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Original Research Article

Fine Needle Aspiration Cytology of Breast Lesions- A Practical Diagnostic Modality

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Abstract
Diseases of breast often present as palpable mass in the breast. Women have a tendency to hide the breast masses due to social stigma. In addition, evaluation of breast lumps in resource-limited settings can be challenging. Fine needle aspiration cytology (FNAC) is a simple, time saving, minimally invasive and fairly accurate method for diagnosis of breast lesions. The aim of this study was to study the cytological features of various breast lesions. and to evaluate the role of FNAC in the diagnosis of breast lesions. The present study was conducted during the period from January 2011 to August 2015. A total of 526 breast cytology cases were studied and correlated with histopathology whenever possible.
The Fine Needle Aspiration Cytology reporting was divided into five reporting categories according to National Health Service Breast Screening Programme 2001. The most common breast lesions belonged to C2 (Benign) category comprising of 318 cases (60.46%) followed by C5 (Malignant) category comprising of 137 cases (26.05 %). Fifteen cases belonged to the category of C3-atypia probably benign and 17 cases to C4 category- suspicious of malignancy. Thirty nine cases were inadequate for opinion. (C1 category) Histopathology was available for 169 cases. Thus, FNAC is simple, quick, cost effective, highly sensitive and specific method in the evaluation of the breast lesions.
Keywords- *FNAC, Breast, Cytology, Carcinoma breast.*

Introduction

A lump in the breast, whether benign or malignant, creates anxiety to the patient and needs quick evaluation. Breast cancer is the second most common malignancy occurring in Indian women.[1] However, due to social stigma, patient often present at late stage. Locally advanced breast cancer constitutes significant proportion of the patients presenting for the treatment. It is necessary to obtain pathological confirmation of the nature of any mass in the breast.[2] Technology has helped us progress in many ways. Recently, use of core needle biopsy for the diagnosis of breast lumps is increasing. However, its disadvantages like, high cost (when compared with FNAC), patient discomfort, longer time for

diagnosis and risk of tumour seeding along the track, limits its utility.[3] Fine needle aspiration cytology, a part of triple assessment, is a simple mean of evaluating breast lesions and aids in improving pre-operative diagnosis and early management of the patient. The diagnostic accuracy of FNAC, especially with experienced cytopathologist and additional cell block preparation, is high, approaching to almost 100%, making FNAC the most reliable test in the assessment of breast lumps.[3] The present study was conducted to study the cytological features of various breast lesions and to evaluate the role of FNAC in the diagnosis of breast lesions.

Material & methods

The present study was conducted on patients presenting with breast lump, during January 2011 to August 2015. It included FNAC of 526 breast lesions. All the patients were explained about the procedure and informed consent was taken prior to the procedure. The clinical and radiological details of the patient were noted. Local examination was done and findings were noted. A 30- 35 mm long, 22 or 23 gauge needle was used for FNAC. On an average, 2 – 4 passes were taken depending upon the size of the lump and nature of aspirate. The slides were immediately dipped and kept for at least 30 minutes in the Papanicolaou fixative. The slides were then stained with Haematoxylin & Eosin stain, Papanicolaou stain and Romanowsky stain. Histopathology correlation was done whenever possible.

Results

The study comprised of FNAC of 526 breast lesions. It included 483 female patients (21 female patients presented with bilateral breast lesions) and 22 male patients with M:F ratio of 1: 21.9. Age range of the patients was 11 to 80 years. The youngest patient was 14 years whereas the eldest patient was 80 years old. Left breast lump was the commonest clinical presentation. (243 cases)

The FNAC reporting was divided into 5 categories according to National Health Service Breast Screening Programme 2001. The most common breast lesions belonged to C2 (Benign) category comprising of 318 cases (60.46%) followed by C5 (Malignant) category comprising of 137 cases (26.05 %). The most common age group for benign lesions was 21-30 years (34.39%) and for malignant lesions was 51-60 years (26.32%). There were 15 cases belonging to the category C3- atypia probably benign and 17 cases to C4 category- suspicious of malignancy. Thirty nine cases were inadequate for opinion. (C1 category) [Table 1]

The commonest benign breast lesion was fibroadenoma seen in 132 cases. The other benign lesions observed were fibrocystic change, mastitis (including granulomatous mastitis), phyllodes tumor, fat necrosis and galactocele. [Table 2] The most common malignant breast lesion was invasive duct carcinoma seen in 127 cases. One case of only ductal carcinoma in situ and one case of sarcoma was observed.

In males, it was observed that maximum number of cases were from 5th decade (27.27%) followed by 6th decade (22.73 %). Majority of the cases (i.e. 17 out of 22 cases) in males belonged to C2 category with 14 cases (63.64%) diagnosed as Gynecomastia. Five cases were inadequate for opinion.

In the present study, histopathological correlation was available in 169 cases.[Table 3] The cytology diagnosis of C5 (malignant) showed 100% correlation with histopathology. In the present study, there were 5 false negative cases. There were no false positive cases in the present study. Six out of seven cases which were reported as C1, were benign on histopathology whereas one case turned out to be undifferentiated pleomorphic sarcoma on histopathology. Out of nine cases which were reported as C3 on cytology, eight were benign lesions and one was phyllodes on histopathology. Six out of seven cases which were reported as C4 on cytology, were malignant on histopathology whereas one case was of a benign lesion. The sensitivity and specificity of FNAC in our study was 91.52% and 100% respectively. The

positive predictive value and the negative predictive value were 100% and 94.56% respectively. The diagnostic accuracy rate in our study was 96.58%.

Table No. – 1 Distribution of FNAC of Breast Lesions According to Reporting Category

Sr. No.	Reporting Category	No. Of Lesions	Percentage (%)
1.	C1 (Inadequate)	39	7.41
2.	C2 (Benign)	318	60.46
3.	C3 (Atypia probably benign)	15	2.85
4.	C4 (Suspicious of malignancy)	17	3.23
5.	C5 (Malignant)	137	26.05
	TOTAL	526	100

Table No. – 2 Analysis of Cytological Diagnosis of Breast Lesions

Cytological diagnosis	No of lesions	Percentage (%)
Inadequate for opinion(C1)	39	7.41
Benign (C2)		
Fibroadenoma	132	25.10
Cellular fibroadenoma	05	0.95
Fibroadenoma with infarction	01	0.19
Fibrocystic change	25	4.76
Benign breast lesions	71	13.50
Mastitis/abscess	36	6.84
Granulomatous mastitis	05	0.95
Actinomycotic abscess	01	0.19
Caseating Tuberculosis	01	0.19
Lactational change	07	1.33
Galactocele	13	2.47
Fat necrosis	03	0.57
Phyllodes tumor	04	0.76
Gynecomastia	14	2.67
Atypia probably benign (C3)	15	2.85
Suspicious of malignancy (C4)	17	3.23
Malignant (C5)		
Infiltrating Ductal Carcinoma	127	24.14
Mucinous Carcinoma	02	0.38
Metaplastic Carcinoma	01	0.19
Infiltrating Ductal Carcinoma with medullary features	01	0.19
Infiltrating Ductal Carcinoma with neuroendocrine features	01	0.19
Infiltrating Ductal Carcinoma with mucinous differentiation	02	0.38
Intracystic Papillary Carcinoma	01	0.19
Ductal carcinoma in situ	01	0.19
Sarcoma	01	0.19
TOTAL	526	100

Table No. 3 Cytohistological Correlation as per Reporting Categories

Sr. No.	Cytological Category	No. Of Lesions	Histological Diagnosis		
			Benign/ inflammatory lesion	Borderline (phyllodes)	Malignant (carcinoma/ sarcoma)
1.	C1 (Inadequate)	07	06	-	01
2.	C2 (Benign)	92	87	02	03
3.	C3 (Atypia probably benign)	09	08	01	-
4.	C4 (Suspicious of malignancy)	07	01	-	06
5.	C5 (Malignant)	54	-	-	54
	TOTAL	169	102	03	64

Table No. 4 Comparison of Statistical Analysis of Cytology of Breast Lesions

Sr. No	Author	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
1.	Madubogwu et al [19]	90.0	95.5	94.7	91.3
2.	Hebbar et al [16]	93.10	100	100	90.47
3.	Chokshi et al [10]	98.08	98.86	99.35	96.66
4.	Khageshan et al [4]	96.97	100	100	98.63
5.	Sandeepa et al [18]	96.15	100	100	95.45
6.	Present study	91.52	100	100	94.56

Table No. 5 Diagnostic Accuracy Rate of FNAC of Breast Lesions – Comparative Analysis

Sr. No	Author	Diagnostic accuracy rate (%)
1.	Choi et al [17]	91.1
2.	Muddegowda et al [20]	97.0
3.	Mahajan et al [5]	98.11
4.	Khageshan et al [4]	99.05
5.	Present study	96.58

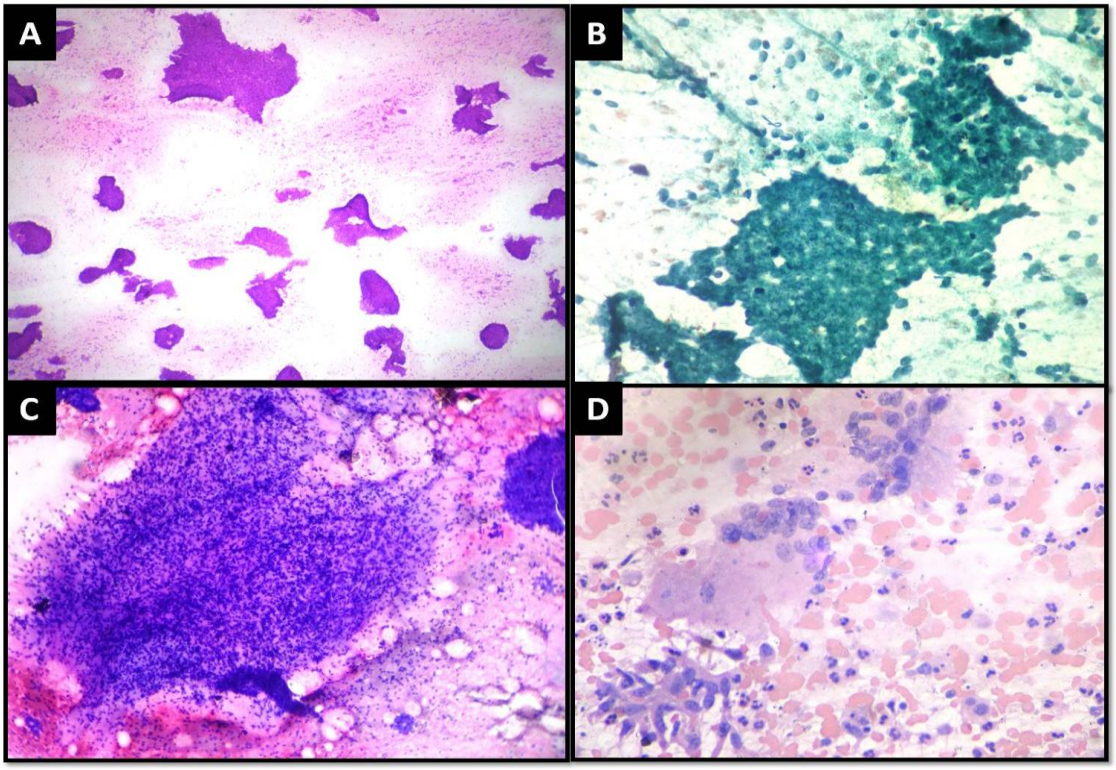

Figure 1: FNAC microphotograph showing A: C2- Fibroadenoma-Cellular smear with tightly cohesive clusters of benign ductal epithelial cells (H and E, x100) B: C2-Cluster of ductal epithelial cells with uniform nuclei against the background of bare nuclei. (Pap stain, x400) C: C2- Phyllodes tumour with cellular stromal fragment. (H and E, x400) D: C2: Granulomatous mastitis (H and E, x400)

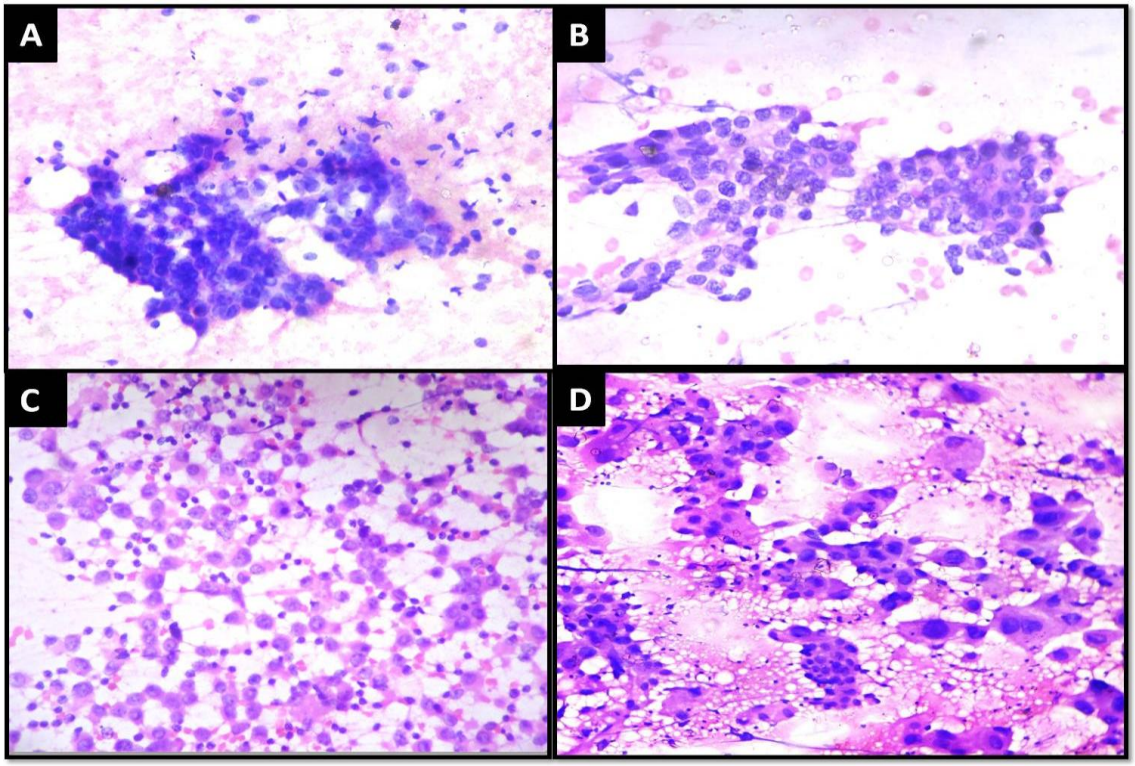

Figure 2: FNAC microphotograph showing A: C3- Ductal epithelial cells showing atypia with few bare nuclei in the background. (H and E, x400) B: C4- Loosely cohesive clusters of epithelial cells showing nuclear atypia and focally prominent nucleoli. (H and E, x400) C: C5- Cellular smear with discohesive malignant epithelial cells (H and E, x100) D: C5- malignant epithelial cells showing marked nuclear atypia against the background of necrotic material. (H and E, x400)

Discussion

FNAC is a simple and effective mean for the diagnosis of breast lumps, especially in today's era where patients are more aware and cosmetically oriented. Preoperative evaluation of breast lumps plays an essential role in the management of breast lesions.[3]

All the studies of breast lesions so far, showed female preponderance. In contrast with the females, male breast is rudimentary and is less sensitive to hormonal influences, and hence relatively resistant to neoplastic growth.[4] The male: female ratio in the present study was 1:21.9 which was in comparison with Mahajan et al[5] and Elmadhoun et al[6] who reported the ratio of 1:20.2 and 1:22.2 respectively. The common age group for benign lesions was 21-30 years and was comparable with study by Chandanwale et al[7] who reported 44.11% of benign cases in the age group of 21-30 years. The common age group for malignant lesions was 51-60 years and was similar to the study by Aslam et al[8] who reported maximum cases in the age group of 40-65 years.

In the present study, thirty nine cases were reported as inadequate- C1 on cytology. Out of these, histopathology was available in seven cases which showed six cases as benign whereas one case was malignant. In these cases, the breast lumps were small and mobile which was the reason for inadequate smears. In addition, technical expertise is needed particularly in cases of small lumps. A multidisciplinary approach including clinical and mammographical findings determines further management of the patient.[9]

In the present study, the benign (C2 category) cases accounted for 60.46% which was in comparison with Aslam et al[8] who reported 55.36% of C2 cases respectively. Fibroadenoma was the commonest benign lesion almost in all the studies conducted by various authors by far.

Lesions belonging to atypia probably benign (C3) were 2.85%. This was comparable to study by Chokshi et al[10] who reported 1.96% C3 lesions. Lesions belonging to suspicious of malignancy (C4) were 3.23 %. This was comparable to study by Goyal et al[11] who reported 2.38% cases as C4 category. The rate of equivocal or suspicious cases can be reduced by use of cell block technique. Studies have shown increased diagnostic rate by cell block technique. Additionally, invasion can be confidently diagnosed on cell block preparation.[3,12]

The malignant cases (C5 category) in our study were 26.05% which was in comparison with Kim et al[13] who reported 24.80%. In the present study, the most common malignant lesion was invasive ductal carcinoma which is in accordance with the literature.

In this study, breast lesions occurred in males between 19-80 years which was in comparison with Rosen et al[14] who observed breast lesions in males between 19-83 years. MacIntosh et al[15] observed that Gynaecomastia was the most common lesion of the male breast as in our study.

In the present study false negative rate was 8.47% which is comparable with Hebbar et al.[16] The reason of false negative cases may be sampling error due to aspiration miss of the main mass. In addition errors in interpretation due to low cellularity, bloody smears and cystic change may lead to false negative results.[17] There were no false positive cases in the present study which correlated with Khageshan et al[4] and Sandeepa et al.[18] False positive diagnosis on cytology may lead to unnecessary radical treatment and hence should be avoided. Low cellularity of the cytology smears with loosely cohesive benign appearing cells may pose a diagnostic dilemma. However careful search of scattered epithelial cells with intact cytoplasm exhibiting intracytoplasmic lumina, nuclear irregularities, and small clusters of cells with slightly enlarged nuclei may aid in the diagnosis of malignancy.[9] The sensitivity in our study was 91.52% and was comparable with study by Madubogwu et al.[19] Specificity and positive predictive value was 100% in our study and was comparable with studies by Khageshan et al[4] and Sandeepa et al.[18] Negative predictive value was 95.45% and was comparable with study by Sandeepa et al.[18] [Table 4] The high sensitivity

and predictive value of FNAC makes it as a desirable modality in the evaluation of palpable breast lesions. The diagnostic accuracy rate of the present study was 96.58% which was in accordance with study by Muddegowda et al.[20] [Table 5]

Many international as well as Indian studies, including ours, have shown high sensitivity, specificity and diagnostic accuracy of FNAC, thus highlighting its role in the pre-operative management of breast lesions.[4,9,16,19]

Conclusion

FNAC of breast is a quick and cost effective procedure. It not only helps in giving accurate diagnosis to the patient but also relieves the anxiety of the patient and helps in providing early diagnosis and thus the treatment.

Authors Contribution

Kalpana R Sulhyan, M.D., Professor and Head of dept. - Manuscript review and editing

Dhruti D Manek, M.D., ex-postgraduate student- - Literature search and manuscript editing

Bhakti D Deshmukh, M.D., Assistant Professor - Literature search and manuscript Preparation

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