

Research Article

The Efficacy of Fine Needle Aspiration Cytology in Identifying Breast Lump Patients

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ABSTRACT

Background: Breast cancer is the most diagnosed cancer among women globally, representing over 10% of all new cancer cases annually. It is the second leading cause of cancer-related deaths in women.

Objective: To assess the efficacy of the fine needle aspiration cytology in identifying breast lumps in patients.

Study Design: Retrospective cross-sectional analytical study

Place and Duration of Study: Department of Pathology, Multan Medical & Dental College, Multan & Multi Test Laboratory, Multan from 1st December 2024 to 30th May 2025.

Methodology: Fifty female patients who were presenting clinical suspicions of a palpable breast lump within age group of 20-59 years were enrolled. All patients who either chose not to participate in the study or those who were receiving neoadjuvant treatment were excluded. Fine needle aspiration cytology was performed after the skin was cleaned and numbed with a local anesthetic. A 22–25-gauge fine needle was inserted into the lump or mass. Manifold passes were performed to confirm a satisfactory sample was collected. The cells were aspirated into the needle and the cells were smeared onto slides and stained. The pathologist examined the cells under a microscope.

Results: It was observed that there were 17% patients identified as benign while 33% were identified as malignant. There were 52.94% patients having cyst size >5cm in benign group and 69.69% of the cases in malignant group were having cyst >5 cm. The sensitivity and specificity of the fine needle aspiration cytology verses fine needle aspiration cytology presented 93.95% sensitivity and 100% specificity with a 100% positive predictive value.

Conclusion Fine needle aspiration cytology is a cost effective highly specific technique for identifying the breast lumps, however further clarification is required that either core needle biopsy or other diagnostic tools may be reserved for cases with wider technological availability.

Key words: Efficacy, Fine needle aspiration cytology, Breast lump, Core needle biopsy.

INTRODUCTION

The breast disease is reported in a broad spectrum all over the globe including inflammatory conditions, neoplastic growths as well as hormonal alternations. Breast lumps can have carcinogenic as well as benign lesions. As the breast carcinomas remains a major risk the breast lesions cannot be ignored. It is pertinent to understand that breast cancer remains one of the major killers worldwide, affecting many women in developing and developed countries.^{1,2}

The symptoms of breast lumps include pain, tenderness, lumpiness, or nipple discharge. Fine needle aspiration cytology (FNAC) is used to

investigate breast lumps and determine their nature. A fine needle is inserted into the lump, and cells are aspirated for examination.³⁻⁵ The process is minimally invasive, quick, and low risk of complications. The accuracy of FNAC is known through its sensitivity and specificity as the test is 80-90% accurate in detecting cancer with specificity: 90-95% accurate in ruling out cancer.⁶⁻⁸

The uses of FNAC includes benign (non-cancerous) or malignant (cancerous) tumors, identification of infections or inflammatory conditions as well as for the monitoring of the progression of a known condition.^{3,8} The process has lowest risk of complications and can be

performed in an outpatient setting. There are some limitations of FNAC that it may not provide a definitive diagnosis in all cases and requires expertise in cytology for accurate interpretation.⁹ It may not be suitable for deep-seated or hard-to-reach lesions.¹⁰ The present study was performed for assessing the efficacy of the FNAC process in identifying breast lump and its types. The study assisted in providing usable data and approach in patients suffering from breast lump without involving cumbersome tests.

MATERIALS AND METHODS

This retrospective cross-sectional analytical study was conducted at Department of Pathology, Multan Medical & Dental College, Multan and Multi Test Laboratory Multan from 1st December 2024 to 30th May 2025. A total of 50 female patients who were presenting clinical suspicions of a palpable breast lump were included. The study exclusion criteria consisted of patients who either chose not to participate in the study or those who were receiving neoadjuvant treatment. Patients wherein the ultrasound imaging suggested cystic swelling or breast abscess, bleeding disorders or fibroadenosis were also excluded from the study. All the included participants signed a written informed consent. The sample size was generated by using a Z value of 1.96 with two tailed sample calculation at 95% CI, the sensitivity of FNAC was considered as 97.2% with an acceptable error of 0.1 and prevalence as 25.8%.¹⁰ FNAC was performed after the skin was cleaned and numbed with a local anesthetic. A 22–25 gauge fine needle was inserted into the lump or mass. Manifold passes were formed to confirm a satisfactory sample was collected. The cells were aspirated into the needle and the cells were smeared onto slides and stained. The pathologist examined the cells under a microscope. The material which was aspirated was further smeared on the glass slide and was later fixed in the ethanol, and then it was stained by using Papanicolaou or else May-

Grünwald-Giemsa stain. During the procedure the aseptic conditions were kept ensured by the application of a needle attached to a 10 mL syringe. All the collected data was entered in a well-structured questioner and analysed in the SPSS-26.0 wherein Chi square test was used for the analysis of the collected information interpretation. The p value which was considered significant was 0.05.

RESULTS

On histopathological examination and on FNAC it was observed that there were 17% patients identified as benign while 33% were identified as malignant (Fig. 1). The majority of the benign cases were within the age group of 20-29 years while there majority of the malignant cases were within the age group of 50-59 years. There were 52.94% patients having cyst size >5cm in benign group and 69.69% of the cases in malignant group were having cyst>5 cm (Table 1).

Within the patients having malignant identification on FNAC the TNM staging interpreted 48.4% cases with stage IIB followed by 21.2% patients having stage IIA while only 02 cases each were presented with stage I or IV respectively. The similar results were reported through histopathological examination. There were no cases in stage IIC (Table 2)

Fine needle aspiration cytology was accomplished on all 50 patients. FNAC diagnosed 52% as ductal carcinoma (DC), and two cases (6%) as with lobular carcinoma. Among the benign patients, fibroadenoma was observed in 11.70% patients while atypical epithelial hyperplasia, non-specific mastitis, fibrocystic disease and phyllodes tumor in 5.88% cases each. The atypical epithelial hyperplasia, granulomatous mastitis, and non-specific mastitis were presented in 11.70% cases each respectively (Fig. 2). The sensitivity and specificity of the FNAC versus FNAC presented 93.95% sensitivity and 100% specificity with a 100% positive predictive value (Table 3).

Table 1: Age distribution within the identified cases (n=50)

Age (years)	Benign (n=17)	Malignant (n=33)
20-29	10 (58.82%)	2 (6.06%)
30-39	5 (29.41%)	4 (12.12%)
40-49	1 (5.88%)	7 (21.21%)
50-59	1 (5.88%)	20 (60.60%)
Cyst >5cm	9 (52.94%)	23 (69.69%)

Table 2: TNM stage identification through fine needle aspiration cytology

TNM Staging	Malignant (n=33)	
	No.	%
I	2	6.06
IIA	7	21.2
IIB	16	48.4
IIC	-	--
IV	2	6.06

Table 3: Comparison of HPE with FNAC for sensitivity and specificity

HPE vs FNAC	95% CI
Sensitivity	93.95% (79.78% to 99.96%)
Specificity	100% (71.52% to 100%)
Positive- predictive value	100%
Negative- predictive value	84.62% (58.95% to 95.66%)
Accuracy	95.43% (84.54% to 99.45%)

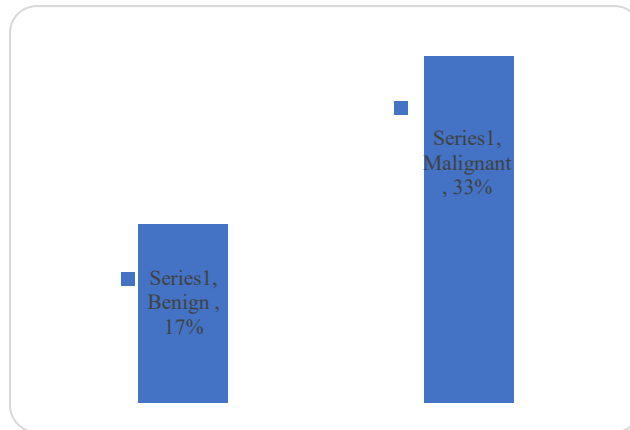


Figure 1: Identification of benign and malignant cases

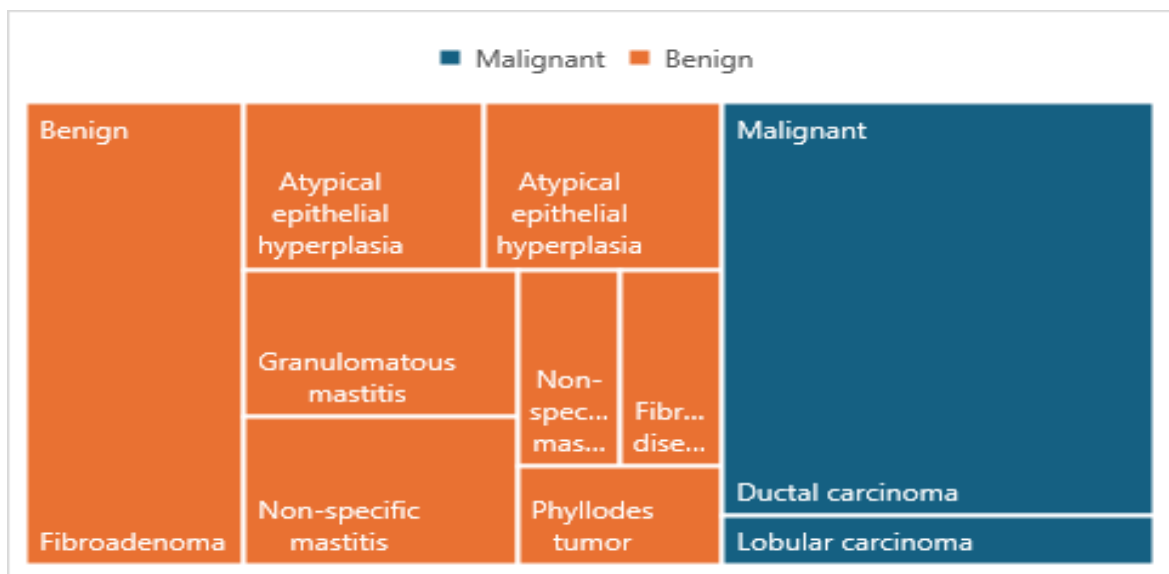


Figure 2: Diagnostic accuracy of fine needle aspiration cytology

DISCUSSION

In the present study, the results revealed that breast cancer incidence increased with age, particularly in the 40-49 and 50-59 age groups. Benign lesions were most common in the 20-29 age group while malignant lesions were more prevalent in the 50-59 age group. These findings align with those of Khemka et al¹¹, who observed a peak incidence between 40-44 years.

In our study, 32 cases involved lumps larger than 5 cm, and 23 of these were malignant. This is consistent with the findings of Saha et al¹² and other researchers¹³⁻¹⁶, who reported that 64.3% of malignant lesions were in lumps ranging from 5 to 10 cm. The larger tumor size in our study likely reflects delayed presentation due to a lack of awareness among patients.

The current study results were compared with those of other research. FNAC in present study had a sensitivity of 93.9%, which is higher than the 69% reported by Saha et al¹² and slightly lower than the 97.22% reported by Rahman et al⁷, indicating strong performance in detecting malignancy in our cohort. The specificity was perfect at 100%, consistent with other studies, highlighting FNAC's reliability in accurately identifying benign cases. The positive predictive value (PPV) of FNAC was also 100%, confirming its robustness in diagnosing malignancy. However, the negative predictive value (NPV) was 84.62%, indicating a relatively lower accuracy in identifying non-malignant cases compared to some other studies. This variation may be attributed to differences in study populations, the prevalence of malignancy or methodological factors such as the cytopathologists skill level or the quality of cytological samples. The slightly lower NPV also underscores the possibility of false negatives, stressing the need for careful interpretation of negative FNAC results, particularly in cases with clinical suspicion.¹⁷⁻²⁰

CONCLUSION

Fine needle aspiration cytology is a cost effective highly specific technique for identifying the breast lumps, however further clarification is required that either core needle biopsy or other diagnostic tools may be reserved for cases with wider technological availability.

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