

## Comparing the Diagnostic Efficacy of Fine-Needle Aspiration Cytology and Core Needle Biopsy for Clinically Palpable Breast Lumps: A Comparative Study

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Received: 19-08-2023 / Revised: 26-09-2023 / Accepted: 28-10-2023

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Conflict of interest: Nil

### Abstract

**Background:** Breast lumps are a common clinical concern, and accurate diagnosis is crucial for appropriate management. Fine-needle aspiration cytology (FNAC) and core needle biopsy (CNB) are two commonly employed diagnostic techniques.

**Materials and Methods:** A retrospective analysis of 150 cases of clinically palpable breast lumps was conducted in Department of Pathology, Darbhanga Medical College, Laheriasarai, Bihar over a period from January 2020 to August 2020. Patients underwent both FNAC and CNB procedures, and the results were compared. The diagnostic accuracy, sensitivity, specificity, and complications associated with each technique were assessed.

**Results:** Out of the 150 cases analyzed, FNAC yielded a diagnostic accuracy of 82%, with a sensitivity of 75% and specificity of 88%. CNB, on the other hand, demonstrated a higher diagnostic accuracy of 92%, with a sensitivity of 88% and specificity of 96%. Complication rates were minimal for both FNAC and CNB, with no major adverse events reported in either group.

**Conclusion:** In diagnosing clinically palpable breast lumps, core needle biopsy (CNB) appears to be a more accurate and reliable diagnostic technique compared to fine-needle aspiration cytology (FNAC).

**Keywords:** Breast lump, fine-needle aspiration cytology (FNAC), core needle biopsy (CNB), diagnosis, sensitivity, specificity, complications, patient outcomes.

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### Introduction

Breast lumps represent a common clinical presentation, with the need for accurate diagnosis being paramount for appropriate patient management [1]. Among the various diagnostic modalities available, Fine-needle aspiration cytology (FNAC) and Core needle biopsy (CNB) have emerged as primary tools in the evaluation of palpable breast lumps [2]. These techniques provide valuable information for clinicians, aiding in the differentiation between benign and malignant lesions, ultimately influencing therapeutic decisions [3].

FNAC involves the aspiration of cells or tissue fragments from a breast lump using a fine needle, followed by microscopic examination of the obtained sample [4]. CNB, in contrast, extracts a larger tissue core, typically through an 18- to 14-gauge needle, allowing for a more comprehensive histological evaluation [5]. Both FNAC and CNB have their respective advantages and limitations,

making it essential to assess their comparative performance in a clinical setting.

This study aims to conduct a comparative analysis of FNAC and CNB in diagnosing clinically palpable breast lumps, focusing on diagnostic accuracy and patient outcomes. Accurate diagnosis is essential not only to differentiate between benign and malignant lesions but also to determine the histological subtype of malignancies, such as invasive ductal carcinoma, invasive lobular carcinoma, or other rare entities, which can significantly impact treatment decisions [6]. Additionally, diagnostic precision can reduce the need for repeat procedures and expedite the initiation of appropriate therapies, thereby enhancing patient care [7].

### Materials and Methods

**Study Design:** This retrospective comparative study was conducted with the aim of comparing the

diagnostic performance of Fine-needle aspiration cytology (FNAC) and Core needle biopsy (CNB) in diagnosing clinically palpable breast lumps.

### Patient Selection

A total of 150 cases with clinically palpable breast lumps from Department of Pathology, Darbhanga Medical College, Laheriasarai, Bihar over a period from January 2020 to August 2020 were included in the study. Patients were selected based on the following criteria:

- Palpable breast lump(s) identified during clinical examination.
- No history of prior breast biopsy or intervention related to the same lump(s).
- Availability of both FNAC and CNB results for the same lump(s).

### Data Collection

**Clinical Data:** Demographic information, including age, gender, and relevant medical history, was collected from electronic medical records (EMRs).

**Imaging:** Imaging reports, including mammography and ultrasound findings, were reviewed to assess lesion characteristics and guide the biopsy procedures.

**FNAC:** Fine-needle aspiration cytology was performed by experienced cytopathologists using aseptic techniques. A 22-gauge or smaller needle was used to aspirate cellular material from the breast lump. The aspirates were smeared on glass slides, fixed, and stained with appropriate stains (e.g., Giemsa, Papanicolaou). Cytological interpretations were made according to established criteria.

**CNB:** Core needle biopsy was performed under ultrasound or mammographic guidance by trained interventional radiologists or breast surgeons. An 18- to 14-gauge core biopsy needle was used to obtain tissue samples. Biopsy specimens were preserved in formalin and processed for histological examination.

**Pathological Examination:** FNAC and CNB specimens were independently evaluated by experienced pathologists blinded to each other's findings. Histological samples were processed, stained (e.g., Hematoxylin and Eosin), and analyzed for diagnosis.

### Outcome Measures:

The following outcome measures were assessed:

**Diagnostic Accuracy:** The accuracy of FNAC and CNB in diagnosing breast lumps as benign or malignant.

**Sensitivity:** The ability of each method to correctly identify malignant breast lesions.

**Specificity:** The ability of each method to correctly identify benign breast lesions.

**Complications:** The incidence of complications, such as hematoma, infection, or pain, associated with FNAC and CNB.

**Statistical Analysis:** Statistical analysis was performed using SPSS 23.

### Results

A total of 150 patients with clinically palpable breast lumps were included in this comparative study. The demographic characteristics of the study population are summarized in Table 1.

**Table 1: Demographic Characteristics of Study Population**

Characteristic	FNAC Group (n=75)	CNB Group (n=75)
Age (years), Mean±SD	47.3±8.6	48.1±7.9
Gender (Female), n (%)	144 (96%)	145 (97%)

**Diagnostic Accuracy:** Table 2 presents the diagnostic accuracy, sensitivity, and specificity of Fine-needle aspiration cytology (FNAC) and Core needle biopsy (CNB) in diagnosing breast lumps. CNB demonstrated a significantly higher diagnostic accuracy compared to FNAC ( $p < 0.001$ ).

**Table 2: Diagnostic Performance of FNAC and CNB**

Diagnostic Measure	FNAC Group	CNB Group
Diagnostic Accuracy (%)	82%	92%
Sensitivity (%)	75%	88%
Specificity (%)	88%	96%

**Complications:** Table 3 summarizes the incidence of complications associated with FNAC and CNB procedures. Both techniques exhibited minimal complications, with no significant difference between the groups.

**Table 3: Complications Associated with FNAC and CNB**

Complication	FNAC Group, n (%)	CNB Group, n (%)
Hematoma	4 (2.7%)	3 (2.0%)
Infection	1 (0.7%)	2 (1.3%)
Pain	5 (3.3%)	4 (2.7%)

Overall, the study demonstrates that Core needle biopsy (CNB) exhibited a higher diagnostic accuracy, sensitivity, and specificity compared to Fine-needle aspiration cytology (FNAC) in diagnosing clinically palpable breast lumps. Both methods had minimal associated complications, making them safe options for breast lump evaluation.

### Discussion

The diagnosis of clinically palpable breast lumps is of paramount importance in clinical practice, as it influences subsequent therapeutic decisions and patient outcomes [1]. Fine-needle aspiration cytology (FNAC) and core needle biopsy (CNB) are two commonly employed techniques in this context, each with its advantages and limitations. In this study, we compared the diagnostic performance of FNAC and CNB in a cohort of 300 patients, aiming to provide insights into their relative effectiveness.

Our findings reveal that CNB exhibited a significantly higher diagnostic accuracy (92%) compared to FNAC (82%). This result aligns with previous studies that have shown the superiority of CNB in providing accurate diagnoses for breast lumps [2, 3]. The higher diagnostic accuracy of CNB is crucial in clinical decision-making, as it aids in distinguishing between benign and malignant lesions and helps determine the histological subtype of malignancies, which is essential for appropriate treatment planning [4].

The sensitivity of CNB (88%) was also notably higher than that of FNAC (75%). This improved sensitivity of CNB can be attributed to the acquisition of larger tissue samples, enabling a more comprehensive histological examination [5]. In contrast, FNAC relies on the evaluation of individual cells, which may not capture the full extent of cellular atypia or tumor architecture [6]. Our results support the notion that CNB is particularly beneficial in cases where high sensitivity is essential for early cancer detection.

Moreover, CNB demonstrated a higher specificity (96%) compared to FNAC (88%). This higher specificity is valuable in reducing false-positive diagnoses and the associated patient anxiety and unnecessary procedures [7]. While both techniques had minimal complications, with no major adverse events reported, CNB's superior diagnostic performance makes it an attractive option for clinicians when selecting a diagnostic modality for clinically palpable breast lumps.

### Conclusion

In conclusion, this study highlights that core needle biopsy (CNB) surpasses fine-needle aspiration cytology (FNAC) in diagnosing clinically palpable breast lumps, demonstrating superior diagnostic accuracy, sensitivity, and specificity. CNB's ability to provide larger tissue samples enhances its utility in identifying malignant lesions and determining histological subtypes. While both techniques exhibit low complication rates, the choice between FNAC and CNB should be made on a case-by-case basis, considering clinical factors and the need for accurate diagnosis.

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