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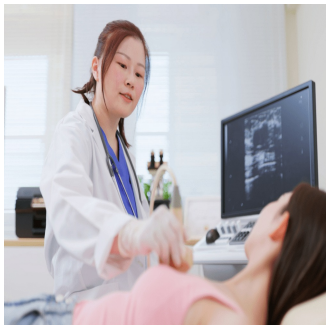
Refining Breast Ultrasound for Nonmass Lesions Detection



Breast ultrasound (US) is a vital diagnostic tool, particularly for individuals with dense breast tissue where traditional mammography may not always reveal early-stage cancers. Among the findings in ultrasound imaging are nonmass lesions (NMLs), areas of altered echotexture that lack the three-dimensionality of a typical mass. While these NMLs are frequently benign, a small proportion can indicate malignancy. Understanding the sonographic characteristics that differentiate benign from malignant NMLs is critical to improving screening accuracy and minimising unnecessary biopsies. A recent review published in Radiology explores key diagnostic features associated with malignant NMLs and the value of combining mammography with ultrasound in refining breast cancer screening protocols.

Characteristics and Diagnostic Importance of NMLs

Nonmass lesions, as identified in breast ultrasound imaging, exhibit distinct patterns of echogenicity and distribution, which hold diagnostic value in assessing malignancy risk. The Breast Imaging Reporting and Data System (BI-RADS) classifies NMLs as lesions with altered echotexture that do not fulfil the criteria of a three-dimensional mass. Benign NMLs are generally characterised by uniform echogenicity, often hypoechoic or isoechoic, and are frequently observed with a non-segmental distribution. These features generally correspond to benign conditions such as fibrocystic changes.

In contrast, malignant NMLs are more likely to display mixed echogenicity and segmental distribution patterns. Studies show that these lesions are also typically larger, with malignant NMLs averaging 2.6 cm, compared to 1.9 cm for benign ones. While size alone is not determinative, it can guide clinicians toward further investigation, especially when combined with other suspicious features. Thus, echogenicity, distribution and lesion size are crucial indicators for radiologists when assessing the malignancy potential of NMLs, helping to guide clinical management and make recommendations for biopsy.

Sonographic Indicators of Malignancy

Several sonographic features associated with malignancy have shown high predictive value, especially when NMLs are detected alongside suspicious mammographic findings. Key indicators include associated calcifications, posterior shadowing and segmental distribution. Calcifications, which may appear in the ducts or within the lesion itself, are particularly concerning and often seen in malignant cases, exhibiting a positive predictive value (PPV) of 44%. Calcifications strongly suggest malignancy when accompanied by architectural distortions or abnormal ductal changes.

Posterior shadowing, another significant feature, involves the attenuation of sound waves behind the lesion, creating a shadowed effect. This shadowing occurs in around 22% of malignant cases and further signals the need for biopsy when found in conjunction with other malignancy indicators. Similarly, segmental distribution, in which the lesion appears distributed in a pattern aligned with the ductal system, is present in 62% of malignant NMLs but only 18% of benign ones. Together, these features—calcifications, posterior shadowing and segmental distribution—enable radiologists to identify high-risk NMLs more accurately, particularly in patients with a family history of breast cancer or other risk factors.

Integrating Mammography and Ultrasound Findings

The integration of mammographic findings with ultrasound characteristics greatly enhances diagnostic accuracy, particularly in cases where mammograms reveal abnormal findings in areas corresponding to the NMLs. Mammographically abnormal cases, where NMLs coincide with suspicious findings such as calcifications, asymmetry or architectural distortion, are associated with a higher malignancy rate of approximately 28.8%. By contrast, NMLs in patients with a negative mammogram have a malignancy rate of only 2.8%, suggesting that additional sonographic scrutiny may be less necessary for this group. For patients with mammographically dense breast tissue, ultrasound is especially valuable as a supplemental screening tool, helping to identify lesions that might be masked on mammography due to tissue density.

In patients with a negative mammogram, segmental distribution remains an important sonographic feature for assessing malignancy, even though the positive predictive values of individual features are generally lower in this group. Other indicators, such as mixed echogenicity and lesion size, also correlate with malignancy in this subgroup. However, when sonographic indicators like non-segmental distribution and the presence of multiple small cysts are observed, the PPV for malignancy drops to as low as 1%, suggesting that immediate biopsy may be unnecessary in these cases. Instead, a conservative approach with follow-up imaging could be more appropriate, reducing the number of unnecessary procedures.

The integration of ultrasound and mammographic findings in the evaluation of nonmass lesions significantly enhances breast cancer screening, particularly for individuals with dense breast tissue. By identifying key suspicious sonographic features, such as calcifications, posterior shadowing and segmental distribution, radiologists can more effectively discern high-risk NMLs from benign ones, ensuring that biopsies are reserved for cases with a meaningful likelihood of malignancy. This combined approach improves diagnostic accuracy and offers a more tailored screening strategy, helping reduce patient anxiety and the incidence of invasive procedures for benign findings. As breast cancer screening techniques continue to advance, these insights are essential for optimising care for women at varying levels of risk, ultimately contributing to better clinical outcomes in breast cancer detection and management.

Source: **Radiology**

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Published on : Mon, 11 Nov 2024