

64. Breast Implants

MRI is the most sensitive study for the detection of breast implant rupture and in the detection of cancer in women with implants. Breast implants can vary in composition and architecture including single-lumen saline or silicone and double-lumen implants, with single-lumen silicone implants being the most common. Rupture of saline implants usually occurs quickly and completely, which is noticed by the patient; thus imaging is rarely performed. By contrast, rupture of a silicone implant can occur without a change in volume and go unnoticed. On T2WI the SI of silicone is between that of water and fat. Thus when suspicion of a ruptured implant is high, water and fat suppression are implemented to facilitate visualization. Fat signal suppression is achieved by the addition of an initial inversion pulse (similar to STIR; see Chapter 34). Water signal is suppressed by a spectral technique (similar to that for fat; see Chapter 48). T2WI in Figs. 64.1 and 64.2 show the effect of these measures, where silicone is the only component demonstrating high SI. Alternatively, a phase-selective approach can be used. In this case multiple images are acquired at different echo-times with variable phase shifts between silicone and water-fat. In the post-processing the images are arithmetically recombined to generate silicone-only and water-fat images (Dixon technique). With appropriate suppression, the normal appearance of a single lumen implant includes a high SI silicone core surrounded by a low SI implant shell and outer fibrous capsule. While the shell can be smooth, more modern implants are typically textured (with the intent of reducing capsular contraction). Folds of this shell may be evident, often with a complex appearance but only encroaching upon the implant lumen peripherally. Implant encapsulation within a rim of reactive collagen and fibrotic tissue is the most frequent complication of breast augmentation, although it is usually a clinical diagnosis. The Baker classification grades degrees of contracture from an encapsulated but normal appearing breast (I)—present in most cases—to one that appears natural but firm (II), to a visibly distorted breast (III), to a hard, painful, and distorted breast (IV) requiring surgical intervention. Rarely visualized on MR, findings of breast encapsulation include focal, asymmetric folding of the fibrous capsule leading to deformity in the implant's normal oval shape.

Intracapsular rupture refers to breach of the implant shell but containment of leaking silicone within the surrounding fibrous capsule. The MR appearance of an intracapsular rupture is demonstrated on the axial and sagittal images of Fig. 64.1A,B, respectively. The appearance of low SI free strands of silicone envelope within the high SI silicone implant is termed the *linguine sign* and is the most reliable marker of implant rupture on MR. Here this sign is present bilaterally, indicating bilateral intracapsular rupture. Oftentimes water

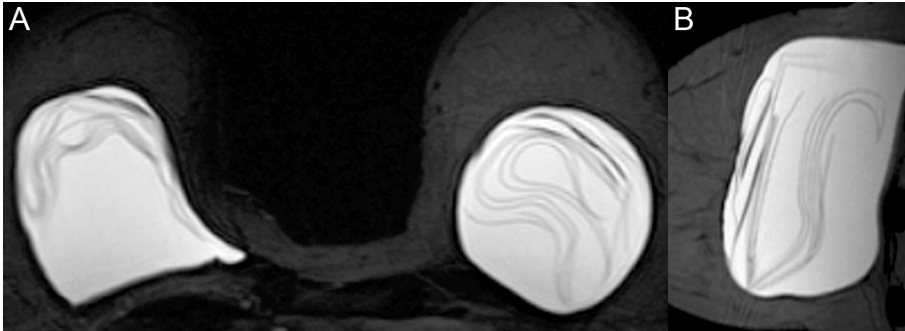


Fig. 64.1

and fat suppression are not necessary to visualize this, although normal folds of the shell may appear similarly confusing the diagnosis. The tear-drop sign and the keyhole (also noose or inverted-loop) sign are observed in the case of uncollapsed intracapsular rupture and represent the leakage of silicone into the invaginated implant shell, respectively with and without contact between the two membranes. Tear-drop signs can be seen bilaterally in the axial images of Fig. 64.2A. Nevertheless silicone between the shell and fibrous capsule within the left breast, laterally, indicates collapse. In Fig. 64.2B the implant in the left breast (on this sagittal image) appears to have two separate lumens (superiorly and inferiorly): the outer wall of the outer lumen is formed by the capsule alone, while the inner lumen wall is formed by the collapsed implant envelope (an intracapsular rupture). Superior extravasation of silicone is most common, although lateral and inferior are also frequent. The MR finding most suggestive of extracapsular rupture is simply the presence of high SI silicone within surrounding tissues. Poorly suppressed water SI can mimic this appearance. As in this case, simple gel extravasation can occur, as can extrusion (whereby the extracapsular component is continuous with the implant lumen). Granuloma or cyst formation may occur, and regional lymph nodes may be involved.

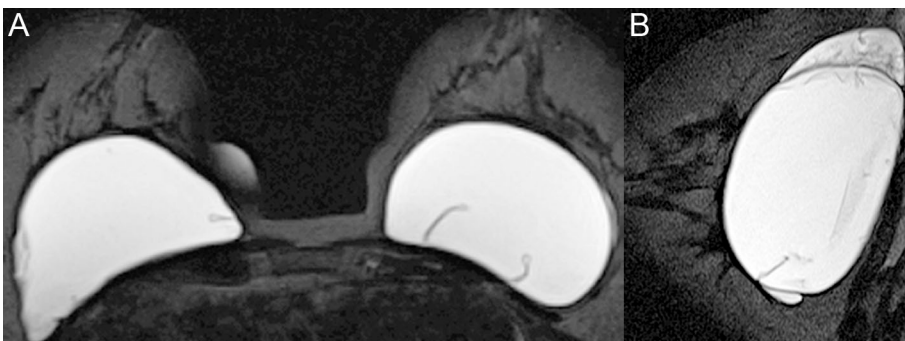


Fig. 64.2

An asymptomatic palpable mass in a woman with silicone breast implants is worrisome for neoplasm or implant rupture. Although neoplasm may theoretically be excluded in part by

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alternatively accentuating and suppressing the SI of silicone, contrast-enhanced examinations are by far more commonly performed (see Chapter 63). Considerations are similar as those in patients without implants, although progressive enhancement of the entire fibrous capsule may occur and is a normal finding. Silicone granulomas may also enhance, but will display SI consistent with silicone on unenhanced MR.