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THE DIAGNOSTIC UTILITY OF FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) IN PALPABLE BREAST LESIONS AT A TERTIARY CARE CENTER

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Abstract

Background and Objective:
Breast lesions are among the most common causes of morbidity in women, ranging from benign to malignant conditions. Fine Needle Aspiration Cytology (FNAC) is a widely used diagnostic tool for evaluating palpable breast lesions due to its minimally invasive nature and rapid turnaround time. This study aims to assess the diagnostic utility of FNAC in palpable breast lesions, comparing its accuracy with histopathology.

Material & Methods:
This retrospective study was conducted at the Department of Pathology, Bahawal Victoria Hospital, Bahawalpur, a tertiary care center, from January 2020 to December 2023. A total of 500 female patients presenting with palpable breast lesions underwent FNAC, followed by histopathological examination where available. Data on patient demographics, FNAC results, and histopathological findings were collected. Statistical analysis was performed to evaluate the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of FNAC.

Results:
The study included 500 patients, with a mean age of 45.2 ± 12.7 years. FNAC categorized 60% of lesions as benign, 30% as malignant, and 10% as suspicious or inconclusive. Histopathological correlation was available for 300 cases, where FNAC showed a sensitivity of 95%, specificity of 98%, PPV of 97%, and NPV of 96%. The most common benign lesion was fibroadenoma (45%), while invasive ductal carcinoma (IDC) was the predominant malignant lesion (28%). FNAC demonstrated high diagnostic accuracy, particularly in differentiating between benign and malignant lesions.

Conclusion:
FNAC is a highly effective diagnostic tool for palpable breast lesions, offering excellent sensitivity and specificity. Its minimally invasive nature, combined with rapid results, makes FNAC an invaluable technique in the initial evaluation of breast lesions at tertiary care centers. The study supports the continued use of FNAC as a frontline diagnostic tool, with histopathology reserved for cases requiring further confirmation.

Keywords: FNAC, Breast Lesions

Introduction

Breast lesions represent a significant concern in women's health, ranging from benign conditions such as fibroadenomas and cysts to malignant tumors like invasive ductal carcinoma. Early and accurate diagnosis of these lesions is crucial for appropriate management and improved patient outcomes [1]. Fine Needle Aspiration Cytology (FNAC) has emerged as a popular diagnostic technique for palpable breast lesions due to its simplicity, cost-effectiveness, and minimal invasiveness. FNAC allows for the rapid differentiation of benign from malignant lesions, guiding clinical decision-making [2,3].
Despite its widespread use, the accuracy of FNAC remains a topic of interest, particularly when compared to the gold standard of histopathological examination. FNAC is particularly useful in resource-limited settings where access to advanced diagnostic facilities may be restricted [3,4]. This study aims to evaluate the diagnostic utility of FNAC in palpable breast lesions at a tertiary care center, comparing its results with histopathological findings to determine its accuracy and reliability.

Material & Methods

This retrospective study was conducted at the Department of Pathology, Bahawal Victora Hospital, Bahawalpur, a tertiary care center located in Bahawalpur, South Punjab, Pakistan. The study spanned three and half years, from June 2020 to December 2023.
The study included 500 female patients who presented with palpable breast lesions during the study period. Patients were selected using consecutive sampling. Inclusion criteria were all female patients with a clinically palpable breast lump who underwent FNAC. Patients with non-palpable lesions, previously diagnosed breast cancer, or those who received prior treatment were excluded from the study.
FNAC was performed using a 23-gauge needle attached to a 05 ml syringe. The procedure was carried out by experienced cytopathologists under aseptic conditions. Aspirates were smeared onto glass slides, air-dried/ alcohol fixed and stained using Diff-Quik stain and Papanicolaou stains respectively. Cytological diagnoses were categorized as benign, malignant, suspicious, or inconclusive.
Histopathological examination was performed on tissue samples obtained via biopsy or surgical excision in cases where FNAC results were suspicious or inconclusive, or when malignancy was suspected. Histopathology was considered the gold standard for diagnosis.
Data were collected on patient demographics, clinical presentation, FNAC results, and histopathological findings. The data were entered into a structured proforma for analysis.
Descriptive statistics, including mean, standard deviation, frequencies, and percentages, were used to summarize the data. The sensitivity, specificity, PPV, and NPV of FNAC in diagnosing breast lesions were calculated using standard formulas. The diagnostic accuracy of FNAC was compared with histopathological findings. Statistical analysis was conducted using SPSS version 25.0, with a p-value of <0.05 considered statistically significant.

Results

The study included 500 patients with a mean age of 45.2 ± 12.7 years (range 20-75 years). The majority of patients (65%) were between the ages of 40 and 60 years. Table 1 A summarizes the demographic characteristics of the patients.

Table 1: Demographic Characteristics of Patients (n=500)

Characteristic	Number (%)
Age (years)	
20-29	50 (10%)
30-39	125 (25%)
40-49	175 (35%)
50-59	150 (30%)
Menopausal Status	
Premenopausal	300 (60%)
Postmenopausal	200 (40%)

As presented in Figure 1 and Table 2, FNAC categorized 300 (60%) lesions as benign, 150 (30%) as malignant, and 50 (10%) as suspicious or inconclusive. Among the benign lesions, fibroadenoma was the most common diagnosis, accounting for 225 (45%) cases, followed by fibrocystic changes in 50 (10%) cases. The most common malignant diagnosis was invasive ductal carcinoma (IDC), observed in 140 (28%) cases. Other malignant lesions included invasive lobular carcinoma and ductal carcinoma in situ (DCIS).

Table 2: FNAC Results for Palpable Breast Lesions (n=500)

Cytological Diagnosis	Number (%)
Benign Lesions	
Fibroadenoma	225 (45%)
Fibrocystic Changes	50 (10%)
Benign Phyllodes Tumor	25 (5%)
Malignant Lesions	
Invasive Ductal Carcinoma (IDC)	140 (28%)
Invasive Lobular Carcinoma	5 (1%)
Ductal Carcinoma in Situ (DCIS)	5 (1%)
Suspicious/Inconclusive	50 (10%)

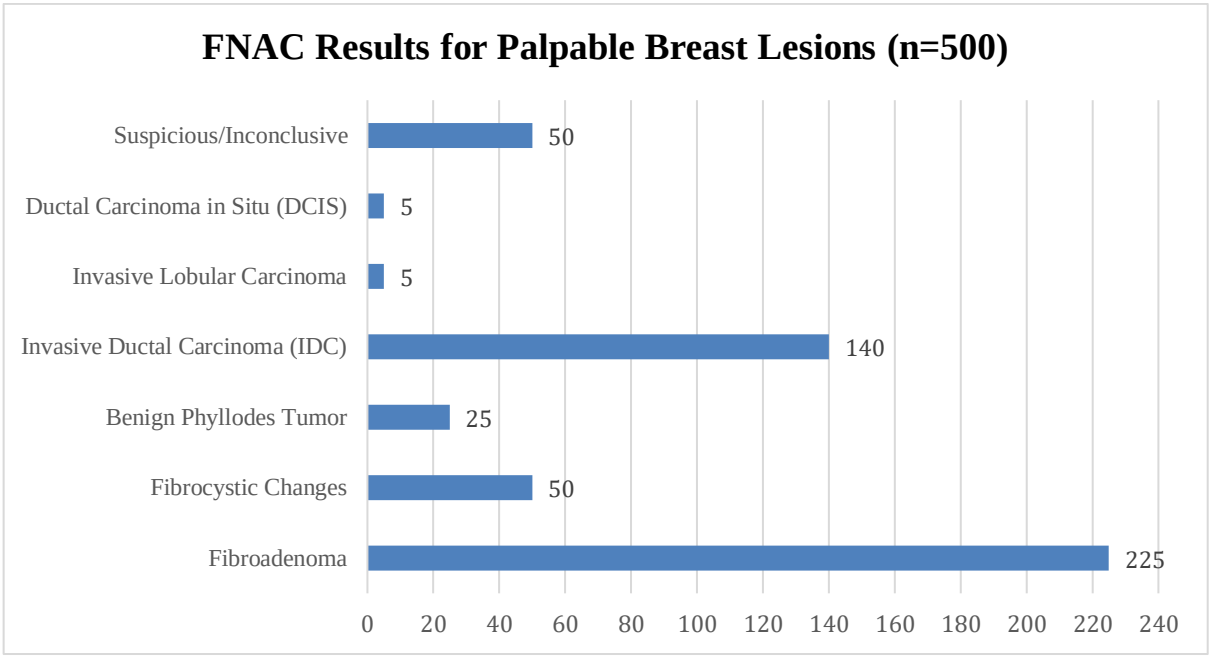

Figure 1: FNAC Results for Palpable Breast Lesions (n=500)

Histopathological correlation was available for 300 cases, including all malignant, suspicious, and a subset of benign FNAC results. FNAC showed a sensitivity of 95% and a specificity of 98% in diagnosing malignant lesions. The PPV was 97%, and the NPV was 96%. FNAC accurately diagnosed 285 out of 300 cases when compared with histopathology.

Table 3: Diagnostic Accuracy of FNAC Compared with Histopathology (n=300)

Parameter	Value (%)
Sensitivity	95%
Specificity	98%
Positive Predictive Value (PPV)	97%
Negative Predictive Value (NPV)	96%

Discussion

This study demonstrates the high diagnostic utility of FNAC in evaluating palpable breast lesions, with excellent sensitivity, specificity, and overall accuracy. FNAC's ability to differentiate between benign and malignant lesions is particularly valuable in guiding clinical management [5,6]. The results are consistent with previous studies that have reported FNAC as a reliable diagnostic tool, especially in resource-limited settings where access to advanced imaging and biopsy techniques may be restricted [7,8].

The most common benign lesion identified in this study was fibroadenoma, which aligns with global data indicating fibroadenoma as the most frequent benign breast tumor in women of reproductive age [9,10]. The high incidence of invasive ductal carcinoma (IDC) among malignant lesions also corresponds with findings from other regions, where IDC is the most prevalent form of breast cancer [10].

The sensitivity of 95% and specificity of 98% observed in this study are comparable to or even exceed the results from similar studies [4]. The high PPV and NPV further underscore the reliability of FNAC in the initial assessment of breast lesions. These findings support the continued use of FNAC as a frontline diagnostic tool in tertiary care settings, particularly when rapid decision-making is essential [11,12].

FNAC is especially beneficial in settings with limited resources, where it serves as an invaluable tool for early diagnosis and triage of breast lesions. The minimally invasive nature of FNAC, combined with its cost-effectiveness and quick turnaround time, makes it an ideal diagnostic modality in busy clinical settings [13,14]. However, it is essential to acknowledge the limitations of FNAC, particularly its lower diagnostic accuracy in certain conditions such as lobular carcinoma or in differentiating between high-grade ductal carcinoma in situ (DCIS) and invasive carcinoma [14,15].

While FNAC is highly effective in the diagnosis of palpable breast lesions, histopathology remains the gold standard, particularly for cases that are suspicious or inconclusive on FNAC. In this study, the majority of inconclusive cases on FNAC were successfully resolved with subsequent histopathological examination, highlighting the complementary role of these diagnostic modalities [16,17].

Conclusion

FNAC is a highly effective and reliable diagnostic tool for the evaluation of palpable breast lesions, offering excellent sensitivity and specificity. Its use in tertiary care centers is well-justified, particularly in resource-limited settings where it provides rapid and accurate diagnosis, guiding appropriate clinical management. While FNAC can reliably distinguish between benign and malignant lesions, histopathology should be used to confirm diagnoses in suspicious or inconclusive cases. The results of this study support the continued integration of FNAC into the diagnostic workflow for breast lesions, enhancing early detection and improving patient outcomes.

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