



Mammogram and Ultrasound Evaluation of Breast Lesions with Fnac Correlation

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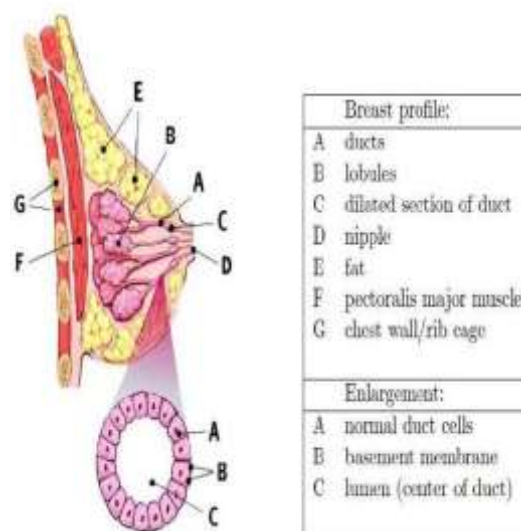
I. AIMS AND OBJECTIVES

1. To study the mammographic and ultrasonographic characteristics of breast lesions in patients.
2. To categorize the detected breast lesions according to BI-RADS.
3. To correlate the categorized breast lesions (BI-RADS) with FNAC.

II. INTRODUCTION AND BACKGROUND

- Breast cancer is the most prevalent cancer among women worldwide causing increased mortality.
- USG along with mammography plays an important role in distinguishing benign lesions from malignant lesions.
- TOPOGRAPHIC ANATOMY
- The breasts lie entirely within the superficial fascia of the chest wall. The retromammary space, separates the superficial and the deep fascia. It extends from the second rib (superiorly) up to the sixth or seventh costal cartilage (inferiorly) and from the sternal edge (medially) and the mid axillary line.
- The maximum amount of fibro-glandular tissue is within the upper outer quadrant which also gives rise to the axillary tail of Spence.

Fig. 1 Anatomy of Breast



CRITERIAS ON USG:

To be classified as benign, a nodule has to have no malignant characteristics and it should also demonstrate 1 of the 3 following combinations of benign characteristics:

- a. Intense uniform hyperechogenicity.
- b. Longitudinal more than anteroposterior diameter or ellipsoid (parallel) orientation along with a thin, echogenic peripheral capsule.
- c. Few lobulations (≤ 3 in number) with a thin echogenic capsule.

To be classified as malignant, the lesion requires to have any of the following characteristics:

- a. Spiculated contour
- b. Antero-posterior diameter more than longitudinal diameter
- c. Angular margins



- d. Marked hypoechogenicity
- e. Posterior acoustic shadowing
- f. Punctate calcifications (Amorphous)
- g. Duct extension
- h. Branch pattern or microlobulation.

CRITERIAS IN MAMMOGRAPHY-

- All lesions with high density , spiculated margins and & fine pleomorphic type of calcification in mammography were found to be positive for malignancy.
- Low density fat containing lesions are usually benign.

Calcifications that are of intermediate concern-

1. **AMORPHOUS CALCIFICATIONS:** Calcifications that are proven to be highly suspicious for malignancy.
2. **FINE, LINEAR OR BRANCHING CALCIFICATIONS:** These are linear, rod-like calcifications which are classically seen in malignancy.
3. **PLEOMORPHIC CALCIFICATIONS:** Micro calcifications of various sizes and shapes that are distributed in clusters.

III. MATERIALS & METHODS

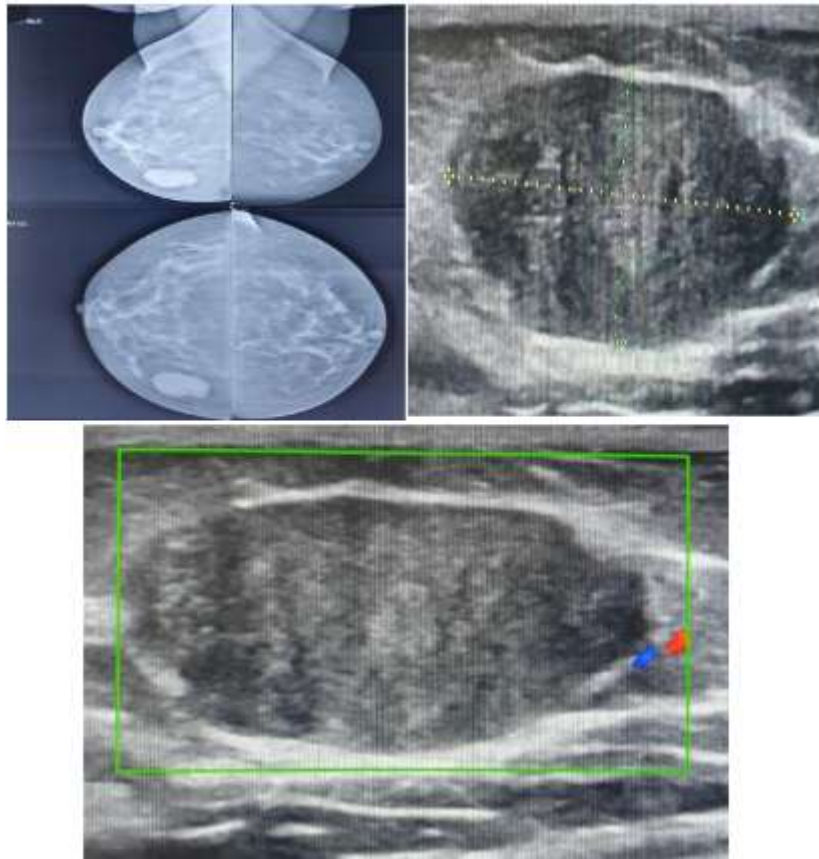
STUDY CENTRE	Department of Radiodiagnosis , HI-TECH Medical College, BHUBANESWAR, ODISHA
STUDY DESIGN	Prospective study
METHODOLOGY (MATERIALS AND METHODS)	<ul style="list-style-type: none"> • females fulfilling the inclusion & exclusion criteria were enrolled in the study. These patients were subjected for mammography & USG examination in SAMSUNG HS70A & PHILLIPS affiniti 70G machine. • Study was carried out from 1st August 2023 to 31st July 2024.
INCLUSION CRITERIA	<ul style="list-style-type: none"> • Females more than 30 years coming for routine breast screening, found to have BI-RADS 2 and above. • Females more than 30 years associated with lump or nodularity in the breast. • Females more than 30 years with complaints of pain in the breast. • Females with history of nipple discharge.
EXCLUSION CRITERIA	Females unwilling to give the consent for the study, Pregnant female , breast feeding female.
SAMPLE SIZE	66

REPRESENTATIVE IMAGES

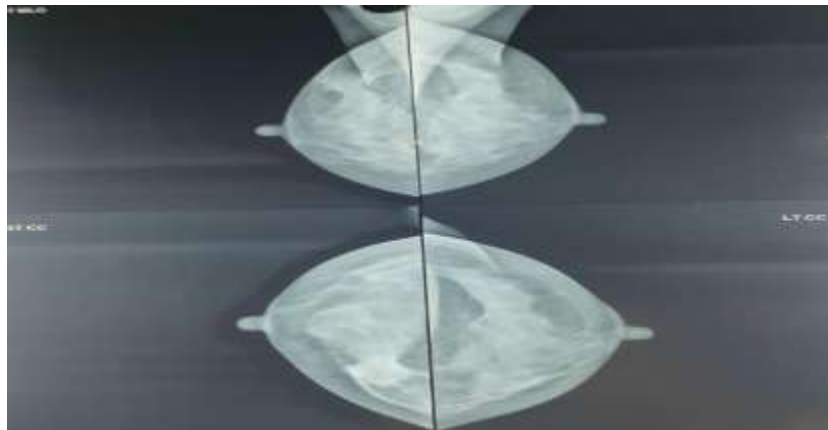
CASE 1

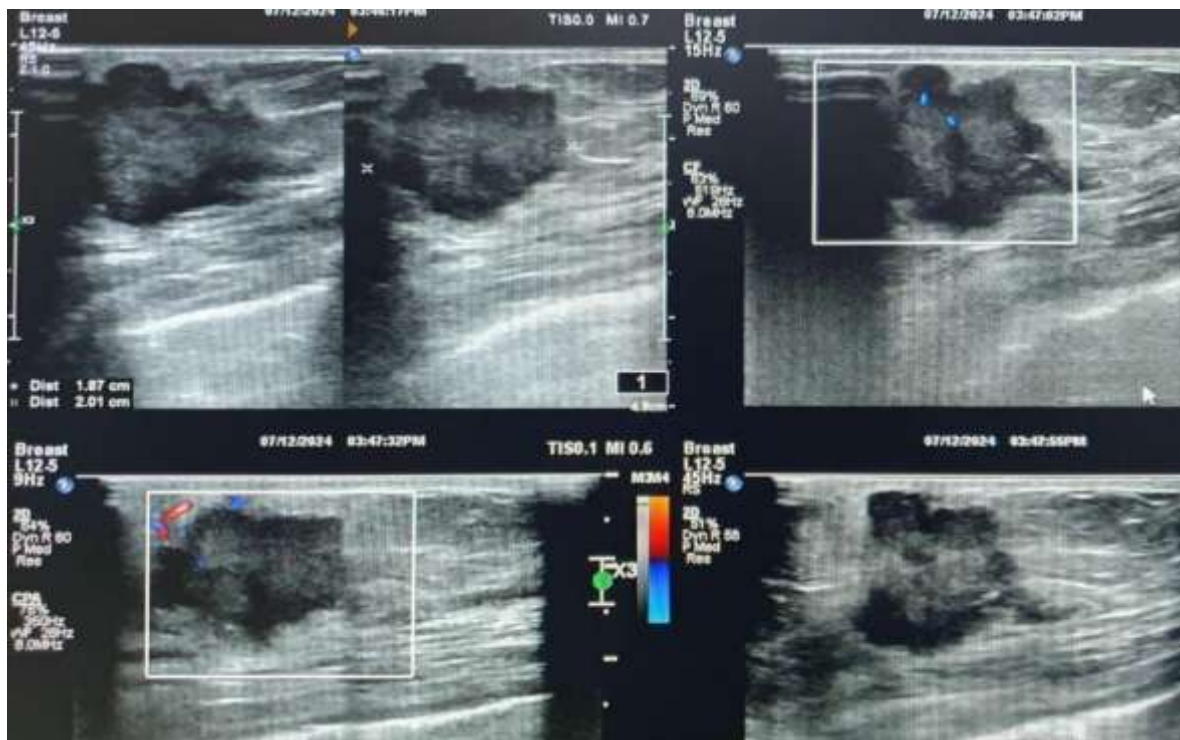
- 37 year female presented with lump in right breast with mild pain.
- Mammography revealed well defined oval ,circumscribed radiodense lesion in the infero-medial quadrant of right breast.

- USG correlation showed an well defined oval isoechoic solid lesion of size 23 x 15 mm ~ 31 mm from right nipple , lesion is wider than taller with circumscribed margin & mild peripheral vascularity . BIRADS III
- ON FNAC correlation showed this is a case of fibroadenoma.



CASE 2

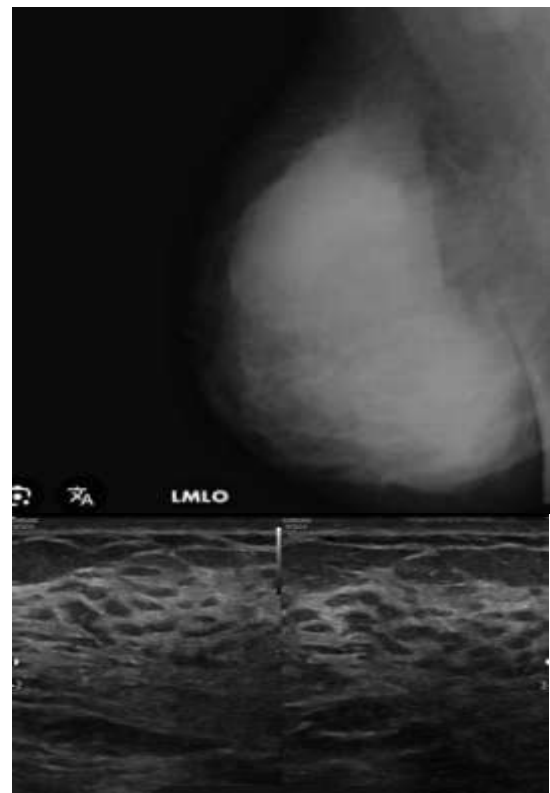




40 year female presented with hard lump in right breast not associated with pain .

- Mammography showing irregular radiodense lesion seen in right supero- medial quadrant .
- ON USG correlation it showed an irregular hypoechoic solid lesion of size ~ 31x 27 mm ~ 38 mm from right nipple, lesion is taller than wider with sharply angulated margin seen in 2 o clock position. internal vascularity seen. BIRADS- IV C
- FNAC correlation showed ductal carcinoma of right breast.

CASE 3



Lumpy left breast with cyclical mastalgia since 4 months in a 30 year female.

- Mammogram shows generalized increased density in left breast. No focal lesions seen.



- USG Shows increased fibroglandular tissue with no focal lesions seen. - FIBROADENOSIS - BIRADS II

CASE-4

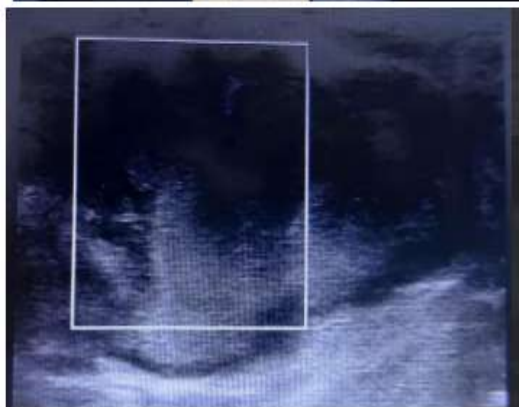
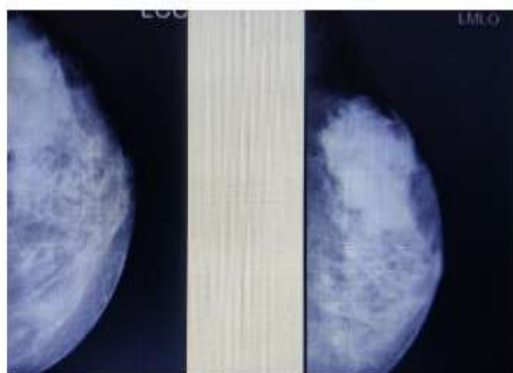
40 year female presented with fever, pain & lump in left breast.

An ill defined radio opacity at upper outer quadrant of left breast.

- Lobulated thick walled cystic lesion with internal echoes- BIRADS IV
- FNAC- Suppurative inflammatory lesion

IV. OBSERVATION

- All lesions with high density spiculated margins & fine pleomorphic type of calcification in mammography were found to be positive for malignancy.
- Low density fat containing lesions are usually benign.
- Hyperechoic, circumscribed oval lesions are found to be benign.
- Irregular, marked hypoechoic, spiculated margin lesions are found to be malignant on FNAC correlation.



V. DATA ANALYSIS

Distribution of patients based on indication of mammogram

Indication of mammogram	Number	Percentage (%)
Screening	13	19.70
Pain	16	24.24
Lump	28	42.42
Nipple discharge	9	13.64

Distribution of patients based on location of lesion

Location	Number	Percentage (%)
Upper outer quadrant	29	43.94
Upper inner quadrant	09	13.64
Lower inner quadrant	08	12.12
Lower outer quadrant	05	07.57
Central (Retroareolar)	15	22.73

BASED ON MAMMOGRAPHY FINDINGS

Distribution of patients based on mammographic grade of lesion (bi-rads)

Mammographic grade of lesion	Number	Percentage (%)
Benign	30	45.45
Probably benign	10	15.15
Suspicious of malignancy	17	25.76
Highly suspicious of malignancy	09	13.64

Distribution of patients based on density of lesion

Density	Number	Percentage (%)
High density	63	95.46
Low density	2	03.03
Fat containing	1	01.51



Distribution of patients based on margin of lesion

Margin of lesion	Number	Percentage (%)
Well defined	44	66.67
Microlobulated	08	012.12
Indistinct	09	13.63
Spiculated	05	07.58

Distribution of patients based on calcification of lesion

Calcification	Number	Percentage (%)
None	56	84.84
Coarse	01	01.53
Fine pleomorphic	06	09.09
Amorphous	03	04.54

DISTRIBUTION BASED ON USG CHARACTER

Distribution of patients based on echogenicity

Echogenicity	Number	Percentage %
Anechoic	21	31.82
Hypoechoic	38	57.57
Isoechoic	01	01.52
Hyperchoic	01	01.52
Complex cystic	05	07.57

Distribution of patients based on margin of lesion

Margin of lesion	Number	Percentage (%)
Circumscribed	36	54.55
Indistinct	10	15.15
Microlobulated	14	21.21
Spiculated	06	09.09

Distribution of patients based on longitudinal versus anteroposterior diameter ratio

Longitudinal versus anteroposterior diameter ratio	Number	Percentage (%)
Yes	38	57.58
No	28	42.42

DISTRIBUTION OF PATIENTS BASED ON FNAC REPORT

FNAC report	Number	Percentage (%)
Benign	50	75.76
Malignant	16	24.24

Comparison of ultrasonography BI-RADS with FNAC for benign & malignant breast lesions

Parameters	Benign	Malignancy
Positive predictive value	97.09	97.09
Negative predictive value	02.91	02.91
Sensitivity	86.00	95.45
Specificity	95.45	86.75

Comparison of mammographic BI-RADS with FNAC for benign & malignant breast lesion

Parameters	Benign	Malignancy
Positive predictive value	76.00	61.54
Negative predictive value	24.00	38.46
Sensitivity	81.81	75.75
Specificity	71.00	59.00

Combined mammography & ultrasonography BI-RADS with FNAC for benign & malignant breast lesions.



Parameters	Benign	Malignancy
Sensitivity	94.20	96.41
Specificity	97.09	92.20

VI. RESULT

- The combination of the imaging modalities of mammography and ultrasonography gave a sensitivity of 92.3%, specificity 100%, positive predictive value 100% and 96% was the negative predictive value.
- It was concluded that combined imaging modalities of ultrasonography and mammography yielded a better result than with either imaging modalities on its own thereby helping in more accurate characterization of lesions in the breast.
- On mammography, 45% of the patients had benign lesions (BI-RADS 2) in the breast, while it was 13.6% of the lesions were highly suspicious for malignancy (BI-RADS 5).
- Ultrasonography showed 57.6% of patients had benign lesions (BI-RADS 2) in the breast while 12.1% had lesions highly suspicious for malignancy (BI-RADS 5).
- FNAC showed that out of the total 66 lesions, 50 of them were benign and 16 were positive for malignant cells.
- Most number of patients with benign breast lesions were in the age group of 30-40 years
- The highest percentage of patients with lesions positive for malignancy was in the age group ranging from 41-50 years which accounted for 37.5%

VII. DISCUSSION

- The primary role of breast imaging is to detect and characterize abnormality that could represent malignancy.
- Benign proliferative breast disease are the breast conditions where there is more glandular and / or fibrotic tissue than expected for the patient's age & parity . These conditions include fibrocystic disease, adenosis , fibroadenoma , cyst , ductal hyperplasia & papilloma.
- All the breast cancers are believed to arise from TDLU. It is the distal most part of the ductal branching system which opens into the lobule of the gland & is the site of most active cellular proliferation.

- Invasive or infiltrating ductal carcinoma is the most common histologic subtype of breast cancer.
- The mammographic lesions which are either suspicious (BIRADS 4) or highly suspicious (BIRADS 5) for malignancy, all such lesions needs to be subjected for biopsy/FNAC for definitive diagnosis.

VIII. CONCLUSION

- Breast ultrasound is more accurate than mammography in women who are young.
- In women with dense breasts, ultrasound appeared to be superior to mammography and could be used as an appropriate initial imaging test in those women.
- The accuracy of mammograms increased with fatty breasts in older age group.
- If the lesion is found to be 100% benign (BI-RADS 2 category) in USG and mammography, FNAC may be avoided.
- All the lesions which were detected as BI-RADS 5 in either USG or mammography or both were found to be 100 % malignant.
- Combined USG and mammography yielded the best result and can be used as a screening modality to detect malignancy earlier.

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