

Case Report

Cutaneous malignant melanoma with ovarian and intracranial metastases: a case report

Fei Yu, Jun Yang, Lifang Lan, Wenjuan Yi

Department of Gynecology, Liuzhou People's Hospital, Liuzhou 545006, Guangxi, China

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Abstract: Cutaneous malignant melanoma is an aggressive malignancy with a high metastatic potential, and although ovarian metastasis is extremely rare, it may be easily overlooked or misdiagnosed due to its nonspecific clinical manifestations. Here, we report a rare case of bilateral ovarian metastases from cutaneous malignant melanoma in a 51-year-old female patient who presented with abdominal pain one year after surgical resection of the primary skin lesion. Pelvic imaging revealed bilateral ovarian masses measuring 12 × 10 cm on the left side and 10 × 9 cm on the right side. The patient subsequently underwent total hysterectomy, bilateral adnexectomy, and resection of the greater omentum. Histopathological examination combined with immunohistochemical staining confirmed metastatic malignant melanoma of the ovaries, with tumor cells showing positive expression of SOX10, HMB45, and Melan-A. Molecular analysis revealed a BRAF mutation, and subsequent magnetic resonance imaging demonstrated multiple brain metastases. The patient was treated with whole-brain radiotherapy combined with vemurafenib-targeted therapy.

Keywords: Malignant melanoma, ovary, metastasis, diagnosis, case report

Introduction

Malignant melanoma (MM) is an aggressive neoplasm originating from melanocytes, most commonly arising in the skin. Although MM accounts for a relatively small proportion of cutaneous cancers, it has a high potential for early hematogenous and lymphatic dissemination, resulting in poor outcomes, particularly in patients with advanced disease [1]. The most common sites of distant metastasis include the lymph nodes, lungs, liver, central nervous system, gastrointestinal tract, and skin or subcutaneous tissues [2]. Ovarian metastasis from malignant melanoma is exceptionally rare and generally results from hematogenous dissemination from cutaneous or other primary sites. In contrast, primary ovarian melanoma is extremely uncommon and most frequently arises within mature cystic teratomas [3]. Diagnosing ovarian metastatic melanoma remains challenging because conventional imaging modalities, including computed tomography (CT) and magnetic resonance imaging (MRI), often lack sufficient specificity. Histopathological

examination combined with immunohistochemical evaluation is therefore essential for establishing a definitive diagnosis. Herein, we report a rare case of cutaneous malignant melanoma with ovarian metastasis and multiple brain metastases.

Case presentation

A 51-year-old Asian woman presented to our hospital in February 2025 with lower abdominal pain. Physical examination revealed mild lower abdominal tenderness and palpable bilateral adnexal masses, with no other significant findings. Her past medical history was unremarkable, and she had no family history of malignancy. Pelvic ultrasonography showed pelvic fluid collection and bilateral solid adnexal masses, categorized as O-RADS 5, highly suspicious for ovarian malignancy. Laboratory tests revealed elevated tumor markers: carbohydrate antigen 19-9 (CA19-9) at 28.09 U/mL and carbohydrate antigen 125 (CA125) at 62.40 U/mL. Pelvic MRI further revealed multiple masses in the lower abdominal and pelvic regions,

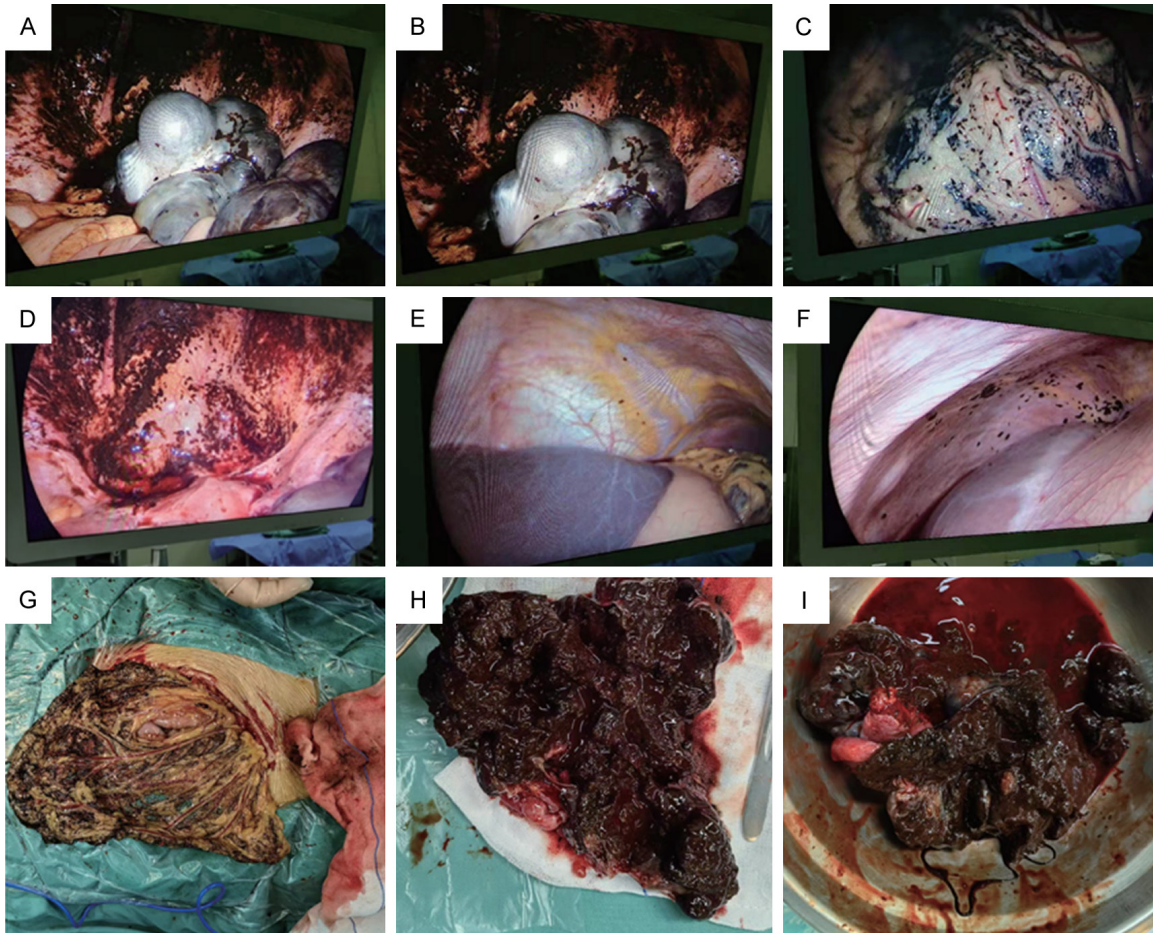


Figure 1. Intra-operative findings. A. Enlarged left ovarian lesion with blue-purple discoloration; B. Right ovarian lesion with smooth, bosselated surface; C. Grossly involved greater omentum with black punctate deposits; D. Bladder peritoneum studded with pigmented metastatic nodules; E. Right upper abdomen; F. Left upper abdominal peritoneal metastases; G. Surgically resected greater omentum showing hemorrhagic necrosis; H. Gross specimen of the left ovary with irregular surface and dark brown viscous fluid upon incision; I. Gross specimen of the right ovary with irregular surface and dark brown viscous fluid upon incision.

raising suspicion of advanced ovarian malignancy. Ethical approval was granted by the Liuzhou People's Hospital Ethics Committee. The patient provided written informed consent.

For definitive diagnosis, laparoscopy was performed on February 7, 2025. Intraoperative findings revealed diffuse peritoneal involvement. Scattered chocolate-colored and black pigmented lesions were observed throughout the abdominal cavity, involving the intestinal tract, mesentery, greater omentum, abdominal wall, uterine serosa, fallopian tubes, ovarian surfaces, and the peritoneum over the liver and bladder. The left ovarian tumor, measuring approximately 12 × 10 cm, had an irregular sur-

face with blue-purple discoloration and a 4 × 3 cm rupture site oozing dark brown viscous fluid. The right ovarian tumor measured about 10 × 9 cm, with a smooth but bosselated surface and blue-purple discoloration. After obtaining written informed consent, we converted to laparotomy and performed transabdominal extrafascial hysterectomy, bilateral salpingo-oophorectomy, and omentectomy (**Figure 1**).

The surgical procedure proceeded smoothly. Microscopic examination of bilateral ovarian tumors showed nests of atypical cells with large, hyperchromatic nuclei. Mitotic figures were readily apparent, along with patchy necrosis and hemorrhage. Inflammatory cell infiltration was observed in the interstitium. Immuno-

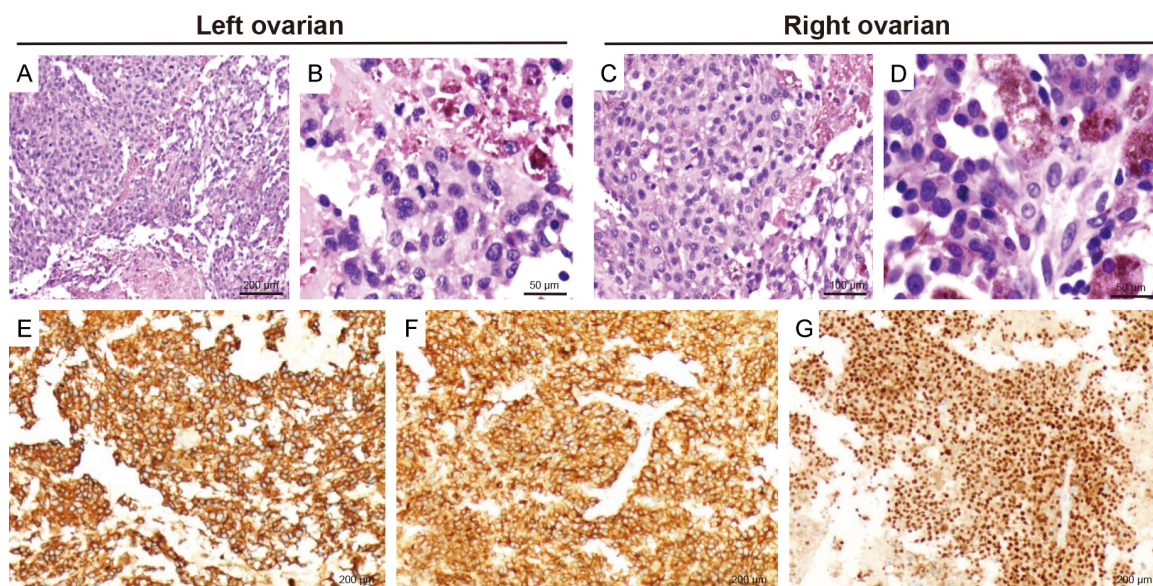


Figure 2. Histopathological and immunohistochemical confirmation of ovarian metastatic melanoma. (A, B) Hematoxylin-eosin (HE) staining of left (A, $\times 100$; B, $\times 400$) and right (C, $\times 200$; D, $\times 400$) ovarian lesions, showing nests of atypical epithelioid cells with large, hyperchromatic nuclei and prominent nucleoli. (E-G). Immunohistochemical staining demonstrating diffuse positivity for melanoma-specific markers HMB45 (E, $\times 100$), MelanA (F, $\times 100$), and SOX10 (G, $\times 100$).

histochemistry showed positivity for HMB45, Melan-A, SOX10, CD10, and Ki-67 (**Figure 2**), while CK, SF-1, SALL4, ER, and CD68 were negative. The postoperative diagnosis was metastatic malignant melanoma to the ovary.

Given that malignant melanoma typically arises in the skin, the ovarian involvement raised suspicion of an occult primary skin lesion. Upon detailed inquiry and medical history review, we found that she had undergone excision of a primary melanoma on the left lower limb at another hospital in February 2024. Post-operative pathology confirmed the diagnosis of malignant melanoma.

Subsequent PET-CT demonstrated multiple intracranial lesions without significant hypermetabolic activity. Contrast-enhanced MRI revealed multiple well-defined nodular lesions in the frontal and parietal lobes, characterized by marked T1 hyperintensity and heterogeneous enhancement. Given the patient's history of cutaneous melanoma and typical MRI features, these lesions were radiologically consistent with melanoma brain metastases. The patient completed whole-brain radiotherapy (30 Gy in 10 fractions) and 6 cycles of vemurafenib-targeted therapy, which she tolerated well. At the last follow-up on August 15, 2025, contrast-

enhanced MRI revealed stable intracranial metastases without new lesions, and serum tumor markers had normalized. She remains under regular clinical surveillance with no evidence of disease progression.

Discussion

Malignant melanoma is an extremely rare and highly invasive neoplasm. Typically, the primary tumor is situated in the skin, particularly on the extremities, and rarely from mucosa, uveal tract, or even the ovary [1]. The most frequent metastatic sites of malignant melanoma are regional and non-regional lymph nodes. Approximately 20% of the initial metastatic sites involve visceral metastases, predominantly in the liver, brain, bone, and lungs, while ovarian metastasis is uncommon [4].

Ovarian metastasis typically occurs several years after the initial diagnosis of malignant melanoma, with a median interval of approximately 7 years [5]. In our patient, ovarian and brain metastases developed within 1 year of the primary diagnosis. Further inquiry revealed that the patient did not receive adjuvant therapy after primary resection, which may explain the rapid progression and metastasis. This case presented with bilateral ovarian masses,

whereas most previously reported cases have described unilateral ovarian involvement [6]. Clinically, most patients with ovarian metastasis from melanoma present with abdominal pain [5, 6], although some patients may be asymptomatic [7]. In the present case, abdominal pain and the detection of an ovarian mass were the initial manifestations. Preoperative laparoscopy and intraoperative frozen section initially suggested an ovarian chocolate cyst. In most cases, the diagnosis is made postoperatively, as tumor markers are nonspecific. Imaging modalities such as ultrasound and CT are often insufficient to accurately determine the nature of the lesion, whereas MRI can provide more characteristic findings, particularly high signal intensity on T1-weighted images.

Pathological diagnosis poses challenges as malignant melanoma can display diverse morphological features. Immunohistochemical staining can aid in confirming the diagnosis, particularly when tumor differentiation is unclear or metastasis occurs. S100 was among the earliest proteins identified as a highly sensitive marker for melanocytes. Subsequently, additional markers such as HMB45, Melan A, MITF, SOX10, and tyrosinase have been increasingly utilized in melanoma diagnosis [8]. Postoperative pathological and immunohistochemical examinations revealed positive expression of SOX10, HMB45, and Melan-A in the bilateral ovarian lesions, confirming the diagnosis of ovarian metastasis from malignant melanoma. Further history-taking confirmed a prior lower-extremity tumor resection. Clinicians should specifically inquire about previous skin or soft tissue surgeries, as such information is critical for diagnosing ovarian lesions.

The overall prognosis for patients with ovarian metastasis from melanoma remains unfavorable. The 5-year survival rate is below 10%, and median survival ranges from 6 to 12 months [6]. Currently, surgery remains the primary treatment for this disease. However, achieving optimal cytoreduction is often challenging, and no standardized adjuvant therapy exists [9]. The advent of BRAF/MEK-targeted therapies has significantly advanced adjuvant treatment. Studies suggest that for patients with BRAF V600E-mutant melanoma, upfront targeted therapy may improve outcomes [10]. The patient tested positive for BRAF mutation and

received vemurafenib-based targeted therapy. Multiple intracranial metastases were detected, but the patient had no neurological symptoms such as dizziness, headache, or blurred vision. For intracranial lesions, whole-brain radiotherapy remains an effective option and was therefore administered, rather than stereotactic radiosurgery.

In summary, metastatic melanoma to the ovarian has a worse prognosis than most primary ovarian cancers. Ovarian involvement generally results from skin metastasis. Medical history collection, particularly the history of skin surgery, should be enhanced. Identification of intraoperative gross specimens and intraoperative rapid pathology should be strengthened. Improved awareness of this entity is needed to decrease the misdiagnosis rate.

Disclosure of conflict of interest

None.

Address correspondence to: Wenjuan Yi, Department of Gynecology, Liuzhou People's Hospital, No. 8 Wenchang Road, Liuzhou 545006, Guangxi, China. Tel: +86-0772-2663161; E-mail: yiwenjuan2026@126.com

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