Atypical ultrasound appearance of malignant breast nodules

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Abstract:
Breast cancer represents the most frequent malignancy in women, with more than a million cases of breast cancer diagnosed worldwide each year. Despite the increasing incidence, mortality from breast cancer continues to fall mainly due to earlier detection via mammographic screening but also due to the complementary diagnostic imaging methods. Among these, ultrasound is most frequently used to reach a correct diagnosis. Despite the fact that ultrasound is able to differentiate between benign and malignant breast masses, in practice, there are many situations in which the atypical appearance of a mass leads to misdiagnosis. This is why, in the case of a breast nodule, all the sonographic features should be carefully analysed in order to reach the correct diagnosis and to reduce the rate of false negative results.

Key words: breast ultrasound, atypical lesions, ultrasound breast diagnosis

Invasive breast cancers usually are epithelial tumors of ductal or lobular origin. Invasive ductal cancer, or infiltrating ductal carcinoma (IDC), is the most common form of breast cancer and accounts for 50% to 70% of invasive breast cancers. Typically, it presents as a hard palpable mass, although with increasing use of screening mammography more cancers of this type are diagnosed at a nonpalpable stage. When this cancer does not take on special features, it is called infiltrating ductal carcinoma, NOS (which is an abbreviation for not otherwise specified) and it accounts for 50%-70% of all IDC. When infiltrating ductal carcinomas take on differentiated features, they are named according to the features that they display: infiltrating tubular carcinoma (2%-3%), mucinous or colloid carcinoma (2%-3%), medullary carcinoma (5%), invasive cribriform carcinoma (1%-3%), invasive papillary carcinoma (1%-2%), adenoid cystic carcinoma (1%) and metaplastic carcinoma (1%) [1,2].

Infiltrating lobular carcinoma has a much lower incidence and comprises about 15% of invasive breast cancers. It has a tendency to be more multifocal.

Other invasive histologies of nonepithelial origin, such as breast lymphoma are much less common and together account for less than 10% of all invasive breast cancers [1,2].
In breast primary malignancies, the invasive ductal carcinoma usually presents on ultrasound as an ill defined mass (fig 1), with irregular contour (spiculated, microlobulated or angulated) (fig 2, fig 3), frequently inhomogeneous due to necrosis within the tumour. Because of the desmoplastic reaction, malignant nodules will cause acoustic shadows and will be surrounded by a hyperechoic rim (fig 4, fig 5).

Because of the tendency of invading anatomical structures, they will have a “taller than wide” appearance
(anteroposterior diameter larger than the horizontal one) (fig 6) [3-7].

Even if the special types of IDC exhibit more frequently atypical ultrasound appearances, IDC NOS can also have special features that can make it difficult to differentiate from a benign lesion.

In cases of extended necrosis, large anechoic areas can lead to confusion with simple cysts, intracystic papilloma, abscess, haematoma or lymphoma (fig 7) [8].

IDC NOS with high histologic grade, because of the high cellularity and little desmoplasia, will have enhanced ultrasound transmission and a rather round shape with well defined margins (fig 8) [4, 7, 8].

Pure medullary carcinomas have an ultrasound appearance that is suggestive more for a benign lesion than for malignancy. They are usually circumscribed, well defined lesions, with a thin echogenic capsule and an extremely hypoechoic structure. These characteristics make them difficult to differentiate from cysts or lymphomas [8-10].

Colloid carcinomas, similar to medullary carcinomas, may exhibit a thin echogenic capsule and normal or enhanced-through transmission (fig 9). Lesions less than 1.5 cm in diameter will be iso or hyperechoic with regard to the surrounding fat which, together with the echogenic capsule will give them a fibroadenoma or a complex cystic appearance (fig 10) [8,11-13].

The breast malignancy with the greatest imaging polymorphism is the invasive lobular carcinoma (ILC). Because mammography is most of the times negative, ultrasound is the most important imaging method for the diagnosis of ILC [8,14]. On ultrasound, it can appear as a parenchimal mass with malignant features or, more often, as a hypoechoic area suggestive for diffuse mastopathy or it can only produce minimal architectural distortion (fig 11, fig 12) [4,8]. The alveolar and the solid variants of ILC present more frequently as solid nodules (fig 13). The alveolar variant may have spiculations or a thick echogenic halo while the solid variant is normal or enhanced through transmission (fig 14 a,b) [8,14].
Breast lymphoma presents on ultrasound as an extreme hypoechoic mass, well defined, hypervascular at Doppler examination. In the majority of the cases, the echogenity is so reduced that it can mimic a cystic lesion. Inhomogeneous content or the absence of the blood vessels can make them difficult to differentiate from be-
nign lesions, as cysts, abscesses or haematomas (fig 15, fig 16).

Other breast malignancies can also have atypical features for a malignant lesion. They can have an ultrasound pseudocystic appearance, or can mimic a fibroadenoma or other benign lesions (fig 17, fig 18).

In all cases in which the benign nature of a breast mass is not certain, all ultrasound features should be carefully analyzed and, if needed, further investigation should be indicated.

Bibliography:


Fig 16. Primary breast lymphoma, with inhomogeneous echostructure, with no blood vessels on Doppler examination.

Fig 17. Round, well defined, homogeneous solid lesions, proved to be a malignant fibrous histiocytooma.

Fig 18. Malignant fibrous histiocytooma with relatively well defined margins, low internal echoes and enhanced-through transmission, mimicking a cystic lesion.