Case Report

Rare Metastatic Pattern: Serous Ovarian Carcinoma Mimicking Primary Breast Cancer – Two Case Reports

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ABSTRACT

Background

High-grade serous ovarian carcinoma (HGSOC) is the most aggressive and most common subtype of epithelial ovarian cancer (OC). Metastases to the breast from malignant neoplasms of other origins are extremely rare, accounting for only 0.5–2% of all breast cancer cases. The metastatic spread of HGSOC to the breast is exceptionally uncommon, representing only 0.07% of all ovarian cancer metastases. Objective is to analyze the clinical characteristics, diagnostic methods, treatment strategies, and outcomes of rare cases of HGSOC metastasizing to the breast.

Case presentation

The study describes two rare cases of HGSOC metastasizing to the breast, recorded in 2024 at the Almaty Oncology Center. Immunohistochemical (IHC) tissue analysis played a key role in diagnosis. In one case, a 57-year-old patient responded well to treatment, which included neoadjuvant chemotherapy, subtotal mastectomy, and adjuvant targeted therapy. CA-125 levels normalized, and PET imaging showed no metabolically active lesions. In contrast, a 52-year-old patient with HGSOC metastases to the breast and peritoneal carcinomatosis experienced disease progression despite undergoing segmental mastectomy, laparoscopic biopsy, and palliative therapy, leading to death two months after diagnosis.

Conclusion

Timely diagnosis using advanced imaging techniques and IHC, along with a multidisciplinary approach, are key factors in improving clinical outcomes. This study presented two clinical cases of HGSOC metastasizing to the breast. In the first case, early diagnosis and a comprehensive treatment approach stabilized the patient's condition, leading to the absence of detectable tumor activity. In contrast, delayed diagnosis and rapid disease progression in the second case resulted in a poor outcome.

Keywords

ovarian cancer;metastases; breast cancer; diagnosis; chemotherapy.

INTRODUCTION

High-grade serous ovarian carcinoma (HGSOC) is the most aggressive and frequently occurring subtype of epithelial ovarian cancer (OC)[1-3]. The disease is characterized by a high propensity for spreading to the peritoneal cavity, lymph nodes, and other organs[4]. The breast can become a site of secondary damage during metastasis

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of tumors originating from other organs. The most common primary sources of such metastases are malignant melanoma, sarcomas of various localizations, lung cancer, ovarian tumors, renal cell carcinoma and thyroid carcinoma [5]. Metastases to the breast from malignant neoplasms of other origins are extremely rare, accounting for only 0.5–2% of all breast cancer cases[6-9]. HGSOC metastasizing to the breast is exceptionally uncommon, representing only 0.07% of all ovarian cancer metastases[10]. Breast metastases pose significant diagnostic challenges, as they can mimic primary breast carcinoma. The average survival time for patients with such metastases is approximately 16 months[11,12]. Diagnosis is further complicated by nonspecific symptoms and often late detection, worsening the prognosis. This study describes two clinical cases illustrating different approaches to the diagnosis and treatment of HGSOC with breast metastases.

Case presentation:

Case 1: Favorable prognosis. A 57-year-old patient presented with complaints of weakness and the detection of a breast mass during routine screening. Diagnostic procedures included mammography performed in December 2023, which revealed a lesion in the left breast (BI-RADS V) and axillary lymphadenopathy. Breast ultrasound (US) on January 3, 2024, confirmed the presence of a nodular mass and suspected metastases in the axillary lymph nodes (BI-RADS IV/VI).

A biopsy performed in January 2024 indicated infiltrating grade 3 breast carcinoma. Immunohistochemical analysis showed positive markers for WT1, PAX8, and CK7, while GATA3, GCDFP15, Her2neu, and p40 were negative, leading to the conclusion of metastatic high-grade serous ovarian carcinoma (Figure 1).

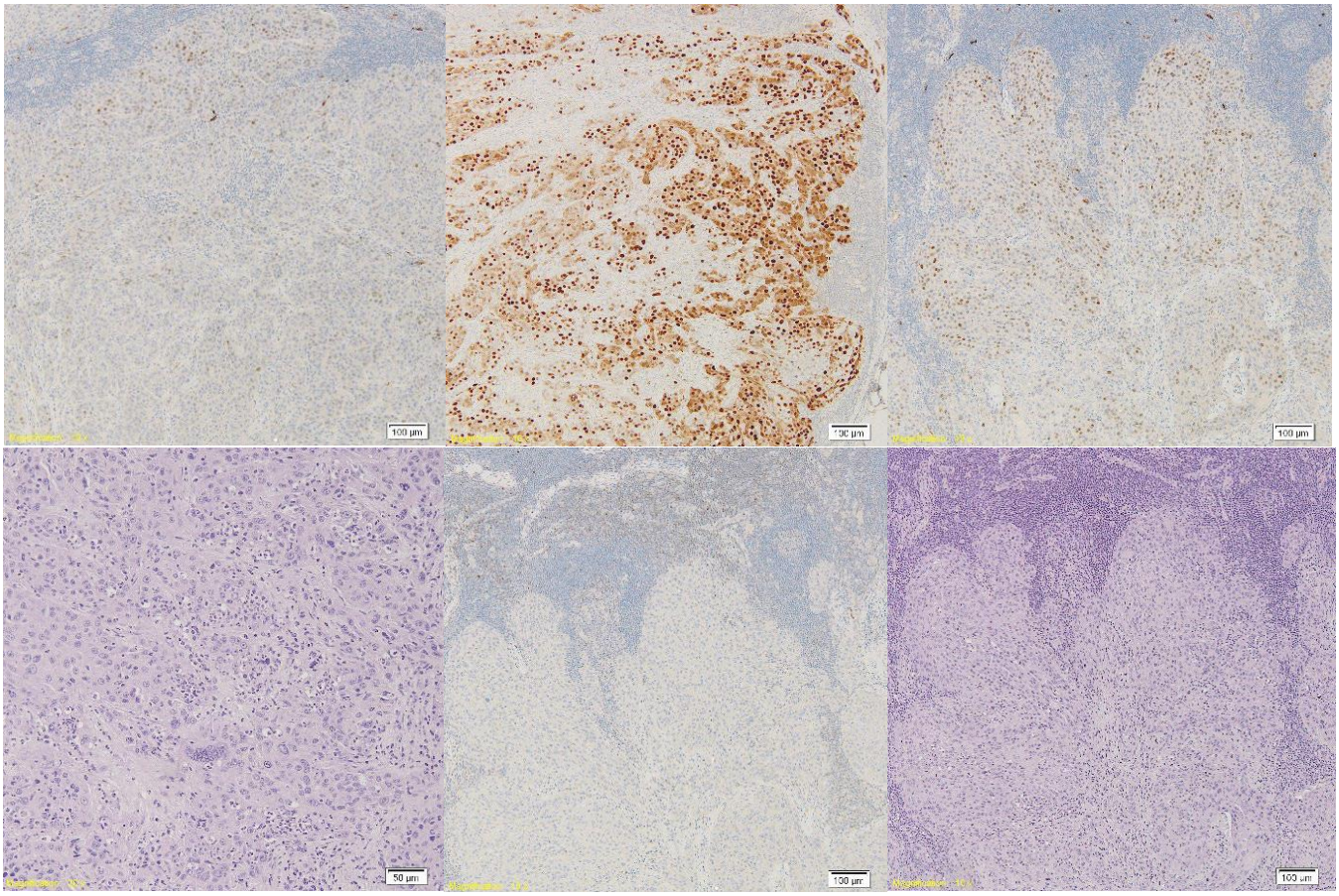

Figure 1. Immunohistochemical analysis showing positive markers WT1, PAX8, and CK7.

Computed tomography (CT) and positron emission tomography/CT (PET/CT) performed between December 2023 and April 2024 revealed lymph node involvement in the abdominal and thoracic cavities, as well as cystic changes in the ovaries. PET/CT showed a reduction in metabolic activity

following chemotherapy, with no metabolically active lesions detected. The tumor marker CA-125 level decreased from 75.82 U/mL to 7.87 U/mL after treatment.

The treatment regimen included four cycles of neoadjuvant chemotherapy with carboplatin (AUC 5) and paclitaxel (175 mg/m²), administered from January to April 2024 to reduce tumor burden. In May 2024, the patient underwent subtotal mastectomy with lymph node dissection. From June to August 2024, adjuvant chemotherapy (three cycles) was administered, supplemented with bevacizumab (anti-VEGF targeted therapy). In August 2024, the patient underwent gynecological surgery, including hysterectomy with adnexectomy and omentectomy. Histological examination confirmed the presence of a serous cystadenofibroma with focal high-grade carcinoma.

The treatment results demonstrated positive dynamics. Follow-up PET/CT in September 2024 showed no metabolically active lesions. The CA-125 tumor marker level was within the normal range, and the patient's overall condition was assessed as satisfactory (ECOG 0) (Figure 2).

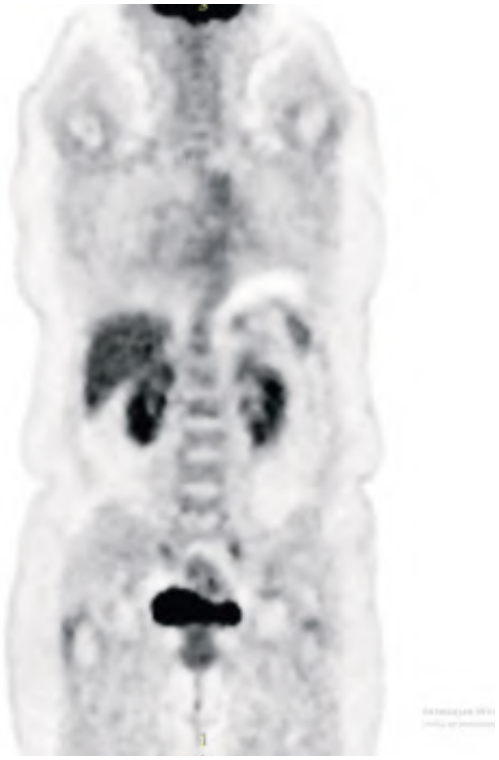

Figure 2. PET/CT scan showing no metabolically active lesions detected.

The patient remains under regular dynamic observation. As part of maintenance therapy, outpatient administration of bevacizumab is planned to prevent disease recurrence. Periodic follow-up examinations, including PET/CT scans and monitoring of the CA-125 tumor marker, will be conducted every 3–6 months.

Case 2: Unfavorable outcome. A 52-year-old patient presented with complaints of abdominal bloating and severe weakness that had persisted for a month. Her initial consultation in September 2024 was accompanied by abdominal discomfort and general weakness. An abdominal ultrasound revealed significant ovarian enlargement and the presence of ascitic fluid, prompting referral to a specialized clinic for further evaluation.

Comprehensive diagnostics conducted between September 13 and 18, 2024, included magnetic resonance imaging (MRI) of the pelvis and abdomen. The MRI performed on September 13 revealed large cystic masses in both ovaries with signs of peritoneal carcinomatosis, including involvement of the parametrial and pararectal peritoneum. Additionally, free fluid (ascites) was detected in the abdominal cavity, along with a small uterine fibroid (Figure 3).

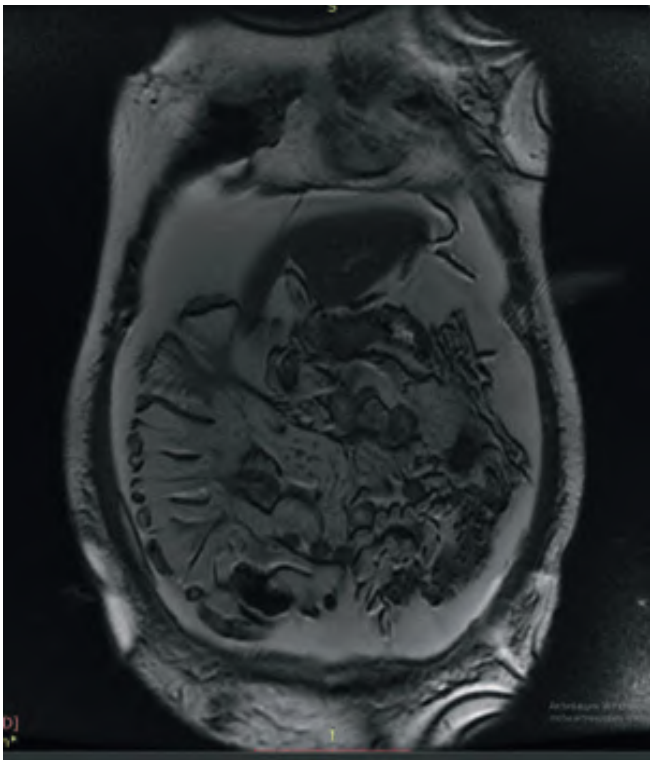

Figure 3. MRI of the abdomen and pelvic organs showing cystic masses in both ovaries with signs of peritoneal carcinomatosis.

CT scan of the chest performed on September 13, 2024, revealed mediastinal lymphadenopathy, focal pneumofibrosis, and signs of chronic bronchitis. No acute lung inflammation was detected. Breast ultrasound on September 26, 2024, identified a lesion in the left breast classified as BI-RADS IV, suggesting malignancy, along with enlargement of the left axillary lymph nodes. A follow-up ultrasound on October 1, 2024, confirmed the presence of a BI-RADS IV lesion in the breast and suspected metastatic involvement of the axillary lymph nodes.

Laboratory tests showed a significant increase in the CA-125 tumor marker level to 1,239.0 U/mL, far exceeding the normal range and suggesting an epithelial origin of the tumor. On September 18, 2024, the case was reviewed by a multidisciplinary team, which confirmed the diagnosis of ovarian carcinoma with breast metastases. Surgical treatment followed by systemic therapy was recommended.

The patient was hospitalized on September 25, 2024, for preoperative preparation. Comprehensive diagnostic and laboratory evaluations were performed, including general condition assessment, blood tests, and coagulogram. On October 1, 2024, a segmental mastectomy of the left breast with sentinel lymph node biopsy was performed, revealing tumor cells in 5 out of 6 nodes. Laparoscopic biopsy confirmed the presence of micropapillary ovarian carcinoma with metastases to the lymph nodes, omentum, and breast tissue. Immunohistochemical analysis identified positive markers WT1, PAX8, and CK7, confirming the diagnosis of metastatic high-grade serous ovarian carcinoma (Figure 4).

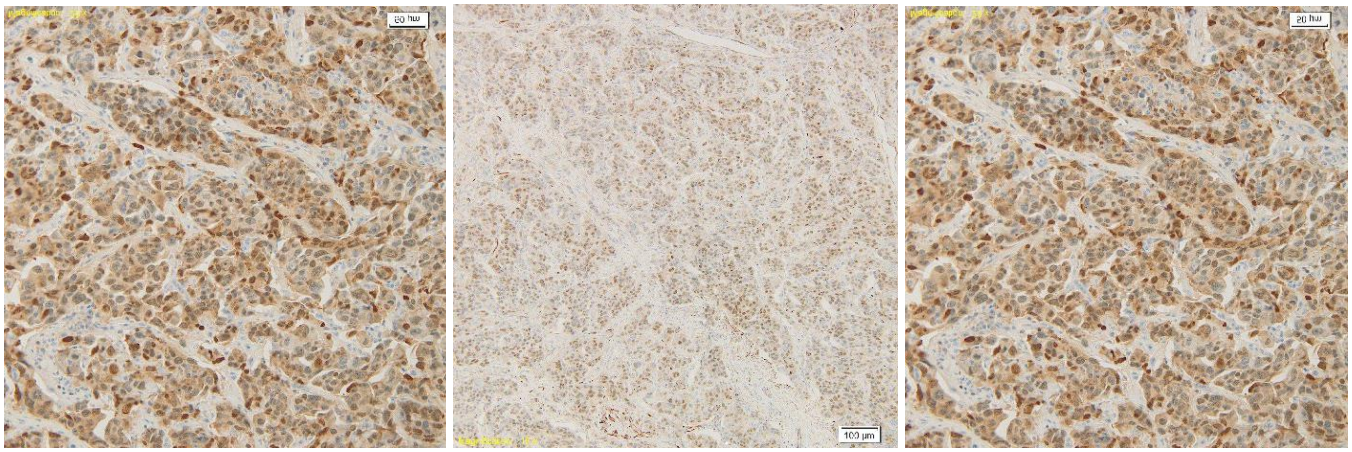

Figure 4. Immunohistochemical analysis showing positive markers WT1, PAX8, and CK7.

Based on the multidisciplinary team discussion on October 14, 2024, chemotherapy with carboplatin and paclitaxel combined with targeted therapy using bevacizumab was recommended. However, the deterioration of the patient's overall condition after surgery prevented the initiation of systemic therapy.

Palliative care was administered, including ascites management, pain relief, and symptomatic treatment. Despite these efforts, the patient's condition continued to decline. Rapid disease progression, peritoneal carcinomatosis, and breast metastases ultimately led to a fatal outcome two months after diagnosis.

DISCUSSION

Metastases to the breast from other organs are extremely rare, accounting for less than 2% of all breast tumors [12,13]. The metastasis of high-grade serous ovarian carcinoma (HGSOC) to the breast is even more uncommon [14]. A major diagnostic challenge lies in the clinical and imaging similarities between metastatic lesions and primary breast carcinoma, making it difficult to determine the true origin of the tumor.

Immunohistochemical (IHC) analysis plays a crucial role in differential diagnosis. Tumors of Müllerian origin can be identified through the expression of WT1 and PAX8 markers [15-17,27,28]. In contrast, GATA3 and GCDFP15 markers indicate a primary breast carcinoma [18,19,29-31]. These IHC findings help determine the tumor's primary source and guide personalized treatment strategies. A multidisciplinary approach involving

oncologists, gynecologists, and breast specialists ensures effective treatment planning and improves clinical outcomes [20-26].

The prognosis largely depends on the stage at diagnosis and the patient's overall condition. In the first case, early diagnosis and a comprehensive treatment strategy—including chemotherapy and targeted therapy—led to partial tumor regression and disease stabilization. In contrast, in the second case, late diagnosis and rapid disease progression severely limited therapeutic options, resulting in a fatal outcome despite surgical interventions.

Thus, integrating modern diagnostic and treatment technologies, along with multidisciplinary team involvement, is essential for improving medical care for patients with rare metastatic patterns.

CONCLUSION

HGSOC metastasis to the breast is a rare yet highly aggressive disease manifestation. The first clinical case demonstrated how timely diagnosis and a multimodal treatment approach—including chemotherapy, targeted therapy, and surgery—can lead to partial tumor regression and patient stabilization. The second case highlighted the challenges associated with late diagnosis, where rapid disease progression rendered comprehensive treatment unfeasible.

To enhance survival and clinical outcomes in patients with similar conditions, it is necessary to expand and improve screening programs to enable regular monitoring and early cancer detection. Additionally, raising awareness among healthcare professionals about rare metastatic patterns and their diagnostic features is crucial. The development and implementation of personalized treatment strategies, particularly for advanced-stage disease, are also imperative.

These clinical observations underscore the importance of a multidisciplinary approach in diagnosing and treating metastatic HGSOC. Such an approach allows for a more accurate diagnosis, the selection of optimal treatment strategies, and, when detected early, a better prognosis for patients.

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