

Role of Sonography and Digital Mammography in Diagnosis of Clinically Palpable Breast Lumps with Fnac Correlation

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Abstract

Introduction: Screening and diagnostic efforts for breast cancer are critical because the disease has a high rate of successful outcomes with early identification and treatment. The mammography (MG) and Ultrasonography/ultrasound (USG) are individually effective diagnostic modalities for detection of breast pathologies.

Materials and Methods: A prospective study on 100 patients carried out to evaluate breast lesions using digital Mammography and ultrasonography (USG) independently and in combination with fine-needle aspiration cytology (FNAC) correlation at Coimbatore medical college Hospital

Results: In case of benign lesions, mammography had a sensitivity of 56.75%, specificity of 100% and positive predictive value of 100%. USG showed sensitivity, specificity and positive predictive value of 97.30%,92.3% and 97.29% respectively. Sensitivity for combined approach was 97.30% and specificity was 100% and positive predictive value was 100%. 84.61% of malignancy cases were detected by mammography while with USG we diagnosed 92.30% cases and combination of both modalities diagnosed up to 100% cases. In case of malignant lesions sensitivity of mammography was 84.4% specificity was 94.59% and positive predictive value was 84.61%. Sensitivity of USG was 92.30% and specificity was 97.29% positive predictive value was 92.30%.

Conclusion: In case of malignancy although mammography was believed to be more sensitive screening method than USG but in context of palpable malignancies targeted USG is definitively better and combination gives further better results.

Keywords: mammography, FNAC, benign breast lesions, malignant breast lesions

Date of Submission: 13-01-2020

Date of Acceptance: 29-01-2020

I. Introduction

Breast cancer affects women both in the developed and the developing world. As per WHO, breast cancer accounts for 2.09 million cases and 627000 deaths globally¹. It is the most common cancer in women in India and accounts for 14% of all cancers in women². It can occur at any age but the incidence rates in India begin to rise in the early thirties and peak at ages 50-64 years. The incidence of breast cancer is increasing in all countries of the world especially in developing countries such as India, especially in metropolitan cities because of change in lifestyle of women, alcoholism, delayed parity and intake of hormone replacement therapy. Mammography & sonomammography are widely used for the radiological evaluation of breast lumps. Both these procedures can be used individually or in adjunction to each other for the detection of nature (benign or malignant) of breast lump. Mammography has been the basic imaging method in breast diagnostics, and the only tool suitable for screening breast cancer. Mammography is still the first line of the imaging investigation. MG is the most commonly used imaging method and is the only currently known means of proven effectiveness, especially in patients with nonpalpable carcinoma^{3,4}. The aim of interpreting mammograms is to find asymmetric densities, mostly circular or stellate lesions; parenchymal contour changes; architectural distortion and micro calcifications with or without associated tumor, which may indicate breast malignancy⁵. The sensitivity and specificity of mammography in detecting breast cancers are highly dependent on the composition of the breast parenchyma. Detection of cancer is difficult in patients with dense breast parenchyma (young, pregnant or lactating patients and patients on HRT) and mammographically non calcified tumours. A definite differentiation between cyst and tumours is also not possible in most of the cases^{6,7}. In response to these diagnostic deficiencies of mammography various modalities have been evaluated for the diagnosis of the breast cancer, including light-scanning, thermography, ultrasonography (US), isotope scanning, digital subtraction angiography, computed tomography and MR imaging, USG and MR being the most reliable of these. The easy availability, cheapness,

portability and low technical requirements have made USG the most important adjunct to mammography in patients with breast lumps with normal or inconclusive mammographic findings.

II. Material and Methods

This cross-sectional, prospective, hospital-based study was carried out at Department of General surgery in Coimbatore medical college Hospital (Tamil Nadu) from January 2019 to January 2020.

A total 100 females of aged ≥ 18 , years were included this study

Study Design: Prospective open label observational study

Study Location: This was a tertiary care teaching hospital based study done in Department of General surgery in Coimbatore medical college Hospital (Tamil Nadu)

Sample size: 100 patients.

Subjects & selection method: The study population was drawn from patients presenting to General Surgery OPD with complaints of breast lump on clinical examination/self-examination

Inclusion criteria:

- Age >18
- Patients presenting with palpable breast lump

Exclusion criteria:

- Pregnant women
- Patients with bleeding diathesis
- Ulcerated and fungating breast
- Moribund patients
- Proven cases of malignancy
- Male patients

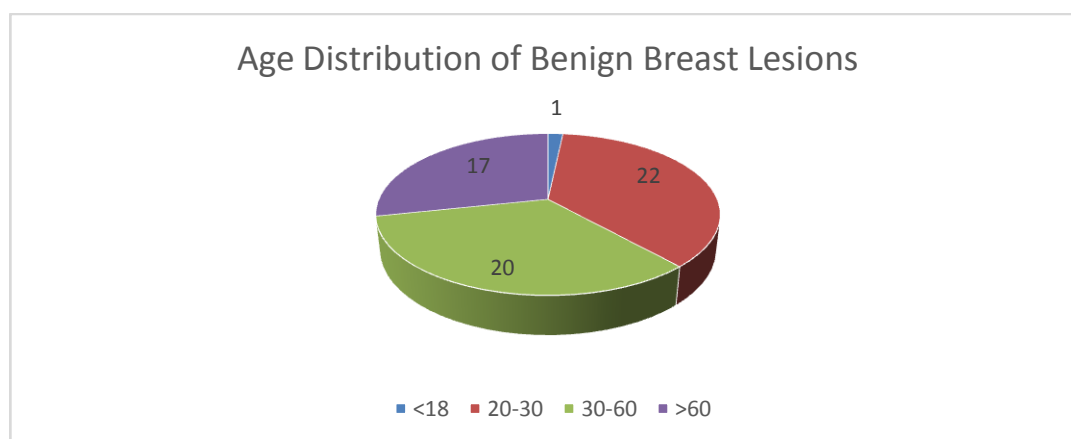
Procedure methodology

A total of 100 patients were studied. Study tools were MG machine and USG machine. MG was performed in a standing or sitting position in combination with mammographic X-ray tube assembly with compression paddle. Mediolateral oblique and craniocaudal images were obtained and assessed carefully. USG was performed on a 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 MG, the site of the lesion, margin of the lesion, surrounding halo, clustered microcalcification, surrounding parenchymal distortion, and thickening of the skin.

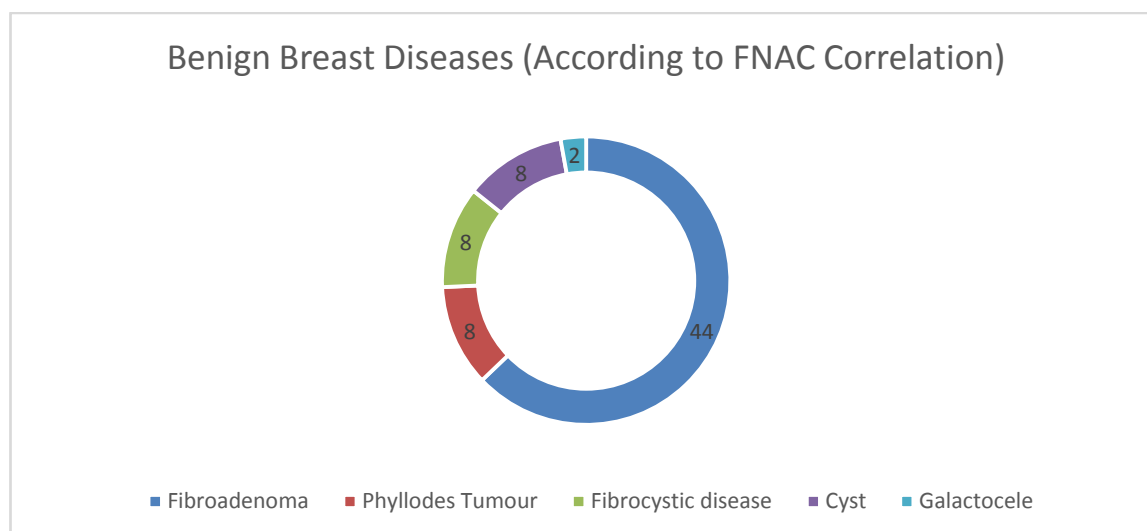
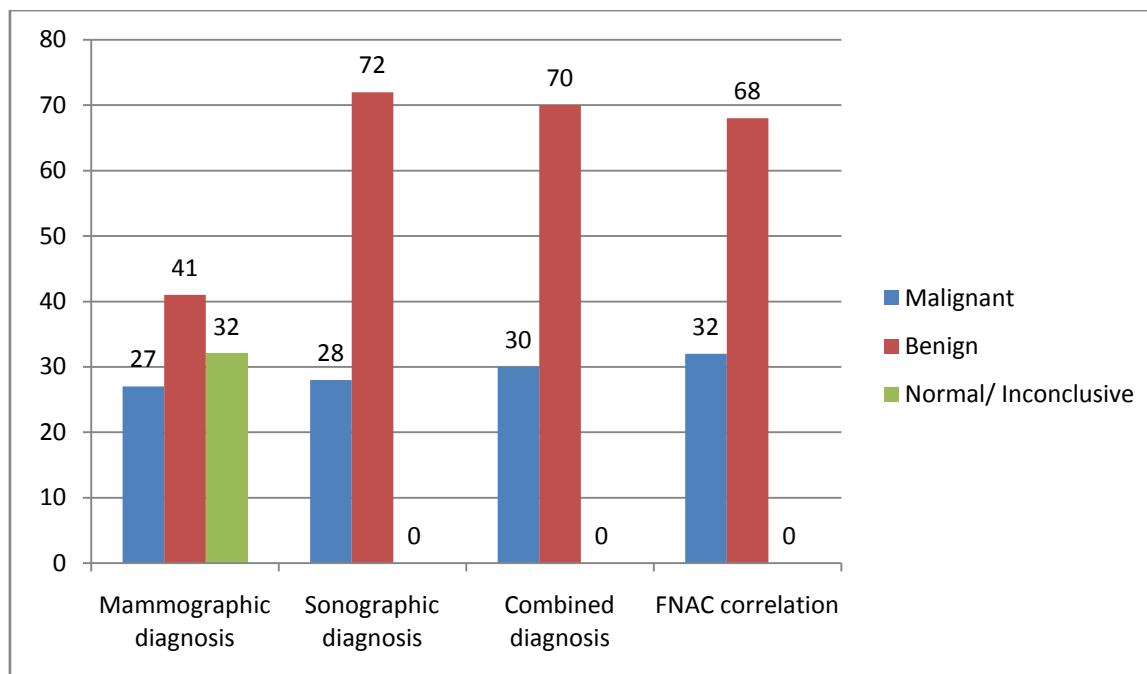
(b) On USG, the size, shape, margins, echo texture, homogeneity of internal echoes, lateral shadowing, posterior effect, calcification, infiltration across tissue space, and surrounding fat were studied. Data were collected and statistically analyzed, and suitable test of significance was applied

III. Result



Mammographic diagnosis	Malignant	27
	Benign	41
	Normal/ Inconclusive	32
Sonographic diagnosis	Malignant	28

	Benign	72
	Normal/ Inconclusive	0
Combined diagnosis	Malignant	30
	Benign	70
	Normal/ Inconclusive	0
FNAC correlation	Malignant	32
	Benign	68



IV. Discussion

A total of 100 females with breast lumps were subjected to Mammography and Ultrasonography with the aim to detect characteristic benign or malignant pattern in breast lumps. The findings were then compared with FNAC reports. Breast is the organ most versatile in producing malignant as well as benign neoplasms with overlapping clinical and radiological manifestations. X-ray mammography is the gold standard imaging technique which can reliably detect clinically occult breast cancer before it grows large enough to become palpable. Microcalcifications which represent the most sensitive sign of early breast cancer can be easily detected on mammography. One drawback is its limited role in dense breasts. It also cannot differentiate between cysts and solid masses. Ultrasonography is the most useful supplement to mammography for examining palpable breast masses and is used to differentiate cystic from solid masses. It also yields the most

accurate determination of breast cancer size and nodal status. It has the additional advantage of being simple, time saving, safe, non-invasive, inexpensive & readily available

Age and Sex Distribution:

Hormonal factors play an important role in many benign pathologies with highest frequency of lumps in the age group of 31- 40 years. Maximum number of benign cases was in age group of 31-40 years while malignant cases were maximum in above 60 years' age group.

Benign Lesions:

Total Number of Benign cases in our study were 68 (68%), according to FNAC correlation. Most common age group was 31-40 years. Fibroadenoma was most common accounting for 44 patients (64%). Our Results are similar to study done by Haagensen CD 1986⁹. On USG we were able to detect all (100%) fibroadenomas, 12 cases more than mammography. Most of these are young patients. So USG is definitively better for diagnosis of fibroadenomas, mainly in young patients with dense breast on mammography. Other benign lesions we encountered i.e. cysts, fibrocystic disease and galactocele do not have characteristic mammographic features. Out of these, fibrocystic disease formed 8% (8 cases), Phyllodes tumor 8% (8 cases), cyst 6% (6 cases) and galactocele 2% (2 case) of all cases. Cysts were characterised on mammography by round (66%) to oval (33%), smooth marginated (100%), hyperdense (100%) lesions. In USG, cysts were seen as round (66%) to oval (33%), smooth marginated (100%), anechoic (100%) lesions with posterior acoustic enhancement (100%).

Malignant Lesions

Most common mammographic presentation of infiltrating carcinoma was hyperdense (100%) mass with spiculated (46.15%) or irregular (46.15%) margins. Obscured margins seen in 7.69% cases. Microcalcification was seen in 53.84% of cases. Nipple retraction was seen in 53.84% and skin thickening in 30.76% of cases. On sonography all infiltrating carcinomas were seen as hypoechoic, heterogeneous masses with irregular margins. 61.54% cases have L/AP ratio less than 1. Majority of masses were irregular in shape (53.84%) followed by oval (23%), round (15.38%) and lobulated (7.69%). Posterior acoustic attenuation was seen in 92.30% cases. Calcification was detected in sonography in 23% cases which is significantly lower than mammography. 84.61% cases showed axillary lymphadenopathy indicating disease was in advanced stage. Hilum of these lymph nodes was destroyed indicating these were metastatic nodes. These nodes were also firm on pressure as applied by probe indicating their malignant nature.

V. Conclusion

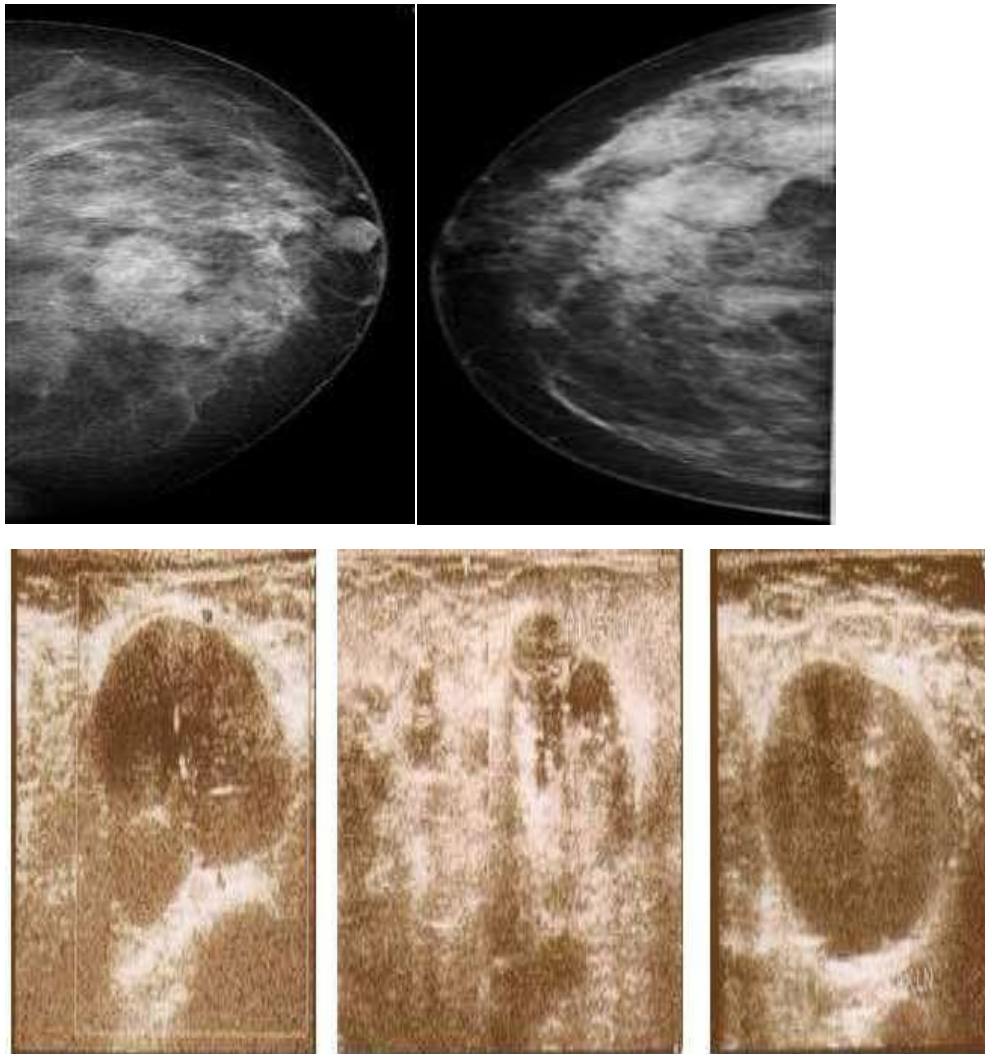
Breast ultrasonography has evolved tremendously and gained clinical acceptance over the decades. Contrary to the previously held belief that it is only capable of detecting palpable breast cancer, ultrasonography can now detect not only early tumors under 1 cm in diameter but also intraductal tumor components using high-resolution real-time systems^{10,11}. This claim, however, cannot be generalized as the accuracy of breast ultrasonography depends on the operator's experience and equipment used (rates range from 58% to 95.7%) We studied 100 patients of breast lumps by mammography and USG and combination of both of them. Findings of these cases were correlated with FNAC findings statistically. Results were as follows: -

1. Out of 44 cases of Fibroadenoma, mammography detected 68.18% cases while USG detected 100% cases and hence combined modality able to diagnose 100% cases.
2. Mammography diagnosed only 33% cases of cystic disease but USG diagnosed all cases of cysts (100%). So we can say fluid filled pathology like cystic disease and fibrocystic disease USG is better than mammography
3. In case of benign lesions, mammography had a sensitivity of 56.75%, specificity of 100% and positive predictive value of 100%. USG showed sensitivity, specificity and positive predictive value of USG in our study was 97.30%, 92.3% and 97.29% respectively. Sensitivity for combined approach was 97.30% and specificity was 100% and positive predictive value was 100%.
4. 84.37% of malignancy cases were detected by mammography while with USG we diagnosed 87.5% cases and combination of both modalities diagnosed up to 93.75 cases.
5. In case of malignant lesions sensitivity of mammography was 84.4% specificity was 94.59% and positive predictive value was 84.61%. Sensitivity of USG was 92.30% and specificity was 97.29% positive predictive value was 92.30%.

In case of malignancy although mammography was believed to be more sensitive screening method than USG, but in context of palpable malignancies targeted USG is definitively better and combination gives further better results. In this study, it can be seen that ultrasonography is equivalent to x-ray mammography in

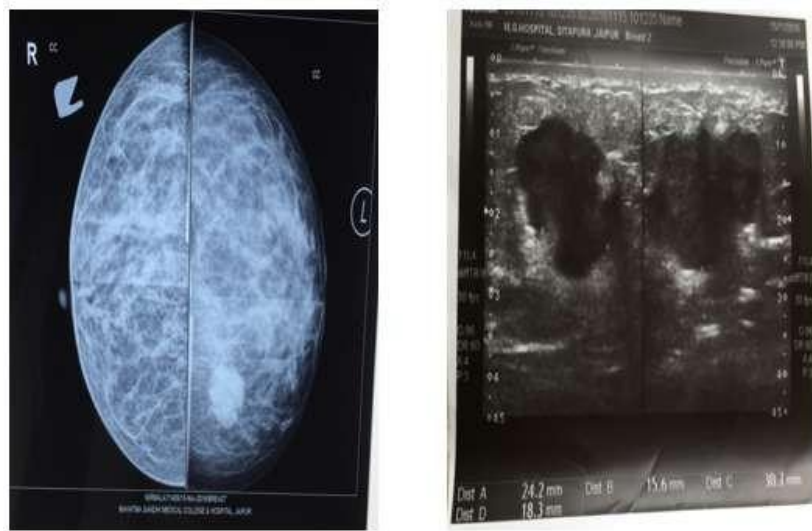
diagnostic accuracy. In its ability to detect small tumor masses (less than 1 cm), ultrasonography was equal to x-ray mammography. The major limitation of ultrasonography was in the diagnosis of associated foci of ductal carcinoma in situ without a palpable mass, owing to its inability to visualize microcalcifications outside a mass. For this reason, ultrasonography has a limited role in breast screening. In conclusion we have demonstrated a high diagnostic accuracy of breast ultrasonography in the diagnosis of palpable breast cancer (sensitivity 97% and specificity 97%) as well as in the evaluation of benign breast conditions. Its role in the evaluation of a palpable breast mass is not only to define the size of a lesion and extent of disease with accuracy but also allow accurate guidance for biopsy.

CASE 1



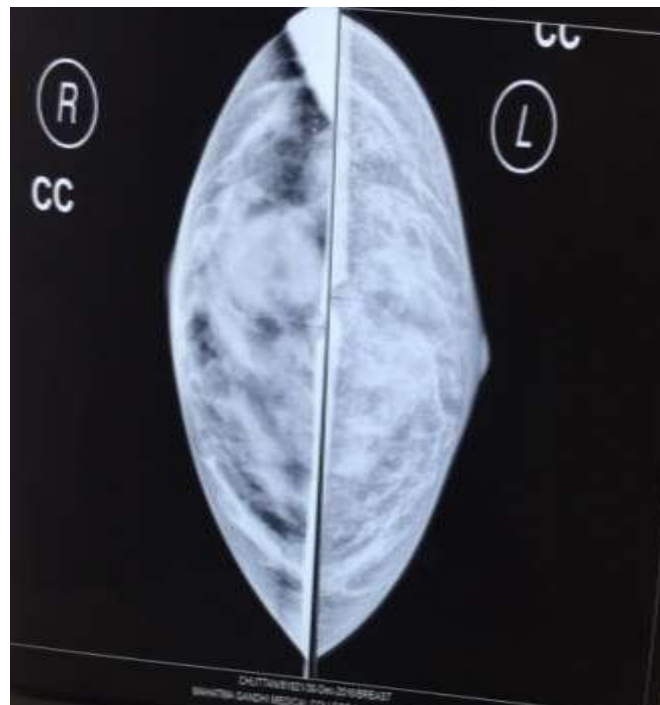
Lobulated mass in upper inner quadrant with microcalcifications on mammogram. Lobulated well defined mass with internal vascularity, satellite lesions and axillary lymph nodes on USG.
FNAC diagnosis : Ductal carcinoma

CASE 2



Lobulated hyperdense lesion with irregular margins in left breast on mammogram.
Ill-defined hypoechoic lesion with irregular margins in left breast at 7 ‘O’ clock position on USG

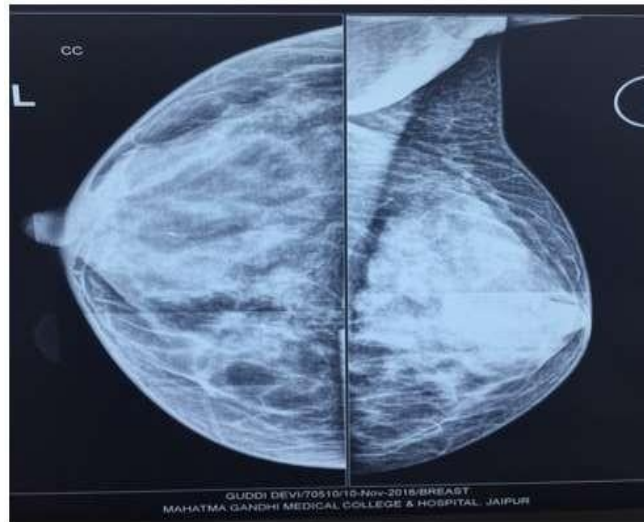
CASE3



Well circumscribed discrete oval mass, isodense to breast tissue in left breast seen in both Craniocaudal And Medio-Lateral Views.

FNACDiagnosis: Fibroadenoma

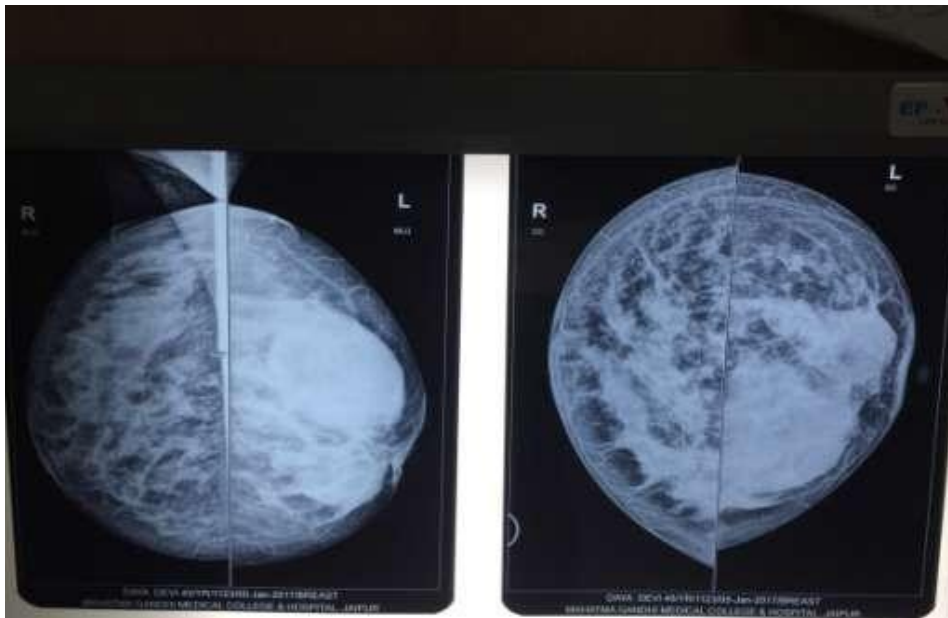
CASE 4

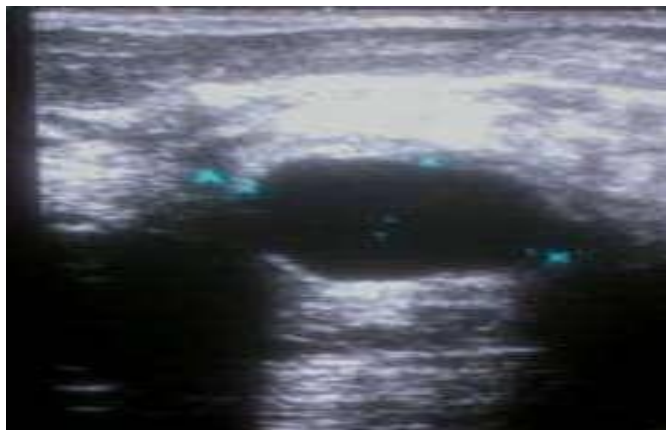


Heterogeneous dense breast parenchyma with partially circumscribed mass in retroareolar region of left breast on mammogram.

FNAC –Fibrocystic disease of breast.

CASE 5





Two well defined hyperdense rounded lesions in left breast on mammogram
Well-defined anechoic rounded lesion with posterior acoustic enhancement on USG. On FNAC- Breast cyst/
Abscess. Pus like fluid was aspirated.

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Dr.T.Srinivasan Ms. "Role of Sonography and Digital Mammography in Diagnosis of Clinically Palpable Breast Lumps with Fnac Correlation". *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(1), 2020, pp. 34-41.