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Intramedullary Spinal Cord Metastasis From Endometrial Cancer Eight Years After the Initial Diagnosis: A Case Report

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Abstract

Intramedullary spinal cord metastasis (ISCM) is a rare manifestation of central nervous system metastasis, and ISCM originating from endometrial cancer is extremely uncommon. Here, we report a case of ISCM from endometrial cancer that developed eight years after the initial diagnosis. An 82-year-old woman presented with bilateral hand weakness and posterior neck pain. She had a history of endometrial cancer (endometrioid carcinoma with highly atypical/serous-like components, pT4N1M1, Stage IVB) treated with surgery and adjuvant chemotherapy eight years prior. Her clinical course included a mediastinal recurrence, which was surgically resected and definitively confirmed as Müllerian in origin (PAX-8 positive) despite focal TTF-1 positivity, and multiple brain metastases treated with stereotactic radiosurgery. Magnetic resonance imaging (MRI) revealed an intramedullary enhancing mass at the C6-C7 level with extensive edema. CA125 levels were remarkably elevated (263.5 U/ml), correlating with disease activity. Based on the clinical course, typical MRI findings, and biomarker trends, she was clinically diagnosed with ISCM from endometrial cancer. Palliative radiotherapy (30 Gy in 10 fractions) was administered, resulting in significant pain relief (Numerical Rating Scale score improved from 5-6 to 0-1) and a slight improvement in muscle strength. The patient eventually transitioned to hospice care and passed away due to disease progression. Although ISCM from endometrial cancer is exceptionally rare, its incidence may increase owing to the prolonged survival of cancer patients. Palliative radiotherapy is a valuable and viable option for symptom management in these patients.

Categories: Obstetrics/Gynecology, Palliative Care, Radiation Oncology
Keywords: brain metastases, endometrial cancer, intramedullary spinal cord metastases, magnetic resonance imaging, palliative radiation therapy

Introduction

Endometrial cancer typically metastasizes to the pelvic lymph nodes, peritoneum, and lung, while central nervous system (CNS) involvement is exceedingly uncommon [1]. Specifically, endometrial cancer accounts for only 0.84% of all patients presenting with brain metastases [2]. Furthermore, intramedullary spinal cord metastasis (ISCM), defined as metastasis within the spinal cord parenchyma, distinct from more common epidural spinal cord compression or vertebral bone metastases, is a remarkably rare manifestation of CNS metastasis [3]. Although ISCM is relatively more frequent in lung and breast cancers [4], ISCM originating from endometrial cancer is extremely rare, with only a few cases reported in the literature [5]. Here, we present a rare case of ISCM originating from endometrial cancer that developed eight years after the initial diagnosis and was subsequently managed with palliative radiotherapy.

Case Presentation

An 82-year-old female presented to our hospital with a chief complaint of bilateral loss of grip and upper limb strength, accompanied by posterior neck pain. Her medical history was significant for a gastric ulcer, deep vein thrombosis, cervical spondylosis, diabetes mellitus, dyslipidemia, and cataracts. She was a former smoker (30 cigarettes/day for 52 years) and consumed alcohol occasionally.

Eight years prior to the current presentation, the patient underwent an exploratory laparotomy for endometrial cancer (endometrioid carcinoma with highly atypical/serous-like components, pT4N1M1, Stage IVB). The procedure included a total hysterectomy, bilateral salpingo-oophorectomy, pelvic and para-aortic lymph node dissection, and omentectomy, followed by six courses of adjuvant chemotherapy (carboplatin and paclitaxel). Five years after the initial diagnosis, she experienced a mediastinal recurrence, which was managed with mediastinal tumor resection and subsequent adjuvant chemotherapy. Four months prior to the current admission, she developed multiple brain metastases; these were treated with stereotactic radiosurgery (SRS) in March before she was transferred to another hospital for rehabilitation. However, in June of the current presentation year, she presented with bilateral weakness in grip and upper limb strength,

as well as posterior neck pain. A follow-up MRI revealed disease progression of the brain metastases along with a newly identified ISCM at the C6/C7 level, prompting her admission to our hospital on June 23 of this year.

Upon admission, physical examination revealed a height of 146 cm and a weight of 43 kg. Her Eastern Cooperative Oncology Group Performance Status (ECOG-PS) [6] was 3. Vital signs were stable with a temperature of 35.2°C, a heart rate of 73 beats/min, a blood pressure of 142/85 mmHg, a respiratory rate of 18 breaths/min, and an SpO2 of 96% on room air. The patient reported posterior neck pain, rating it 5-6 on the Numerical Rating Scale (NRS) [7]. No remarkable abnormalities were noted in the chest or abdomen. Neurological examination of the upper extremities showed a manual muscle testing (MMT) [8] score of approximately 4 - bilaterally in the biceps, triceps, wrists (both dorsiflexion and palmar flexion), and grip strength. Lower extremity evaluation was difficult due to pain. There were no obvious sensory deficits in the extremities and no signs of bowel or bladder dysfunction. A complete assessment of deep tendon reflexes was difficult to perform due to the patient's pain; however, no obvious sensory deficits were observed in the extremities.

Pathological findings

The primary uterine tumor from the initial surgery comprised endometrioid adenocarcinoma-like components (Figure *1a*) alongside a papillary proliferation of highly atypical tumor cells (Figure *1b*), consistent with high-grade endometrial carcinoma.

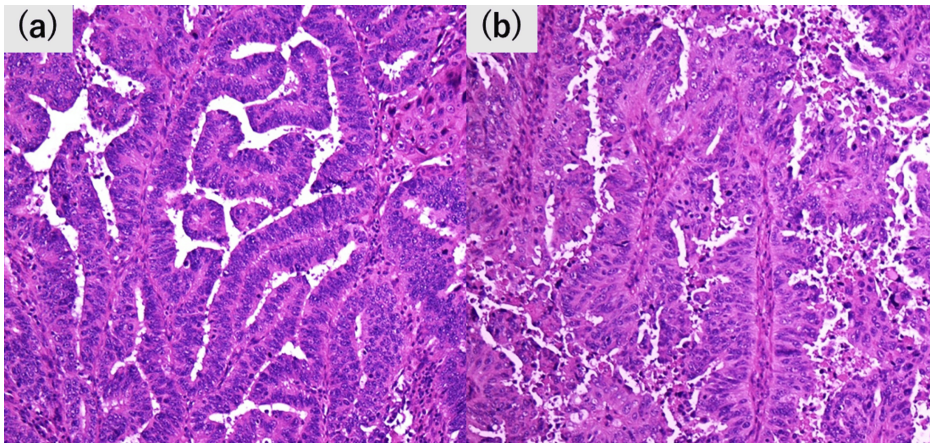


FIGURE 1: Histopathological findings of the primary endometrial tumor.

(a) An endometrioid adenocarcinoma-like component (H&E stain, original magnification ×100). (b) Papillary proliferation of highly atypical tumor cells (H&E stain, original magnification ×200). These findings are indicative of high-grade endometrial carcinoma.

The resected mediastinal tumor at the time of recurrence exhibited the same adenocarcinomatous morphology as the primary lesion (Figures *2a*, *2b*). Immunohistochemical (IHC) staining of the recurrence was positive for ER (Figure *2c*), p53 (Figure *2d*), PAX-8 (Figure *2g*), vimentin (Figure *2h*), and p16 (Figure *2i*); focally positive for TTF-1 (Figure *2e*); and negative for calretinin (Figure *2f*). These findings strongly suggested metastasis from a gynecologic malignancy with a serous carcinoma component.

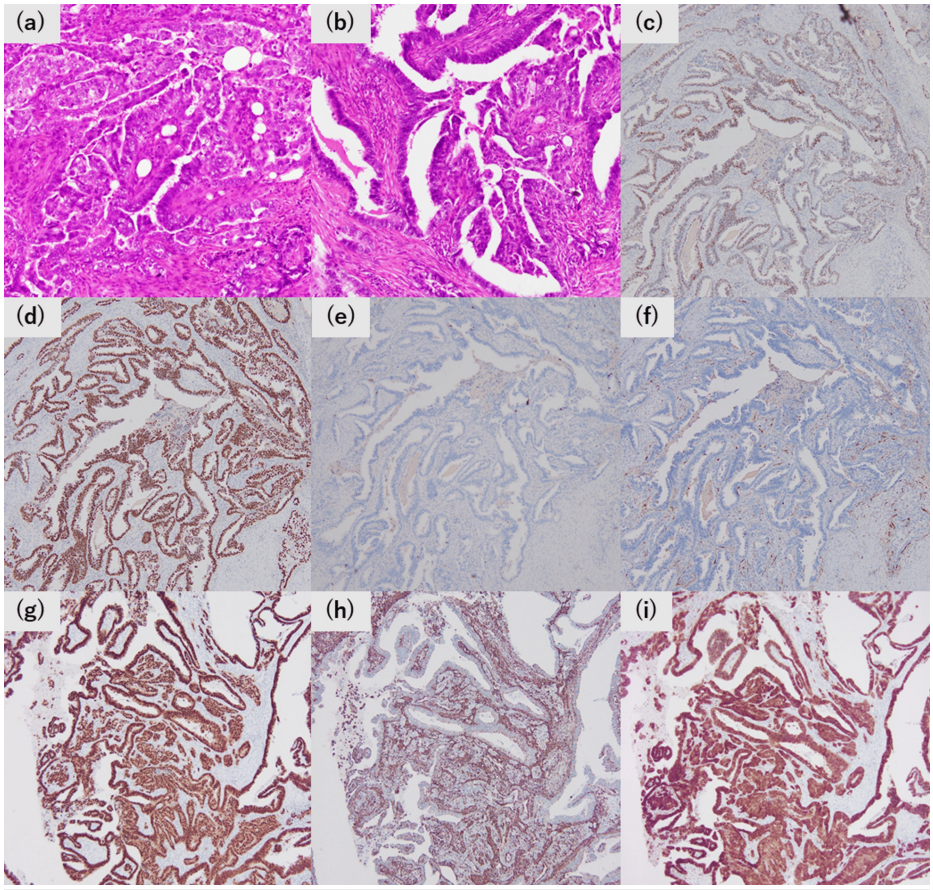


FIGURE 2: Histopathological and immunohistochemical findings of the resected mediastinal recurrence.

(a, b) Adenocarcinoma cells exhibiting a morphology identical to the primary tumor (H&E stain, original magnification ×100). Immunohistochemical staining is positive for (c) ER and (d) p53, focally positive for (e) TTF-1, negative for (f) calretinin, and positive for (g) PAX-8, (h) vimentin, and (i) p16 (original magnification ×40 for panels c-i). These findings are consistent with metastasis from a gynecological malignancy, strongly suggesting a serous carcinoma component.

Laboratory findings

Blood tests revealed hypoalbuminemia (Alb 2.9 g/dl), hyponatremia (Na 135 mEq/l), hyperglycemia (Glu 149 mg/dl), and leukocytosis (WBC 10,900/μl). The tumor marker CA125 was markedly elevated at 263.5 U/ml. No other significant abnormalities were noted (Table *1*).

Parameter	Measured Value	Reference Range	Unit
Biochemistry			
Total Protein (TP)	6.4	6.5–8.5	g/dL
Albumin (Alb)	2.9	4.1–5.3	g/dL
Total Bilirubin (T-Bil)	0.45	0.20–1.20	mg/dL
Aspartate Aminotransferase (AST)	16	10–35	IU/L
Alanine Aminotransferase (ALT)	16	10–35	IU/L
Lactate Dehydrogenase (LDH)	196	124–222	U/L
Alkaline Phosphatase (ALP)	58	38–113	U/L
Gamma-Glutamyl Transferase (γ-GTP)	22	8–60	IU/L
Creatine Phosphokinase (CPK)	7	40–180	IU/L

Blood Urea Nitrogen (BUN)	17.5	9.0–22.0	mg/dL
Creatinine (Cre)	0.32	0.40–0.80	mg/dL
Estimated GFR (eGFR)	141	> 60	mL/min/1.73 m²
Sodium (Na)	135	138–145	mEq/L
Potassium (K)	4	3.4–4.7	mEq/L
Chloride (Cl)	97	99–108	mEq/L
Calcium (Ca)	8.5	8.5–10.5	mg/dL
Glucose (Glu)	149	70–109	mg/dL
C-Reactive Protein (CRP)	0.324	0.0–0.400	mg/dL
beta-D-glucan	< 5.0	0.0–20.0	pg/mL
Tumor Markers			
Carcinoembryonic Antigen (CEA)	1.7	0.0–5.0	ng/mL
Carbohydrate Antigen 19-9 (CA19-9)	11	0–37	U/mL
Cancer Antigen 125 (CA125)	263.5	0.0–35.0	U/mL
Hematology			
White Blood Cells (WBC)	10,900	3,500–9,000	/μL
- Neutrophils	83.8	-	%
- Lymphocytes	10	-	%
- Monocytes	6.1	-	%
- Eosinophils	0	-	%
- Basophils	0.1	-	%
Red Blood Cells (RBC)	482	370–490	10^4/μL
Hemoglobin (Hb)	14.3	11.3–14.9	g/dL
Hematocrit (Ht)	44.1	34.0–45.0	%
Mean Corpuscular Volume (MCV)	91.5	78.0–100.0	fL
Mean Corpuscular Hemoglobin (MCH)	29.7	26.0–34.0	pg
MCH Concentration (MCHC)	32.4	29.0–35.0	g/dL
Platelets (PLT)	36.9	12.5–37.5	10^4/μL

TABLE 1: Laboratory Findings

Head MRI findings

Head MRI showed multiple metastatic brain tumors with surrounding edema in the right cerebrum, cerebellum, and brainstem (Figures *3a*-c).

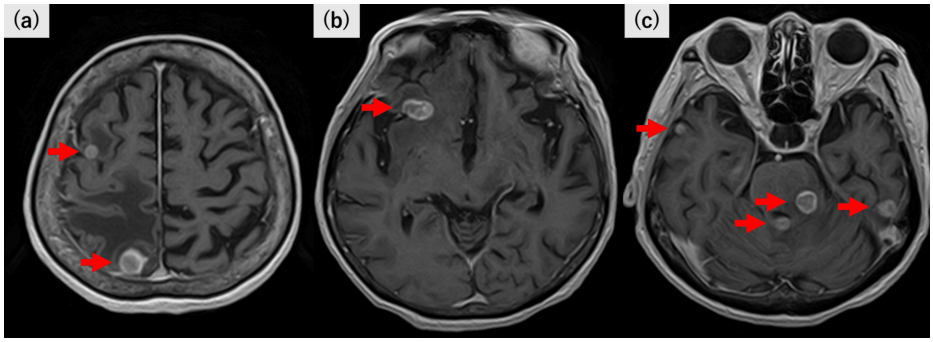


FIGURE 3: Brain MRI findings.

Gadolinium-enhanced T1-weighted imaging demonstrates multiple brain metastases with surrounding edema in the right cerebrum, cerebellum, and brainstem (red arrow) (a-c).

Cervical MRI findings

Cervical MRI demonstrated a well-demarcated nodular lesion within the cervical spinal cord parenchyma at the C7 level. This lesion appeared isointense on T1-weighted images (T1WI) (Figure *4a*) and exhibited homogeneous, distinct enhancement on gadolinium-enhanced T1WI (Figures *4b*, *4e*) and fat-suppressed T1WI (Figures *4c*, *4f*), without signs of intradural extramedullary or epidural compression. T2-weighted images (T2WI) (Figures *4d*, *4g*) showed an extensive hyperintense area surrounding the tumor, suggestive of intramedullary edema. Additionally, T1WI (Figure *4a*) indicated hypointense areas in the C6 and Th1 vertebrae, suspected to be bone metastases.

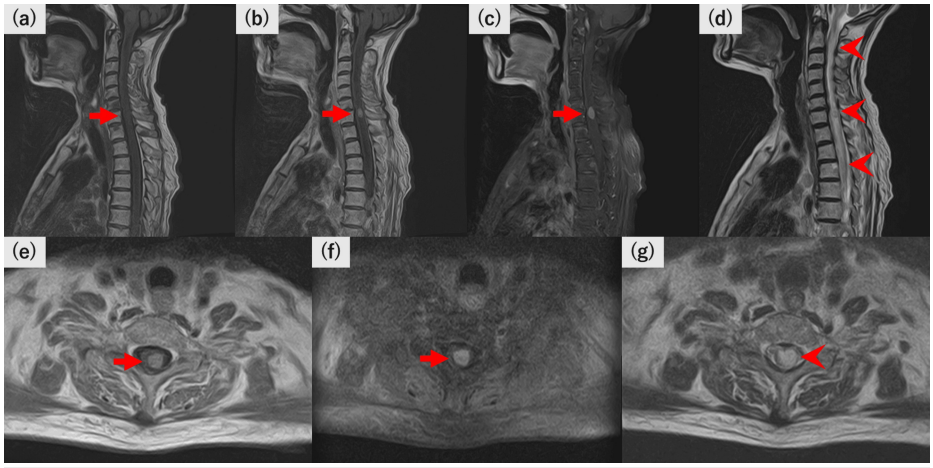


FIGURE 4: Cervical spine MRI findings.

(a) T1-weighted image (T1WI) shows an isointense nodular lesion in the spinal cord at the C7 level (red arrow), with hypointense areas at C6 and T1 suggesting bone metastases. (b, e) Gadolinium-enhanced T1WI and (c, f) fat-suppressed contrast-enhanced T1WI show a well-circumscribed, homogeneously enhancing intramedullary mass without dural or epidural compression (red arrow). (d, g) T2-weighted images reveal extensive hyperintense areas surrounding the tumor, indicative of intramedullary edema (red arrowhead).

Chest CT findings

Chest CT revealed enlarged mediastinal lymph nodes and left-dominant bilateral pleural effusions (Figure *5*).

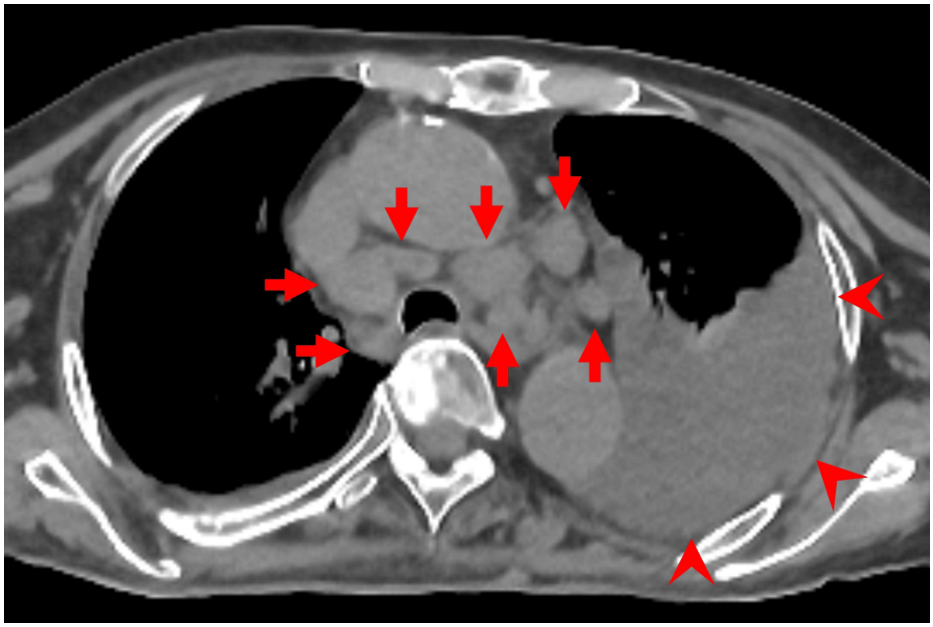


FIGURE 5: Chest CT findings.

Chest CT shows enlargement of mediastinal lymph nodes (red arrow) and left-dominant bilateral pleural effusion (red arrowhead).

Clinical course

At the time of transfer on June 23 (Day 1), the progressing brain metastases had already been treated with SRS by the previous physician. The right frontal lobe and left cerebellar lesions had notably shrunk following the SRS performed in March (Figure *6*). Due to equipment limitations at the previous facility, palliative radiotherapy (30 Gy in 10 fractions, 3D-CRT, D-max 31.423 Gy) was planned for the ISCM at our hospital. The radiation field was extended one vertebral body cranially and caudally to encompass the concurrent C6 and Th1 bone metastases (Figure *7*). Pain management included sustained-release oxycodone (40 mg/day) and pregabalin (150 mg/day). By Day 7, her posterior neck pain had improved to an NRS of 0-1; anticipating future difficulties with oral intake, her analgesia was transitioned to a fentanyl transdermal patch (1 mg; 0.3 mg/day). The pain remained well-controlled without exacerbation following this opioid rotation. Her upper limb weakness also showed slight improvement, reaching an MMT of 4+ by Day 18. Because the primary goal of this intervention was symptom palliation in the end-of-life setting, follow-up MRI to document objective radiologic tumor response was not performed; efficacy was assessed solely by clinical symptom improvement. However, her overall condition gradually deteriorated, leading to a transfer to a hospice for end-of-life care on Day 32. She passed away due to disease progression approximately two weeks later.

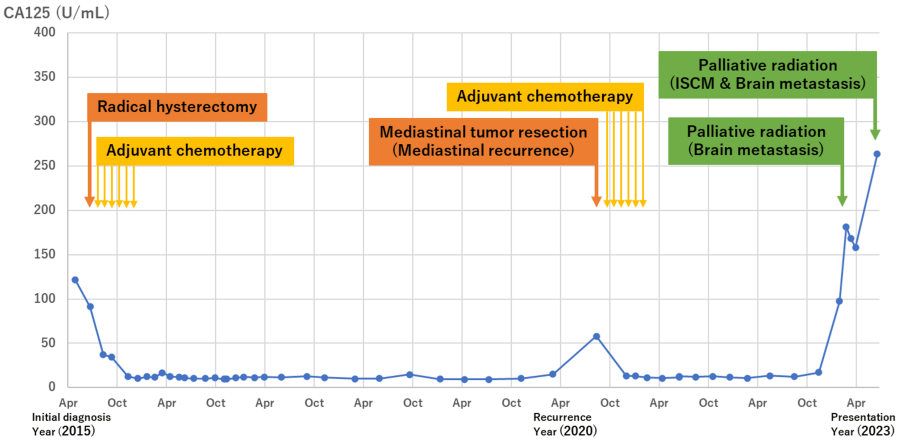


FIGURE 6: Clinical course.

Timeline of the patient's treatment over eight years, from initial radical hysterectomy to the development of ISCM and palliative radiation. This image was created by the authors using Microsoft PowerPoint (Microsoft Corporation, Redmond, Washington).

ISCM: Intramedullary spinal cord metastasis.

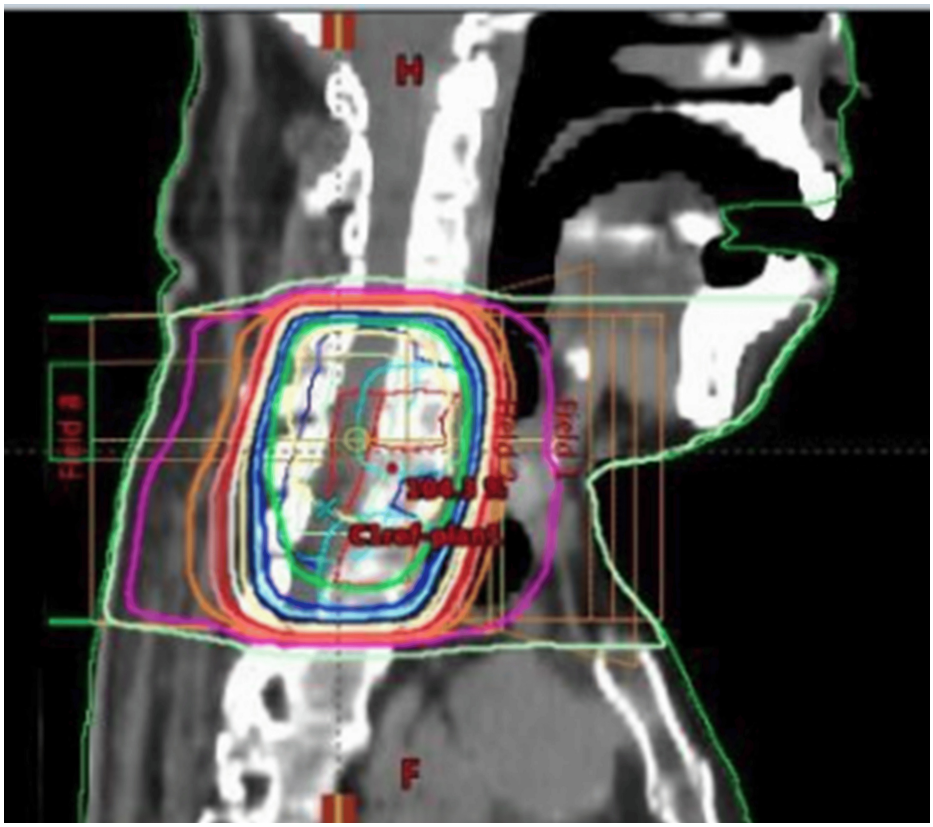


FIGURE 7: Radiotherapy treatment planning.

The palliative radiotherapy plan targeting the intramedullary spinal cord metastasis and adjacent bone metastases (C6 and T1). A total dose of 30 Gy in 10 fractions using 3D-conformal radiotherapy (3D-CRT) was prescribed.

Discussion

ISCM is a specific pattern of CNS metastasis. While CNS metastases most frequently involve the cerebrum, involvement of the cerebellum, brainstem, or spinal cord is relatively rare. This rarity is thought to be due to the narrow caliber of blood vessels at the gray-white matter junction, which limits hematogenous spread [3].

Proposed mechanisms for ISCM dissemination include (1) hematogenous spread via arteries, (2) dissemination through the spinal venous plexus, (3) cerebrospinal fluid (CSF) seeding from pre-existing brain metastases, and (4) direct invasion [9-11]. The most common primary sites for ISCM are the lungs (51.4%) and breasts (18.6%), with lesions typically occurring in the cervical cord (33.7%), thoracic cord (16.3%), or conus medullaris (16.3%) [4]. According to reports of ISCM secondary to lung cancer, common clinical presentations include lower limb weakness (76.4%), sensory disturbances (61.5%), pain (49.7%), and bowel/bladder dysfunction (48.4%) [12]. Characteristic MRI features consist of distinct enhancement, extensive hyperintensity on T2WI, and the absence of cysts or hemorrhage [13]. Although a standardized treatment protocol has not been established, radiotherapy is often selected - similar to the approach for brain metastases - because the blood-brain barrier limits the efficacy of systemic pharmacotherapy [4]. A 2025 systematic review of stereotactic radiotherapy for ISCM reported a median survival of approximately nine months, an 86.3% local control rate, good neurological control in 69% of patients, and no observed spinal cord toxicity [14]. Surgical intervention may also be considered; a 2024 review demonstrated that gross total resection was achieved in 54% of cases, yielding an 85% local control rate, symptomatic improvement or stabilization in 92%, and a median survival of about five months [15].

CNS metastases from endometrial cancer are relatively uncommon, accounting for only 0.84% of all patients with brain metastases [2]. The median time to the development of brain metastases is reported to be 20.8 months, with a median overall survival of 6.8 months from the time of diagnosis [2]. Furthermore, ISCM originating from endometrial cancer is exceptionally rare. To our knowledge, besides one detailed case report published in 2014 [5], only a few cases have been noted in reports by Jincai et al. [16] and Sung et al. [17].

In the present case, the patient developed both metastatic brain tumors and ISCM from a primary endometrial cancer. Given the preceding history of brain metastases, the mechanism of ISCM development was highly suspected to be CSF seeding. Although a lumbar puncture for CSF cytology could definitively confirm this mechanism, it was deferred due to the risk of cerebral herniation from the existing brain metastases and the overarching goal of non-invasive palliative care. MRI revealed marked contrast enhancement and a broad area of hyperintensity on T2WI indicative of edema. These features are typical of ISCM and effectively ruled out non-neoplastic lesions or primary spinal cord tumors, especially when contextualized with the patient's treatment history. Alongside pharmacological pain management, palliative radiotherapy was administered in consideration of her poor ECOG-PS score. This intervention proved partially effective, as evidenced by the clear improvement in her NRS scores and slight recovery in MMT. Therefore, the significant pain relief observed was likely a combined effect of both the radiotherapy and the concurrent use of opioids and pregabalin.

As advances in oncology continue to prolong patient survival, the incidence of CNS metastases, including brain tumors, is expected to rise [18]. Consequently, clinicians may increasingly encounter rare metastatic manifestations developing over long clinical courses, as demonstrated in this case. In patients with advanced malignancy, when MRI findings are highly suggestive and invasive diagnostic procedures are unlikely to alter management, a clinicoradiological diagnosis may be considered sufficient. Although tissue confirmation of the intramedullary lesion itself was not obtained, a highly invasive spinal cord biopsy was deemed clinically inappropriate given the patient's advanced age, poor performance status (ECOG-PS 3), and the presence of extensive distant metastases. Therefore, ISCM was diagnosed clinically based on the typical MRI features. The validity of identifying endometrial cancer as the primary source is supported by the patient's clinical course, where fluctuations in the disease-activity marker CA125 correlated with her initial treatment and mediastinal recurrence. This mediastinal recurrence had been previously confirmed to match the primary tumor histologically. Notably, CA125 levels transiently decreased (from 181.3 U/ml to 158.2 U/ml) following radiotherapy for her brain metastases.

Furthermore, at the time the ISCM was identified, the adjacent mediastinal lymph nodes had enlarged again following the prior mediastinal resection, suggesting parallel progression of the disease. Although the resected mediastinal recurrence was focally positive for TTF-1, partial TTF-1 positivity has been previously documented in endometrioid carcinomas [19]. Importantly, the tumor was positive for PAX-8 - a highly specific marker for Müllerian-derived tumors - which effectively ruled out primary lung cancer. The additional positivity for vimentin, p16, and ER, combined with the morphological features on H&E staining, were fully consistent with endometrial cancer. Given the extremely limited number of past reports, the present case - which developed after a prolonged course of eight years from the initial diagnosis - represents a highly valuable report with a well-documented clinical course.

Conclusions

Although ISCM originating from endometrial cancer is extremely rare, its clinical recognition may increase as advanced cancer survival times and neuroimaging utilization improve. Palliative radiotherapy remains a valuable and highly viable therapeutic option for rapid symptom palliation and neurological preservation in these patients.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Shuji Kodama, Masamichi Yoshida

Acquisition, analysis, or interpretation of data: Shuji Kodama, Yui Nanpei, Takuya Kawamura, Mikiko Sakai

Drafting of the manuscript: Shuji Kodama

Critical review of the manuscript for important intellectual content: Shuji Kodama, Yui Nanpei, Takuya Kawamura, Mikiko Sakai, Masamichi Yoshida

Supervision: Shuji Kodama, Yui Nanpei, Takuya Kawamura, Masamichi Yoshida

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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