

## An Observational Study to Determine the Correlation Between Cytological Findings and Histological Findings, as well as the Accuracy of FNAC in the Diagnosis of Breast Lesions

Prem Prakash<sup>1</sup>, Sanjay Kumar Rao<sup>2</sup>, Rajesh Narayan<sup>3</sup>

<sup>1</sup>Medical officer, Department of Surgery, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India.

<sup>2</sup>Assistant Professor Department of Surgery, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India.

<sup>3</sup>Associate Professor, Department of Surgery, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India.

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Corresponding author: Dr. Sanjay Kumar Rao

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### Abstract

**Aim:** The aim of the present study was to correlate cytological findings with histopathological findings and to determine the accuracy of FNAC in the diagnosis of breast lesions.

**Methods:** This was a retrospective and prospective study in which patterns of various breast lesions on FNAC were studied. This retrospective and prospective study was carried out in the Department of Surgery, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India, for 24 months. Total 200 all cases of breast lump FNAC in which cytological impression could be given were included in the study. The patterns evaluated were biphasic, inflammatory, fluid rich, epithelial cell rich, spindle cell rich, small round cell rich and pleomorphic.

**Results:** The accuracy of present study in diagnosing breast neoplasms is 97%. The specificity of 98% and the sensitivity of 95%.

**Conclusion:** Systematic pattern analysis and systematic categorisation of the breast lesions as per patterns, assists the cytopathologists to reach the final impression. Each pattern has its own implications for management and has a variable risk of malignancy.

**Keywords:** breast neoplasms, malignancy

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### Introduction

Fine needle aspiration cytology (FNAC) is an established tool in the diagnosis of various palpable lesions and it correlates well with histopathological diagnosis in most of the cases. The major utility of FNAC is in differentiating benign and malignant lesions of various tissues. Breast is one of the organs, which is routinely subjected to FNAC to diagnose malignant

lesions. Breast carcinoma is the second commonest cancer among Indian females after carcinoma cervix and FNAC is a very cost-effective, sensitive and rapid diagnostic method in differentiating benign breast lesions from malignant ones[1,2] But there exist some gray areas in breast lesions in which this differentiation becomes difficult. Although needle core needle

biopsy (CNB) is now being preferred over FNAC, FNAC still has a lot to offer as a first line diagnostic procedure, particularly in developing countries with economic restrictions. Moreover FNAC remains almost as accurate as CNB in determination of malignancies[3] FNAC has its definite value in the diagnosis of various breast lesions as it is minimally invasive, safe and cost effective[4,6]FNAC is used to evaluate not only palpable mass and cyst of breast but also non palpable mammographic abnormalities. FNAC is highly accurate for palpable mass[7,8]

FNAC is a part of 'triple test' for diagnosis of carcinoma breast. The 'triple test' is a multidisciplinary approach which analyses the pathologic features in conjunction with clinical and radiologic findings to diagnose the lesion and determine the best treatment plan[7]

The use of FNAC significantly lowers the costs of health care by decreasing the number of open surgical biopsies, without sacrificing early detection[8]In benign lesions, further procedures are avoided or delayed and also it helps in diagnosing the recurrence, obtaining material for IHC and other ancillary studies. It is useful for evaluation of local chest wall recurrences and permits a number of ancillary studies such as flow cytometry, hormone receptor analysis and molecular studies[9]Most cases of breast lumps are benign[10]but sometimes, it is difficult to determine whether a suspicious lump is benign or malignant, simply by doing a clinical examination. In these circumstances, as a widely accepted and established outdoor patient procedure, FNAC plays an important role in determining the nature of the lump. FNAC can reduce the number of open breast biopsies[11]

### Material and Methods

This retrospective study was carried out in the Department of Surgery, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India for 24 months, after taking the approval of the protocol review

committee and institutional ethics committee.

### Methodology

Total 200 all cases of breast lump FNAC in which cytological impression could be given were included in the study. Patients having only nipple secretions with undetectable breast lump even on ultrasonography, patients who were not willing to undergo FNAC and FNAC smears with inadequate cellularity were excluded from study.

In retrospective analysis case details were recorded from case records, cytology and histopathology forms. Past, present history examination findings, lymph node status and histopathology reports were taken into consideration. In prospective analysis, before doing the procedure detail past and present history was taken and thorough examination of breast lesion and lymph nodes (if enlarged) was done. Radiological reports were taken into consideration. In few cases with low cellularity, repeat aspiration was performed under USG guidance.FNAC was done using 23G needle and 5 mL syringe. Material was smeared immediately on clean glass slides. Whenever fluid was aspirated, it was centrifuged and smears were made from the sediment for getting maximal cellularity. Hematoxylin and Eosin and Papanicolau staining was done for alcohol fixed slides and May-Grunewald Giemsa staining was done for air dried smears. Ziehl-Neelsen staining was done for acid fast bacilli in suspected cases of tuberculosis. Histopathological correlation was done for 200 cases. After collecting the data, sensitivity and specificity in each pattern was calculated.

### Results

The lesions were classified as per patterns followed by evaluation of accuracy and risk of malignancy associated with each pattern. We found that the risk of malignancy varies with patterns [Table 1].

**Table 1: pattern of lesion**

Pattern	Most Common
Biphasic	Fibroadenoma (Benign)
Inflammatory	Fibrocystic disease (Benign)
Fluid-rich	Breast cyst, galactocele (Benign)
Epithelial cell-rich	Carcinoma (Malignant)
Spindle cell-rich	Phyllodes, fibroadenoma (Benign)
Small round cell-rich	Carcinoma (Malignant)
Pleomorphic	Carcinoma (Malignant)

**Table 2: clinical diagnosis of cytology and histology diagnosis**

Category	Pattern	Additional Cytological Features	Cytology Diagnosis	Histopathology Diagnosis
I	Biphasic (120)	Myxoid/mucinous background	Benign (118)	Fibroadenoma (107) Benign phylloide (4) Tubular adenoma (3) Gynecomastia (3) Malignant phyllode (1)
		Atypia, dyscohesion	Suspicious (2)	IDC (2) Metaplastic carcinoma (0)
II	Inflammatory (12)	Necrosis/myxoid background/histiocytes	Benign (12)	Acute Mastitis (2) Granulomatous mastitis (1) Fat necrosis (1) Fibrocystic disease (7) FA with cystic change (1)
III	Fluid-rich (4)	Normal ductal/acinar cells	Benign (3)	Galactocele (1) Breast cyst (2)
		Atypical ductal/acinar cells	Malignant (1)	Mucinous Carcinoma (1)
IV	Epithelial cell-rich (57)	Papillary structure	Papillary neoplasm (2)	IDC (1) Duct papilloma (1) Nipple adenoma (0)
		Ductal proliferation±atypia	PBD±atypia (7)	IDC (4) ADH (1) PBD with adenosis (2) Adnexal tumour (0)
		Ductal cells with features of malignancy	Malignant (48)	IDC (46) Medullary Carcinoma (2)
V	Spindle cell (3)	Myxoid/mucinous background	Fibroadenoma (3)	Fibroadenoma (2) Benign Phylloide (1) Sarcomas (0)
VI	Small round cell-rich (1)	Smaller ductal cells with dyscohesion/small round cells	Malignant (1)	Lobular Carcinoma (1) Lymphomas of breast (0)
VII	Pleomorphic (3)	Lipophages/inflammatory cells	Benign (1)	Fat necrosis (1)
		Necrosis/dyscohesion/features of malignancy	Malignant (3)	IDC (1) Lobular Carcinoma (1) Medullary Carcinoma (1)

**Biphasic Pattern:** On cytology most of the biphasic pattern lesions (n=120) were reported as benign lesions (118), further diagnosis was confirmed by histopathology as mentioned in [Table 2]. In biphasic

pattern, most common lesion was fibroadenoma (n=107) followed by benign phyllodes (n=4) and tubular adenoma (n=3).

**Inflammatory Pattern:** Total 12 inflammatory cases were showing inflammatory cells. All were benign in nature in cytology as well as histopathology. On histopathology reported as acute mastitis (2) granulomatous mastitis(1), fat necrosis(1), fibrocystic disease(7) and fibroadenoma with cystic disease(1). No case was positive for malignancy.

**Fluid Rich Pattern:** In fluid rich pattern out of 4 cases with histopathological correlation, 3 were reported as benign and on histopathology reported as breast cysts (n=2), galactocele (n=1). 1 case showing small monomorphic round cells with lot of thick mucin and transgressing capillaries in background, was diagnosed as mucinous carcinoma.

**Epithelial Cell Rich Pattern:** Out of 57 epithelial cell rich patterns, 48 were reported as malignant on cytology. Histopathology confirmed malignancy in all cases. The type was Infiltrative Duct Carcinoma (IDC) in 46 cases and medullary carcinoma in 2 case. In cases where typical

papillary structures were seen and were reported as papillary neoplasm (n=2) on cytology, histopathological diagnosis was IDC (n=1) and duct papilloma (n=1). Proliferative epithelial lesions were reported as Proliferative Breast Disease (PBD) with or without atypia (n=7). Histopathological confirmation using core biopsy was obtained in these cases.

**Spindle Cell Pattern:** In this pattern out of the 3 cases one was reported as Fibroadenoma on cytology and confirmed on histopathology. 1 case of diagnosed as fibroadenoma on cytology was a cystosarcoma phyllodes on histopathology

**Small Round Cell Pattern:** Small cell tumours were reported as lobular carcinoma (n=1) confirmed on histopathology.

**Pleomorphic Pattern:** Majority of the pleomorphic pattern were malignant (n=3) on cytology as well as histopathology. On histopathology, they were reported as Invasive lobular carcinoma (n=1) and medullary carcinoma (n=1), Duct Carcinoma (n=1).

**Table 3: risk of malignancy**

Pattern	Benign	Suspicious	Malignant	Total	Risk of Malignancy
Biphasic	118	2	0	120	0%
Inflammatory	12	0	0	12	0%
Fluid-rich	3	0	1	4	25%
Epithelial cell-rich	0	9	48	57	85%
Spindle cell-rich	3	0	0	3	0%
Small round cell	0	0	1	1	100%
Pleomorphic	0	0	3	3	100%
<b>Total</b>	136	11	53	200	44.28%

**Table 4: Specificity and sensitivity of present study**

Parameter	Sensitivity (%)	Specificity (%)	Accuracy (%)
Total	95	98	97

## Discussion

FNAC of breast lumps is an important diagnostic tool for the pre-operative diagnosis of breast neoplasm. It provides rapid and accurate diagnosis and has become a cost effective tool for the treatment of breast lesions[12]. Success of FNAC depends upon several important contributing factors like aspirator's experience, skillful cytological interpretation and a rational analysis based upon correlation of cytological and clinical information in the context of the patient[13]. Inadequate sampling, overlapping cytological features and inexperience of cytologist are the limitations in breast cytology study[14]. Pattern identification helps a cytologist to shortlist lesions. Predominant cell pattern, cellular features and background are morphological attributes of aspirates to assist pattern recognition. On the basis of predominant cell pattern, differential diagnosis is suggested and then final diagnosis is narrowed down using cellular features and background. Recognition of pattern reduces inter observer variation. Moreover, diagnosis of pattern is all inclusive and offers a medico legal protection. Before analysing cellular details and background elements; observation of the cell pattern alone can complement breast cytology study. This approach could be a very good step for a beginner in cytology and also helps cytologist in screening the breast cytology slides[15]. Systematic pattern recognition of breast cytology smears will also be very useful in reducing false positive rates. In our study epithelial cell-rich, small round cell-rich and pleomorphic patterns are most commonly associated with malignancy. Most important attribute in case of inflammatory, fluid-rich and epithelial cell-rich pattern is ductal epithelial cells which were used to differentiate between benign and malignant lesions. As there are few limitations for cytological studies, there was difficulty in diagnosing cases like PBD with atypia, papillary lesions,

cystosarcoma phyllodes, in situ carcinoma and fibroadenoma with changes secondary to hormone therapy or infarction. The cytologic distinction of intraductal carcinoma insitu from an invasive cancer is not reliable[16].

**Biphasic Pattern:** In this pattern, along with epithelial cells, second population of cell was myoepithelial cells or nuclei of myoepithelial cells. Presence of myoepithelial cells suggests benign nature of lesion, so there wasn't any difficulty in diagnosing these cases. In two case, few atypical cells and dyscohesiveness was seen, so it was reported as suspicious for malignancy which was further reported as IDC on histopathology.

**Inflammatory Pattern:** In inflammatory lesions, ductal cells need to be examined very carefully. Most of the time, clinically and radiologically mastitis mimics carcinoma of breast, so cytology is very useful to decide further management[12].

**Fluid Rich Pattern:** Due to paucity of cells it is difficult to diagnose cases in which aspirate is fluid in nature. Immediate repeat aspiration and smears from centrifuged fluid help to increase cellularity. Apocrine metaplasia favored diagnosis of benign while with mucinous background extensive search is done to rule out mucinous carcinoma. In cases where no distinction possible, may be reported as a mucocele like lesion.

**Epithelial Cell Rich Pattern:** Epithelial cell rich lesions varied from mild atypia to frank malignant features. Cases with clear malignant features on cytology were reported as malignant lesion, confirmed as IDC and medullary carcinoma on histopathology. In papillary lesions/neoplasm FNAC has limitations and was reported as papillary neoplasm of breast (n=2). Final histopathology diagnosis in these cases were IDC (n=1) and duct papilloma (n=1). A study by Pratibha D et al[17]. has found similar overlap in diagnosis of papillary lesions of breast Cases with scanty cellularity of cells

showing features of malignancy were reported as suspicious and those with proliferative epithelial lesions were reported as PBD with or without atypia. Total 7 cases of cytologically diagnosed PBD were malignant on histopathology. These were low grade duct carcinoma where diagnosis of PBD with atypia was given on cytology. When there is epithelial hyperplasia as seen by hypercellularity, dyscohesive cell population, paucity of myoepithelial cells it is extremely difficult to distinguish between atypical ductal hyperplasia and low grade duct carcinoma. Such lesions are grey zones of breast cytology this is in concordance with the Mitra S et al.[18] Shabba LS et al[19].found 20% lesions in true grey zone due to overlap of cytological features of benign and malignant conditions due to nature of lesions. Thus, the loss of sensitivity in this pattern is at the cost of high specificity.

**Spindle Cell Pattern:** Spindle cell rich pattern need to be interpreted carefully due to variable presentation of fibroadenoma. The distinction between phyllodes tumour and fibroadenoma is difficult. Hypercellular stromal fragments are more common in phyllodes tumour but can be seen in fibroadenoma as well. Numerous individual, long, plump fibocystic cells with spindle shaped nuclei are characteristic of a phyllodes tumour[20,21]. Diagnostic difficulty due to overlap of cytological features of fibroadenoma and phyllodes is also noted by Bandyopadhyay R et al[22]. Metaplastic carcinoma can mimic a phyllodes tumour because of a prominent spindle cell component, but the benign epithelial component of a phyllodes tumour is absent[23].

**Small Round Cell Pattern:** In lobular carcinoma, are sparsely cellular because of marked stromal fibrosis and predominantly isolated cells with small groups or linear arrays are seen. Lymphomas show monomorphic small cell pattern, in our present study no case of lymphoma or malignant small round cell tumour was found.

**Pleomorphic Pattern:** In cases with pleomorphic cellularity pattern, one case was showing lipophages and inflammatory cells and it was reported as fat necrosis which was confirmed on histology. As fat necrosis mimics like carcinoma clinically, radiologically and on cytology, it is important to look background for other features. While cases with necrotic background and dyscohesive groups were reported as malignant which were high grade invasive duct carcinoma on histopathology. Fat necrosis is a lesion which contributes to indeterminate or erroneous diagnosis on cytology because in this epithelial cells are typically sparse but nuclear atypia may mimic malignancy. Shabba NS et al[19]. also noted similar findings.

The accuracy of present study in diagnosing breast neoplasms is 97% which corresponds well with Nggada HA et al[24]. who reported diagnostic accuracy of 97.7%.The specificity of 98% in our study was similar with studies done by Muddegowda PH et al[25]. and Nggada HA et al[24]. which showed specificity of 98% and 98.7% respectively. The sensitivity of 95% correlates with studies done by Nggada HA et al[20]. They noted sensitivity of 96% and 99% .Pattern analysis is highly reliable and recommended mode of analysis of breast lesion. Each pattern has its implications for management and has variable risk of malignancy.

#### **Conclusion:**

Systematic pattern analysis and systematic categorisation of the breast lesions as per patterns, assists the cytopathologists to reach the final impression. Each pattern has its own implications for management and has a variable risk of malignancy.

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