

Case Research

Metaplastic carcinoma of the right breast and simultaneous giant ovarian teratoma: a case report

Shuang Li¹ and Qing-Zhu Wei²

Abstract

We describe here a female patient who presented with a breast mass and giant abdominal mass. Fine needle aspiration cytology of the breast mass and histological examination after modified radical mastectomy confirmed metaplastic carcinoma of the breast. The epithelial components were formed by infiltrating ductal carcinoma with poor differentiation, and the sarcomatous components were formed by fibrosarcoma and osteosarcoma. Histological examination of the abdominal mass confirmed ovarian teratoma. The patient underwent modified radical mastectomy of the right breast and laparoscopic excision of the abdominal mass in the lower right quadrant. Having undergone six courses of chemotherapy, the patient is now in her tenth month after surgery and under follow-up, and she has no relapsed disease. These two diseases have never been seen in one patient before. The case we report here provides some new data for research and clinical experience and it may also provide a new insight into the relationship between metaplastic breast carcinoma and ovarian teratoma.

Key words Metaplastic carcinoma, breast, ovarian teratoma

Metaplastic carcinoma of the breast is a subtype of breast cancer. Although relatively rare, its peculiar histomorphology, classically characterized by the coexistence of carcinomatous and sarcomatous components, has long been intriguing because the origin of breast carcinosarcoma is controversial. The underlying molecular alterations, possibly related to epithelial-mesenchymal transition, remain elusive^[1]. This cancer has been assigned several names, including carcinosarcoma, spindle carcinoma, and sarcomatoid carcinoma, because of its heterogeneous histological features. Carcinomas with these peculiar features are also encountered in organs other than the breast, including the lungs, prostate, urinary bladder, and organs of the female genital tract^[2]. Several lines of evidence suggest that metaplastic carcinoma of the breast has a

monoclonal origin, with the sarcomatous component converted from a carcinomatous component through a metaplastic process; however, whether this morphologic subtype of breast cancer is genetically distinct from the conventional ductal carcinoma of the breast is currently unknown. Moreover, given the bona fide carcinomatous nature of metaplastic carcinoma of the breast, the genetic programming underlying the metaplastic process remains elusive^[3,4]. Here we report a case of metaplastic carcinoma of the right breast with simultaneous giant ovarian teratoma, with a focus on the relationship between breast carcinoma and tumors of the female reproductive system.

Case Report

A 55-year-old woman (married, having 3 children) presented with a painless mass in the right breast discovered by self-examination one year before reporting it. She had no other symptoms or previous breast problems and no family history of breast cancer.

On clinical examination, palpation of the right breast revealed a painless, mobile, hard mass at the 1-o'clock

Authors' Affiliations: ¹Department of General Surgery, ²Department of Pathology, The Third Affiliated Hospital, Southern Medical University, Guangzhou, Guangdong 510630, P. R. China.

Corresponding Author: Shuang Li, Department of General Surgery, The Third Affiliated Hospital, Southern Medical University, No.183 Zhongshan Street, Guangzhou, Guangdong 510630, P. R. China. Tel/Fax: +86-20-62784433; Email: littlemermaid0302@yahoo.com.cn.

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position (upper inner quadrant) that measured 5.0 cm in width and 4.0 cm in height. There was no tethering of the skin or peau d' orange, and there were no enlarged lymph nodes in the axillary region. The opposite breast and the axilla were normal. Hematological investigation results were within normal limits, and chest X-ray, electrocardiogram showed the heart and lung functions were normal. A large mass was also noted in the mid-lower right part of the abdomen. Clinical diagnosis of the right breast mass and abdominal mass was ambiguous.

Ultrasound scan of the breast showed a hypoechoic area measuring approximately 28 cm in anteroposterior diameter in the upper half of right breast. Meanwhile, it was demonstrated that a relatively circumscribed complex echoic mass with posterior enhancement and uneven density and abundant vessels existed in this area. Calcifications were found focusing in the breast lesion, and several axillary lymph nodes were highly suspicious of metastasis. There were no other focal lesions noted on the scan. Mammography demonstrated an increased density with smooth contour corresponding to the palpable mass. The patient had also undergone an initial computed tomography scan, which revealed a spherical multicystic mass in the right abdomen that measured 259 mm in length, 170 mm in width, and 106 mm in height.

Fine-needle aspiration cytology and intraoperative frozen sections demonstrated and confirmed the malignancy of the mass in the right breast as infiltrating ductal carcinoma (IDC). Upon review of the biopsy specimen from the breast tissue at a multidisciplinary meeting, the diagnosis was reclassified as granulocytic sarcoma.

The patient underwent modified radical mastectomy of the right breast and laparoscopic excision of the abdominal mass in the lower right quadrant 15 days after gynecology consultation. The histology of both lesions was reviewed. No residual tumor was found in the surgical margin of the breast specimen. Having undergone 6 courses of chemotherapy, the patient is now under follow-up, and she has no relapsed disease.

Histological findings

Gross pathologic examination of the right breast specimen revealed a tumor that measured 4.5 cm in length, 3.0 cm in width, and 3.0 cm in height. A gray nodule was seen on gross section with punctiform necrosis. Microscopically, the right breast tumor exhibited a biphasic pattern consisting of epithelial and mesenchymal components of carcinosarcoma. The epithelial components were formed by poorly differentiated carcinoma that exhibited glandular tubiform and screen-form or nest-form patterns. The mesen-

chymal components contained connective tissue cells, spindle cells, osteoblastic cells, and bone matrix. Mesenchymal fibrous tissue was hyperplastic, and some mesenchymal cells had obvious heteromorphism. Cell nuclei were large and undergoing anachromasis. Mitotic activity within these cells was extremely high (Figure 1). Bone matrix was present outside of these cells in some areas. No metastasis was found in 25 lymph nodes.

Gross pathologic examination of the mass from the lower right quadrant of the abdomen showed a tumor measuring 14.0 cm in length, 12.0 cm in width, and 7.0 cm in height with gray capsule wall. The thickness of the capsule wall was 0.2–0.5 cm. Fatty tissues and hairs were prevalent in the tumor. Microscopically, the capsule wall contained squamous epithelium. Skin appendages such as sweat and sebaceous glands were found under the epithelium. There were also some ovarian tissues. Keratinized tissues, which were stained in red, were apparent in the capsular space (Figure 2).

Immunohistochemical findings

Immunohistochemical studies of the breast tumor showed that the epithelial components were positive for c-erbB2 but negative for estrogen receptor (ER), progesterone receptor (PR), vimentin, and cytokeratin 5/6 (CK5/6). In contrast, the mesenchymal components were positive for vimentin and negative for ER, PR, and c-erbB2. In addition, epithelial membrane antigen (EMA), smooth muscle antigen (SMA), S-100 protein, and P63 were not expressed in either the epithelial or mesenchymal component of the breast tumor (Figure 3).

Discussion

Metaplastic carcinoma of the breast, a malignant sarcomatous metaplasia of epithelial carcinoma, is a rare tumor that accounts for 0.08%–0.2% of all malignant breast tumors. The macroscopic appearance of these tumors is determined by a variety of possible components. The epithelial components may be formed by undifferentiated carcinoma, adenocarcinoma, carcinoma *in situ*, infiltrative ductal carcinoma or squamous carcinoma, whereas the mesenchymal components may contain connective tissue cells, fibroblastic, chondroblastic, and osteoblastic cells. The epithelial components display a positive staining for epithelial antigens such as Kermix, keratin, and CAM5.2, whereas the mesenchymal components may stain positive with actin, vimentin, or S-100 protein. Hormone receptors and c-erbB2 are usually negative^[5]. Tumor size, differentiation, high histological grade, atypia, and active pleomorphic spindle cells all play a role in

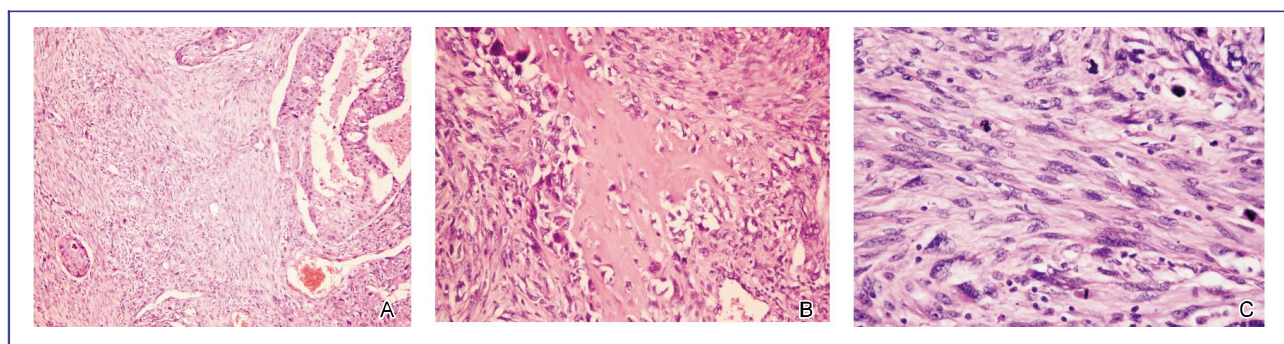


Figure 1. Histological examinations of the right breast tumor. A, epithelial and mesenchymal components of carcinosarcoma are shown together and cancer nests are observed (HE ×40); B, the bone matrix can be seen among atypical cells (HE ×200); C, atypical cells are apparent (HE ×400).

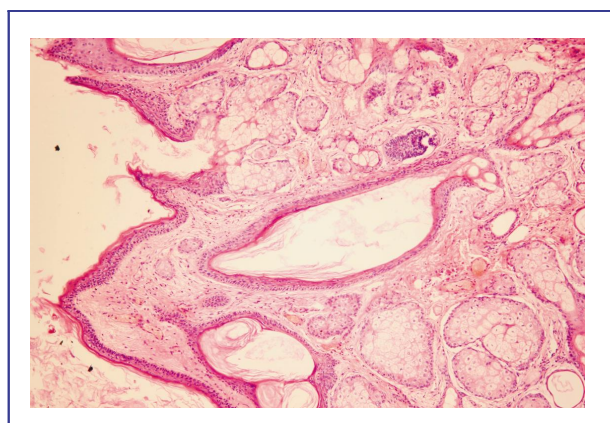


Figure 2. The histological image of the ovarian teratoma. The tumor is consisted of diverse mature tissues, including skin and cutaneous appendages (HE ×40).

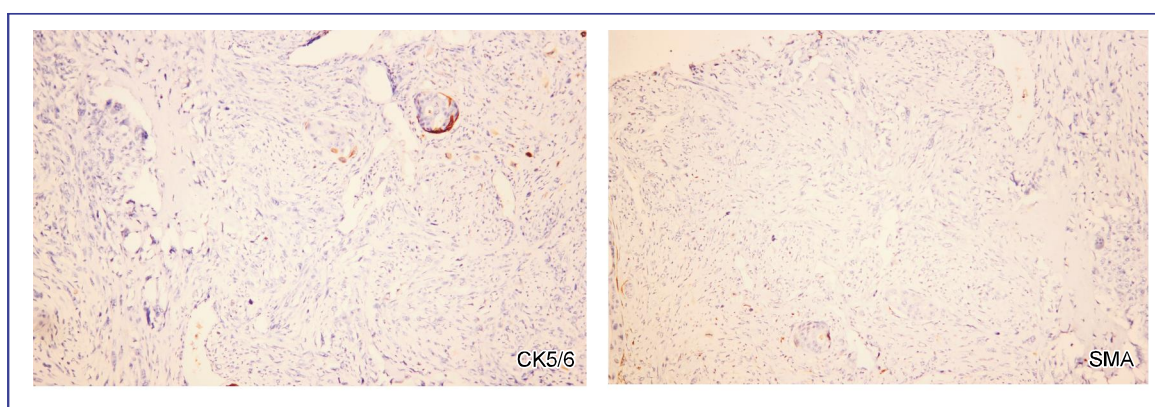


Figure 3. Immunohistochemistry of the right breast tumor. The myoepithelial cells around the cancer nest disappeared. Cytokeratin 5/6 (CK5/6) and smooth muscle actin (SMA) are negative in the tumor (HE ×40).

prognosis^[6]. Overall, carcinosarcomas generally have a poor prognosis, most likely because they tend to be poorly differentiated. In the case reported here, the histological outcome showed the epithelial components was formed by poorly differentiated infiltrating ductal

carcinoma and the mesenchymal components contained fibrosarcoma and osteosarcoma.

In addition to its histopathologic features, metaplastic carcinoma of the breast also has clinical features distinct from ductal carcinoma of the breast, including relatively

large size at diagnosis, infrequent expression of hormone receptors, low incidence of axillary nodal involvement than typical breast carcinoma of similar size, and high rate of extra nodal metastasis^[7,8]. Axillary lymph nodes of patients with metaplastic carcinoma of the breast are reportedly less frequently involved. Metaplastic carcinoma of the breast behaves differently from carcinoma or sarcoma of the breast, with a worse prognosis than classical breast carcinoma. Although it presents more commonly as node-negative disease, metaplastic carcinoma of the breast has a generally poor outcome, with a high risk of recurrence^[9]. Patients with metaplastic carcinoma of the breast usually do not benefit from conventional chemotherapy or hormone therapy^[10]. Despite these distinct clinicopathologic features, the genetic basis for the recognition of metaplastic carcinoma of the breast as a discrete subtype of breast cancer distinct from ductal carcinoma of the breast is still lacking. Moreover, the molecular alterations of metaplastic carcinoma of the breast, critical for understanding the pathology of this cancer, have not yet been explored. Many features of metaplastic carcinoma of the breast, including large tumor size, lack of nodal involvement, advanced stage, and triple negative phenotype^[11], were partly observed in our patient. The above similar features have been documented in other published series of patients with metaplastic carcinoma of the breast^[10,12-14]. However, the latter two features were not observed in this case. The majority of published case series have demonstrated a worse prognosis for metaplastic carcinoma of the breast compared to infiltrating ductal carcinoma, with 3-year overall survival rates of 48%–71% and 3-year disease-free survival rates of 15%–60%^[11,12,14].

Most patients with metaplastic carcinoma of the breast are treated with surgery, with mastectomy more common than breast-conserving surgery presumably because of the large tumor size at presentation^[10,12-14].

Standard breast cancer chemotherapeutic regimens have been routinely used in treating metaplastic carcinoma of the breast, though there is little data to show improved outcome with this approach^[11-13]. As in soft tissue sarcomas, metaplastic carcinoma of the breast shows a tendency for local recurrence and for hematogenous spread to the lungs, liver, and bone^[10,12,14]. Based on the sarcomatous characteristics of metaplastic carcinoma of the breast, Gutman *et al.*^[12] suggested that a sarcoma-directed therapy may be more efficacious. Several other published case series have called for innovative chemotherapeutic regimens for metaplastic carcinoma of the breast^[10,12,14].

Another study identified 5-year overall survival rates at stages I, II, III, and IV as 73%, 59%, 44%, and 0%, respectively^[15]. Our case was diagnosed as T2N0M0 (stage II) histologically. The patient was recurrence- and metastasis-free in the 10th month under follow-up. The onset age of breast carcinoma is generally younger, and family history is indefinite for Chinese female patients. In the patient described herein, we found a simultaneous giant abdominal mass. No similar case has been reported before. The relationship between the mass of the right breast and the mass of the abdomen was initially considered primary and metastatic tumor, respectively. However, surgery and post-surgical histological examination revealed that the two masses were not related. Presently, the direct relationship between the breast carcinosarcoma and the ovarian teratoma in the abdomen remains unknown; however, the research on the relationship between these two diseases will conduce to in-depth understand of metaplastic carcinoma of the breast and promote the early diagnosis on similar cases.

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