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Evaluation of breast lumps by HRUSG and its correlation with FNAC findings in a teaching hospital

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Abstract

Background: High resolution ultrasonography is useful investigation modality for evaluation of breast lumps.

Aim of the study: To study the ultrasonographic features of breast lumps and to correlate the findings with fine needle aspiration cytology.

Materials and Methods: A prospective study done on 70 patients of breast lumps who attended department of Radiology, over a period 2 years ie, from January 2018 to November 2020.

Results: In the Present study on HRUSG breast 60 cases (85.7%) were circumscribed masses and 10 cases (14.2%) were not circumscribed masses. Calcification and necrosis were noted in 07 malignant cases. 09(12.8%) of our malignant cases showed markedly hypoechoic echotexture.

Conclusion: Specificity of HRUSG in diagnosing breast lumps was found to be 98.3% in our study.

Keywords: Breast lump, HRUSG

Introduction

Ultrasound (US) is also the modality of choice to characterize palpable lumps in radiographically dense breasts ^[1]. Ultrasonography (USG) of breast is a useful adjuvant modality to X-ray mammography. Its role is well established in differentiating solid from cystic lesions. It also characterizes whether a cyst is simple or complex. High-resolution US (HRUS) is an efficient modality to detect micro calcifications with a sensitivity of 95% ^[2]. It can also pinpoint an intraductal lesion. Refinement of high-frequency technology, particularly with 7.5–13 MHz probes, has brought out a totally new facet in USG breast imaging ^[3].

For example:

- High-density probes provide better lateral resolution
- Harmonic imaging leads to improved resolution and reduced reverberation and near-field artifacts
- Real-time compound scanning results in increased tissue contrast resolution

Extended or panoramic views provide a better perspective of the lesion in relation to the rest of the breast.

Breast Imaging Reporting and Data System (BI-RADS) lexicon initially was used only in mammography. In an attempt to standardize the description and reporting of breast lesions in all modalities, the American College of Radiology published, in 2003, an extended version of the 3rd edition, which includes new sections on breast US and magnetic resonance imaging (MRI) ^[4]. The breast US descriptors are based on shape, orientation, margin, boundary, echo pattern, posterior acoustic features, and surrounding tissue, as well as special features, such as intramammary lymph nodes.

Fine needle aspiration cytology (FNAC) of breast lump is an accepted and established method to determine the nature of the lump and it may play an important role when it is difficult to determine the nature of breast lump by clinical examination. FNAC of breast is simple, cost effective and less traumatic method for diagnosis of breast lump ^[5].

Aim of the study: To study the ultrasonographic features of breast lumps and to correlate the findings with fine needle aspiration cytology.

Materials and Methods

This was a prospective hospital-based observational study. It was done in the department of Radiology in 70 female patients at Shri satya sai medical college and research institute, kancheepuram district, Tamil Nadu, over a period 2 years ie, from January 2018 to November 2020.

The study had no ethical issues. Written informed consent was obtained from all the cases included in the study.

Inclusion criteria

Patients willing to participate in the study Age group range from 20 years to 70 years Patients with breast lumps confirmed by HRUSG.

Exclusion criteria

Patients not willing to participate in the study Age less than 20 years and more than 70 years. Pregnant women and lactating women. Recurrent lumps.

Methodology

A total of 70 cases were studied. Thorough clinical history was taken including present history, past history, family history and personal history. History of any previous USG done was obtained. A general and detailed clinical examination was done. The procedure of HRUSG was explained to the patient.

Sonography was performed with a high-resolution ultrasound instrument (GE machine) equipped with a 7.5 - 12 MHz linear probe, in supine position. The high frequency linear probe (Transducer VF 10-5) was used to image the breast tissues. Each lesion was classified according to the BI-RADS sonographic protocol. Interpretation of sonography was performed prospectively as benign, suspicious or malignant. Both the breasts were exposed and the transducer was swept in radial and anti-radial direction to look for any abnormality. The presence of a mass, its margin, boundary zone, internal echoes, posterior echoes and associated findings were recorded.

All the cases with breast lumps were sent for FNAC to the

department of Pathology. The FNAC slides were reported by senior pathologist. USG and FNAC findings were correlated. Following this workup, all patients underwent an excisional biopsy.

Statistical analysis

Data entered in Microsoft Excel sheet and was analysed using SPSS version 20.0 statistical software. Data was depicted in the form of tables and charts.

Observations and Results

A total of 70 cases with breast lump confirmed on HRUSG were included in the study.

Table 1: Distribution of age in years

Age distribution (in years)	No. of cases	Percentage (%)
20-30	08	11%
31-40	37	52.8%
41-50	20	28%
51-60	03	4.2%
61-70	02	2.8%
Total	70	99.4%

In the present study majority of the cases 37 (52.8%) were in the third and fourth decades. In our study the youngest patient was 20 years old and the oldest was 69 years old. the mean age of presentation of breast lumps was 34.14 years and the malignant lumps was 55.08 years.

Table 2: Distribution of cases on clinical examination

Location of lesion	No. of cases	Percentage (%)
Upper outer quadrant	55	78.5%
Upper inner quadrant	07	10%
Lower outer quadrant	05	7.1%
Lower inner quadrant	03	4.2%
Total	70	99.8%

In the present study most of the cases 55 (78.5%) were located in the Upper and outer quadrant.

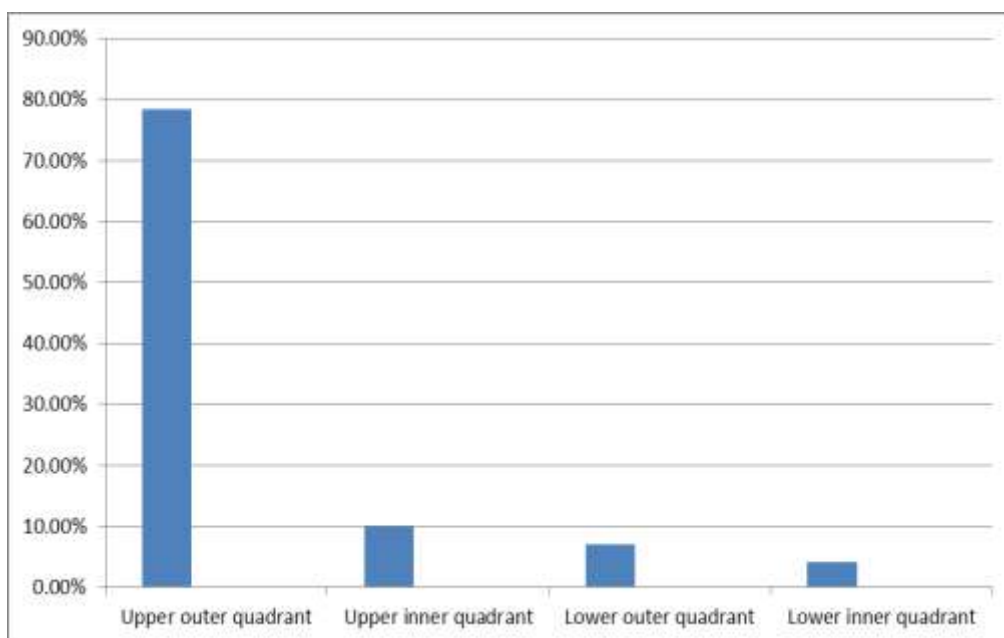


Fig 1: Bar diagram showing 78.5% cases were located in the Upper and outer quadrant, 10% in Upper inner quadrant Lower outer quadrant, 7.1% in Lower outer quadrant, 4.2% Lower inner quadrant

Table 3: Distribution of cases on clinical diagnosis

Lesions	No. of cases	Percentage (%)
Benign	55	85.7%
Malignant	15	14.2%
Total	70	99.9%

In the present study majority of the cases 60(85.7%) were diagnosed clinically as benign and 10(14.2%) cases as Malignant. Most of the benign lesions were noted in the 20-50 years age group while all malignant lesions were observed between 45 to 70 years.

Table 4: Distribution of cases according to USG findings

S. No.	USG findings	Benign (n=60)	Suspicious of malignancy (n= 02)	Malignant (n=08)	Total (n=70)
1	Shape of lesion Round Oval	53(75.7%) 07(10%)	02 (2.8%)	05(7.1%) 03(4.2%)	60 (85.6%) 10 (14.2%)
3	Lesion Hyperechoeic Hypoechoeic	60(85.7%) -	01 (1.4%) 01 (1.4%)	- 08(11.4%)	61(87.1%) 09(12.8%)
2	Margins Well circumscribed Not well circumscribed	60(85.7%) -	02(2.8%)	- 08(11.4%)	60(85.7%) 10(14.2%)
5	Necrosis Present Absent	60(85.7%) -	01 (1.4%) 01 (1.4%)	06(9.09%) 02(2.8%)	07 (10%) 63(90%)
4	Calcification Present Absent	- 60(85.7%)	- -	07(10%) 03 (4.2%)	07(10%) 63(90%)
6	Overlying skin Normal Skin retraction	60(85.7%) -	01 (1.4%) 01 (1.4%)	02(2.8%) 06(8.5%)	63(90%) 07(10%)
7	Invasion Present Absent	- -	- 02 (2.8%)	7(10%) 01 (1.4%)	7 (10%) 03 (4.2%)
8	Underlying muscle and chest wall	-	-	-	-

In the Present study 60 cases (85.7%) were circumscribed masses and 10 cases (14.2%) were not circumscribed masses. Calcification and necrosis were noted in 07

malignant cases. 09(12.8%) of our malignant cases showed markedly hypoechoic echotexture.

Table 5: Distribution of cases based on BIRADS Grading

Ultrasonography grade of lesion (BI-RADS)	No. of cases	Percentage (%)
Benign (II)	60	85.7%
Probably benign (III)	-	-
Suspicious of malignancy (IV)	02	2.8%
Highly suspicious malignancy (V)	08	11.4%
Total	70	99.9%

In the present study based on grading of the lesion (BI-RADS) on HRUSG. 60 (85.7%) lumps were reported as benign (grade II),

02(2.8%) were reported as suspicious for malignancy (Grade IV). and 08 (11.4%) as Highly suspicious malignancy (Grade V)

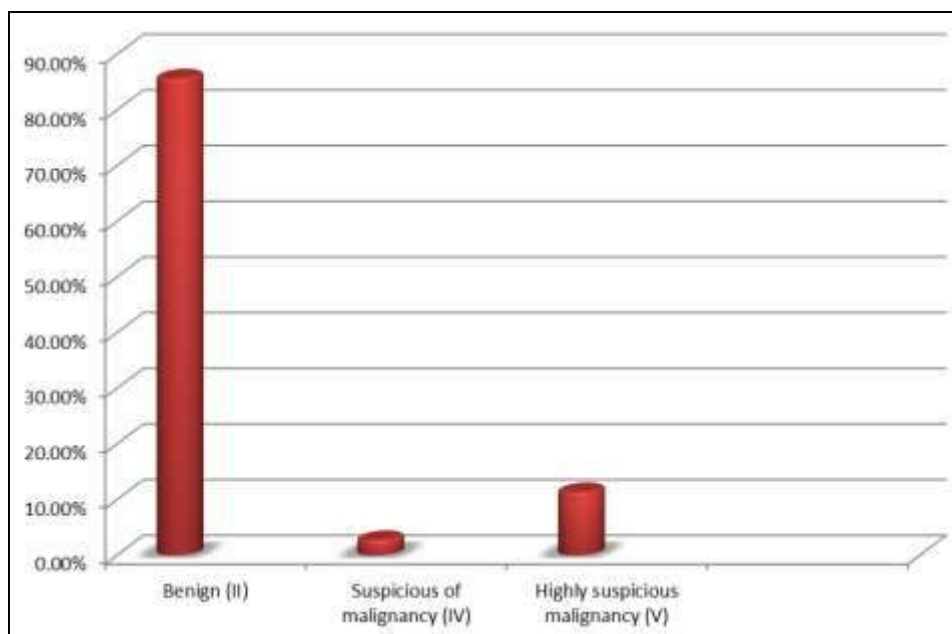


Fig 2: Bar diagram showing 60 (85.7%) lumps as benign (grade II), 02(2.8%) as suspicious for malignancy (Grade IV). and 08 (11.4%) as highly suspicious malignancy (Grade V)

Table 6: Distribution on FNAC (benign and malignant cases n=70)

Lesions	No. of cases	Percentage (%)
Fibroadenoma	55	78.5%
Benign phyllodes tumor	02	2.8%
Fibrocystic disease	02	2.8%
Fibroadenoma with Fibrocystic changes	01	1.4%
Atypical ductal hyperplasia (UDH)	01	1.4%
Carcinoma breast	09	12.8%
Total	70	99.7%

In the present study, FNAC reported 60 (85.7%) breast lumps as benign and 09 (12.8%) as malignant and 01 case as Atypical ductal hyperplasia (ADH).

Table 7: Correlation of USG findings and Clinical findings

Clinical findings	USG Findings	Remarks
Benign cases (55)	Benign (55)	True negatives
Malignant cases (15)	Benign (05)	False negatives
	Carcinoma breast(08)	True positive
	Suspicious for malignancy (02)	False positives

The sensitivity, specificity, positive predictive value and negative predictive values of ultrasonography and clinical

diagnosis in diagnosing breast lesions were 61.5%, 96.4%, 80%, and 91.6% respectively.

Table 7: Correlation of USG findings and FNAC

USG Findings	FNAC Findings	Remarks
Benign cases (60)	Fibroadenoma (55)	True negatives
	Benign phyllodes tumor (02)	True negatives
	Fibrocystic disease (02)	True negatives
	Fibroadenoma with Fibrocystic changes (01)	True negatives
Suspicious of malignancy (02)	Carcinoma breast (01)	True positives
	ADH (Atypical ductal hyperplasia) (01)	False positives
Malignant cases (08)	Carcinoma breast (08)	True positives

The sensitivity, specificity, positive predictive value and negative predictive values of ultrasonography and FNAC in diagnosing breast lesions were 100%, 98.3%, 90%, and 100% respectively

[6], where all the lumps (100%) were in the upper outer quadrant.

Discussion

Comparative study related to Age distribution

In the present study majority of the cases 37 (52.8%) were in the third and fourth decades. In our study the youngest patient was 20 years old and the oldest was 69 years old. The mean age of presentation of breast lumps was 34.14 years and the malignant lumps was 55.08 years. The findings were compared to other studies. In Zende U MA *et al* [6] study, the youngest patient was 15 years old and the oldest was 76 years old. The mean age of presentation of all type of breast lumps was 35.13 years and the malignant lumps was 50.07 years. In a study conducted by Raj Bhesdadiya *et al.* all [7] symptomatic women between 25-65 years were included. The mean age of women in the present study was around 40, with most of patients 18(36%) belonging to 41-50 years age group. 86% of the cases were in the age group of less than 50 years. Only two patients above the age of 60 years were included. In Kamini Gupta *et al* study [8] a series of eight cases were analyzed. Out of which, five were multiparous women of age more than 40 years and three were uniparous and <40 years of age.

Comparative study related to Clinical complaints

In the present study most of the cases 55 (78.5%) were located in the upper and outer quadrant. Similar findings were observed in a study conducted by Zende U MA *et al.*

Comparative study related to Clinical diagnosis

In the present study majority of the cases 60 (85.7%) were diagnosed clinically as benign and 10(14.2%) cases as Malignant. Most of the benign lesions were noted in the 20-50 years age group while all malignant lesions were observed between 45 to 70 years. In a study conducted by Zende U MA *et al.* [6], 39% of benign lumps and 61% of malignant lumps. In Raj Bhesdadiya *et al.* [7] study out of 50 cases, 27 cases were diagnosed as benign, 23 were diagnosed as malignancy. In Yumjaobabu Singh Takhellambam *et al.* [9] study, 40 benign and 22 malignant were included.

Comparative study related to USG findings

In the Present study based on grading of the lesion (BI-RADS) on HRUSG.

60 (85.7%) lumps were reported as benign (grade II), 02 (2.8%) were reported as suspicious for malignancy (Grade IV). and 08 (11.4%) as highly suspicious malignancy (Grade V). 60 cases (85.7%) were circumscribed masses and 10 cases (14.2%) were not circumscribed masses. Calcification and necrosis were noted in 07 malignant cases. 09 (12.8%) of our malignant cases showed markedly hypoechoic echotexture. In the present study, FNAC reported 60 (85.7%) breast lumps as benign, 09 (12.8%) as malignant and 01 case as Atypical ductal hyperplasia (ADH).The sensitivity, specificity, positive predictive value and negative predictive values of ultrasonography and

FNAC in diagnosing breast lesions were 100%, 88.2%, 80%, and 100% respectively. In a study conducted by Yumjaobabu Singh Takhellambam *et al.*^[9] Ultrasonography reported 36 cases as benign, 18 as malignant and 6 as indeterminate; it failed to detect breast lump in 2 cases. Sensitivity, specificity, positive and negative predictive values of ultrasonography and FNAC in diagnosing malignant breast lump were respectively 94.74%, 100%, 100%, 97.22% and 90.48%, 100%, 100%, 95.24%. In a study done by Raj Bhesdadiya^[7] Ultrasonography (USG) could pick up 49 lesions. Amongst 49 cases, 23 were benign and 26 were malignant. In 1 case, USG was normal or negative for lesion. On pathological correlation, 1 out of 23 benign lesions was malignant. 25 out of 26 malignant lesions were correctly diagnosed as malignant. 1 malignant case was missed on USG. USG, sensitivity & specificity were 92.62% & 98.12% respectively. In Zende U MA *et al.*^[6], in their study observed 62.8% of malignant cases showed markedly hypoechoic echotexture. The margins of the malignant lesions in their study were angular or irregular in 51.72% cases and spiculated in 27.59% of cases. The accuracy of HRUSG characterization of Breast masses was 96%. The accuracy for detection of malignant masses was 96%. The NPV of a BI-RADS 3 lesion being malignant was 97%.

Conclusion

High resolution ultrasonography is useful investigation modality for evaluation of breast lumps including microcalcifications and intraductal lesions and has good sensitivity, specificity, positive and negative predictive values for diagnosing breast lesions. The FNAC of breast is cheap, safe and highly accurate preoperative method for diagnosis of breast lesions. But core needle biopsy is the diagnostic method of choice for malignant lumps. Specificity of both the HRUSG & FNAC in diagnosing breast lumps was found to be 98.3% in our study.

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