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Mammography and sonomammography in evaluation of palpable breast lumps

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Abstract
The commonest lesion encountered in the study was fibroadenoma followed by breast carcinoma and breast cyst. The peak incidence of fibroadenoma was seen in 3rd decade. This study was undertaken to evaluate the role of mammography and sonography in characterizing the palpable breast masses. The study includes 100 patients with palpable breast abnormalities. Out of 100 patients, 12 showed no evidence of mass lesion on mammography. The sensitivity & specificity for cancer lesions undergoing biopsy that showed questionable findings on combined mammographic and sonographic evaluation was 98 % & 98.24%. Combined use of mammography and sonography plays an important role in the management of palpable breast lesions. Negative findings on combined mammographic and sonographic imaging have very high specificity and are reassuring to the patient.

Keywords: breast, mammography, sonography, lumps, imaging, cancer, benign, breast masses

Introduction
Breast cancer is the most common cancer diagnosed in women, accounting for more than 1 million new cases annually. In India breast cancer is second most common cancer in females after Cancer cervix. Management of breast cancer has undergone drastic changes starting from Halsdatian radical surgical approach to cosmetic & conservation surgeries. Chemotherapy and Radiotherapy has advanced treatment through the decade [1]. Mammography is considered as gold standard for breast evaluation [2]. However recent concern of radiation exposure in patient undergoing mammography and reduced sensitivity in patient with dense breast has increased use of Sonomammography. Large scale research on use of USG was made in 1970 after possible radiation induced breast cancer risk was evaluated in cases with mammography. Continued technical advances led to use of Sonomammography as tool of screening in women with dense breast. Outcome (Sensitivity and specificity) of Sonomammography or mammography are higher in conjunction; than done individually. MRI seems to be helpful in breast imaging as it depicts good soft tissue contrast. Contrast enhanced MRI study is helpful in differentiating between scar tissue and malignancy, malignancy in dense breast, breast with implants and assessment of axillary lymphnodes [3]. But due to non-availability of MRI in periphery and long image acquisition time has led to increased use of Mammography and Sonomammography. This study deals with imaging characteristics of various breast disorders and differentiation of benign and malignant lesions. It evaluates role of mammography and Sonomammography in conjunction in evaluating palpable breast lumps besides providing further guideline for histopathalogical & surgical intervention.

Aims and Objectives
To study the role of Mammography and Sonomammography in evaluating imaging characteristics of various breast abnormalities i.e. masses and other abnormalities. To provide systematic and practical approach for evaluation of palpable breast masses.

Review of Literature
Almost eighteen years after of discovery of X-ray in 1895, in 1913 Albert Simpsons was the first person to describe the use of X-rays in breast cancer cases. He performed radiographic examination in 3000 mastectomy specimens and correlated radiographic findings, gross and microscopic findings. Also described spread to axillary lymph nodes and micro-calcification associated with malignancy. In 1972 Surgeon Otto Kleinschmidt reported the use of mammography as a diagnostic aid. In 1931, on the basis of examination of 56 patients, J. Goyanes *et al* described the mammographic features of the normal breast and distinguished inflammatory neoplastic from neoplastic lesions. Also emphasized on the proper breast positioning in mammography. In 1950s, Gershon-Cohen *et al*, performed roentgenologic pathologic correlation of breast specimen using whole-breast histology sections, establishing mammographic criteria for the diagnosis of benign and malignant lesions. They also emphasized on use 7 of high contrast images & breast compression and recommended the simultaneous exposure of both the juxtaposed films for adequate of both thinner peripheral and thicker juxtathoracic tissue [4]. In 1962, Robert Egan, described a high-milliampearage/ low-kilovoltage technique that resulted in dependable, reproducible, diagnostic-quality mammographic images; and studied 1000 breasts with excellent results [5].

Meyer *et al* (1980) [5]. Reported experience with biopsy of 1261 occult breast lesions, 626 (50%) masses and 625 (50%) were lesions with calcification. Biopsies performed for masses yielded 21% predictive value for malignancy and for calcification yielded predictive value of 17%. Kopans *et al* (1981) [6] studied biopsy revealed 125 cancers in 127 breasts. Physical examination was able to reveal 91% (115/127) of the cancer and failed to detect 12 lesions. Mammography disclosed 947 (119/127) of the cancers including 12 clinically occult lesions but did not show 8 palpable cancers.

Beughat *et al* (1981) [7] studied 709 patients who had undergone both ultrasound and mammography. Sensitivity for breast cancer of 69% was found on ultrasound and 74% for mammography. A. Sickles *et al* (1983) [8] studied 41 cases of pathologically confirmed palpable breast masses and detected 40 (95%) by mammography and 30 (75%) by ultrasound. Sickles *et al* (1984) [9] studied 82 patients of clinical palpable breast masses by 4.2 MHz automated whole breast sonography scanner found cyst in 38% (31/82), solid masses in 51% (42/82) and no mass seen in 11% (9/82). Rubin *et al* (1985) [10] study of 22 patients of clinically palpable breast masses by 7.5 MHz hand held real time sonography showed cysts in 32% (7/22), solid mass in 59% (12/22) and no mass in 9% (2/22). Hilton *et al* (1986) [11]. evaluated 264 patients with clinically palpable breast masses with 10 MHz hand held real time sonography unit, found cyst in 25% (66/264), solid masses in 28%(74/264) and no mass seen in 47% (124/264). Meyer *et al* (1989) [12] studied 24 cases of medullary carcinoma visible at mammography as round or oval, non-calcified masses with varying degree of marginal lobulations. In 6 of the 24 patients ultrasound demonstrated well-defined masses with in homogeneous hypoechoic texture with enhanced through transmission.

Fung *et al* (1990) [13] reported biopsies of 62 lesions found only on ultrasound in mammographically dense breasts of asymptomatic women. All were benign. Mahender *et al* (1994) [14] carried out ultrasound and mammography on 73 breast lumps. On ultrasound 27 of 30 fibroadenomas and 27 out of 32 malignancies could be correctly diagnosed. Lumps smaller than 1 cm in size and micro-calcification in malignancy were missed on ultrasound. Ultrasound was assessed to be a better imaging modality in characterizing cyst, breast abscess and galactocele. Combined use of both modalities provides a greater overall accuracy since both modalities complimentary each other.

Materials and Methods

Consecutive 100 patient coming to OPD services (surgery) of Krishna Hospital Karad with complaint of palpable breast lumps & other associated breast symptoms (Nipple discharge, Skin changes: redness, puckering etc.) were analyzed in the study; over the period of eighteen months from September 2011 up to August 2012. The patients underwent bilateral breast evaluation with both mammography and Sonomammography on the same setting.

Observation and Results

There were 129 patients with palpable abnormalities and associated breast symptoms were evaluated with both Mammography and Sonomammography. Out of which 109 patients presented with palpable breast masses and other symptoms (nipple discharge n: 11, skin changes n: 9). All were included in further evaluation with histopathology. 9 patients were dropped from further study as histopathological follow up was not done. Out of 129 patients 20 patients presented with non-specific symptoms e.g. diffuse nodularity, nipple discharge, and vague breast pain. These cases were excluded from study to reduce selection bias. Out of above cases consecutive 100 cases were analyzed further. The palpable abnormalities were reported in 59 patients in the right breast and 33 patients in the left breast and 8 patients on both sides. The assessment of cases according to age, benign/ malignant lesions distribution side of involvement, breast density and comparison with pathological findings were done.

Table 1: Age Distribution of Most Common Benign Lesions

Age group (Years)	Fibroadenoma	Simple breast cyst	Total
11-20	1	0	1
21-30	21	3	24
31-40	5	4	9
41-50	8	2	10
51-60	1	1	2
61-70	0	0	0
Total	36	10	46.

As shown in table 1, among the all age group fibroadenoma was most commonly noted in the 3rd decade. Simple breast cysts were noted most in 4th decade.

Table 2: The Distributions of Cases According to Side Involvement

Breast mass	Right	Left	Bilateral
Benign	28	25	03
Malignant	26	18	0
Total	54	43	03

As shown in table 2, out of 100 cases right breast showed 54 lesions and left breast showed 43 and bilateral lesions were noted in 3 cases. Most of the lesions were present in right breast out of which benign and malignant lesions were equal in number.

Table 3: Distribution of Benign and Malignant Breast Masses

Breast masses	Mammographic	Ultrasonic	Pathologic
Benign	36	55	56
Malignant	32	42	44
Total	68	97	100

As shown in table 3, true positive cases after the mammographic and sonographic evaluation compared to pathological results. Mammography showed 32 malignant and

36 benign lesions; and Sonomammography showed 38 malignant and 55 benign lesions out of 100 patients. Out of 100 patients pathological results showed 56 benign and 44 malignant lesions.

Table 4: Distribution of Breast Masses Diagnosed By Imaging and Pathology

Breast masses	Combined	Approach	Pathologic
	Diagnosed	Missed	
Benign	55	1	56
Malignant	43	1	44
Total	98	2	100

On combined imaging approach out of 100 cases 55 cases (55%) showed benign characteristics and 43 cases showed malignant characteristics. Higher % of malignant cases are mainly because our centre being the tertiary referral centre for breast malignancy and case selection bias. Sonography showed both high sensitivity and specificity for both malignant and benign lesions. However combined evaluation showed increase in both sensitivity and specificity compared to both mammography and sonography alone.

Discussion

Detection of breast mass lesions and its characterization in its earliest possible stage is the ultimate goal in imaging the breast, and the role of the radiologist is therefore vital. Imaging includes mammography and ultrasonography followed by biopsy[15]. In this study analysis 100 out of 129 consecutive cases, coming to surgical (Breast) OPD with palpable breast lump and associated breast symptoms. Most of the patient came with complaints of increase in size of lump, nipple discharge or pain in breast. Being the rural area and non-availability of any tertiary care centre other than this and low socioeconomic status most of the cases presented only after worsening of their Symptoms/ Disease (increase in size or pain). The mass characterization was done by shape, echogenicity, margins and calcification, width (AP dimensions of the lesion) and adjacent breast parenchyma on both mammography and USG and using BI-RADS lexicon similar as mammography. Most of the bulk of benign lesions was formed by fibroadenomas (36 cases) followed by simple breast cysts (10 cases) and inflammatory conditions (4 cases). The youngest patient was of 16 years showed fibroadenomas.

Conclusion

Combined use of mammography and sonography plays an important role in the management of palpable breast lesions. Imaging has a important role in management of palpable breast abnormalities. Combined use of mammography and Sonomammography is appropriate in most instances to characterize the palpable mass lesion. 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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