



Original Research Article

## Comparison between Role of Ultrasound and X-Ray Mammography in Diagnosis of Breast Masses

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### ABSTRACT

**Context:** With progress in surgical techniques an approach of conservative procedures for management of breast cancer, efforts were on for early diagnosis of breast malignancy. Mammography is used a screening procedure and ultrasonography is used for diagnostic purposes of breast masses. In our study we have compared role of both procedures in cases of breast masses and results were compared with histopathology. Inability of ultrasound to pick- up micro calcification had lead to its main limitation in screening procedure.

**Objectives:** To assess the role of ultrasound mammography in diagnostic examination of breast masses and to compare the results obtained by both methods.

**Methods:** This was the prospective study carried out in the Department of Radio diagnosis, SRTR medical college, Ambajogai in the period from October, 1996 to January, 1999. This study comprises 125 unselected patients of different age groups in whom there was clinical suspicion of breast mass. This includes 123 female and 2 male patients. Each patient had been separately studied by using mammography and sonography alone and combined sonography and mammography.

**Results:** Maximum no. of patients' age was from reproductive age group. Breast masses were commonly found in females and rare in males. Benign breast masses were found to be more common than malignant breast masses. Mammography as found to be comparatively better than ultrasound in detection of malignant breast masses ultrasound was more helpful in detection of benign breast masses. Combined mammography and sonography results were found to be superior to mammography and sonography alone.

**Conclusion:** In present study an attempt has been made to evaluate the specific efficacy of mammography and ultrasound in differentiating palpable breast masses taking pathological confirmation as ultimate milestone. Mammography and sonography if interpreted together as a single breast imaging report, they are complimentary and more beneficial.

**Key words:** Breast masses, Ultrasound mammography, X-ray mammography

### INTRODUCTION

The breast has always been symbol of womanhood and ultimate fertility. As a result, both disease and surgery of the breast

evoke a fear of mutilation and loss of femininity. <sup>[1]</sup> So the masses in the breast have evoked considerable interest since centuries. The writing of paparus (3000-2500BC),

Celsus (1<sup>st</sup> century AD), Leonides all described in detail lumps in the breast. Real treatment of the breast started with approach of Halsted's technique of radical mastectomy which leads to severe mutilation. [2] With progress in surgical techniques an approach of conservative procedures for management of breast cancer, efforts were on for early diagnosis of breast malignancy.

Mammography is used a screening procedure leading to early detection and better management and improved prognosis of patient. The ability of mammography to pick up multicentric carcinoma and to provide index of suspicion by visualization of microcalcification is its main advantage. [3] Many alternative diagnostic approaches have been described including ultrasonography, CT mammography, transillumination, MRI, PET, Scintimammography etc. The inability of ultrasonography to pick up microcalcification had led to its main limitation in screening procedures. [4]

In present study sonomammography and x-ray mammography of patients were done and results of each were compared with histopathology with an aim to answer two important questions: 1) Does ultrasound mammography has a place in diagnostic examination? 2) Are the results of ultrasound mammography comparable to those of x-ray mammography?

## **MATERIALS & METHODS**

This was the prospective study carried out in the department of Radiodiagnosis, SRTR Govt. Medical College, Ambajogai in the period from October, 1996 to January, 1999. This study comprises 125 unselected patients of different age groups in whom there was clinical suspicion of breast mass. These include 123 female and 2 male patients. Each patient had been separately studied by using mammography and sonography alone

and combined sonography and mammography. Mammography examination was done using Mammography unit [VILLA INDIA MAMMOGRAPHY UNIT, VENUS-X]. The Mammography examination basically composed of two-view technique, Cranio-caudal view and Medio-lateral oblique view. Compression is one of the critical aspect of Mammographic positioning. Modified views like spot compression views in smaller ill-defined lesions, magnification view to demonstrate micro-calcification and the borders, 90 degree lateral view to visualize air fluid level etc.

Sonographic Examination was done Using state of the art real-time grey scale ultrasound equipment [ALOKA-SSD 630] with a 7.5 MHz mechanical transducer. Patients were scanned supine with handheld transducer, raising the patient's ipsilateral arm with the hand placed behind the head, helps to spread out breast hence decreasing the amount of tissue the beam must penetrate. For large or pendulous breast, rotating the patient slightly to contralateral side helps in imaging the outer quadrants. Once the patient is adequately positioned the lesion detected were characterized properly.

### ***Criteria for evaluation:***

Criteria for mammographic evaluation

Visualization of the mass

Size of the mass

Location of the mass

Density of the mass

Shape of the mass

Clarity of the mass

Type of calcification

Associated changes in breast parenchyma including nipple and skin.

Criteria for sonographic evaluation

Delineation or non delineation of a mass

Presence or absence of internal echoes

Regularity of contour of the mass

Character of the far wall

Extent of transmission of sound deep to the mass

### OBSERVATIONS

Out of 125 cases of clinically suspected breast masses 5 cases were normal physiological breast having no abnormality though clinically suspected, hence excluded from this study and rest of 120 cases were pathologically proved breast masses.

**Table 1:** Distribution of cases of breast masses according to sex.

Sex	Number of cases	percentage
Male	2	1.67
Female	118	98.33
Total	120	100.00

Out of 120 cases of breast masses, females 118 (98.33%) had outnumbered the males to (1.67%). Male: Female was 1:58.88.

**Table no. 2:** The distribution of pathologically proved benign and malignant breast masses according to age.

Age group (years)	Benign	Malignant	Total
11-20	12(10.0%)	0	12(10.0%)
21-30	41(34.17%)	0	41(34.17%)
31-40	26(21.67%)	3(2.5%)	29(24.17%)
41-50	11(9.17%)	3(2.5%)	14(11.67%)
51-60	5(4.17%)	7(5.83%)	12(12.00%)
61-70	4(3.3%)	7(5.83%)	11(9.17%)
71-80	0	1(0.83%)	1(0.83%)
<b>Total</b>	<b>99(82.5%)</b>	<b>21(17.5%)</b>	<b>120(100.00%)</b>

**Table no 4:** Distribution of different benign lesions diagnose on mammography, sonography and on pathology.

Sr.no.	Benign breast masses	Mammography	Sonography	pathology
1.	Fibroadenosis	51(42.5%)	47(39.16%)	46(38.33%)
2.	Fibroadenoma	35(29.17%)	33(27.5%)	31(25.83%)
3.	Phylloides tumour	2(1.67%)	2(1.67%)	2(1.67%)
4.	Breast abscess	7(5.83%)	9(7.5%)	10(8.33%)
5.	galactocele	1(0.83%)	2(1.67%)	2(1.67%)
6.	Simple cyst	0	5(4.17%)	5(4.17%)
7.	Intraductal papilloma	0	1(0.83%)	1(0.83%)
8.	Gynaecomastia	2(1.67%)	2(1.67%)	2(1.67%)
	<b>Total</b>	<b>98(81.67%)</b>	<b>101(84.17%)</b>	<b>99(82.5%)</b>

Out of total 99 cases proved pathologically as benign breast masses, fibroadenosis 46 and fibroadenoma 31 were frequently noted. Out of total 101 cases of sonographically suspected benign breast masses and 98 cases of mammographically suspected benign breast masses,

Out of 120 cases of breast masses studied, 99 cases were benign and 21 cases were malignant proved pathologically. The maximum number of cases combined both benign and malignant masses, 41 were recorded in age group 21-30. The maximum number of benign cases, 41 were in age group 21-30 and maximum number of cases with malignant masses were 7 in age group 51-60 as well as in age group 61-70.

**Table no 3:** Distribution of benign and malignant breast masses diagnosed on mammography, Sonography and pathology.

Breast masses	Mammographic	Ultrasonic	Pathologic
Benign	98(81.67%)	101(84.87%)	99(82.5%)
Malignant	22(18.33%)	19(15.83%)	21(17.5%)
Total	120	120	120

Out of total 120 cases, pathologically 99 cases were proved to be benign and 21 cases were proved to be malignant. Out of total 120 cases evaluated on ultra Sonography, in 101 cases benign breast masses and in 19 cases malignant breast masses were suspected.

Out of total 120 cases evaluated on mammography, in 98 cases, benign breast masses and in 22 cases malignant masses were suspected.

fibroadenoma and fibroadenosis were the common diagnosis.

**Table no. 5:** Showing comparison of mammography and Sonography in differentiating pathologically proved benign and malignant breast masses.

Breast masses	Pathologic diagnosis	Mammography	Sonography
Benign	99(82.5%)	95(79.17%)	98(81.67%)
Malignant	21(17.5%)	20(16.66%)	18(15.0%)
Total	120(100%)	115(95.83%)	116(96.66%)

Out of 120 cases diagnosed pathologically as benign and malignant breast mass, Sonography was able to

differentiate between them in 116(96.66%), while mammography was able to differentiate 115(95.83%) cases.

Breast masses	Pathologic diagnosis	Correctly diagnosed by		
		Mammography	Sonography	Combined
Benign	99	95(95.95%)	98(98.98%)	98(98.98%)
Malignant	21	20(95.23%)	18(85.71%)	20(95.23%)
Total	120	115(95.83%)	116(96.66%)	118(98.33%)

Of the total 99 pathologically proved benign breast masses, mammography correctly diagnoses 95 while Sonography correctly diagnoses 98 and both combined correctly diagnose 98 cases.

Of the total 21 pathologically proved malignant breast masses, mammography

correctly diagnoses 20, Sonography correctly diagnoses 18 and both combined correctly diagnose 20 cases.

Combined mammography and Sonography were able to differentiate benign from malignant breast masses in 118 cases.

**Table no. 6:** Diagnostic accuracy of individual mammography, Sonography and combined mammosonography to differentiate various in pathologically confirm 99 benign breast masses.

Benign breast masses	Pathological diagnosis	Correctly diagnosed by		
		Mammography	Sonography	Both
Fibroadenosis	46	42(91.30%)	45(97.82%)	46(100%)
Fibroadenoma	31	24(77.41%)	29(93.54%)	29(93.54%)
Phyllode	2	2(100%)	2(100%)	2(100%)
Breast abscess	10	5(50%)	9(90%)	9(90%)
Galactocoele	2	1(50%)	2(100%)	2(100%)
Simple cyst	5	0(0%)	5(100%)	5(100%)
Intraductal papilloma	1	0(0%)	1(100%)	1(100%)
Gynaecomastia	2	2(100%)	2(100%)	2(100%)
Total	99	76(76.76%)	95(95.95%)	96(96.96%)

From the above table, it has been observed that sonography is a better modality to differentiate various benign breast masses as compared with mammography while the combined Sonography and mammography found to be more better.

Simple cyst and intraductal papilloma were solely diagnosed by ultrasound only, moreover Sonography was found to be better modality to diagnose the breast abscess, galactocoele and fibroadenoma as compared with mammography alone.

## RESULTS

In present study out of the 120 cases of breast masses, females 118(98.33%) had outnumbered the males 2(1.67%). Hence

breast masses were commonly found in females and rare in males. Maximum no. of patients were from reproductive age group Majority of pathologically proven breast masses 73(60.83%) cases were having right sided breast masses while 47(39.17%) were having left side breast masses. Hence breast masses were found to be more frequent on right side than left.

Out of the 120 patients presenting clinically as breast masses maximum (70%) were associated with pain in breast. Pain and tenderness were the most frequently noted complaints in the patients presenting with clinically palpable breast mass. According to present study out of 120 cases, pathologically 99 (82.5%) cases were proved to be benign and 21(17.5%) were

proved to be malignant. Hence, benign breast masses were found to be more common than malignant breast masses.

Out of 120 cases evaluated ultrasonographically 99(82.5%) cases were proved to be benign and 21(17.5%) cases were proved to be malignant and out of 120 cases evaluated mammographic ally 101(87.17%) cases were proved to be benign and 19(15.83%) cases were proved to be malignant. Hence mammography as found to be comparatively better than ultrasound in detection of malignant breast masses while ultrasound was more helpful in detection of benign breast masses. Ultrasound was really helpful in differentiating various benign Breast masses and was found to be the only modality to detect simple cyst and intraductal papilloma. Ultrasound was also helpful in detecting secondaries in lymph nodes and differentiating benign and malignant lymphadenopathy. Combined mammography and sonography results were found to be superior to mammography and sonography alone.

## DISCUSSION

Breast cancer continues to be most prevalent malignant processes in female. At present time X-ray Mammography is the only imaging technique with proved capability for detecting clinically occult early stage breast cancer at the same time other imaging modalities like Ultrasound, CT, Thermography, MRI, PET have been constantly evaluated. Ultrasound has established itself as the most useful adjuvant to x-ray Mammography despite the reservations about ability of sonography to differentiate benign from malignant lesions, it is efficient enough to differentiate between solid and cystic masses. It has a special role as a guide for aspiration or preoperative localization and for positioning of wire

guide through a needle to direct the surgical excision of non-palpable solid masses.

In present study an attempt has been made to evaluate the specific efficacy of mammography and ultrasound in differentiating palpable breast masses taking pathological confirmation as ultimate milestone. In present study out of 125 patients presenting with palpable breast masses 5 were physiologically normal, 99 cases were non-malignant and 21 were Malignant. Two male patients coming with palpable mass, who were clinically suspected to have malignancy, were found to be cases of gynaecomastia.

In present study of 120 cases of breast masses nearly 73(60.83%) breast masses situated on right side as compared with 47(39.17%) of breast masses on left side. At the same time, malignancy was found to be twice more common on right side than left. The studies of Srivastav et al 53% and Dixit et al 61% shows similar preponderance on right side. [5,6]

The age distribution in present study with maximum cases between 31-70 years (99.16%) in comparable with that of other workers like Wynder et al. [7] Majority of patients presenting with breast masses, the commonest age group for benign masses was 20-40 years. For malignant masses the commonest age of presentation was 50-70 years.

In the Benign group, the commonest diagnoses were Fibroadenoma and fibroadenosis. It is well documented that Fibroadenoma is the disease of the youth and the most frequent breast tumor in women under the age of 25 years (Haagensen,1971). [8]

In the present study maximum numbers of malignant breast masses were found to be in the age group of 51-70 yrs and this findings corresponds to the findings of Paymaster et al. [9]



From the 98 cases of mammographically suspected benign breast masses 95 [95.96%] while from 101 cases of sonographically suspected benign masses 98[98.98%] cases were found to be correct histopathologically. While combine Mammography and sonography correctly dignosed 98 (98.98) cases. Ultrasound is more sensitive in differentiating solid and cystic benign masses. This corresponds with Teixdor et al. <sup>[10]</sup>

In our study of total 120 cases, pathologically proved cases of malignancy were 21. Mammography had suspected malignant lesions in 22 cases and was found to be correct in 20(95.23%) cases while ultrasonography had suspected malignant breast masses in 19 cases and was correct in 18(85.71%) cases. Combined Mammography and sonography was able to detect 20 (95.23%) cases. Findings of present study are comparable with Teixdor et al. <sup>[10]</sup>

In the study done by Catherine et al (1975) found 31 solid circumscribed masses on ultrasound suspecting fibroadenoma, pathologically 29 cases were proved to be fibroadenoma and rest of two cases was found to be circumscribed medullary carcinoma. <sup>[11]</sup> In the above series mammography was able to pick up only 23 cases of fibroadenoma.

Out of 99 pathologically proved benign breast masses 2 cases were of cystosarcoma phyllodes which were correctly diagnosed by both mammography and sonography. It is comparable with the Carl et al (1983) who found 8 cases of phyllodes in a series of 50,000 examinations. <sup>[12]</sup>

From the above study it can be understood that Sonography and mammography should be interpreted together as the single Breast –Imaging report. In other words rather than comparing

ultrasound and mammographic findings they should be complemented together.

## CONCLUSION

It can be concluded that even though mammography and sonography are excellent investigation in their own right, but they have their own blind spots. So mammography and sonography if interpreted together as a single breast imaging report, they are complimentary and more beneficial.

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