

Comparative Evaluation of Breast Lump With Mammography And Sonography: Can Sonography Replace Mammography in Symptomatic Cases?

Savitri Thanukula¹, Radha Puppala², Chaitra G³

¹(Assistant Professor, Radiodiagnosis Department, Andhra Medical College/ NTR University, India)

²(Senior Resident, Radiodiagnosis Department, Andhra Medical College/ NTR University, India)

³(Senior Resident, Radiodiagnosis Department, Andhra Medical College/ NTR University, India)

Abstract :

Introduction: The incidence of breast cancer is rising in every country of the world especially in developing countries such as India with early detection and intervention saving lives of many. *Materials and methods:* This prospective study was conducted from October 2012 to May 2014 with a study population of 50 patients who were referred to Radiodiagnosis department of King George Hospital with complaints of lump in breast. All of the cases underwent standard mammographic evaluation in mediolateral oblique and craniocaudal views and high resolution ultrasound with a 5 – 10 MHz linear – array transducer. The nature of the lesion on mammography, characterization of the lesion on ultrasound were evaluated separately and compared with histopathology. The accuracy, sensitivity, specificity, positive predictive value and negative predictive values of mammography and sonography were evaluated. *Results:* Our data indicate that accuracy, sensitivity, specificity, positive predictive value and negative predictive value of ultrasound was statistically significant and better than mammography in patients with breast symptoms for detection of breast cancer and benign lesions, particularly with dense breasts. *Conclusion:* Our results show breast ultrasound to be more accurate, sensitive and specific than mammography in symptomatic cases and in cases with dense breasts. Our results also indicate that breast density is an important predictor of accuracy of mammography.

Keywords: Breast, cancer, palpable lump, mammography, sonography.

I. Introduction

Breast cancer is the most commonly occurring female cancer in the world with an age-standardized incidence rate (ASR) of 39.0 per 100,000, which is more than double that of the second ranked cervical cancer (cervical cancer ASR=15.2 per 100,000) [1,2]. In India, breast cancer is the second most common cancer (after cervical cancer) with an estimated 115,251 new diagnoses and the second most common cause of cancer-related deaths with 53,592 breast cancer deaths in 2008 [1]. The age-standardised incidence rate for breast cancer in India is 22.9 per 100,000, one-third that of Western countries and the mortality rates are disproportionately higher[3,4].

With increasing urbanisation, more women are subjected to risk factors such as late age at first childbirth, fewer children and shorter duration of breast-feeding. In the past decades, great strides have been made in breast cancer screening. The combination of imaging, clinical examination and histopathology known as triple assessment, is the expected standard for breast diagnosis. While multiple studies have shown the low yield of mammography especially in patients with dense breasts and painful lesions, prompting the development of several adjuvant-imaging techniques, most importantly the ultrasound evaluation.

In this study the accuracy, sensitivity, specificity, positive predictive value and negative predictive value of mammography was compared with ultrasound of breast in symptomatic cases of breast lump belonging to BI-RADS category 0,1, 2, 3, 4 & 5. Histopathological evaluation was taken as gold standard.

II. Materials And Methods

Study was carried out in the Department of Radiodiagnosis, King George Hospital, Visakhapatnam from October 2012 to May 2014 on patients above 35yrs of age with complaints of lump in breast. All the examinations were carried out after obtaining informed consent from the patient. Mammography was performed using GE Alpha ST Mammography machine in standard mediolateral oblique and craniocaudal projections and mammographic BI-RADS category was established. Sonography was performed with Esaote Ultrasound scanner using high frequency 5-7 MHz linear transducer in radial, antiradial planes and Ultrasound BI-RADS category was documented. Subsequently all the patients were subjected to histopathology. Patients belonging to BI-RADS category 6 and post-operative cases were excluded from the study.

III. Results And Observations

50 cases were distributed according to age group as given below in Fig 1.

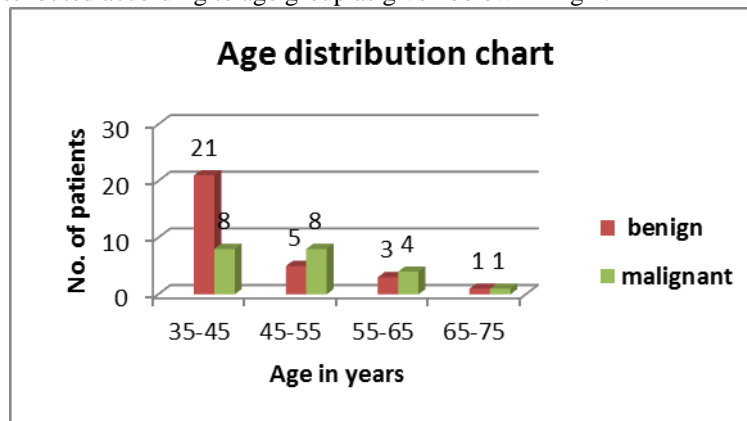


Figure 1: Distribution of study population according to age.

Various pathologies included in the study were tabulated as shown in Table 1.

PATHOLOGIES	NUMBER OF CASES
BREAST MALIGNANCIES	13
FIBROADENOMAS	16
SIMPLE CYSTS	7
GALACTOCELE	3
DUCT ECTASIA	5
BREAST ABCESS	4
LIPOMA	1
MASTITIS	2

Table 1 shows the histopathological distribution of cases included in the study.

Significant percentage of study population as depicted in Fig.2 with palpable abnormalities had dense breasts, thus concealing lesions at mammography.

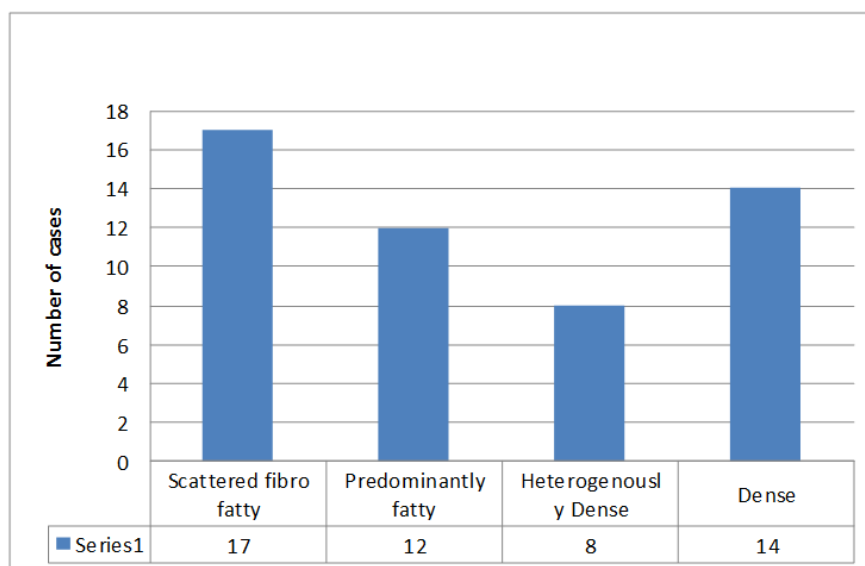


Figure 2 shows the Mammographic tissue density in study population.

	MAMMOGRAPHY(%)	ULTRASOUND (%)
Sensitivity	59.3	100
Specificity	73.6	82.1
Positive Predictive Value	79	82.1
Negative Predictive Value	51	100
Accuracy	64.7	90

Table 2 shows the sensitivity, specificity, positive predictive value, negative predictive value and accuracy of mammography and ultrasound in detection of malignant lesions.

	MAMMOGRAPHY (%)	ULTRASOUND (%)
Sensitivity	45.1	82.1
Specificity	95	95
Positive Predictive Value	93.3	100
Negative Predictive Value	52.7	82.1
Accuracy	64.7	90

Table 3 shows the sensitivity, specificity, positive predictive value, negative predictive value and accuracy of mammography and ultrasound in detection of benign lesions.

Our data indicate that sensitivity and specificity of ultrasound was greater than mammography in patients with breast symptoms for the detection of breast cancer and benign lesions, particularly in dense breast women. The overall accuracy of ultrasound (90%) was better than mammography (64.7%) in detection of palpable breast lesions.

IV. Discussion

Breast carcinoma has been reported in only 4% of patients with breast symptoms, and even among palpable lesions undergoing biopsy, a large number of lesions turn out benign [5,6]. The role of imaging in patients with palpable breast lump is to show a benign cause for palpable abnormality so as to avoid and defer further intervention, to support earlier intervention for a mass with malignant features, to assess the extent of malignancy when cancer is diagnosed and to screen the remainder of the ipsilateral and contralateral breast [7].

However the false negative rate of mammography for breast cancer in patients with palpable abnormalities of the breasts has been reported to be as high as 16.5 % [8] thus increasing rate of the unnecessary interventions and patient anxiety.

Sonography may obviate the need for intervention by showing benign causes of palpable abnormalities such as cysts, benign intra mammary lymphnodes, extravasated silicon and superficial thrombophlebitis of Mondor being few examples.

In this study, 14 (50%) cases were categorized as benign in mammography as compared to 23 (82%) cases in sonographic evaluation, clearly showing the value of sonographic imaging in helping avoid unnecessary biopsies. In our study, sonography was also able to characterize and categorize palpable lesions obscured by dense tissue on mammograms.

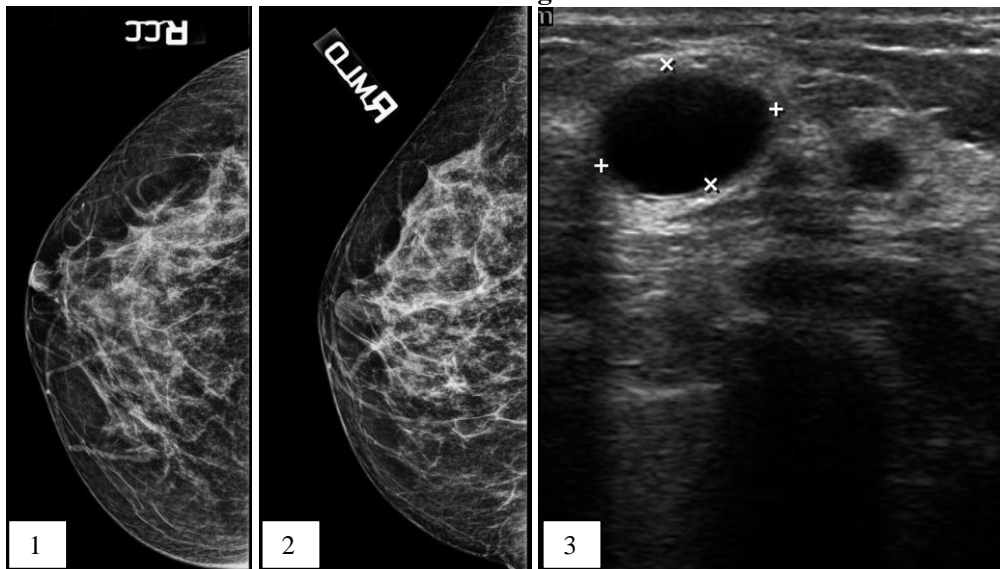
The results of our study were in accordance with study conducted by Moss et al [9] who reported increased cancer detection by 14% in symptomatic patients by addition of sonography to mammography. In another retrospective analysis of 293 palpable malignant lesions, sonography detected all cancers, even the 18(6.1%) cases which were mammographically occult[10]. Yet another prospective study of 148 cases of palpable and nonpalpable probably benign solid masses showed a sonographic false-negative rate of 0.7%, thus playing a major role in deferring unnecessary biopsies and prompting follow up[11].

One limitation of our study is that we were not able to assess intraobserver and interobserver variability.

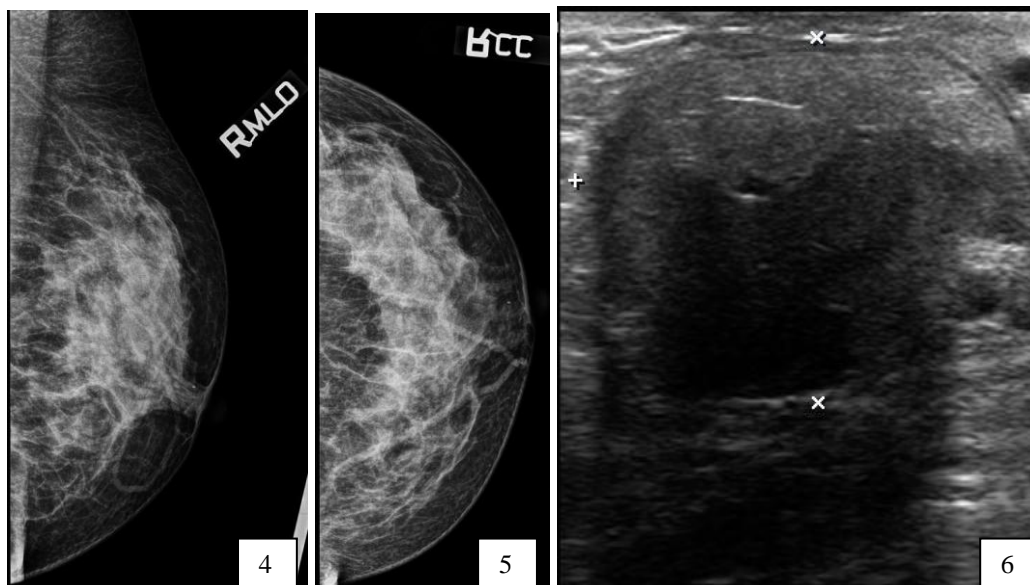
V. Conclusion

Sonography of breast is emerging, convenient, widely available, accurate and dynamic tool in assessment of palpable breast lumps as compared to mammograms without the risk of ionising radiation. Our results indicate that breast density is an important predictor of accuracy of mammography. Though previously confined as adjunct tool in breast imaging, ultrasound is more accurate than mammography in characterization and investigation of symptomatic breast lumps which are both mammographically visible and occult. Especially in women with dense breasts, sonography reigns over mammography, and is an appropriate initial imaging test so as to avoid unnecessary interventions and patient discomfort.

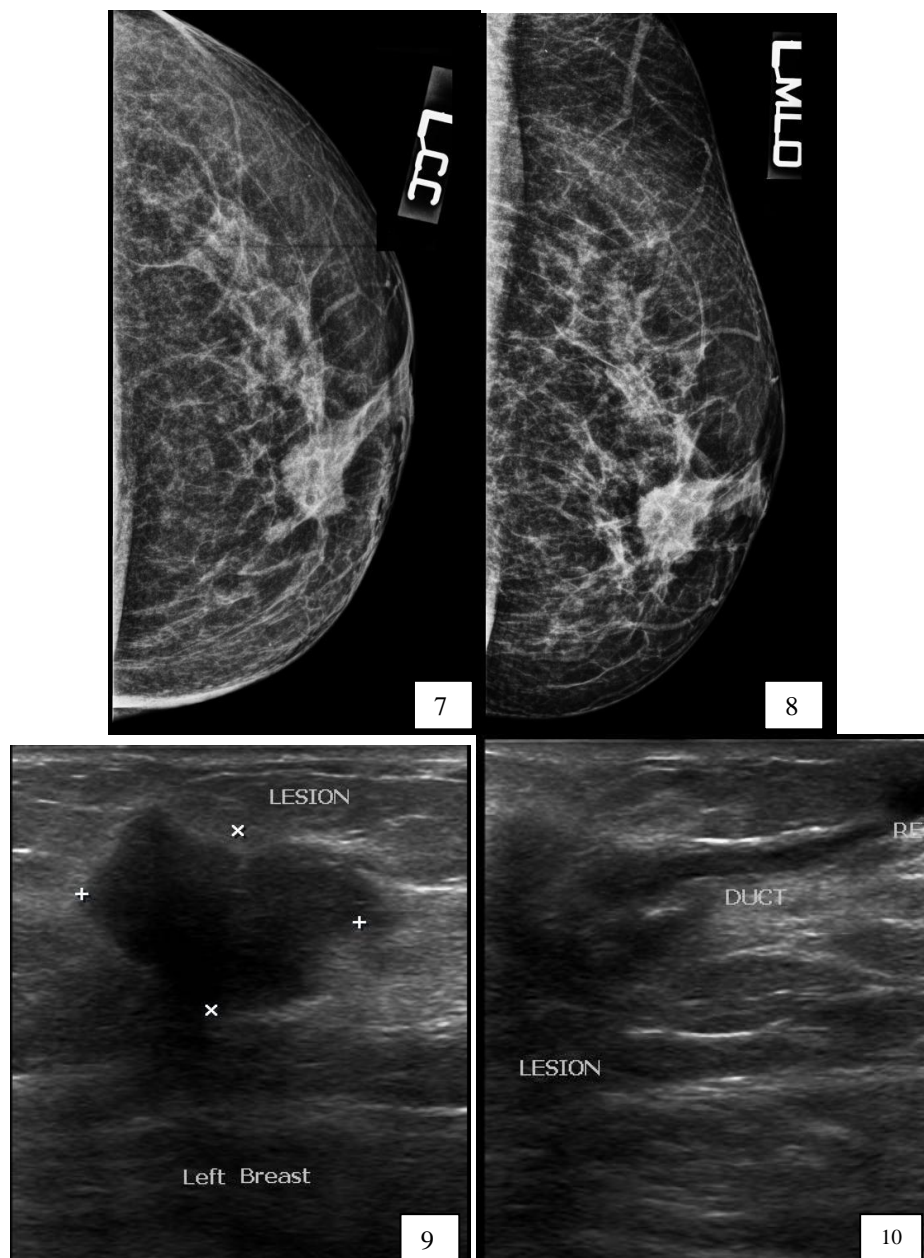
VI. Images



40 year female presented with palpable breast mass in right breast. Mammography obtained in craniocaudal and mediolateral oblique projections (Image 1 and 2) show no mass lesion. Sonography (Image 3) shows well defined anechoic cystic lesion with posterior acoustic enhancement suggestive of simple cyst.



38 year lady came with complaints of swelling and heaviness of few months duration. Mammograms (Image 4 and 5) obtained in standard views shows dense breast with no mass lesions. Sonogram (Image 6) showed a thick walled collection which turned out to be chronic breast abscess.



50 year lady came with retraction of nipple and palpable mass within left breast. Mammograms obtained in craniocaudal and mediolateral projections (Image 7 and 8) show an ill marginated, spiculated mass lesion with architectural distortion and nipple retraction. Sonographic evaluation (Image 9 and 10) shows hypoechoic, irregular mass lesion, which is taller than wide with intraductal extension.

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