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ROLE OF HIGH RESOLUTION ULTRASONOGRAPHY & COLOUR DOPPLER IN EVALUATION OF BREAST MASSES AND ITS CORRELATION WITH FINE NEEDLE ASPIRATION CYTOLOGY

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Abstract:

Aim: To determine the role of High Resolution Ultrasonography & Colour Doppler (HRUSG& CD) in evaluation of breast masses and its correlation with Fine Needle Aspiration Cytology (FNAC).

Method: Prospective analytical study. A total of 100 patients referred with clinically palpable breast lump were included in the study. A detailed history was obtained from each patient with emphasis on presence of lump in the breast, its duration & associated symptoms. Ultra-sonographic examination of breast was performed in supine position with elevation of ipsilateral hemi thorax by high resolution real time transducer of 7.5 to 10 MHz

Results: 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 50.07years. The mean size of malignant lesion was 4.72 cm. 39% of benign lumps and 61% of malignant lumps were in upper outer quadrant. Fibroadenoma was the commonest lesion detected in our study (43%). Doppler sonography added useful information to the gray-scale imaging in characterizing solid breast nodules. Ultrasound coupled with Doppler was found to be useful in differentiating vascular lesions from non-vascular lesions like cysts, abscesses and also in differentiating the benign from malignant lesions to some extent.

Conclusion: It was possible to reach a correct diagnosis in 96 % of the 100 total cases based on ultrasonography & Colour Doppler alone. The overall sensitivity of HRUSG &CD in the detection and characterization of malignant breast lesions was 89.66 % with overall accuracy of 96%.

Keywords: Breast masses, Ultrasonography, Colour Doppler, Fine Needle Aspiration Cytology

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Introduction:

Breast cancer in women is a major public health problem, the most commoncancer among women both in developed and developing countries. More than 1.1 million cases are diagnosed and more than 410,000 patients die of it worldwide.[1] It is the second most common cancer now, after lung cancer, when ranked by cancer occurrence in both sexes. About 55% of the global burden is currently experienced in developed countries, but incidence rates are rapidly rising in developing countries.[1,2] The incidence of carcinoma of the breast is on an increase and early detection offers better treatment and survival rate. The breast, being a superficial organ, is ideal for HRUSG evaluation. Sonography due to non-invasive nature, easy availability, low cost and accuracy has become a choice of investigation for breast imaging. More recently, USG Elastography can improve the specificity and positive predictive value

of USG in the characterization of breast masses.[3,4]

Aim: To determine the role of High Resolution Ultrasonography & Colour Doppler in evaluation of breast masses and its correlation with Fine Needle Aspiration Cytology.

Objectives: To diagnose a breast mass as accurately as possible by high resolution ultrasound. Correlate the HRUSG &CD findings with FNAC results.

Method:

Study design: It is a prospective, analytical study.

Ethics approval: The study was approved by IEC and informed consent was obtained from the participants**.**

Sample size & sample technique: A total of 100 patients referred from various Departments, particularly departments of General Surgery & Obstetrics-Gynaecology with clinically palpable breast lump were included in the study.

Inclusion criteria:

1. All female patients of any age group presenting with a lump in the breast.
2. Patients with symptomatic, non-palpable lesions in the breast, detected by HRUSG.

Exclusion criteria:

1. Previously diagnosed cases of benign disease or of carcinoma of the breast.
2. Patients undergoing treatment and returning to the radiology department for follow-up of residual or recurrence of disease.

Machine specification: Ultrasound machines: LOGIQ PRO 5 [GE] with 10-12 MHz probe. SSD DYNAVIEW-II [Aloka, Japan] with 7.5 MHz probe.

Examination Method: A detailed history was obtained from each patient with emphasis on presence of lump in the breast, its duration & associated symptoms. After a complete history, a detailed general physical and local examination was done. Patients are explained about the non-invasive nature of the procedure.

Ultra-sonographic examination of breast was performed in supine position with elevation of ipsilateral hemi thorax by a support and arm above the head. Since breast is a superficially placed, high resolution real time transducers of 7.5 and 10 MHz are used. Linear transducers are preferred over sector and convex probes. The probe is swept from the outer to the inner aspect in horizontal, vertical and radial directions up to the nipple. Following grey scale solography, colour flow imaging and spectral waveform analysis were performed for determining grade and pattern of vascularity. The identified lesions are subjected to FNAC.

Data analysis: Data was entered in Microsoft excel sheet. All the data were analyzed using tables and charts. Statistical analysis was done using 2x2 tables to obtain sensitivity, specificity, positive predictive value, negative predictive value and accuracy & chi square value.

Result:

Fig 1: Age distribution among the patients

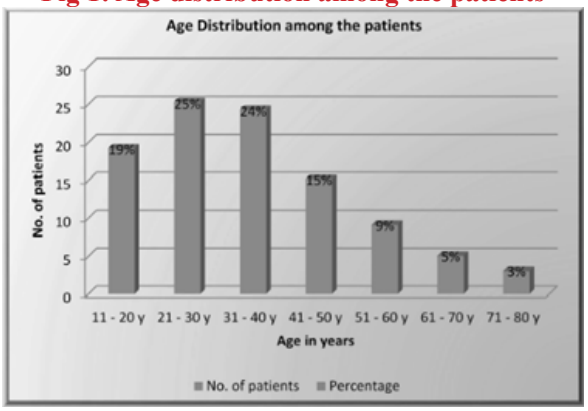

Table 1: Distribution of benign and malignant according the age

Age (year)	Benign %	%	Malignant	%
11 – 20	19	26.76	0	
21 – 30	22	30.99	3	10.34
31 – 40	19	26.76	5	17.24
41 – 50	7	9.86	8	27.59
51 – 60	4	5.63	5	17.24
61 – 70	0		5	17.24
71 – 80	0		3	10.34

Mean ± S.D in Benign group = 29.02 ± 10.5, in Malignant

group = 50.07 ± 14.28
|Z|tab= 1.96 at 5% level of significance
|Z|cal>|Z| {7.18 > 1.96}
Hence, there were statistically significant differences between two groups, according to their Age. Malignancy increases with increase in age. With p value {<0.05 }

Table 2: Distribution of the primary clinical symptoms

Clinical symptoms	No. of patients
Palpable Lump / Lumpy feel	49
Lump + Nipple discharge	4
Lump + Pain	27
Lump + Nipple retraction	5
Pain & discomfort	6
Increase in breast size	2
Lump and fever	3
Lump + skin thickening / Puckering	4

Table 3:Distribution of Location of Lesions

Location	RT	LT	B/L
Retroareolar	8	3	0
SMQ	12	13	1
SLQ	19	16	2
IMQ	7	2	1
ILQ	3	9	1
Diffuse	1	0	2

Table 4: Distribution of Maximum Sizes of Lesions Detected on USG

Size	Benign	Malignant
N.A.	2	0
< 1 cm	2	0
1 – 2 cms	16	1
2 – 3 cms	27	7
3 – 4 cms	16	9
4 – 5 cms	5	7
5 – 6 cms	1	2
6 – 7 cms	1	0
7 – 8 cms	1	0
>8 cms	0	3

Table 5: Distribution of L/AP Ratio of Lesions

Groups	No of patients	(μ ± δ)
Benign	69	1.49 ± 0.496
Malignant	29	0.72 ± 0.404

|Z|cal> |Z| tab {25.67 > 1.96}
Hence, there were Statistically Significance difference between two groups, according to their L/AP Ratio. The L/AP ratio is higher in benign groups.

Table 6: Distribution of Multiplicity of Fibroadenomas

Fibroadenomas	No of patients	%
Solitary	39	90.7
Multiple	4	9.3

Tab 7: Distribution of Shape, Margin, Posterior Acoustic, Echogenic characteristics of Lesions

	Benign	Malignant
Oval	55	3
Round	11	0
ill-defined	1	13
Irregular	2	11
Lobulated	0	2
Margins		
Circumscribed	64	2
Irregular	3	4
Angular	2	15
Spiculated	0	8
Posterior Acoustic Characteristics		
Enhancement	23	3
Attenuation	3	8
Shadowing	2	16
No acostic feature	14	2
Echogenic Characteristics		
Hyper	10	2
Hypo	44	27
Anechoic	13	0
Isoechoic	2	0

Table 8: Distribution of Skin thickening

		Benign	Malignant
Skin thickening	Present	2	10
	Absent	67	9
Axillary lymphadenopathy	Present	5	12
	Absent	64	17
Calcification	Present	3	15
	Absent	66	14

Table 9: Incidence of Lesions

Lesion	Number
Fibroadenoma	43
Carcinoma	29
Fibrocystic Disease	4
Simple Cysts	7
Fibroadenosis	3
Breast Abscess	5
IntramammaryLymphnode	4
Galactocele	2
Lipoma	1
Normal	2

Discussion

In our 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. The mean age of presentation of all types of breast lumps was higher as compared to studies conducted by Tiwari M,[5] Vetto John T et al,[6] but lower as compared to studies by Ahmed [17] and Panda AR.[8]

Most of the patients who were included in the study came with the chief complaint of Palpable Lump / Lumpy feel (n=49). In the present study the size range of benign lesion was 0.8cm to 8 cm with the mean size of 2.91 cms. The size range of malignant lesion was 2.2cms - 15cms with the mean size of 4.72 cm. In our study, 39% of benign lumps and 61% of malignant lumps were in upper outer quadrant. Bhattacharya S et al found that 36% of malignant lumps were in upper outer quadrant.[9] Azzena A et al found that 60% of malignant lumps were in upper outer quadrant.[10]

Fibroadenoma was the commonest lesion detected in our study (43%).Previously Jokich PM[11] Cole- Beuglet C Soriano RZ et al[12] had reported fibroadenoma being the common palpable breast masses in the young women. All the fibroadenomas are solid in nature. There was no change in the posterior sound transmission in majority of cases (n=41). A study by Cole-Beuglet et al (1983)[12] Harper[13] also showed that fibroadenoma have a typical appearance on sonomammography as seen in 140 patients.

Thibault F et al (2000)[14] showed that most important sonographic features to differentiate between benign fibroadenoma and carcinomas are L/AP ratio, margins and sound transmission, which correlates with our study.

62.8% of our malignant cases showed markedly hypoechoic echotexture. Therefore even though marked hypoechogenicity is a worrisome finding for malignancy, isoechogenicity and mild isoechogenicity are not necessarily a finding of benignity and should be considered an indeterminate finding. The margins of the malignant lesions in our studies were angular or irregular in 51.72% cases and spiculated in 27.59% of cases.

Malignant tumors secrete antigenic factors to help the recruitment on new vessels that allow temporal enlargement. It seems Doppler sonography technique that allows vascularization assessment, could be used to differentiate between benign and malignant breast lesions and even to predict the prognosis of the tumors. Doppler sonography added useful information to the gray-scale imaging in characterizing solid breast nodules. Ultrasound coupled with Doppler was found to be useful in differentiating vascular lesions from non-vascular lesions like cysts, abscesses and also in differentiating the benign from malignant lesions to some extent.[15] In our study, 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:

The ACR BI-RADS lexicon provides standardized terminology to facilitate accurate and consistent breast sonography and mammography reporting. This study shows that features from the standardized sonographic lexicon can be helpful in distinguishing benign from malignant solid masses. Further evaluation of the sonographic BI-RADS lexicon would be useful, including studies using prospective real-time analysis of sonograms and interobserver variability studies of the descriptors. Such studies would further help to assess the utility of the sonographic BI-RADS lexicon in clinical breast Radiology**.** Color Doppler imaging is a valuable adjunct to conventional sonography in differentiating malignant from benign breast lesions. USG guided FNAC's from breast lesions and lymph nodes increases further diagnostic accuracy.

Conflict of interest: Nil

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