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Original Research Article

Evaluation of Ultrasound Findings of Breast Fibroadenomas: A Cross-Sectional Study

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Abstract:

Breast fibroadenomas are common benign lesions usually seen in women below 30 years of age. This cross sectional study aimed to evaluate the ultrasonographic characteristics of fibroadenomas among 114 women, attending the Surgery and Gynaecology outpatient departments of Agartala Government Medical College. Data were collected through informed consent, ultrasonographic features of breast lump on radiological reports who's having pathologically confirmed diagnosis. The majorities of fibroadenomas were located in the upper outer breast quadrant (58.77%) and measured less than 3 cm (50.88%). Ultrasound findings revealed that most fibroadenomas were round (97.37%), had circumscribed margins (78.07%), and were hypoechoic (89.47%). Classification according to the BIRADS reporting system indicated that 71.13% of cases were benign (BIRADS 2 or 3). These findings align with existing literature and show the effectiveness of ultrasonography as a non-invasive, radiation-free modality for the assessment of fibroadenomas, particularly in younger women.

Keywords: ultrasonography, fibroadenoma, BIRADS, breast lump.

Introduction

Fibroadenomas are common benign breast lesions typically seen in women less than 30 years of age [1]. The incidence decreases with increasing age. They are characterized by a polyclonal proliferation of both epithelial and stromal tissue, representing hyperplastic changes rather than true neoplasms [2]. Risk factors include young age, hormonal fluctuations, family history, hormonal contraceptive use, pregnancy, obesity, high-fat diet. Fibroadenomas are hormonally sensitive and often enlarge during pregnancy and lactation due to increased hormone levels. During pregnancy, they may undergo infarction from outgrowing their blood supply, presenting as a painful mass in affected women [3]. These lesions usually present as firm, mobile, painless nodules with well-defined boundaries and are easily palpable. Routine physical examinations and imaging tests help reduce the need for invasive procedures in patients with breast lumps. As non-invasive methods, imaging can save time and resources for both patients and healthcare systems. While histopathological tests remain the most accurate for diagnosing breast masses, understanding the appearance of different types of masses in imaging studies is essential to ensure these methods are sensitive and effective alternatives for screening and diagnosis.Ultrasonography and mammography are two of the most readily available imaging techniques for screening breast lump. Mammogram quality is reduced in younger women with dense breast tissue, making it difficult to differentiate fibroadenomas from other disorders such cysts and carcinomas. Because ultrasound can more accurately differentiate cysts and carcinomas from fibroadenoma, it is a useful substitute for mammography [4]. Ultrasound can identify fibroadenomas, which usually presents as round or oval shape with a small depth to width ratio (D/W) and can be associated with lobulations. Their margins are circumscribed with homogenous echogenicity ranging from isoechoic to hypoechoic tissue pattern associated with thin echogenic capsule indicating benign lesion [5].

Materials and Methods

A cross-sectional study was conducted involving 114 participants attending the department of Surgery and Gynaecology OPD at Agartala Government Medical College & G.B.P. Hospital, Tripura. The study was conducted over the period of 18 months from March 2021 to August 2022.

Study Population: Patients attending Gynaecology and Surgery OPD with breast lumps and having pathological diagnosis of fibroadenoma either on cytological or histopathological examination.

Sampling Technique: Consecutive sampling

Inclusion Criteria: Patients having breast lumps with pathologically confirmed diagnosis of fibroadenoma.

Exclusion Criteria:

1. Patients who did not have an appropriate pathological report of their mass, due to either insufficient tissue sample or discordance.
2. All other breast masses with typical criteria for being simple cysts, lipomas, carcinomas, post-operative cases, and recurrent lesions.

Statistical Analysis: Data entry and analysis were performed on a computer using SPSS software version 21.0. Data were expressed as charts, tables and bar graphs. Continuous variables were expressed as mean ± standard deviation.

Procedure: Informed consents were taken from all participants. The collected data included participants' ages, confirmed pathological reports diagnosing their breast masses as fibroadenomas, and corresponding ultrasound reports. All ultrasound examinations were conducted by a skilled radiologist using ultrasonographic equipment with 7.5–10 MHz probes. The reports provided details on the location, size, and characteristics of the mass, including its shape, margin definition, and internal features. Additionally, the masses were categorized according to the Breast Imaging-Reporting and Data System (BIRADS) based on ultrasound imaging findings[6].

Results

In this study 114 women were included with their age ranged from 18 to 41 years. Here, the location of fibroadenomas was categorized based on quadrants of the breast. The majority of fibroadenomas were found in the upper outer quadrant (67 cases, 58.77%), followed by the upper inner quadrant (16 cases, 14.04%). The lower outer quadrant had 14 cases (12.28%), while the lower inner quadrant had the least number of cases (7 cases, 6.14%). The remaining cases (10 cases, 8.77%) were categorized under others (Table 1).

Table 1: Quadrant wise distribution of fibroadenoma breast

Location	Number of cases
Upper outer quadrant	67
Upper inner quadrant	16
Lower outer quadrant	14
Lower inner quadrant	7
Others	10
Total	114

Fibroadenomas were classified according to their size, with the majority of cases (58 cases, 50.88%) falling under the <3 cm category. The next most common size group was 3-5 cm (46 cases, 40.35%), and >5 cm tumors were the least frequent (10 cases, 8.77%) (Table 2).

Table 2: Size wise distribution of fibroadenoma breast

Size (cm)	Number of cases	Percentage (%)
<3	58	50.88
3-5	46	40.35
>5	10	8.77
Total	114	100

The BIRADS system was employed to categorize fibroadenomas based on their ultrasonographic features. The distribution showed that the majority of fibroadenomas were classified as BIRADS 2 in 36.04% cases, followed by BIRADS 3 in 35.09%. A smaller proportion of fibroadenomas were classified as BIRADS 4a with 21.05%, while a very few were classified as BIRADS 4b and 4c with 5.26%, 2.63% respectively (Table 3).

Table 3: distribution of fibroadenoma breast according to BIRADS category

BIRADS category	Number of cases	Percentage (%)
2	41	36.04
3	40	35.09
4a	24	21.05
4b	6	5.26
4c	3	2.63
Total	114	100

The ultrasound features of fibroadenomas in all enrolled patients were gathered and reported in Figure 1, across three main categories.

Regarding the shape of the masses, almost all the masses were round with 97.37% only 2.63% reported oval. When assessed for the margin definition, 78.07% were reported circumscribed. Non-circumscribed masses were reported in 21.93% of the cases. Content evaluation of the masses revealed that 89.47% of cases were hypoechoic in the ultrasound evaluation.

Lobulated masses were reported in 28.95% of the cases. 7.02% of the masses were having posterior acoustic shadowing whereas 7.02% and 4.39% of them had micro-calcification and heterogenic appearance, respectively.

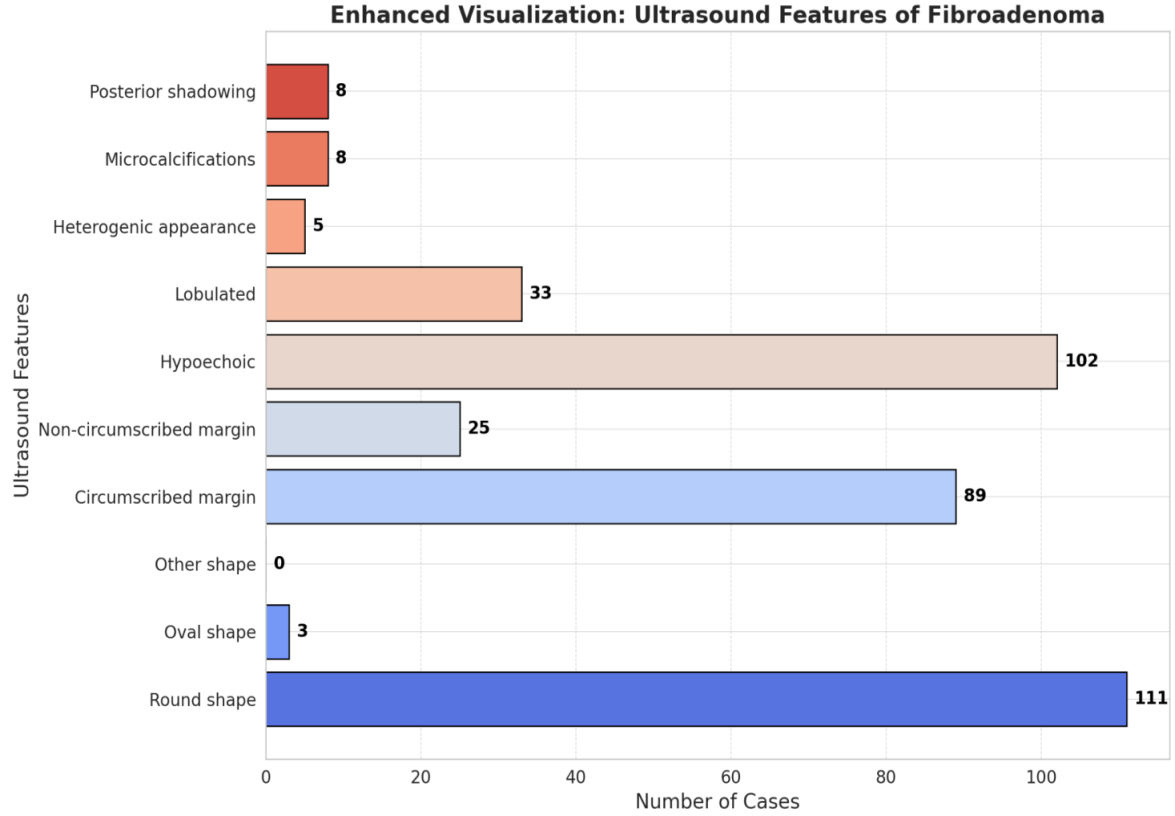

Figure 1: The frequency of the different features of fibroadenoma masses, when assessed by ultrasound

Discussion

The presence of a breast lump often raises significant concern to the patient. With advancements in ultrasound technology over the past 20 years, it has become easier to differentiate between malignant and benign breast lesions [7]. Ultrasound is the preferred imaging modality for patients younger than 30 years old and pregnant women, as it does not involve radiation exposure. It also enables imaging-guided biopsy when necessary and serves as a safe method for follow-up [5].

The term "complex fibroadenoma" is used to describe fibroadenomas with specific features, including cysts larger than 3 mm, sclerosing adenosis, apocrine epithelial changes, and epithelial calcifications [8]. The BIRADS ultrasound descriptors for solid breast lesions include characteristics such as margin, shape, lesion boundary, orientation, posterior acoustic features, and internal echo patterns [9]. Here, we evaluated the ultrasound features of fibroadenoma to report the frequent findings of such masses. These findings are in agreement with several studies that have indicated a predilection for fibroadenomas to occur more frequently in the upper outer quadrant of the breast. In a study by Kashyap et al. (2021) [10], 52% of fibroadenomas were located in the upper outer quadrant, consistent with our findings. The higher incidence of fibroadenomas in this area could be attributed to the denser glandular tissue in the upper outer part of the breast, which is more prone to developing fibroadenomas. Chung et al. (2019) [11] reported that the majority of fibroadenomas are small, measuring less than 3 cm in diameter. Huang et al. (2020) [12] found that smaller fibroadenomas (less than 3 cm) were more likely to remain stable over time and less likely to require surgical intervention. Larger fibroadenomas, particularly those over 5 cm, have been associated with a higher risk of complications,

such as symptoms of pain or changes in breast shape. In our study, most of the patients had benign pathologic results and were classified as different variants of category 4 on the BIRADS reporting system. Mishra et al. (2022) [13] reported that the majority of fibroadenomas were categorized as BIRADS 2 or BIRADS 3, both indicative of benign conditions. Similarly, Gupta et al. (2021) [14] observed that fibroadenomas with complex features, such as mixed echogenicity or irregular margins, were more frequently assigned a BIRADS 4 classification. Ultrasound features of fibroadenomas were analyzed in this study. The majority of fibroadenomas were round in shape, with only a few being oval, and none were characterized as having any other shape. This is consistent with Baskin et al.'s (2020) [15] observation that fibroadenomas are predominantly round or oval in shape when imaged. Regarding the margin, findings are consistent with a study by Verma et al. (2021) [16], which demonstrated that circumscribed margins are a key feature of benign fibroadenomas.

The majority of fibroadenomas were hypoechoic and lobulated. The presence of heterogenic appearance and micro-calcification is relatively rare, but such features may warrant closer follow-up as they can sometimes be indicative of complex fibroadenomas or suspicious lesions. Finally, posterior shadowing, is common in larger or more complex lesions, and is in agreement with the findings of Singh et al. (2020) [17], who reported posterior shadowing as a characteristic feature in some fibroadenomas.

Conclusion

This study provides valuable insights into the ultrasonographic characteristics of fibroadenomas. Most fibroadenomas were located in the upper outer quadrant of the breast and were small in size (<3 cm). The majorities were classified as BIRADS 2 or 3, indicating benign lesions, and most presented with typical ultrasound features such as round shape, circumscribed margins, and hypoechoic appearance. These findings are consistent with the literature and highlight the benign nature of fibroadenomas in most cases, although closer monitoring may be warranted for those with complex features. Further research, especially long-term follow-up studies, would be helpful to understand the behavior of larger or atypical fibroadenomas.

Limitation

A limitation of this study is its retrospective design, as the pathological results were known during the analysis. A prospective study with long term follow-up is recommended for future research.

Ethical approval: The present study was approved by the Institutional Ethics Committee for clinical studies of Agartala Government Medical College. Ref. No. 4 (5-244)/AGMC/Academic/IEC certificate/ 2021/7142.

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