

CYTOLOGICAL STUDY OF PALPABLE BREAST LUMPS (407 CASES) WITH THEIR HISTOLOGICAL CORRELATION

Mital Chokshi, Nandita Mehta

Department of Pathology, BJ Medical College, Ahmedabad, Gujarat, India

Correspondence to: Mital Chokshi (mitalgandhi9@gmail.com)

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ABSTRACT

Background: In India a large number of patients have been suffering from breast cancer and with each passing year, the number is increasing. Fine needle aspiration cytology (FNAC) is an inexpensive, simple and highly accurate means of diagnosing both benign and malignant breast lesions. The procedure provides a rapid and non-morbid diagnosis before the operation which enables the patient and the surgeon to discuss and plan therapeutic alternatives in a rational atmosphere.

Aims & Objective: To find out the common causes of breast lesions, to evaluate role of FNAC in the diagnosis of them, their risk categorization for development of cancer and to conduct cytohistological correlation wherever possible. In addition the sensitivity, specificity, positive & negative predictive value of FNAC in breast lesions are carried out.

Material and Methods: The present study was carried out on 407 patients who presented with palpable lump in the breast in the Department of Pathology, Government Medical College, Ahmedabad over a period of one year. FNAC slides were examined under light microscope after H&E, Papanicolaou & May-Grunwald –Giemsa staining and were categorized as Unsatisfactory sample, inflammatory, Benign, Atypical probably benign, suspicious probably malignant and Malignant. Cytological Diagnosis was correlated with histological findings wherever possible.

Results: Cytologically, the lesions were categorized in, Unsatisfactory 28 (6.87%), inflammatory 64 (15.72%), Benign 229 (56.26%), Atypical probably benign 8 (1.96%), suspicious probably malignant 8 (1.96%) and Malignant 70 (17.19%). Out of these 407 cases, 161 cases (39.55%) were available for histopathological examination. The most common benign lesion in this study was fibroadenoma 178/229 (77.72%) and the most common malignant lesion was infiltrating ductal carcinoma 51/70 (72.85%). The sensitivity and specificity of FNAC came out to be 98.08%, 98.86% respectively & positive & negative predictive value of FNAC were 99.35% & 96.66% respectively.

Conclusion: The FNAC of breast is cheap, safe and highly accurate preoperative method for diagnosis of breast lesions. Preoperative categorization of breast lesions is utmost important for management of the patient.

Key-Words: Breast Lump; Fine Needle Aspiration (FNAC); Mastectomy; Fibroadenoma; Invasive Ductal Carcinoma

Introduction

Breast cancer is the leading cause of morbidity and mortality.^[1,2] Increase in cases of breast cancers are related to late marriage, birth of child in the later age, shorter period of breast feeding and nulliparity or low parity. Clinically, the diseases of breast present with lump in breast or nipple discharge. Mass in breast, whether benign or malignant is a cause of anxiety to the patient & her family members. Though histopathological diagnosis is a universally accepted confirmatory mode of diagnosis & follow up, FNAC of breast lumps is an important part of triple assessment (clinical examination, imaging, and FNAC) of palpable breast lumps. There is wide variety of breast pathology. It has been postulated that inflammatory breast disease and non-proliferative breast disease do not increase the risk of cancer. Proliferative breast disease without atypia and with atypia confers mild and moderate risk respectively, whereas carcinoma in situ is associated with substantial risk if untreated.^[3]

There are different preoperative diagnostic modalities for

breast pathology. FNAC is sensitive, simple, cost-effective, less traumatic and rapid method. FNAC may be used for palpable or non-palpable and benign or malignant breast lesions. Palpable lesions may be either solid or cystic and non-palpable lesions are detected by radio imaging study.^[1]

The aim of this study was to evaluate role of FNAC in the diagnosis of breast lesions, their risk categorization for development of cancer & to compare the cytological findings with the histopathology wherever possible.

Materials and Methods

This was a retrospective study done over a period of one year from January 2012 to December 2012, in the Department of Pathology, in tertiary care government hospital, Ahmedabad, India. FNAC was done with a 23 gauge disposable needle attached to a 10 cc airtight disposable syringe. The sample was obtained with aspiration and non-aspiration techniques with minimum passes to minimize hemorrhage. Samples were smeared

onto glass slides and fixed as necessary. In cystic lesions after aspiration of fluids the lesion was again aspirated. The fluid was centrifuged and sediment was taken for smears preparation. Wet-fixed smears were stained with Haematoxylin & Eosin (H &E) and Papanicolaou (PAP) stain, while air dried smears were stained with May-Grunwald-Giemsa (MGG) stain. During the period of study, breast lesions were interpreted according to the risk of developing cancer. FNAC categorization of breast lesions are: Unsatisfactory, inflammatory, Benign, Atypical probably benign, suspicious probably malignant and Malignant. Histopathological examination was done on lumpectomy, mastectomy or true cut biopsy samples wherever possible & cytohistological correlation was done. Sensitivity, specificity and positive predictive value and negative predictive value of a test were assessed.

Results

Total no of FNAC done in year 2012 was 2732. Among them 407 (14.89%) cases were of FNAC of palpable breast lump. Among 407 case 10 (2.45%) were male & 397 (97.55%) were female patients. M:F ratio is 0.025:1. Cases were collected with detail clinical & radiological findings from pathology records. Histopathology examination of breast pathology was found in total of 161 cases (39.55%) of total breast FNAC. The FNAC report was correlated with the final histopathology report in 154/161 cases (95.65%). The maximum number of cases was in the age group of 21-30 years in benign breast lesion and in the age group of 41-50 years in malignant breast lesion. Out of 407 cases, in 28 cases samples were unsatisfactory for evaluation & cytological diagnosis were not possible. Inflammatory lesion cases were 64 with breast abscess as most common lesion (49 cases). Aspiration from axillary tail region in 2 cases show Koch's lymphadenitis. Benign lesion with no risk of cancer were 33, while benign lesion with mild and moderate risk for cancer were 196 cases. Most common cases were fibroadenoma (178 cases) followed by fibrocystic change (17 cases) in benign breast lesion. Among 10 male patients gynecomasia is most common breast lesion (8 cases) with 2 cases of malignancy. 8 cases were atypical, probably benign. Suspicious for malignancy cases were 8 and malignancy cases were 70. Ductal carcinoma (51 cases) was the commonest malignant breast lesion. The details of these lesions are in Table 1 & 2. Out of 161 histological samples, 88 cases were benign breast disease and 49 cases were malignant lesions.

The statistical test used in interpretation of the results obtained in our study were the determination of sensitivity of FNAC as a diagnostic procedure for entire study,

specificity of FNAC in relation to Malignant lesions, positive predictive value of FNAC as a diagnostic procedure for the entire study and negative predictive value in relation to Malignant lesions. In our study, of the 407 patients underwent FNAC. 28 cases with unsatisfactory samples (3 cases with histological examination) were not considered in statistical tests. Out of 158 cases with histological examination in 154 the FNAC report matched with the final histopathology report

Table-1: Categorization of FNAC samples with histopathological correlation

Category	No. of Cases (FNAC)	No. of Cases (Histology)	No. of Cases with Correlation	No. of Cases without Correlation
Unsatisfactory sample	28 (6.87%)	3 (0.73%)	0	3 (not diagnosed by FNAC)
Inflammatory breast lesion	64 (15.72%)	7 (1.72%)	7	0
Benign breast disease	229 (56.26%)	88 (21.62%)	87	1 (false negative)
Atypical but benign	8 (1.96%)	6 (1.47%)	4	2 (false negative)
Suspicious for malignancy	8 (1.96%)	8 (1.96%)	8	0
Malignant breast lesion	70 (17.19%)	49 (12.04%)	48	1 (false positive)
Total	407 (100%)	161 (39.55%)	154 (95.65%)	7 (4.35%)

The sensitivity of a test is the ability of a test to identify correctly all those who have the disease. In our study the sensitivity would be,

$$\text{Sensitivity of FNAC} = \frac{\text{True positive}}{\text{True positive} + \text{False negative}} \times 100$$

$$= \frac{154}{154 + 3} \times 100 = 98.08\%$$

The specificity of a test is the ability of the study to identify correctly the candidates who do not have the disease. In our study, only cases with a lump in their breast were selected. Therefore, in purely statistical terms, there were no normal individuals i.e., those cases with normal breasts were not selected. Hence, the ability of FNAC as a diagnostic test to identify correctly those individuals not having disease (i.e., true negatives) could not be calculated since in every patient in our study, FNAC would reveal some result. Hence, to give a wider spectrum to our interpretation of the results, we calculated the specificity of FNAC for malignant lesions against benign lesions i.e., "how specific is FNAC as a test in the diagnosis of malignancy in a breast lump?"

$$\text{Specificity of FNAC} = \frac{\text{True negative}}{\text{True negative} + \text{False positive}} \times 100$$

$$= \frac{87}{87 + 1} \times 100 = 98.86\%$$

The positive predictive value of a test indicates the probability that the patient with a positive test has, in fact, the disease in question

Positive Predictive value of FNAC

$$= \frac{\text{True positive}}{\text{True positive} + \text{False positive}} \times 100$$

$$= \frac{154}{154 + 1} \times 100 = 99.53\%$$

It should be noted that this positive predictive value is for FNAC as a diagnostic test for all patients.

The negative predictive value of a test indicates the probability of a patient with a negative test not having the disease in question. As stated above in our results, we had no true negatives. In the absence of true negatives, the predictive value of negative test is actually zero, since the numerator becomes zero. As with the calculation of

specificity for malignant lesions, we broadened the interpretation of our results by calculating the negative predictive value of the test for malignant lesions.

Negative Predictive value of FNAC

$$= \frac{\text{True negative}}{\text{True negative} + \text{False negative}} \times 100$$

$$= \frac{87}{87 + 3} \times 100 = 96.66\%$$

So in our study, sensitivity and positive predictive value of FNAC were 98.08% and 99.35% respectively, while specificity and negative predictive value for malignancy were 98.86% and 96.66% respectively.

Table-2: FNAC & histopathology correlation

Cytology		Histology	
Cytology Diagnosis	No. of Cases	Histology Diagnosis	No. of Cases
Unsatisfactory Sample	28 (6.87%)	Fibrocystic disease	1
		Fibroadenoma	1
		Lobular carcinoma in situ	1
		Total	3
Inflammatory Breast Lesion	49	Acute mastitis	3
		Chronic & granulomatous Mastitis	3
		Fat necrosis	1
		Koch's lymphadenitis in axillary tail	-
		Total	7
No Risk of Cancer	21	Fibrocystic change & simple cyst	2
		Epithelial hyperplasia, mild	2
		Lactational change/ Galactocele	1
		Gynaecomastia	3
		Total	9
Benign Breast Disease	12	Lipoma	1
		Sebacous cyst	0
		Total	1
Benign Lesion with Mild And Moderate Risk For Cancer Proliferative Breast Disease without Atypia	196	Epithelial hyperplasia, moderate	3
		Adenosis	1
		Papilloma	0
		Fibroadenoma	71
		Phylloedes tumor, benign	4
Total	88		
Proliferative Breast Disease With Atypia /Atypical but Benign	8 (1.96%)	Fibroadenoma	3
		Benign phylloid	1
		Ductal carcinoma (false negative)	2
Suspicious For Malignancy	8 (1.96%)	Ductal carcinoma	5
		Borderline phylloid	2
		Papillary carcinoma	1
Malignant Breast Lesion	51	Ductal carcinoma	30
		Lobular carcinoma	1
		Benign proliferative breast disease with epithelial hyperplasia (false positive)	1
		Total	32
		Ductal carcinoma	8
		Lobular carcinoma	1
		Medullary carcinoma	1
		Mucinous carcinoma	1
		Infiltrating papillary carcinoma	1
		Carcinosarcoma	1
Angiosarcoma	1		
Malignant breast lesion requiring histology for typing	19	Phylloedes tumor, malignant	3
		Total	17
		Total	49

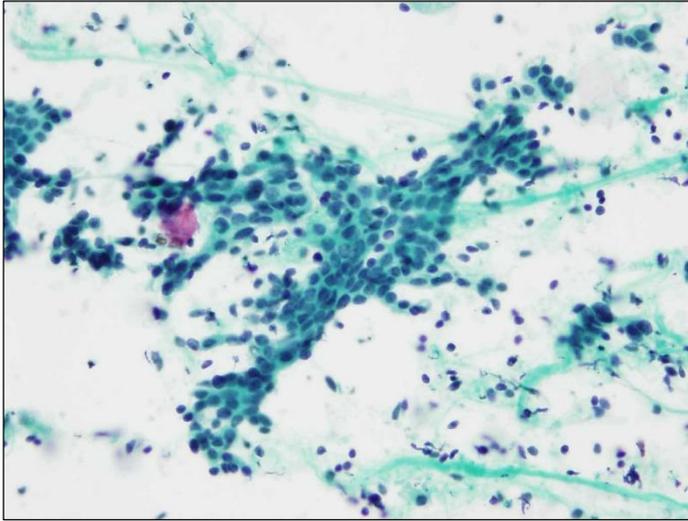


Figure-1: Fibroadenoma cytology -benign ductal epithelial cells arranged in sheet & group with bare bipolar nuclei in surrounding

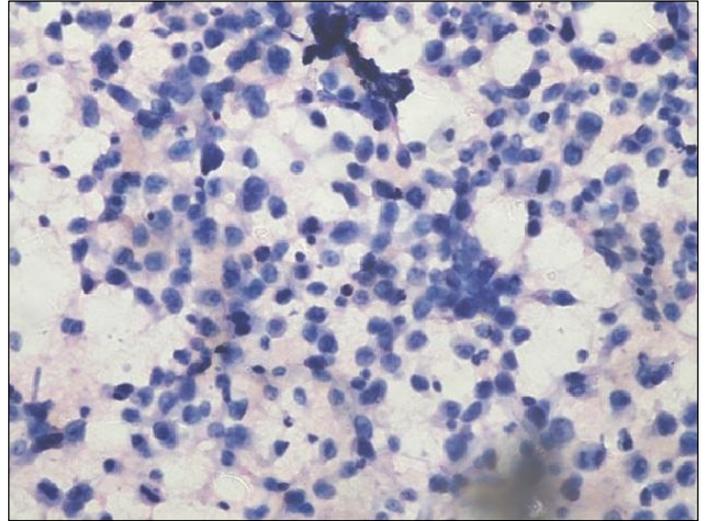


Figure-2: Angiosarcoma cytology -High cellularity showing dyscohesive cells with well-defined eosinophilic cytoplasm and hyperchromatic nuclei

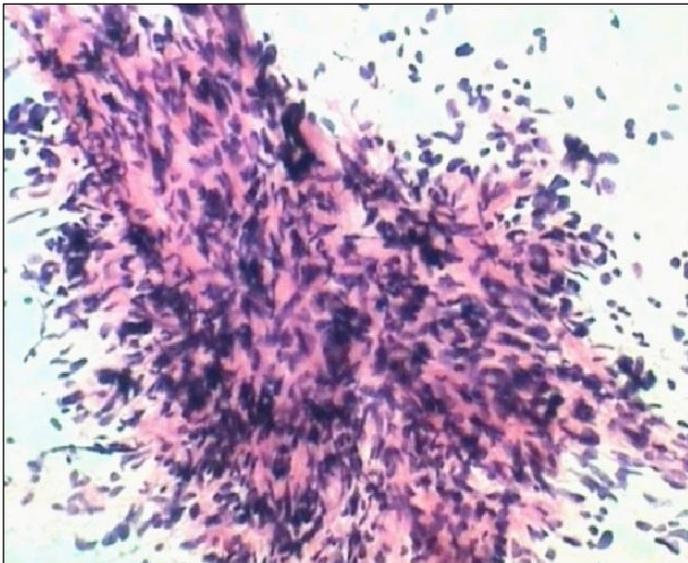


Figure-3: Malignant phylloid cytology -Spindle cells with hyperchromatic and pleomorphic nuclei surrounded by benign ductal epithelial cells)

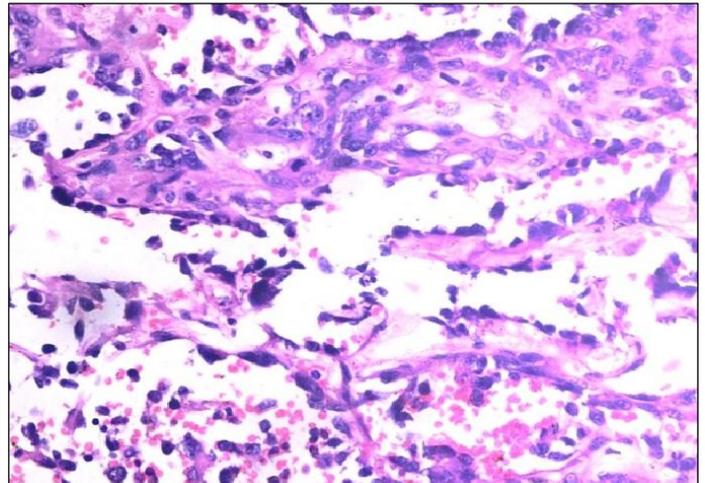


Figure-4: Angiosarcoma histology -Anastomosing vascular channels are lined by plump, malignant endothelial cells)

Discussion

Breast carcinoma is common cancer among females in India preceded by cervical cancer.^[4,5] Different studies have shown that the most common lesions are benign and needs only reassurance.^[5,6] Early screening and diagnosis of breast lesions and categorization into different groups of breast pathology is important. This can be helpful in prevention of cancer and in accurate management of the patients. Early diagnosis helps to prevent patients discomfort and anxiety.^[7,8] Fibroadenoma (table 2) is the commonest lesion in the category of proliferative breast disease without atypia that has minimal risk for cancer development. Ferguson also reported most common benign breast lesion as fibroadenoma occurring before the age of 25 years of age.^[9] Singh A et al.^[5] reported that invasive ductal carcinoma is the commonest breast

malignancy and found in the age group of 41-60 years of age. The present study shows similar findings, the ductal carcinoma being the most common breast malignancy in the age group of 41-60 year of age (table 2). In this study 6.87 % cases were unsatisfactory. Sudarat et al.^[10] found 4.2% of unsatisfactory smear which needs further repeat aspiration or needs core/incisional biopsy for analysis. Unsatisfactory sample can be due to insufficient experience of the pathologist, radiologist or clinician who perform FNA or due to nature of lesion itself. FNA sampling technique is equally important as sample interpretation in reaching the correct diagnosis. Provision of adequate sample and experienced pathologist can prove FNAC as highly reliable diagnostic tool.^[11]

In comparative analysis of FNAC and histopathology diagnosis, we observed 4 cases of cytologically interpreted

errors which were 1 false positive case and 3 false negative cases. Among 3 false negative cases diagnosed, 1 case was BPBD with moderate epithelial hyperplasia & 2 cases were BPBD with atypia turn out to be malignant cases (invasive ductal carcinoma). 1 false positive case was actually BPBD with moderate epithelial hyperplasia by histology, which was diagnosed as ductal carcinoma by cytology. All 8 cases diagnosed as suspicious for malignancy in FNA were confirmed as malignant by histopathological examination. FNAC of breast lesions is sensitive, specific, and highly accurate as the initial investigation of palpable breast lesions in tertiary hospital.^[11] Thus the FNAC smears have very high accuracy in diagnosis of breast lump.^[12,13]

This study was undertaken to assess the use of FNAC as primary method for diagnosis of breast lumps. Fine Needle Aspiration Cytology has been proved to be highly efficacious method in diagnosis of palpable breast lesion in this study. The sensitivity of 98.08% and specificity of 98.86 % obtained in our study were in accordance to sensitivity of 77-99% and specificity of 92-100% reported in various studies^[14-21] as shown below by the table 3.

Table-3: Comparison of statistical data of various studies

Study	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Hussain MT ^[14]	90.9%	100%	-	-
Jayram et al ^[15]	97.4%	92.4%	-	-
Muhamed et al ^[16]	90.6%	100%	100%	99%
Rubin et al ^[17]	87%	100%	100%	89%
Ishikawa et al ^[18]	86.3%	98.2%	97.9%	-
Ariga et al ^[19]	99%	99%	99%	99%
Choi et al ^[20]	77.7%	99.2%	98.4%	88%
Umesh J et al ^[21]	96.42%	100%	100%	93.4%
Present study	98.08%	98.86 %	99.35%	96.66%

Conclusion

FNAC is a simple and reliable method for diagnosis of both benign and malignant lesions quite accurately thus reducing unnecessary surgeries. The present study proved that the procedure has high sensitivity, specificity and diagnostic accuracy. Though it cannot categorize the lesion in some cases but it can rule out malignancy in most of the cases. Considering its low cost and quick results, it can be a potential tool for screening of breast cancers.

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