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RESEARCH ARTICLE

USG IN BREAST DISEASES

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Abstract

Introduction: The diseases of breast are among the leading causes of morbidity and mortality throughout the world. Ultrasound detects unsuspected benign and malignant masses, and is also of benefit in the evaluation of mammographically indeterminate masses. **Methods**: Our study was prospective one conducted at the Postgraduate Department of Surgery, Government Medical College, Srinagar, over a period of two years. This study included patients who presented to OPD with complaints of breast pain/discomfort, lump and nipple discharge. **Results**: Out of 14 patients of HPE confirmed malignancy, 12 (85.7%) had irregular shape, two patients had round/oval shape, 12 (85.7%) had non-circumscribed margins, two had circumscribed margins, 8 (57.1%) had axis ≤1.4 while 6 had axis >1.4 and lastly 12 (85.7%) had hypoechoic lesions and one each had hyperechoic and isoechoic lesion. In benign masses, 31 (70.5%) patients had round/oval shape, 13 (29.5%) had irregular shape, 35 (79.5%) had circumscribed and 9 (20.5%) had non circumscribed margins, 42 (95.5%) had >1.4 and 2 (4.5%) had ≤1.4 and lastly 25 (56.8%) were hyperechoic, 12 (27.3%) were isoechoic and 7 (15.9%) were hypoechoic. **Conclusion**: The sensitivity, specificity, positive predictive value, negative predictive value and accuracy were found to be 93.2%, 64.3%, 89.1%, 75.0% and 86.2% respectively in benign lesions. In case of malignant lesions, sensitivity, specificity, positive predictive value, negative predictive value and accuracy were found to be 64.3%, 93.2%, 89.1%, 75.0% and 86.2% respectively. Thus, ultrasound is a relatively inexpensive, time saving and a more accessible modality for evaluating breast masses.

Introduction

The diseases of breast are among the leading causes of morbidity and mortality throughout the world since times immemorial. Although, being so accessible for inspection, palpation and investigations, its neoplastic affections are seldom identified at an earlier curative stage. Regular self-palpation and awareness about the breast disease have been put forward as an effective and widely acceptable means for early detection of breast diseases.[1]

In the breast with radiographically dense fibroglandular tissue in which mammography is unable to demonstrate non-calcified masses, ultrasound detects unsuspected benign and malignant masses, and is also of benefit in the evaluation of mammographically indeterminate masses. The ability of ultrasound to differentiate cystic from solid lesions is in the range of 96-98% far exceeding the ability of mammography or physical examination in that aspect.[2]

The special situations where the ultrasound is definitely indicated as a diagnostic tool are:[2]

1. Evaluation of radiographically dense breast.

2. Evaluation of indeterminate lesions seen on mammography.
3. Evaluation of palpable masses not seen on mammography.
4. Evaluation of palpable masses particularly after unsuccessful aspiration.
5. Visualisation of the entire tissue surrounding Breast augmentation prosthesis.

The sensitivity of breast sonography has been found superior to mammography especially in pre menopausal breasts, and recently, screening sonography has also been advocated for dense breasts. Today sonography plays an important role in guiding interventional procedures such as needle aspiration, core needle biopsy, and pre-biopsy needle l ocalization.[3]

A lexicon of sonographic descriptions of breast masses with attendant assessment categories (breast imaging reporting and data system [BI-RADS]) has been developed by the American college of radiology (ACR; Reston, VA) to enhance the clinical efficacy of breast sonography and to standardize terms for lesion characterization and reporting.

Materials and Methods

Our study was prospective one conducted at the Postgraduate Department of Surgery, Government Medical College and SMHS Hospital, a tertiary care hospital situated at Srinagar, over a period of two years from March 2011 to March 2013.

This study included patients of all age groups who presented to OPD / Emergency of Department of Surgery with complaints of breast pain/discomfort, lump and nipple discharge. Patients already diagnosed and treated for any breast pathology, either palliatively or definitively, and male patients.

AIMS

1. To evaluate the sensitivity and specificity of ultrasound in detecting breast diseases.
2. To evaluate efficiency of ultrasound in distinguishing benign diseases from carcinoma breast.

Ultrasonography of both breasts was done to rule out any synchronous lesion. USG of breast was done on Philips i22 color Doppler USG machine with high frequency linear trasducer (multi-frequency 7.0MHz to 12.0MHz).Scanning was done with patients lying in supine position, arms raised and placed under the neck to keep the breast firm on to the chest wall and then turned slightly in oblique position to scan the breast. The transducer orientation was transverse and radial. Lesions were classified as per American College Of Radiology BIRADS (breast imaging reporting and data system) classification.

Results

The study was conducted on 58 patients with various breast complaints who reported to OPD/emergency of postgraduate department of General Surgery of SMHS hospital Srinagar over a period of two years.

Table – 1
Age Distribution of Studied Population

Age in Years	**N**	**%**
15 to 29	19	32.8
30 to 44	30	51.7
45 to 59	6	10.3
≥ 60	3	5.2
mean ± SD	34.0 ± 12.2 (15, 65)	

The age of patients (table-1) ranged from 15 to 64 years in case of benign lesions and from 30-65 years in case of malignant lesions. It was observed that maximum number of cases of breast complaints were seen in the third decade of life. 33 (56.9%) were from rural area, and 25 (43.1%) were from urban area.

The incidence of right sided breast masses was found to be 38 (65.5%) which was higher than the l eft sided breast masses 20 (34.5%).

The table-2 below evaluates the efficiency of USG to distinguish malignant from benign diseas of breast.

Table – 2
Histopathology

USG Findings		**Malignant**		**Benign**		**Results**
		N	**%**	**N**	**%**	
Shape	Irregular	12	**85.7**	13	29.5	OR= 14.3, Sensitivity = 85.7, Specificity = 70.5 , PPV = 48.0 , NPV = 93.9, Accuracy =74.1 , p value = 0.000 (Sig)
	Round/Oval	2	14.3	31	**70.5**	
Margins	Non-circumscribed	12	**85.7**	9	20.5	OR=22.3, Sensitivity = 85.7, Specificity = 79.5, PPV = 57.1, NPV = 94.6, Accuracy = 81.0, p value = 0.000 (Sig)
	Circumscribed	2	14.3	35	**79.5**	
Axis	≤ 1.4	8	**57.1**	2	4.5	OR= 28.0, Sensitivity = 57.1, Specificity = 95.5, PPV = 80.0, NPV = 87.5, Accuracy = 86.2, p value = 0.000 (Sig)
	> 1.4	6	42.9	42	**95.5**	
Echogencity	Hypoechoic	12	85.7	7	15.9	OR = 31.7, Sensitivity = 85.7, Specificity = 84.1, PPV = 63.2, NPV = 94.9, Accuracy = 84.5, p value = 0.000 (Sig)
	Isoechoic	1	7.1	12	27.3	
	Hyperechoic	1	7.1	25	56.8	

Table-2 shows USG characteristics namely shape, margins, axis (width/AP diameter) and echogenecity in relation to benign and malignant masses. Out of 14 patients of HPE confirmed malignancy, 12 (85.7%) had irregular shape. The remaining two patients had round/oval shape. Out of 14 HPE confirmed malignancy patients, 12 (85.7%) had non-circumscribed margins. The remaining ones had circumscribed margins. Out of 14 HPE confirmed malignancy patients, 8 (57.1%) had axis ≤1.4. The remaining 6 had axis >1.4. Out of 14 HPE confirmed malignancy patients, 12 (85.7%) had hypoechoic lesions. And one each had hyperechoic and isoechoic. In benign masses, 31 (70.5%) patients had round/oval shape, 13 (29.5%) had irregular shape. Among margins in benign lesions, 35 (79.5%) had circumscribed and 9 (20.5%) had non circumscribed margins. Among axis, 42 (95.5%) had >1.4 and 2 (4.5%) had ≤1.4. Among echogenecity, 25 (56.8%) were hyperechoic, 12 (27.3%) were isoechoic and 7 (15.9%) were hypoechoic.

Table – 3

USG	**Benign**	**Malignant**
Sensitivity	93.2	64.3
Specificity	64.3	93.2
PPV	89.1	75.0

NPV	75.0	89.1
Accuracy	86.2	86.2

Table-3 shows overall sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of Ultrasound in relation with Histopathology (HPE).

Discussion

Diagnostic accuracy of USG for malignant lesions:

In the correlation of USG diagnosis with pathological diagnosis in case of malignant breast lesions, It was observed that out of 14 cases of pathologically proven carcinomas, 12 were correctly diagnosed on USG where as two were reported as benign. In the present study, it was observed that the sensitivity, specificity and accuracy were 64.3%, 93.2% and 86.2% respectively. The results correlated with those of Itoh A, et al (2006)[4] who reported sensitivity, specificity, accuracy of 78.6%, 93.1% and 86.0% respectively.

Malik G, et al (2006)[5] conducted a study which showed sensitivity and specificity of 67% and 92.4% respectively.

However the results revealed by our study were better than that of Gonzaga MA, et al (2010)[6] who had results with sensitivity and specificity of 57.1% and 62.8% respectively.

Diagnostic accuracy of USG for benign lesions:

In the present study it was observed that in 44 patients who were pathologically proven benign lesions the sensitivity, specificity, and accuracy was 93.2%, 64.3% and 86.2% respectively. The results found correlated with those of found in a study carried by Malik G, et al (2006)[5] which showed a sensitivity of 92% for diagnosing benign lesions and accuracy 91%.

The sensitivity, specificity and accuracy for diagnosing fibroadenoma was 70%, 86.8% and 81% respectively. The results correlated well with the study conducted by Prasad SN, et al (2008)[7] who observed sensitivity of 75% for fibroadenoma.

The accuracy of USG for diagnosing cystic lesions was found to be 100% in our study which correlated well with the study conducted by Fleishcher AC, et al (1983)[8].

Diagnostic accuracy of USG features:

In our study USG findings, the benign lesions having regular /oval shape, circumscribed margins, width/AP ratio >1.4, hypoechoic, isoechoic and hyperechoic lesions were 70.5%, 79.5%, 95.5%, 15.9%, 27.3% and 56.8% respectively.

The findings observed in our study for malignant masses were in tandem as observed by Gonzaga MA, et al (2010) [6] who noted that irregular shape, non-circumscribed margins, taller than wider, and hypoechogenicity most reliably characterize breast masses as malignant.

Among the malignant lesions, a single lesion was observed as hyperechoic. It correlated closely with the findings observed by Singh K, et al (2008)[45] who had not observed any malignant lesion as hyperechoic. The irregular margins were present in 85.7% which correlated with 87.5% seen by Hasni H, et al (2004)[9]

Incidence of irregularity in shape, non-circumscribed margins, width/AP ratio $\leq$1.4 and least hyperechoicity was more in the malignant masses than benign masses and p value=o.ooo i.e. the difference was significant.

Conclusion

1. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy were found to be 93.2%, 64.3%, 89.1%, 75.0% and 86.2% respectively in benign lesions.
2. In case of malignant lesions, sensitivity, specificity, positive predictive value, negative predictive value and accuracy were found to be 64.3%, 93.2%, 89.1%, 75.0% and 86.2% respectively.

Thus, ultrasound is a relatively inexpensive, time saving and a more accessible modality for evaluating breast masses. The role of ultrasound in the diagnosis of malignancy of breast needs further evaluation before it can be used for screening of malignancy breast.

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