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Original Research Article

A prospective study and correlation of cytological, cell-block and histopathological diagnosis of breast lesions

Sowmya S Manjunath¹, Ankita Paul^{2,*}¹Dept. of Pathology, Shree Atal Bihari Vajapayee Medical College and Research Institute, Bangalore, Karnataka, India²Dept. of Pathology, Jagannath Gupta Institute of Medical Sciences and Hospital, Kolkata, West Bengal, India

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ABSTRACT

Introduction: Breast carcinoma is the second most common cancer in the world and establishing an early diagnosis is clinically very important. Fine needle aspiration cytology (FNAC) is the fast, reliable and ideal initial diagnostic modality for the diagnosis of these lesions.

Materials and Methods: This is a cross-sectional prospective study of 12 months duration. A total of 160 patients underwent FNAC of palpable breast lump/lumps. A cell-block preparation was done for 80 cases and the histopathological examination has been performed on all the 160 cases.

The cytomorphological diagnosis, cell-block diagnosis and histopathological diagnosis were correlated using suitable statistical methods.

Observation and Results: Out of 160 patients, on cytological examination, 107 cases (67%) were benign and 53 cases (33%) were malignant. On histopathological examination, 104 cases (65%) were benign and 56 cases (35%) were malignant. On examination of cell block, two cases which were indeterminate in FNAC turned out to be malignant.

Conclusion: FNAC plays a main diagnostic role as an out-patient procedure which gives rapid diagnosis. FNAC when combined with cell-block can give more accurate diagnosis.

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1. Introduction

Breast carcinoma is the most common cancer in women worldwide. Cytology having gained importance in diagnostic approach, has gradually moved from an era of 'positive,' 'negative' and 'suspicious' diagnosis to an era of specific morphological typing of breast lesions. Fine needle aspiration cytology (FNAC) today occupies an extremely important place in the pre-operative evaluation of breast lesions since it is easy to perform, reliable, cost effective and out-patient procedure. The most valuable role of cytology in benign lesions is in the identification of epithelial proliferative lesions.¹ Triple test is the combination of

clinical evaluation, mammography and cytological findings and Triple diagnosis when used in parallel leads to the improvement of pre-operative diagnosis, increasing the diagnostic accuracy rate to 99%.² The aim of our study is to evaluate the cyto-histopathological correlation of breast lesions in a tertiary care hospital.

2. Aims and Objectives

1. To correlate the cytological and histopathological findings of breast lesions.
2. To correlate the efficacy of FNAC with Cell block and histopathology.

* Corresponding author.

E-mail address: dr.ankita.paul@gmail.com (A. Paul).

3. Materials and Methods

A cross-sectional prospective study was conducted at the Department of Pathology in JSS Medical College and Hospital, Mysore over a period of 12 months from July 2016 to July 2017, during which a total of 160 cases with palpable breast lesions underwent FNAC. In 80/160 cases cell block samples were also collected. Information about the patient's details, clinical and radiological findings were recorded.

FNAC was done under strict aseptic precautions using 22 or 23 gauge needle in a 10 ml syringe. Multiple smears were prepared from the aspirate and those immediately fixed in 95% ethanol were stained using Haematoxylin and Eosin (H&E) and Papanicolaou (Pap) stains and air dried smears were stained using Leishman–Giemsa and May Grunwald Giemsa (MGG) stains.

For making cell block, remaining material in the aspirating syringe, after making enough conventional cytology smears, was clotted and the formed cell button was allowed to fix in 10% neutral buffered formalin for 12 h. Then cell button was removed carefully and wrapped in a Whatman filter and placed in cassette. This sample was then processed as surgical tissue in automated tissue processor. FNAC smears and cell block sections were examined separately for cellularity and reported.

The excised specimens after surgery were subjected to histopathological examination. Deparaffinized sections of the received tissue specimens were stained with Hematoxylin and Eosin (HE) stains. HE stained slides gave the information about the histopathology of the breast lesion. The final diagnosis of each lesion was determined taking biopsy as the gold standard.

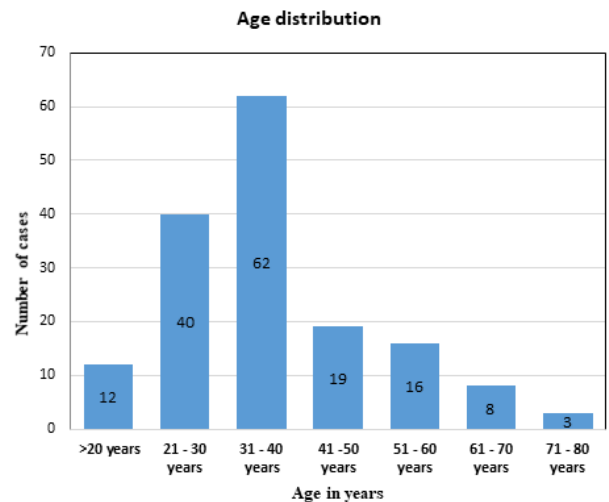
All data were calculated using statistical measures like specificity, sensitivity, positive predictive value and negative predictive value and analysed descriptively.

4. Results

The present study was conducted on 160 patients who presented with palpable breast lesions. All cases included were females with age ranging from 18 to 82 years. Maximum numbers of cases were in the age group of 31-40 years (Graph 1). Left sided breast lesion was more commonly seen accounting for 56%.

Among the 160 cases, 107 cases (67%) were reported as benign and 53 cases (33%) were reported as Positive for malignancy on cytology. The distribution of benign lesions and malignant lesions on cytology are shown in Table 1.

On histopathological examination the benign and malignant cases were studied and classified and is shown in Table 2. Among the benign lesions, Fibroadenoma was most commonly seen (32%) and among malignant lesions, poorly differentiated Invasive Breast carcinoma, no special type (IBC – NST) was more common (16%).



Graph 1: Graph showing age distribution among the study cases

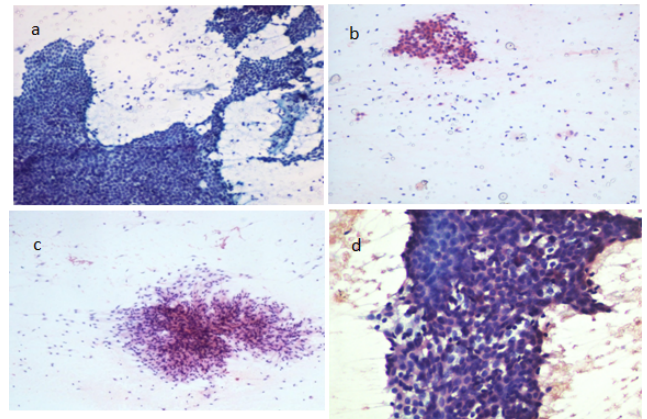


Fig. 1: Photomicrograph showing - **a:** Fibroadenoma (PAP, x200), **b:** Fibrocystic disease (H&E, 200), **c:** Phyllodes tumor (H&E, x 200) and **d:** Proliferative breast disease with Atypia (H&E, x 400)

The sensitivity, specificity, positive predictive value and the negative predictive value were calculated as 94.5%, 100%, 100% and 97.01% respectively. The only discordance was with the diagnosis of proliferative breast disease with atypia in FNAC which happened to be Invasive duct carcinoma on histopathology.

Cell block was performed on 80 cases and the distributions of diagnosis are tabulated in Table 4.

The diagnosis on FNAC and cell block findings has been correlated and presented in Table 5.

The sensitivity and specificity for the diagnosis of breast lesions in FNAC and Cell block were calculated as 97.5% and 100% respectively. The only discordance was with the diagnosis of proliferative breast disease with atypia in FNAC which was reported as positive for malignancy on

Table 1: Cytological diagnosis of benign and malignant lesions on FNAC (n=120)

Category	Cytological diagnosis	No of patients (n=160)	% of patient
Benign (n=120)	Fibroadenoma	51	32
	Fibrocystic disease	29	18
	Fibroadenosis	13	8
	Proliferative breast disease with atypia	6	4
	Proliferative breast disease without atypia	3	2
	Phyllodes disease	3	2
	Lactating adenoma	2	1
Total benign cases		107	67
Malignant (n=40)	Positive for malignancy	53	33

Table 2: Histopathological diagnosis of benign and malignant lesions on FNAC (n=120)

Category	Histopathological diagnosis	No of patients (n=160)	% of patient
Benign (n=104)	Fibroadenoma	51	32
	Fibrocystic disease	29	18
	Fibroadenosis	13	8
	Proliferative breast disease with atypia	3	2
	Proliferative breast disease without atypia	3	2
	Phyllodes disease	3	2
	Lactating adenoma	2	1
	Total benign cases		104
Malignant (n=56)	Well differentiated Invasive breast carcinoma – NST	3	2
	Moderately differentiated Invasive breast carcinoma – NST	21	13
	Poorly differentiated Invasive breast carcinoma – NST	25	16
	Mucinous carcinoma	3	2
	Lobular carcinoma	2	1
	Medullary carcinoma	2	1
	Total malignant cases		56

Table 3: Correlation of FNAC and histopathological findings

Cytological diagnosis	Histopathological Diagnosis (%)								Total
	FA	FCD	Fibro adenosis	PBD - A	PBD without A	Phyllodes	LA	CA	
Fibroadenoma	32								32
Fibrocystic disease		18							18
Fibroadenosis			8						8
Proliferative breast disease with Atypia				2				2	4
Proliferative breast disease without Atypia					2				2
Phyllodes						2			2
Lactational Adenoma							1		1
Carcinoma								33	33
Total	32	18	8	2	2	2	1	35	100

FA –Fibroadenoma; FCD- Fibrocystic disease; PBD-A- Proliferative breast disease with atypia; PBD without A- Proliferative breast disease without atypia; LA- Lactating adenoma; CA-Carcinoma

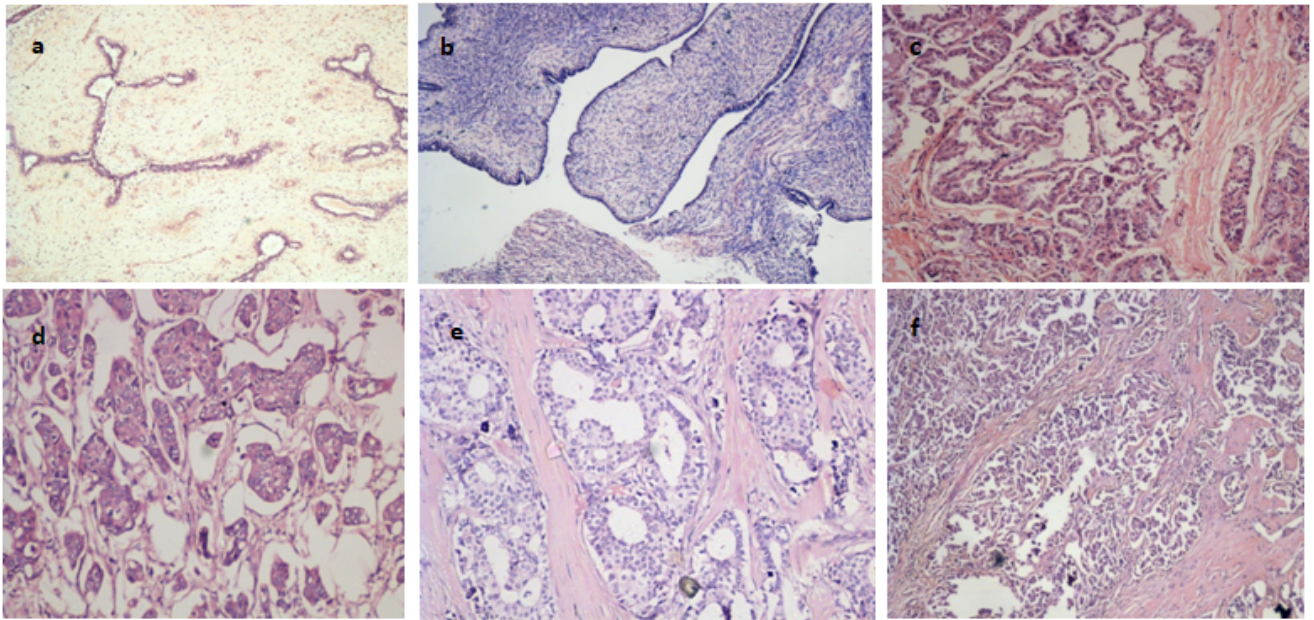


Fig. 2: Photomicrograph showing **a:** Fibroadenoma (H&E, x400); **b:** Phyllodes tumor (H&E, x400); **c:** Lactational Adenoma (H&E, x200), **d:** Well differentiated Invasive breast carcinoma – NST (H&E); **e:** Moderately differentiated Invasive breast carcinoma – NST(H&E) and **f:** Poorly differentiated Invasive breast carcinoma – NST(H&E)

Table 4: Cell block distribution of benign and malignant lesions on FNAC (n=80)

Category	Histopathological diagnosis	No of patients (n=80)	% of patient
Benign	Fibroadenoma	19	23
	Fibrocystic disease	15	18
	Fibroadenosis	9	11
	Proliferative breast disease with atypia	4	5
Malignant		35	43

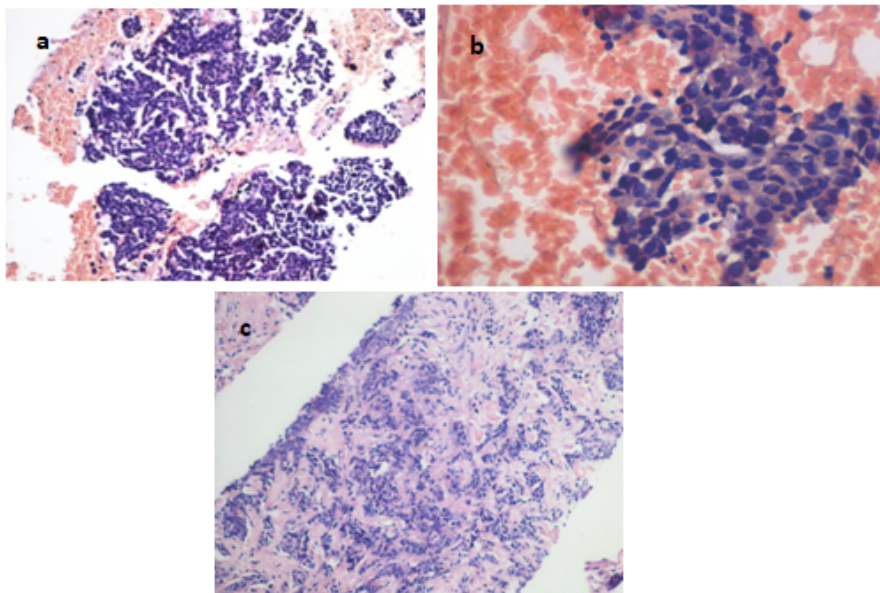


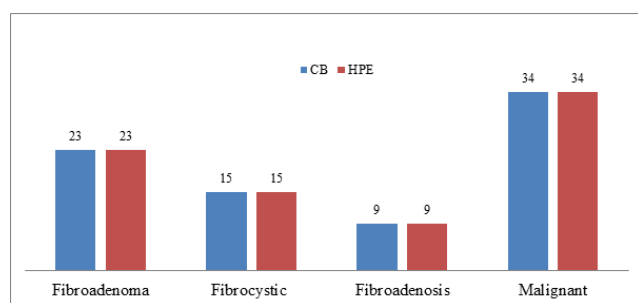
Fig. 3: Photomicrograph showing **a:** Cell block - Moderately differentiated Invasive breast carcinoma – NST(H&E, x200); **b:** Cell block - Moderately differentiated Invasive breast carcinoma – NST (H&E, x400) and **c:** Cell block - Moderately differentiated Invasive breast carcinoma – NST (H&E, x200)

Table 5: Correlation of FNAC and Cell Block Findings

FNAC	Cell Block					Total
	FA	FC	Fad	PBD A	CA	
Fibroadenoma	19					19
Fibrocystic disease		15				15
Fibroadenosis			9			9
Proliferative breast disease with Atypia				2	2	4
Cancer					33	33
Total	19	15	9	2	35	80

cell block.

The correlation between the cell block and histopathology diagnosis of breast lesions has been represented in Figure 1. The sensitivity, specificity, positive predictive value and negative predictive value for the diagnosis of breast lesions in Cell block and histopathology were calculated as 100% each.



Graph 2: Correlation of cell block and histopathology

5. Discussion

Clinically palpable breast mass is the most common presentation of breast lesions in females. It is also a usual presentation of carcinoma breast.³ Martin and Ellis first introduced the application of FNAC for the diagnosis of palpable breast masses in the year 1930.⁴ It has since become an increasingly popular diagnostic procedure owing to its distinctive advantages of being easy, fast, sensitive, economical and safe with excellent patient acceptability.⁵ FNAC of the breast has two main goals. One is to confirm a radiological and clinical benign lesion and avoid unnecessary surgery and the other is to confirm a malignant diagnosis and allow definite treatment planning.⁶

In the present study FNAC was performed on 160 patients and these were followed for histopathology.

The age range was 18-82 years with mean age being in the range of 34.6 years in our study. In study by Pandey V et al, Tiwari M and Koirala et al, the age range was 15-75, 17-56 and 15-67 years respectively⁷⁻⁹ and the mean age was 30.8 years, 32 years and 36.2 years in the study by Pandey V et al., Tiwari M and Koirala et al. respectively.⁷⁻⁹ The mean age of our study was slightly higher than the study done by

Pandey V et al., and slightly lower than the study done by Tiwari M, and Koirala et al., since benign lesions were more common in our study.

The breast pathology was common in age group of 31-40 years (39%) followed by 21-30 years (25%), 41-50 years (12%) and 51-60 years (10%) in our study. As expected, benign lesions were more common in younger age groups while malignant lesions were more common in older age groups, this has also been observed in other studies.

In the present study, 90 cases (56%) presented with lump in left breast, 70 cases (44%) with lump in right breast. Hussain MT has reported left and right breast involvement in 54% cases and 46% cases respectively, in their study.¹⁰ In a study by Sushma Yalavarthi et al, most lesions were in left breast, 52.22%.¹¹ Our findings are similar to studies by these authors who also found left breast involvement more than right.

In our study, on cytology, out of 160 cases, 107 cases (67%) were benign lesions and 53 cases (33%) were malignant. In the study by Varsha Pandey et al.,⁷ benign lesions were 70.5%, malignant lesions were 27.9% and inflammatory 8.65%. In study by Khanna R et al, 61.3% cases were benign and non-neoplastic and 38.7% were malignant. Benign lesions were more common in our study, similar to studies by Varsha Pandey et al and Khanna R et al.^{7,12}

In our study, most common benign lesion diagnosed on cytology was fibroadenoma, 51 cases (32%). This is similar to findings by Varsha Pandey et al.,⁷ and Pinto et al.¹⁰ who also reported fibroadenoma as the most common lesion. Fibroadenoma was confirmed histopathologically also in 51 cases out of 160.

The accuracy of FNAC in detecting the breast lesions were compared with other studies using statistical parameters like sensitivity, specificity, positive predictive value and negative predictive value. These are compared and described in Table 6.

In our present study, the accuracy of cell blocks in identifying the breast lesions is 100%. And there is 100% correlation between the histopathological and cell block diagnosis. According to the study done by Daramola et al,²⁰ 181 out of 1790 cases showed equivocal results to detect malignancy, which has been overcome by the use of cell

Table 6: Comparison of accuracy on FNAC

Authors	Sensitivity	Specificity	Positive Predictive value	Negative Predictive Value
Sri Lakshmi HP. ¹³	95.2%	100%	100%	95.2%
Hussain MT ¹⁰	90.9%	100%	-	-
Tiwari M ⁸	83%	100%	-	-
Ariga et al. ¹⁴	99%	99%	99%	99%
Hebbar A. ¹⁵	93.10%	100%	100%	90.47%
Choi Y. ¹⁶	77.7%	99.2%	98.4%	-
Agarwal R et al ¹⁷	89.5%	100%	100%	94.2%
Mehra et al., ¹⁸	93.8%	100%	100%	91.4%
Gupta et al., ¹⁹	85%	95.8%	89%	93.8%
Daramola et al., ²⁰	95.4%	88.9%	99.6%	*
Kochhar et al., ²¹	98.1%	100%	100%	96.8%
Kanika Makkar et al ²²	94.59%	100%	100%	94.74%
Present study	94.5%	100%	100%	97.01%

blocks preparations. This shows that the detection rate of breast lesions especially malignancy increases if FNAC is combined with cell-block preparations. The similar results has been seen with other studies like Hegazy et al,²³ S. P. Bueno Angela et al,²⁴ N. A. Nathan et al,²⁵ and Obiajulu et al.²⁶

6. Conclusion

Fine needle aspiration cytology is a simple, cost- effective, highly accurate, quick and relatively less painful procedure which can be used for the diagnosis of breast lumps. Some amount of difficulties can be incurred in the approach to diagnosis. This can be overcome by the use of cell-block along with FNAC which makes the diagnosis easy and reliable.

7. Source of Funding

None.

8. Conflict of Interest

None.

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Author biography

Sowmya S Manjunath, Assistant Professor

Ankita Paul, Senior Resident

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