Radiology Case Reports 16 (2021) 136–139

Available online at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/radcr

Case Report

Bone in the breast: A case report of a metaplastic breast cancer with osseous differentiation ☆

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ARTICLE INFO

Article history:
Received 3 August 2020
Revised 2 November 2020
Accepted 2 November 2020

Keywords:
Breast
Carcinoma
Cancer
Metaplastic
Osseous differentiation

ABSTRACT

Metaplastic breast carcinoma is an uncommon malignant tumor with various pathologic subtypes. Diagnosis is often challenging due to the wide spectrum of clinical and imaging presentations. Here, we present the case of a very rare subtype of metaplastic breast carcinoma—a mixed-type metaplastic breast cancer with osseous differentiation in a 55-year-old female patient. The clinical presentation, imaging-pathology diagnosis, and treatment options are reviewed. Knowing this rarely reported but aggressive breast cancer is very important for clinicians to establish a timely diagnosis for effective management.

Introduction

Metaplastic breast carcinoma (MBC) is an uncommon invasive tumor that makes up less than 1% of primary breast cancers [1] that was not recognized as a distinct histologic entity until 2000 [2]. MBC is a heterogeneous disease with many pathologic subtypes characterized by a mixture of adenocarcinoma with components of squamous, spindle, osseous, and chondroid differentiation [1]. It is challenging to diagnose MBC because it has a broad spectrum of imaging and clinical presentations. Radiologists and clinicians have limited experience in the diagnosis and management of MBC because it is an uncommon disease and is poorly documented in literature.

Here, we report a case of a very rare subtype of MBC—a mixed-type metaplastic breast cancer with osseous differentiation. The multimodality imaging features along with the pathology correlation is presented and the multidisciplinary treatment approach is also reviewed. This case report will augment our understanding of this rare subtype of MBC.

☆ Declaration of Competing interest: Xiaoqin Wang, MD, is currently sponsored by the Markey Cancer Center Support Grant which has no impact on this report. Kyle Luo and Xiaoqin Wang have no other conflicts of interest, grants, disclosures, or other assistance.

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https://doi.org/10.1016/j.radcr.2020.11.001

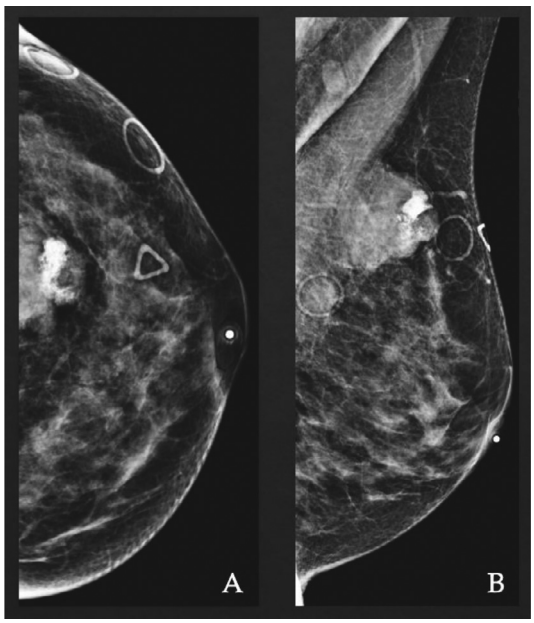

Fig. 1 – Mammogram craniocaudal (A) and mediolateral oblique (B) views of the left breast demonstrate a circumscribed irregular mass with coarse calcifications in the posterior 12 o'clock axis. The triangular marker indicates the palpable concern.

Case report

A 55-year-old female presented with a palpable abnormality in the left breast. The patient had no personal or family history of breast cancer. Bilateral mammograms were performed and showed a 35-mm circumscribed irregular mass with coarse calcifications in the left breast at 12 o'clock located 8 cm from the nipple (Fig. 1). This correlated with the palpable concern.

A focused ultrasound was performed in the area of concern for further evaluations and indicated an irregular mass with internal vascularity measuring 39 × 21 × 29 mm (Fig. 2). The mass was predominantly hypoechoic with an echogenic component corresponding to the coarse calcifications on the mammogram. The noncalcified component demonstrated posterior acoustic enhancement. The mass appeared to be in close proximity to the underlying pectoralis muscle. A focused ultrasound was also performed in the left axilla and showed a few normal lymph nodes (images not shown).

A percutaneous core needle biopsy of the mass was performed with a 12-gauge spring-loaded needle device (Bard Marquee, Q123). Histopathology of the core biopsy indicated a mixed adenocarcinoma with a spindle area and osteoid matrix (Fig. 3). Immunohistochemistry was negative for estrogen and progesterone receptors as well as HER2 and melanoma markers. Immunohistochemistry also indicated no specific mesenchymal, neural, muscle, or endothelial cell differentiation.

A 1.5-Tesla magnet breast MRI was performed to delineate the extent of the cancer, especially the pectoral muscle involvement. The MRI indicated a mass with heterogeneous enhancement measuring 40 × 41 × 34 mm in the posterior left breast located at the 12:00 position (Fig. 4). The kinetics showed at worst a rapid initial enhancement followed by washout. This enhancing mass contained an artifact from the biopsy clip consistent with the biopsy proven malignancy. The mass was compressing the pectoralis major without definite muscular enhancement. However, the fat plane between the mass and the pectoralis major was obliterated. CT images of the chest, abdomen and pelvis showed the biopsied left breast mass and calcifications of bone density without distant metastasis (Fig. 5).

The patient underwent a lumpectomy of the left breast, including a resection of the left breast cancer as well as a portion of the underlying pectoralis major given its proximity to the cancer. The patient also underwent 4 cycles of Carboplatin and Taxol chemotherapy treatment in addition to radiation therapy.

The patient was recommended to have a routine annual clinical follow-up with bilateral mammograms. At the 1-year follow-up, the patient denied any major complaints. No masses were felt on physical examination or seen on the mammograms.

Discussion

MBC is an uncommon, heterogeneous group of cancer with various pathologic subtypes. Mixed MBC with osseous

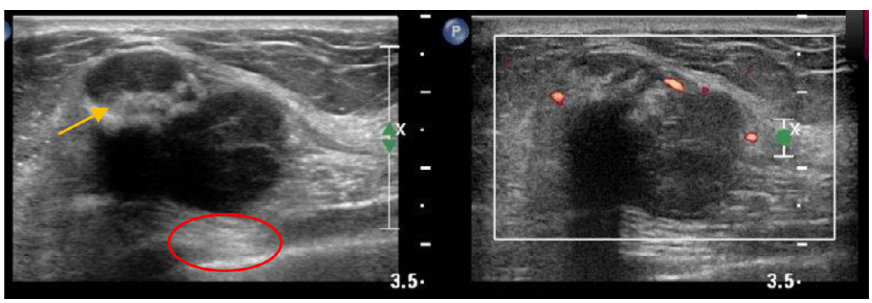

Fig. 2 – Ultrasound imaging demonstrates a circumscribed irregular mass with rim vascularity at the area of palpable concern. The internal echotexture is heterogeneous. The echogenic area (arrow) corresponds to the coarse calcification on mammogram. The noncalcified component shows posterior acoustic enhancement (circle).

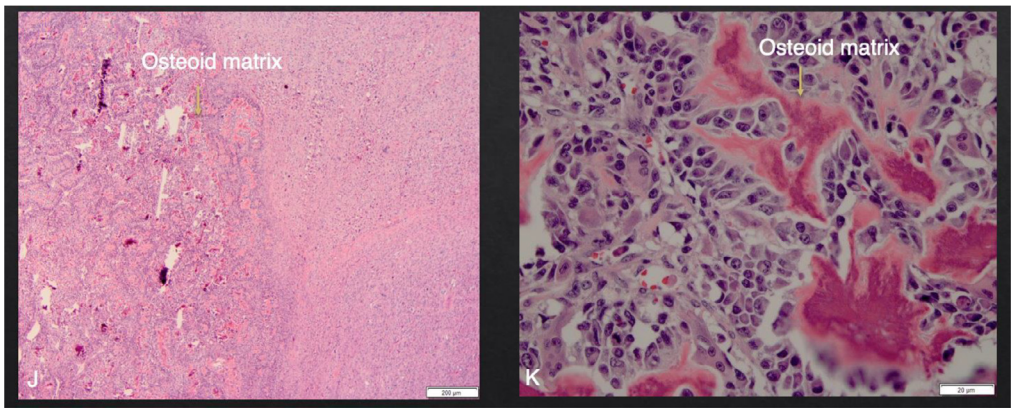

Fig. 3 – Histopathologic findings with (J) lower and (K) higher power magnification showing the interface between the spindle area and osteoid matrix.

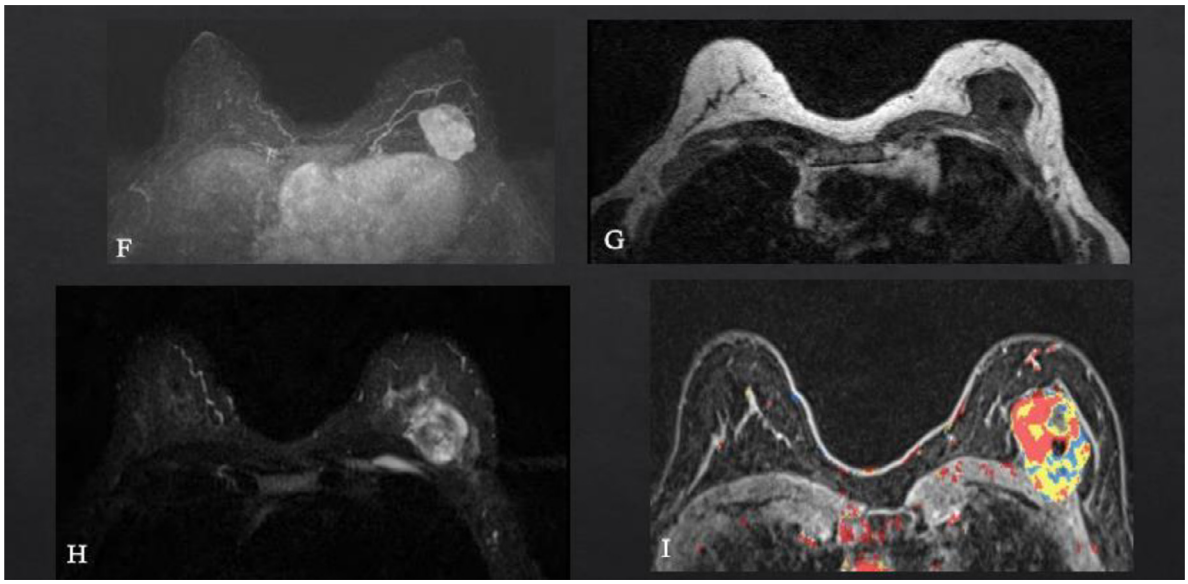

Fig. 4 – MRI images [(F) Maximum Intensity Projection Image, (G) T1 without contrast, (H) T1 with contrast enhancing, and (I) T1 with contrast and color mapping] show a circumscribed mass with a kinetics pattern of at worst rapid initial enhancement followed by washout at the left breast. There is a signal void from the biopsy clip in the center of this enhancing mass. This mass is close to the pectoralis muscle.

differentiation is a very rare subtype with limited literature reports [3]. The median age at the time of presentation is 48-59 years and it usually presents as a rapidly growing palpable mass generally greater than 2.0 cm in presentation [2]. Despite its large size, axillary involvement is much less common (6%-26% of cases) when compared with invasive ductal carcinoma [2]. MBC demonstrates a tendency to spread to lung and bone tissue by hematogenous means [4].

Histologically, MBC is a poorly differentiated heterogeneous tumor containing ductal carcinoma cells mixed with areas of spindle, squamous, chondroid, or osseous elements [5]. The wide range of microscopic appearances of MBC has resulted in a variety of classifications and designations with the World Health Organization dividing MBC into epithelial and mixed types [6]. The mixed type category is further divided into carcinosarcomas, carcinomas with chondroid differentiation and carcinomas with osseous differentiation. The broad spectrum of MBC pathology often leads to various clinical and imaging presentations which makes its diagnosis and treatment challenging.

MBC often demonstrates triple negative biomarkers (estrogen receptor, progesterone receptor and Her2-neu) and as such is difficult to treat. When compared with other breast cancers, there are fewer therapeutic options and the outcomes are generally poorer with a higher recurrence rate. Previous studies indicate that MBC has a poor response to systemic chemotherapy and that neoadjuvant chemotherapy has little effect in preventing its progression [7]. Thus, aggressive surgical interventions with wide local excision of the lesion are often required due to the high recurrence rate. However, there is no consensus of the specific surgical margins.

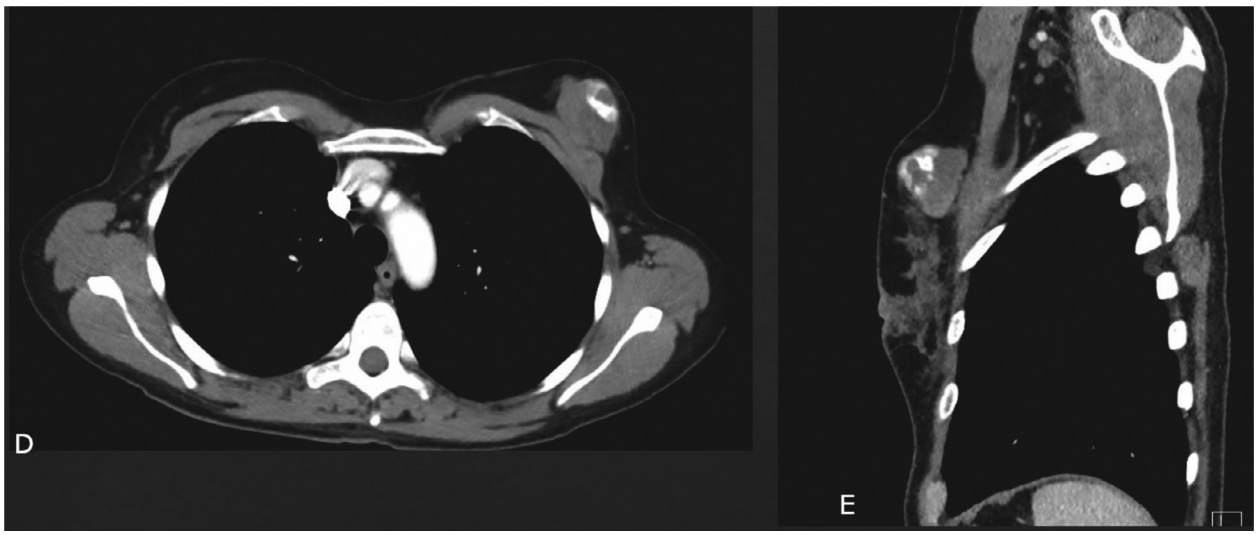

Fig. 5 – CT axial (D) and sagittal (E) images of the chest show the left breast mass with calcifications of dense bone density.

The mixed MBC with osseous differentiation we reported is a very rare subtype of MBC. It has a few unique imaging features that make it more difficult to diagnose as it often demonstrates benign features that hide its malignant nature. MBC commonly presents as a round and circumscribed mass with posterior acoustic enhancement, rather than the irregular shape and posterior acoustic shadowing that is demonstrated in other malignant breast cancers [3,8]. The dense calcifications that were observed in the case report are the "bone"—osseous components of the lesion which are not commonly seen in the breast cancer [8]. The circumscribed mass and coarse calcifications can mimic benign fibroadenoma with hyalinized calcifications or trauma with dystrophic calcifications. A history of rapid growth and high clinical suspicion will help differentiate MBC from other benign breast conditions. Multimodality imaging, including a breast MRI, defines the extent of the disease and CT imaging helps rule out metastasis. In this case, a multidisciplinary clinical team decided on a wide surgical excision with chemoradiation therapy and the patient responded well to this treatment approach.

Conclusion

Mixed MBC with osseous differentiation is a very rare type of breast cancer that often presents as a circumscribed mass with coarse calcifications on imaging. As a triple negative breast cancer, it is limited in the available treatment options. Timely diagnosis and wide surgical resection are keys for successful management of this rapidly growing cancer.

Consent statement

The University of Kentucky College of Medicine and Markey Cancer Center would like to state that no consent was obtained as there is no risk to the patient's privacy and no identifiable information is present in this case report manuscript.

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