Case report

Impressive MRI findings of bilateral ovarian endometriomas coexisting with ovarian metastases: the structural relationship between the endometrioma and the ovary.

Mariko Kumazawa, MD[1)],Kensuke Inamura, MD[1)],Ganbold Tsengel, MD[1)],
Chiyori Sakamoto, MD[2)],Kensuke Ohikata, MD[3)],Kazuyuki Ishida, MD[3)],
Yasushi Kaji, MD[1)]

[1)] Department of Radiology,Dokkyo Medical University
[2)] Department of Obstetrics & Gynecology,Dokkyo Medical University
[3)] Department of Pathology,Dokkyo Medical University

Abstract

We report a case of a middle-aged woman who had radiologically impressive metastatic ovarian tumors with endometriomas. On initial MRI examination, we found bilateral endometriomas close to normal-sized ovaries. Six months later, follow-up MRI revealed bilateral metastatic enlargement of ovaries wrapping around endometriomas. Pathologically, endometriotic implants have been reported to invade the parenchyma from the surface of the ovary, but this is rarely visualized by MRI. These impressive MRI outlines may be clues for revealing the development of endometrioma.

"Conflicts of Interest and Source of Funding"
We have no conflict of interest to declare.

key words | Endometrioma, metastatic ovarian tumors, bilateral ovarian masses, MRI.

Introduction

Although the origin and development of endometrioma are still unclear (e.g., metastatic [1], metaplastic [2], or more complex reasons) , it is thought that they result from the repeated cyclic hemorrhage caused by the endometriotic cells that develop in the ovaries. In such cases, microscopy and ovarioscopy show that the ovarian epithelium is invaginated [3, 4]. As such, endometrioma is considered one of the epithelial tumors.

We recently encountered a patient with bilateral ovarian endometriomas coexisting with ovarian metastases. The purpose of this case presentation is to show the structural relationship between the endometrioma and the ovary.

Corresponding author：Mariko Kumazawa, MD
Departments of Radiology Dokkyo Medical University School of Medicine,
880, Kita-Kobayashi, Shimotsuga-Gun, Mibu,Tochigi, 321-0293 Japan
Office phone: +81-282-86-1111　Office fax: +81-282-86-4940
Received January 4th,2021/Accepted after revision January 17th,2021

Case description

A 49-year-old woman underwent a total gastrectomy for gastric cancer six years ago and received adjuvant chemotherapy. She completed chemotherapy three years ago, but a mild elevation of CA19-9 was observed. An 18-F-fluorodeoxyglucose-PET / CT revealed bilateral ovarian masses. She was referred to the Department of Obstetrics and Gynecology at our institution, and after MRI, was diagnosed with bilateral endometriomas (**Fig.1**). Each ovarian mass was 4 cm in diameter with the ovary attached. After six months, during a follow-up ultrasound examination, the masses were found to have rapidly increased to 12 cm. The patient's blood test results showed elevated CA125 (79 U / mL) while CA19-9 (19 U / mL) and CEA (2.2 ng / mL) were in the normal ranges. On MRI, the size of the bilateral endometriomas did not increase, but the bilateral ovarian stroma became larger and surrounded the endometriomas (**Fig.2**). There were no mural nodules in the endometriomas. The enlarged ovaries, showing high signal intensity on a T2-weighted image (T2WI), had thin septa-like multilocular cysts. We suspected the existence of metastatic ovarian tumors based on the bilaterality and clinical history, although the tumor signal intensity on the T2WI was not typical for findings of ovarian metastases from gastric cancer. Bilateral salpingo-oophorectomy and partial omentectomy were performed.

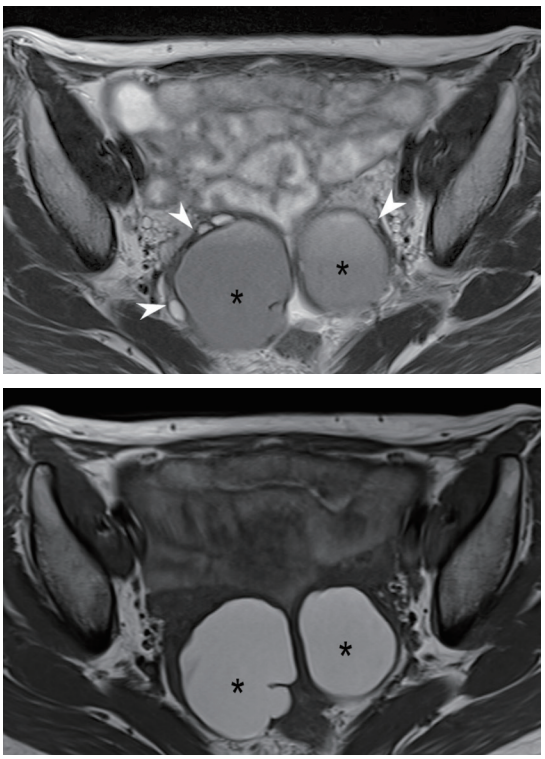


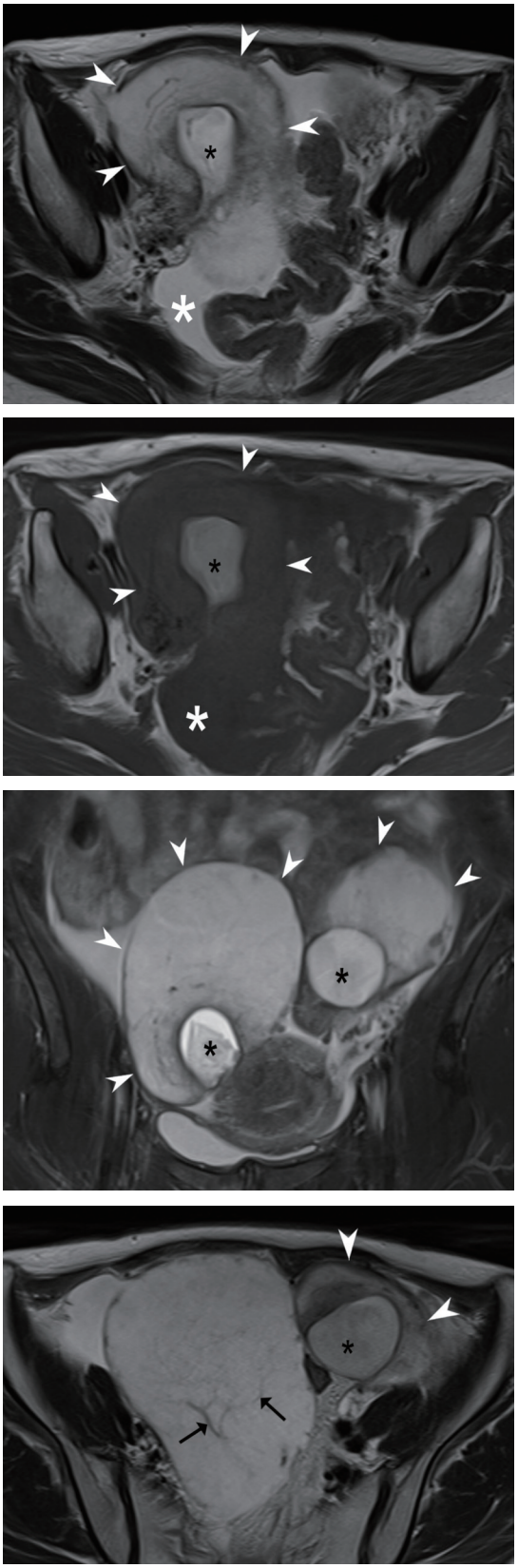
Figure 1; Initial pelvic MRI for the ovarian masses.
A, T2-weighted axial image. B, T1-weighted axial image. Bilateral cystic adnexal masses are found in the pelvis. The inside of the mass shows high signal intensity on the T1-weighted image and shading on the T2-weighted image (black star). These are findings of endometrioma. Normal follicles are found on the margins, and the ovaries themselves are stretched in a crescent shape (arrowhead).

Macroscopically, the masses were solid and yellowish white (**Fig.3A**). A cyst with hemosiderin was found at the peripheral site of both ovarian tumors (**Fig. 3A, B**). Atypical cells were distributed microscopically in a diffuse focal pattern (**Fig. 3C**). The tumor cells contained signet ring cells, resembling those in the primary gastric tumor.

Bilateral metastatic ovarian tumors and bilateral endometriomas were pathologically diagnosed. The patient continued to receive postoperative chemotherapy, but she passed away nine months after surgery.

Discussion

Endometrioma results from the repeated cyclic hemorrhage caused by the endometriotic cells. In the present case, initial MRI revealed endometriomas with the stretched ovaries in a crescent shape. Even at this stage, the endometrioma could be



recognized in the outermost layer of the ovary. Furthermore, due to the metastatic tumor cells that proliferated into the stroma, it became apparent that the endometriomas were surrounded by the ovarian cortex.

This is consistent with reports that state endometrioma is formed as a result of the invagination of the ovarian cortex [3, 4]. No matter how the tumors grow, they do not enter the space between the ovarian cortex and the endometrioma; hence, the endometrioma is fixed at the outermost layer.

The shape of the mass was similar to that of the multilocular cystic tumor; however, the consistency was solid. The lymphatic stasis, caused by the tumor cells blocking the lymphatic tract, resulted in massive ovarian edema [5], and the signet ring cells had a little mucous component and less fibrous component, which highlighted the interstitial edema on T2WI. Upon closer examination of the T2WI, it was observed that the tumors had low intensities around the endometriomas, which led us to conclude that they were solid tumors. The MRI of metastatic ovarian tumors from gastric cancer, known as Krukenberg tumors, will show a low signal intensity on T2WI due to fibrosis, as described in signet ring cell tumors and

Figure 2; Follow-up pelvic MRI after six months.
A, T2-weighted axial image. B, T1-weighted axial image. C, T2-weighted coronal image with fat suppression. D, T2-weighted axial image (more cranial slice from A).
Bilateral ovarian enlargements (arrowhead) surrounding the bilateral endometriomas (black star) are shown on the T2-weighted image. The enlarged ovaries resemble multilocular cysts due to having a thin septa-like structure (arrow). On the T1-weighted image, the enlarged ovaries (arrowhead) show slightly high signal intensity compared with fluid (white star), which may indicate an abundant mucinous component. Based on the bilaterality and clinical history, bilateral ovarian metastases were suspected.

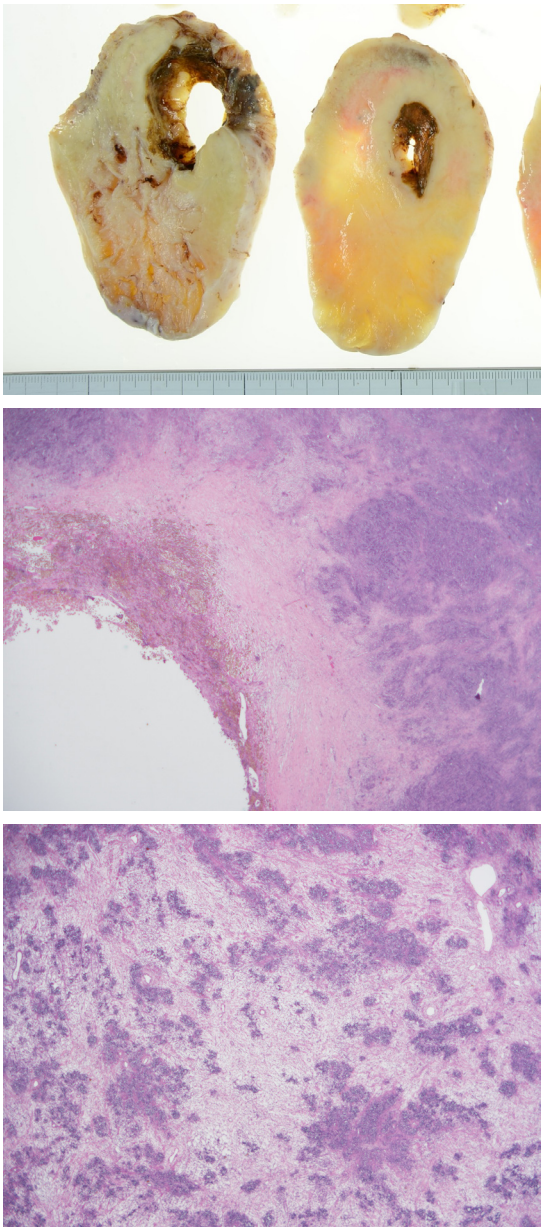


Figure 3; Pathological specimen.
A, Cut surface of the ovarian tumor. B and C, low-power field (HE stain).
An endometrioma was found at the peripheral site of the ovarian tumor (A), and fibrosis was observed around the endometrioma (B). Atypical cells in the ovary were distributed microscopically in a diffuse focal pattern. The farther away from the endometrioma, the more spare interstitium was noticeable in the tumor(C). Due to this sparse part, T2WI showed higher signal intensity.

A
B
C

ovarian reaction [6]. The MRI findings of this case differed from the typical MRI findings of Krukenberg tumors because the less fibrous component was masked by interstitial edema.

However, MRI images collected before and after ovarian enlargement could be compared to clearly delineate the relative relationship between ovarian parenchyma and endometrioma. This case is valuable because the MRI results may demonstrate the invagination of the ovarian epithelium of endometrioma.

References

1. Sampson JA. Peritoneal endometriosis due to menstrual dissemination of endometrial tissue into the peritoneal cavity. Am J Obstet Gynecol 1927; 14:422-469.
2. Donnez J, Nisolle M, Gillet N, et al. Large ovarian endometriomas. Hum Reprod 1996; 11: 641-646.
3. Hughesdon PE. The structure of endometrial cysts of the ovary. BJOG 1957; 64:481-487.
4. Brosens IA, Puttemans PJ, Deprest J. The endoscopic localization of endometrial implants in the ovarian chocolate cyst. Fertil Steril 1994; 61: 1034-1038.
5. Tanaka YO, Takazawa Y, Matsuura M, et al. MR imaging of secondary massive ovarian edema caused by ovarian metastasis from appendiceal adenocarcinoma. Magn Reson Med Sci 2019; 18: 111–112.
6. Zulfiqar M, Koen J, Nougaret S, et al. Krukenberg tumors: Update on imaging and clinical features. Am J Roentgenol 2020; 215: 1020-1029.