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Radio-Diagnosis

PREOPERATIVE DIAGNOSTIC EVALUATION OF BREAST LESIONS USING MAMMOGRAPHY, SONOGRAPHY AND MAGNETIC RESONANCE MAMMOGRAPHY

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ABSTRACT A total of 50 patients who had atypical breast findings underwent examinations using magnetic resonance imaging MR mammography, sonography, and mammography. For these conditions, the sensitivity for mammography was 50.20%, for sonography it was 67.8%, and for MR mammography it was 93.7%. When all three diagnostic techniques are used together, breast cancer can be detected most successfully. On the other hand, the combined sensitivity of sonography and mammography was lesser than that of MR mammography and mammography. breast lesions, diagnostic methods, mammography, sonography and MR mammography

KEYWORDS : breast lesions, diagnostic methods, mammography, sonography and MR mammography

INTRODUCTION

Breast cancer is second most common cancer in women in India. Excluding cancers of skin, breast cancer is the most common type of cancer in women in United States, accounting for 1 of every 3 cancers diagnosed. The two standard imaging techniques for identifying and assessing breast disease are mammography and sonography [1]. The most widely used screening method is mammography [2]. Sonography looks to be better than mammography, especially in young women and women with dense breasts, and it makes it easier to distinguish between solid tumors and cysts. When sonography and mammography are combined, the sensitivity and specificity of either test are increased [3]. While MR mammography's stated specificity varies, it is widely acknowledged to be the most sensitive method for diagnosing breast cancer [4–12]. In such investigations, highly qualified radiologists conducted MR mammography in research setting and assessed the results. Therefore, the current prospective study set out to evaluate MR mammography's validity in clinical routine practice against that of sonography and mammography. This comparison was based on results for the three diagnostic techniques that were recorded on routine reports that the surgeon had access to prior to surgery. The detection multicentric invasive illness received particular attention. Breast cancer mortality has been decreasing, because of early detection, intervention and post operative treatment.

MATERIAL AND METHODS

The study was carried out in the Department of Radiodiagnosis of Mahatma Gandhi University of Medical Sciences and Technology, Jaipur, Rajasthan.

Duration: Between June 2023 to June 2024, 50 patients with abnormal breast findings, included in our study after informed written consent.

Inclusion Criteria Of Patients:

- All females with breast lump detected on self- examination or clinical examination.
- Females with positive screening mammography.
- Contra lateral breast examination in a patient with breast malignancy.

Imaging

Prior surgery, all patients had access to written reports detailing the results of their mammographic, sonographic and dynamic magnetic resonance mammographic findings. Mammograms were done at our Institute. Test results from other institutions that met our institution's quality requirements for mammography were also approved for review. All females in our study were subjected to conventional mammography: bilateral mammography was performed on Xtronics mammography machine and included routine craniocaudal and medio-lateral views. Additional views, spots or magnification views were taken as and when required. Findings were recorded according to BIRADS lexicon.

Bilateral whole-breast US was performed on Philips iU 22 machine with a linear-array broadband transducer (5-12 MHz) and findings recorded as per BIRADS lexicon.

At the Institute, MR mammography was done on patients in the prone position with a 1.5 T field strength and a phased-array breast coil. A multislice two-dimensional fast-field-echo (FFE) sequence was used to acquire dynamic T1-weighted images. A bolus injection of 0.1 mmol gadolinium-DTPA/kg body weight was utilized as the contrast medium. Malignancy was defined as signal elevation of 90% or more during the first two minutes following bolus injection, followed by signal plateau or washout phenomenon. Low signal intensity in the T2-weighted images and uneven lesion margins were additional criteria. A distance of less than 3 cm was defined as multifocal carcinoma, and a distance greater than 3 cm was defined as multicentric carcinoma.

Statistical Analysis

Elucidation of the different symptomatic strategies was compared with the histological examination with respect to affectability, specificity, and precision. Criteria for suspected danger within the composed reports were the terms 'cancer', 'malignant injury or tumor', or 'suspicious for cancer'. Affectability, specificity, and precision were assessed as takes after:

Sensitivity = patients with suspected breast cancer/ patients with histologically confirmed breast cancer

Specificity = patients with suspected benign disease/patients with histologically confirmed benign disease

Accuracy = patients with true-positive and true-negative detected disease/patients with histologically confirmed breast cancer

We compared the performance of all diagnostic methods individually and in combination using the results from all patients.

RESULTS

All patients underwent breast surgery and all abnormal lesions identified by mammography, sonography or MR mammography were

surgically removed. As shown in Table 1, Majority of patients were in 37 – 46 years of age group i.e. 52% followed by 47 – 56 years with 20%, 12% in 27 – 36 years age group. As shown in Table 2, Majority of patients were in BIRADS 2 category i.e. 49.2% followed by BIRADS 3 category with 19.00%, 12.70% in BIRADS 4 category for mammography and in remaining categories patients were less than 10%. As shown in Table 3, Majority of patients were in BIRADS 2 category i.e. 38.10% followed by BIRADS 3 category with 25.40%, 17.50% in BIRADS 4 category and 11.10% in BIRADS 5 category for sonography. As shown in Table 4, Majority of patients were in BIRADS 2 category i.e. 33.33% followed by BIRADS 3 category with 22.22%, 20.60% in BIRADS 4 category and 15.90% in BIRADS 5 for M R mammography.

Table 1: Distribution Of Patients According To Age

S.No.	Age Group (Years)	No. of patients	Percentage
1.	17-26	4	8%
2.	27-36	6	12%
3.	37-46	26	52%
4.	47-56	10	20%
5.	57-66	4	8%

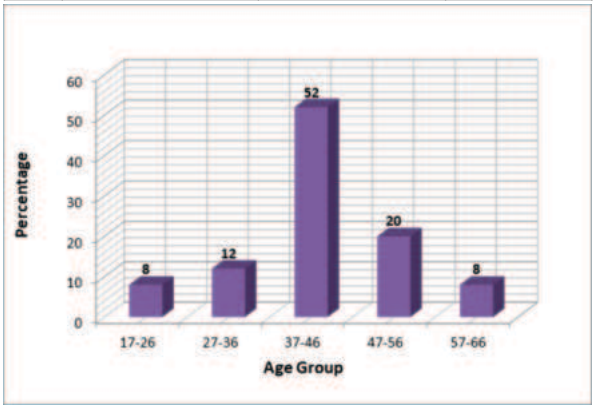

Figure 1: Distribution of patients according to age

Table 2: Classification Of Lesions (64 in 50 patients) On The Mammography BIRADS Lexicon

S.No.	Category	No. of patients	Percentage
1.	BIRADS 0	4	6.3%
2.	BIRADS 1	4	6.3%
3.	BIRADS 2	31	49.2%
4.	BIRADS 3	12	19%
5.	BIRADS 4	8	12.7%
6.	BIRADS 5	4	6.3%

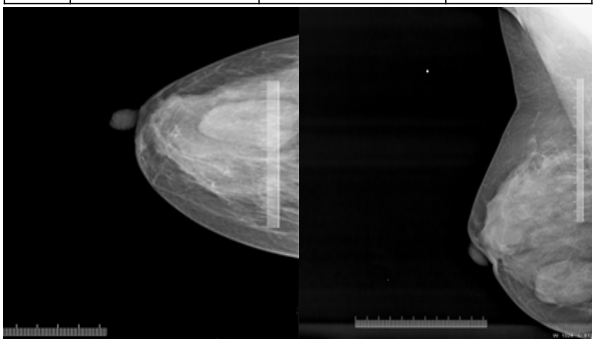

Fig.2: Dense, sharply marginated lesion in lower outer quadrant, no microcalcification, categorized as BIRADS 2 lexicon in conventional mammography

Table 3: Classification Of Lesions (63 in 50 patients) On The Sono Mammography BIRADS Lexicon

S. No.	Category	No. of patients	Percentage
1.	BIRADS 0	2	3.2%
2.	BIRADS 1	3	4.8%
3.	BIRADS 2	24	38.1%
4.	BIRADS 3	16	25.4%
5.	BIRADS 4	11	17.5%
6.	BIRADS 5	7	11.1%

Fig.3: Oval, hypoechoic, solid lesion with smooth margins categorized as Sono mammography BIRADS 3 lexicon

Table 4: Classification Of Lesions On The M R Mammography BIRADS Lexicon

S. No.	Category	No. of patients	Percentage
1.	BIRADS 0	1	1.6%
2.	BIRADS 1	2	3.2%
3.	BIRADS 2	21	33.3%
4.	BIRADS 3	14	22.2%
5.	BIRADS 4	13	20.6%
6.	BIRADS 5	10	15.9%

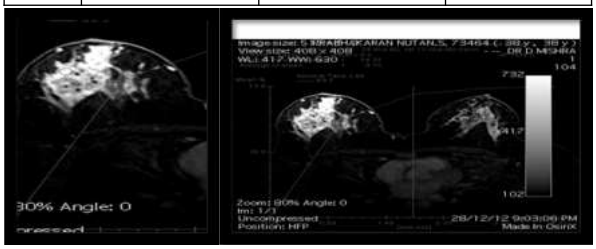

Fig.4: Large, irregular mass with heterogenous enhancement with rapid uptake and plateau phase, categorized as MRI BIRADS 5 lexicon

Table 5: Comparison Of Mammography, Sonography And MR Mammography And Combinations

	Mammo.	USG	Mammo. +USG	MRI	Mammo. +MRI
Sensitivity	50.2	67.8	83.3	93.7	94.5
Specificity	96.3	90.4	88.2	97.4	95.5

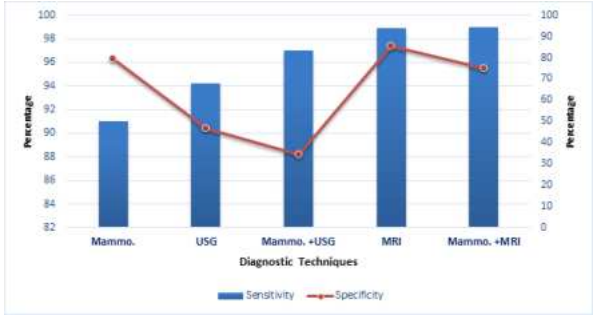

Figure 5: Comparison Of Mammography, Sonography And MR mammography and combinations

For each imaging modality, a cancer was considered to be depicted successfully (true positive) if it appeared to be suspicious for or highly suggestive of malignancy with that modality. Lesions considered probably benign that proved to be malignant at biopsy were classified as false negative for the modality.

As per table 5 mammography had sensitivity of 50.2% in diagnosing malignancy, the sensitivity decreased to 42% in extremely dense breast. Sono mammography was more sensitive than mammography in detecting IDC however US was less sensitive for DCIS. Sono Elastography proved helpful in further characterization of equivocal lesions on US. M.R.I had the highest sensitivity, specificity and positive predictive value for detection of invasive as well as intraductal cancer. M.R.I was significantly more sensitive than mammography,

US and combination of both. M.R.I was also helpful in determining multifocal lesions and extent of lesion more accurately.

DISCUSSION

Analysis of the effectiveness of different diagnostic methods for identifying invasive breast cancer revealed varying levels of sensitivity and specificity: 79.9-89% and 64-93.5% for mammography [6,7,13], 67.6-96% and 93-97.7% for sonography [13,14], and 91-98.9% and 20-97.4% for MR mammography [6-10, 15-17]. The current findings show comparable sensitivity and specificity in detecting malignant breast lesions, with MR mammography having the highest sensitivity among all imaging techniques. When examining the use of all three techniques together, mammography and sonography (the typical method) showed a sensitivity of 83% and a specificity of 92% in detecting malignant conditions [3].

Using a combination of mammography, sonography, and MR mammography (combined method) resulted in a sensitivity of 95% and a specificity of 64% [3]. Sensitivity for nonpalpable lesions increased from 73% with the standard method to 82% with the combined method. The standard method had a higher specificity rate (89%) compared to the combined method (71%). A sensitivity of 85% was achieved for the standard method for detectable lesions and 98% for the combined method, but the specificity was 100% for the standard method and 45% for the combined methods [3]. In our current research, we observed the greatest sensitivity and specificity with the use of mammography and MRI methods together. The sensitivity and specificity of a combination of mammography and sonography was lesser than that of MR mammography and sonography.

CONCLUSION

Mammography still remains gold standard for screening in females above 35 years of age. Sono mammography has a role in characterization as well as primary evaluation of mammographically dense breast, ultrasound missed small lesions mainly in fatty breast and DCIS. M.R.I was most sensitive for detection of multiple malignant foci especially in dense or fibroglandular breast. Combined mammography, sono-mammography and MRI were more sensitive than any other individual test. A change in management in 10-15% of patients resulted from additional imaging after mammography. M.R.I should be considered integral part of surveillance programme for women at high familial and hereditary risk.

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