Original Research Article

A study on combined mammographic and sonographic evaluation of palpable breast masses with histopathological correlation in tertiary care hospital

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Abstract

Aims and Objectives: To study the role of ultrasound and mammography in diagnosis and management of various breast lesions. **Materials and Methods: Study setting:** The study was conducted at department of radiology, Kempegowda Institute of medical sciences and research Centre, Bangalore, Karnataka. **Study design:** Prospective Observational study. **Study duration:** November 2012 to April 2014. **Results:** - Our study in which 50 female patients presenting with breast lump, were further evaluated by combined mammographic and sonographic modalities. The palpable abnormalities were reported in 30 patients in the right breast and 18 patients in the left breast and 2 patients in bilateral breasts For combined mammographic and sonographic evaluation Sensitivity – 88.88%. Specificity– 100%, Positive predictive value–100%. Negative predictive valu–93.54 %.**Conclusion:** Mammography with sonography as an adjunctive in evaluating the breast lump plays an important role in early detection of malignant breast lesions, in differentiating the benign and malignant lesions, to avoid unnecessary pre-operative invasive procedures and also in management of palpable breast lesions.
Key Words: Mammography, sonography.

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INTRODUCTION

Breast cancer is one dominating malignancy in women all over the world and second most common cancer in women after cancer cervix. It is responsible for 15% of cancer deaths in women in western countries, affecting not only elderly but also many younger patients, with the highest incidence among the (60–69) age group.[1] Nearly 7% of women will develop breast cancer during their lifetime. The major risk factors are sex, age, family history, parity, previous cancer in one breast or precancerous mastopathy. Methods of diagnostic imaging are of great value for breast pathology. Diagnostic accuracy of clinical examination in revealing benign breast changes does not exceed 59.5 % in detection of breast cancer. The sensitivity of clinical examination for breast carcinoma is 40–69 % with specificity of 88–95%.[2] Palpation is also far from modern demands in detection of malignant lymph nodes. It fails to reveal metastases. Gershon-cohen and his associates[3] first reported breast cancer doubling times ranging from 23-209 days with an average of 100 days. Based on this, it is estimated that the average breast cancer is present for 6 to 8 years before it reaches the clinically palpable size of 1cm.X-ray mammography is traditionally recognized all over the

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world and one of the most informative methods for early diagnosis of breast diseases [4].It is a well-defined and widely accepted technique to evaluate clinically suspected breast lesions and screening for breast cancer. In these patients sonography is an useful adjunctive modality and helps characterizing amammographically detected palpable abnormality, especially in patients with dense breast [5]. Sensitivity and specificity of sonography or mammography is more if one act as adjunctive to other.

AIMS AND OBJECTIVES

- To study the role of ultrasound and mammography in diagnosis and management of various breast lesions.
- To study various patterns of palpable breast lesions by mammography and ultrasonomammography.

MATERIALS AND METHODS

Study setting: - The study was conducted at department of radiology, Kempegowda Institute of medical sciences and research Centre, Bangalore, Karnataka.
Study design: - Prospective Observational study
Study duration: - November 2012 to April 2014
Source of data:- All female patients attending outpatient or inpatient department of KIMS hospital with age equal or more than to 30 years and less than 70years with palpable abnormalities of breast during a period of 18 months from NOVEMBER 2012-APRIL 2014 who underwent a combined mammographic and sonographic evaluation of breast. Palpable abnormalities of the breast included in the study had a variety of clinical descriptions, such as palpable lump, thickening, nodularity etc and postoperative cases with history of recurrence presetting with palpable lump.
Age of the patient, date of initial visit, site of the lump and its description were documented at the time of initial visit, all patients underwent diagnostic mammography, which included
Standard cranio-caudal, and medial -lateral -oblique views. Later all the patients were subjected to sonomammography of breast. Mammography was performed with GE SENOGRAPHE DMR + equipment. Sonographic examination was performed with a 5 MHz transducer of GE VOLUSON 730 pro. FNAC/Biopsy in doubtful cases, post-operative follow up in operative cases.
INCLUSION CRITERIA:
-Female patients age >30 - < 70 years of age who give consent to the modalities.
-Palpable abnormalities of the breast having variety of clinical descriptions, such as palpable lump, nodularity, retracted nipple, peaud'orange skin etc.
-Postoperative cases with history of recurrence presenting with palpable breast lesions.
EXCLUSION CRITERIA:
-Women below 30 years and more than 70yrs.
-Pregnant and lactating women.
-Women with fungating mass per breast, mass adherent to chest wall where performing mammography was difficult.

RESULTS

Our study in which 50 female patients presenting with breast lump, were further evaluated by combined mammographic and sonographic modalities. The palpable abnormalities were reported in 30 patients in the right breast and 18 patients in the left breast and 2 patients in bilateral breasts

Table 1: Distribution of subjects according to age group

Age groups (in years)	No. of cases	Percentage
30-39yrs	18	36
40-49yrs	20	40
50-59yrs	6	12
>60yrs	6	12
Total	**50**	**100**

Majority of the subjects 40% were in 40-49yrs age group, 36% were in 30-39yrs age group, 12% were in 50-59yrs age group and 12% were in >60yrs age group.

Table 2: Distribution of cases based on mammography and USG

Lesion	Mammography	Sonography
Benign	23	32
Malignant	16	15
Occult	11	3
Total	**50**	**100**

According to mammography 23(46%) were benign, 16(32%) were malignant and 11(22%) were occult cases.According to sonography 32(64%) were benign, 15(30%) were malignant and 3(6%) were occult cases.

Table 3: Distribution of cases based on FNAC

FNAC diagnosis	No. of cases	Percentage
Atypical ductal hyperplasia	5	10.63
Breast cyst	5	10.63
Ductal carcinoma in situ	1	2.15
Fibroadenoma	13	27.6
Fibrocystic changes	7	14.89
Infiltrative ductal carcinoma	5	10.63
Infiltrative papillary carcinoma	2	4.25
Lipoma	2	4.25
Medullary carcinoma	5	10.63
Total	**47**	**100**

Sensitivity for mammography alone – 88.23%. Specificity for mammography alone – 95.45%. Positive predictive value for mammography alone – 93.75%. Negative predictive value for mammography alone – 91.30%. Sensitivity for sonography alone – 82.3%.Specificity for sonography alone – 96.5%.Positive predictive value for sonography alone – 93.33%. Negative predictive value for sonography alone – 87.5%.

Table 4: Summarizes the final assessment after the combined mammographic and sonographic evaluation of palpable abnormalities.

Combined Diagnosis	FNAC diagnosis		Total
	Malignant	Benign	
Malignant	16	0	16
Benign	2	29	31
Total	18	29	47

Sensitivity for combined mammographic and sonographic evaluation – 88.88%Specificity for combined mammographic and sonographic evaluation – 100%. Positive predictive value for combined mammographic and sonographic evaluation –100%.Negative predictive value for combined mammographic and sonographic evaluation –93.54 %.

DISCUSSION

Palpable breast lumps are the most common conditions that we come across in the clinical practice. Aim of early detection of breast cancer and its management encourage to go ahead with invasive pre surgical diagnostic procedures for breast lumps. Patients with palpable breast lesion commonly present for radiology evaluation. Various imaging techniques like mammography, ultrasonography, MRI, scintimammography and PET are now available. Mammography is primary method of detection and diagnosis of breast disease with sensitivity of 85% - 95% [6]. The specific mammographic features of the breast mass help in diagnosis. Benign lesions show round to oval shape, well defined margins, few lobulations, low soft tissue density and fat containing lesions. Malignant lesions are high soft tissue density, irregular margins, multiple lobulations and spiculations with or without micro calcifications [7]. Mammography in breast mass can be used to look for micro calcifications and architectural distortion, speculated margins and hence to determine the potential malignant nature of the lesion also to screen for occult dis- ease in the surrounding tissue Mammography proved to be an effective diagnostic tool for defining the benign and malignant characteristics of palpable breast mass. Mammography is nearly 87% accurate in detecting cancer [8-13], its specificity is 88% and its positive predictive value may be as high as 22% [12]. But the false negative findings in mammography in evaluation of palpable breast mass is high, estimated between 4% and 12% [14,15]. In our study Sensitivity for mammography was 88.23%. Specificity for mammography was 95.45%, Positive predictive value for mammography was 93.75%. Negative predictive value for mammography was 91.30%. Due of the low sensitivity of the mammography in younger women because of dense Breast tissue and also low incidence of breast carcinoma in women less than 40 years [16], only women who are 30 and over 30 years and less than 70 years of age with palpable abnormalities of breast are included in this study. The positive biopsy rate for breast cancer is between 10-30% [17]. Breast carcinoma has been reported in only 10% of patients with breast symptoms in this study, and of all the palpable lumps who underwent biopsy, maximum number of lesions came out to be benign [18,19].The role of mammography in patients with palpable breast lumps is to show a benign cause for palpable abnormality and to avoid further intervention, to support earlier intervention for a mass with malignant features, screen of the ipsilateral and contralateral breast for additional lesions, and to assess the extent of malignancy when carcinoma is diagnosed[20] Mammography has reduced sensitivity in dense breast tissue, with sensitivity as low as 30% to 48% in extremely dense parenchyma.[21,22] However the false negative rate of mammography for breast cancer in patients with palpable

abnormalities of the breasts has been reported to be as high as 16.5 % [23].Hence many of the times, other modalities are needed to compliment the primary diagnosis given on Mammography. Additional imaging with sonography is appropriate in most instances, with the exception of lesions that are mammographic ally benign as or lesions that are highly indicative of malignancy, in which sonographic imaging would not add any additional information. Ultrasonography is perfect adjunct to the mammography since both the modalities are easily available, relatively cheaper and can take relatively less time. Initially ultrasonography was only used to differentiate solid from cystic masses. Ultrasonography effectively differentiates solid lesions from cysts which account for nearly 25% of breast lesions [10]. Now it can be used to evaluate dense breasts usually below 35 years of age. In the breasts where solid lesions and cysts are obscured by mammography due to dense fibroglandular tissue, ultrasonography help in diagnosis and to decrease the number of surgical biopsies [14,15]. It is necessary to evaluate the complex cysts or cyst which need repeated aspiration since they can harbor malignancy [10].The specific sonographic features determining the benign nature of the lesion include intense hyper echogenicity, ellipsoid shape, gentle lobulations, thin echogenic pseudocapsule and less than four gentle lobulations. Malignant nature of the lesion is given by spiculations, angular margins, shadowing, microlobulations and microcalcifications. In our study, 31 of the 50 lesions were categorized as benign and 16 as malignant after a combined mammographic and sonographic evaluation, clearly showing the value of Imaging in helping avoid unnecessary biopsies. The value of combined mammographic and sonographic imaging in symptomatic patients has been studied previously. Moss *et al* reported sensitivity of 94.2% and specificity of 67.9% in 368 patients [24]. Shetty MK and Shah YP reported a sensitivity of 100% and specificity of 80.1% [5]. Barlow *et al* reported a sensitive of 87% and specificity of 88% and positive predictive value of 22 % [25].Their findings are comparable with present findings of sensitivity of 88.88 and specificity of 100% in patients with palpable breast lumps.

CONCLUSION

This study confirms the higher combined specificity for ultrasonography and mammography for detection of breast masses including malignancies. USG is better in cystic lesion, ectasia, infections and inflammatory conditions, pregnancylactation, dense breast evaluation and real time image guidance, whereas mammography is better in detecting microcalcifications, spiculated masses for early detection of occult malignancies and for stereotactic biopsies. Ultrasonography and mammography cannot replace each other but to suggest single modality, ultrasonography is better in younger population and BIRAD 1, 2 and 3 lesions. Whereas, mammography is better in older population and BIRAD 4 and 5 lesions. Mammography with sonography as an adjunctive in evaluating the breast lump plays an important role in early detection of malignant breast lesions, in differentiating the benign and malignant lesions, to avoid unnecessary pre-operative invasive procedures and also in management of palpable breast lesions. Also the negative findings on combined mammographic and sonographic imaging have high specificity and does not need further evaluation by any modality or invasive diagnostic procedures. Thus ultrasound and mammography are safe, cost effective and noninvasive modalities for evaluation of breast lesions and should be considered as the first choice of investigations before proceeding to painful invasive procedures.

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