

# Right diaphragm metastasis of endometrial cancer: a case report

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## Abstract

A diaphragmatic tumor is usually caused by metastasis from lung cancer, malignant mesothelioma, and malignant thymoma. Endometrial cancer is rarely involved in metastasis to the diaphragm. A right anterior mediastinal tumor was found in a 60-year-old woman who was initially diagnosed with endometrial carcinoma. There was initially no relationship between the right anterior mediastinal tumor and endometrial carcinoma. Radical curative surgery was performed for endometrial carcinoma. The endometrial carcinoma stage was IA. The patient was admitted to the Department of Thoracic Surgery 6 months after the curative surgery. Intraoperative exploration showed a tumor growing in the right diaphragm. Right diaphragmotomy was performed. Immunohistochemistry showed metastasis of endometrial carcinoma to the diaphragm. Endometrial cancer solitary metastasis to the diaphragm is rare. Clinicians should be aware of this possibility. Surgical treatment followed by a pathological examination is the most useful method for determining the diagnosis of a diaphragmatic tumor due to metastasis of endometrial cancer.

## Keywords

Diaphragm, metastasis, endometrial neoplasm, carcinoma, mediastinal tumor, pathological examination

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## Introduction

Most diaphragmatic tumors are the result of metastasis.<sup>1</sup> The majority of diaphragmatic metastasis is lung cancer, malignant mesothelioma, and malignant thymoma.<sup>2</sup>

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Previous reported cases of diaphragmatic metastasis were mostly combined with metastasis of other organs.

Endometrial cancer ranks fourth in female cancers,<sup>3</sup> and it commonly metastasizes to the lungs, bone, liver, and brain.<sup>4</sup> Previous reports have described that isolated diaphragmatic metastasis at the time of diagnosing endometrial cancer has not been reported.<sup>5,6</sup> We present a clinical case of endometrial carcinoma solitary metastasis to the right diaphragm in which the primary tumor and metastasis were found at the same time.

## Case report

A 60-year-old woman was diagnosed with endometrial cancer by curettage because of vaginal bleeding. In a preoperative examination, chest computed tomography (CT) showed a tumor that was located at the right anterior mediastinum. Total hysterectomy with double appendages was performed on 13 March 2019. A pathological examination showed that the tumor was  $3.5 \times 2.5$  cm, it was highly differentiated endometrial adenocarcinoma, and it invaded the superficial myometrium ( $<1/2$  of the myometrium). There was no metastasis in bilateral pelvic lymph nodes. Because the endometrial lesion only invaded the muscle layer, there was little possibility that the anterior mediastinal tumor was related to the endometrial cancer. The staging of endometrial cancer was pIA. The patient did not receive any adjuvant therapy and was told to seek further treatment for her mediastinal tumor.

Six months after the radical operation, the patient was admitted to the Department of Thoracic Surgery without any discomfort. Preoperative thoracoabdominal CT showed a solitary  $5.2 \times 8.0 \times 7.1$ -cm (W  $\times$  L  $\times$  H) tumor in the right mediastinum near to the pericardium (Figure 1). A bone scan did not show

bone metastasis. We explained the treatment plan for the patient and obtained consent for the treatment.

On 7 September 2019, the patient had an operation under video-assisted thoracoscopy. The tumor was in the right cardiophrenic angle, approximately 8 cm in maximum diameter, with a hard texture and clear boundary. The tumor adhered to the pericardium and lower lobe of the right lung. After separating the adhesions, we found that the tumor had grown in the diaphragm rather than in the mediastinum (Figure 2a). To completely remove the tumor, we performed thoracotomy through the right fifth intercostal space. The diaphragm was resected along with 1 cm from the margin of the tumor (Figure 2b). We then found that the tumor had grown into the abdominal cavity (Figure 2c). We stripped the tumor from the liver's surface and removed the tumor with the invaded diaphragm (Figure 2d). After resection, the diaphragmatic defect was repaired by a Dacron patch. The chest was finely closed. The total bleeding volume was 500 mL. The patient could get out of bed on the second day. The drainage tube was removed on the third day.

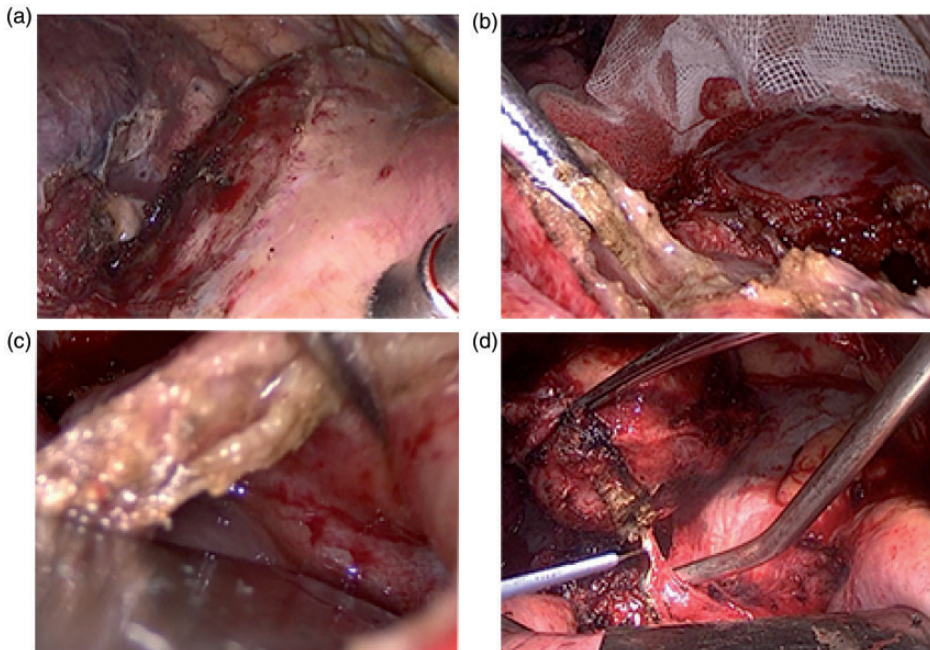
The gross specimen was  $8 \times 6 \times 6$  cm, with a yellow hard capsule and a multicystic structure. A morphological examination suggested that the tumor was diaphragmatic metastasis from endometrial cancer by the following immunohistochemical results: estrogen receptor (ER), 20% + and progesterone receptor (PR), 30% + (Figure 3). At 16 months after the total hysterectomy, there was no evidence of tumor relapse.

## Discussion

Primary tumors of the diaphragm are uncommon. Only approximately 200 primary cases of these tumors have been reported.<sup>2</sup> By contrast, secondary diaphragmatic tumors are more frequent than



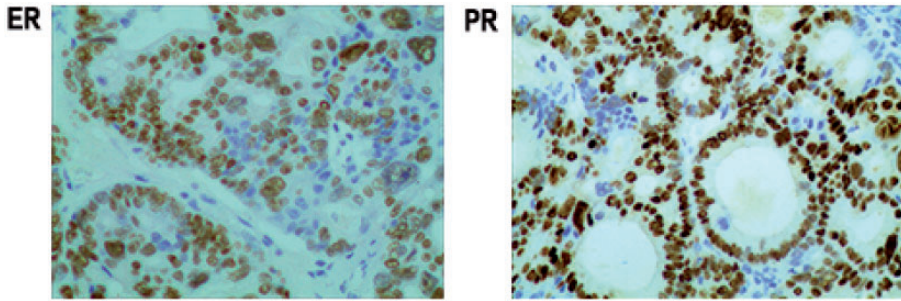
**Figure 1.** Preoperative computed tomography shows that the right diaphragmatic tumor is  $5.2 \times 8.0 \times 7.1$  cm (W  $\times$  L  $\times$  H). Computed tomographic imaging had difficulty in differentiating the anterior mediastinal mass from the diaphragmatic mass



**Figure 2.** Video-assisted thoracoscopic images. The tumor was thought to have adhered to the surface of the diaphragm. (a, c) During the operation, we found that the tumor had grown into the diaphragm. (b) Therefore, the diaphragm was cut along 1 cm from the margin of the tumor. (d) The tumor and the invaded diaphragm were completely resected

primary diaphragmatic tumors,<sup>1</sup> such as benign endometriosis,<sup>7</sup> malignant mesothelioma,<sup>8</sup> lung cancer,<sup>9</sup> and ovarian cancer.<sup>10</sup> Moreover, secondary diaphragmatic tumors are often accompanied by metastases to other locations, such as the lungs, liver, and thoracic cavity. Solitary diaphragmatic metastasis is rare.

In 2012, approximately 320,000 new cases of endometrial cancer were diagnosed worldwide.<sup>11</sup> The incidence of endometrial cancer is the fourth most common cancer in women, behind breast cancer, lung cancer, and colorectal cancer.<sup>3</sup> The most common location of distant metastasis from endometrial cancer is the lungs, bone, liver, and



**Figure 3.** Pathology of the diaphragmatic tumor after the operation. Immunohistochemistry shows that ER was 20% + and PR was 30% +. Diaphragmatic metastasis of endometrial carcinoma was confirmed. (magnification,  $\times 200$ ). ER, estrogen receptor; PR, progesterone receptor

brain.<sup>4</sup> Endometrial carcinoma rarely metastasizes to the diaphragm. Only two cases of endometrial carcinoma metastasizing to the diaphragm have been reported. In 2019, Gruzdev et al.<sup>5</sup> reported a case of solitary right diaphragmatic metastasis 8 years after radical curative surgery of endometrial carcinoma. Under thoracotomy, the mass was removed and the diaphragmatic defect was sutured. In 2016, Menderes et al.<sup>6</sup> reported a case of stage IIIA endometrial cancer with right diaphragmatic invasion 4 years after debulking surgery. These authors performed diaphragmatic tumor resection and patch repair of the diaphragmatic defect by laparoscopy. We report a case of endometrial cancer combined with solitary diaphragmatic metastasis at the time that the primary lesion was found. Six months after radical surgery for endometrial carcinoma, thoracotomy was performed for resection of the diaphragmatic metastasis and repair of the defect.

As shown in the cases mentioned above, endometrial metastasis to the diaphragm is mostly on the right side. There might be a particular mechanism for metastasis from the uterus to the right diaphragm. Specialists might not consider an association between endometrial cancer and a right diaphragmatic tumor because it is rare. The tumor stage may be

underestimated and corresponding adjuvant therapy may not be performed, which could affect the prognosis of the patient. Moreover, differentiating an anterior mediastinal mass from a diaphragmatic mass by a CT scan is difficult because the diaphragm has the same CT value as soft tissue, which adds difficulty in preoperative planning. Preoperative diagnosis of this condition may be difficult, which means that surgical treatment might be the only way of making a diagnosis.

## Conclusions

Endometrial cancer solitary metastasis to the diaphragm is rare. Clinicians should be aware of this condition and prepare to treat it. Surgical treatment followed by a pathological examination is the most useful method for making a diagnosis.

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## Declaration of conflicting interest

The authors declare that there is no conflict of interest.

## Ethics statement

The study was approved by the Ethical Review Committee of Peking University People's Hospital (Beijing, China). The patient provided verbal informed consent for publication. The patient's details were de-identified for protection of privacy.

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## Authors' contributions

YGL was in charge of the patient, decided on the treatment method, and performed the surgery. XL, GWL, and XYZ assisted with the surgery and helped to collect the materials. TYZ conceived the idea of the study and wrote this manuscript. All authors have read and approved the final manuscript.

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