

## Collective approach of mammographic and sonomammographic technique for assessment of lesions of the breast

Dr. Vishwajeet A. Burungale<sup>1\*</sup>, Dr. Sunil K. Agrawal<sup>2</sup>, Dr. S. C. Gupta<sup>3</sup>, Dr. Ankur Choudhary<sup>4</sup>, Dr. Hemant Kumar Mishra<sup>5</sup>

1-Junior Resident, Dept of Radiodiagnosis, Mahatma Gandhi Hospital, Jaipur

2-Professor, Dept of Radiodiagnosis, Mahatma Gandhi Hospital, Jaipur

3-Professor, Dept of Radiodiagnosis, Mahatma Gandhi Hospital, Jaipur

4- Junior Resident, Dept of Radiodiagnosis, Mahatma Gandhi Hospital, Jaipur

5- Professor, Dept of Radiodiagnosis, Mahatma Gandhi Hospital, Jaipur

\*Corresponding Author: Dr. Vishwajeet A. Burungale, Junior Resident Dept of Radiodiagnosis, Mahatma Gandhi Hospital, Jaipur.

### Abstract

Breast cancer is the most common cause of cancer death in women and an overall fifth common cause of cancer deaths. Triple assessment of clinical examination, breast imaging and needle biopsy remain the mainstay of a breast cancer diagnosis. Mammography helps in evaluation of density, margins, calcification and distortion of architecture, whereas USG plays a key role in differentiating cystic and solid masses. This study assessed palpable breast lesions using mammography and ultrasound and compared them with histopathological results. A cross-sectional study was conducted at Mahatma Gandhi Hospital, which included sixty women more than or equal to 21 years with abnormalities of the breast such as palpable lump, thickening, nodularity. After taking informed written consent the patients underwent mammographic evaluation, followed by ultrasonographic evaluation. HPE was considered as gold standard and results were compared with image finding. In our study, majority were in the age group between 41-50 years. The most common clinical complaint was (68.3%) palpable lump. Mammography findings reported 51.6% malignant lesions, 16.6% of benign lesions and 15% were suspicious lesions. On USG 51.6% were malignant lesions, 23.3% of benign lesions and 8.3% were suspicious lesions. Histopathological examination revealed 64% were malignant and 36% were benign lesions. The diagnostic accuracy of mammography and sonomammography was 95% and 96% respectively.

Date of Submission: 20-11-2021

Date of Acceptance: 04-12-2021

### I. Introduction:

Female breast is a specialized tissue which has glandular, adipose, and fibrous structures. It is constantly under effect of hormones and any irregularity in this mechanism can lead to various pathologies which may need Surgical, Chemotherapeutic or Radiotherapy treatments. Breast cancer is most common cancer in Indian women, and usually presents as a painless lump.<sup>1,2</sup> Lump in breast is therefore a cause of great anxiety to patients. According to WHO in India, about 1 lakh new patients with breast cancer are diagnosed annually and an estimated 70,218 Indian women die due to breast cancer every year.<sup>3</sup> Despite the gloomy prognosis, increased morbidity, and reduced survival time, it can be controlled if detection and diagnosis is made at the earliest. Evaluation of breast lump involves the wise use of detailed history, clinical examination, imaging modalities and tissue diagnosis. USG breast, mammography, and Fine Needle Aspiration Cytology (FNAC) are investigational tools often used to distinguish malignant lumps from benign ones. Though the ultimate diagnosis is formed by histopathological examination of the excised tissue, routine excision of all breast lumps wouldn't be rationale, because the maximum number of lumps are benign.<sup>4</sup> Hence, it's important to utilize less invasive and cost-effective methods of diagnosis without resorting to a more painful and invasive surgical biopsy. The modality should even be acceptable to the patient, accurate, easy to use, reproducible and must not need any excessive amount of preparation.<sup>5</sup> Mammography is the method of using low energy X-rays to study the human breast. The origin of mammography can be traced to the discovery of x-rays by Wilhelm Roentgen in 1895.<sup>6</sup> Sonomammography is use of ultrasound to perform imaging of breast. It is more useful in younger women, where the dense fibrous tissue of breast may make mammograms more problematic to interpret. Keeping in view, the limitations of individual modalities, we aimed in our study to evaluate breast lesions, using

mammography and sonomammography, instead of using a single method and compared them with histopathological results.

**Table 1: Age Distribution of Patients**

Age Group	No. of Patients	% Of Patients
21-30	11	18.3 %
31-40	11	18.3 %
41-50	16	26.6 %
51-60	15	25 %
>60	7	11.6 %
<b>Total</b>	<b>60</b>	

## II. Material & Method:

This study was conducted at Mahatma Gandhi Hospital, it included sixty women more than or equal to 21 years, who presented to our centre with abnormalities of the breast during a time period of 18 months between January 2020 and June 2021. Abnormalities of the breast with various clinical descriptions, such as palpable lump, thickening, nodularity were included in this study. After taking the informed written consent, patients were subjected to breast examination. Then patients underwent mammography in the presence of a female attendant. Both mediolateral oblique and craniocaudal views were taken of each breast after firm compression. Mammography was performed with Hologic Selenia Dimension equipment. The mammographic assessment was followed by ultrasonographic evaluation of breast using a real-time scanner (SEIMENS ACUSON NX3elite and TOSHIBA XARIO 100) with a 7 to 10 MHz broadband linear array probe with a breast present. Each quadrant of the breast with lesion was scanned in radial and antiradial planes. Both sides were checked in every case for comparison and axilla was also checked for presence of lymph nodes if any. Histopathological examination was considered as gold standard and results obtained were compared with radiological finding. Suitable statistical test was used for analysis.

## III. Result:

A total of 60 subjects were included in the final analysis. Among the study population, 11 (18.3%) participants belong to 21 to 30 years age group, 11 (18.3%) were in 31 to 40 years age group, 16 (26.6%) were in 41 to 50 years age group, 15 (25%) were in 51 to 60 years age group, and 7 (11.6%) were aged > 60 years. (Table 1). Among the study population, 41 (68.3%) participants had a palpable lump, 11 (18.3%) participants had thickening and 8 (13.3%) participants had nodularity. (Table 2). All these patients underwent the triple test for diagnosis of breast carcinoma. Triple test includes mammography, sonomammography and histopathology after biopsy.

**Table 2: Presenting Complaint of Patients**

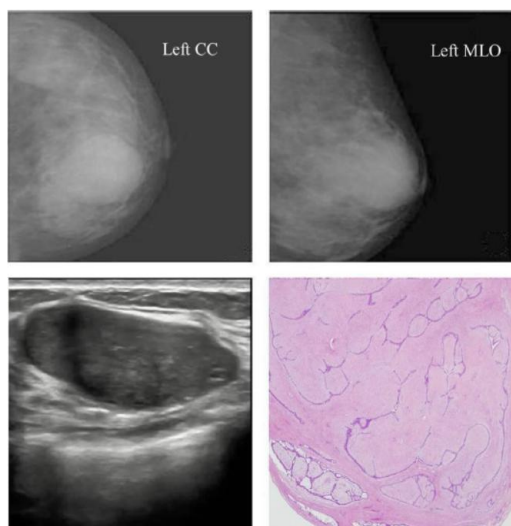
Presenting Complaint	No. of Patients	% Of Patients
Palpable Lump	41	68.3%
Nodularity	8	13.3%
Thickening	11	18.3%
<b>Total</b>	<b>60</b>	

**Table 3: Distribution of Cases**

Cases	Mammography	Sonomammography
Benign	10	14
Malignant	31	31
Indeterminate	9	5
Normal	10	10
<b>Total</b>	<b>60</b>	

Histopathology findings		No. of Patients	% Of Patients
Benign 36%	Fibroadenoma	11	22%
	Fibrocystic Disease of Breast	4	8%
	Benign Cyst	3	6%
Malignant 64%	Invasive Ductal CA NOS type	25	50%
	Ductal CA in situ	3	6%
	Mucinous CA breast	4	8%
<b>Total</b>		<b>50</b>	

On mammography, 51.6% patients had a malignant lesion, 16.6% patients had benign lesion, 15% patients had indeterminate findings that could not be classified into benign or malignant only on the basis of mammography. 16.6% patients had a normal mammography scan. (Table 3) On sonomammography, 51.6% patients had a malignant lesion, 23.3% patients had a benign lesion, 8.3 % were indeterminate scans and 16.6 % were normal scans. (Table 3) On histopathology, 36% lesions were of benign type. 22% were diagnosed as fibroadenoma, 8% had fibrocystic disease of breast and rest 6% had a benign cyst in the breast. 64% lesions were proven as malignant, out of which 50% were Invasive ductal carcinoma NOS type, 6% were Ductal carcinoma in situ and 8% were Mucinous type of CA breast. (Table 4) Diagnostic accuracy was calculated for mammography and sonomammography, which was 95% and 96% respectively.



Mammographic CC and MLO views of left breast showing a well-defined, oval lesion with peri-lesional halo.

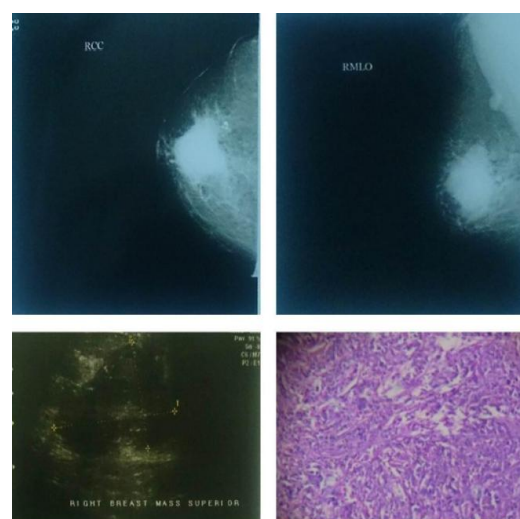
Sonographic image shows well defined, homogeneously hypoechoic, oval, solid mass lesion with posterior acoustic enhancement.

Histopathology confirms a **FIBROADENOMA**

Mammographic CC and MLO views of right breast showing an irregular, high density mass with spiculated margins.

Sonographic image shows irregular, multilobulated, hypoechoic, solid mass lesion with spiculated margins showing posterior acoustic shadow and ductal extension.

Histopathology confirms **INVASIVE DUCTAL CARCINOMA OF BREAST.**



#### IV. Discussion:

Breast carcinoma is a ranked first in women in India. They usually present with a palpable lump, or a nodularity or thickening in the breast tissue that is most of the times an incidental finding. The aim of early detection of breast cancer is for its timely management and intervention, if required. These patients usually

present for radiological evaluation. Mammography is one of the primary methods of detection and diagnosis of breast disease with a sensitivity of 85% - 95%.<sup>7</sup> It is the only proven screening tool for the breast as of date and is one imaging technique that has a considerable impact on screening asymptomatic patients for diagnosis and staging of cancer and patient follow up.<sup>8</sup> Benign lesions have characteristic well defined margins, few lobulations and low soft tissue density. Whereas, malignant lesions are high in soft tissue density, they have spiculated margins, multiple lobulations, shape can be architecturally distorted, can present with or without microcalcifications.<sup>9</sup> In this study, 60 patients presented to Mahatma Gandhi Hospital during the study period with various complaints, 68.3% patients presented with a complain of palpable lump, 13.3% patients presented with a nodularity, and 18.3% patients presented with thickening. In a review article *Donegan* stated that most of the breast cancers appear as palpable lumps, frequently found by the patient herself.<sup>10</sup> However, not all palpable abnormalities represent a discrete mass. This is specifically true in women younger than 40 years in whom normal glandular nodularity can also be mistaken for a dominant mass.<sup>11</sup> All these patients underwent the triple test, this includes mammography, sonomammography and histopathology after biopsy. On mammography, 51.6% patients had a malignant lesion, 16.6% patients had benign lesion, 15% patients had indeterminate findings that could not be classified into benign or malignant only on the basis of mammography. 16.6% patients had a normal mammography scan. On sonomammography, 51.6% patients had a malignant lesion, 23.3% patients had a benign lesion, 8.3% were indeterminate scans and 16.6% were normal scans. Comparing with mammography, malignant lesions identified were similar in number in both the investigations. Similar number of scans were normal in both the investigations. Lister D et al, 1998, concluded USG is superior to mammography in diagnosing clinically benign palpable lesions.<sup>12</sup> The sensitivity of USG/combined approach is higher as compared to mammography in diagnosing fibrocystic disease. In their series Prasad SN et al, 2007, reported 22 cases of fibrocystic disease out of 62 study cases. Only one case was missed sonographically (95.4%). 4 cases were missed with mammography (81.8%) and no case was missed with combined approach (100%).<sup>8</sup> On histopathology, 36% lesions were of benign type. 22% were diagnosed as fibroadenoma, 8% had fibrocystic disease of breast and rest 6% had a benign cyst in the breast. 64% lesions were proven as malignant, out of which 50% were Invasive ductal carcinoma NOS type, 6% were Ductal carcinoma in situ and 8% were Mucinous type of CA breast. Diagnostic accuracy was calculated for mammography and sonomammography, which was 95% and 96% respectively. Positive predictive value for mammography was 96% and for sonomammography 98%. Negative predictive value was 90% for both the tests. Sensitivity of sonomammography was almost same as sensitivity of mammography ~ 97%. Specificity of sonomammography was more than of mammography. Several studies have shown that the false negative rate for collective mammographic and sonographic evaluation varies from 0% to 2.6%.<sup>13,14</sup> The worth of combined mammographic and ultrasonographic imaging in symptomatic patients has been studied previously. Moss et al stated sensitivity of 94.2% and specificity of 67.9%.<sup>15</sup> Shetty MK and Shah YP reported a sensitivity of 100% and specificity of 80.1%.<sup>16</sup> *Morris KT et al*, 2002, have stated that the best clinical approach to the diagnosis and management of patients with a breast lesion is the combination of all three tests- physical examination, radiographic imaging and pathology (Biopsy / FNAC).<sup>17</sup> Hence, as mammography and sonomammography have their own advantages and disadvantages, no single investigation is 100% accurate for diagnosis but a combination of mammography and ultrasonography can produce a near accurate result.<sup>18</sup>

## V. Conclusion:

This study confirms that a combination of investigations: mammography and sonomammography is better for detection of breast lesions. There is a greater combined sensitivity and specificity rate. Sonomammography and mammography cannot replace each other for a diagnosis, but sonomammography is better in younger females, mostly for BIRAD 1,2 & 3 lesions, whereas mammography is better in old females, mostly for BIRADS 4 & 5 lesions. Both these investigations are safe, cost effective and non-invasive modalities for breast lesions. Histopathology is a confirmatory test needed in most cases. Hence, triple test is considered gold standard for diagnosis of breast carcinoma.

## References:

- [1]. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *Int J of Cancer*. 2010;127(12):2893–917.
- [2]. Ferlay J, Soerjomataram I, Ervik M, GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer; 2013
- [3]. Rashmi Bawa, Breast Cancer in India. *Int J Med Res Prof*. 2015;1;27-31.
- [4]. Pruthi S. Detection and evaluation of a palpable breast mass. *Mayo Clin Proc*. 2001;76:641–48.
- [5]. Tiwari M. Role of fine Needle aspiration cytology in diagnosis of breast lumps. *Kathmandu Univ Med J*. 2007;5(2):215–17.
- [6]. Skloot, Rebecca (April 2001). "Taboo Organ" . *University of Pittsburgh School of Medicine*. 3 (2). Archived from the original on 2016-03-03.
- [7]. K. L. Chakraborti, P. Bahl, M. Sahoo, S. K. Ganguly and C. Oberoi, "Magnetic Resonance Imaging of Breast Masses: Comparison with Mammography," *Indian Journal of Radiology and Imaging*, Vol. 15, No. 3, 2005, pp. 381- 387.
- [8]. Prasad SN, Houserkova D, A comparison of mammography and ultrasonography in the evaluation of breast masses. *Biomed Pap*

- Med Fac Univ Palacky Olomouc Czech Repub. 2007 Dec; 151(2):315-22.
- [9]. W. P. Evans, "Breast Masses, Appropriate Evaluation," RCNA, Vol. 33, No. 6, 1995, pp. 1085-1108
- [10]. Donegan WL evaluation of a palpable breast mass. N Engl J Med 1992;327:937-942.
- [11]. Hall FM Sonography of the breast: controversies and options. AJR Am J Roentgenol 1997;169:1635-1636.
- [12]. Lister D, Evans AJ, Burrell HC, Blamey RW, Wilson AR, Pinder SE, and colleagues. The accuracy of breast ultrasound in the evaluation of clinically benign discrete, symptomatic breast lumps. Clin Radiol 1998; 53:490-2.
- [13]. Soo MS, Rosen EI, Baker JA, Vott, Boyd BA. Negative predictive value of sonography with mammography in patients with palpable breast lesions. AJR AmJ Roentgenol 2001; 177; 1167-1170.
- [14]. Moy L, Slantez PJ, Moore R. Specificity of mammography and US in the evaluation of a palpable abnormality 2002;225:176-181.
- [15]. Hilary A.Moss Peter D. Britton Christopher D.R. Flower Alan H. Freeman David J. Lomas Ruth M.L. Warren, How reliable is modern breast imaging in differentiating benign from malignant breast lesions in the symptomatic population?
- [16]. Mahesh K. Shetty MD, FRCR, Yogesh P. Shah MD, Ralph S. Sharman MD, Prospective Evaluation of the Value of Combined Mammographic and Sonographic Assessment in Patients With Palpable Abnormalities of the Breast
- [17]. Morris KT, Vetto JT, Petty JK, Lum SS, Schmidt WA, Toth-Fejel S and colleagues. A new score for the evaluation of palpable breast masses in women under age 40. American journal of surgery 2002; 184:245-7.
- [18]. Ahmed I, Nazir R, Chaudhary MY, Kundi S, Triple assessment of breast lump. J Coll Physicians Surg Pak. 2007 Sep; 17(9):535-8.

Dr. Vishwajeet A. Burungale, et. al. "Collective approach of mammographic and sonomammographic technique for assessment of lesions of the breast." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(12), 2021, pp. 59-63.