Case Report

A case of primary small cell neuroendocrine carcinoma of the uterus ☆,☆☆

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ABSTRACT

Neuroendocrine carcinoma of the uterine endometrium is extremely rare and found in <1% of all primary endometrial carcinomas. We report a case of neuroendocrine carcinoma of the endometrium detected in a 65-year-old woman and focus our attention on the main imaging features. The low apparent diffusion coefficient value and high maximum standardized uptake value for neuroendocrine cancer serve to distinguish this cancer from endometrial cancer.

Introduction

Neuroendocrine carcinomas (NECs) often develop in the gastrointestinal system or respiratory system at a high rate of approximately 90% [1]. NEC of the uterine endometrium is extremely rare and found in <1% of all primary endometrial carcinomas, and it is also known as an aggressive tumor with a poor prognosis. Only a few cases have been reported in the English literature to date. Here, we report a case of NEC of the uterine endometrium.

Case presentation

A 65-year-old woman was admitted to the Department of Gynecology because of irregular genital bleeding and abdominal mass that had grown for 6 months. Cytodiagnosis performed upon medical examination indicated suspected malignant lymphoma. The laboratory tests were unremarkable, except for the evaluation of serum lactate dehydrogenase (3190 U/L; reference level, 124-222 U/L), neurospecific enolase (level, 153.2 ng/mL; reference level, ≤12.0 ng/mL), carbohydrate antigen 125 (level, 73.3 U/mL; reference level, ≤35.0 U/mL), and progastrin releasing peptide (level 36.6 Pg/mL; reference level, ≦81.0 Pg/mL). Computerized tomography (CT) showed that the uterus was significantly enlarged, with an irregular mass (114 × 99 × 110 mm) observed in the uterine
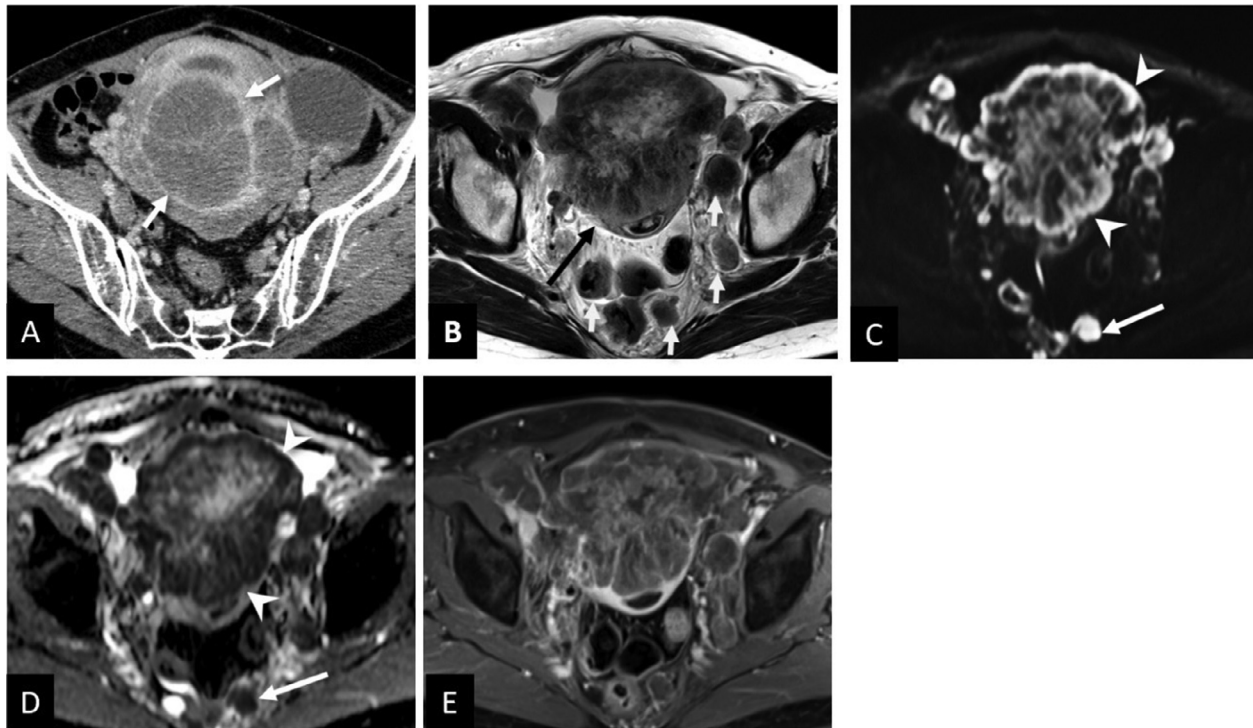
Fig. 1. – (A) Axial contrast-enhanced CT scan shows a bulky mass (arrows) in the uterus with heterogeneous enhancement, suggesting the presence of necrosis. (B) Axial T2-weighted MR image demonstrates the mass (long black arrow) of heterogeneous intensity in the endometrial cavity and multiple lymphadenopathies (short white arrows). (C) Axial diffusion-weighted image shows hyperintensity with border-predominant (white arrowheads) of the mass and lymphadenopathy (long white arrows). (D) ADC map shows low signal intensity in the same site of DWI hyperintensity. (E) Axial contrast-enhanced T1-weighted MR image shows the mass of heterogeneous intensity.

cavity (Fig. 1A). CT also revealed a mass invading the bilateral ovaries and swelling of the lymph nodes in the pelvis and para-aortic site. The mass demonstrated homogeneously low signal intensity on T1-weighted imaging and heterogeneously slightly high signal intensity on T2-weighted imaging (Fig. 1B). The tumor showed high signal intensity on diffusion-weighted imaging (b = 1000 s/mm^2) (Fig. 1C) and a low signal intensity on the apparent diffusion coefficient (ADC) map (0.59×10–3 mm^2/s) (Fig. 1D). Dynamic T1-weighted contrast-enhanced fat-suppressed imaging revealed a gradually increasing enhancement effect (Fig. 1E). Fluorodeoxyglucose (FDG) positron emission tomography with CT (Fig. 2) imaging demonstrated increased high uptake of FDG of the uterine mass (maximum standardized uptake value: SUV$_{max}$ range 31.5-36.9), nodules of the ovaries (SUV$_{max}$ range 39.9-43.0), enlarged lymph nodes: inguinal lymph nodes (SUV$_{max}$ range right lesion 21.2-26.9, left lesion 14.2-18.2), and peritoneal dissemination (SUV$_{max}$ range 6.1-8.0). Biopsy was performed, and immunohistochemistry revealed positive staining for synaptophysin, cluster of differentiation 56 and Ki67 (95%+), and negative staining for chromogranin. The tumor was diagnosed as small cell NEC. The patient died 6 months later after surgery.

Discussion

NEC develops in cells of the pituitary gland, parathyroid gland, adrenal medulla, and other cells with neuroendocrine granules. Primary NEC of the uterus is rare, with an incidence of approximately 1% of all malignant endometrial tumors having the same histological features as small cell cancer seen in the lungs and gastrointestinal tract. At stage IVB, almost all patients undergo total hysterectomy with adnexectomy; however, the prognosis is poor, with a mean survival period of 9 months [1]. Lymph node metastasis, generalized metastases, and intraperitoneal dissemination commonly occur, while the initial clinical symptoms often include irregular vaginal bleeding and abdominal pain. In our case, lymph metastasis and intraperitoneal dissemination were also observed. NEC arising in the uterus is said to differ from the initial diagnosis in approximately 90% of cases. Histologically, most neuroendocrine cancers arising in the endometrium are large-cell cancers, with the same morphology as small cell lung cancer, and in many instances, there is accompanying necrosis in the inner portion of the tumor [1].

Kitajima K et al. [2] reported that the characteristics of primary neuroendocrine cancer of the uterus include a dis-
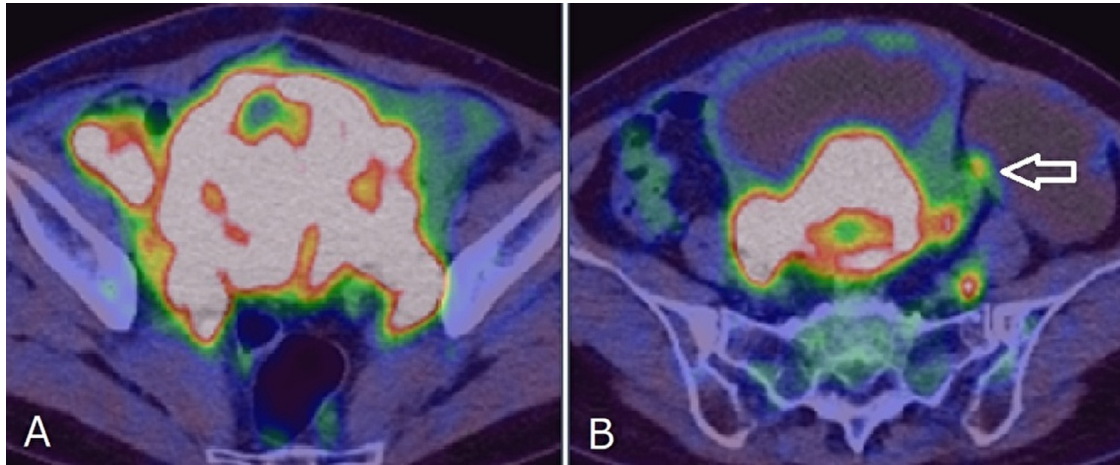
Fig. 2. – (A) FDG-PET/CT images demonstrate a bulky mass in the uterine cavity, and the SUV$_{max}$ of the lesion was 36.9. (B) The SUV$_{max}$ of the ovarian nodule was 43 (arrowheads).
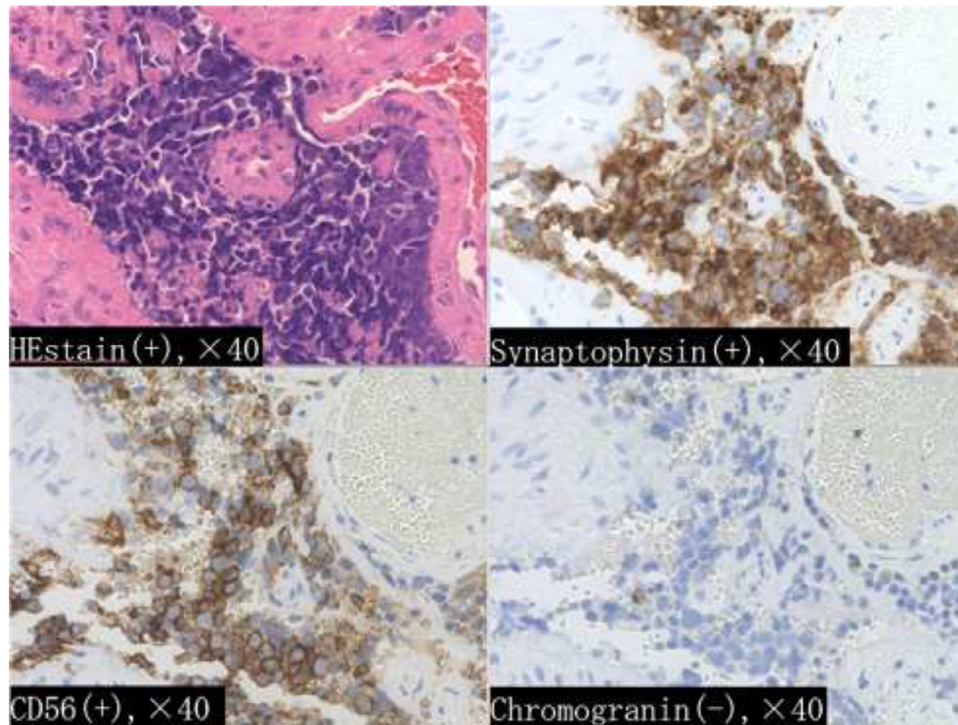

Fig. 3 – Immunohistochemistry revealed positive staining for synaptophysin, cluster of differentiation (CD) 56 and Ki67 (95%+) and negative staining for chromogranin.

tinct border (72.7%), isointensity on T1WI (59.1%), slightly hyperintense signal on T2WI (68.2%), extremely high intensity on diffusion-weighted imaging (100%), extremely low intensity on ADC mapping (100%), and a dynamic contrast enhancement pattern, gradually increasing the contrast enhancement effect in the late phase (80%), with moderate enhancement (80%), and most of these findings were consistent with our patient. Furthermore, in the report by Qi Wan et al. [3], characteristics seen in primary neuroendocrine cancer of the uterus included extremely high FDG uptake (SUV$_{max}$: approximately 36.9) and high FDG uptake in lymph node metastases (SUV$_{max}$ early = 7.0, SUV$_{max}$ delayed = 21.4). In the present case, we also found high FDG uptake in the primary lesion, lymph node lesions (uterine mass SUV$_{max}$ early = 31.5, SUV$_{max}$ delayed = 36.9), and metastatic lymph nodes (SUV$_{max}$ early = 8.1, SUV$_{max}$ delayed = 26.9) [4].

In addition to these characteristics, we currently focused on the reduced ADC values of neuroendocrine cancer. Many imaging characteristics are shared between cancer of the uter-

ine body and primary neuroendocrine cancer of the uterus, making image-based diagnosis difficult. Antonsen et al. [5] summarized reports of uterine body cancer and reported that the ADC value of uterine body cancer was $0.86 \pm 0.22 \times 10^{-3}$ mm^2/s, with a negative correlation between the ADC value and cell concentration; however, there was no correlation with the level of invasion. On the other hand, Mebis et al. [6] reported that in neuroendocrine tumors, there is a negative correlation between the ADC value and the level of malignancy, and with regard to G3 in particular, the ADC value is considerably low (0.32-0.67×10^{-3} mm^2/s). The SUV_{max} values were high for uterine body cancer and neuroendocrine cancer; however, it has been reported that the ADC value for neuroendocrine cancer is lower than that of uterine body cancer, which we believe can serve to distinguish this cancer from other types.

Conclusion

The low ADC value and high SUV_{max} for neuroendocrine cancer serve to distinguish this cancer from endometrial cancer.

Patient consent

The author was unable to obtain written consent from the patient because the patient died. The patient had no known relatives or guardian. Because of the public interest in publication, the anonymization of the patient, and that the patient or their relatives could not be contacted, exceptional agreement for publication of the case report was given by the Editor-in-Chief of the journal *Radiology Case Reports*.

Availability of data and material

Data available within the article.

Code availability

Not applicable.

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