A Prospective Cross‑Sectional Study to Assess the Role of FNAC and Cell Block in the Diagnosis of Breast Lesions

Shambhwi Sharma

Senior Resident, Department of Pathology, AIIMS, Patna, Bihar, India

Abstract

Aim: The present study aims to highlight the role of FNAC and cell block in the diagnosis of breast lesions.

Methods: This study was a prospective cross‑sectional study of a total of 100 patients studied over a period of 2 years at Department of Pathology, AIIMS, Patna, Bihar, India. All patients referred for diagnostic FNAC of palpable breast lumps were included in the study. Cases in which cell blocks were a cellular, hemorrhagic, or only necrotic were excluded from the study as FNAC correlation was not possible in such cases.

Results: It was noted that among 130 patients, the mean age was 37 years, with a range of 13–85 years. Among neoplastic lesions, benign lesions were more common (55%) compared to malignant (35%). In benign and malignant lesions, the accuracy of cell block when correlated with histopathological findings was 72.5% and 84.61%, respectively, compared to FNAC which was 60% and 73.07%, respectively. The sensitivity (true positive) of the cell block was 100%, whereas that of FNAC was 97.6%, whereas the specificity (true negative) of the cell block was 81.8%, whereas that of FNAC was as low 15.6%. Therefore, the accuracy of the cell block was 88.8%, whereas that of FNAC was 69.2%, proving that cell block is more specific and accurate than FNAC.

Conclusion: Cell block method is superior to FNAC in the diagnosis of both benign and malignant tumors of the breast and helps to eliminate the need for invasive breast biopsies.

Keywords: Palpable breast lesions FNAC, Cell block Diagnosis, Histopathological examination.

Introduction

Breast cancer is a national health problem in India and a serious health concern in all countries. The early detection of breast cancer represents a major challenge for oncologists, pathologists, and surgical oncologists. [1] Breast lumps are a cause for concern in both young and elderly women. [2] Fine needle aspiration cytology (FNAC) is a widely used preoperative diagnostic method that is quick, cost-effective, minimally invasive, and safe. But FNAC diagnosis comes with limitations in maintaining consistency and reproducibility of the findings. [3]

Other limitations include difficulty in differentiating in situ and invasive carcinomas [4] and classifying various proliferative breast disorders. [5] These limitations can be overcome by using cell blocks. Architectural features can be better

appreciated by using cell blocks and the classification of these lesions is easier. Acquiring an adequate sample material can be challenging for the preparation of cell block slides prone to having variable cellularity after processing which may or may not correlate with FNA slides. [6] In addition, immunohistochemistry can be applied to these cell blocks to extend the accuracy of the diagnosis.

When a patient presents with a palpable breast lump, fine‑needle aspiration cytology (FNAC) is the most helpful preliminary test in categorizing lesions as benign and malignant, as this is inexpensive and minimally invasive. To further improve diagnosis and to carry out immune markers, cell blocks prepared from aspirated material have emerged not only as a useful technique but also have the potential to replace the necessity of doing invasive breast biopsies. Cell blocks are microbiopsy which employs retrieval of small tissue fragments from FNA specimen and is then fixed and processed with standard histopathology technique. It offers high diagnostic accuracy, cost‑effectiveness, and rapidity of results. Even though simple and cost‑effective, there is still a lack of awareness regarding its preparation and utility in many centers.

The present study aims to highlight the role of FNAC and cell block in the diagnosis of breast lesions.

Materials and Methods

This study was a prospective cross‑sectional study of a total of 100 patients studied over a period of 2 years at Department of Pathology, AIIMS, Patna, Bihar, India. All patients referred for diagnostic FNAC of palpable breast lumps were included in the study. Cases in which cell blocks were a cellular, hemorrhagic, or only necrotic were excluded from the study as FNAC correlation was not possible in such cases.

After taking informed written consent, an external examination of breast lumps was done, and FNAC was performed following standard procedure using 5–10 ml of disposable syringe with 22–24G needle. At least two aspirates were collected, and FNA smears were prepared immediately. The smears were either air‑dried for Giemsa stain or fixed in alcohol fixative for hematoxylin and eosin (H and E) and Papanicolaou stain.

The remaining aspirated material in the syringe was put in a cuvette containing 10% neutral buffered formalin and centrifuged for 5 min; the supernatant was discarded and to the cell button, four drops of plasma and four drops of recombiplastin (thrombin) were added and kept for incubation for 10 min. The cell button is then put on a filter paper and placed in the tissue cassette for routine histopathology processing. About 3–5 µ‑thick paraffin‑embedded tissues were cut and stained with standard H and E stain and were studied under a light microscope.

The findings of cell blocks were studied in detail to arrive at a diagnosis and compared with FNAC diagnosis. Findings of subsequent biopsy or resection when done for diagnostic or therapeutic purpose were also noted and correlated with cell block diagnosis.

Results

Table 1: Types of breast lesions

Types of breast lesions	N%
Non-neoplastic	7 (7)
Benign	55 (55)
Borderline	3 (3)
Malignant	35 (35)
Total	100 (100)

It was noted that among 130 patients, the mean age was 37 years, with a range of 13–85 years. Among neoplastic lesions, benign lesions were more common (55%) compared to malignant (35%).

Table 2: Correlation of fine-needle aspiration cytology and cell block with histopathology findings in breast lesions

Neoplastic breast lesions	Number of samples	Correct diagnosis (%)	
		Cell block diagnosis	**FNAC diagnosis**
Benign N=70 Histopathological findings			
Fibroadenoma	40	38 (95)	36 (90)
Fibrocystic disease	20	8 (60)	3 (15)
Phyllodes	3	3 (100)	2 (66.66)
Galactocele	2	1 (50)	1 (50)
Lactating adenoma	2	0	0
Intraductal papilloma	1	1	0
Sclerosing adenosis	1	0	0
Duct ectasia	1	0	0
Borderline N=2			
Borderline phyllodes	2	2 (100)	2 (100)
Malignant N=26			
Invasive mammary carcinoma	21	20 (95.23)	19 (90.47)
Medullary carcinoma	1	1 (100)	0
Metaplastic carcinoma	1	0	0
Mucinous carcinoma	1	1 (100)	0
Neuroendocrine carcinoma	1	0	0
Angiosarcoma	1	0	0
Non-neoplastic N=2			
Chronic mastitis and TB mastitis	2	1 (50)	1 (50)
Total	100	76 (76)	64 (64)

In benign and malignant lesions, the accuracy of cell block when correlated with histopathological findings was 72.5% and 84.61%, respectively, compared to FNAC which was 60% and 73.07%, respectively.

Table 3: Sensitivity and specificity for fine-needle aspiration cytology and cell block diagnostic accuracy parameters

	Cell block (%)	FNAC (%)
N	100	100
Sensitivity	100.0	97.6
Specificity	81.8	15.6
Accuracy	88.8	69.2
PPV	77.7	68.6
NPV	100.0	77.8

The sensitivity (true positive) of the cell block was 100%, whereas that of FNAC was 97.6%, whereas the specificity (true negative) of the cell block was 81.8%, whereas that of FNAC was as low 15.6%. Therefore, the accuracy of the cell block

was 88.8%, whereas that of FNAC was 69.2%, proving that cell block is more specific and accurate than FNAC.

Discussion

This study aimed at the advantage of cell block over the FNAC to study morphological features of breast lesions. However, it has been proved fact that the combined use of FNAC and cell blocks in the breast lesions yields better results. [7,8] Breast cancer is the most common female cancer worldwide, and it represents nearly a quarter (25%) of all cancers with an estimated 1.67 million new cancer cases diagnosed in 2012. There is a significant increase in the incidence and cancer-associated morbidity and mortality in the Indian subcontinent as described in various studies. [9]

Breast lumps are a fairly common presenting feature in the outpatient department, with majority of them being benign. However, malignancy contributes to a significant percentage of breast lumps, and therefore, early diagnosis is a must to treat the patients. Triple assessment, i.e. a combination of physical examination, imaging, and FNAC, can give an accurate diagnosis in 95% of the cases, which can be confirmed on histopathology. [10] FNAC has its disadvantages such as poor spreading, air‑drying artifact, presence of thick tissue fragments, and also sometimes may not yield sufficient information for diagnosis which leads to the risk of false-negative or intermediate diagnosis. [11] In order to overcome these problems, the cell block technique has been introduced to make the best use of the available material and to provide accurate diagnosis.

In our study of 100 cases, the age group of patients ranged from 20 to 60 years. The majority of the patients were between 21 and 30 years of age. This was similar to studies by Rakesh et al. and Yalavarthi et al., where the most common age groups of presentation were 21–40 years and 20–30 years, respectively. [10,12] However, the age group of common presentation was slightly higher at 31–40 years in a study by Kulashekhar et al. [13] Benign lesions were the most common in our study, whereas borderline lesions were the least common. Fibroadenoma was the most common benign breast lesion, followed by fibrocystic disease. Invasive mammary carcinoma‑no special type was the most common malignancy reported in our study. Other malignancies reported were metaplastic carcinoma; mucinous carcinoma; medullary carcinoma; high‑grade malignant small, round cell tumor, probably neuroendocrine carcinoma; and non‑Hodgkin lymphoma. A similar study was done by Bhagat et al. [14] in which the most common benign breast lesion was fibroadenoma (52.3%), followed by fibrocystic disease (36. 53%). Moreover, among malignant lesions, the most common lesion seen was invasive mammary carcinoma‑no special type (84.8%). Our results were also in concordance with studies done by Rakesh et al. [10] and Yalavarthi et al. [12]

Among malignant lesions, invasive mammary carcinoma‑no special type was diagnosed correctly on the cell block and FNAC in 94.7% and 89.5% of cases, respectively compared to the final histopathological diagnosis. In a similar study by Patel et al. [15] 33 breast lesions were correlated on FNAC and cell block. Fibroadenoma was diagnosed correctly in all cases on cell block and FNAC, followed by phyllodes tumor which was diagnosed correctly on cell block but was misdiagnosed as fibroadenoma on FNAC. Invasive mammary carcinoma was correctly diagnosed in all cases on cell block and FNAC. However, the histopathological diagnosis of metaplastic carcinoma did not correlate with the diagnosis on FNAC and cell block, which was reported as duct carcinoma on FNAC and inadequate on cell block. Another study done by Raafat et al. in Egypt revealed similar results. [16]

In the present study, the sensitivity of cell block was 100%, whereas that of FNAC was 97.6%. The specificity of cell block was 81.8%, whereas that of FNAC was as poor as 15.6%. The accuracy of cell block was 88.8%, whereas that of FNAC was 69.2%, showing that cell block is more specific and accurate than FNAC. In contrast, in a study conducted by Ashwin kumar et al., the accuracy of FNAC was more (81.85%) compared to cell block (79.25%) in diagnosing breast lesions. [17] However, the combined use of the two had the most accurate results (87.40%). Raafat et al. [16] and Patel et al. [15] showed that the combined utility of FNAC and cell block had best results. In a study by Basnet et al., [11] the cell blocks were found superior in diagnosing neoplasm than FNAC with a diagnostic accuracy of 95.91% and 91.8%, respectively. Thus, our study concurred with other studies and gave similar results except with the study done by Ashwin kumar et al. [17,18]

Conclusion

Breast masses are a source of anxiety for women especially of younger age as it has a risk of cancer and because of cosmetic disfigurement following surgery. Hence, there is a need for an accurate diagnosis of these breast lumps. FNAC of the breast is a minimally invasive, cost-effective, rapid, and simple technique to assess breast lumps. It has decreased the risk of morbidities like pain, infection, and hematoma as compared to other techniques like core biopsy.

It is recommended that cell block technique should be employed in all cases along with FNAC to help in the accurate diagnosis of breast lesions. Cell blocks have an added advantage that it may be used as an alternative to more invasive technique of breast biopsy and the sections of the cell block can be used for special stains and immunohistochemistry. Our study's findings were in concordance with other studies, and the sensitivity and specificity of cell blocks were superior in diagnosing various benign and malignant tumors of breasts compared to FNAC except in rare forms of cancer where only histopathological examination could show various architectural patterns to arrive at correct diagnosis.

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