

## Radial Scar of the Breast

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### INTRODUCTION

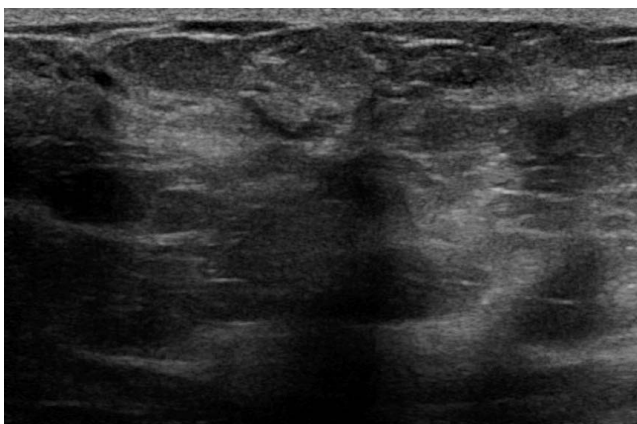
Despite their name, radial scars (or complex sclerosing lesions) are idiopathic lesions of the breast unrelated to prior trauma or surgery. The etiology of radial scars is hypothesized to be a localized inflammatory reaction or chronic ischemia with subsequent slow infarction.<sup>1</sup> The prevalence of radial scars ranges from 0.1-2.0 per 1,000 screening mammograms and 1.7%-14% on autopsy specimens.<sup>2-4</sup> Although suspected radial scars are frequently sampled initially with percutaneous image-guided core needle biopsy, the general recommendation is to surgically excise these lesions because of the association of atypical ductal hyperplasia and carcinoma in up to 50% of cases.<sup>5-7</sup>

### HISTORY

A 25-year-old female presented with a 6-month history of a subtle palpable finding in her left breast. She denied any nipple discharge or skin changes. Her age at menarche was 12. At the time of presentation, she had used oral contraceptives for 5 years; her surgical history included tonsillectomy and adenoidectomy. She had a personal history of hyperhidrosis, eczema, and asymptomatic thrombocytopenia. She had no known family history of breast cancer and no history of trauma or breast surgery.

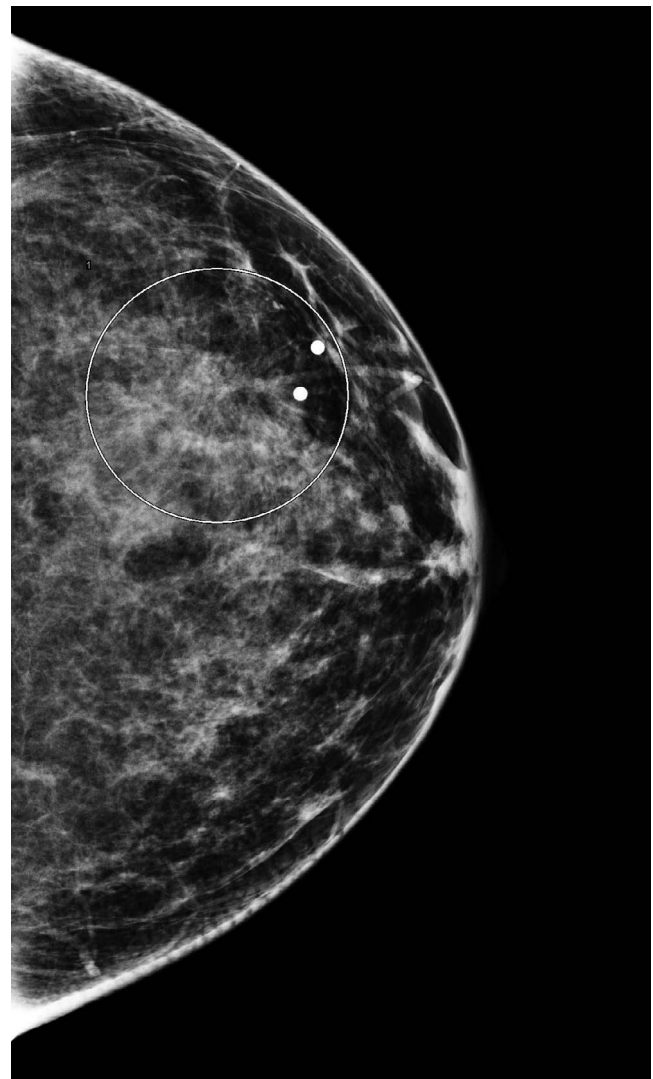
### RADIOGRAPHIC APPEARANCE AND TREATMENT

A left breast ultrasound was performed because it is the initial diagnostic imaging study for a patient of this age with a new palpable finding.<sup>8</sup> Ultrasound showed a subtle, mildly hypoechoic mass with poorly defined margins and associated architectural distortion (Figure 1). Because of the

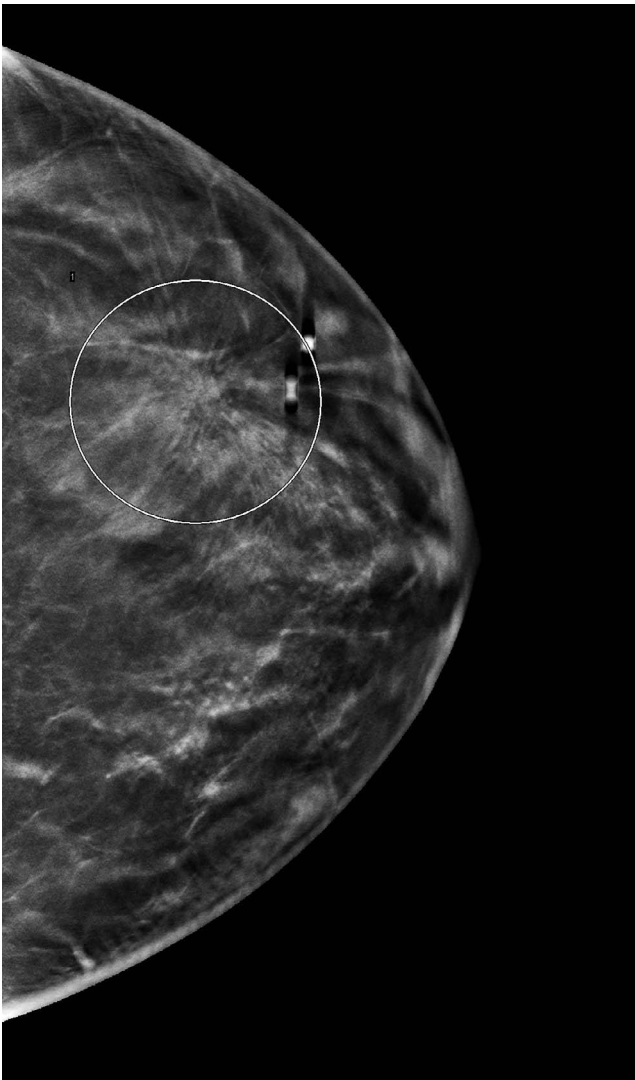


**Figure 1.** Ultrasound image demonstrates a subtle, mildly hypoechoic mass with poorly defined margins and associated architectural distortion.

vague nature of the sonographic findings, full-field digital mammogram with digital breast tomosynthesis (DBT) was performed to better delineate the lesion. The DBT images showed a focal asymmetry with associated architectural distortion (Figures 2-5) but no well-defined central mass.



**Figure 2.** Craniocaudal mammogram image demonstrates central radiolucency without a well-defined mass and long, thin, radiating spicules arranged parallel to radiolucent linear structures (the so-called “black star” appearance). Two BBs (white dots) mark the patient’s skin overlying the palpable finding.



**Figure 3. Craniocaudal digital breast tomosynthesis image.**

Percutaneous ultrasound-guided core needle biopsy of the lesion was performed with a 14-gauge gun-type needle (Figure 6). The patient subsequently underwent needle localization with surgical excision. Specimen radiography of the excised tissue confirmed that the lesion had been removed.

### DISCUSSION

The classic mammographic appearance of a radial scar was described by Tabar and Dean as a central radiolucent core with long, thin, radiating spicules arranged parallel to radiolucent linear structures (the so-called “black star” appearance).<sup>9</sup> Typically, radial scars have no palpable lesion, skin changes, or mammographically identifiable central mass. Radial scars vary in appearance with different mammographic projections, presumably because of their planar configuration.<sup>9</sup> Recent studies have demonstrated that radial scars are more conspicuous on DBT than on standard mammography. In addition, the architectural distortion characteristic of radial scars may be more apparent in orthogonal planes on DBT images.<sup>10-12</sup> Although radial scars are not generally believed to be palpable, the large radial scar in this case was believed to

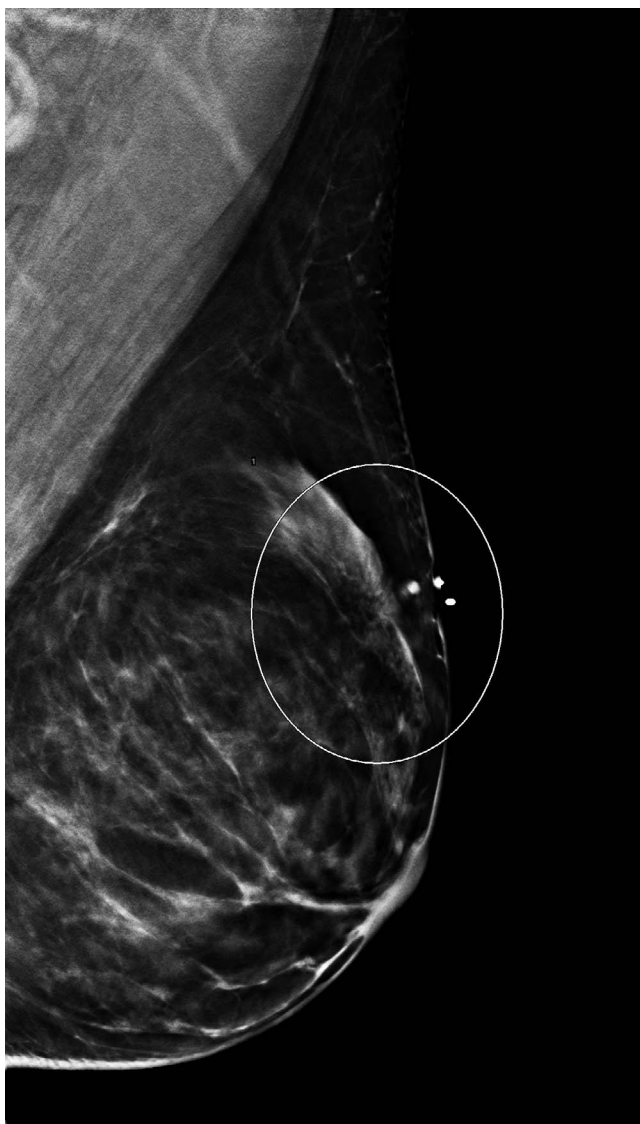


**Figure 4. Mediolateral oblique mammogram.**

account for the clinical finding in this patient. Radial scars that are too small to be visualized with imaging are sometimes incidentally identified in pathologic specimens from biopsies of unrelated lesions.

At pathology, radial scars are stellate with narrow bands of pale stroma extending in a radial configuration into surrounding fat. Unlike breast carcinoma, radial scars are soft in texture and have little or no retraction of the exposed surface on a bisected surgical specimen. They have a central sclerotic core of acellular connective tissue (fibrosis) and elastin deposits (elastosis). If ductules are trapped within the sclerotic core, they demonstrate an intact myoepithelial layer, unlike carcinomas. The peripheral portion of the radial scar may contain distorted ducts and lobules, ductal hyperplasia, fibrocystic changes, and papillomatosis.

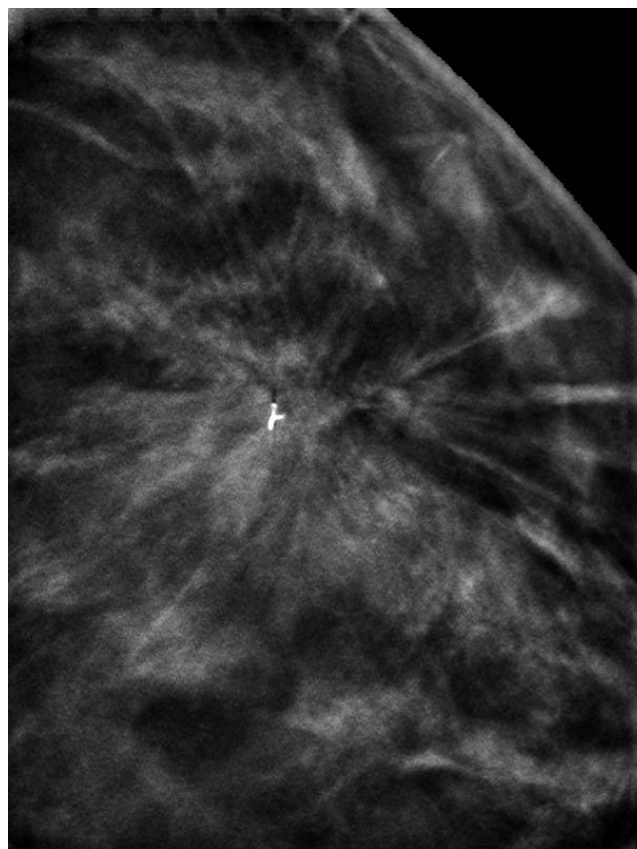
It is well established that carcinomas can mimic radial scars on imaging and that breast carcinomas (invasive and in situ) and atypical epithelial lesions can be associated with radial scars.<sup>5-7</sup> In addition to the coexistence of breast carcinomas and atypia in radial scars, a history of radial scar (similar to lobular carcinoma in situ and atypical lobular hyperplasia) may increase a woman’s risk of developing subsequent breast carcinoma almost 2-fold (relative risk 1.8). The relative risk of developing breast cancer is greater



**Figure 5. Mediolateral oblique digital breast tomosynthesis image.**

in patients who have radial scars  $>4$  mm in diameter and radial scars that contain atypical hyperplasia.<sup>13</sup> Some research has suggested that microscopic radial scars incidentally found with benign findings on histopathology and certain radial scars visible on mammography may not require surgical removal.<sup>14,15</sup> Other studies, however, have not confirmed these findings for macroscopic radial scars, and the absence of atypical epithelial proliferation in specimens from core needle biopsy of a radial scar does not preclude the presence of malignancy.<sup>16-18</sup> Finally, magnetic resonance imaging may prove helpful in identifying radial scars when the risk of unexpected malignancy is sufficiently low that surgical excision is not necessary.<sup>19</sup>

In summary, patients diagnosed with radial scars are at increased risk for the subsequent development of breast cancer. In addition, radial scars can be associated with adjacent in situ and invasive breast carcinomas and atypical epithelial lesions. Although imaging surveillance may be an acceptable alternative for microscopic radial scars identified



**Figure 6. Craniocaudal digital breast tomosynthesis image demonstrates radial scar and marker placed during core needle biopsy.**

at core needle biopsy of otherwise benign lesions, surgical excision remains the recommended treatment for most radial scars. As the use of DBT increases in the United States, it is likely that the detection of radial scars will increase as well. It is important that radiologists, surgeons, and other healthcare professionals who refer patients for screening mammography understand the implications of a diagnosis of radial scar at core needle biopsy.

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