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COMBINED STUDY OF MAMMOGRAPHY AND SONOMAMMOGRAPHY FOR EARLY AND ACCURATE DETECTION OF BREAST LESIONS

Radiodiagnosis

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ABSTRACT

BACKGROUND: Globally, women of all age groups are seen being affected by various pathological conditions of the breast. The most common complain that females present with in breast pathologies is breast lump which needs to be efficiently investigated and rightly diagnosed because amongst the numerous pathologies that affect the breast, cancers are the ones most commonly dealt with and the most dreadful.

AIM: To compare the diagnostic accuracy of mammography and sonomammography in assessing benign and malignant lesions with pathological correlation.

MATERIALS AND METHODS: This study was conducted over a period of 6 months. A total of 50 patients presenting with lump, pain and discharge in breast referred to the Department of Radio diagnosis at Dr.Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik were evaluated with mammography, sonomammography and histo-pathological correlation.

RESULTS : The sensitivity of mammography for diagnosing breast lesions was 93.55%, specificity was 73.68% and the positive predictive value was 85.29%. Sensitivity, specificity and positive predictive value with sonomammography was 93.55%, 78.95% and 87.88% respectively. The combination of mammography and sonomammography showed sensitivity, specificity and positive predictive value of 96.77%, 84.21% and 90.91% respectively.

CONCLUSION: Our study confirms that there is higher sensitivity, specificity and positive predictive value with combined use of mammography and sonomammography in evaluation of breast masses as compared to when used individually.

KEYWORDS

Mammography, Sonomammography, BIRADS, Positive Predictive Value (PPV).

INTRODUCTION:

A broad spectrum of pathologies can be seen in the breast which are primarily classified as benign and malignant disease processes. Amongst the numerous pathologies that affect the breast, cancers are the most common and the most dreadful. (1, 2) Breast cancer has been found to be the second most common malignant disease amongst females. The majority of the women to get affected are the ones above 40 years of age. However, it has also been seen affecting younger women especially those with the genetic predisposition. (3, 4) The most common complain that females present with in breast pathologies is breast lump. The established management of palpable breast masses includes triple assessment, which includes clinical examination, imaging and fine needle aspiration cytology or core biopsy.(5) The ultimate goal in imaging of the breast is to detect any malignancy of breast in its earliest stage and the role of the radiologist is of utmost importance. Imaging of the breast chiefly includes mammography and ultrasonography followed by histo-pathological investigations like FNAC &/or biopsy.

For characterizing, evaluating and grading breast lesions to indicate their severity the American college of radiology (ACR) has introduced the Breast Imaging Reporting and Data System (BI-RADS).

AIMS & OBJECTIVES:

To compare the diagnostic accuracy of mammography and sonomammography in assessing benign and malignant lesions with pathological correlation.

MATERIALS & METHODS:

This study was conducted over a period of 6 months. A total of 50 patients were included in this study and evaluated with mammography, sonomammography and histo-pathological correlation. The following criteria were used for selection of patients in this study.

Inclusion criteria:

- Patients with clinically palpable breast masses,
- Patients with no obvious clinical mass on palpation but presented with axillary adenopathy.
- Patients with strong family history- First degree relatives with breast carcinoma.

Exclusion criteria:

- Patients with very enlarged and very tender breast.
- Patients with fungating mass and mass adherent to chest wall where performing USG and mammography is difficult.
- Patients who are very apprehensive patients or uncooperative patients.
- Patients who are pregnant.

All these patients were examined clinically, given adequate explanation about the procedure before the radiographic assessment of the breast and an informed consent was taken from the patients.

Mammography was done for all 50 patients on XTROMAM 2000 and views taken were medio-lateral Oblique (MLO) and cranio-caudal (CC) views with technical factors: 40-50 kVp with 40-80 mAs.

Ultrasonography was done for all the 50 patients by using high frequency probe of 4 to 12 MHz on GE LOGIQ F8 in supine position.

All patients underwent either FNAC or biopsy depending upon the type of lesion, its location and accessibility.

The characterization, evaluation and grading breast lesions was done in accordance with the breast imaging reporting and data system (BI-RADS), fifth edition in this study as illustrated in Table 1.(6)

Table 1. Criteria for BI-RADS fifth edition.

Category 0	Incomplete – need additional imaging evaluation and / or prior mammograms for comparison.
Category 1	Negative
Category 2	Benign
Category 3	Probably benign
Category 4	Suspicious A. Low suspicion for malignancy B. Moderate suspicion for malignancy C. High suspicion for malignancy
Category 5	Highly suggestive of malignancy
Category 6	Known biopsy proven malignancy

RESULTS :

A total of 50 patients were included in this study. There were a total of 31 cases of benign etiology. These etiologies include simple cysts, fibrocystic diseases, fibroadenomas , ductal ectasias , mastitis and galactoceles. There were 19 cases that were malignant which were found to be infiltrating ductal carcinoma, duct papilloma, ductal carcinoma in situ, mucinous carcinoma and cribriform carcinoma.

In 19 cases of histo-pathologically proven malignancy, there were various other associated findings such as metastatic lymph nodal involvement, nipple discharge, nipple retraction , skin thickening and asymmetry between the two breasts noted as illustrated in table 2.

Table 2. Associated findings with malignant lesions.

Associated findings	Number of patients
Skin thickening	3
Nipple retraction	6
Nipple discharge	5
Axillary adenopathy	19

The sensitivity, specificity and the Positive Predictive Value (PPV) of mammography and sonomammography were calculated individually, as well as combined (using sonomammography and mammography together). It was found that accurate evaluation of breast masses was higher when both the imaging modalities were used combined rather than individually. The results are illustrated in Table 3.

Table 3. Sensitivity, specificity and PPV for Mammography, sono-mammography and combined.

Modality	Sensitivity	Specificity	PPV
Sonomammography	93.55%	78.95%	87.88%
Mammography	93.55%	73.68%	85.29%
Combined	96.77%	84.21%	90.91%

DISCUSSION:

Breast masses are common presentation in women and are usually of benign etiology, but effective evaluation and prompt diagnosis is of utmost importance to rule out any possibility of a malignancy.

Breast cancer is the second leading cause of cancer causing deaths in women after lung carcinoma. Over 100,000 new breast cancer patients are diagnosed annually in India and according to WHO (2012) an estimated 70218 women died due to breast cancer. In 2008, breast cancer caused 458,000 deaths worldwide. (7,8,9,10)

While investigating breast masses mammography is the primary method of detection and diagnosis of breast disease which has a proven sensitivity of 85%-95%. (11)

However, for better accuracy additional diagnostic procedures often become necessary in view of its low specificity. It has been also observed that dense breast parenchyma as seen in younger patients is usually associated with lower mammographic sensitivity. The overall sensitivity and specificity of mammography in this study, was found to be 93.55% and 73.68%, respectively. Sonomammography has proven as an efficient adjuvant to mammography considering the facts that it is a quick and non invasive procedure, easily available and economical. Although a definitive diagnosis is possible with non-invasive imaging procedures, it is recommended to perform a biopsy/fine needle aspiration cytology for most lesions in order to derive reliable results. (12,13)

Sonography is often helpful in differentiating between cysts or solid lesions that are often obscured on the mammogram by the surrounding fibroglandular tissue and can reduce the number of surgical biopsies required when cysts are identified. (14, 15)

On the contrary, the specificity of sonomamography in diagnosing the malignant lesions is less as it is difficult to demonstrate micro-calcifications on ultrasound. The overall sensitivity and specificity of sonomammography in this study, was found to be 93.55% and 78.95%, respectively.

On combined evaluation of the findings of mammography and sonomammography, the sensitivity and specificity in this study were 96.77% and 84.21% respectively. These results were significantly higher than mammography or sono-mammography, individually.

The results of our study are in accordance with the previous studies which have been demonstrated in the following Tables 4, 5 & 6.

Table 4. Comparison of sono-mammography results.

Study	Sensitivity(%)	Specificity(%)	PPV(%)
Berg WA et al (2004)	83.0	73.5	67.8
Gonazaga MA et al (2010)	57.1	62.8	-
Taori K et al (2013)	-	86.9	92.7
Kumar et al (2016)	85.45	89.31	82.7
Present study (2018)	**93.55**	**78.95**	**87.88**

Table 5. Comparison of mammography results.

Study	Sensitivity(%)	Specificity(%)	PPV(%)
Berg WA et al (2004)	67.8	75	70.2
Cavert MM et al (2009)	56.6	99.4	-
Taori K et al (2013)	-	78.2	87.9
Kumar et al (2016)	79.5	80.4	83.4
Present study (2018)	**93.55**	**73.68**	**85.29**

Table 6. Comparison of combined i.e. sono-mammography & mammography results.

Study	Sensitivity(%)	Specificity(%)	PPV(%)
Shetty MK et al (2003)	100	80.1	-
Berg WA et al (2004)	91.5	23	70.2
Taori K et al (2013)	-	97.8	98.8
Kumar et al (2016)	94.25	96.2	97.4
Present study (2018)	**96.77**	**84.21**	**90.91**

CONCLUSION:

Imaging-pathology correlation is integral in multidisciplinary team and in establishing concordance or disconcordance between imaging findings and pathologic results for appropriate management of patients with breast pathologies. It is the effective utilization of the available imaging modalities ie. the combined use of Mammography and Sonomammography which provides higher sensitivity and specificity for evaluating Breast lesions thus helping in accurate and early detection of Breast malignancies.

REFERENCES

1. Clarke D, Sudhakaran N, Gateley CA. Replace fine needle aspirationcytology with automated core biopsy in the triple assessmentof breast cancer. Ann R CollSurgEngl 2001; 83:110–2.
2. Schoonjans JM, Brem RF. Fourteen-gauge ultrasonographicallyguided large-core needle biopsy of breast masses. J UltrasoundMed 2001; 20:967–72
3. National Cancer Institute. SEER 1973–2001 public-use data. Accessed online October 14, 2004, at: http://seer.cancer.gov/publicdata/.
4. Madigan MP, Ziegler RG, Benichou J, Byrne C, Hoover RN. Proportion of breast cancer cases in the United States explained by well established risk factors. J Natl Cancer Inst 1995; 87:1681–5.
5. Cavert MM, O"Donnell ME, Aroori S, Badger SA, Sharif MA, Crothers JG et al. Ultrasound is a useful adjunct to mammography in the assessment of breast tumours in all patients. Int J ClinPract, 2009 Nov;63 (11):1589–94. doi: 10.1111/j.1742-1241.2009.02102.
6. Rao, A. A., Feneis, J., Lalonde, C., & Ojeda-Fournier, H. (2016). A Pictorial Review of Changes in the BI-RADS Fifth Edition. RadioGraphics, 36(3), 623–639. https://doi.org/10.1148/rg.2016150178
7. Shah S. Breast cancer, India. http://www.breastcancerindia.net (Accessed October 21, 2014).
8. Kumar N. Consolidated Report of PBCRs.

http:// www.icmr.nic.in/ncrp/ncrp_p/cancer_reg.pdf (accessed 15 October 2014)
9. World Health Organization. Breast cancer: prevention and control. http:// www.who.int/cancer/detection/breastcancer/en/ (accessed 1 October 14).
10. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin D. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. Int J Cancer 2010; 127: 2893–917.
11. Chakraborti KL, Bahl P, Sahoo M, Ganguly SK, Oberoi C. Magentic resonance imaging of breast masses: Comparison with mammography. Indian J Radiol Imaging 2005; 15:381–387.
12. Chakraborti KL, Bahl P, Sahoo M, Ganguly SK, Oberoi C. Magentic resonance imaging of breast masses: Comparison with mammography. Indian J Radiol Imaging 2005; 15:381–387
13. Fajardo LL. Screening mammography, sonography of dense fibrocystic breast tissue. AJR Am J Roentgenol. 2003 Dec; 181(6):1715.
14. Dennis MA, Parker SH, Klaus AJ, Stavros AT, Kaske TI, Clark SB. Breast biopsy avoidance: the value of normal mammograms and normal sonograms in the setting of a palpable lump. Radiology 2001; 219:186 -191
15. Weinstein SP, Conant EF, Orel SG, Zuckerman JA, Czerniecki B, Lawton TJ. Retrospective review of palpable breast lesions after negative mammography and sonography. J Women's Imaging 2000; 2:15–18