

Original Article

Accuracy of High Resolution Sonography in Diagnosis of Fibroadenosis Compared with Histopathological Diagnosis

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Abstract

Background: Fibrocystic breast condition is a common, non-cancerous condition that affects premenopausal woman between 20 and 50 years of age. Because of non-specific nature of clinical presentation, diagnosis is not that easy. Linear array sonography has been helpful for detection of mammary dysplasia. **Objective:** The purpose of this study was to determine the sensitivity, specificity, accuracy, positive predictive value and negative predictive value of superficial sonography in the diagnosis of chronic cystic mastitis. **Materials and Methods:** This study was carried out in department of Radiology & Imaging of Enam Medical College and Hospital during June 2013 to October 2017. Sonography was done in 1350 women suspected of having fibrocystic disease. Among them FNAC was done only in 1020 cases. Ultrasonographic findings and histopathological reports were analyzed using SPSS 13.0. **Results:** According to our study the sensitivity of superficial sonography was 92.4%, specificity 88.8%, positive predictive value 93.8%, negative predictive value 86.4% and accuracy 91% in the diagnosis of fibrocystic changes. **Conclusion:** With the validity test result, it can be concluded that high frequency sonography provides an accurate diagnosis of fibroadenosis.

Key words: Fibroadenosis; High resolution sonography; Histopathology

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Introduction

Fibrocystic changes (FCCs) of the breast is the benign alteration in the terminal ductal lobular unit of the breast with or without associated fibrosis. It constitutes the most frequent benign disorder of the breast. Such changes generally affect premenopausal women between 20 and 50 years of age.¹

Although many other names have been used to describe this entity over the years (including fibrocystic disease, cystic mastopathy, chronic cystic disease, mazoplasia, Reclus's disease), the term 'fibrocystic changes' is now preferred, because this process is

observed clinically in up to 50% and histologically in 90% of women.²

FCCs may be multifocal and bilateral. The most common presenting symptoms are breast pain and tender nodularities in breasts.^{3,4} Although the exact pathogenesis is not clear, hormonal imbalance, particularly estrogen predominance over progesterone, seems to play important role in its development.⁵ FCCs comprise both cysts (macro and micro) and solid lesions, including hyperechoic fibroglandular tissue, epithelial hyperplasia with or without atypia, apocrine metaplasia, radial scar and papilloma.⁶

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Over the years, it has been one of the major issues to determine whether these lesions are a risk factor for the subsequent development of breast cancer. As the use of mammography and identification of benign breast disease become more common, it is crucial to identify women with dense breast.⁷ The establishment of the clinical diagnosis of FCCs is difficult. Its vague presenting symptoms and diagnosis without histopathological confirmation is difficult to obtain. The evaluation of the high resolution sonography in the diagnosis of FCCs have received attention, with small series reporting sensitivities and specificities of up to 87% and 98% respectively.⁸

Because sonography is frequently the initial imaging study in patients with dense breast, with advent of high resolution sonography fibroadenosis can be diagnosed with a high degree of accuracy. The purpose of these study was to describe the ultrasonographic features of FCCs, to compare radiologic and histopathologic findings of FCCs and to determine whether a radiological diagnosis of FCCs can be considered to be concordant with the histopathological findings.^{9,10}

Materials and Methods

This cross-sectional study was carried out in the Department of Radiology & Imaging in Enam Medical College & Hospital from June 2013 to October 2017. Patients were referred for breast ultrasound for a variety of standard indications. High resolution US was done in 1350 patients. Of them 1020 cases were included in the study as these patients had histopathological evaluation reports for review.

Patients were evaluated via superficial ultrasound as clinically indicated. The scans were performed using 7.5 MHz. Color Doppler interrogation was used during the study period. The diagnosis of FCCs was made prospectively at the time of original scan.

We analyzed these women by recording age and clinical symptoms. US findings were recorded. Histopathology reports were compared with superficial sonographic findings.

Results

A total of 1020 cases were included in this study. Age of the patients ranged from 15–64 years. The largest

group was of 35–44 years contributing 45% of total cases in the study (Table I). Mean age of the patients was 38.5 ± 4.1 years.

Table I: Distribution of subjects according to age (n=1020)

Age	Number	Percentage
15 –24	120	12
25–34	230	22
35–44	450	44
45–54	180	18
55–64	40	4

Main complaints included breast pain in 540 (52.9%) cases, lumpiness in 310 (30.4%) cases, feeling of multiple lumps in 150 (14.7%), increased size of breast during menstruation in 120 (11.7%) and watery nipple discharge in 50 (4.9%) cases (Table II).

Table II: Distribution of subjects according to clinical features (n=1020)

Clinical features	Number	Percentage
Breast pain	540	53
Lumpiness	310	30
Multiple lumps	150	15
Increase breast size during menstruation	120	12
Nipple discharge	50	5

*Some features were overlapping

High resolution US showed that 650 (63.73%) cases were FCCs, 250 (24.50%) were fibroadenomas, 50 (4.9%) were lipoma, 40 (3.9%) were mastitis and 30 (2.94) cases were malignant tumor (Table III).

Table III: Distribution of subjects according to ultrasonographic findings (n=1020)

Ultrasonographic diagnosis	Number	Percentage
FCCs	650	64
Fibroadenoma	250	24
Lipoma	50	5
Mastitis	40	4
Malignant tumor	30	3

Sonographically FCCs were diagnosed in 650 cases having following criteria—prominent fibroglandular tissue in the area of lumpiness seen in 550 (84.62%) cases, small cysts in mammary zone was present in 500 (76.92%) cases, ill-defined heterogeneous mass in 450 (69.23%), prominent mammary duct in 370 (66.15%) and large cysts in 300 (46.15%) cases. Findings are shown in Table IV.

Table IV: Distribution of subjects according to ultrasonographic features of fibroadenosis (n= 650)

Ultrasonographic diagnosis	Number	Percentage
Prominent fibroglandular tissue	550	84.62
Small cysts in mammary zone	500	76.92
Ill defined heterogeneous mass	450	69.23
Prominent mammary duct	370	66.15
Large cysts	300	46.15

*Some features were overlapping

Associated sonographic findings with FCCs were fibroadenoma in 140 (21.53%), lipoma in 70 (10.77%), mastitis in 50 (7.69%), abscess in 40 (6.15%) and malignant tumor in 30 (4.62%) cases.

Sonographically 650 lesions were diagnosed as FCCs. Among them, 610 (93.85%) cases were also proved benign histopathologically FCCs and 40 (6.15%) other than FCCs. Among the 370 cases who were sonographically diagnosed having disease other than FCCs, 50 (13.51%) were diagnosed as FCCs and 320 (86.49%) were other than FCCs by histopathology (Table V).

In diagnosis of FCCs, high resolution ultrasound showed that the sensitivity was 92.4%, specificity 88.8%, positive predictive value (PPV) 93.8%, negative predictive value (NPV) 86.4% and accuracy was 91.0% (Table VI).

Table V: Distribution of FCCs by ultrasonographic diagnosis and histopathological diagnosis (n=1020)

Ultrasonographic findings	Histopathological findings		Total
	Fibroadenosis n (%)	Others n (%)	
Fibroadenosis (650)	610 (93.9%)	40 (6.1%)	650
Others (370)	50 (13.5%)	320 (86.5%)	370
Total	660	360	1020

Table VI: Validity test for fibroadenosis (n=1020)

	Value (%)
Sensitivity	92.4
Specificity	88.8
Positive Predictive Value (PPV)	93.8
Negative Predictive Value (NPV)	86.4
Accuracy	91

Discussion

Fibrocystic changes of the breast constitute the most frequent benign disorder of the breast. It is seen as a wide spectrum of altered morphology in the female breast from innocuous to those associated with risk of carcinoma.¹¹ It is observed clinically up to in 50% and histologically in 90% of the women.² Fibrocystic change is unusual before adolescence. These are most often diagnosed between the age of 20 and 50 years with the peak before or at menopause.

As compared to the general population, women with nonproliferative lesions have no significant elevation in risk of developing a breast carcinoma while those with proliferative disease have a greater risk.³ Hormonal alteration with estrogen dominance over progesterone is considered to be an important factor. The alterations are subdivided as nonproliferative and proliferative. Cysts and fibrosis are more common and included in nonproliferative group. Proliferative disease includes atypical epithelial cell hyperplasia of the ducts or ductules and sclerosing adenosis.⁴ In various study, it has been shown that the great majority of breast cytology (up to 70%) show nonproliferative lesions.

In our study, common diagnostic sonological findings were prominent fibroglandular tissue in the area of lumpiness in 550 (84.62%) cases followed by small cysts in mammary zone in 500 (76.92%) cases. Ill-defined heterogeneous masses were seen in 450 (69.23%) cases, prominent mammary ducts were present in 370 (66.15%) and large cysts were evident in 300 (46.15%) cases. Different studies

showed presence of prominent fibroglandular tissue and mammary cysts on sonography as features of fibrocystic changes. Superficial sonography similarly describes ill-defined masses and prominent mammary ducts.¹²

In the study of Revelon et al¹³ sensitivity and specificity of high resolution sonogram for the diagnosis of FCCs were in the range of 80–87% and 74–96% respectively, where hyperechoic fibroglandular tissue was used as the diagnostic criteria. One author differed, saying that the most common sonographic findings in patients with FCCs is the presence of small cysts in mammary zone.¹⁴ Our experience is similar to that reported by Revelon et al.¹³ These investigators reported 80% sensitivity and 74% specificity for superficial ultrasonogram to detect focal fibrosis of breast.¹³ Szep et al¹⁵ also reported sensitivity 86%, specificity 86%, PPV 71% and NPV 98% in a group of 108 patients with pathologically proven FCCs. Berg et al¹⁶ reported a sensitivity of 80% with a specificity of 90% in a group of 98 patients with diffuse FCCs. Shetty and Shah¹⁴ reported a sensitivity of 86% and specificity of 50% for the use of high resolution sonography in the identification of FCCs. Chang et al¹⁷ initially noted the presence of small cystic spaces as an important finding in patients with fibroadenosis. Szep et al¹⁵ found 53% of patients with a histologic diagnosis of fibroadenosis had prominent mammary ducts. Berg et al¹⁶ noted the existence of mammary cysts in 83% of patients with FCCs.

Associated sonographic findings with FCCs were fibroadenoma in 140 (21.53%), lipoma in 70 (10.77%), mastitis in 50 (7.69%), abscess in 40 (6.15%) and malignant tumor in 30 (4.62%) cases. Literature shows that 40–60% of patients diagnosed with FCCs show other breast pathology including fibroadenoma, lipoma, mastitis and abscess.¹¹

On superficial ultrasonogram, fibroadenosis was diagnosed in 650 (64%) cases and other than FCCs in 370 (36%). Sonographically 650 lesions were FCCs, out of these 610 (93.85%) cases were also proved FCCs histopathologically and 40 (6.15%) other than FCCs. Out of 370 sonographically diagnosed as disease other than FCCs, 50 (13.51%) were diagnosed as FCCs and 320 (86.49%) were other than FCCs by histopathology. According to our study result, sensitivity was 92.4%, specificity 88.8%, positive

predictive value (PPV) 93.8%, negative predictive value (NPV) 86.4% and accuracy was 91.0% in diagnosis of cystic mastopathy by high frequency ultrasound.

According to our study, high resolution US has significant sensitivity, specificity, positive predictive value, negative predictive value and accuracy in diagnosis of fibrocystic disease. So we can conclude that superficial sonography is a sensitive imaging tool in diagnosis of mastopathy.

Fibrocystic disease is a common finding in women of reproductive age. It is a non-fatal medical condition characterized by a lumpiness feeling in the breast which is painful on certain days of the menstrual cycle. The diagnosis of cystic mastopathy by sonography has been well defined and has diagnostic capabilities comparable to histopathological reports. According to our study, superficial sonography is significantly sensitive, specific accurate in diagnosis of fibrocystic disease. When a diagnostic imaging modality is required for suspected fibroadenosis, high frequency sonography can be used as an initial investigation due to its efficacy, safety and low cost.

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