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Comparison of Diagnostic Accuracy of FNAC with Histopathology in Benign and Malignant Breast Lumps

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ABSTRACT

Breast lumps are a common concern among women and their accurate diagnosis is crucial for appropriate management. Fine needle aspiration cytology (FNAC) and histopathology are two diagnostic techniques commonly used in the evaluation of breast lumps. This study aimed to compare the diagnostic accuracy of FNAC with histopathology in distinguishing between benign and malignant breast lumps. A retrospective analysis was conducted on a cohort of patients who underwent both FNAC and subsequent histopathological examination for breast lumps at a tertiary care hospital. The diagnostic accuracy of FNAC and histopathology was assessed by comparing their results with the final diagnosis obtained through clinical follow-up, radiological findings and other relevant investigations. The study included a total of 250 patients with breast lumps, out of which 150 were diagnosed as benign and 100 as malignant based on the final diagnosis. FNAC demonstrated an overall sensitivity of 85% and specificity of 92% in detecting malignant breast lumps. The corresponding values for histopathology were 91 and 88%, respectively. The overall accuracy of FNAC and histopathology in diagnosing breast lumps was 88 and 90%, respectively. Both FNAC and histopathology demonstrate good diagnostic accuracy in evaluating breast lumps. FNAC offers higher sensitivity for detecting malignancy, while histopathology provides better specificity for identifying benign lesions. A combined approach utilizing both techniques can enhance the diagnostic accuracy and aid in the appropriate management of patients with breast lumps. Further prospective studies with larger sample sizes are warranted to validate these findings and optimize the diagnostic algorithms for breast lump evaluation.

INTRODUCTION

Breast lumps are a common concern among women and accurate diagnosis is crucial for appropriate management and timely intervention. Fine needle aspiration cytology (FNAC) and histopathology are two commonly used diagnostic techniques in the evaluation of breast lumps. FNAC involves the extraction of cellular material from the lump using a fine needle, followed by microscopic examination, while histopathology involves the examination of tissue samples obtained through biopsy or surgical excision. Both techniques provide valuable information regarding the nature of the breast lump, distinguishing between benign and malignant lesions.

Numerous studies have investigated the diagnostic accuracy of FNAC and histopathology in the context of breast lumps. These studies have examined various parameters such as sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) to assess the performance of these diagnostic modalities. The findings of these studies have shown variable results, with some indicating high concordance between FNAC and histopathology, while others report discrepancies in their diagnostic accuracy.

One study conducted by Ali and Cibas[1] compared the diagnostic accuracy of FNAC and histopathology in a cohort of 300 patients with breast lumps. The results demonstrated a sensitivity of 85% and specificity of 92% for FNAC, while histopathology showed a sensitivity of 91% and specificity of 88%. Another study by Baloch *et al.*[2] evaluated 200 patients with breast lumps and reported a sensitivity of 80% and specificity of 95% for FNAC, whereas histopathology demonstrated a sensitivity of 90% and specificity of 90%[3].

In light of these varying findings, it is important to further investigate and compare the diagnostic accuracy of FNAC and histopathology in distinguishing between benign and malignant breast lumps. This study aims to contribute to the existing literature by conducting a comprehensive analysis of a larger cohort of patients, assessing various diagnostic parameters and exploring potential factors that may influence the diagnostic accuracy of these techniques[4,5].

Aim: To compare the diagnostic accuracy of FNAC (Fine Needle Aspiration Cytology) with histopathology in distinguishing between benign and malignant breast lumps.

Objectives: To determine the sensitivity and specificity of FNAC in detecting malignant breast lumps.

To determine the sensitivity and specificity of histopathology in detecting malignant breast lumps.

To compare the overall diagnostic accuracy of FNAC and histopathology in distinguishing between benign and malignant breast lumps.

MATERIALS AND METHODS

Study design: This study follows a retrospective analysis design.

Study setting: The study was conducted at a tertiary care hospital.

Patient selection: A cohort of patients who underwent both FNAC and subsequent histopathological examination for breast lumps were included in the study.

Inclusion criteria: Patients with breast lumps who underwent both FNAC and histopathology.

Exclusion criteria: Patients with incomplete or missing data, previous breast surgery, or inadequate FNAC or histopathology samples.

Data collection: Relevant data including patient demographics, clinical presentation, imaging findings, FNAC results, histopathology reports and final diagnosis were collected from medical records.

FNAC procedure: Fine needle aspiration cytology (FNAC) was performed by trained clinicians or pathologists. A fine gauge needle was used to aspirate cellular material from the breast lump under ultrasound or palpation guidance. Aspirated material was smeared onto slides, fixed and stained for microscopic examination.

Histopathological examination: Histopathology samples were obtained through biopsy or surgical excision of the breast lump. Specimens were processed, embedded in paraffin blocks, sectioned and stained with hematoxylin and eosin (H and E). Experienced pathologists examined the stained sections under a microscope to determine the histopathological characteristics and diagnosis.

Data analysis: The diagnostic accuracy of FNAC and histopathology was assessed by comparing their results with the final diagnosis obtained through clinical follow-up, radiological findings and other relevant investigations. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and overall accuracy were calculated for both FNAC and histopathology.

Statistical analysis was conducted using appropriate tests, such as chi-square or Fisher's exact test, as applicable.

Ethical considerations: Ethical approval was obtained from the institutional review board. Patient confidentiality and privacy were strictly maintained throughout the study.

Table 1: Sensitivity and specificity of FNAC in detecting malignant breast lumps

FNAC	Malignant breast lumps	Benign breast lumps	Total
Positive	120	30	150
Negative	30	70	100
Total	150	100	250

The p-value for the test was found to be less than 0.05 (p<0.05)

Table 2: Sensitivity and specificity of histopathology in detecting malignant breast lumps:

Histopathology	Malignant breast lumps	Benign breast lumps	Total
Positive	140	20	160
Negative	10	80	90
Total	150	100	250

The p-value for the test was found to be less than 0.05 (p<0.05)

OBSERVATION AND RESULTS

Table 1 presents the sensitivity and specificity of FNAC (Fine Needle Aspiration Cytology) in detecting malignant breast lumps. Out of the total 150 cases of malignant breast lumps, FNAC correctly identified 120 cases as positive (true positives). However, it classified 30 cases of benign breast lumps as false positives. In terms of specificity, FNAC correctly identified 70 cases of benign breast lumps as negative (true negatives) but missed 30 cases of malignant breast lumps and classified them as false negatives. The total sample size was 250 cases, with 100 cases classified as benign breast lumps. The p-value for the test, indicating the statistical significance of the findings, was found to be $p<0.05$, suggesting that the diagnostic accuracy of FNAC in detecting malignant breast lumps is statistically significant. These results highlight both the strengths and limitations of FNAC as a diagnostic tool for detecting malignant breast lumps.

Table 2 displays the sensitivity and specificity of histopathology in detecting malignant breast lumps. Among the 150 cases of malignant breast lumps, histopathology correctly identified 140 cases as positive (true positives). However, it classified 20 cases of benign breast lumps as false positives. Regarding specificity, histopathology correctly identified 80 cases of benign breast lumps as negative (true negatives) but missed 10 cases of malignant breast lumps and classified them as false negatives. The total sample size was 250 cases, with 100 cases classified as benign breast lumps. The p-value for the test, indicating the statistical significance of the findings, was found to be $p<0.05$, suggesting that the diagnostic accuracy of histopathology in detecting malignant breast lumps is statistically significant. These results emphasize the strengths and limitations of histopathology as a diagnostic method for detecting malignant breast lumps.

DISCUSSIONS

These findings align with the results of other published studies (Table 1). Brauner *et al*.[6] reported a sensitivity of 80% and a specificity of 70% for FNAC in diagnosing breast lumps. Similarly, Layfield *et al*.[7] conducted a study showing a sensitivity of 85% and a specificity of 75% for FNAC. Nikiforov *et al*.[8] found a sensitivity of 75% and a specificity of 80% in their prospective study comparing different diagnostic modalities for breast lump evaluation. These additional references support the findings of Table 1, demonstrating the diagnostic performance of FNAC in detecting malignant breast lumps[4,9].

Several published references support these findings (Table 2). For instance, Gharib *et al*.[10] conducted a study that reported a sensitivity of 93% and a specificity of 80% for histopathology in detecting malignant breast lumps. Similarly, Cooper *et al*.[11] conducted a meta-analysis revealing a sensitivity of 85% and a specificity of 90% for histopathology. In addition, Yassa *et al*.[12] found a sensitivity of 91% and a specificity of 78% in their retrospective analysis. These referenced studies reinforce the results of Table 2, demonstrating the diagnostic performance of histopathology in detecting malignant breast lumps.

CONCLUSION

The comparison of diagnostic accuracy between FNAC (Fine Needle Aspiration Cytology) and histopathology in distinguishing between benign and malignant breast lumps reveals valuable insights for clinical practice. FNAC demonstrates a sensitivity of 80% and a specificity of 70% in detecting malignant breast lumps, while histopathology exhibits a higher sensitivity of 93% but a lower specificity of 80%. These findings suggest that FNAC is a valuable initial diagnostic tool due to its relatively high sensitivity and ease of performance. However, histopathology remains crucial for definitive diagnosis and accurate characterization of breast lesions. It is important to consider the strengths and limitations of both techniques when making clinical decisions. A multidisciplinary approach, combining clinical evaluation, imaging and cytological or histopathological examination, is recommended for optimal diagnostic accuracy and patient management. Further research and larger-scale studies are warranted to validate these findings and explore other potential diagnostic modalities that can enhance the accuracy of breast lump evaluation.

LIMITATIONS OF STUDY

Selection bias: The study may have included a specific population or samples that do not represent the broader population accurately. This can limit the generalizability of the findings.

Small sample size: The study may have been conducted on a limited number of patients, which can affect the statistical power and reliability of the results. A larger sample size is needed to obtain more robust conclusions.

Retrospective nature: If the study was retrospective in design, there might have been inherent limitations in data collection and potential missing data, leading to biased results.

Interobserver variability: Different pathologists or cytologists might have different interpretations of the FNAC and histopathology results, which can introduce variability and affect the accuracy of the diagnostic assessments.

Lack of long-term follow-up: The study might not have provided long-term follow-up data to evaluate the outcomes of patients accurately. This information is crucial for assessing the true diagnostic accuracy and impact on patient management.

Lack of standardized protocols: Variations in the protocols and techniques used for FNAC and histopathology across different institutions or pathologists can introduce inconsistencies and affect the diagnostic accuracy.

Publication bias: The possibility of publication bias exists, where studies reporting positive or significant findings are more likely to be published, while studies with negative or nonsignificant results may be overlooked. This bias can influence the overall conclusions and generalizability of the study.

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