Peripherally Enhancing Breast Lesion With Central Fat

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Case Presentation

67-year-old female presents with a palpable mass within her right breast. Review of systems revealed a breast procedure approximately 2 years prior. Physical exam demonstrated nipple inversion with confirmation of a deep palpable mass in the upper breast. Patient then underwent breast MRI imaging (Figures A - C).

Figure. Axial T1 image (A) demonstrates a triangular shaped lesion within the upper breast posterior depth with central high T1 signal. Sagittal dynamic post-gadolinium T1 subtraction image with fat saturation from the sub-peak phase (B) shows peripheral enhancement with central hypointense signal. Sagittal dynamic post-gadolinium T1 subtraction image with fat saturation with color overlay (C) demonstrates the lesion to have mixed kinetics, including type III washout.
Key clinical finding

Palpable mass with history of prior surgical procedure or trauma.

Key imaging finding

Peripherally enhancing breast lesion with central fat signal on T1.

Differential diagnoses

Fat Necrosis
Infiltrating Ductal (IDC) Carcinoma
Radial Sclerosing Lesion (RSL)

Discussion

A key component in the evaluation of a breast lesion seen on mammography or ultrasound is obtaining a thorough patient history. Answers regarding personal and familial cancer history, as well as prior surgeries and trauma, should be elicited and may guide differential considerations. In indeterminate cases when the discrimination between benign and malignant processes cannot be made, MRI may be an invaluable diagnostic tool, even though there is overlap in the MR appearance of many benign and malignant breast lesions.

Fat necrosis.

Fat necrosis most commonly is a consequence of surgery or accidental trauma but may also result from prior radiation therapy to the breast.\(^1,2\) Patients may or may not have grossly visible or palpable evidence of fat necrosis depending on the depth and size of the lesion.

On imaging, the varied appearances of fat necrosis is ascribed to various amounts of histiocytic infiltration, hemorrhage, fibrosis, and calcification present after breast insult and is dependent on the stage of evolution.\(^1\) Lesion morphology can range from a well-marginated appearance of an oil cyst to a spiculated appearance of robust fibrosis. This wide gamut of tissue changes produces a constellation of MRI signal abnormalities and enhancement patterns.

T1 sequences are the most useful in evaluating suspected fat necrosis, which typically has signal characteristics consistent with fat elsewhere in the breast.\(^3\) Occasionally, necrotic fat may demonstrate low T1 signal secondary to the presence of hemorrhage and inflammatory content.\(^3\) Post-contrast images show variable amounts of enhancement depending on the amount of inflammation present, although a thin rim of enhancement is common.\(^2\)

When increasing amounts of inflammation and fibrosis are present, imaging findings can be easily confused with malignancy. Fibrosis may have hyperintense, intermediate, or hypointense signal on T1, and areas of thick nodular enhancement may persist for several years after the initial insult.\(^2\) Washout kinetics are as variable as the morphology and signal characteristics; therefore, they are typically not very helpful.\(^3\)

Infiltrating ductal carcinoma (IDC).

IDC is the most common histologic variant of breast cancer and often progresses from ductal carcinoma in situ. Patients presenting with IDC may be asymptomatic, or may have a palpable mass, nipple discharge/ inversion, or overlying skin findings.

MRI is a valuable tool in diagnosing IDC with a sensitivity of 90-100%.\(^3\) Its main uses in the setting of IDC include evaluating tumor extent and assessing for multicentric involvement and contralateral disease in patients with biopsy proven carcinoma.

The classic pre-contrast T1 and T2 MRI appearance of IDC is signal intensity equal to or lower than that of fibroglandular tissue.\(^4\) Post-contrast images typically reveal an irregular, spiculated, enhancing mass with early enhancement with delayed washout kinetics.\(^5\) Less common enhancement patterns include heterogeneous mass-like or rim enhancement; rim enhancement is highly suggestive of malignancy when not otherwise consistent with fat necrosis.\(^4\)

Radial sclerosing lesion (RSL):

RSLs, otherwise known as radial scars, are not truly scars and are not associated with prior surgery or trauma. They are typically asymptomatic and found incidentally. There is a known increased incidence of breast cancer when a radial scar is present; atypical
ductal hyperplasia and carcinoma are found in up to 50% of cases.6

In many cases it may be difficult or impossible to distinguish sclerosing lesions of the breast from ductal carcinoma, even with MRI. Morphologically, these lesions have spiculated margins and secondary architectural distortion; post-contrast enhancement patterns are similar compared to IDC.

Percutaneous biopsy of these lesions remains controversial. One study suggests that core needle biopsy alone is sufficient if at least 12 tissue samples are obtained and there is no histologic evidence of atypical hyperplasia.7 Otherwise, excisional biopsy is recommended due to the lesion’s high association with carcinoma and heterogenous histology.

**Diagnosis**

Fat Necrosis

**Summary**

Imaging findings of fat necrosis of the breast are varied and have several overlapping imaging characteristics with other benign and malignant breast lesions, making it a particularly challenging diagnosis. However, when characteristic features are present, such as fat signal intensity, thin peripheral enhancement, superficial location, history of trauma or surgery, oil cysts, or benign calcifications, short-term follow-up may be preferred to biopsy.2 In the absence of these classic findings, however, tissue sampling should be a consideration.

**References**