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RETROSPECTIVE ANALYSIS OF MAMMOGRAM, SONOMAMMOGRAM AND ITS HISTOPATHOLOGICAL CORRELATION AS AN AID FOR DIAGNOSIS OF BREAST LESIONS

Radiodiagnosis

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ABSTRACT

INTRODUCTION: Breast cancer is the most common cancer impacting 2.1 million women each year and also relates to the most cancer related deaths in women. In 2018, it was estimated that 627,000 women died from breast cancer which approximates to 15 % of all cancer related deaths among women [1]. The triple test– clinical examination, mammography and core biopsy helps in differentiating benign and malignant lesions. Histopathological examination is considered being the gold standard test for confirming malignant lesions and forms the basis of management. **AIM:** To assess sensitivity of mammogram with ultrasonography in diagnosing various breast lesions and to correlate the categorized breast lesions (BI-RADS) with histopathology reports and thereby obtain specificity and NPV of evaluation using Mammogram and ultrasonography. **STUDY DESIGN:** Retrospective analytical study. Study Period: July 2018 – July 2019. **METHODS:** The results of ultrasonography and mammography of 72 cases diagnosed clinically with breast lesions over the period of one year in tertiary health care hospital were compared with histopathology reports. **RESULTS:** The mean age of the patients was 45.65 ± 3.19. Our results showed that in histopathology reports in 20 patients (27.78%) were malignant, 51 cases (70.83%) had benign disease and 1 case 1.39% was borderline malignant. Fibroadenoma was the commonest benign lesion whereas infiltrating ductal carcinoma was the most common malignant lesion. Breast Imaging – Reporting and Data System (BIRADS) by mammogram revealed category II in 54.1%, III in 20.8%, IV in 16.6% and V in 8.3%. The specificity of mammography alone in diagnosing malignant breast lesions was 90.1%. When combined (ultrasound and mammogram), the specificity in diagnosing malignant breast lesion was 98.5% **CONCLUSION:** Mammography and sono-mammogram plays an important role in the diagnostic and surgical management of breast lesions with correlative histopathology evaluation. The diagnostic accuracy shows significant improvement when mammogram was combined with ultrasound correlation and thereby improving sensitivity and specificity of diagnosing malignant breast lesions.

KEYWORDS

Mammogram, Ultrasound, Histopathology, BIRADS (Breast Imaging Reporting And Data System).

INTRODUCTION

Breast cancer is the most frequent cancer among women, impacting 2.1 million women each year and also is responsible for the greatest number of cancer related deaths among women. In 2018 it was estimated that 627,000 women died from breast cancer this approximates 15 % of all cancer related deaths among women [1]. In India, breast cancer is the second common malignancy after cervical cancer with incidence rates are roughly 20 per 100,000 women[2].

Benign breast diseases are more common than malignant ones [3]. Clinically the patients mostly present with history of palpable lump in the breast or nipple discharge or may present with pain[4]. All modern literature states that in order to improve cancer survival early detection is crucial. There are two early detection strategies for breast cancer: early diagnosis and screening. Early diagnosis strategies focus on providing timely access to cancer treatment and by improving access to quality diagnostic services. The goal is to increase the proportion of breast cancers identified at an early stage allowing more effective treatment and reducing risks of death. Screening consists of testing women in the specific age group to identify cancers before patients become symptomatic. Triple diagnostic test– clinical examination, mammography and fine needle aspiration cytology (FNAC) helps to differentiate between benign and malignant lesion[5,6]. Histopathological examination is considered gold standard for identifying malignant lesions and aids in developing a suitable management plan for the patient[7].

After mammography was introduced as a screening tool in the diagnosis of breast malignancies, the mortality of breast malignancies has dropped drastically since 1990 [8]. However, the limitation of mammography depends in patients with dense breasts where lesion identification is limited by surrounded fibro-glandular tissue [9] and post –operative patients with excisions of tumors from breasts. Ultrasound plays an important role in differentiating cystic and solid masses. It is helpful in the evaluation of palpable masses which is not visible in mammogram and in young patients who have dense breast and are susceptible to radiation damage [10,11].

The present study is to evaluate the breast lesions according to BI-RADS (Breast Imaging Reporting and Data System) by using two different radiological procedures (non-invasive method) with correlation of histopathology reports (invasive method). The aim of the study is to assess sensitivity of mammogram and ultrasonography in diagnosing benign and malignant breast lesions and to correlate the categorized breast lesions (BI-RADS) with histopathology reports.

MATERIALS AND METHODS

This was a retrospective cross-sectional analytical study performed on patients referred to Department of Radiodiagnosis, Sree Mookambika Institute of Medical Sciences (SMIMS), Kulasekharam for mammogram and sonomammogram study. From July 2018 – July 2019 a total of 204 patients underwent mammography and ultrasound of which 132 patients were diagnosed with a breast lesion. Of these 72 cases underwent histopathological examination. The patient's information was recorded using a checklist. The results of ultrasonography and mammography were compared with the histopathology. We retrospectively reviewed the mammography, ultrasound and histopathological features of these 72 cases. All patients provided informed consent and the study protocol was approved by the institutional ethics committee.

RESULTS

72 patients underwent all three diagnostic tests (Mammogram, Sonomammogram and Histopathological evaluation). The mean age of the patients was 45.65 (±3) years (Table 1). Our result showed that in histopathology reports (20/72) patients i.e. 27.78% were malignant, 51 patients (70.83) had benign disease and borderline malignant in 1 patient (1.39 %) (Table 2). Breast Imaging – Reporting and Data System (BIRADS) by mammogram and ultrasound revealed the categories as follows: BIRADS 2 in (39) 54.1%, BIRADS 3 in (15) 20.8%, BIRADS 4 in (12) 16.6% and BIRADS 5 in (6) 8.33% (Table 4). The specificity, sensitivity and NPV of combined mammogram & sonomammogram in diagnosing breast malignancies was 85.7%, 98.5% and 94.4% respectively (Table 6).

Other findings of mammogram was; anatomical area of breast involved, it was retroareolar in (7) 9.72%, upper outer quadrant in (12) 16.6%, upper inner quadrant in (16) 22.2%, lower outer quadrant in (1)

1.38%, lower inner quadrant in (15) 20.8%, multiple lesions in (11) 15.2%, diffuse involvements in (6) 8.3% and undetected (unable to pick) in (4) 5.5%. In mammogram, calcifications were noted 8.33% in malignant and 5.55% in benign lesions (Table 3).

Table-1: Mean age of study population

Demographic data	MEAN±SD
Age (Years)	45.65±3.19

Table-2: Distribution of cases based on histopathological examination

Histopathological correlation	Number	Percentage (%)
Malignant	20	27.78 %
Benign	51	70.83%
Borderline malignant	1	1.39 %
Malignant		
Invasive ductal Carcinoma	18	25.0 %
Ductal carcinoma in situ	2	2.77 %
Phyllodes - Borderline Malignant	1	1.39 %
Inflammatory lesions		
Granulomatous mastitis	1	1.39 %
Chronic mastitis	4	5.56 %
Duct ectasia	1	1.39 %
Benign proliferative disorders		
Benign epithelial proliferation	3	4.17 %
Fibrocystic disease	2	2.78 %
Benign neoplasm		
Lipoma	2	2.78 %
Fibroadenoma	33	45.83 %
Phyllodes –benign	5	6.94 %

Table-3: Distribution of cases based on mammogram and ultrasound findings

Mammographic findings	**Breast composition**		
	A (entirely fatty)	7	9.7 %
	B (scattered areas of fibroglandular density)	30	41.6 %
	C (heterogeneous dense may obscure masses)	28	38.8 %
	D (extremely dense)	7	9.7 %
	Anatomical area involved		
	Retroareolar	7	9.72 %
	Upper outer	12	16.6 %
	Upper inner	16	22.2 %
	Lower outer	1	1.38 %
	Lower inner	15	20.8 %
	Multifocal lesions	11	15.2 %
	Diffuse involvement	6	8.3 %
	Unable to pick	4	5.5 %
	Calcifications		
	Benign	4	5.5 %
	Malignant	6	8.3 %
	Nothing	62	86.1 %
Ultrasound findings	**Nature of mass**		
	Solid	58	80.5 %
	Cystic	14	19.4 %
	Calcifications		
	In mass	6	8.33 %
	Outside mass	-	-
	Intraductal	3	4.16 %
	Architectural distortion	6	8.33 %
	Colour flow		
	Present	37	51.3 %
	Absent	35	48.6 %

Table 4: Distribution of patients based on mammogram & ultrasound grading of lesion (BI-RADS)

		Number	Percentage
Mammogram findings	Benign	46	63.8 %
	Malignant	15	20.8 %
	Inconclusive	11	15.2 %
Combined mammography and ultrasound BI-RADS scoring	**BI-RADS scoring**		
	2 (benign)	39	54.1 %
	3 (probably benign)	15	20.8 %
	4 (suspicious)	12	16.6 %
	5 (highly suspicious of malignancy)	6	8.33 %
	6 (known biopsy proven case of malignancy)	0	0

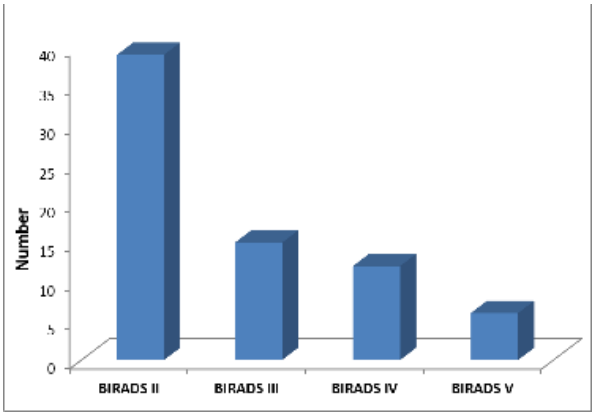

Fig-1: Distribution of cases based on X ray with USG correlation

Table 5: Comparison of mammography diagnosis with histopathology

Parameters	Percentage
Sensitivity	71.4 %
Specificity	90.1 %
Positive predictive value	75.0 %
Negative predictive value	88.4 %

Table 6: Comparison of ultrasound and mammography BI-RADS scoring with histopathology

Parameters	Percentage
Sensitivity	85.7 %
Specificity	98.5 %
Positive predictive value	98.9 %
Negative predictive value	94.4 %

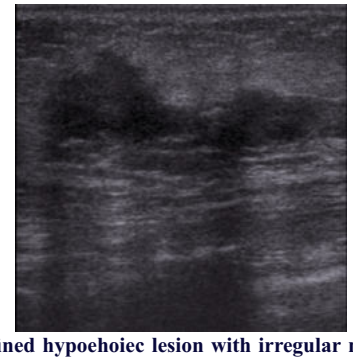

Fig:2 Ill defined hypoehoiec lesion with irregular margin in the lower inner quadrant of right breast shows vascularity - Invasive ductal carcinoma

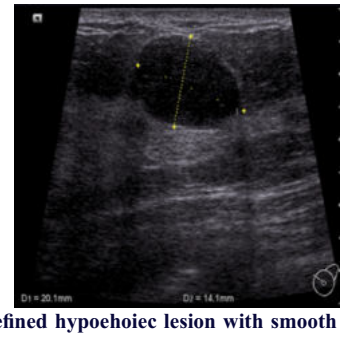

Fig:3 well defined hypoehoiec lesion with smooth margin in the upper outer quadrant of right breast shows minimal vascularity – Fibroadenoma

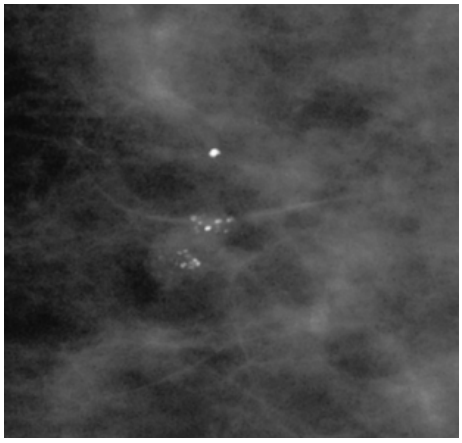

Fig:4 Mammogram shows multiple pleomorphic calcification within a malignant breast lesion

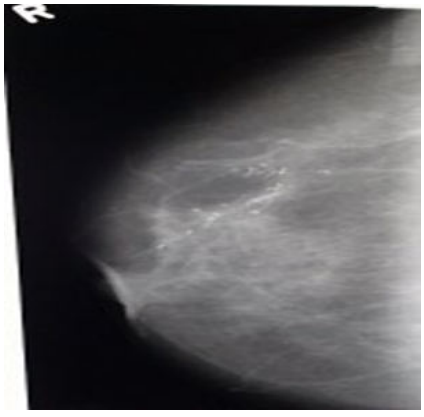

Fig:5 Mammogram shows linear calcification in a case of ductal carcinoma in situ

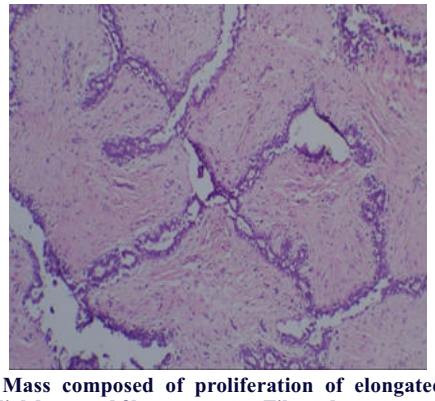

Fig:6 Mass composed of proliferation of elongated, slit-like epithelial ducts and fibrous stroma - Fibroadenoma

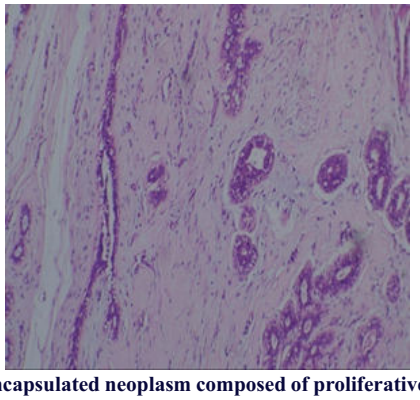

Fig:7 Encapsulated neoplasm composed of proliferative ductules, arranged in intracanalicular and pericanalicular pattern – Benign Phyllodes

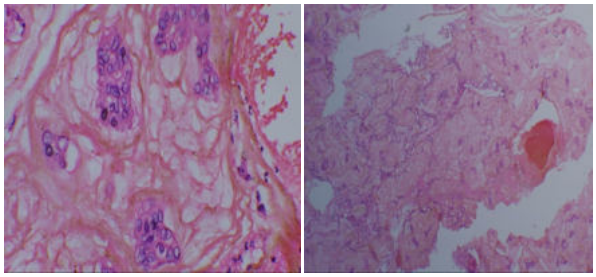

Fig:8 58 year old female with h/o lump in right breast, HPE shows mucinous material composed of tumour cells floating in abundant extracellular mucin. Tumour cells are large with pleomorphic round to oval vesicular nucleus, inconspicuous nucleoli and abundant eosinophilic cytoplasm

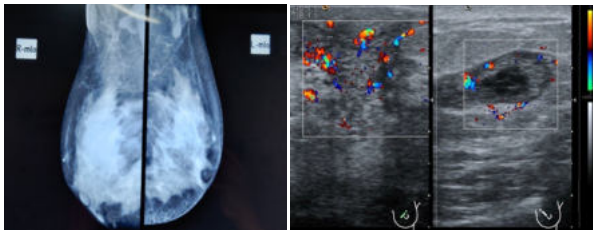

Fig: 9 35 year old female with h/o painful lump in left breast, mammogram shows type D breast. On USG correlation, there is an ill defined hypoechoiec lesion with irregular margins measuring approximately 20 x 5.6 mm noted at 7-8'o clock position of left breast with hyperechogenecity in the surrounding premammary fat region – BIRADS IV

DISCUSSION

Breast lesions are one of the most commonly encountered lesions in clinical practice. In the present study, the frequency of benign lesions was higher than malignant lesions similar to numerous other studies. Among the benign lesions, Fibroadenoma (45.8%) was the commonest benign breast lesions with peak incidence in the 3rd decade of life, as seen in other studies. In the present study, infiltrating ductal carcinoma was the most common type of invasive carcinoma (25.0%). Our findings correlated with studies conducted by other authors.

Hussain MA et al (2018) [12] showed that mammography is the preferred modality in screening breast cancer patients aged more than 35years. For the younger age group, magnetic resonance imaging and ultrasonography is suggested for diagnosis of malignant and benign lesions in patients with high breast density. Ultrasonography is increasing the speed of detection and also reducing the costs. Women above age of 40, mammogram has best results in earliest detection of disease with a higher sensitivity and the results are near to open biopsy.

Shanibi S et al (2017) [13] Mammography screening proves to be an excellent tool in the diagnosis of diseases of the breast. There is a definite relation between the presence of a false positive test and the risk of cancer detection in subsequent screening participations. The association was much clear in false positives involving a cytology examination or biopsy, and in women with a family history of breast cancer.

Mulka A et al (2017) [14] concluded that Mammography can diagnose more malignant lesions than benign because mammography was done after 35 years of age. It showed that majority of non-neoplastic cases are reported in the third decade. Malignant lesions were common after 5th decade. Among the benign lesions, Fibroadenoma (64.30%) was the commonest benign breast lesions followed by fibrocystic disease (13.9%) with peak occurrence in 3rd decade of life. In the present study, infiltrating ductal carcinoma was the most common invasive carcinoma. Comparison of mammographic with pathological diagnosis helps to find the true nature of the lesion. Histopathological study is considered to be the internal quality measure for Cytological and Mammographic diagnosis. The histopathology is considered to be the gold standard test for diagnosis of neoplastic lesions.

Lehman CD et al (2012) [15] studied that ultrasound is the primary imaging modality for the diagnostic evaluation of women between 30

and 35 years of age. Ultrasound has high sensitivity (95.7 %) and high NPV (99.9 %) and should be considered the primary imaging modality of choice. Adjunct mammography may be recommended for particular high-risk cases with a highly suspicious lesion on ultrasound or those with a known gene mutation / strong family history.

Tamaki K et al (2011) [16] commented that histological grading is known to have a strong correlation with clinical outcome in patients with breast cancer. Many factors including ER expression, HER2 status and lymphovascular invasion are clearly demonstrated in histopathological reports which helps in subsequent prognosis of patients with breastcancer. An accurate correlation between mammographic findings and their corresponding histopathological features is considered to be the most important criteria in mammographic evaluation. Mammographic findings provide insights into pathological and biological features, like tumor cell characteristics and cell proliferation which helps in better histological grading.

Yang WT et al (2003) [17] stated that Mammography is the important imaging technique for the detection of ductal carcinoma in situ and a cluster of micro calcifications is the most common finding on a screening mammogram. Sonography can reveal micro calcifications but it is difficult in characterizing the morphology and extent of micro calcifications, particularly when they are in isolation. Therefore, sonography should not be used to replace mammography but can used as an adjunctive tool to increase the sensitivity of mammography.

CONCLUSION

This study showed that mammography along with Ultrasound correlation has improved the sensitivity and specificity when compared with that of evaluation using mammogram alone. So we conclude that addition of sonological assessment of breast to routine mammogram evaluation should be the preferred modality in screening for breast cancer for any age group. For younger patients and also in cases with high breast density as seen in below 30 years, ultrasound increases the speed of detection. For the patients present with breast lump, suspicious for malignancy, mammogram together with ultrasonography should be suggested for differentiating malignant and benign lesions, especially in high-risk women. However, the histopathological evaluation acts as an internal quality measure and is considered to be the gold standard for confirming the BIRADS categorization and in diagnosis of neoplastic lesions.

REFERENCES

1. Guray M, Sahin A. Benign Breast Diseases: Classification, Diagnosis and Management. Oncologist. 2006; 11(5): 435-49.
2. Ibrahim E M, Zeeneldin A A, Sadiq BB, Ezzat AA. Breast Cancer in Saudi Arabia Incidence Developing Country. Medical Oncology. 2008; 25:387 – 393
3. Haagensen CD. The basis forthe histologic grading of carcinoma of the breast. Amer. Cancer 19 (1933), 235. Diseases of the breast. WB Saunders Co., Philadelphia and London: 1956.
4. Dixon J M, Mansel RE.ABC of breast diseases. Symptoms assessment and guidelines for referral. BMJ. 1994; 309(6956):722-26.
5. Kreuzer G, Boquoi E. Aspiration biopsy cytology, mammography and clinical exploration: a modern set up in diagnosis of tumors of the breast. Acta Cytol. Jul-Aug1976; 20(4):319-23.
6. Hermansen C, Skovgaard Poulsen H, Jensen J, Langfeldt B, Steenoskov V, Frederiksen P, Myhre Jensen O. Palpable breast tumors: "triple diagnosis" and operative strategy: Results of a prospective study. Acta Chir Scand.1984;150(8): 625-28.
7. Hari S, Srivastava A, Thulkar S. Scope of Breast Imaging in Developing Countries.NJR. 2013;vol 3(2):11-30.
8. Lee CH, Dershaw DD, Kopans D, Evans P, Monsees B, Monticciolo D, et al. Breast cancer screening with imaging: Recommendations from the society of breast imaging and the ACR on the use of mammography,breast MRI, breast ultrasound, and other technologies for the detection ofclinically occult breast cancer. J Am Coll Radiol 2010;7:18-27.
9. Weidner N, Semple JP, Welch WR, Folkman J. Tumor angiogenesis andmetastasis - Correlation in invasive breast carcinoma. N Engl J Med 1991;324:1-8.
10. Berg WA, Gutierrez L, NessAiver MS, Carter WB, Bhargavan M, Lewis RS et al. Diagnostic accuracy of mammography, clinical examination, US, and MR imaging in preoperative assessment of breast cancer. Radiology 2004;233:830-49.
11. Kerlikowske K, Smith-Bindman R, Ljung BM, Gardy D. Evaluation of abnormal mammography results and palpable breast abnormalities. Ann Intern Med 2003;139:274-84.
12. Hussain MA, Alhamami QS, Almetlag MH, Alyami AR, Al Hashan GM. Correlation of Ultrasound & Mammography to Histopathology Results in Breast Cancer. A One Year Study at King Khalid Hospital, Najran, Saudi Arabia. The Egyptian Journal of Hospital Medicine. 2018 Apr 1;71(2):2603-9.
13. Shanibi S, Rajamma CK. Mammography Correlated with Histopathology in the Diagnosis of Mass Lesions of the Breast in a Tertiary Teaching Hospital: An Analytical Study. International Journal Of Scientific Study. 2017 Jun 1;5(3):252-6.
14. Mulka A, Kotasthane VD, Dhaka R, Kotasthane DS. Correlation of Histopathological Study of Breast Lesions with cytology and mammography as a measure of internal quality and diagnostic accuracy. Annals of Pathology and Laboratory Medicine. 2017 Jul;4(4):A397-402.
15. Lehman CD, Lee CI, Loving VA, Portillo MS, Peacock S, DeMartini WB. Accuracy and value of breast ultrasound for primary imaging evaluation of symptomatic women 30-39 years of age. American journal of roentgenology. 2012 Nov;199(5):1169-77.
16. Tamaki K, Ishida T, Miyashita M, Amari M, Ohuchi N, Tamaki N, Sasano H. Correlation between mammographic findings and corresponding histopathology: potential predictors for biological characteristics of breast diseases. Cancer science. 2011 Dec;102(12):2179-85.
17. Yang WT, Tse GM. Sonographic, mammographic, and histopathologic correlation of symptomatic ductal carcinoma in situ. American Journal of Roentgenology. 2004 Jan;182(1):101-10.