

MR Findings of Metaplastic Carcinoma of the Breast: Case Report¹

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We report the dynamic magnetic resonance imaging findings (MRI) of a metaplastic carcinoma of the breast. A 44-year-old woman presented with a 2-month history of a mass in the right breast. The tumor showed a central irregular necrosis that was depicted upon low signal intensity on a T1-weighted image and high signal intensity on a T2-weighted image. The periphery of the tumor showed strong enhancement on a contrast enhanced T1-weighted image. The time-signal intensity curve revealed an early strong contrast enhancement and a delayed washout pattern.

Index words : Metaplastic carcinoma

Breast

Magnetic resonance (MR), image display

Metaplastic carcinoma is a rare form of breast carcinoma. It accounts for less than 5% of breast cancers (1 - 3), and it may have a poorer prognosis than most other breast malignancies (4, 5). Some authors have reported a metaplastic carcinoma of the breast with the mammographic and sonographic features (3, 6), however, typical magnetic resonance imaging (MRI) findings are unknown. The MRI findings of a metaplastic carcinoma of the breast were evaluated in this study. To our knowledge, this is the first report describing the MRI findings of a metaplastic carcinoma of the breast.

Case Report

A 44-year-old woman noticed a palpable mass in the

right breast for 2 months. On a physical examination, a large, hard and fixed mass was noticed in the right breast. The mammographic images showed an ovoid shaped large dense mass with an ill-defined margin at the upper portion of the right breast with enlarged and dense ipsilateral axillary lymph nodes; there was also a loss of the fatty hilum (Fig. 1). An ultrasound study with a 5 - 12.5 MHz probe revealed a microlobulated heterogeneous hypoechoic mass which had central multifocal irregular anechoic areas (Fig. 2). A dynamic MRI was performed using a 1.5 T unit (Magnetom Vision Plus, Siemens, Erlangen, Germany). The patient was examined in the prone position using a double breast coil. The sequences were as follows: axial nonenhanced spin-echo T1 and T2-weighted image, a T1-weighted three-dimensional fast low-angle shot (3D FLASH) sequence before and six times after the contrast injection. Axial T1-weighted images were obtained using a 3D FLASH sequence (TR=16 ms, TE=4 ms, 20° flip angle, 3-mm slice thickness with no slice gap, 224 × 256 in-plane matrix) that covered the whole breast. The field of view was 340 mm. For dynamic contrast enhancement, gadopentetate dimeglumine (0.15 mmol per Kg of body weight) was injected in a bolus pattern for a duration of

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10 s. Post-contrast T1-weighted images were obtained six times with no delay at the same slice position and location. Acquisition time for each T1-weighted 3D FLASH sequence was about 50 s and total acquisition time was about 350 s. The images were postprocessed by the subtraction method. The axial nonenhanced spin-echo MR images demonstrated a tumor, which had a central irregular low signal intensity surrounded by an intermediate signal intensity on the T1-weighted image (Fig. 3A), and a high signal intensity surrounded by peripheral intermediate signal intensity on the T2-weighted image (Fig. 3B). The subtraction images revealed the lesion to be an intensive enhancement at the peripheral solid portion (Fig. 3C). The time-signal intensity curve revealed an early strong contrast enhancement and a delayed washout pattern (Fig. 3D).

Using 14-gauge US-guided core biopsy, the histopathologic diagnosis was a squamous type of metaplastic carcinoma. A modified radical mastectomy with an axillary node dissection was performed. The tumor measured up to $4.5 \times 3.5 \times 3.5$ cm, and an axial cut surface of it showed gross prominent necrotic areas throughout the mass (Fig. 4). The areas of high signal intensity on the T2-weighted images were well correlated with pathologic necrosis. The axillary lymph nodes (3/21) were involved. There has been no recurrence or any distant

metastasis in the 2 years since the treatment.

Discussion

Breast carcinomas that undergo metaplastic changes are rare and they occur in less than 5% of the breast carcinomas. Tumors are considered to be metaplastic carcinomas if the metaplastic component constitutes at least 25% of the tumor and if it is merged into the foci of an infiltrative ductal carcinoma that is not otherwise specified (3). Metaplastic foci have squamous cells; spindle cells; both squamous and spindle cells; or heterologous elements, including muscle, cartilage, or bone (3).

Several reports have described a metaplastic carcinoma of the breast, and these reports concentrate mainly the clinicopathologic, mammographic and sonographic features (1 - 7). We have looked for reports regarding the MRI findings for this tumor and they are not to be found in the medical literature. The mammographic appearance of a metaplastic breast carcinoma has been described as a well-circumscribed mass or an irregular or spiculated mass (5), an ill-defined, round mass with an associated architectural distortion (6), a predominantly circumscribed, noncalcified mass with a spiculated portion (3, 7) or a rapidly growing, palpable mass that has a high density (8). Patterson et al. (3) reported that the



Fig. 1. Mediolateral oblique mammogram of the right breast shows an ill-defined ovoid mass (arrows) in the upper portion of the right breast. There are noted the enlarged and dense ipsilateral axillary lymph nodes with the loss of the fatty hilum (arrowheads).

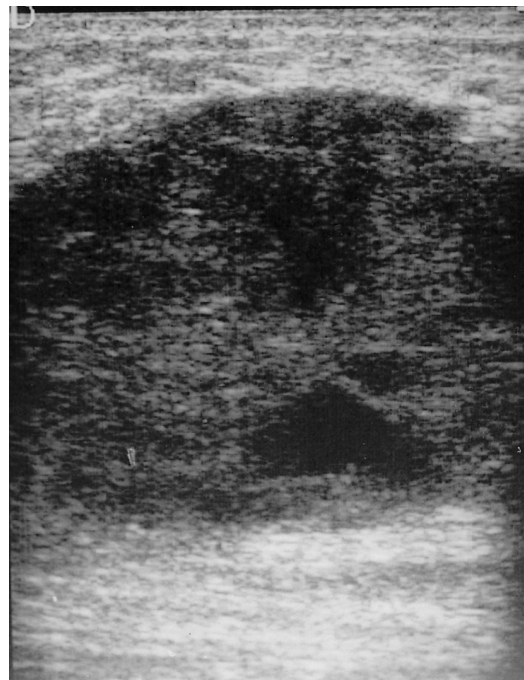
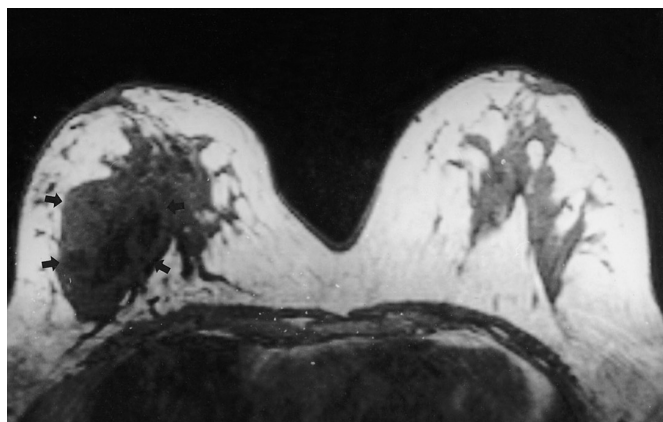


Fig. 2. Sonography of the right breast reveals a microlobulated heterogeneously hypoechoic mass with the central irregular anechoic necrotic areas.

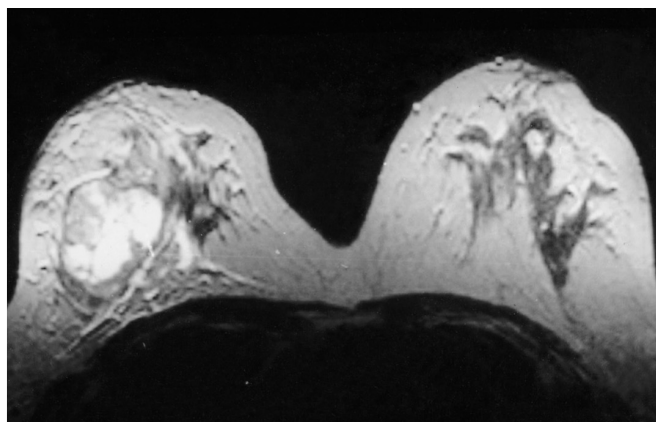
metaplastic portions of these tumors were associated with a circumscribed or lobular appearance on mammograms, whereas the invasive ductal carcinoma portions, if not otherwise specified, had irregular margins on mammograms. On sonography, the mass showing an inhomogeneous echo pattern with solid and cystic components was confirmed to relate it with the hemorrhagic or cystic necrosis finding upon pathology (6, 8). These findings are similar to those in our case. In addition, a histopathologic examination of this tumor at the same section on MRI demonstrated a good radiological and pathological correlation. The peripheral solid portion showed intensive and fast contrast enhancement with a delayed washout pattern that is often observed in carcinomas of the breast (9). This peripheral pattern is consistent with typical invasive ductal carcinoma upon



Fig. 4. Microphotograph shows an extensive necrosis (arrows) in the squamous metaplastic area (arrowheads) (HE, $\times 20$).



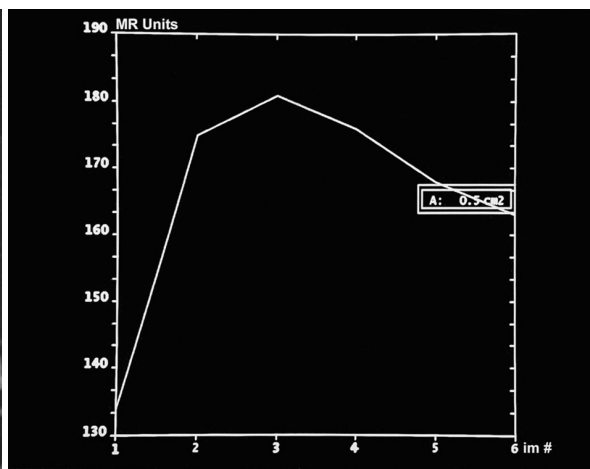
A



B



C



D

Fig. 3A. Axial nonenhanced, T1-weighted MR image demonstrates about a 5 cm-sized tumor (arrows) with a central irregular low signal intensity surrounded by an intermediate signal intensity on the T1-weighted spin echo sequence.
 B. On T2-weighted spin echo image, the tumor shows a central high signal intensity surrounded by peripheral intermediate signal intensity.
 C. A Dynamic 3D FLASH subtraction image shows a strong-enhanced high signal intensity at the periphery of the tumor.
 D. The time-signal intensity curve reveals an early strong contrast enhancement and delayed wash out.

histopathology. The central necrotic areas of the mass corresponded to the squamous metaplastic area upon histopathology (6, 8).

We experienced that MRI findings of metaplastic carcinoma of the breast were well correlated with the sonographic findings. These MRI findings demonstrated the central necrotic portion, the peripheral solid portion and the depicted characteristic signals on spin echo T1 and T2 weighted images and 3D dynamic enhanced images.

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