Original Article

Histopathological correlation of breast lump with the mammographic and cytological findings

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ABSTRACT

Background: Palpable breast lump is a common clinical presentation, and about 10% of them turn out to be breast cancer. The triple diagnostic approach - clinical examination, mammography, and cytology assists in diagnosing and determining the need for histopathological confirmation. The present study aims to compare mammography and cytology against the histopathological diagnosis to determine the sensitivity, specificity, negative predictive value, positive predictive value, and diagnostic accuracy of both techniques.

Materials and Methods: This cross-sectional study, done from February 2023 to November 2024 included 50 patients presenting with a breast lump who underwent mammography, FNAC, and histopathological examination of the lump. Data were analyzed using SPSS software ver.20, employing both descriptive and inferential statistics.

Results: Out of 50 cases, 70% (35) were benign and 30% (15) were malignant. Fibroadenoma was the most common benign lesion 40% (20/50), while invasive ductal carcinoma was the most common malignant lesion 20% (10/50). Three-fourths of the benign cases occurred in patients under 45 years, while two-thirds of the malignant cases were in patients over 45. Mammography showed 60% sensitivity, 82.86% specificity, 60% positive predictive value, 82.86% negative predictive value, and diagnostic accuracy of 76%. FNAC showed 73.33% sensitivity, 97.14% specificity, 91.67% positive predictive value, 89.47% negative predictive value and diagnostic accuracy of 90%.

Conclusions: Mammography and FNAC, when used together, supplement histopathological examination. FNAC offers higher accuracy than mammography and closely approximates histopathology in diagnosing breast lesions.

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INTRODUCTION

The breast is an apocrine gland comprising glandular and stromal tissue that undergoes a variety of physiological changes under the hormonal influence throughout reproductive age.[1] Palpable breast lump is a common clinical presentation that needs appropriate evaluation since approximately 10% of breast lumps are diagnosed as breast cancer. The different breast lesions are inflammatory disorders (fat necrosis, ductal ectasia, acute mastitis, squamous metaplasia of lactiferous ducts), benign epithelial lesions (gynaecomastia, non-proliferative breast changes,

proliferative breast disease with or without atypia), carcinoma in-situ (ductal carcinoma in-situ (DCIS), lobular carcinoma in-situ (LCIS) and carcinoma of the breast (invasive carcinoma, male breast cancer).[2]

Early detection and treatment remain the mainstay for prevention as well as reduction of breast cancer-related mortality.[3] Triple diagnostic technique is an integrated approach that comprises clinical examination, mammography, and cytological examination that determines the diagnosis and assessment for the need of histopathological examination. Mammography, which is a primary imaging modality for breast cancer screening, helps in the early detection of lesions as it can identify breast cancers that are too small to be palpable during physical examination and is beneficial in diagnosing even noninvasive lesions. Mammographic screening reduces the risk of breast cancer mortality significantly.[4] FNAC has been established as a reliable tool for preoperative diagnosis of breast lesions without surgical intervention. In addition to cost-effectiveness and high diagnostic accuracy, it has other advantages such as minimal invasiveness and discomfort, suitability as an outpatient procedure, minimal complications, and rapidity of results.[5] Though a degree of diagnosis is possible with imaging and cytological studies, histopathological study is essential for confirmation and categorization and has been the gold standard for definite diagnosis.

This study aimed to describe and compare cytological and mammographic findings in various breast lesions against histopathological diagnosis to calculate the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy of each technique.

MATERIALS AND METHODS

The present study was carried out from February 2023 to November 2024 in the Pathology department of Nobel Medical College Teaching Hospital, Biratnagar, Nepal. Ethical clearance was taken from the institutional review committee. Informed expressed consent was taken from each participant before enrollment of their clinical data for study purposes.

50 patients presenting with breast lump who were subjected to mammography, cytology, and histopathology were included in the study. The mammographic "Breast Imaging Reporting and Data System" (BI-RADS) score was noted from mammography reports. Cases categorized under BI-RADS Stage I (Negative in routine screening) were excluded. FNAC was performed and reported into five categories as per "United Kingdom National Health Service Breast Screening Program" (UK-NHSBSP) guidelines, further elaborated by their cyto-morphologic diagnosis. Cases falling under C1 (Inadequate for diagnosis) were excluded. For histopathological examination, the received mastectomy

and excisional biopsy specimens were processed and stained with Hematoxylin and Eosin as per standard protocol. The microscopic slides thus obtained were examined under a microscope and histopathological findings were noted. Details of history and examination findings were recorded in standard case proforma.

Essential data were entered and analyzed using Statistical Package for Social Science (SPSS) software Ver. 20 The histopathological diagnoses were correlated with mammographic and cytological diagnoses for evaluation of sensitivity, specificity, PPV, NPV, and diagnostic accuracy.

RESULTS

In the present study, the maximum number of patients were of the age group 15-24 years [28% (14/50)] followed by 25-34 years [20% (10/50)]. 6% (3/50) of the patients were over 65 years of age. 22% (11/50) out of 30% (15/50) of malignancies occurred in patients over 45 years of age. Whereas 56% (28/50) out of 70% (35/50) of benign cases occurred in patients below 45 years of age. The mammographic and cytological staging of cases is presented in Table 1.

Table 1: Staging based on Mammography (BI-RADS) and Cytology (UK-NHSBSP)

Mammography (BI-RADS)			Cytology (UK-NHSBSP)		
Staging	N=50	%	Staging	N=50	%
I (Negative)	0	0	C1 (Inadequate)	0	0
II (Benign)	31	62	C2 (Benign)	18	36
III (Probably benign)	4	8	C3 (Atypia probably benign)	20	10
IV (Suspicious of malignancy)	10	20	C4 (Suspicious of malignancy)	9	18
V (Highly suggestive of malignancy)	5	10	C5 (Malignant)	3	6

Out of 70% (35/50) cases diagnosed as benign by mammography, 12% (6/50) were found to be malignant on histopathology, and out of 30% (15/50) cases diagnosed as malignant by mammography, 12% (6/50) were found to be benign on histopathology (Table 2).

Table 2: Comparison of mammographic and histopathological diagnosis

Mammographic diagnosis (n=50)	Histopathological diagnosis	
	Benign (35)	Malignant (15)
Benign (35)	True negative (29)	False negative (6)
Malignant (15)	False positive (6)	True positive (9)

Fibroadenoma was the commonest benign cytological diagnosis [42% (21/50)], followed by fibrocystic changes [14% (7/50)]. Others were chronic mastitis [4% (2/50)], ductal ectasia [2% (1/50)], tubular adenoma [2% (1/50)], lactating adenoma [4% (2/50)], ductal hyperplasia without atypia [4% (2/50)], benign phyllodes [2% (1/50)] and intraductal papilloma [2% (1/50)]. Nine cases (18%) were suspicious of malignancy and 6% (3/50) were diagnosed as malignant. Out of 76%(38/50) cases diagnosed benign by cytology, 8%(4/50) were found to be malignant on histopathology, and out of 24% (12/50) cases diagnosed malignant by cytology 2% (1/50) were found to be benign on histopathology (Table 3).

Table 3: Comparison of Cytological and Histopathological diagnosis

Cytological diagnosis (n=50)	Histopathological diagnosis	
	Benign (35)	Malignant (15)
Benign (38)	True negative (34)	False negative (4)
Suspicious for malignancy/ Malignant (12)	False positive (1)	True positive (11)

On histopathological evaluation, out of 50 cases, 70% (35) cases were benign and 30% (15) cases were malignant. Most common benign histopathological diagnosis was Fibroadenoma 40% (20/50) followed by Fibrocystic changes 16% (8/50). Others included breast abscess 8% (4/50), benign phylloides 4% (2/50) and ductal carcinoma in situ 2% (1/50). Similarly, invasive ductal carcinoma 20% (10/50), medullary carcinoma 4% (2/50), malignant phylloides 4% (2/50) and mucinous carcinoma 2% (1/50) were diagnosed malignant by histopathology. Cytology was found to be more accurate in diagnosing breast lesions compared to mammography when compared against histopathological findings (Table 4).

Table 4: Diagnostic correlation of mammography and cytology compared to histopathology

	Mammography	Cytology
Sensitivity (Sn)	60%	73.33%
Specificity (Sp)	82.86%	97.14%
Positive Predictive Value (PPV)	60%	91.67%
Negative Predictive Value (NPV)	82.86%	89.47%
Diagnostic Accuracy (DA)	76%	90%

DISCUSSION

Breast lump is one of the most common lesions encountered in the gynecology and surgical OPD. In the present study, the incidence of benign lesions 70% (35/50) was found to be higher than malignant lesions 30% (15/50). Similar findings are seen in other studies.[6-8] As the diagnostic tool

for breast lumps, the combination of all three modalities comprising cytological examination (FNAC), radio imaging (mammography), and histopathological examination is used. The triple assessment is considered positive if any single test, among all three tests, is positive, and negative is when all three tests are negative.[9-13] In the present study, among the benign lesions, fibroadenoma 40% (20/50) was the commonest lesion followed by fibrocystic changes 16% (8/50), both by cytological and histopathological examinations. A similar result was seen in the study done by UR Rehman et al. Among the malignant breast lesions, invasive ductal carcinoma 20%(10/50) was found to be the most common malignant lesion. Similar findings were noted by Bane AL et al. [14,15]

Mammography is a cost-effective diagnostic modality that is widely used for screening for breast cancer. Mammographic evaluation is a very sensitive and highly specific diagnostic tool for breast lesions. It has 0-6 categories as per BI-RADS.[16] However, mammography also has its pitfalls. In the present study, 30% (15/30) of cases were reported as BIRAD's category IV and V, among which only 18% (9/50) cases were found to be malignant in histopathology. The remaining 12% (6/50) cases were false positives. The present study revealed that mammography has a sensitivity of 60% and specificity of 82.86%, which were lower than the sensitivity (88.89%) and specificity (95.53%) obtained by Gurung G et al.[17]

In the present study, 8% (4/50) of cases reported benign on cytology turned out to be false negative. The cases reported as fibrocystic changes in cytology were diagnosed as invasive ductal carcinoma Grade- II in histopathological examination. One case reported as benign intraductal papilloma in cytology was diagnosed as ductal carcinoma in-situ. This is the major pitfall in cytopathology, which can be due to inadequate sampling or can be due to the non-targeted FNAC. The USG-guided targeted FNAC can be helpful for such lesions that may get missed during blinded FNAC. In this study, the sensitivity and specificity of cytology were 73.33% and 97.14% respectively, which was comparable to the findings of Martelli G et al who found a sensitivity of 68% and specificity of 97%.[18]

The present study revealed sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy to be higher with cytology than mammography when compared to histopathology as a standard technique. Similar findings were noted by Mulka A. et al and Stephen B. et al who showed cytology to be a superior technique for the diagnosis of breast lesions compared to mammography. Similarly, a high diagnostic accuracy of FNAC was reported by Pandey DA. et al and Shanmugasamy K. et al.[19-22]

CONCLUSION

Histopathology is still the gold standard for diagnosis of breast lesions. Mammography and FNAC can be

used as supplementary techniques in combination to histopathological examination. However, FNAC may be preferred over mammography as an isolated technique for provisional diagnosis in palpable breast lesions, as it shows much higher accuracy than mammography and near accuracy to histopathology in diagnosing breast lesions.

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