CASE REPORT

Spindle Cell Carcinoma of the Breast: MR Findings Correlated with Histopathology

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We correlate findings from magnetic resonance (MR) imaging and pathology in a 55-year-old woman with spindle cell carcinoma of the breast. Pathological examination showed a fibrous capsule at the margins and abundant fibromyxoid stroma within the mass. Spindle cell carcinoma may be included in the differential diagnosis of expanding round masses with internal components that demonstrate rapid initial enhancement with high signal intensity on T2-weighted images in postmenopausal women.

Keywords: breast, fibromyxoid stroma, magnetic resonance imaging, spindle cell carcinoma, T2-weighted image

Introduction

Spindle cell carcinoma, a variant of metaplastic carcinoma, is a rare breast carcinoma that has a predominant spindle cell component and resembles a low-grade sarcoma or reactive process, such as fasciitis or granulation tissue.1 To our knowledge, only a few reports present the disease with its radiological findings. We correlate findings of magnetic resonance (MR) imaging and histopathological analysis.

Case Report

A 55-year-old postmenopausal woman came to our hospital one week after noticing a painless lump in her left breast. Physical examination of the breast indicated a hard, smooth, mobile mass of approximately 2 cm and no axillary lymphadenopathy or nipple discharge.

Mammography showed an oval mass with irregular borders in the upper part of the left breast and no microcalcification or architectural distortion (Fig. 1). Sonography showed a heterogeneous hypoechoic oval mass with posterior echo enhancement (Fig. 2). In prone position, the patient underwent MR imaging using a 1.5-tesla unit (Signa Horizon; General Electric Medical Systems, Milwaukee, WI, USA) with dedicated breast coil. Fat-saturated coronal T2-weighted fast spin-echo images (repetition time [TR], 3,100 ms; echo time [TE], 103 ms; number of excitations [NEX], 2; slice thickness, 4 mm with 1-mm sectional gap; matrix, 256 × 196; and field of view [FOV], 350 mm) showed a heterogeneous, hyperintense, oval mass with a rim of irregular hypointensity in the upper portion of the left breast (Fig. 3a). We performed coronal dynamic contrast enhancement study using a 3-dimensional fat-saturated fast-spoiled gradient-recalled echo sequence (TR, 6.7 ms; TE, 1.7 ms; flip angle, 20°; NEX, 1; slice thickness 4 mm with 2-mm overlap; matrix, 256 × 256; and FOV, 20 cm) and intravenous injection of gadopentate dimeglumine at a dose of 0.1 mmol/kg followed by saline flush (20 mL). We obtained one series of precontrast and 4 series of postcontrast dynamic images at one-minute intervals; we began enhanced image acquisition 20 s after injection of contrast medium. On precontrast fat-saturated T1-weighted images, the mass showed low signal intensity and a rim with relatively high intensity (Fig. 3b); on dynamic contrast enhancement study, the mass demonstrated heterogeneous enhancement (Fig. 3c) with rapid initial enhancement followed by a plateau pattern (Fig. 3d).
Fig. 1. Mammogram shows an oval mass with irregular borders in the upper part of the left breast and no microcalcification or architectural distortion.

Fig. 2. Sonogram shows a heterogeneous hypoechoic oval mass with posterior echo enhancement.

Aspiration cytology revealed large irregular spindle cells in the myxomatous interstitial component. We suspected the tumor was sarcoma or carcinoma with sarcomatous component, and the patient underwent surgery to conserve the breast.

The surgical specimen revealed a well defined mass of 1.3-cm diameter. Pathological examination revealed a fibrous capsule at the margin of the tumor and spindle cell proliferation with fibromyxoid stroma within the mass (Fig. 4a, b, c). Immunohistochemically, the spindle cells were positive for p63 (Fig. 4d), CK14, and 34betaE12, markers of epithelial cells; we observed no staining for S100. Therefore, we finally diagnosed the mass as spindle cell carcinoma of the breast.

Discussion

Spindle cell carcinoma is a rare malignant breast neoplasm frequently classified under the broad category of metaplastic carcinoma. Wargotz and associates defined spindle cell carcinoma as an intraductal or infiltrating carcinoma (ductal, lobular, squamous, or mixed) contiguous or subtly merged with a bland, monotonous-appearing spindle cell proliferation comprising more than half the neoplasm.1 Clinically, spindle cell carcinoma usually presents in postmenopausal women with an average age of 63, as a single, palpable, painless, firm breast mass, located most often in the upper outer quadrant.1 On gross examination, the tumors are firm to hard, well circumscribed or ill-defined, and have one or more cysts.2 Although comparable prognosis of spindle cell carcinoma of the breast and common breast carcinoma has been reported,3,4 spindle cell carcinoma is a highly aggressive neoplasm with a high rate of extranodular metastasis and lower overall survival rate for metaplastic carcinoma.5–7 Therefore, careful definition of other variants of metaplastic carcinoma is necessary.1

Few reports have presented radiological findings of spindle cell carcinoma of the breast, but radiological imaging of metaplastic carcinoma has been reported.6–8 Metaplastic carcinoma has been reported to show more benign mammographic features and typically appears as a round or oval mass with circumscribed margins and lower frequency of combination with malignant calcification than invasive ductal carcinoma.6,7 These lesions show benign features characterized by an oval, round, or lobular solid mass with circumscribed or indistinct margins on sonography.9 Complex internal echogenicity with solid and cystic components has also been reported and correlated with necrosis and cystic degeneration on histopathological evaluation.7 MR imaging findings of metaplastic carcinoma of the breast have included high signal intensity of internal components on T2 that correspond with pathological findings of necrosis, cysts, and chondroid matrix.8 A single report presenting MR imag-
Fig. 3. Magnetic resonance (MR) imaging of spindle cell carcinoma of the breast in a 55-year-old woman. (a) Fat-saturated coronal T2-weighted fast spin-echo image shows a heterogeneous hyperintense round mass with rim of irregular hypointensity (arrowheads) in the upper portion of the left breast. (b) Precontrast fat-saturated T1-weighted image shows a mass with low signal intensity with rim with relatively high signal intensity. (c) Postcontrast enhancement image (third phase) shows heterogeneous enhancement. (d) Time-signal intensity curve shows rapid initial enhancement followed by plateau pattern.

Our patient’s lesion appeared as an oval mass with irregular margins, internal low signal intensity, and rim demonstrating moderate high intensity on fat-saturated T1-weighted images; with high signal intensity and rim of irregular hypointensity on fat-saturated T2-weighted images; and with rapid initial enhancement followed by plateauing pattern on dynamic contrast enhancement study. However, we observed no cystic component on MR imaging. Pathological study demonstrated a fibrous capsule at the margins of the mass that corresponded to a rim of relatively high intensity on precontrast fat-saturated T1-weighted images and of irregular hypointensity on fat-saturated T2-weighted images. These findings were thought to indicate an expanding growth pattern of the tumor. In addition, high signal intensity on fat-saturated T2-weighted images and early enhancement on dynamic enhancement study were considered to correspond to abundant fibromyxoid stroma and not to necrosis, cysts, or chondroid matrix, which are frequently present in other types of metaplastic carcinoma. Although this fibromyxoid stroma has been reported as a frequent minor component and the predominant component of a few neoplasms in spindle cell carcinoma, it has not been reported in other metaplastic carcinomas. Hence, observation of early enhancing internal components with high...
signal intensity on T2-weighted imaging may be useful in differentiating spindle cell carcinoma from other types of metaplastic carcinoma. Fibroadenoma with fibromyxoid stroma, or so-called myxoid fibroadenoma, has also been reported to show high signal intensity on T2-weighted images and marked enhancement.10 Myxoid fibroadenoma occurs in younger women and shows lobulation and internal septation, which appear to reflect the intrinsic growth pattern, whereas spindle cell carcinoma is usually seen in postmenopausal women and shows ill-defined margins or an expansive growth pattern. Therefore, it may be possible to distinguish spindle cell carcinoma from fibroadenoma. However, further investigation of radiographic findings is necessary. Differential diagnosis of masses with high T2 signal intensity includes mucinous carcinoma, infiltrating ductal carcinoma with abundant necrotic component, and other metaplastic carcinomas.8,9 Furthermore, Yuen and colleagues11 reported that nonmucinous carcinomas with strong high signal intensity on T2-weighted images exhibited a mixture of background matrix, higher proportion of cells than stroma, abundant cytoplasm, edematous stroma, and hemorrhage. Mucinous carcinoma typically shows gradual enhancement on dynamic contrast enhancement study.12 In invasive ductal carcinoma with massive necrotic tumors or other metaplastic carcinomas, internal components with high signal intensity on T2 images correspond to necrosis, cysts, or chondroid matrix and do not enhance in contrast study. Yuen’s group reported that nonmucinous carcinomas with strong high signal intensity on T2-weighted images frequently showed washout phenomenon and rim enhancement, but there were no cases with fibrous capsule showing expanding growth pattern.11 Therefore, a mass showing high signal intensity on T2-weighted imaging with an expansive growth pattern and rapid initial enhancement followed by a plateau pattern may suggest spindle cell carcinoma.
Conclusion

Spindle cell carcinoma should be included in the differential diagnosis of expanding round or oval masses with internal components with initial rapid enhancement that show high signal intensity on T2-weighted images in postmenopausal women.

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