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RESEARCH ARTICLE

RADIOLOGICAL TESTS VERSUS PATHOLOGICAL DIAGNOSTICS: COMPLIMENTARY OR ANTAGONISTIC RELATIONSHIP- AN INSTITUTIONAL EXPERIENCE

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Abstract

Aims & Objective: To determine the yield, reliability and diagnostic accuracy of Breast Imaging Reporting and Data System in evaluation of breast lesions taking histopathology as gold standard.

Material and Methods: This cross-sectional, analytical study was conducted at Pathology dept. Of SMSMC Jaipur from June 2019 to June 2020. The data of the core needle biopsies of breast lesions received at the Pathology department which had been also categorized on mammogram, according to the Breast Imaging Reporting and Data System (BI-RADS), were selected for the study. All clinical parameters, the site of the biopsy, the radiological findings, the pathological diagnoses were studied. The concordance between the radiological and pathological results was studied . According to BI-RADS, categories II and III were classified as benign and BI-RADs IV and V as malignant. The breast core biopsies were classified as benign and malignant, according to the diagnosis.

Results: A total of 115 patients were included in the study. BI-RADS system for reporting whencompared with histopathology had sensitivity of 93.55%, specificity 68.18%, positive predictive value92.55%, negative predictive value 71.43% and diagnostic accuracy 88.70%.

Conclusion: The findings of this study report a high diagnostic accuracy of BI-RADS in the diagnosis ofbreast carcinoma.

Introduction:-

Breast cancer incidence in India is increasing and has nowbecomethemostcommon cancer among women, surpassing cervical cancer in all the urban cancer registries (1)**.**It commonly affects women older than 40 years of age. However, younger women can also be affected.

Patients mostly present in breast clinics with Breast lump as one of the commonest complaints (2).

As approximately 10% of breast masses ultimately lead to a diagnosis of breast cancer, so a woman with a breast lump requires a multi-dimensional approach. An accurate evaluation can maximize cancer detection and minimize unnecessary testing and procedures. Early detection and treatment are a key to preventing breast cancer from spreading (3).

Pathologists and radiologists are integral members of the multidisciplinary team necessary for optimal management of patients with breast carcinoma.

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Sonomammography is non-invasive, easily available, cheaper and accurate tool in diagnosing breast masses. It is very helpful in pre surgical assessment of tumour size of even 2mm.

The American College of Radiology (ACR) created the breast imaging reporting and data system (BIRADS), to achieve trick verbal uniformity so as to get clear, unambiguous and standard language, not only among radiologist but also the treating physicians and surgeons. BI-RADS had 0-6 assessment categories (4)**.**

- Category 0: need additional imaging evaluation
- Category 1: negative
- Category 2: benign finding
- Category 3: probably benign finding; short-interval follow-up suggested
- Category 4: suggestive abnormality; biopsy should be considered
- Category 5: highly suggestive of malignancy; appropriate action should be taken
- Category 6: known biopsy-proved malignancy

Core needle biopsy (CNB) of a suspicious breast lesionhaving suspicious ultrasound and/or mammography findings; and breast lesions with micro calcifications; is a safe and effective tool for diagnosis, grading of breast cancers and forimmuno-histochemical studies. Trucut biopsies can be performed percutaneously or under the guidance of U/S or MRI. Neo-adjuvant chemotherapy can be started in patients after trucut biopsy evaluation without the need for an excisional biopsy or mastectomy (5)**.**Therefore this study is carried out to compare between core needle biopsy and BIRADS to diagnose breast carcinoma.

Aims&Objectives:-

-To evaluate the rates of pathologic and radiologic correlation in breast needle core biopsies,
-To evaluate laboratory and radiology practices associated with greater correlation rates, and
-To measure the rates at which the lack of radiologic-pathologic correlation is documented in pathology reports.

Material&Method:-

Study design:

This cross-sectional, analytical study was conducted at Pathology dept.ofSMS MC Jaipur from June 2019to June 2020. The data of the core needle biopsies (CNB) of breast lesions received at the Pathology department ,reported using the standard NHSBSP criteria (National Health Service Breast Screening Programme) ; which had been also categorized on mammogram, according to the Breast Imaging Reporting and Data System (BI-RADS), were selected for the study. All clinicalparameters, laterality, thesiteofthe biopsy, the radiological findings,thepathologicaldiagnoseswere studied.Theconcordancebetweentheradiologicalandpathologicalresults wasstudied. According to BI-RADS, categories II and III were classified as benign and BI-RADs IV and V as malignant. The breast core biopsies were classified as benign and malignant, according to the histopathological features observed . The variables recorded were the age of the patient, BI-RADS category assigned to the lesions and the histopathological diagnosis of the breast lesions. The diagnosed cases were categorized into benign and malignant. We calculated the frequencies of BI-RADS categories and correlated these with the benign and malignant histopathological diagnosis.

Statistical analysis was performed to compute the sensitivity, specificity, accuracy, positive and negative predictive values of sonomammogram in relation to the BIRADS score taking histopathology as the gold standard.

Results:-

The current study included 115 patients presenting with breast lump. The youngest patient was 16 years of age and the eldest was 79 years of age [Table -1]. Majority of cases were seen in 46-55 years age group followed by 36-45 years age group.

Sonomammogram results categorized according to BIRADS score is given in Table -2.There were no patients in categories 0,1 and 6.There were total of 18 patients(15.65%) in category 2 and 3 revealing benign findings, total of 83 patients (72.17) in category 4 revealing suspicious abnormality and 14 patients in category 5 (12.3%) indicating a high suspicion of malignancy. Findings were considered benign if score was 2 or 3 and malignant if score was 4 or 5. Sonomammography diagnosed 18 (15.65%) cases as benign and 97 (84.34%) cases as malignant.

Distribution of lesions on Histopathological examination are given in Tables- 3 On histopathological examination, 22 lesions (19.13%) were diagnosed as benign with majority being Fibroadenoma and intra ductal papilloma and 93lesions (80.86%) as malignant with majority being Infiltrating ductal carcinoma I (44 cases).

Four lesions that were given a score of 4 on BIRADS i.e., suspicious of malignancy,2 out of them were diagnosed on histopathological examination as Fibrocystic disease with mastitis (Granulomatous Mastitis). And the remaining 2 were diagnosed as Intraductal Papilloma on histopathological examination. These cases thus constituted the false positives in our study. Two cases were given a score of 3 i.e., probably benign on imaging, was diagnosed as Ductal carcinoma in situ, was later confirmed as Infiltrating ductal carcinoma on histopathological examination. These cases constituted the false negatives in our study.

Tables -4 (Figure 1- a, b and Figure 2- a, b) show the comparison of BIRADS scoring with histopathologic findings respectively. Diagnostic accuracy of BI-RADS showed that sensitivity of this reporting system for detection of malignancy was96.774%, specificity was 68.181%, positive predictive value was 92.783%, negative predictive value was83.33% and overall diagnostic accuracy was 91.304% [Table 5]. Overall, NPV was high in our study i.e. if a radiologist reports a lesion as benign, the chance of it being benign on histopathology is 83.33% and in 16.67% it would turn out to be malignant. Table- 5 shows the overall accuracy of sonomammography using BIRADS scoring and histopathological examination in the diagnosis of breast lesions as standard.

Discussion:-

Breast lesions are common in females. Females in developing countries like India, are unaware of breast pathologies and are hesitant to reveal, hence majority are detected usually in advanced stages. Various benign breast lesions like fibroadenomas, breast abscess, galactocele, duct ectasia, enlarged lymph nodes and different malignancies are common pathologies of female breast(6).

Several studies have suggested that sonographic appearance can be useful in differentiating malignant from benign solid breast masses (7).

Our results confirm that BI-RADS scoring system for radiological evaluation of breast lesions is a predictable and pragmatic tool for reporting and managing breast lesions; The sensitivity of BI-RADS in our results was 96.77%, specificity was 68.181%, PPV was 92.783%, NPV 83.33% and diagnostic accuracy was 91.304 %. According to a meta-analysis performed in 1998 the sensitivity of mammography ranged from 83 to 95% and specificity from 93 to 99% (8).

A wide variation in the sensitivity of sonomammogram in the diagnosis of breast lesions ranging from 67% to 97% have been reported (9).

Emine D et al did a study on 546 breast lesions with histopathology analysis, they reported sensitivity and specificity for sonomammogram to be 72.6 and 88.5% (10). In the present study we got comparable results in differentiating benign from malignant masses in sonomammography using the BIRADS lexicon system.

Many of the newer international studies have shown a chronological increment in the predictive value of BI-RADS. These studies have reported a positive predictive value of BI-RADS category 5 to be in the range of 54-92% (11) (12) (13).

One of these studies reported a sensitivity of mammogram to be 90% but specificity to be 19%, PPV of 4% for BI-RADS 3, 15% for category 4 and 75% for category 5 respectively; recommended that BIRADS 3 lesions with microcalcifications should be biopsied, due to association of microcalcifications with malignancy. Another study showed a positive predictive value for categories 3, 4A, 4B, 4C and 5 were, respectively, 3.4%, 10.3%, 11.3%, 36% and 91.7% and an overall PPV of 24.8 % for non-palpable breast lesions (14).

A number of studies have been performed in Pakistan to assess the sensitivity and accuracy of BI-RADS reporting system. The sensitivity of BI-RADS mammogram is reported ranging from 36% to 88%,specificity ranges from 73% to 100%, PPV 64 to 100%, NPV 33 to 93% and diagnostic accuracy 88-90% (15) (16) (17).

A study showed diagnostic accuracy of mammogram in the range of 62-75% for differentiation of benign and malignant lesions according to BI-RADS classification; and reported inter-observer disparity in the analysis of calcification and mass margins (18)

Our findings are comparable to these studies with a diagnostic accuracy of 91.304%.

Hence correlation between Pathology and Radiology remains the cornerstone for the treatment of patients in a hospital setting and participation in multi-disciplinary meetings and together has shown to reduce the false positive and negative reports, thus improving patient care. Latest studies support an integrated reporting system for the two diagnostic disciplines, thus reducing the false positive and false negative cases and improving the diagnostic accuracy of the reporting system as a whole (19).

However, the gold standard test remains the histopathological report which is valid, reproducible and has been accepted as the gold standard worldwide.

Conclusion:-

The practice of needle core biopsy provides the most accurate and optimal diagnostic information. BIRADS classifications and histopathologic results revealed significant correlation and high diagnostic accuracy. True Core Biopsy identification of breast cancers has high correct ratios. BIRADS classification predicts the high suspicion for malignancy in lesions classified as category 5, moderate and low suspicion in lesions classified 4 and 3 respectively. Women with dense breast (in young) is underdiagnosed, abscess with calcification, duct papilloma are sometimes overdiagnosed ,overdiagnosis in case of invasive duct carcinoma lead to psychological distress and over cancer treatment side effects.

However all clinically malignant or suspicious masses should be subjected to histopathological examination which is the gold standard for tissue diagnosis

Tables: -

Table 1:- Age Distribution of Cases.

AGE GROUP	NO. OF CASES	PERCENTAGE%
15-25	11	9.56
26-35	10	8.69
36-45	24	20.87
46-55	38	33.04
56-65	15	13
66-75	11	9.56
>75	6	5.2

Table 2:- Distribution of benign and malignant lesions on mammogram.

LESION	NO. OF CASES
BENIGN	
FIBROADENOMA	4
INTRADUCTAL PAPILLOMA	5
GRANULOMATOUS MASTITIS	4
DUCT ECTASIA	1
FIBROADENOSIS	2
FIBROCYSTIC BREAST LESION	2
PHYLLOIDES (benign)	2
TUBULAR ADENOMA	1
USUAL DUCTAL HYPERPLASIA	1
TOTAL	22
MALIGNANT	
DCIS	2
IDC 1	44
IDC 2	36
IDC 3	11
TOTAL	93

Table 3:- Distribution of lesions on Histopathology.

BIRADS CATEGORY	NO. OF CASES	PERCENTAGE %
BIRADS2 and 3	18	15.65
BIRADS 4A	3	2.6
BIRADS 4B	4	3.4
BIRADS 4C	76	66.22
TOTAL BIRADS 4	83	72.17
BIRADS 5	14	12.3
TOTAL BIRADS 4 & 5 (Malignant)	97	84.34

Table 4:- Comparison of BIRADS score with Histopathology.

BIRADS DIAGNOSIS	HISTOPATHOLOGY		
	MALIGNANT	BENIGN	TOTAL
MALIGNANT	90	7	97
BENIGN	3	15	18
TOTAL	93	22	115

Table 5:- Overall accuracy of mammography in breast lesions with histopathology as gold standard.

SENSITIVITY	96.774
SPECIFICITY	68.181
PPV	92.783
NPV	83.33
DIAGNOSTIC ACCURACY	91.304

Figure legends:

Figure 1

a. Ildefined hypoechoic Irregular mass with spiculated margin,highdensity,scattered microcalcification with increased vascularity noted at 11 o'clock- Right breastBIRADS 5,IDC II at 40x on H &E,Left breast BIRADS 3.

b. Ill defined hypoechoic mass with spiculated margin with thickening of overlying skin seen retroareolar-BIRADS 4, DUCT PAPILLOMAat 100x on H & E.

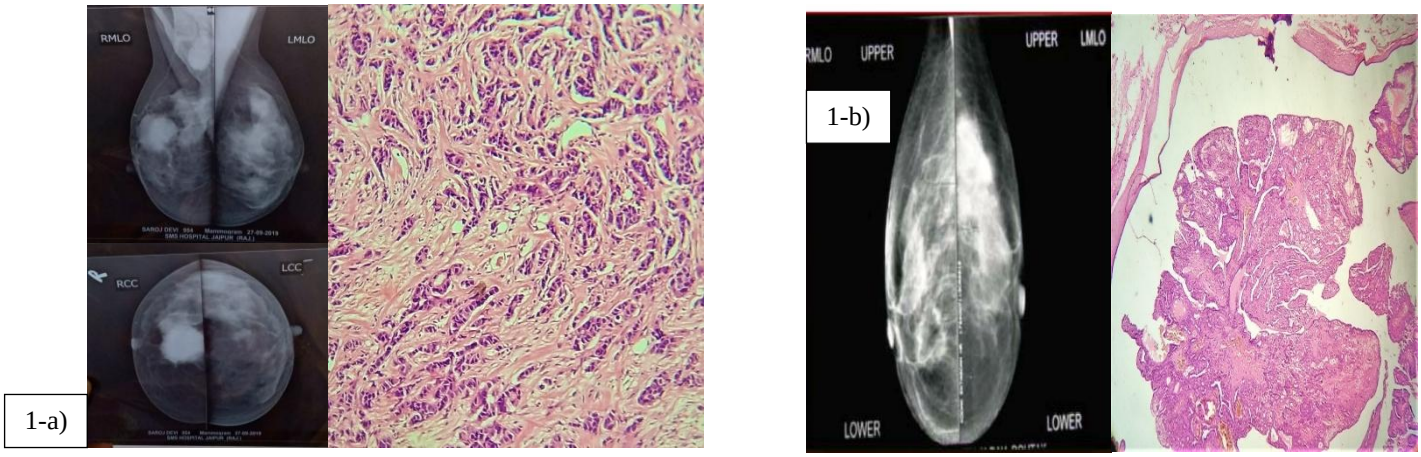
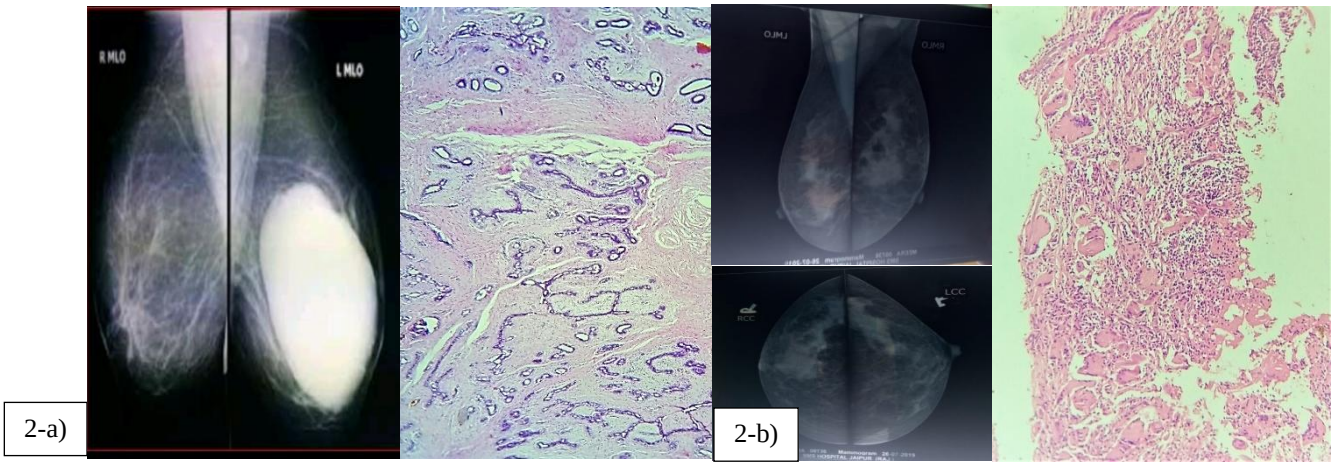


Figure 2

a) Oval mass with Well circumscribed margins in left lower quadrant -BIRADS 3,FIBROADENOMA on H & E.

b) Irregular mass with speculated margin and fine pleomorphic region distribution of calcification noted in right outer upper quadrant- Right breast BIRADS 4C

GRANULOMATOUS MASTITISat 40x on H & E.



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