



THREE CLUES, ONE DIAGNOSIS: CONCORDANCE AND DIAGNOSTIC ACCURACY OF TRIPLE ASSESSMENT IN WOMEN WITH BREAST LUMPS

Breast Surgery

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ABSTRACT

Background: Triple assessment combines clinical examination, breast imaging, and cytological or core-needle sampling. Concordance between these components can improve diagnostic confidence in women presenting with a breast lump. **Objective:** To determine the diagnostic performance of each component of triple assessment and describe concordance with final histopathology. **Materials and Methods:** This prospective analytical study included 88 consecutive women older than 18 years who presented with a breast lump at a tertiary teaching hospital in Mathura. All underwent clinical assessment, ultrasonography and/or mammography classified by BI-RADS, and fine-needle aspiration cytology or core-needle biopsy. Final histopathology was the reference standard. Sensitivity, specificity, predictive values, accuracy, and concordance were summarized. **Results:** Histopathology identified 54 benign (61.36%) and 34 malignant (38.64%) lesions. Accuracy was 88.64% for clinical assessment, 88.64% for imaging, and 92.05% for cytology/core biopsy. Corresponding sensitivities were 82.35%, 79.41%, and 88.24%; specificities were 92.59%, 94.44%, and 94.44%. All components and histopathology were concordantly benign in 47 cases (53.41%) and concordantly malignant in 25 (28.41%). Sixteen cases (18.18%) were discordant; nine of these were malignant on final histopathology. Cytology/core biopsy had the highest reported AUC (0.913). **Conclusion:** Cytology/core biopsy was the most accurate individual component. Complete triple-assessment concordance occurred in 81.82% of cases, but the malignant outcomes among discordant cases support histological confirmation whenever findings disagree.

KEYWORDS

Breast Lump; Triple Assessment; Bi-rads; Fine-needle Aspiration Cytology

INTRODUCTION

Breast lumps are common in surgical practice and encompass benign disorders and malignancy. Prompt, structured evaluation is important because diagnostic delay can worsen outcomes, whereas indiscriminate biopsy increases cost, morbidity, and anxiety [1,2]. Triple assessment integrates clinical examination, imaging, and tissue sampling so that each modality tests a different aspect of the lesion [3,4].

When all three findings agree, diagnostic confidence is high; discordance requires further investigation rather than reassurance [4,5]. Imaging also provides standardized risk stratification through the Breast Imaging Reporting and Data System (BI-RADS), while cytology or core biopsy supplies cellular or architectural evidence [6,7]. This study evaluated the diagnostic performance of the three components and their concordance with final histopathology in women presenting with breast lumps.

Materials and Methods

This prospective analytical study was conducted in the Department of General Surgery, K.D. Medical College, Hospital & Research Center, Mathura. Consecutive women older than 18 years with a breast lump were enrolled until 88 evaluable participants were available. Women with clinically advanced breast disease, pregnancy or lactation, a disorder of sex development, loss to follow-up, or non-surgical treatment were excluded.

Each participant underwent standardized clinical breast and nodal examination. Ultrasonography and/or mammography was performed before invasive sampling and categorized using BI-RADS; BI-RADS 4 or 5 was considered positive for malignancy. Tissue assessment used fine-needle aspiration cytology and/or core-needle biopsy. Final histopathology served as the reference standard.

Data were analyzed using frequencies, percentages, and diagnostic-accuracy measures. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), accuracy, and area under the receiver-operating-characteristic curve (AUC) were summarized for the individual modalities. Complete concordance meant agreement among clinical assessment, imaging, tissue assessment, and final histopathology. Because patient-level binary triple-test predictions were not available for the discordant cases, a combined sensitivity and specificity for the triad were not recalculated.

The Institutional Ethics Committee of K.D. Medical College approved the study (KDMCHRC/IEC/2024/46; project reference KDMCHRC/PG/IEC/2024/19; dated October 10, 2024). Written informed consent was obtained, and patient confidentiality was maintained.

RESULTS

The mean age was 48.6 years. Twenty-nine women (32.95%) were older than 60 years and 24 (27.27%) were aged 51–60 years. Left- and right-sided lumps were nearly equal (45 vs. 43). Histopathology showed 54 benign lesions (61.36%) and 34 malignant lesions (38.64%). Parity was not associated with malignancy ($\chi^2 = 0.19$; $p = .66$).

Table 1. Diagnostic performance of individual triple-assessment components

Component	Sensitivity (%)	Specificity (%)	Accuracy (%)
Clinical assessment	82.35	92.59	88.64
Imaging (BI-RADS 4–5 positive)	79.41	94.44	88.64
FNAC/core-needle biopsy	88.24	94.44	92.05

Clinical assessment had a PPV of 87.50% and NPV of 89.29%. Imaging had a PPV of 90.00% and NPV of 87.93%. FNAC/core biopsy had a PPV of 90.91% and NPV of 92.73%, and its AUC was the highest at 0.913, compared with 0.875 for clinical assessment and 0.860 for imaging.

Table 2. Concordance of triple assessment with final histopathology

Concordance category	Cases (n)	Percentage	Final histopathology
Benign concordant	47	53.41	Benign
Malignant concordant	25	28.41	Malignant
Discordant	9	10.23	Malignant
Discordant	7	7.95	Benign

Overall, 72/88 cases (81.82%) were fully concordant and 16/88 (18.18%) were discordant. More than half of the cohort had concordantly benign findings; however, nine discordant cases were malignant on final histopathology.

DISCUSSION

This study found that each component of triple assessment had good diagnostic performance, with cytology/core biopsy producing the highest accuracy and AUC. These results support the complementary structure of triple assessment: clinical examination guides initial suspicion, BI-RADS imaging stratifies risk and lesion characteristics, and tissue sampling provides pathological evidence [3,6,7]. Comparable studies have reported high accuracy when clinical, imaging, and cytological findings are assessed together [8,9].

The most clinically important finding was not simply the 81.82%

overall concordance, but the composition of the discordant group. Nine of 16 discordant cases were malignant at final histopathology. A benign result from one modality therefore should not override suspicious findings from another. Published work similarly emphasizes additional tissue diagnosis when triple-assessment results disagree [4,5].

Complete benign concordance occurred in 47 women. In an appropriately selected setting, this pattern may reduce repeat imaging and unnecessary invasive procedures, improving patient experience and resource use [3,4]. Nevertheless, the present study was not designed to establish a no-biopsy pathway, and histopathology remained the reference standard. Any conservative pathway should include standardized reporting, safety-net follow-up, and prompt biopsy for discordance.

Strengths include prospective consecutive enrollment, standardized BI-RADS classification, use of tissue diagnosis, and final histopathological verification. Limitations include the single-center design, modest sample, incomplete reporting of the study period and confidence intervals, and use of FNAC and core biopsy within one analytical category. Patient-level binary predictions for the discordant triad were unavailable; consequently, defensible combined sensitivity and specificity could not be calculated from the reported dataset. Larger multicenter studies should prespecify how a composite triple-test result is classified and report 95% confidence intervals.

CONCLUSION

Cytology/core-needle biopsy was the most accurate individual component of triple assessment. Four-fifths of cases were fully concordant, but more than half of the discordant cases proved malignant. Concordant findings can streamline care; discordant findings require histological resolution.

Declarations

Ethical approval: Institutional Ethics Committee, K.D. Medical College, Hospital & Research Center (KDMCHRC/IEC/2024/46; project KDMCHRC/PG/IEC/2024/19; October 10, 2024).

Informed consent: Written informed consent was obtained from all participants.

Conflict of interest: Not reported in the source dissertation; the author should confirm before submission.

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