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MR Imaging and Spectroscopic Findings of Primary Angiosarcoma of the Breast: A Case Report[1]

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Angiosarcoma is a rare, malignant tumor of the breast. MR spectroscopy and a new breast MR imaging technique called MR angiography were used to study a case of multifocal primary angiosarcoma of the breast. The mass was isointense on the T1-weighted images and it was hyperintense on the T2-weighted images. Early fast enhancement and draining vessels with a washout curve were revealed by the dynamic enhancement. The MR spectroscopy did not show a choline peak.

Index words : Sarcoma
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Magnetic resonance (MR), spectroscopy
Breast neoplasms

Angiosarcoma is a rare, malignant tumor of the breast. It accounts for 0.04% of the malignant tumors and about 8% of all the primary sarcomas of the breast (1, 2). In many cases, these tumors are discovered in young women during pregnancy or when they are breast-feeding. The coexistence of pregnancy may delay the diagnosis. To date, there are only a few reports on the MRI studies of angiosarcoma (3, 4). We investigated a case of primary angiosarcoma using proton MR spectroscopy and a new breast MR imaging technique called MR angiography.

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Case Report

A 44-year-old woman presented with a palpable mass in her left breast that she had become aware of 10 days previously. She had no family history of breast carcinoma or trauma. The physical examination revealed a hard, painless mass in the upper, outer quadrant of the left breast. The overlying skin was intact and not discolored. A mammogram showed that the breasts were dense and they did not have focal masses or calcifications. A sonogram showed that the tumor consisted of three conglomerated, ill-defined, irregular hypoechoic masses (Fig. 1A).

MR imaging was performed using a 1.5 T system (Signa Excite; GE Healthcare, Milwaukee, WI). The patient was imaged in the prone position with using a dedicated four-channel breast open-coil. Each MR image acquisition consisted of the sagittal, fat-saturated, T1-weighted imaging with the spin-echo sequence (420/13 ms), the sagittal, fat-saturated, T2-weighted imaging

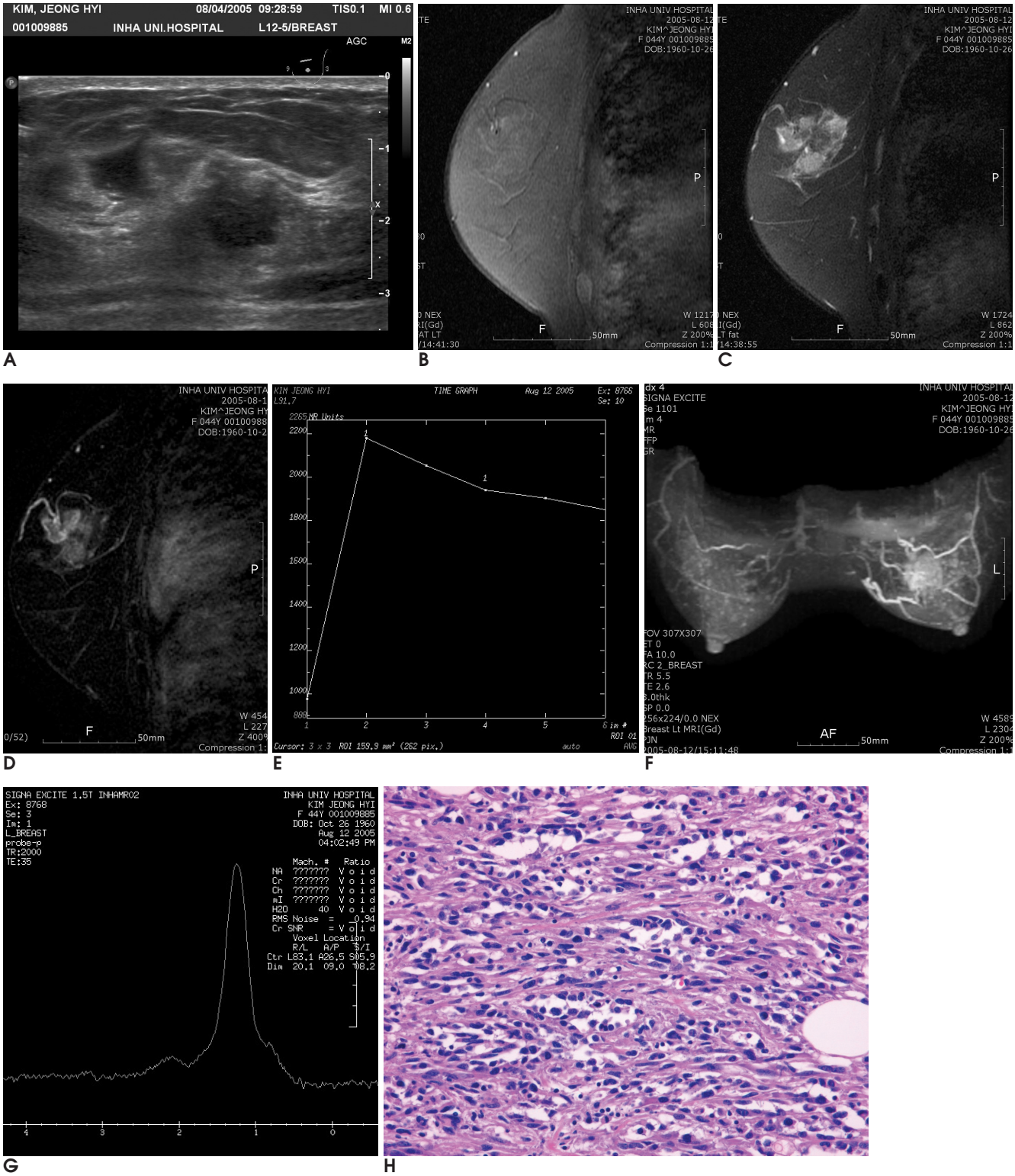

Fig.1. A 44-year-old woman with multifocal breast cancer.
A. Sonography revealed irregular and oval hypoechoic masses having ill-defined margins.
B. The sagittal, fat-saturated T1-weighted spin-echo imaging showed iso-signal intensity.
C. The sagittal, fat-saturated T2-weighted fast spin-echo imaging showed a high signal intensity.
D. The contrast-enhanced sagittal subtraction image showed intense enhancement with enlarged vessels (arrow).
E. The time signal intensity curve demonstrated early fast enhancement and a washout curve.
F. The MR angiography showed many enlarged draining vessels.
G. The MR spectroscopy taken after the administration of contrast agent showed the absence of a choline peak.
H. The histological findings of the tumor revealed a high grade sarcoma that formed vascular space (H & E, ×400).

with the spin-echo sequence (4340/85.9 ms), and the dynamic contrast-enhanced imaging with 3D SPGR (5.5/2.6 ms). For dynamic contrast enhancement, a bolus of gadopentetate dimeglumine (Magnevist; Berlex Laboratories, Wayne, NJ) at 0.1mmol/kg body weight was injected at a rate of 2.0 mL/sec through the antecubital vein with using a power injector, and flushing was done with 10 mL saline. One image was obtained before the injection and five images were obtained thereafter.

The subtraction images, the time-intensity curve (TIC) images and the maximum intensity projection (MIP) images were generated from postprocessing the MR imaging data. The subtraction images were computed from the precontrast S0, the early postcontrast S1 and the late postcontrast S2 as: S1- S0 (standard subtraction), S1- S2 (reverse subtraction) and S2- S0. The TIC was obtained by plotting the region of interest (ROI). The reformed images with MIP were visualized in both the craniocaudal and mediolateral directions.

MR spectroscopy was performed immediately after the MR imagings. A stimulated echo acquisition method (STEAM) in conjunction with a three-pulse chemical shift selective (CHESS) sequence to suppress the water signal was used; the acquisition parameters were a 3,000/30 ms repetition time/echo time, a 13.7-msec mixing time, a 2.500-Hz sweep width, 2048 data points and 128 images. A localization voxel of 1.6 cm^3 was placed in the enhancing mass.

The mass was isointense on the T1-weighted images (Fig. 1B) and it was hyperintense on the T2-weighted images (Fig. 1C). The mass was markedly enhanced on a contrast-enhanced T1-weighted image, which displayed large draining vessels (Fig. 1D). The kinetic curve showed a washout curve (Fig. 1E). The MR angiogram with the MIP technique showed the existence of prominent vascularity compared with the healthy breast (Fig. 1F). MR spectroscopy did not detect a choline peak in the tumor (Fig. 1G). There was no evidence of axillary lymph node involvement or other metastases.

A core biopsy was done with using 14-gauge automated gun under sonographic guidance. There was no hematoma after the biopsy. Pathology revealed a high-grade angiosarcoma. The patient underwent modified radical mastectomy and axillary node dissection. Subsequent pathology revealed a 3.5 cm×2.5 cm high-grade angiosarcoma (Fig. 1H) with no lymph node involvement. The immunohistochemical analysis revealed reactivity for CD31 and focal reactivity for CD34. The patient did not undergo adjuvant chemotherapy because the effects of chemotherapy on this type of tumor are not well defined. Her six-month follow-up after surgery was uneventful.

Discussion

Angiosarcoma is an extremely uncommon tumor in the breast. Angiosarcoma is an aggressive tumor that shows local recurrence and hematogenous dissemination. Such tumors can originate from endothelial cells in any part of the body. The etiology of breast angiosarcoma is unknown. Although it may occur in women of any age, it is more common in younger women. A few cases of angiosarcoma in a mastectomy scar after chest wall irradiation have been well documented. If the tumor is close to the surface of the body, then blue discoloration of the skin may be present. The lesions are firm and they are composed of vascular channels, which may be similar in appearance to those channels of benign hemangiomas. Benign hemangiomas are invariably less than 2 cm in diameter, whereas angiosarcomas are usually greater than 2 cm in diameter. Pathologists now classify the angiosarcomas into low, intermediate and high grades.

The MR imaging findings showed isointensity on the T1-weighted images and hyperintensity on the T2-weighted images; these findings are consistent with other studies (3, 4). A washout curve of TIC and early fast enhancement of the dynamic imaging are indicative of malignant lesions; our case also exhibited early fast enhancement (>80%) with delayed washout enhancement. MR angiography more clearly showed the multiple draining vessels and the extensive vascularity than did the MR imaging. The MIP images were used with MR angiography to create projection images of the vascular structures and the enhancing tissue. MIP images are very effective for quantifying distribution of disease in the breast in relation to the skin, nipple, chest wall and large vessels, as well as displaying the multifocal nature of the disease.

MR imaging in combination MR spectroscopy is a useful diagnostic technique for providing information on tissue/tumor metabolism. MR spectroscopy detects cellular turnover and proliferation by monitoring the levels of a collection of chemicals having choline bases. A peak at 3.2 ppm represents an elevation of the composite choline compounds, and it has been suggested that a choline peak might be a useful criterion for detecting breast malignancies (5). The sensitivity of MR spec-

troscopy ranges from 0.70 to 0.92, and the specificity ranges from 0.83 to 0.87. Contrary to the published studies, where was an absence of choline resonance on our proton MR spectroscopy. It is possible that the malignancy in our case was a subtype, and subtypes of invasive cancers have been reported on (6). Noninvasive cancers may have much lower levels of choline compounds. The reports on choline resonance for medullary carcinoma are somewhat conflicting: one paper reported a negative result and another reported a positive result (6, 7). To the best of our knowledge, this is the first report on the MR spectroscopy of angiosarcoma. It is unclear why a choline peak was not observed in our study. Further spectroscopic studies of angiosarcoma are needed to elucidate this point.

In summary, the radiological differentiation of angiosarcoma is not specific because its appearance may resemble that of an ill-defined early-enhancing mass that's indistinguishable from other invasive carcinomas. Our study showed that primary angiosarcoma of the breast exhibits enlarged draining vessels that are easily visualized.

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유방에 생긴 원발성 혈관육종은 드문 악성 종양이다. 저자들은 다병소성의 혈관육종의 자기공명영상 소견과 자기공명분광술 소견을 보고하려고 한다. 이 종양은 T1 강조영상에서 등신호강도, T2 강조영상에서 고신호강도을 보이고 조영증강영상에서 조기에 빠른 조영증강과 유출정맥을 보였다. 자기공명분광술에서 콜린 최고점은 볼 수 없었다.