

Correlation of Breast Lump Mammographic and Sonomammographic Findings with Histopathological Diagnosis

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Abstract

Background: Breast cancer is the second most common cancer in Indian women. Early detection, diagnosis, and treatment is possible by screening women with breast lumps. Most commonly used screening methods are Mammography and Sonomammography, with histopathological confirmation done in suspected cases. The aim of this research was to find out the most accurate method of screening for cancer in females presenting with breast lumps. **Subjects and Methods:** We enrolled 53 females with age over 35 years presenting with palpable breast lump. All patients were subjected to Mammography, Sonomammography, and Fine Needle Aspiration Cytology. Findings of mammography and sonomammography were correlated with Fine needle aspiration cytology (as gold standard for cancer diagnosis) to find out the most sensitive, specific and accurate screening methodology. **Results:** The sensitivity and specificity for cancer diagnosis by mammography was 77% and 98% respectively, as compared to 56% and 97% for sonomammography. The sensitivity and specificity of both methods combined was 100% and 97% respectively. In younger patients with mammographically dense breasts, sonomammography performs better for detection and diagnosis. **Conclusion:** Mammography and Sonomammography are individually effective diagnostic modalities for detection of breast cancer. Detection of breast carcinoma is higher by mammography in comparison to Sonomammography; however, the accuracy significantly improves when both methods are combined. Sonomammography is better in comparison to mammography for detecting lesions in mammographically dense breast.

Keywords: Breast Cancer, Mammography and Sonomammography.

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Introduction

Breast masses or lumps are localized swellings that feel different from the surrounding breast tissue.^[1] It is a symptom/sign for a variety of conditions. It is one of the commonest complaints with which females present to cancer clinics. As approximately 10% of breast masses ultimately lead to a diagnosis of breast cancer, it is important for women with a breast lump to receive proper workup, early diagnosis and treatment.^[2]

Breast cancer is an important global health problem and is one of the leading causes of cancer mortality among women across the world.^[2] Older a woman is, greater is her chance of developing breast cancer.^[3] Hospital-based registries show that over 80% of patients come for diagnosis and treatment at advanced stages of the disease, and one third of them do not complete treatment for various reasons.^[4] Early detection and treatment is the key to preventing breast cancer related mortality.

The established management of palpable breast lesions includes the triple assessment, which includes physical examination, imaging and fine needle aspiration or core

biopsy.^[1] Diagnosis can be reached in majority of patients with this approach. Other techniques are MRI, Colour Doppler, contrast enhanced ultrasound, scintimammography and digital mammography.^[1]

Diagnostic mammography is considered "gold standard" in screening, detection and follow up of breast lesions, and is safe, simple, acceptable, reproducible, and cost efficient. However, mammography is known to have a false-negative rate of about 8-10%.^[5] Basic limitation of mammography are that solid and cystic masses cannot be differentiated. Approximately, 1-3% of women with a clinically suspicious abnormality, a negative mammogram, and a negative sonogram may still have breast cancer. Possible causes for missed breast cancers include dense parenchyma obscuring a lesion, poor positioning or technique, perception error, incorrect interpretation of a suspicious finding, subtle features of malignancy, and slow growth of a lesion.^[6]

Sonomammography is a non-invasive, easily available, cheaper and accurate tool in diagnosing breast masses. It is very helpful in pre-surgical assessment of tumor size of even 2 mm. Primary advantage of ultrasound is its ability to directly correlate physical examination findings on imaging. Other uses of breast ultrasound include potential staging of

cancer, evaluating breast implants and for guiding interventional breast procedures. It is the method of choice for differentiating solid from the cystic lesions, for further characterizing mammographic findings and better appreciating palpable breast lesions.^[5] Ultrasound is limited by its failure to detect microcalcifications.^[6]

Fine needle aspiration cytology (FNAC) has a high diagnostic accuracy rate (98%) in the hands of experienced cytopathologists.^[7] FNAC is a reliable method to differentiate whether a suspicious breast mass is benign or malignant from sonomammography and mammography without open biopsy. FNAC is also an ideal method for patients follow up if there is recurrence of breast lump.^[7]

Use of multiple modalities in diagnosing palpable masses increases the true positive rate and minimizes false negative rate for cancer detection.^[7]

This research aims to study the clinical correlation of findings of mammography and sonomammography of patients presenting with complaint of lump in breast with their histopathological diagnosis.

Subjects and Methods

53 female patients attending OPD with complaint of palpable lump/lumps in breast were studied in a prospective cross-sectional observational study. Patients below the age of 35 years, Pregnant patients, and those with known advanced breast cancer, were excluded from this study. Specific history pertaining to risk factors for breast cancer (like Age at menarche, Age at first childbearing, age at menopause, history of breastfeeding, number of children, history of hormone therapy, a history of premenopausal breast cancer for a mother and a sister, a personal history of breast cancer or benign proliferative breast disease, radiation, chemical exposure and smoking) was obtained. Visual and physical examination of breast mass was performed.

Mammography

Conventional film-screen mammography was performed with Allenger Venus (Alleger, India) Mammographic machine in at least two views per breast, medio-lateral oblique and cranio-caudal views. Additional views or spot compression views were obtained where appropriate. Lesion characteristics like site, margin, surrounding halo, clustered micro calcification, parenchymal distortion and skin thickening were noted. Mammograms were interpreted according to the Breast Imaging Reporting and Data system (BI-RADS) diagnostic categories on a five-point scale, with BI-RADS 1 (negative), 2 (benign finding), 3 (probably

benign), 4 (suspicious abnormality), and 5 (highly suggestive of malignancy). Breast density grades were also determined according to the BI-RADS on a scale of 1-4, with 4 corresponding to a dense breast, 3 to a heterogeneous breast, 2 to scattered fibroglandular densities, and 1 to an almost entirely fat breast.^[8]

Breast Ultrasound/Sonomammography

Sonomammography was performed using ClearVue 650 Ultrasonogram machine (Philips, USA) with a linear array probe centred at 7.5 MHz. All ultrasound examinations were performed with the patient in a supine position for the medial parts of the breast and in a contralateral posterior oblique position with arms raised for the lateral parts of the breast. Apart from diagnosis, sonomammograms were scored on a five-point scale identical to the mammographic BI-RADS categories.^[8]

Histopathological examination

Final histological diagnosis was obtained for all patients by fine needle aspiration cytology (FNAC) and correlated with mammographic and sonomammographic findings to find sensitivity, specificity, and predictive values.

Results

Majority (80%) of patients belonged to age group of 35-60 years. Most common presenting complaints were palpable breast lumps, and pain in breast. Nipple discharge or retraction was found in minority of patients.

Benign fibrocystic disease was the most common histological diagnosis overall (41% cases). This was followed by Fibroadenoma (30% cases). Breast cancer was finally diagnosed in 17% of cases. Benign cysts were found in 5% cases and breast abscess/infection was found in only 4% of cases.

Among the benign diseases of breast, our study showed that diagnostic sensitivity and specificity of sonomammography was superior to mammography alone. Combination of both modalities had high accuracy in identifying pathologies [Table 1].

Among breast cancer patients, diagnostic sensitivity and specificity of mammography was superior to sonomammography alone. Diagnosis is missed by mammography in younger patients with very dense breasts, where sonomammography proved to be useful for identification. Again, the combination of both modalities had almost 100% sensitivity in identifying malignant pathology [Table 1, Figure 1].

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

	Cytology	Mammography (MG) Alone	Sonography (USG) Alone	Combined MG + USG
Fibrocystic disease	22	18	21	22
Infection	2	1	2	2
Fibroadenoma	16	12	5	15
Cyst	3	2	3	3
Lipoma	1	1	1	1
Carcinoma	9	8	6	9
Total	53	42 (79%)	38 (72%)	52 (98%)

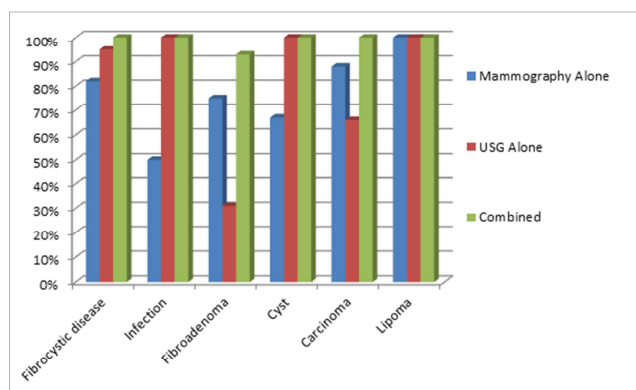


Figure 1: Comparative analysis of mammography, USG and combined study in detection of different breast lesions

Overall in our study, sonomammography alone was more accurate in diagnosis of benign breast pathologies, while mammography alone was more accurate for malignant pathologies. But accuracy of mammography decreases dramatically in mammographically dense breasts. Combining both these modalities increases diagnostic accuracy for both benign and malignant pathologies.

Discussion

In this study, we prospectively studied 53 adult female patients with palpable breast lump with mammography, sono-mammography, and Fine-needle aspiration cytology. The results of all three were correlated at the end of study. Because of the low sensitivity of the mammography in younger women due to dense breast tissue and low incidence of breast carcinoma in women less than 40 years, we included only women over 35 years of age in our study.

The role of mammography in patients with palpable breast lumps is to show a benign cause for palpable abnormality and to avoid further intervention, to support earlier intervention for a mass with malignant features, screen the remainder of the ipsilateral and contralateral breast for additional lesions, and to assess the extent of malignancy when cancer is diagnosed.^[7] However, 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%.^[9] Multiple studies have shown that the false negative rate for a combined mammographic and sonographic evaluation varies from 0% to 2.6%.^[10-11] Additional imaging with sonography is appropriate in most instances, with the exception of lesions that are mammographically highly indicative of malignancy, in which sonographic imaging would not add any additional information. Sonography may obviate the need for intervention by showing benign causes of palpable abnormalities such as cysts, benign intra mammary lymph nodes, extravasated silicon and superficial thrombophlebitis of the breast.^[10-11]

Mahesh K. Shetty et al, has conducted a study to evaluate the role of combined mammographic and sonographic imaging in patients with palpable abnormalities of the breast in 401 consecutive cases. 40.1% had a benign assessment; 58.7% of the benign lesions were visible on both mammography and sonography; 40% of benign lesions were mammographically occult and identified at sonographic evaluation. In 14.6% cases, imaging evaluation resulted in a suspicious assessment; 28.5% of these lesions were histologically proved to be carcinoma. 45% had negative imaging assessment findings; 12 patients with negative imaging findings underwent biopsy, and all had benign findings. The sensitivity (14 of 14) and negative predictive value (186 of 186) for a combined mammographic and sonographic assessment were 100%.^[12] In our study, 83.01% were benign lesions among 53 patients and out of which 77.27% of the lesions 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. Out of 9 malignant lesions, mammography individually detected 7 and USG detected 5 cases. But when these modalities combined, there was 100% detection of the cancer. About 22% malignant lesions were occult in mammography, which were detected in USG. Combined mammographic and sonographic assessment was shown to be very helpful in identifying benign as well as malignant lesions causing palpable abnormalities of the breast.

Skaane P et al, evaluated mammographic and ultrasound findings of 355 malignant breast tumours among 2,985 consecutive patients who underwent breast ultrasound were compared with clinical findings and pathologic subtypes of the tumours. They found a total of 97.5% of the palpable and 67.9% of the nonpalpable malignant neoplasms were detected as tumours on US. A negative predictive value of 100% in palpable and 96% in nonpalpable tumours was achieved using strict ultrasound criteria.^[13] In our study, the sensitivity of the USG to detect the malignant lesion is 55% in both palpable and nonpalpable breast lesion and specificity is 97.7%. The negative predictive value is 91.4%.

Thomas M. Kolb et al, found sensitivity, specificity, negative and positive predictive values, and accuracy of mammography were 77.6%, 98.8%, 99.8%, 95.8%, and 98.6%, respectively; and those of USG was 75.3%, 96.8%, 99.7%, 20.5%, and 96.6%, respectively.^[14] In our study, the sensitivity, specificity, NPV and PPV of mammography are 77%, 97.7%, 95.5% & 87.5% respectively. The sensitivity, specificity, NPV and PPV values of USG are 55%, 97.7%, 91.4% & 83.3% respectively.

Therefore, Sonography is complimentary to mammography in patients with palpable abnormalities;

its superiority over mammography is in being able to show lesions obscured by dense breast tissue and in characterizing palpable lesions that are mammographically visible or occult. Mammography is complimentary to sonography because of its ability to screen the remainder of the ipsilateral and contra lateral breast for clinically occult lesions.

Conclusion

Mammography and Sonomammography are individually effective diagnostic modalities for detection of breast cancer. Detection of breast carcinoma is higher by mammography in comparison to Sonomammography; however, the accuracy significantly improves when both methods are combined. Sonomammography is better in comparison to mammography for detecting lesions in mammographically dense breast.

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