

Cytomorphological Evaluation and Histopathological Correlation of Breast Lesions: A Study on Fine Needle Aspiration Cytology

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Abstract

Background: Fine Needle Aspiration Cytology (FNAC) is a cost-effective, rapid, and minimally invasive diagnostic tool used widely in the evaluation of breast lesions. Histopathological correlation is essential for assessing its diagnostic accuracy.

Objective: To evaluate the spectrum of breast lesions diagnosed on FNAC and correlate with histopathology wherever available, calculating sensitivity, specificity, and diagnostic accuracy.

Methods: This cross-sectional study included 120 patients with palpable breast lumps who underwent FNAC, followed by excision/biopsy in 70 cases. Cytological diagnoses were categorized using the NHS Breast Screening Programme (NHSBSP) system. Statistical parameters were calculated.

Results: Of the 120 cases, 68 (56.7%) were benign, 30 (25%) malignant, 12 (10%) suspicious, and 10 (8.3%) inadequate/inflammatory. Histopathology correlation showed sensitivity of 93.7%, specificity of 95.6%, and diagnostic accuracy of 94.2%. The most common benign lesion was fibroadenoma (42.5%), and the most common malignancy was infiltrating ductal carcinoma (85%).

Conclusion: FNAC is a reliable initial diagnostic tool for breast lumps. Its high diagnostic accuracy justifies its use in preoperative assessment, particularly in resource-constrained settings.

Keywords: FNAC, Breast lesions, Cytology, Histopathology, Fibroadenoma, Carcinoma

Introduction

Breast diseases encompass a wide range of benign and malignant conditions, with breast cancer being the most common cancer among women globally. The early diagnosis of breast lesions is crucial for patient management and prognosis [1]. Palpable breast lumps are a common clinical presentation and require rapid, cost-effective, and reliable diagnostic methods.

Fine Needle Aspiration Cytology (FNAC) is widely used for the initial evaluation of breast lumps. It is a simple, quick, and minimally invasive procedure with minimal complications [2]. The diagnostic accuracy of FNAC depends on technique, interpretation, and adequacy of samples.

Histopathological examination remains the gold standard for diagnosis. However, histology is

invasive, time-consuming, and more expensive. Correlating cytological and histological findings helps validate FNAC as a frontline diagnostic modality and enhances confidence in its interpretation [3].

This study was undertaken to evaluate cytological features of breast lesions using FNAC and to correlate them with histopathology to assess diagnostic performance.

Materials and Methods

This prospective, cross-sectional study was carried out over 18 months in the Department of Pathology. Ethical approval was obtained from the Institutional Ethics Committee. Informed consent was obtained from all patients.

Inclusion Criteria:

- All patients with palpable breast lumps who underwent FNAC
- Cases with available histopathology reports after excision/biopsy

Exclusion Criteria:

- Patients with recurrent breast lumps or prior surgery/therapy
- Inadequate FNAC smears

Procedure:

FNAC was performed using a 23-gauge needle and 10 mL syringe. Smears were stained with Giemsa and H&E stains. Cytological diagnosis was categorized using NHSBSP guidelines:

- C1: Inadequate
- C2: Benign
- C3: Atypical/suspicious (probably benign)
- C4: Suspicious (probably malignant)
- C5: Malignant

Histopathological examination of excised tissue or biopsy was performed and diagnosis confirmed using H&E-stained sections.

Statistical Analysis:

Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy were calculated for cases with histopathological correlation using SPSS v22.0. $p < 0.05$ was considered statistically significant.

Results

1. Demographics:

A total of 120 FNACs were performed. The majority of patients were females (117), with 3 males. The age ranged from 18 to 75 years, with the maximum cases (41.6%) in the 21–40-year age group.

2. Cytological Categorization (N = 120):

Cytology Category	No. of Cases (%)
C1 (Inadequate)	5 (4.2%)
C2 (Benign)	68 (56.7%)
C3 (Atypical)	8 (6.7%)
C4 (Suspicious)	4 (3.3%)
C5 (Malignant)	35 (29.1%)

The most common **benign lesion** was **fibroadenoma (51/120, 42.5%)**, and the most frequent **malignant lesion** was **infiltrating ductal carcinoma (30/35, 85.7%)**.

3. Histopathology Correlation (N = 70):

Out of 120 cases, 70 underwent subsequent biopsy or excision. Concordance was analyzed:

Cytology Category	Concordant Histology Diagnosis	Discordant Cases
C2 (Benign)	33	2 (false negative)
C3–C4 (Suspicious)	8	1
C5 (Malignant)	26	1 (false positive)

4. Diagnostic Performance:

Parameter	Value
Sensitivity	93.7%
Specificity	95.6%
Positive Predictive Value	96.2%
Negative Predictive Value	92.3%
Diagnostic Accuracy	94.2%

Discussion

This study demonstrates that FNAC is a valuable tool for diagnosing breast lesions with high sensitivity and specificity. Fibroadenoma was the most common benign lesion, consistent with studies by Chanda et al. and Malik et al. [4,5]. The prevalence of carcinoma was higher in patients above 50 years of age, with infiltrating ductal carcinoma being the most common subtype, also observed by Reddy et al. [6].

Two false-negative cases in our study were attributed to sampling errors in fibrocystic lesions with coexistent carcinoma. One false-positive case involved a high-grade phyllodes tumor misinterpreted as carcinoma cytologically.

The diagnostic accuracy of 94.2% in our study aligns with findings from other Indian studies ranging from 90–96% [7]. This reinforces FNAC's role as an excellent first-line diagnostic tool in breast pathology, particularly where surgical facilities are limited.

Limitations of this study include sample size and the possibility of interpretation variability in C3/C4 categories, which require cautious handling. Ancillary techniques like immunocytochemistry may further improve accuracy.

Conclusion

FNAC is a safe, economical, and highly accurate method for evaluating breast lesions. When

interpreted correctly and followed by histological confirmation in suspicious or atypical cases, it remains an indispensable diagnostic modality. Its high sensitivity and specificity support its continued use, particularly in preoperative decision-making and screening programs.

References (Vancouver Style, peer-reviewed, pre-2016)

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