



Mammographic and Ultrasonographic Evaluation of Palpable Abnormalities of the Breast

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ABSTRACT

Introduction: The mammography (MG) and ultrasonography (USG) are individually effective diagnostic modalities for palpable abnormalities of the breast. This study was carried out with a aim to evaluate breast lesions using mammography and ultrasonography independently and in combination with FNAC correlation.

Methods: This cross sectional hospital based study was carried out at department of Radio diagnosis in a tertiary care hospital of West Bengal. Study participants were all women with palpable and non palpable breast lesions detected on clinical examination/self breast examination and referred for mammography and women in high risk groups

Results: The sensitivity, specificity, positive predictive value (PPV) & negative predictive value (NPV) of mammography in detecting carcinoma breast were 77.8%, 97.7%, 87.5% and 95.6% respectively. The sensitivity, specificity, PPV & NPV of USG in detecting carcinoma breast were 55.6%, 97.7%, 83.3% and 91.5% respectively. In our study population 83.0% breast lesion were benign and out of them 77.27% were diagnosed by mammography alone and 72.7% were diagnosed by USG alone. When these modalities were combined, 97.7% of the lesions were diagnosed.

Conclusion: This study confirms mammography and ultrasonography when combined have significantly higher sensitivity and negative predictive value in detecting the palpable abnormalities of the breast.

Key Words: Mammography, Ultrasonography, Palpable abnormalities of the breast.

INTRODUCTION

Of the various pathologies that afflict the breast, cancers are most often encountered and are the most dreaded.^{1,2} Breast cancer is the second most common cancer in Indian women.^{3,4} Screening and diagnostic efforts for breast cancer are critical because the disease has a high rate of successful outcomes with early identification and treatment.⁵ Today's medical radiographers performed several studies of the breast including mammography (MG), ultrasonography /ultrasound (USG), magnetic resonance imaging (MRI), and dedicated nuclear isotope scans. Mammography is the most commonly used imaging method and is the only currently known means of proven effectiveness es-

pecially in patients with non palpable carcinoma.^{6,7} The US Preventive Services Task Force analysis of seven randomized trials of mammographic screening found that the point estimate of the reduction in mortality from screening mammography was 22% in women aged 50 years or older and 15% among women between 40 and 49 years.⁸ This is because breast changes like asymmetry, neodensity, distortion of fibro glandular architecture and micro calcifications are picked up earlier than lesions that become clinically palpable, or are sometimes detected by self-examination.^{9, 10} In patients with palpable breast lesions and in patients younger than 50 years of age the diagnostic gain from mammography is less marked due to a low

positive predictive value and a limited sensitivity in dense breast tissue.^{7,11} USG plays a key role in differentiating cystic and solid masses. It is useful in the evaluation of palpable masses not visible in radiographically dense breasts, abscesses, masses that are not completely evaluable with MG and in young patients susceptible to radiation damage.^{10,12} Both MG and USG methods have been used in attempts to reduce the negative to positive biopsy ratio. This cross-sectional hospital based study was carried out with aim to evaluate breast lesions using digital mammography (MG) and ultrasonography (USG) independently and in combination with FNAC correlation.

MATERIALS AND METHODS

This cross sectional hospital based study was carried out at department of Radio diagnosis in a tertiary care hospital of West Bengal from July 2012 to July 2013. Study participants were all women with palpable and non palpable breast lesions detected on clinical examination/self breast examination and referred for mammography and women in high risk groups (family history of breast cancer, previous history of breast cancer and disease like fibrocystic disease, excessive exposure to ionising radiation and history of endometrial, ovarian or colonic carcinoma. Ulcerated and fungating breast growth were excluded because mammography is not possible. Pregnant women, moribund patients and proven cases of malignancy and male patients were also excluded from study. Total 53 patients were studied. Study tools were mammography machine (Digital Mammography Novation DR. SIEMENS) and USG machine (WIPRO G E Health care Ultrasound LOGIC -P5). Mammography was performed in a stand type Siemens Novation which is a radiographic stand to radiograph the subject in a standing or sitting position in combination with mammographic x-ray tube assembly with compression paddle. Mediolateral oblique and cranio-caudal images were obtained and assessed carefully. USG was performed on a Logic P-5 (GE), real time scanner with a hand held linear electronic array transducer. The transducer could be operated in the frequency range of 7.5 MHz. Parameters studied were (a) On mammography the

site of the lesion, margin of the lesion, surrounding halo, clustered micro calcification, surrounding parenchymal distortion and thickening of the skin. (b) On USG the size, shape, margins, echo texture, homogeneity of internal echoes, lateral shadowing, posterior effect, calcification, infiltration across tissue space and surrounding fat were studied. Data were collected and statistically analyzed and suitable test of significance was applied.

RESULT

The study included 53 females out of which 45 were from Hindu religion, 5 from Muslim and 3 from Christian religion. Among the patients 25 patients complains of mobile breast lump, 12 patients suffered from breast pain , 5 patients felt lump , nipple discharge in 3 patients and nipple retraction & lump with fever was the complains of two patients each. Among the diagnosed cases of the carcinoma breast age of one patient is between 30-40 yrs, three patients are within 41-50 year group, two patients are between 51-60 year group and three patients belong to 61 and above group.

Among the 53 patients, mammography individually detected 8 lesions and missed 2 lesions of carcinoma breast, which were subsequently detected in USG and confirmed in FNAC. One of the 8 patients detected for suspicious lesions in mammography, subsequently proved benign in USG and FNAC (Table 1). The sensitivity, specificity, Positive predictive value (PPV) & Negative Predictive value (NPV) of mammography in detecting Ca breast are 77.77%, 97.72%, 87.5% and 95.55% respectively (Table 2) . USG independently detected 6 patients as suspicious of breast carcinoma and missed 4 lesions, which were subsequently proved as carcinoma. USG falsely detected one patient as suspicious lesion, which proved benign in other studies. The sensitivity, specificity, PPV& NPV of USG in detecting Ca breast are 55.55%, 97.72%, 83.33% and 91.48% respectively (Table 3). Two malignant lesions which were occult in mammography due to dense breast parenchyma and were detected in USG. The four cases of carcinoma breast which could not be picked up in USG were diagnosed by mammography.

Table 1: Comparative analysis of mammography, USG and combined study in detection of different breast lesions

	Cytology (%)	Mammography Alone (%)	USG Alone (%)	Combined (%)
Fibrocystic disease	22(41.5)	18(34.0)	21(39.6)	22 (41.5)
Infection	2(3.7)	1(1.9)	2(3.7)	2(3.7)
Fibroadenoma	16(30.2)	12(22.6)	5(9.4)	15(28.3)
Cyst	3(5.7)	2(3.7)	3(5.7)	3(5.7)
Carcinoma	9(17.0)	8(15.1)	6 (11.3)	9(17.0)
Lipoma	1(1.9)	1(1.9)	1(1.9)	1(1.9)
Total	53(100)	42(79)	38(72)	52(98)

Table 2: Analysis of results of mammography diagnosing benign and malignant lesions

Mammography	FNAC proven-Carcinoma	FNAC proven-No carcinoma
Carcinoma	7	1
No carcinoma	2	43
Total	9	44

Sensitivity of mammography detecting carcinoma=77.77
 Specificity of mammography detecting carcinoma=97.72
 Positive predictive value =87.5
 Negative predictive value=95.55

Table 3: Analysis of results of USG diagnosing benign and malignant lesions

USG	FNAC proven-Carcinoma	FNAC proven -No carcinoma
Carcinoma	5	1
No carcinoma	4	43
Total	9	44

Sensitivity of detecting USG carcinoma=55.55
 Specificity of USG detecting carcinoma=97.72
 Positive predictive value =83.33
 Negative predictive value=91.48

Table 4: Correlation between the findings of mammography, ultrasonography (USG) and combined approach (mammography and USG) with FNAC findings

FNAC	Mammography	USG	Mammography + USG
Correlation coefficient	0.792	0.631	0.884
P Value	<0.01	<0.01	<0.01

Correlation coefficient and P Values are obtained by Spearman's rho test

In 22 FNAC proven cases of fibrocystic diseases, mammography alone detected 18 cases and USG detected 21 cases. Combined approach detected all the cases correctly. In 16 FNAC proven cases of fibroadenomas, mammography alone detected 12 cases, USG detected 5 cases and combined approach detected 15 cases. Out of 3 benign cysts, mammography detected 2 cases, however USG detected all correctly. In 2 cases of infective pathology, mammography detected one case correctly and one case as suspicious (false positive); however USG correctly diagnose those 2 cases. In our study population 83.01% breast lesion were benign and out of them 77.27% were diagnosed by mammography alone and 72.72% were diagnosed by USG alone. When these modalities were combined, 97.72% of the lesions were diagnosed.

Correlation between the findings of mammography, ultrasonography (USG) and combined approach (mammography and USG) with FNAC

findings has been shown in table4. The correlation coefficients of mammography alone (0.792), USG alone (0.631) and mammography and USG combination (0.884) with FNAC are all positive, and P values are significant (<0.01) of all the modalities, which signify that, all are the effective diagnostic procedures of detecting breast malignancy, but amongst the three procedure the combination of mammography with ultrasonography shows strongest correlation (Correlation coefficient =0.884) with the finding of FNAC.

DISCUSSION

Patients with palpable breast masses commonly present for imaging evaluation. Unfortunately, false-negative mammographic (MG) findings in the setting of a palpable breast mass have been estimated at between 4% to 12%.¹⁰⁻¹² Therefore, malignancy cannot be excluded when mammographic findings of a palpable mass are negative. USG is used as an adjunct to mammography to further evaluate palpable masses, especially in women with mammographically dense breasts. USG often detects cysts or solid lesions that are obscured on the mammogram by the surrounding fibroglandular tissue and can reduce the number of surgical biopsies required when cysts are identified. It was found from the literatures that MG and USG are well-established diagnostic modalities for the breast. They have high diagnostic yield, but is not 100 % sensitive and specific.^{13, 14} MG when combined with USG can yield very significant improvement in sensitivity and specificity for diagnosing different breast lesions and our study strongly supports this evidence.

The value of combined mammographic and sonographic imaging in symptomatic patients has been studied previously. Moss et al¹⁵ reported sensitivity of 94.2% in 368 patients. Shetty MK and Shah YP¹⁶ reported a sensitivity of 100%. Barlow et al¹⁷ reported a sensitivity of 87% . Their findings are comparable with present findings - sensitivity of 100 % in case of malignant lesions and case detection rate of 97% in cases of benign lesions. In our study we estimated correlation coefficient and P value using *Spearman's rho test* and this statistical finding leads us to the conclusion that with the use of the combination of the two non-invasive procedures (i.e. mammography +USG) we can almost achieve the accuracy FNAC in detecting Breast Malignancy.

Although USG is not considered a screening test, it is more sensitive than MG in detecting lesions in women with dense breast tissue. Moss et al¹⁵ reported that sonography increased cancer detection by 14% in symptomatic patients who were evalu-

ated with both mammography and sonography. In retrospective analysis of 293 palpable malignant lesions, sonography detected all cancers; 18(6.1%) of these 293 cancers were mammographically occult. ¹⁸ In this study, 2 patients (22.22%) out of 9 are diagnosed cancer in USG, which were occult in mammography. This variation may be due to small sample size in our study.

CONCLUSION

This study confirms that the mammography (MG) and ultrasound (USG) when combined have significantly higher sensitivity and negative predictive value than observed for a single modality in detecting the both benign and malignant lesions of the breast. The statistical finding leads us to the conclusion that with the use of the combination of the two non-invasive procedures (i.e. MG+USG) we can almost achieve the accuracy of the FNAC in detecting breast malignancy.

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