

Role of Mammography and Ultrasound in the Evaluation of Palpable Breast Masses with Histopathological Correlation

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A B S T R A C T

Introduction: Breast cancer is most common cause of cancer death in women and overall fifth common cause of cancer deaths in the world.¹ In India, breast cancer is the second most common cancer in women, next to cervical cancer. Early detection of breast cancer reduces the morbidity and mortality rate. Present study was designed to evaluate the role of mammography and sonography independently and combinedly in diagnosing palpable breast mass lesions with histopathological correlation.

Material and Methods: 50 patients aged 30 and above with palpable abnormalities of breast underwent combined mammographic and sonographic evaluation.

Results: In this study 52 breast masses from 50 patients were evaluated with USG and Mammography and the incidence of malignancy was 22%. 10 cases were diagnosed as malignant after a combined mammographic and sonographic evaluation and only one case was missed. 33 of the 50 cases were categorized as benign after a combined mammographic and sonographic evaluation, only one fibrocystic case not detected on mammogram and ultrasound was diagnosed with HPE. The combined evaluation have sensitivity 95.7% and specificity is 102%. The positive predictive value of this test is 100% and negative predictive value 60%. This data clearly shows the value of imaging in avoiding unnecessary biopsies.

Conclusion: we can conclude that combined sonography and mammography can appropriately characterize the breast lesion and unnecessary intervention can be avoided.

Keywords: Breast Mass; Mammography; Palpable Lumps; Sonography; Biopsy.

INTRODUCTION

Breast cancer is most common cause of cancer death in women and overall fifth common cause of cancer deaths in the world.¹ In India, breast cancer is the second most common cancer in women, next to cervical cancer. Early detection of breast cancer reduces the morbidity and mortality rate. Triple assessment of breast mass include clinical examination, imaging and FNAC are the establish management protocol of palpable mass.²

Mammography is the widely accepted modality used for breast cancer screening in clinically suspected lesion.³ The adjunctive modality to mammography is high resolution Ultra Sonography (USG) which helps in characterizing a mammographically undetected palpable breast abnormality especially in dense breast. Imaging can provide definitive diagnosis, but for confirmation of diagnosis histopathology and cytology is essential. The present study was designed to compare the accuracy of Mammography and ultrasonography in the evaluation of palpable breast masses with histopathological correlation.

MATERIAL AND METHODS

In present prospective study we have included fifty patients above 30yrs of age who has palpable mass in breast and underwent mammography and USG in the department of Radio-diagnosis, KIMS and RF, Amalapuram during November 2017 to October 2018. All patients underwent diagnostic mammography, which included cranio-caudal and medio-lateral oblique views. Later all the patients were subjected to sonography of breast.

Mammography was performed by using Allengers Mammography Venus Adv model equipment in two views(i.e., cranio-caudal and medio-lateral oblique views) are used and other views and high kVp and low mAs exposures vary with the thickness of the breasts with minimum kVp 23.0 to max kVp 26.0.

Ultrasonography was performed by using Philips Ultrasound clear vue 650, using High frequency 4 - 12 MHz probe and Philips clear vue 350 using high frequency 4- 12 MHz probe. Evaluation of radiographic characteristics of mass was carried out using BI-RADS criteria and nature of mass was

evaluated with USG and Mammography assessment. Ultrasound machine with colour Doppler was used to determine the following sonographic findings under the following headings:

Location-Superior / inferior / medial / lateral quadrant,

Margins – Regular / Irregular,

Width /A.P diameter ratio: >1.4 / < 1.4,

Echotexture: Homogeneous / Heterogeneous,

Echogenicity: Hyperechoic/ Hypoechoic, Mixed echogenic / Anechoic,

Posterior sound transmission: Enhancement / shadowing, Calcification, Pseudocapsule, Vascularity and Axillary Lymphadenopathy

We used mammography to determine location, appearance, Margins, density, architectural distortion and lymphadenopathy. Result was coordinated with history and physical examination of the patients. All the finding which arouses suspicion about the lesion and possibility of malignancy were evaluated.

Inclusion criteria

All women who were suspected to have palpable breast mass

S No	Pathology	Number of patients(%)
1	Fibroadenomas	16(32)
2	Simple Cyst	5(10)
3	Galactocele	2(4)
4	Duct Ectasia	2(4)
5	Breast Abscess	1(2)
6	Fat necrosis	1(2)
7	Fibrocystic disease	8(16)
8	Breast malignancy	11(22)

Table-1: Distribution of breast pathologies:

either on self-examination or on clinician examination and evaluated with Mammography and Ultrasonography of the breast with subsequent biopsy/FNAC were included.

Exclusion criteria

Pregnant women 2. Women with breast implants 3. Patients already undergone surgery or received radiotherapy.

STATISTICAL ANALYSIS

All the statistical analysis were done with IBM SPSS statistical software package (version 20.0, SPSS Inc., Chicago, IL, USA). Descriptive data was presented in the form of mean +/- standard deviation for continuous variables and as percentages for categorical variables. The sensitivity, specificity, positive predictive value and negative predictive value for the detection of breast lesions by mammography and ultrasonography of the breast were calculated. Chi-square test was used to compare the sensitivity and specificity of mammography and ultrasonography of the breast in the evaluation of breast lesions. P value less than 0.05 was considered to indicate statistical significance.

RESULTS

In this study total 50 patients complaining of breast mass in one or both breasts were examined clinically and evaluated with USG and Mammography. The lesions were confirmed on histopathology (FNAC/biopsy/tissue from post-operative specimens).

The palpable breast masses were reported in the right breast in 22 patients, in the left breast in 26 patients and bilateral in the remaining 2 patients. Patients in this study ranged in age from 31 to 75 yrs. Majority of patients were in the age group of 30-39 yrs.

As per table 1 in 45 of the 50 cases, imaging evaluation resulted in a recommendation for surgical consultation based on a

BI-RADS categories	Total(n=50)	Histopathologydiagnosis(n=47)		
		Benign	Malignant	Normal
Category 0	1	0	0	1
Category 1: Negative	5	1	1	-
Category 2: Benign	33	33	0	-
Category 3: Probably benign	1	1	0	-
Category 4: Suspicious	2	0	2	-
Category 5:Highly suggestive of malignancy	8	0	8	-
Category 6: Known biopsy-proven malignancy	-	-	-	-

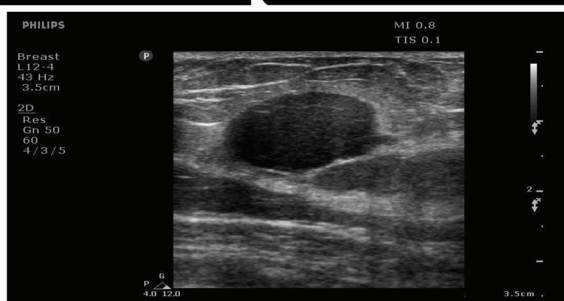
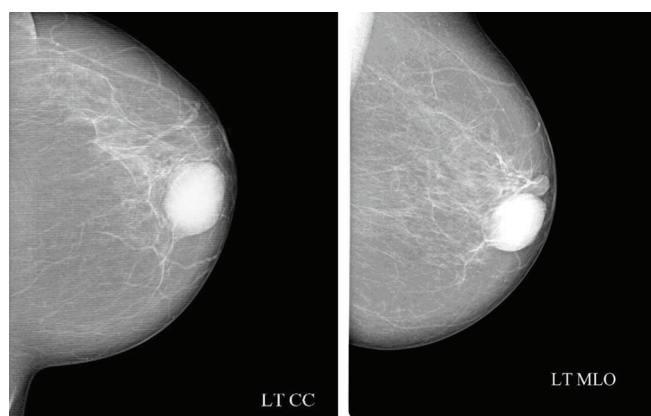
Table-2: Mammographic BIRADS Vs Histopathology correlation

HPE diagnosis (n)	Mammography Alone	USG Alone	Combined(Mam raphy+USG) mog
Fibroadenomas(16)	13	10	16
Simple Cyst (5)	2	5	5
Galactocele(2)	2	2	2
Duct Ectasia (2)	Inconclusive in 2 cases	2	2
Breast Abscess (1)	inconclusive	1	1
Fat necrosis(1)	1	Inconclusive	1
Fibrocystic disease(8)	6	7	7
Breast malignancy (11)	8	6	10
Normal glandular tissue(1)	inconclusive	Inconclusive	Inconclusive

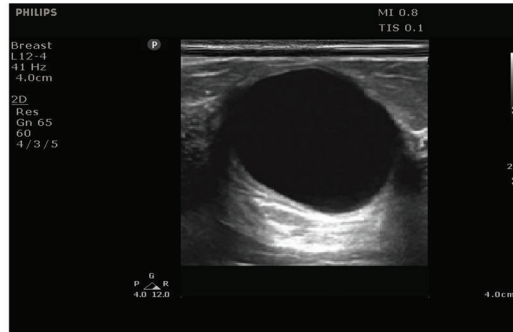
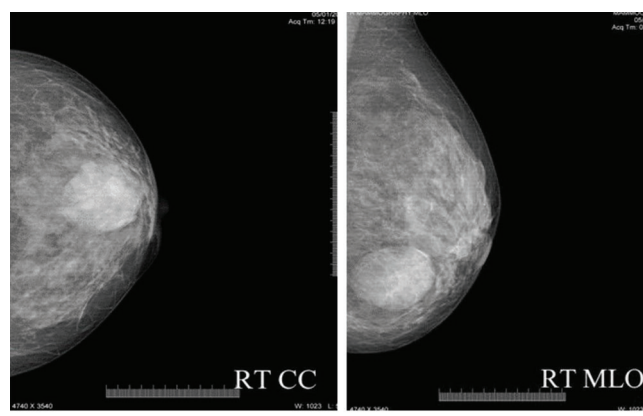
Table-3: HPE findings with comparative analysis

Modality	Sensitivity	Specificity	Positive Predictive value	Negative P redictive	Accuracy
Mammography	68.0%	100.0%	100.0%	16.6%	70%
USG	70.2%	100.0%	100.0%	17.6%	72%
Mammography+USG	95.7%	100.0%	100.0%	60.0%	96%

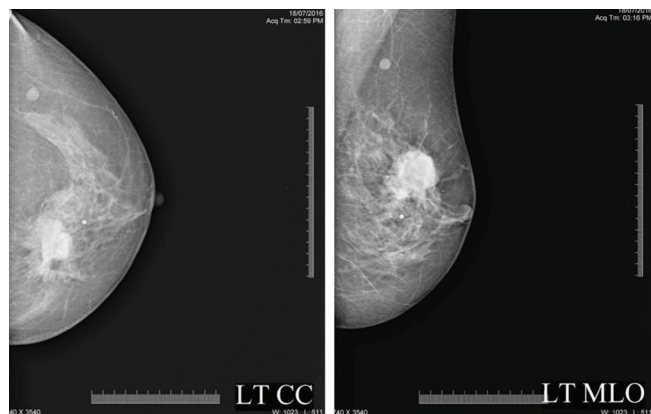
Table-4: Diagnostic accuracy of Mammography, USG and USG + Mammography



Case-1: Fibroadenoma



Case-3: Simple Cyst



Case-2: Invasive Ductal Carcinoma

combination of mammographic and sonographic features. Two more patients were also recommended for surgical consultation despite negative imaging findings because of

high degree of clinical suspicion. All of these underwent biopsy (biopsy/tissue from post-operative specimens/aspiration). Of these 47 patients 11 were malignant and remaining were as described in table-1. Among 2 patients with negative imaging findings one had histological diagnosis of fibrocystic disease and another had malignancy. There were 5 cases of cysts, which was clearly detected by USG, but Mammography picked up only 2. Out of the 8 fibrocystic cases, Mammography alone picked 6 whereas the USG missed only 1 case. Among 2 cases of galactocele Mammography findings were inconclusive, whereas the USG correctly detected both cases. Out of 16 cases of fibroadenoma, Mammography detected 13 and USG detected 10. By the combined USG and Mammography approach all 16 cases were correctly diagnosed. The HPE reports revealed 11 patients with a carcinoma. Out of 11 malignancies USG alone detected only 6, Mammography alone picked 8 and when combined picked up 2 more cases but none picked up one case that was identified with HPE alone done in view of high clinical suspicion (table-3). Sensitivity, specificity were derived for USG and Mammography individually and also combined. Overall, the histopathological results when correlated with each modality findings, revealed that Mammography had a sensitivity of 68.0% and USG 70.2% when used alone in detecting these lesions of the breast compared to a sensitivity of 95.7% obtained by their combined approach (table-4).

In this study there was no significant difference in sensitivity between mammography and USG in detecting breast disease ($p = 0.98$). But there was a significant difference when mammography and Ultrasonography were done independently compared to combination of mammography and USG ($p=0.022$).

A histopathologically diagnosed case of Fibroadenoma in a 40 yr old patient came with palpable mass in the left breast, mammography 1A)CC and 1B)MLO views shows scattered fibroglandular dense breast with a high density oval shaped mass with circumscribed margins in medial quadrant, corresponding ultrasound 1C) image shows oval shaped well defined hypoechoic lesion with increased vascularity, oriented parallel to skin, features suggestive of BIRADS II a benign lesion (figure-1). A histopathology proven case of Invasive Ductal Carcinoma in a 50 Y old patient, mammography 6A) CC and 6B)LO views shows a fibro glandular breast predominantly fatty with a dense irregular lesion with spiculated margins in the upper outer quadrant associated with few segmental micro calcifications BIRADS V and ultrasound image shows an irregular hypoechoic lesion with indistinct margins with posterior acoustic shadowing, suggestive of malignant lesion (figure-2). A histopathologically diagnosed case of Simple Cyst in a 38 yr old female patient came with palpable mass and tenderness in right breast, mammography 2A) CC and 2B)MLO Views shows a dense fibroglandular breast with a well defined round, dense lesion in lower inner quadrant, corresponding ultrasound 2C) image shows a circumscribed, round, anechoic lesion with posterior acoustic enhancement oriented parallel to skin, suggestive of BIRADS II a benign lesion (figure-3).

DISCUSSION

Breast cancer is a common malignancy in developing world and consciousness about it is essential for early detection and cure.

The gold standard for evaluation for breast cancer is mammography⁴ when it is combined with USG the sensitivity rate used to become high.⁵ It has been reported that only 4% of palpable breast lesion are malignant.^{7,8} Mammography can establish the benign cause of palpable lesion and avoid further investigation. But false negativity in case of mammography was represent to be 16.5%.⁹ When it is used with USG the false negativity rate used to reduce to 0 to 2.6%^{10,11}

In present study 66% patients with palpable breast mass were benign, 20% patients have malignant feature, 4% patient are clinically suspicious but have negative imaging study. They went for biopsy and out of that 11 were management and 1 were found to be benign.

Morris KT et al has stated that Triple test that is physical examination, radiography and pathology have diagnostic accuracy of 100%.^{12,13} We have observed that out of 50 patients 33 were benign lesions. Out of that 13 were benign solid and 20 were cystic, 16 cases were fibro adenoma. In our study combined mammography and USG are more sensitive in diagnosis fibro adenoma This finding is supported by the work of Lister D et al and Moss et al.^{14,15}

Kolb Tm et al in 1998 has also found that combining USG as additional major with mammography increases the cancer detection rate.¹⁶

We have observed that sensitivity and specificity of combined approach was 95.7% and 100% respectively. The positive predictive value was 100% and the negative predictive value was 60% with palpable breast mass. Observation of various author are tabled below.

	Sensitivity	Specificity
Moss et al (12)	94.2%	67.9%
Shefty pk et al (17)	100%	80.1%
Barlow et al (18)	88%	22%

These finding support our study.

CONCLUSION

Combined mammography and sonography approach plays an important role in the management of palpable breast lesions. They aid in Characterization of the palpable breast lesions. Avoids unnecessary interventions in which imaging findings are unequivocally benign. Negative findings on combined mammographic and sonographic imaging have very high specificity and are reassuring to the patient.

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