



ROLE OF ULTRASOUND IN THE EVALUATION OF BREAST LESIONS & COMPARISON WITH MRI & MAMMOGRAPHY

Clinical Radiology

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ABSTRACT

Aims and Background: The purpose of this study was to assess the role of ultrasonography (USG) in the evaluation of breast lesions. The study also aimed to characterize and classify lesions using the appropriate BI-RADS score, and to compare the accuracy of USG with mammography and MRI of the breast. **Materials & Methods:** This was a prospective observational study conducted at Amaltas Institute of Medical Sciences, Dewas-Ujjain highway, Bangar. The study assessed and analyzed the clinical presentation, outcome, and imaging results from ultrasound, mammography, and MRI. The sample size was 35 cases. Inclusion criteria included patients presenting with breast lump, pain, fever with suspected abscess, axillary lump, skin changes, or nipple discharge, as well as patients with a family history of breast cancer. Exclusion criteria included patients with a previously confirmed diagnosis of breast cancer, pregnant or lactating women (if other imaging was contraindicated), patients with incomplete data, or those who denied consent. **Results:** The study included 35 cases. The most common presenting complaint was a lump (14 cases). The most common age group affected was 50-59 years (11 cases). Based on sonographic characterization, the most frequent findings were malignant lesions (11 cases) and fibroadenomas (9 cases). In mammography, 10 cases were identified as a mass, while 8 were identified as having no lesion. On MRI, 8 cases were identified as a mass, while 12 were identified as having no lesion. USG was found to have a high accuracy in detecting spiculated or angulated margins, microcalcification, and microlobulations, leading to better characterization of breast lesions compared to other imaging modalities. **Conclusion:** Ultrasound has a high diagnostic yield in differentiating breast cancer from benign lesions. It is also valuable for preoperative assessment and in detecting early cancers that may be occult on mammography or clinically. The diagnostic advantage of USG compared to mammography increases with higher breast density and in younger women where mammography's sensitivity is low. Therefore, a complementary breast USG should always be performed in patients with dense breasts. While breast MRI is useful, it can lead to more false positives in screening plans for women with dense breasts, causing stress and the need for more tests and follow-up visits. USG offers significant accuracy in detecting malignancy in dense breasts, multifocal and multicentric lesions, and can be used for image-guided procedures in the same sitting.

KEYWORDS

INTRODUCTION:

Breast lesions are a common clinical presentation, and accurate characterization is crucial for appropriate patient management. Various imaging modalities are used, including mammography, ultrasound, and MRI, each with its own strengths and limitations. Ultrasonography (USG) is a widely available and cost-effective tool that plays a significant role in the evaluation of breast lesions, particularly in women with dense breast tissue. This study compares the diagnostic performance of USG with mammography and MRI.

Materials and Methods:

This was a prospective observational study conducted at the Amaltas Institute of Medical Sciences. The study included 35 cases of patients presenting with one or more of the following: a breast lump, breast pain, fever with suspected breast abscess, an axillary lump, skin changes over the breast, or nipple discharge (bloody or non-bloody). Patients with a family history of breast cancer were also included. Patients with a previously confirmed diagnosis of breast cancer, pregnant or lactating women (if imaging other than ultrasound was contraindicated), those with incomplete data, or those who denied consent were excluded. The study assessed and analyzed clinical presentation, outcomes, and imaging results from ultrasound, mammography, and MRI.

RESULTS:

The study cohort had a mean age of 45 years. The most represented age group was 50-59 years, with 11 cases. Presenting complaints included a lump (14 cases), pain (9 cases), nipple discharge (6 cases), fever (4 cases), and axillary lump (2 cases).

On sonographic characterization, the most common findings were malignant lesions (11 cases) and fibroadenomas (9 cases). Other findings included abscess (5 cases), galactocele (2 cases), phyllodes (1 case), and indeterminate lesions (7 cases).

The study compared the findings across the three imaging modalities: Mammography: The most common finding was a mass (10 cases), followed by no lesion (8 cases), microcalcification (6 cases), focal asymmetry (6 cases), and architectural distortion (5 cases).

Ultrasound: The most common findings were a mass (11 cases) and no lesion (7 cases). Other findings included microlobulation (7 cases), microcalcification (4 cases), architectural distortion (4 cases), and spiculated/angulated margins (2 cases).

MRI: The most frequent finding was no lesion (12 cases), followed by a mass (8 cases) and a non-mass like finding (6 cases). Microcalcification, microlobulation, and angulated/spiculated margins were each present in 3 cases.

The study also compared the diagnostic accuracy of the three modalities in detecting malignancy:

Mammography: Sensitivity was 75% and specificity was 47%. Out of 16 cases diagnosed as malignant, 10 were benign on HPE. Out of 11 benign cases, only 2 turned out to be malignant on HPE.

USG: Sensitivity was 93% and specificity was 70%. Out of 18 cases diagnosed as malignant, 4 were benign on HPE. Out of 10 benign cases, 1 turned out to be malignant.

MRI: Sensitivity was 60% and specificity was 84%. Out of the 8 cases diagnosed as malignant, 2 turned out to be benign on HPE. Out of 15 benign cases, only 4 turned out to be malignant on HPE.

USG was noted to be highly accurate in detecting spiculated or angulated margins, microcalcification, and microlobulations, which are key features for better characterization of breast lesions.

DISCUSSION:

Ultrasound has several key strengths. It is highly effective in evaluating dense breast tissue where mammography is less sensitive. It excels at lesion characterization and is a valuable tool for guiding biopsies. It also offers high specificity and is a readily accessible modality. However, its limitations include operator dependency and its inability to detect certain microcalcifications. It can also have a higher false-positive rate.

When compared to mammography, ultrasound serves as a complementary tool, improving detection in dense breasts and helping to clarify ambiguous findings. In comparison to MRI, ultrasound provides cost-effective, targeted evaluations and helps to reduce false positives when used in conjunction with MRI. For example, a 43-year-old woman with extremely dense breast tissue had a breast cancer that was obscured on mammography but easily visible on ultrasound, which showed a 1.2 cm irregular mass proven to be invasive ductal carcinoma. Similarly, a 58-year-old woman with dense breasts had a palpable abnormality that mammograms failed to reveal, but high-resolution ultrasound easily depicted a 0.9 cm spiculated mass due to invasive ductal carcinoma. In another case, a patient with dense breasts on mammography had an irregular mass in the left breast shown on both MRI and ultrasound. The MRI also showed a small mass in the same breast, which was identified on a second-look ultrasound and confirmed to be invasive ductal carcinoma.

CONCLUSION:

Based on the study findings, breast ultrasound has a high diagnostic yield in differentiating breast cancer from benign lesions and is useful for preoperative assessment. Its advantage over mammography is particularly notable in young women and those with dense breasts, where the sensitivity of mammography is low. Therefore, a complementary breast USG should always be included in the evaluation of dense breasts. While MRI is a valuable tool, its use in screening for women with dense breasts can lead to more false positives, causing additional stress and further medical procedures. The study demonstrates that USG has significant accuracy in detecting malignancy in dense breasts, identifying multifocal and multicentric lesions, and can facilitate easy image-guided procedures in the same sitting.

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