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Research Article

Evaluation of breast lesion by ultrasonography during pregnancy

Dr N. Anwar Hussain[1], DrTaheer Khan Tadakod[2*]
[1]Associate Professor, Department of Radiodiagnosis, Kurnool Medical College, Kurnool.
[2]Assistant Professor, Department of Radiodiagnosis, Deccan Institute of Medical Science, Hyderabad

***Corresponding author**
DrTaheer Khan Tadakod

Abstract*Introduction:* The use of colour Doppler ultrasonography (CDUS) for characterizing breast lesions has increased in recent years. The presence and distribution of blood vessels associated with malignant lesions is visualized by CDUS. Doppler criteria such as resistive index (RI), pulsatility index (PI), and flow velocity are used to distinguish benign from malignant lesions.***Materials and Methods:*** This is a prospective and observational study conducted at tertiary care teaching hospital over a period of 6 months. All female Patients irrespective of age who came for ultrasound breast examination withsuspected breast lesions, complain of pain, palpable lump,breast complaints like nipple discharge, retraction,skin thickening were included in the study. Sixty pregnant or /and lactating females who came for ultrasound examination were done such as proper application of compression, transducer positioning, and image labelling.***Results:*** In our study, most of the subjects were 21-40 years i.e., 27 out of 60 (45%) followed by 41-60 years, i.e., 21 out of 60 (35%).There were total of 39 benign cases, Fibroadenoma (53) being the commonest, followed by least beingFibroadenoma with atypia, Lipoma and others.In this study, the age range of patients presenting with breast lesions was 18–60 years with mean age 47.4 years. 23 patients were breast lesions occurred in the age group of 31-40 years, 21 were younger age between 18-30 years and 14 were between 41-60 years. ***Conclusions:*** Evaluation of the pregnant patients who present with a breast problem is challenging. Although ultrasound may characterise the finding in many cases, mammography and even MRI may have a role in the management of these patients.
Keywords: Ultrasonography, Breast lesion, Pregnant women.

INTRODUCTION

The use of colour Doppler ultrasonography (CDUS) for characterizing breast lesions has increased in recent years [1]. The presence and distribution of blood vessels associated with malignant lesions is visualized by CDUS. Doppler criteria such as resistive index (RI), pulsatility index (PI), and flow velocity are used to distinguish benign from malignant lesions [2]. Most of the studies are based on RI comparison between malignant and benign lesions. However, different sensitivities, specificities, and positive and negative predictive values have been reported [3].

The imaging appearance on ultrasound is variable depending upon the duration of pregnancy and/or lactating state. An overall diffuse increase in breast density accompanied by breast enlargement is commonly seen on mammography. Given increased density of the breast the sensitivity of mammography is low (30 % for dense breast compared with 80 % for fatty breast), and cancer detection may be somewhat difficult[4]. According to one study evaluated patients with false-negative mammograms and symptomatic cancer, and found that 78 % of the mammographically occult lesions were in women with heterogeneously or extremely dense tissue. The imaging features of breast cancer on the mammogram are identical to those seen in non-pregnant women[5]. These are speculated or irregular masses, pleomorphic linear branching or grouped microcalcifications, focal asymmetries and architectural distortion. Detection is sometimes difficult as the overlying dense tissue may obscure the findings.

Ultrasound has a better sensitivity in pregnant and lactating patients, ranging from 86.7 to 100 %[6]. On ultrasonography, during pregnancy, the breast shows diffuse hypoechogenicity with fibroglandular enlargement and increased vascularity. In lactating women, the breast shows diffuse hyperechogenicity with a prominent ductal system and increased vascularity[7]. Ultrasonography is the best imaging modality to evaluate breast lesions during pregnancy and lactation, as it is sensitive and confers no radiation exposure[8]. According to the ACR Appropriateness Criteria, pregnant woman with palpable masses or pathological nipple discharge should be initially evaluated by ultrasonography in order to characterize the features of the lesion and plan proper management

MATERIALS AND METHODS

This is a prospective and observational study conducted at tertiary care teaching hospital over a period of 6 months.

Inclusion criteria: All female Patients irrespective of age who came for ultrasound breast examination withsuspected breast lesions, complain of pain, palpable lump,breast complaints like nipple discharge, retraction,skin thickening were included in the study.

Exclusion criteria: Patients with previous history of incision and drainage, already diagnosed or on medical treatment were excluded from the study.

Sixty pregnant females who came for ultrasound examination were done such as proper application of compression, transducer positioning, and image labelling. In order to stabilize, center, and thin out the breast tissue, the conventional position for breast US examination places the patient supine with the arm of the side being examined raised above the head. With larger breasts, a degree of elevation under the shoulder blade may be required in order to center the breast. This can best be accomplished with a foam wedge or roll of towels or sheets.

Scanning is performed with the degree of compression necessary to penetrate to the area of interest and eliminate superficial artifact. Scanning in the plane of ductal anatomy can be achieved by scanning in the radial and antiradial planes. Radial scanning is performed with the long axis of the transducer oriented along the long axis of the ductal and lobar anatomy (nipple to periphery of the breast in a branching pattern) and antiradial in the orthogonal plane (from the periphery of the breast inward toward the nipple).

Transverse and sagittal plane scanning are acceptable in the initial survey, and if a lesion is detected, radial and antiradial scanning are recommended, as the margins and extension of the mass may be better displayed and this approach increases the potential for finding other masses within the same ductal system. The position of the lesion should be labeled on the image according to the mammographic clock, noting distance from the nipple or areolar margin. It is important that this information be labeled on each image to ensure appropriate follow-up or localization for biopsy.

US findings were categorized according to the Breast Imaging Report and Data System (BI-RADS) lexicon using the following tumour classification,[11]: Shape (oval, round or irregular), orientation (parallel to the skin surface or not), margin (circumscribed or not, indistinct, angular, spiculated or microlobulated), echo pattern (anechoic, hypoechoic, hyperechoic or complex), posterior acoustic features (none, enhancement or shadowing), surrounding tissue change (absent or present), vascularity (none, focal or penetrating flow, or diffusely increased flow), presence of associated calcifications (none or microcalcifications in or out of a mass).

The BI-RADS lexicon requires the breast imaging report be summarized into 1 of 7 possible categories, [12]

BI-RADS 0 - Further assessment required;
BI-RADS 1 - Negative study;
BI-RADS 2- Benign finding (risk of malignancy similar to that of the surrounding parenchyma);
BI-RADS 3 - Probably Benign finding (less than 2% risk of malignancies should be followed up at 6, 12, and 24 months, and then classified as benign category 2 after showing stability for 24 months or biopsied if concerning changes or growth are seen);
BI-RADS 4- lesion is Suspicious for Malignancy (biopsy is offered);
BI-RADS 5- lesions are Highly suggestive of Malignancy; and
BI-RADS 6- lesions are Biopsy-proven Malignant before surgery is obtained (it is suggested that appropriate actions should be taken for these categories).

“Positive” category was all those who had BIRADS assessment category 4, 5 and 6. “Negative” category was all those with BIRADS assessment category 0, 1, 2 and 3.

All patients underwent pathological assessment either by FNAC or biopsy or both. Biopsies included either core biopsy or surgical excision biopsy. Surgical specimens had been fixed in 10% formaldehyde solution and cut into serial 5-mm thick slices. Histo-pathological slides in each tumor were reviewed by a pathologist independently. The cytology reports were classified as benign, suspicious for carcinoma, malignant, or inadequate. Histology was performed if cytology was suspicious or suggestive of malignancy.

BI-RADS criteria combined with US guided FNAB, were correlated with pathological findings to determine the Sensitivity, Specificity and Accuracy of the Sonographic examinations. After the pathological assessment patients were reviewed in the out-patient’s clinic with their pathology report to plan any further treatment.

RESULTS

In table 2, in our study, most of the subjects were 21-40 years i.e., 27 out of 60 (45%) followed by 41-60 years, i.e., 21 out of 60 (35%).

Table 1: Distribution of different age groups of patients

Age	No. of patients	Percentage %
<20 years	9	15
21-40 years	27	45
41-60 years	21	35
>61 years	3	5
Total	60	100

Table 2: Clinical Presentation of Patients in Study (N-60)

Complaints	No. of patients	Percentage %
Lump	43	71.6
Lump + Pain	7	11.6
Lump + Nipple Retraction	1	1.6
Lump + Skin Redness	1	1,6

Table 3: Distribution of Benign lumps

Benign lumps	Number of patients	Percentage %
Fibroadenoma	53	88.3
Fibroadenoma with atypia	1	1.6
Benign neoplastic lesion	1	1.6
Benign epithelial lesion	2	3.3
Benign papillary lesion	1	1.6
Lipoma	1	1.6
Intraductal papilloma	1	1.6
Total	60	100

There were total of 39 benign cases, Fibroadenoma (53) being the commonest. least being followed by Fibroadenoma with atypia, Lipoma and others.

Table 4: Number of Breast Lesions in study According To BI-RADS Category

BIRADS Score	Age group in years		
	18-30	31-40	41-60
II	8	7	1
III	3	6	2
IV	9	8	9
V	1	2	2
Total	21	23	14

In table 4, in this study, the age range of patients presenting with breast lesions was 18–60 years with mean age 47.4 years. 23 patients were breast lesions occurred in the age group of 31-40 years, 21 were younger age between 18-30 years and 14 were between 41-60 years.

Table 5: Sonographic diagnosis of Carcinoma Breast compared with pathologic findings

Sonography	Pathology		Total
	Positive	Negative	
Positive	19	3	22
Negative	2	15	17
Total	21	18	39

The patients with malignant disease underwent surgery. The surgical and histo-pathological findings were positive for carcinoma breast in 21 patients in table 5.

Table 6: Results of Sonographic studies in diagnosis of Breast Disease

Breast disease	Proven on Histopathology	Sonography			
		True Positive	True Negative	False Positive	False Negative
Benign	18	15	19	3	2
Malignant	21	19	15	2	3

DISCUSSION

Many breastfeeding women experience breast symptoms including pain, tenderness, firmness, and palpable lumps. Thanks to the increasing breast cancer awareness, these patients are usually referred for further examination. The lactating breast is under the influence of circulating hormones which lead to glandular proliferation, ductal dilatation, and stromal involution. Hence, the physical examination of the lactating breasts is difficult, and radiologic evaluation is usually necessary [9]. It has been suggested that, regardless of the lactational or gestational status, for symptomatic women younger than 30 years of age, US should be the first-line imaging and mammography should be saved for patients with indeterminate or suspicious lesions on US scans. US is quite successful in demonstrating true masses as well as normal breast parenchyma which may show palpable nodularity during lactation. When necessary, mammography can be performed just after breastfeeding to avoid high-density parenchyma related to retained milk products[10]. Magnetic resonance imaging findings may be altered due to physiologic changes but remains an efficient technique for the detection and characterization of breast lesions during lactation[11].

In our study, the enrolled women were with a wide age range between 18 and 60 years. The mean age was 47.4 years old. This study is similar to study by Cacala SR et al, were mean age of the women was 47 years, with a range of 18-88 years and near similar to studies of Brennan M et al and Ayyappan AP MS et al, were age range of 14-70 and mean age of 41years were reported[12-14]. In our study 14 patients were breast lesions occurred in the age group of 41-60 years, 21 were younger than 30 years and 23 were between 31-40 years. Most of the patients with benign (37.31%) according to BI-RADS assessment were within the age range of 40-49 years. This finding is in agreement with the results of Baker TP et al, where they found patients with malignancy to be from the 4th decade of life[15].

In our study 53 women were fibroadenoma was the commonest. Fibrocystic changes and inflammatory changes were the main categories of other lumps. According to Two studies had a higher rate compared to our study. In the young age group 73% had fibroadenoma[16]. These results may be explained by differences in ethnicity in these studies. In our study 9 patients of benign lesions were fibrocystic changes which was comparable to the result of Litton JK et al who reported 14%[17]. Four patients had mastitis and most of them were above 30 years old. This incidence was lower compared to the other studies except for Kang YD et al, who noted mastitis in only 2.5% of their patients[18-20].

Other benign lumps were rare in our and other studies. Rare entities included phyllodes tumor, galactocele, lipoma and sclerosingadenosis. Therefore, it was difficult to compare these results. In general, in western countries, 90% of lumps are benign. The largest number of women with benign condition present with fibrocystic changes (38%), cysts (15%), fibroadenoma (13%), inflammatory (8%) and few other entities[21].

The mean age of patients in the two benign and malignant groups in our study were 42.37 years and 53 years respectively, which is similar to study by Tirada N et al who have reported significantly older age among the malignant breast lesions compared with the benign group[22].

CONCLUSION

Substantial physiological changes during pregnancy make it challenging to evaluate patients presenting with a breast problem. Most findings in pregnant patients are benign. Ultrasound is the first-line imaging modality for all pregnant women less than 30 years of age pregnant, and for guiding interventional breast procedures. US has a significant role in the postoperative assessment of patients with breast cancer. It is helpful in evaluating postoperative recurrent breast masses and postsurgical complications, such as infection and fat necrosis, as well as exclusion of recurrent disease.

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