Radiology Case Reports 20 (2025) 2719–2722

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Case Report

Breast cancer with medullary features shows a fast and plateau enhancement pattern on magnetic resonance images: A case report ☆

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ARTICLE INFO

Article history:
Received 27 November 2024
Revised 21 February 2025
Accepted 23 February 2025

Keywords:
Breast cancer
Fast and plateau pattern
Medullary features
MRI
Punctate hyperechoic foci

ABSTRACT

An 80-year-old woman with a left breast mass was referred to our department. Mammography showed an oval mass, 2.5cm in size, with circumscribed margins in her left breast. Ultrasound showed an oval tumor with circumscribed margins, heterogenous internal echoes including numerous punctate hyperechoic foci, and posterior echo enhancement. Magnetic resonance imaging (MRI) of the tumor showed low and high signal intensity on T1-weighted images and on fat-suppressed T2-weighted images, respectively. Kinetic curve assessment of the tumor showed a fast and plateau pattern. After the pathological confirmation of malignant cells, the patient underwent mastectomy and sentinel node biopsy. Postoperative pathological study showed that atypical cells formed irregularly arranged papillary nests and grew in a medullary fashion accompanied by massive lymphocyte infiltration, leading to the diagnosis of invasive ductal carcinoma with medullary features (IDCMF). Immunostaining showed that the tumor had a triple negative phenotype and a high Ki-67 labelling index of 52%. In conclusion, breast diagnostic physicians should note that IDCsMF show a fast and plateau enhancement pattern on MRI kinetic curve assessment. Furthermore, the presence of punctate hyperechoic foci in the tumor can be useful in distinguishing IDCsMF from medullary breast carcinomas.

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Introduction

Breast medullary carcinomas are rare breast malignancies, which have high nuclear grades, a triple negative phenotype, high proliferation potential, massive lymphocyte infiltration around the cancer cells, and no ductal structures. Despite their presumed aggressive characteristics, medullary carcinomas generally show favorable clinical outcomes [1,2].

Many researchers have reported that the abundant presence of tumor-infiltrating lymphocytes in the tumor contributes to the discrepancy between the dismal prognostic

☆ Competing Interests: The authors have declared that no competing interests exist.

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https://doi.org/10.1016/j.radcr.2025.02.099

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factors and the favorable clinical outcomes in medullary breast carcinomas [3–5]. Breast cancers that resemble medullary carcinomas but have tubule forming structures are classified as invasive ductal carcinomas with medullary features (IDCsMF). Prominent lymphatic infiltration, however, is a frequent finding observed in both medullary carcinomas and IDCsMF.

We report a case of IDCMF which had characteristic image findings.

Case presentation

An 80-year-old woman with a family history of colon cancer and hepatocelular carcinoma in her 2 brothers was undergoing outpatient treatment at our hospital for primary biliary cholangitis. The patient also suffered from hypertension, dyslipidemia, and subclinical thyroid dysfunction, but noticed a painless mass in her left breast, leading to the consultation to our department. Mammography showed an oval mass, 2.5cm in size, with circumscribed margins in the upper outer quadrant of her left breast (Fig. 1). Ultrasound showed that an oval tumor had circumscribed margins, heterogenous internal echoes including numerous punctate hyperechoic foci, and posterior echo enhancement (Fig. 2). Magnetic resonance imaging (MRI) of the tumor showed low and high signal intensity on T1-weighted images and on fat-suppressed T2-weighted images, respectively. Kinetic curve assessment of the tumor showed a fast and plateau pattern. Enhanced areas, however, differed slightly between the early and late phase images (Fig. 3). Under the tentative diagnosis of breast cancer, the patient underwent core needle biopsy of the breast mass. Pathological study showed nuclear grade 3 atypical cells growing in solid, trabecular, and papillary fashions with prominent inflammatory cell infiltration around the cancer cells. Immunostaining showed that the tumor was negative for estrogen receptor, progesterone receptor and human epidermal growth factor receptor type 2, and had a high Ki-67 labelling index of 45%. Due to no suspicious lymph nodes on palpation and ultrasound evaluation, the patient underwent mastectomy and sentinel node biopsy, resulting in no sentinel node metastasis on frozen section. Postoperative pathological study showed that atypical cells formed irregularly arranged papillary nests and grew in a medullary fashion accompanied by numerous lymphocyte infiltration. Immunostaining showed that the tumor had a triple negative phenotype and a higher Ki-67 labelling index of 52% than that observed in the core needle biopsy specimen (Fig. 4). The patient was discharged in 7 days after operation and is scheduled to be followed-up without any adjuvant therapy due to her old age.

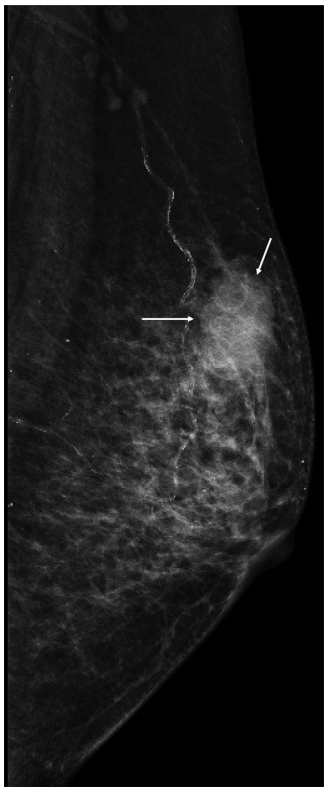

Fig. 1 – Mammography findings. Mediolateral oblique mammogram showed an oval mass with circumscribed margins (arrows) and neither daughter nodules nor ductal spread.

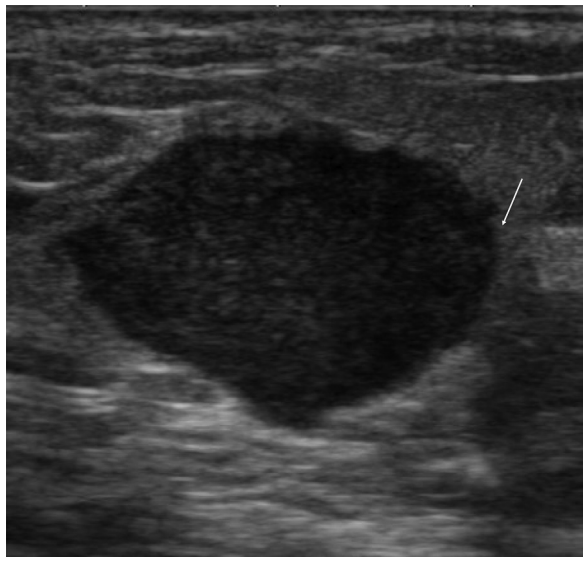

Fig. 2 – Ultrasound findings. Ultrasound showed an oval tumor with circumscribed margins, hypo echoic background, and numerous punctate hyper echoic foci. The mass had ruptured anterior borders of the mammary gland (arrow) and no presumed ductal spread.

Discussion

An irregular mass with spiculated margins on mammography is easily diagnosed as a BI-RADS category 5 lesion. Breast medullary carcinomas, however, are generally detected as round or oval masses with circumscribed margins and are dif-

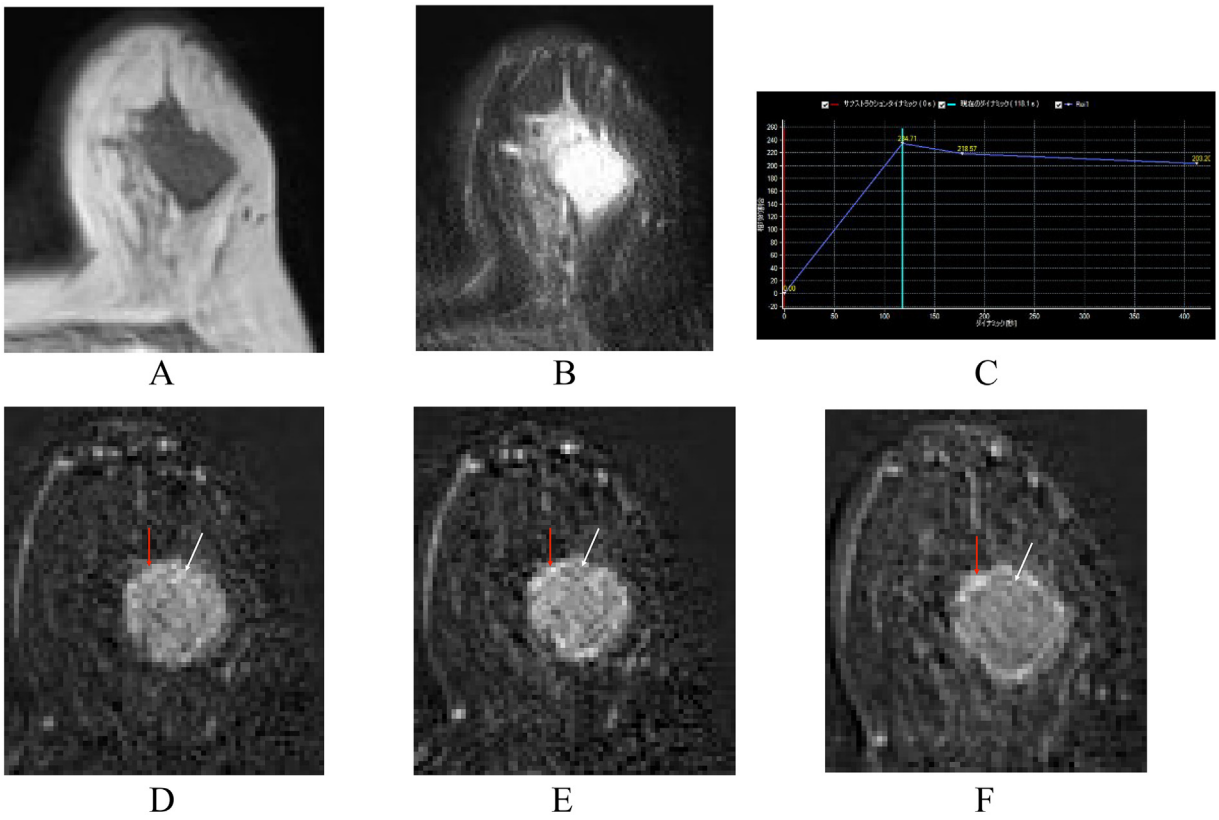

Fig. 3 – Magnetic resonance image (MRI) findings. T1- (A) and T2-weighted images (B) showed that the tumor did not contain, at least, many fibrous components. The time signal intensity curve showed a fast and plateau enhancement pattern (C). Of the subtraction MRI images, white and red arrows showed the areas showing a wash out pattern and those showing a persistent pattern, respectively (D-F).

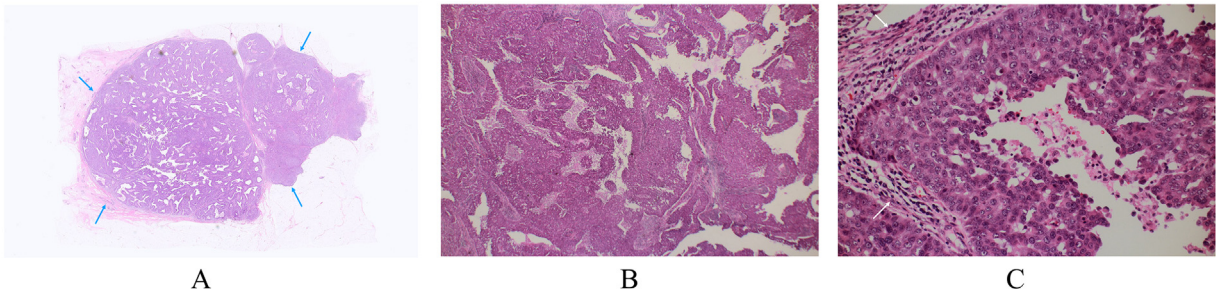

Fig. 4 – Pathological findings. (A) Low magnified view showed that the tumor had clear margins (arrows) and abundant atypical cells showing papillary structures (H.E. x 20). (B) Magnified view showed that the tumor had papillary structures (H.E. x 40). (C) Magnified view showed the abundant lymphocyte infiltration (arrows) around the cancer cell clusters (H.E. x 200).

ficult to be diagnosed as breast cancer only with mammography [1]. Circumscribed margins on mammography suggest the absence or least presence of fibrous components at the mass margins in breast medullar carcinomas. Ultrasound showed that the tumor had more circumscribed margins than mammography, heterogenous internal echoes including numerous punctate hyperechoic foci, and posterior echo enhancement, highly suggesting the mass to have abundant cell components and no or least fibrous components not only at the mass margins but also in the mass center. In addition, punctate hyperechoic foci in the mass suggested the presence of papillary / tubular structures [6]. In addition to these imaging findings, the triple negative phenotype and the high Ki-67 labelling index led to the diagnosis of IDCMF.

In tumors containing a large amount of fibrous components, the tumor intensity on T2-weighted images decreases. We, therefore, can conclude that the tumor does not contain, at least, many fibrous components in this case. On the contrary, fast enhancement on MRI suggested that the tumor had abundant cellular components. Cell-rich tumors, however,

generally show a fast and wash out pattern [7]. Conversely, benign tumors [8] or inflammatory diseases [9] generally show a plateau or a persistent pattern. The plateau pattern can be even seen in breast cancers with abundant noncancerous elements such as fibrous or mucinous components, but in such cases the initial phase enhancement is generally slow. This case, however, pathologically lacked such noncancerous components and showed a fast and plateau pattern, which is rarely seen in cell-rich breast cancers. Therefore, a fast and plateau pattern explained the cell-rich characteristics and the presence of abundant inflammatory cells in this case. A fast and plateau pattern on MRI should be an important diagnostic clue for breast medullary carcinomas or IDCsMF.

Pathological study showed that atypical cells formed irregular papillary nests and grew in a medullary fashion in this case. The papillary structures contributed to the formation of numerous punctate hyperechoic foci. In addition to the papillary structures, the presence of fat or water in the tumor can also make internal echoes of the mass high. However, if fat or water had been present in the tumor, internal echoes would have been much higher than those observed in this case because acoustic impedance of fat or water is extremely low.

The solid or trabecular arrangement of homogeneous cancer cells seemed to have caused the background low internal echoes. If papillary structures had not been observed in this case, the image diagnosis would have been medullary breast carcinoma. In that case, many punctate hyperechoic foci should not have been observed. Therefore, when a fast and plateau enhancement pattern is observed in breast masses, the presence of many punctate hyperechoic foci can be useful to differentiate IDCsMF from breast medullary carcinomas.

Conclusion

Breast diagnostic physicians should note that either IDCsMF or medullary carcinomas have abundant cancer cells and numerous lymphocyte infiltration around the cancer cells, leading to a fast and plateau enhancement pattern on MRI. Furthermore, the presence of many punctate hyperechoic foci can be useful in distinguishing these 2 disorders.

Patient consent

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images.

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