

[ CASE REPORT ]

## A Metastatic Gastric Tumor from Ovarian Cancer

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### Abstract:

Gastric metastasis from ovarian cancer has rarely been reported. We herein report the case of a 64-year-old woman with gastric metastasis from ovarian cancer that was diagnosed as surgical stage IA. Diagnostic and staging laparotomy showed mucinous carcinoma of the right ovary. At one month after surgery, bone metastasis was detected via scintigraphy. On esophagogastroduodenoscopy, a 10-mm elevated lesion with ulceration on the top was seen in the stomach. The immunohistochemical analysis of biopsy specimens showed that these metastases arose from ovarian cancer. We recommend that physicians remain aware of the possibility of gastric metastasis in patients with ovarian cancer.

**Key words:** gastric metastasis, ovarian cancer, mucinous carcinoma, biopsy

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### Introduction

Although gastric metastases are uncommon, most arise from primary breast cancer, followed by melanoma and lung cancer (1). There have been few reports of gastric metastasis from ovarian cancer. This type of metastasis is extremely rare because malignant cells from the ovary usually spread through the intraperitoneal cavity (2). We herein report the first case of gastric metastasis from stage IA ovarian cancer.

### Case Report

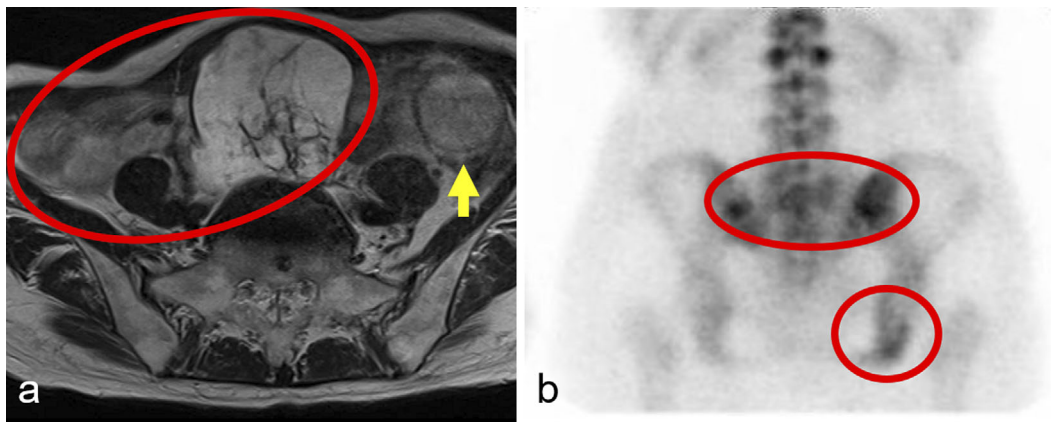
A 64-year-old woman with a history of hypertension, diabetes mellitus, and chronic renal failure (diabetic nephropathy stage V) was admitted to our hospital with bilateral ovarian tumors that had been diagnosed as mature cystic teratoma at a previous hospital. A physical examination identified anemia of the palpebral conjunctiva, with normal vital signs, leg edema, and tumor of 20 cm in size with tenderness in the lower abdomen. A laboratory examination revealed anemia, a low platelet count, and renal dysfunction

(hemoglobin, 8.0 g/dL; platelets, 17,100/ $\mu$ L; creatinine, 5.39 mg/dL; estimated glomerular filtration rate, 6.88 mL/min). Her tumor marker levels were elevated, as follows: carbohydrate antigen 19-9 (CA 19-9), 175 U/mL; carcinoembryonic antigen (CEA), 197 U/mL; carbohydrate antigen 125 (CA 125), 9 U/mL; and sialyl Tn antigen (STn), 134 U/mL. Magnetic resonance imaging (MRI) revealed cystic masses of 13 cm and 6 cm in size on the right and left ovaries, respectively, with solid components that were suspected to be malignant tumors of the ovaries (Fig. 1a). No metastasis was observed on plain chest-to-pelvic computed tomography (CT) scans or pelvic MRI; however, enhanced CT could not be performed because of renal failure. Diagnostic and staging laparotomy was performed. An intraoperative rapid pathological diagnosis revealed mucinous carcinoma of the right ovary; thus, bilateral salpingo-oophorectomy, simple hysterectomy, pelvic and para-aortic lymph node dissection, and partial omental resection were performed. Right mucinous carcinoma without lymph node metastasis and left mature cystic teratoma were histologically diagnosed. The right ovarian capsule was not ruptured. There was no metastasis or vascular/lymphatic vessel invasion. The pT1aN0M0 mucin-

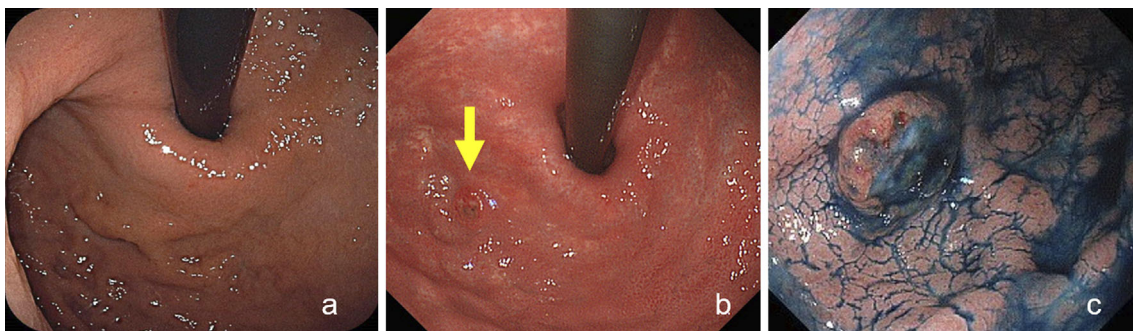
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**Figure 1.** a: Magnetic resonance imaging shows bilateral ovarian masses (red circle and yellow arrow). b: Bone scintigraphy reveals bilateral iliac and the uptake of the right sciatic nerve.



**Figure 2.** a: Esophagogastroduodenoscopy (EGD) before surgery shows no abnormality of the gastric fundus. b: EGD at one month after surgery shows an elevated lesion of 10 mm in size with ulceration at the top of the lesion in the posterior wall of the gastric fundus (yellow arrow). c: Chromoendoscopy with indigo carmine shows a submucosal tumor with ulceration at the top.

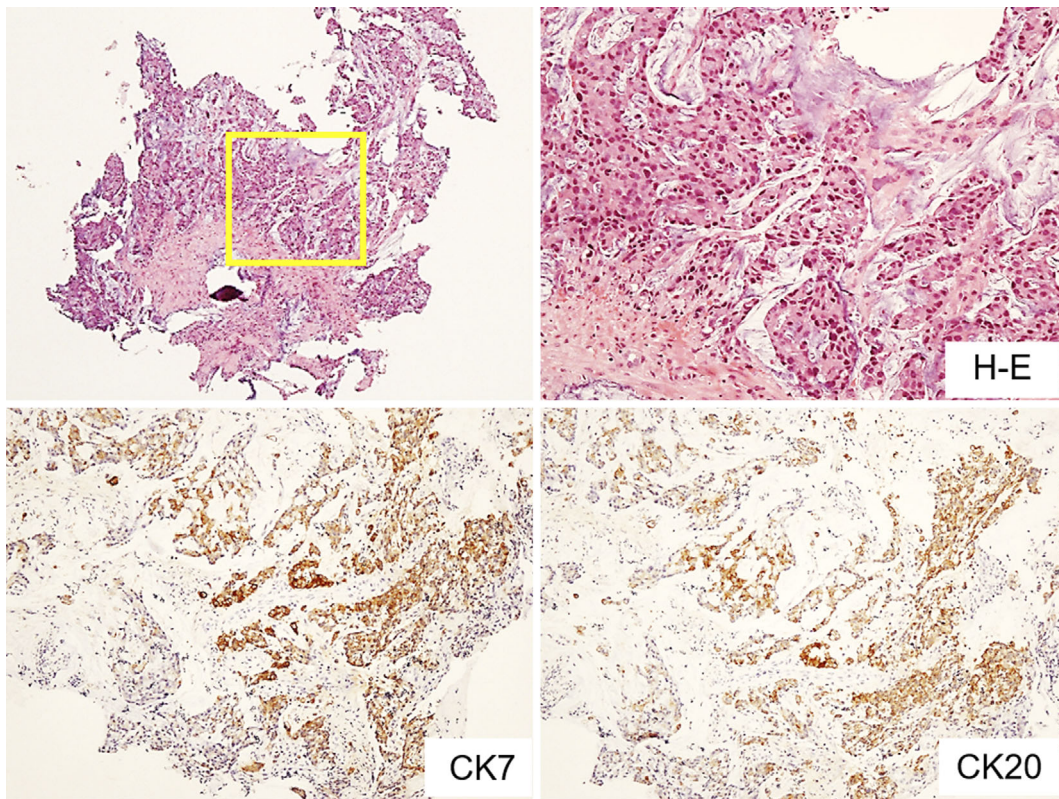
nous carcinoma (Union for International Cancer Control, 7th ed.) was diagnosed as surgical stage IA (International Federation of Gynecology and Obstetrics) ovarian cancer. Her tumor marker levels improved after surgery. At one month after surgery, the patient presented with back pain and re-elevated tumor marker levels (CA19-9, 86 U/mL; CEA, 832 U/mL; CA125, 446 U/mL; STn, 3,378 U/mL). Bone metastasis, which is atypical in ovarian cancer, was detected via scintigraphy (Fig. 1b). Esophagogastroduodenoscopy (EGD) was performed due to suspected metastasis from another primary cancer, and this revealed a 10-mm elevated lesion with ulceration at the top of the gastric fundus (Fig. 2b, c) that had not been observed 3 months earlier (Fig. 2a). CT showed no abnormal findings (including the pancreas and chest findings) and no tumors were observed in colonoscopy. Gastric and bone biopsies revealed mucinous carcinoma, and immunohistochemistry revealed that these metastases had arisen from ovarian cancer (Fig. 3). Despite the administration of additional chemotherapy, the patient died three months later.

## Discussion

Metastatic disease involving the stomach is unusual. Ac-

cording to clinical and autopsy findings, the incidence of gastric metastasis is 0.2-0.7% (1). A review by Zhou and Miao found 17 cases (1.68%) of stomach metastasis among 1,010 patients with all types of malignant tumors (3). Another series of autopsies discovered 92 cases (1.28%) of gastric metastasis among 7,165 cases with all types of malignant tumors (4). Most gastric metastases arise from primary breast cancer, followed by melanoma and lung cancer (1).

Gastric metastasis from ovarian cancer is rare, but a few cases of gastric metastasis from ovarian cancer have been reported, because ovarian cancer typically spreads along the peritoneum and throughout the pelvic and abdominal cavities (1). The most frequent locations of occult metastatic disease from ovarian cancer are the omentum, the uterus and the fallopian tubes, the lymph nodes, the abdominal peritoneum, and the pelvic peritoneum (5). Because mucinous carcinoma is rare in ovarian cancer and the prognosis is poorer than that of serous carcinoma, gastric metastasis might not be reported (6). Although most metastatic sites are similar, regardless of the histological type, clear cell and mucinous carcinomas are associated with more frequent lymph node metastasis in comparison to serous carcinoma. Hematogenous metastasis is rare in each type. There have been no re-



**Figure 3.** A histological examination of gastric biopsy samples. Immunohistochemistry revealed that the tumor cells were positive for cytokeratin (CK) 7 and 20. H-E: Hematoxylin and Eosin staining

ported cases of gastric metastasis from stage IA ovarian cancer. In malignant epithelial ovarian tumors, the tumor stage is determined by staging laparotomy. In the present case, the ovarian capsule of the cancer site did not demonstrate rupture to the peritoneum and abdominal cavity, and no distant metastasis was observed; thus, the cancer was diagnosed as surgical stage IA. However, it was undeniable that the small gastric metastatic lesion might have been detected by preoperative EGD with sufficient air insufflation, since bone metastasis was detected at one month after surgery. On the other hand, surgical intervention might have caused rapid hematogenous metastasis. Gastrointestinal involvement is usually limited to the seromuscular layer of the bowel and its mesentery. However, gastric metastasis also occurs via lymphatic channels or through the hematogenous route (1). Because the stomach receives a rich blood supply, it should be considered as a possible target organ of metastasis.

The clinical manifestations of metastasis to the stomach are nonspecific and include epigastric pain, melena, anemia, nausea, and vomiting (1). Because the most common gross appearance of gastric metastasis from ovarian cancer is a submucosal tumor (SMT) without mucosal involvement, most cases have no symptoms (4). Recently,  $^{18}\text{F}$ -fluorodeoxyglucose positron emission tomography/computed tomography ( $^{18}\text{F}$ -FDG PET/CT) has been found to be useful in the detection of such occult gastric metastases (3). The interval between treatment of the primary tumor and diagnosis of metastatic tumor in the stomach is not specified, and

ranges from 0 to 216 months, with a median of 24 months (Table). When tumor marker levels are elevated before and after surgery, such as in the present case,  $^{18}\text{F}$ -FDG PET/CT and upper gastrointestinal endoscopy should be recommended. Although the final diagnosis is easily obtained from endoscopic biopsies in over 90% of cases involving gastric metastasis from another site (1), there have only been 2 cases, including the present case, in which a diagnosis of gastric metastasis from ovarian cancer was made based on the examination of a biopsy specimen (Table). The main diagnostic method in previous cases has been surgical resection. Recently, endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) has become the most popular diagnostic method, and surgery has successfully been avoided in 5 cases that were diagnosed by this method (Table). Because the present case had an SMT with ulceration, its diagnosis by means of biopsy might have been possible. The histological examination, showed that the origin of the tumor could be diagnosed with a combination of cytokeratin 7 (CK 7) and cytokeratin 20 (CK20). The positivity of the tumor cells for CK7 and CK20 reveals that the tumor was derived from mucinous carcinoma of the ovary (Fig. 3) (7). This is the first reported case of mucinous carcinoma; the most common histological type is serous carcinoma (12/14) (Table).

The treatment for metastasis is chemotherapy to the primary tumor. In the present case, we used paclitaxel-carboplatin combination therapy to treat the ovarian mucin-

**Table. A Review of the Reported Cases of Metastatic Gastric Tumors from Ovarian Cancer.**

Patient number	Reference	Age	Tumor location	Tumor size (cm)	Gross appearance	Histological type	Stage	Diagnosis	IPM (months)	Treatment	Outcome
1	1	63	L	ND	SMT	Serous carcinoma	II	EUS-FNA	72	Surgery	ND
2	1	42	L	7	Isolated mass	Serous carcinoma	IIIC	Laparoscopy	216	Chemotherapy	Alive at 12months
3	1	55	L	3.4×3.7 1.2×0.8	SMT	Papillary serous carcinoma	IIIB	EUS-FNA	24	Chemotherapy	ND
4	1	62	U	4	Gastric ulcer	Serous carcinoma	ND	Surgery	15	Surgery	DOD at 6months
5	1	62	U	4	Ulcerated SMT	Poorly differentiated carcinoma	II	EUS-FNA	84	Surgery	Alive at 1year
6	1	49	L	2.5×2.5	SMT	Serous carcinoma	IIC	EUS-FNA	52	Chemotherapy	Alive at 18months
7	1	70	M	3.8×4.8	Ulcerated SMT	Serous carcinoma	IV	EUS-FNA	0	ND	ND
8	1	55	L	4.5×4	Ulcerated SMT	Serous carcinoma	IV	Surgery	0	Chemotherapy	Alive at 1year
9	3	61	L	2.4×3	Ulcerated SMT	Serous carcinoma	IV	Surgery	72	Surgery	Alive at 5months
10	4	73	L	6.5×6	Gastric ulcer	Serous carcinoma	IV	Biopsy	42	Chemotherapy	DOD at 7years
11	9	58	L	3.5×3	Ulcerated SMT	Serous carcinoma	IIIB	EUS-FNA	36	Chemotherapy	Alive at 3months
12	10	51	L	4.5×2.9	SMT	Papillary serous carcinoma	ND	EUS-FNA	25	ND	ND
13	11	43	U	6×3	Gastric ulcer	Serous carcinoma	IIIC	Surgery	0	Chemotherapy after surgery	Alive at 1month
Present case		64	U	1	Ulcerated SMT	Mucinous carcinoma	IA	Biopsy	3	Chemotherapy	DOD at 4months

U: upper third of the stomach, M: middle third of the stomach, L: lower third of the stomach, EUS-FNA: endoscopic ultrasound-guided fine-needle aspiration, SMT: submucosal tumor, IPM: interval between the treatment of the primary tumor and the diagnosis of metastatic tumor in the stomach, ND: not described, DOD: dead of disease

nous carcinoma. Because the presence of gastric metastasis is likely to be a pre-terminal event, the prognosis is poor, and the survival period is extremely short (1).

The average survival period after the diagnosis of gastric metastasis is 15 months (Table). In addition, mucinous carcinoma demonstrates a low response to chemotherapy (12.5-26%). Additional treatment, such as adjuvant chemotherapy is not recommended for surgical stage IA epithelial tumors other than clear cell carcinoma. The 5-year survival rate of stage I ovarian cancer is 92%, whereas the rate of lymph node metastasis in stage IA cancer is reported to be 9.3% (8). We recommend that physicians keep in mind the possibility of gastric metastasis in patients with ovarian cancer, and periodically measure their tumor marker levels. In addition, <sup>18</sup>F-FDG PET/CT and upper gastrointestinal endoscopy would be strongly recommended to detect gastric metastasis in patients whose tumor marker levels remain elevated after surgery, despite a diagnosis of stage IA ovarian cancer.

### Conclusion

We herein reported a case of gastric metastasis from ovarian mucinous carcinoma, which was diagnosed by biopsy. We recommend that physicians remain aware of the possi-

bility of gastric metastasis in patients with ovarian cancer.

**The authors state that they have no Conflict of Interest (COI).**

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