Palliative Surgery for Respiratory Failure Caused by Massive Pleural Effusion in a Patient Suffering From a Metastatic Ovarian Tumor From Colon Cancer — Pseudo-Meigs' Syndrome : A Case Report and Literature Review

RYUJIN, Keiichiro
Department of Surgery, National Hospital Organization Fukuokahigashi Medical Center

KOREHISA, Shotaro
Department of Surgery, National Hospital Organization Fukuokahigashi Medical Center

MINAMI, Yu
Department of Surgery, National Hospital Organization Fukuokahigashi Medical Center

TAKIZAWA, Katsumi
Department of Pathology, National Hospital Organization Fukuokahigashi Medical Center

他

https://doi.org/10.15017/6788685

出版情報：福岡醫學雜誌. 113 (4), pp.83-91, 2022-12-25. 福岡医学会
バージョン：
権利関係：

Case Report

Palliative Surgery for Respiratory Failure Caused by Massive Pleural Effusion in a Patient Suffering From a Metastatic Ovarian Tumor From Colon Cancer – Pseudo-Meigs' Syndrome : A Case Report and Literature Review

Keiichiro Ryujin[1)], Shotaro Korehisa[1)], Yu Minami[1)], Katsumi Takizawa[2)], Yoshinari Nobuto[1)], Eiji Tsujita[1)] and Hideaki Uchiyama[1)]

[1)] *Department of Surgery, National Hospital Organization Fukuokahigashi Medical Center*
[2)] *Department of Pathology, National Hospital Organization Fukuokahigashi Medical Center*

Abstract

Meigs' syndrome is characterized by benign ascites and hydrothorax associated with the fibrous neoplasm, generally fibromas of the ovaries. The ascites and hydrothorax resolve by resecting such ovarian tumors. The ovarian malignancy and metastatic tumors of the ovaries can also cause the same syndrome with benign hydrothorax and ascites. In such cases, the condition is called pseudo-Meigs' syndrome. Herein, we present a successful palliative surgery for pseudo-Meigs' syndrome due to a metastatic ovarian tumor from colon cancer. A 79-year-old woman was transferred to our hospital for the treatment of refractory hydrothorax. Computed tomography and colonoscopy revealed ascending colon cancer with lymph node metastases, a large right primary or metastatic ovarian tumor, and massive pleural effusion. The patient's general condition gradually worsened toward respiratory failure. Therefore, a rescue operation, including a right hemicolectomy with lymph node dissection, the resection of peritoneal dissemination, and the resection of the ovarian tumor, was performed. The amount of pleural effusion markedly decreased after the operation, and the patient was diagnosed with pseudo-Meigs' syndrome. The patient recovered well and was transferred to a nearby hospital for rehabilitation. The patient lived well at home until 11 months postoperatively when she suddenly succumbed to pan-peritonitis caused by intestinal perforation. In literature reviews regarding pseudo-Meigs' syndrome and colorectal cancer, refractory ascites and pleural effusion were promptly resolved after the resection of ovarian metastases, and this palliation was long-lasting. Therefore, palliative surgery should be attempted in such patients.

Key word : Meigs' syndrome, pseudo-Meigs' syndrome, colon cancer, metastatic ovarian tumor

Introduction

Meigs' syndrome is defined as a syndrome characterized by ascites and hydrothorax associated with ovarian fibroma or other pelvic tumors[1)]. Although the precise mechanism remains to be elucidated, ascites and hydrothorax in Meigs' syndrome are resolved by resecting such ovarian tumors[2)]. The ovarian malignancy and metastatic tumors of the ovaries can also cause the same syndrome with benign hydrothorax and ascites. In such cases, the condition is called pseudo-Meigs' syndrome. Pseudo-Meigs' syndrome due to malignancy has been reported in 13% of all cases, and this syndrome due to metastatic ovarian tumors is relatively rare[3)~6)].

Corresponding author : Keiichiro Ryujin
Department of surgery, National Hospital Organization Fukuokahigashi Medical Center, Fukuoka 811-3195, Japan
Tel : +81-92-943-2331, Fax : +81-92-943-8775
E-mail : kei-ronshen@outlook.jp

Table 1 Laboratory data of the patient on admission

Tests	Data on admission	Normal range
White blood cell ($\times 10^3/\mu L$)	10.5	3.3–8.6
Hemoglobin (g/dL)	10.2	11.6–14.8
Mean corpuscular volume (fL)	76.8	83.6–98.2
Platelet ($\times 10^3/\mu L$)	639	158–348
Albumin (g/dL)	2.4	4.1–5.1
Aspartate aminotransferase (U/L)	36	13–30
Alanine aminotransferase (U/L)	16	7–23
Blood urea nitrogen (mg/dL)	27.9	8–20
Creatinine (mg/dL)	1.22	0.46–0.79
C-reactive protein (mg/dL)	5.214	0–0.3
Carcinoembryonic antigen (ng/mL)	20.3	0–5
Carbohydrate antigen 19–9 (U/mL)	31	0–37
Carbohydrate antigen 125 (U/mL)	599.6	0–35

Herein, we present a long-lasting palliative operation for respiratory failure caused by massive pleural effusion in a patient who suffered from a metastatic ovarian tumor due to colon cancer.

Case Report

A 79-year-old woman was transferred to our hospital with a massive right pleural effusion. At first, the patient was treated by thoracic surgeons. On admission, she had severe dyspnea and was totally exhausted. Blood tests showed mild iron-deficiency anemia and severe hypoalbuminemia.

Carcinoembryonic antigen and carbohydrate antigen 125 were both elevated (Table 1). Chest computed tomography (CT) revealed a massive pleural effusion in the right thorax, but no organic abnormalities were found in the thoracic cavity (Fig. 1a). On admission, a chest tube was inserted into the right thorax for continuous chest drainage (Fig. 2). Pleural fluid cytology showed no obvious malignant findings. Approximately 1,000 mL of pleural fluid was drained daily, which further worsened her hypoalbuminemia. The three sessions of pleurodesis were temporarily effective ; the chest tube was even removed on day 24 (Fig. 2). However, massive pleural effusion reaccumulated rapidly, and a chest tube was reinserted into the right thorax.

Abdominal CT revealed a wall thickening in the ascending colon, enlargement of the surrounding lymph nodes, and peritoneal nodules. These findings strongly suggested ascending colon cancer with lymph node metastases and peritoneal dissemination (Fig. 1b). In addition, a large mass of 20 cm, which seemed to have originated from the right ovary, was found in the pelvis (Fig. 1c). Colonoscopy revealed a circumferential, elevated lesion in the ascending colon (Fig. 1d). The lesion was diagnosed as a moderately differentiated adenocarcinoma through biopsy. Irrespective of several studies, it was impossible to determine whether the ovarian tumor was primary or metastatic. However, the presence of refractory pleural effusion and a large pelvic mass strongly suggested that the patient suffered from pseudo-Meigs' syndrome. Regardless of continuous thoracic drainage and high-volume albumin administration, the patient's general condition gradually worsened, and she was about to succumb to respiratory failure. The thoracic surgeons consulted gastroenterological surgeons.

A rescue operation, resection of the huge pelvic tumor, hoping to control the pleural effusion, was planned. The abdomen was opened through a midline incision. There was a moderate amount of

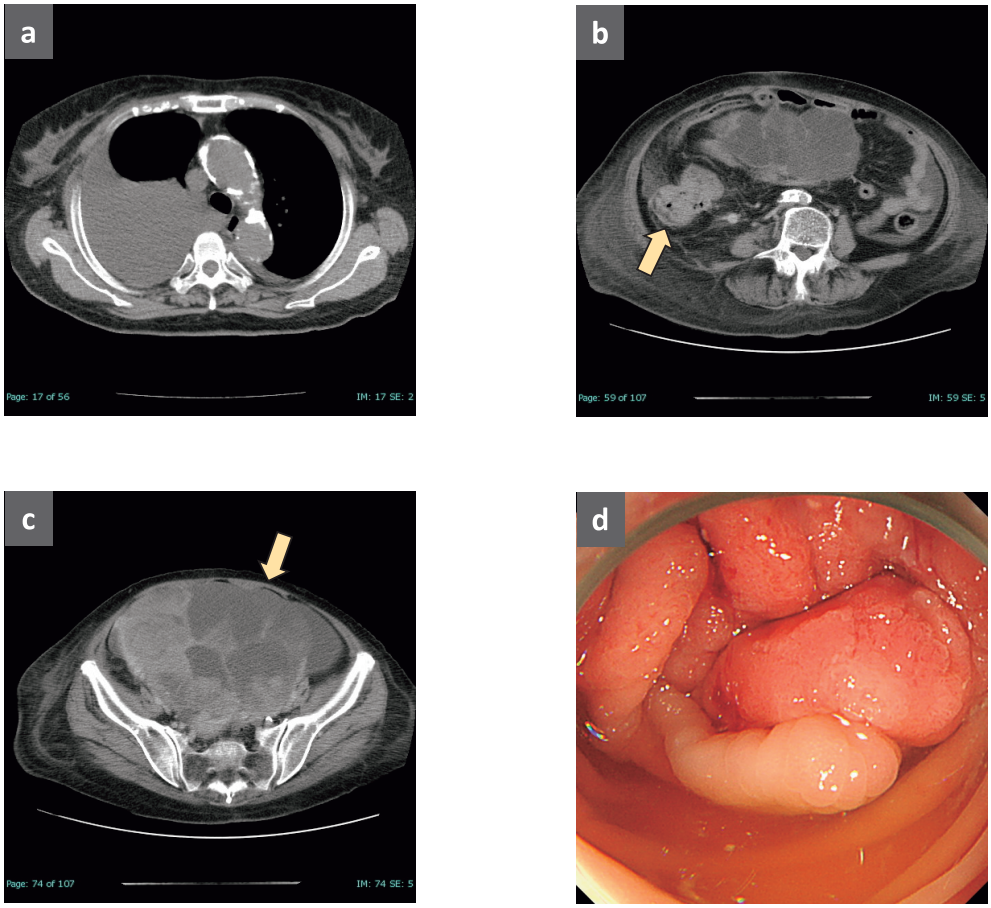

Fig. 1 Preoperative chest and abdominal contrast-enhanced CT and colonoscopy images
a Chest CT shows a massive pleural effusion in the right thoracic cavity. No organic abnormalities are observed. **b** Abdominal CT shows a wall thickening of the ascending colon (arrowheads). **c** Abdominal CT also shows a large 20 cm ovarian tumor (arrowheads). **d** Colonoscopy shows a circumferential, elevated lesion in the ascending colon.

ascites. A hard mass with serosal invasion in the ascending colon, surrounding lymph node swelling, and peritoneal dissemination were noted. The right ovary had changed to a large lobulated mass. The right ovary, together with the right oviduct, was resected. A right hemicolectomy with lymph node dissection was performed for the ascending colon cancer. The lymph node at the origin of the ileocecal artery was remarkably swollen to approximately 4 cm in diameter and adhered to the pancreas head. The swollen lymph node was dissected with the pancreas parenchyma. All visible peritoneal dissemination was resected. The operation time was 128 minutes, and the intraoperative blood loss was 700 mL.

The ascending colon cancer measured 45 × 65 mm, and was a type 2 tumor (Fig. 3a). The tumor was diagnosed as moderately to well-differentiated adenocarcinoma on histopathological examination (Fig. 3b). The right ovarian tumor measured 20 × 18 cm, and was a multi-lobulated mass (Fig. 3c, 3d). The histopathological examination showed moderately differentiated adenocarcinoma (Fig. 3e). The ovarian tumor was negative for cytokeratin 7 (Fig. 4a), positive for cytokeratin 20 (Fig. 4b), and positive for CDX-2 (Fig. 4c), which suggested that the ovarian tumor was derived from the colorectal cancer[7]. Other disseminated nodules were also moderately differentiated adenocarcinoma, which were regarded as disseminated metastases from colon cancer.

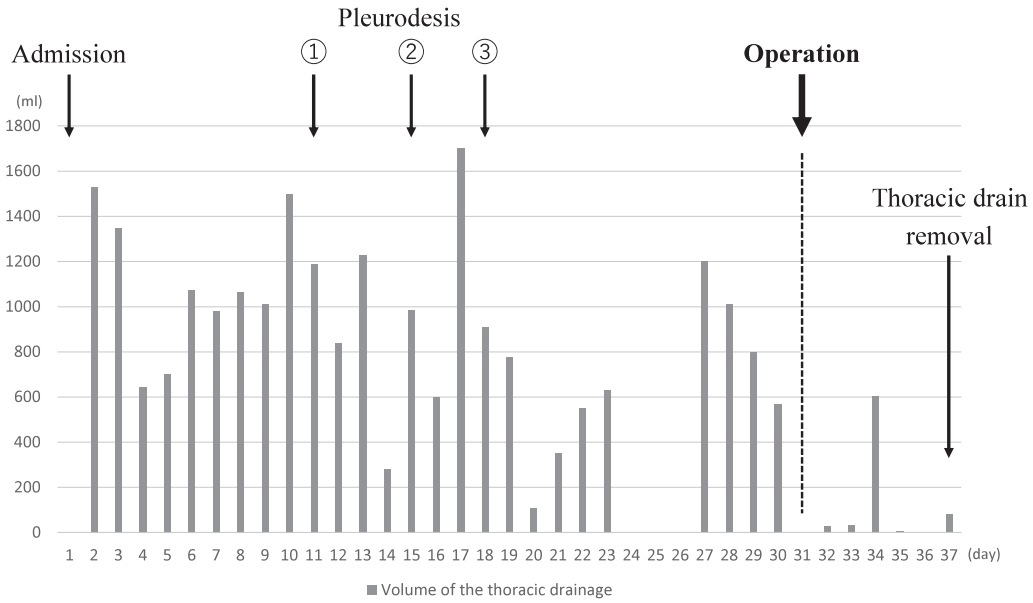

Fig. 2 Kinetics of daily thoracic drainage volume
Irrespective of aggressive continuous drainage, pleural effusion reaccumulated rapidly. The amounts of daily drainage volume were markedly reduced after the operation.

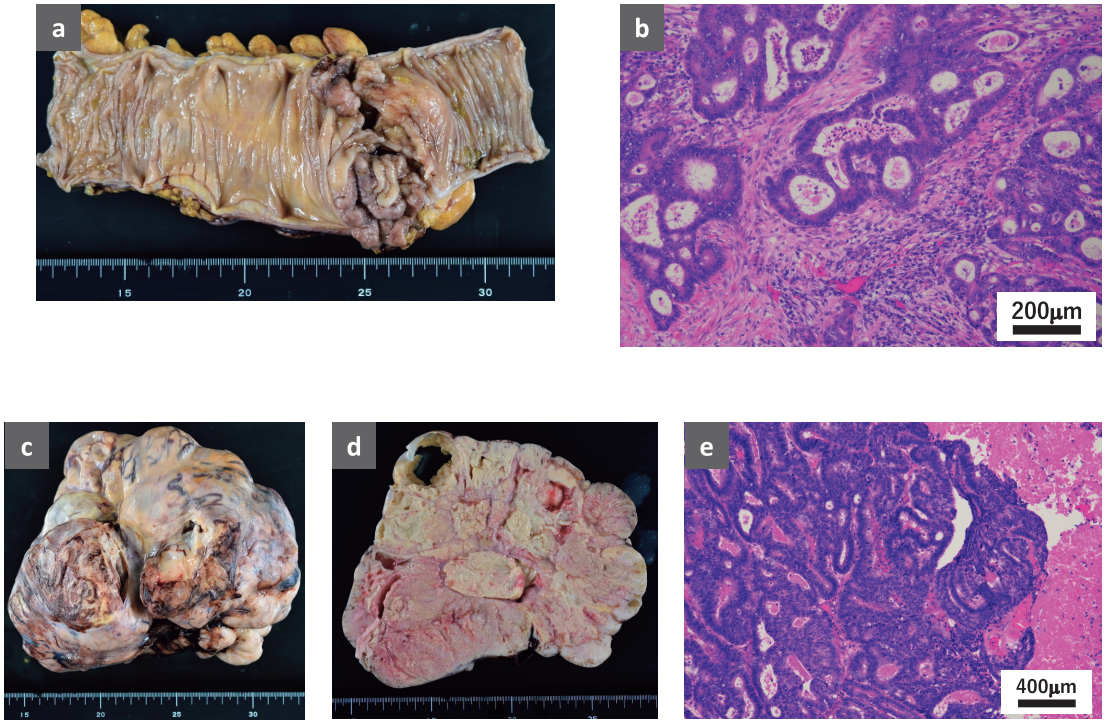

Fig. 3 Macroscopic and pathological findings of the resected specimen
a The resected ascending colon has a circumferential, 45 × 65 mm, type 2 tumor. **b** Pathological examination of the colon cancer reveals moderately to well-differentiated adenocarcinoma (H&E staining, bars, 200 μm). **c** The resected ovary is a macroscopically lobulated mass, 20 cm in maximum diameter. **d** cross-section of the ovary showing a multi-lobulated mass. **e** Pathological specimens of the resected right ovarian tumor reveal a moderately differentiated adenocarcinoma (H&E staining, bars, 400 μm).

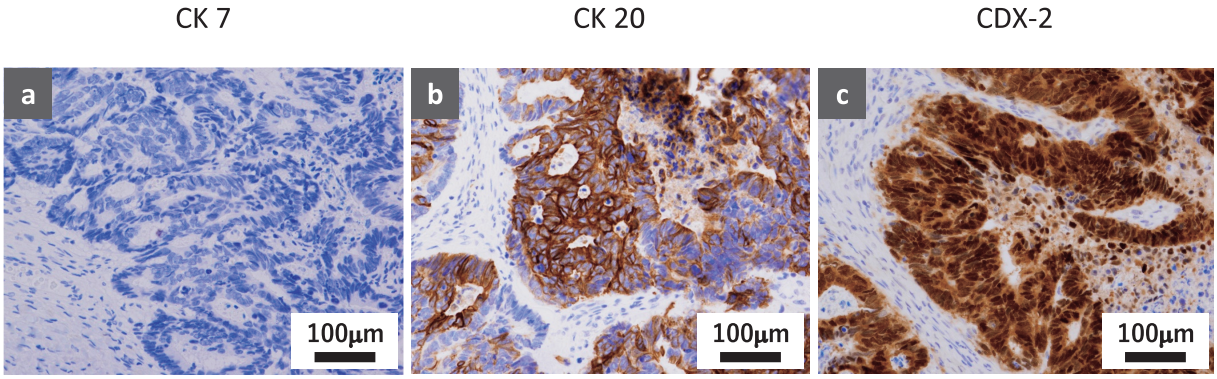

Fig. 4 Immunohistochemical staining of the resected ovarian tumor
a The ovarian tumor is negative for cytokeratin 7 (bars, 100 μm). **b** The cytoplasm of the ovarian tumor cells is diffusely positive for cytokeratin 20 (bars, 100 μm). **c** The nuclei of the ovarian tumor cells are strongly positive for CDX-2 (bars, 100 μm).

Pleural effusion decreased markedly on postoperative day 1, and the thoracic and abdominal drains were removed on postoperative day 7 (Fig. 2). The patient convalesced without complications. She was transferred to another hospital for rehabilitation on postoperative day 43. Postoperative chemotherapy was abandoned due to the patient's poor performance status. The patient lived well at home until 11 months postoperatively when she suddenly succumbed to pan-peritonitis caused by intestinal perforation.

Discussion

Herein, we present a case of pseudo-Meigs' syndrome caused by ovarian metastases from colon cancer. Early detection and intervention of this syndrome lead to a good outcome[8)~14)]. Our patient was about to succumb to respiratory failure due to massive pleural effusion. This critical status rapidly resolved after the removal of the large ovarian metastasis.

We reviewed all reports regarding pseudo-Meigs' syndrome caused by colorectal cancer published between 2000 and 2021. We used the keywords "Meigs' syndrome" and "colorectal cancer" to search for relevant articles. Additional relevant articles were inspected by searching the references in the first-searched articles. We found 14 cases (including the current case) of pseudo-Meigs' syndrome caused by colorectal cancer (Table 2).

The mean age of the patients in the 14 cases was 49.4 (range ; 27-79) years. Pseudo-Meigs' syndrome, caused by colorectal metastases to the ovary, tended to occur in middle-aged women. Our patient was the oldest. The mean maximum diameter of the metastatic ovary was 15.8 (range ; 9-20) cm. The current case was one of the largest metastases. Ten of 14 cases were synchronous metastases to the ovaries. Eight cases had metastases to the bilateral ovaries. All the patients in the 13 previous cases underwent bilateral oophorectomy even when the other ovary was intact. The ovaries are well known for frequent metastatic sites from colorectal cancer, and if one ovary is metastatically affected, it is recommended that the other intact one should be excised[15)]. Our patient underwent the resection of the diseased ovary only, considering her general condition.

Pleural effusion was only on the right side in eight cases, only on the left side in two, and bilateral in four. Refractory pleural effusion rapidly resolved after the operation in all the cases. There are several theories regarding the mechanism underlying the development of pleural effusion and ascites. The leading theory is that the blood and lymphatic vessels within the tumor become obstructed, resulting in leakage of tissue fluid and development of ascites. Furthermore,

Table 2 Review of reported cases of Meigs' syndrome with colorectal cancers published between 2000 and 2021

Authors	Published year	Age of the patient	Maximum diameter of ovarian tumor (cm)	Ovarian metastasis	Oophorectomy	Pleural effusion	Other metastases	Outcome after the oophorectomy
Nagakura et al. [3]	2000	53	18	Bilateral (synchronous)	Bilateral	Right	None	52 months, alive with disease (pulmonary and brain)
Ohsawa et al. [4]	2003	41	20	Bilateral (synchronous)	Bilateral	Bilateral	Peritoneum	9 months, died of cancer
Feldman et al. [5]	2004	49	13	Right (metachronous)	Bilateral	Left	Liver	6 months, alive without recurrence
Rubinstein et al. [6]	2009	61	13	Left (synchronous)	Bilateral	Bilateral	None	N.A.
Hosogi et al. [8]	2009	44	15	Bilateral (synchronous)	Bilateral	Right	None	19 months, alive with disease (peritoneum)
Okuchi et al. [9]	2010	42	11.5	Left (metachronous)	Bilateral	Right	Liver, para-aortic lymph nodes	12 months, died of cancer
Maeda et al. [10]	2011	58	15	Bilateral (synchronous)	Bilateral	Right	Peritoneum	10 months, alive without recurrence
Saito et al. [11]	2012	44	20	Right (synchronous)	Bilateral	Bilateral	None	N. A.
Kyo et al. [12]	2016	65	9	Bilateral (metachronous)	Bilateral	Left	Peritoneum	66 months, died of cancer
Tajima et al. [13]	2016	47	18	Bilateral (synchronous)	Bilateral	Bilateral	Peritoneum	78 months, alive without recurrence
Yamamoto et al. [14]	2017	48	13	Bilateral (synchronous)	Bilateral	Right	None	17 months, alive without recurrence
Yamamoto et al. [14]	2017	33	18	Bilateral (synchronous)	Bilateral	Right	Liver	22 months, alive with disease (liver)
Yamamoto et al. [14]	2017	27	18	Right (metachronous)	Bilateral	Right	None	12 months, alive without recurrence
Current case	2022	79	20	Right (synchronous)	Right	Right	Peritoneum	11 months, died of cancer

N. A. ; not addressed

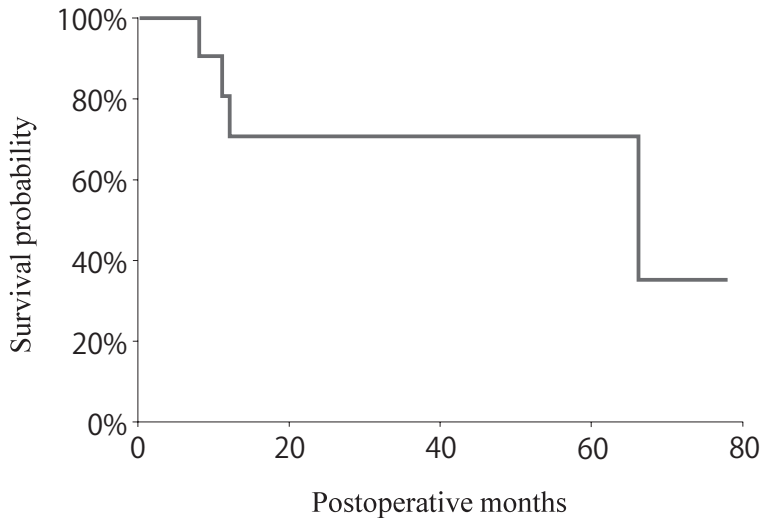

Fig. 5 Survival probability of the 12 patients after the resection of the ovarian tumors
Kaplan-Meier analysis of the 12 cases. The median survival time was 66 months, and the 5-year survival rate was 70.7%

the ascites migrate into the thoracic cavity through the lymphatic vessels and lead to pleural effusion. Since the right side of the diaphragm is rich in lymphatic vessels, a right-sided predominance of pleural effusion tends to occur. In addition to the aforementioned mechanism, the hypersecretion of vascular endothelial growth factor is thought to be a plausible mechanism[9].

The long-term outcomes were demonstrated in 12 cases (including the current case). Death occurred in four cases due to cancer. The patients in five cases were alive without cancer recurrence. The patients in three cases were alive even with cancer recurrence. There were no recurrences of pleural effusion in all the cases. This palliation was long-lasting. These patients would have died soon without the resection of the ovarian tumors. Patients with ovarian metastases from colorectal cancer are reported to have favorable long-term outcomes[15]. In the Kaplan-Meier analysis of the 12 cases, the median survival time was 66 months, and the 5-year survival probability was 70.7% (Fig. 5).

Conclusion

In the patient in this case report, refractory ascites and pleural effusion rapidly resolved after the resection of ovarian metastases, and this palliation was long-lasting. Therefore, palliative surgery (resection of ovarian metastases, and in synchronous cases, resection of colorectal cancer) should be attempted in such patients even if the operation would not be curative.

List of Abbreviations

None

Ethical Approval and Consent to Participate

The study was approved by the ethics committee (No. 2021-48)

Consent for Publication

Written informed consent for this case report was obtained from the patient.

Availability of Data and Materials

Not applicable

Competing Interests

Not applicable

Funding

Not applicable

Authors' Contributions

KR and SK conducted the literature search and drafted the manuscript. HU made a critical revision. YM, KT, YN, and ET provided advice on improvement of the manuscript. All the authors have read and approved the manuscript.

Acknowledgments

This work was supported by JSPS KAKEN Grant Number JP 19K09149.

References

1) Dorland. Dorland's Illustrated Medical Dictionary. 33rd ed. ELSEVIER, Philadelphia, 2020.
2) Meigs JV and Cass JW : Fibroma of the ovary with ascites and hydrothorax : With a report of Seven Cases. Am J Obstet Gynecol. 110 : 731–754, 1939.
3) Nagakura S, Shirai Y and Hatakeyama K : Pseudo-Meigs' syndrome caused by secondary ovarian tumors from gastrointestinal cancer. A case report and review of the literature. Dig Surg. 17 : 418–419, 2000.
4) Ohsawa T, Ishida H, Nakada H, Inokuma S, Hashimoto D, Kuroda H and Itoyama S : Pseudo-Meigs' syndrome caused by ovarian metastasis from colon cancer : report of a case. Surg Today. 33 : 387–391, 2003.
5) Feldman ED, Hughes MS, Stratton P, Schrump DS and Alexander HR Jr : Pseudo-Meigs' syndrome secondary to isolated colorectal metastasis to ovary : a case report and review of the literature. Gynecol Oncol. 93 : 248–2451, 2004.
6) Rubinstein Y, Dashkovsky I, Cozacov C, Hadary A and Zidan J : Pseudo meigs' syndrome secondary to colorectal adenocarcinoma metastasis to the ovaries. J Clin Oncol. 27 : 1334–1336, 2009.
7) Kim MJ : The usefulness of CDX-2 for differentiating primary and metastatic ovarian carcinoma : an immunohistochemical study using a tissue microarray. J Korean Med Sci. 20 : 643–648, 2005.
8) Hosogi H, Nagayama S, Kanamoto N, Yoshizawa A, Suzuki T, Nakao K and Sakai Y : Biallelic APC inactivation was responsible for functional adrenocortical adenoma in familial adenomatous polyposis with novel germline mutation of the APC gene : report of a case. Jpn J Clin Oncol. 39 : 837–846, 2009.
9) Okuchi Y, Nagayama S, Mori Y, Kawamura J, Matsumoto S, Nishimura T, Yoshizawa A and Sakai Y : VEGF hypersecretion as a plausible mechanism for pseudo-meigs' syndrome in advanced colorectal cancer. Jpn J Clin Oncol. 40 : 476–481, 2010.
10) Maeda H, Okabayashi T, Hanazaki K and Kobayashi M : Clinical experience of Pseudo-Meigs' Syndrome due to colon cancer. World J Gastroenterol. 17 : 3263–3266, 2011.
11) Saito H, Koide N and Miyagawa S : Pseudo-Meigs syndrome caused by sigmoid colon cancer metastasis to the ovary. Am J Surg. 203 : e1–3, 2011.
12) Kyo K, Maema A, Shirakawa M, Nakamura T, Koda K and Yokoyama H : Pseudo-Meigs' syndrome secondary to metachronous ovarian metastases from transverse colon cancer. World J Gastroenterol. 22 : 4604–4609, 2016.
13) Tajima Y, Kameyama H, Yamada S, Yagi R, Nakano M, Nagahashi M, Shimada Y, Sakata J, Kobayashi T, Umezu H and Wakai T : Long-term survival in pseudo-Meigs' syndrome caused by ovarian metastases from colon cancer. World J Surg Oncol. 14 : 286, 2016.
14) Yamamoto Y, Miyagawa Y, Ehara T, Koyama M, Nakamura S, Takeuchi D, Muranaka F, Kitazawa M and Miyagawa S : Three cases of pseudo-Meigs' syndrome secondary to ovarian metastases from colorectal cancer. Case Rep Surg. 2017 : 1–8, 2017.
15) Thornblade LW, Han E and Fong Y : Colorectal cancer ovarian metastases. Int J Gynecol Cancer. 31 : 1137–1144, 2021.

(Received for publication October 31, 2022)

（和文抄録）

大腸癌からの転移性卵巣腫瘍に随伴する大量胸水による呼吸不全に対する緩和手術-pseudo-Meigs 症候群：症例報告および文献的考察

[1)]国立病院機構　福岡東医療センター　外科
[2)]国立病院機構　福岡東医療センター　病理診断科

龍神圭一郎[1)]，是久翔太郎[1)]，南　　祐[1)]，瀧 澤 克 己[2)]，
信 藤 由 成[1)]，辻 田 英 司[1)]，内 山 秀 昭[1)]

Meigs 症候群は，線維性腫瘍，一般的には卵巣の線維腫に伴う良性の腹水・胸水が特徴であり，卵巣腫瘍を切除することによって消失する．卵巣の悪性腫瘍や卵巣の転移性腫瘍も同様に良性の腹水・胸水を伴う同じ症候群を引き起こすことがある．そのような病態は pseudo-Meigs 症候群といわれる．今回われわれは，大腸癌の転移性卵巣腫瘍による pseudo-Meigs 症候群に対する緩和手術の成功例を報告する．症例は 79 歳女性で，難治性胸水の治療のため当院に転院してきた．CT 検査と大腸内視鏡検査により，リンパ節転移を伴う上行結腸癌，巨大な右原発卵巣腫瘍，または転移性卵巣腫瘍，大量胸水貯留の診断となった．呼吸不全の増悪により全身状態は徐々に悪化した．そこで，救命目的でリンパ節郭清を伴う結腸右半切除術，腹膜播種切除術，卵巣腫瘍切除術を施行した．術後，胸水量は著明に減少し，pseudo-Meigs 症候群と診断した．患者は順調に回復し，リハビリのため近医に転院した．その後，術後 11ヶ月目に腸管穿孔による汎発性腹膜炎で死亡した．pseudo-Meigs 症候群と大腸癌に関する文献では，難治性の腹水・胸水が卵巣転移巣の切除により速やかに消失し，その緩和効果は長期に及んでいる．従って，このような患者に対しては緩和手術を試みるべきである．

キーワード：Meigs 症候群，大腸癌，転移性卵巣腫瘍