiration Cytology in Evaluation of Breast Lumps

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ABSTRACT

Background: Breast lump is most common presentation in most of the breast diseases. Fine-Needle Aspiration Cytology (FNAC) is the immediate tool of the physician when first time patient is examined. The method is rapid, accurate, minimally invasive and serve as a therapeutic procedure when a cyst is encountered.

Method: This is a retrospective hospital based study conducted at department of Pathology, Gandhi Medical College, Bhopal over a period of two and a half years. It included 531 patients with breast lump attending the outpatient department (OPD).

Result: FNAC was done on 531 cases of breast lump, 31 (5.84%) cases were not satisfactory and remaining 500 (94.16%) were satisfactory enough for a cytological diagnosis. Out of 500 cases, benign lesions were 358 (71.60%), malignant lesions were 87 (17.40%), inflammatory lesions were 41 (8.20%) and suspicious category include 14 (2.80%). Fibroadenoma was the most common benign lesion and ductal carcinoma was the common malignant lesion. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of FNAC was 98.13%, 100%, 100%, 98.98% and 99.34% respectively.

Conclusion: FNAC of the breast lump is a simple, safe, economical, and rapid diagnostic procedure which can be used routinely on OPD basis, because the cytopathological examination of these lesions before operation or treatment serves as an important diagnostic modality.

Keywords: FNAC, Breast Lesions, Fibroadenoma, Ductal Carcinoma.

Introduction:

All breast lesions are not malignant, and all the benign lesions do not progress to cancer; however the accuracy of diagnosis can be increased by a combination of preoperative tests (like physical examination, mammography, fine-needle aspiration cytology, and core needle biopsy). These modalities are more accurate, reliable, and acceptable when compared with a single adopted diagnostic procedure despite of having their own technical limitations.^[1, 2]

Most common symptoms associated with breast lesions reported by women are pain, palpable mass, lumpiness without a palpable mass or nipple discharge.^[3] A breast mass is generally palpable when it exceeds 2cm in size. The likelihood of a palpable mass being malignant increases with age. Only 10% of breast masses under the age of 40 are malignant compared to 60% of masses over the age of 50 years.^[3]

Fine-needle aspiration (FNA) is an established and highly accurate method for diagnosing breast lesions. The use of core biopsy (CB) is being increasingly advertised but its procedure is more cumbersome, expensive and time consuming as compared to FNA procedure.^[4-6] Core Biopsy or tru cut needle biopsy is not widely used because of its complications, interpretation, and time-consuming

results; therefore palpable breast lesions can be accurately diagnosed by triple test only (FNAC, physical examination and Mammography).^[7]

It has been shown that, FNAC can reduce the number of open breast biopsies.^[8] FNAC has been found to have sensitivity ranging from 82% to 97.5% and specificity of more than 99% .^[9,10,11]

The adequacy of FNAC is dependent on multiple factors. The rate of inadequate aspiration ranges from 0.7% to 25.3% , and this is influenced by the nature of the lesion, the available technology, and the experience and preference of the operator. ^[12] It was reported that the nature of the lesion was the most common cause of inadequacy of FNAC, accounting for 68% of the inadequate aspirates, followed by the experience of the aspirator that accounted for 32% of the inadequacy rate. ^[13] Some studies advocated that both aspirator and interpreter should ideally be the same, as the number of inadequate aspirates was far lower and the accuracy of diagnosis was higher when the same person aspirated and reported on the specimens. ^[12, 14, 15] The National Cancer Institute (NCI) definition of adequacy was one that led to resolution of a problem presented by a lesion in a particular patient's breast. ^[16] Nevertheless,

many authors considered epithelial cell clusters as the most important adequacy criteria. Studies demonstrated that an appropriate number of epithelial cell clusters could be an important factor in lowering the false-negative diagnosis rate in palpable and nonpalpable breast masses. [17,18] It was further suggested that a cut-off of six epithelial cell clusters may provide a reasonable balance between reduction of false-negative FNAC smears and an increase in the rate of inadequate smears. [18] Since diagnosing malignancy involves evaluation of the cytologic features of the epithelial cells, quantification of epithelial cells in the smears is most likely helpful. [17]

Standard reporting system for breast FNAC, In the UK National Health Service Breast Screening Programme (NHSBSP) guidelines use a C1–C5 system: C1, inadequate; C2, benign; C3, atypical, probably benign; C4, suspicious; and C5, malignant. So that we find that the C3 and C4 categories always go to biopsy, be it core biopsy (CB) or otherwise. [19,20]

Most of the institutions in the USA follow the National Cancer Institute (NCI) consensus conference recommendations belonging to the following categories: unsatisfactory, benign, atypical, suspicious and malignant. [21]

The present study was undertaken to evaluate frequency, cytomorphological variations, and clinical presentation of different breast lesions.

Material and Methods

A retrospective hospital based study was conducted at the pathology department, Gandhi Medical College, Bhopal, India. Data was collected from the records of FNAC of breast lesions done in last two and half year duration. All the fine needle aspiration (FNA) was carried out with a 22 or 23 gauge needle attached to a 20 cc airtight disposable syringe fitted in a syringe holding FNA gun which provided a better grip and a negative pressure to aspirate adequate sample. The sample was obtained by to and fro motion. Samples were smeared onto glass slides just previously smeared with albumin for cellular adhesion; a thin smear was made and the slide was fixed immediately in 95% methanol. In cystic lesions, after aspiration of fluids, the lesion was again aspirated. The fluid was centrifuged and smears are made from sediment. Wet-fixed smears were stained with Haematoxylin and Eosin (H&E), and Papanicolaou stain. FNAC results were studied in detail for findings of inflammatory, benign breast lesions, suspicious and malignant lesions.

Result

FNAC of palpable breast lesions was done in different age group ranging from 11 yrs to 80 yrs and the mean age was 34.33 yrs. The first decade (21-30) showed maximum number of breast lesion (35.97%) while no case was found in the first decade. In the present study, 45 patients (8.47%) presented with bilateral lesions, where as 486 patients presented with unilateral involvement of the breast. Majority of the lumps 269 (50.66%) were located in left breast and 217 (40.87%) were located in the right breast.

Among the quadrants majority of the lumps 302 (56.88%) were located in upper outer quadrant, followed by upper inner quadrant which constituted 87 cases (16.38%) and rest as shown in the (Table No.3). Out of 500 cases, inflammatory lesion were 41 (8.20%) benign lesions 358 (71.60%) and malignant lesion 87 (17.40%) with suspicious category 14 (2.80%) .

Amongst inflammatory lesion, mastitis was commonest with 36 cases (9.02%) followed by Abscess 3 (0.75%) A single case of granulomatous lesion and epithelial hyperplasia was encountered in this category of inflammatory lesions.

Amongst Benign lesions, Fibroadenoma (39.94%) was the most common lesion, followed by fibroadenosis and fibrocystic disease. This benign category also includes two false negative cases which proved to be malignant on histopathology.

Fibrocystic Disease: Smear showed cyst macrophages, bare nuclei and small groups of benign ductal epithelial cells and RBCs in all cases.

Fibroadenoma: The aspirate was whitish granular in these cases. Cellular smears showed benign duct epithelial cells in tight cohesive clusters. Background was formed by bare nuclei and stromal fragments. A few cases showed apocrine changes and antler horn pattern.

Out of 101 malignant lesions, 94 were infiltrating duct carcinoma (93.07%), 4 were Lobular carcinoma (3.96%) and 1(0.99%) each of Apocrine carcinoma, Metaplastic carcinoma and Non-Hodgkin's lymphoma.

Infiltrating Ductal Carcinoma: Smear showed malignant cells with hyperchromatic nuclei and prominent cytoplasm. A few cases showed mitotic figures, multinucleate.

Invasive Lobular carcinoma: Smear showed Indian file arrangement of malignant cells with poorly cohesive clusters. Also there was intracytoplasmic neolumina.

Metaplastic Carcinoma: Smear showed high cellularity of fragments of fibromyxoid stroma containing spindle cells with nuclear pleomorphism and hyperchromasia. Also showed tumor giant cell.

Non- Hodgkin's Lymphoma: Cellular smear showed proliferation of lymphocytes with mixture of centrocytes and centroblasts having round, irregular and cleaved

hyperchromatic nuclei with scanty cytoplasm.

Apocrine carcinoma: Smear showed malignant cells both individually scattered and arranged in syncytial fragments having apocrine features.

Microphotograph of infiltrating lobular carcinoma showing typical Indian File of malignant cells with poorly cohesive clusters (PAP: 40X).

Table 1: Age incidence

	Age Group	Number of Cases	Percentage (%)
1	0-10	00	00
2	11-20	74	13.94
3	21-30	191	35.97
4	31-40	139	26.18
5	41-50	63	11.86
6	51-60	15	2.82
7	61-70	32	6.03
8	71-80	17	3.20
	Total	531	100.00

Table 2 : Side Of Involvement

Sr. No.	Side	Number of Cases	Percentage (%)
1	Right	217	40.87
2	Left	269	50.66
3	Bilateral	45	8.47
	Total	531	100

Table 3: Involvement of different quadrants

Sr.No.	Quadrant	Number of Cases	Percentage (%)
1	Upper outer	302	56.88
2	Upper inner	87	16.38
3	Lower outer	85	16.01
4	Central	40	7.53
5	Lower inner	17	3.20
	Total	531	100

Table 4: Categorization Of Various Lesions Of Breast

Lesions	Number of Cases	Percentage (%)
Inflammatory	41	8.20
Benign	358	71.60
Malignant	87	17.40
Suspicious	14	2.80

Table 5: Categorization of inflammatory lesions of breast

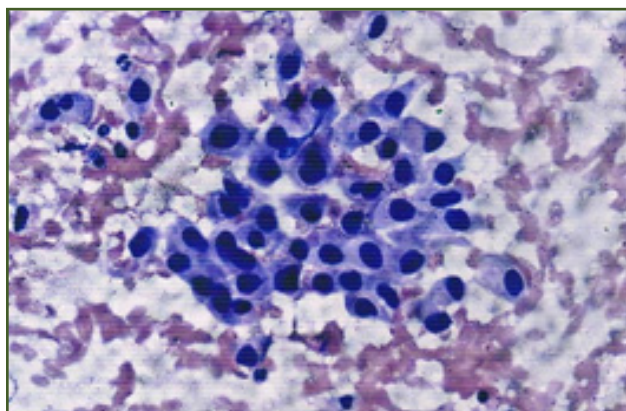
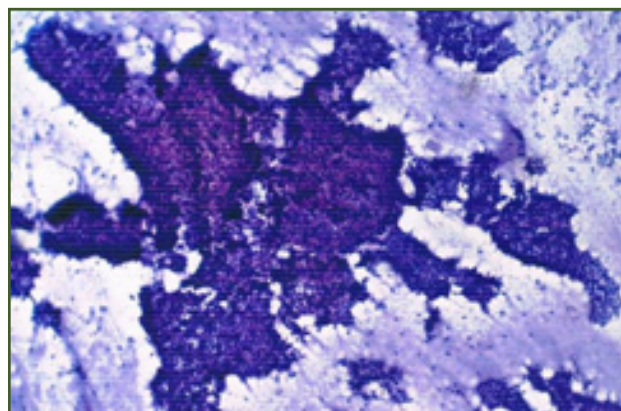
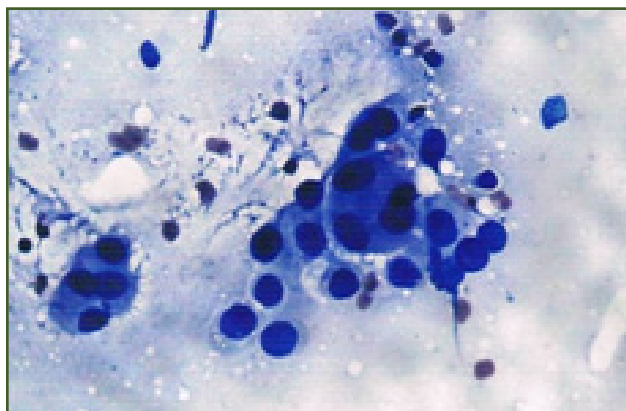
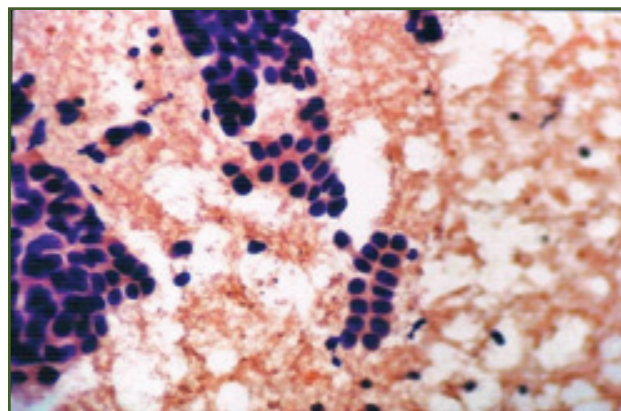
Benign Lesions	Number of Cases	Percentage (%)
Mastitis	36	87.80
Abscess	3	7.32
Granulomatous	1	2.44
S/o Epithelial Hyperplasia	1(False Negative)	2.44

Table 6: Categorization of benign lesions of breast

Benign Lesions	Number of Cases	Percentage
Fibroadenoma	143	39.94
Fibroadenosis	111	31.01
Fibrocystic disease	41	11.45
Gynecomastia	35	9.78
Benign cyst	13	3.63
Galactocele	7	1.96
Benign phylloides tumor	4	1.12
Lipoma	3	0.84
Fibroadenoma with Apocrine cell change	1 (False Negative)	0.27

Table 7: Categorization of malignant lesions of breast.

Malignant Lesion	Number of Cases	Percentage
Infiltrating carcinoma	94	93.07
Lobular carcinoma	4	3.96
Non Hodgkin's lymphoma	1	0.99
Apocrine carcinoma	1	0.99
Metaplastic carcinoma	1	0.99

**Fig. 1 : Microphotograph of Fibroadenoma showing Antier horn pattern.****Fig. 2: Microphotograph of Invasive duct carcinoma showing dispersed malignant cells.****Fig. 3: Microphotograph of Invasive duct carcinoma showing dispersed malignant cells with multinucleation.****Fig.4: Microphotograph of infiltrating lobular carcinoma showing typical Indian File of malignant cells with poorly cohesive clusters (PAP: 40X).**

Discussion

In the present study, left breast was more commonly involved than the right breast. Similar finding were found in studies of Ahmed et al ^[23] and Sandhu et al ^[24].

Upper outer quadrant was more commonly involved followed by upper inner quadrant which correlated well with the study conducted by Zuk et al ^[25] and Sandhu et al ^[24].

In the present study inflammatory lesion were well in comparison with those of Singh et al ^[26] G. Jayaram ^[27] and Pradhan M ^[28].

Benign breast lesions accounted for 71.60% of the cases (358 cases), and this finding is comparable with finding of G. Jayaram ^[27], Choi et al ^[29] and Pandit et al ^[30].

Malignant lesions accounted for 17.40% (101 cases) of total cases and there were (14) 2.64% lesions diagnosed as suspicious for malignancy on cytology, these finding are comparable with the finding of the breast of the breast FNAC study reported by Pradhan M ^[28] and Singh et al ^[26].

In the present study, fibroadenoma was the most common benign lesion diagnosed in 39.94% which is in comparison with the study of breast lesion FNAC by Singh et al ^[26]. It is followed by Fibroadenosis as second most common benign lesion which is similar finding to that of Singh et al ^[26] and Pradhan et al ^[28].

Out of 500 cases in the present study, malignancy was noted in 101 cases (including 14 cases reported as 'suspicious for malignancy') accounting for 20.20% incidence. Among these 101 cases, 94 were reported as infiltrating duct carcinoma, 4 as lobular carcinoma and 1 each as Apocrine carcinoma, Metaplastic carcinoma and Non-Hodgkin's lymphoma. the incidence of infiltrating ductal carcinoma is similar to studies of Goel et al ^[31] and Pradhan et al ^[28].

In the present study Sensitivity is 98.13% Specificity 100.00% Positive predictive value 100.00% Negative predictive value 98.98% and Overall accuracy 99.34%. Sensitivity and Specificity are similar to Kapila and Verma et al ^[32] and Q. He et al ^[33]. Whereas Positive and Negative Predictive value is similar to Kapila and Verma et al ^[32].

Table 8: Side of involvement (in Percentage)

Sr. No.	Author	Right	Left	Bilateral	Total
1	Ahmed et al (2010)	43.0	51.0	6.0	200
2	Sandhu et al (2010)	47.4	51.6	1.0	267
3	Present study	40.87	50.66	8.47	531

Table 9: Presenting quadrants of breast lesions: (In Percentage)

Presenting Quadrants	Zuk et al (1989)	Sandhu et al (2010)	Present study
Upper outer	42.2	47.7	56.88
Upper inner	6.4	9.5	16.38
Lower outer	5.3	3.6	16.01
Lower inner	4.3	1.6	3.20
Central	31.6	4.9	7.53

Table 10: Comparative analysis of Breast Lesions: (In percentage)

Sr.No.	Author	Inflammatory	Benign	Malignant	Suspicious
1	Pandit et al (1988)	16.97	67.42	28.02	4.55
2	G. Jayaram (1996)	7.4	69.7	12.2	3.3
3	Singh et al (2001)	8.5	83.33	14.58	2.08
4	Choi et al (2004)	0.77	75.6	14.0	2.9
5	Pradhan M (2008)	8.24	81.92	15.49	2.32
6	Ahmed et al (2010)	11.00	66.00	34.00	00
7	Present study	8.20	71.60	17.40	2.80

Table 11: Comparative analysis of benign lesions: (In percentage)

Cytological diagnosis	Singh et al (2001)	Pradhan et al (2008)	Ahmed et al (2010)	Present Study
Fibroadenoma	48.5	8.01	28.0	39.94
Fibroadenosis	40.5	43.41	00	31.01
Fibrocystic disease	00	4.27	11.5	11.45
Gynecomastia	00	2.18	1.5	9.78
Galactocele	1.0	0.71	4.0	1.96
Benign phylloides tumor	00	0.18	1.0	1.12
Benign cyst	3.0	0.09	6.0	3.63
Lipoma	00	0.31	3.0	0.84

Table 12 : Comparative analysis of malignant lesions : (In Percentage)

Cytological diagnosis	Goel et al (2003)	Pradhan et al (2008)	Present study
Infiltrating ductal carcinoma	90.0	97.13	94.07
Lobular carcinoma	2.0	0.29	04.96
Medullary carcinoma	2.0	0.86	00
Mucinous carcinoma	00	0.86	00
Non-Hodgkin's lymphoma	00	0.29	01.99
Apocrine carcinoma	00	00	01.99
Metaplastic carcinoma	00	00	01.99
Metastatic	3.0	00	00

Table 13: Statistical Result- Comparative Analysis

Sr.No.	Study	Sensitivity	Specificity	PPV	NPV	Accuracy
1	Kapila & Verma (1989)	97.6	99.4	99.5	97.2	98.4
2	Collaco et al (1999)	92.1	98.6	99.4	82.1	-
3	Choi et al (2004)	77.7	99.2	98.4	88.0	91.1
4	Q. He et al (2007)	97.72	99.4	-	-	97.94
5	Present study	98.13	100	100	98.98	99.34

Conclusion

The fine needle aspiration cytology of the breast lumps is a simple, safe and rapid diagnostic procedure which can be used routinely on OPD basis.

The main purpose of FNAC of breast lumps is to confirm cancer preoperatively and to avoid unnecessary surgery in specific benign conditions. A diagnosis of malignancy allows pre-operative discussion on available therapeutic option.

The benign breast lesions were far more common than the malignant breast lesions.

Ethical Approval

The study was approved by the Institutional Ethics Committee.

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