

Unilateral ovarian metastasis from gastric mucinous adenocarcinoma visualized on FDG PET/CT

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Abstract. – **BACKGROUND:** Krukenberg tumor is a metastatic ovarian tumor with primary focus usually seen in the gastrointestinal tract. Metastatic involvement of the ovary is an uncommon manifestation of malignancy. We report a [18F]-fluoro-2-deoxy-D-glucose positron-emission tomography/computed tomography (FDG PET/CT) appearance of solitary unilateral ovarian metastasis in a 44-year-old woman with a history of mucinous adenocarcinoma type of gastric carcinoma. Total hysterectomy with bilateral salpingo-oophorectomy was performed. Histopathological verification determined metastasis of mucinous adenocarcinoma with components of signet-ring cell carcinoma in the right ovary.

Key Words:

FDG PET/CT, Gastric carcinoma, Ovarian metastasis, Krukenberg tumor.

Introduction

Krukenberg tumor is a metastatic ovarian tumour with primary usually seen in the gastrointestinal tract¹⁻⁷. It was initially described by Friedrich Ernst Krukenberg in 1896 as a new ovarian tumor; fibrosarcoma ovarii mucocellulare carcinomatodes. Subsequently, in 1902 Schlagenhauer reported the nature of the Krukenberg tumor; that it's secondary, epithelial in origin and metastatic to the ovaries^{8,9}.

Neoplasm from the gastrointestinal tract especially from colon, stomach and breast cancer are three the most common non-genital tumors that metastasize to the ovary². Gastric cancer, the most common malignancy, frequently reveals lymph node, peritoneum, and liver metastases. In contrast, ovarian metastasis is rare. Ovarian metastases account for 1-19% of all ovarian malignancies^{3,4}. They are generally bilateral².

Positron-emission tomography/computed tomography (PET/CT) with [18F]-fluoro-2-deoxy-D-glucose (FDG) is increasingly being used for diagnosis, disease staging and restaging, and treatment monitoring in patients with various cancers⁵.

We report a case of solitary unilateral ovarian metastases of detected on FDG PET/CT and confirmed by histopathology.

Case Report

A 44-year old female patient with mucinous adenocarcinoma type of gastric carcinoma underwent subtotal gastrectomy. After a year tumor marker level measurement revealed markedly elevated carcinoembryonic antigen [CEA] of 6.1 ng/ml (reference range 0-4); increased carbohydrate antigen [CA] 19-9: 219.4 U/ml (reference range 0-35), and CA125: 12 U/ml (reference range 0-35). The patient was referred to FDG-PET/CT scan for restaging.

Whole-body PET/CT images were obtained approximately 60 min after the intravenous injection of 420 MBq FDG. FDG-PET/CT images showed unilateral adnexal focus of increased FDG uptake (maximum standardized uptake values (SUVmax): 4.8) with no other sites of metastasis (Figure 1). Total hysterectomy with bilateral salpingo-oophorectomy was performed. Histopathological verification determined metastasis of mucinous adenocarcinoma (Figure 2A) with components of signet-ring cell carcinoma in the right ovary (Figure 2B).

Discussion

The Krukenberg tumor describes the classic metastatic lesion to the ovary. Metastasize to the ovary may be through haematogenous, lymphat-

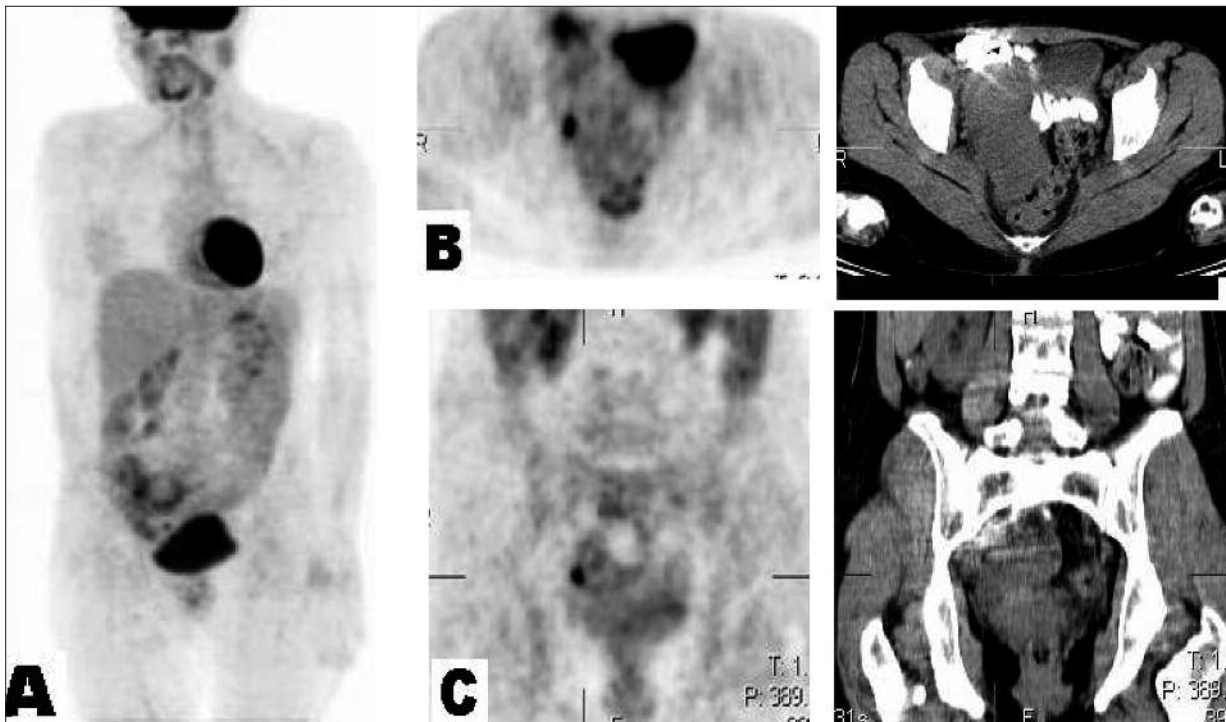


Figure 1. A maximum intensity projection (MIP) image (A), of PET showed intense FDG uptake in the right adnexal area. Transaxial PET and CT (B) coronal PET and CT (C) revealed a focal uptake in the same localization.

ic, or transperitoneal spread, as well as by direct extension. Ovarian metastases account for 1-17% of all ovarian malignancies⁵. An adnexal mass suspicious for an ovarian neoplasm that may be determined as metastatic spread to the ovary in approximately 6-7% of patients^{2,5}. Unilateral Krukenberg tumor is, allegedly, exceptional⁴ as in our case.

Prognosis of Krukenberg tumors is extremely poor, when compared to that of primary ovarian cancer⁷. Total hysterectomy with bilateral salpingo-oophorectomy should be the choice of treatment if curative resection is possible. In order to perform curative surgery for the metastasis, early detection would be important^{3,7}. Any patient presenting with a pelvic mass suspicious for an

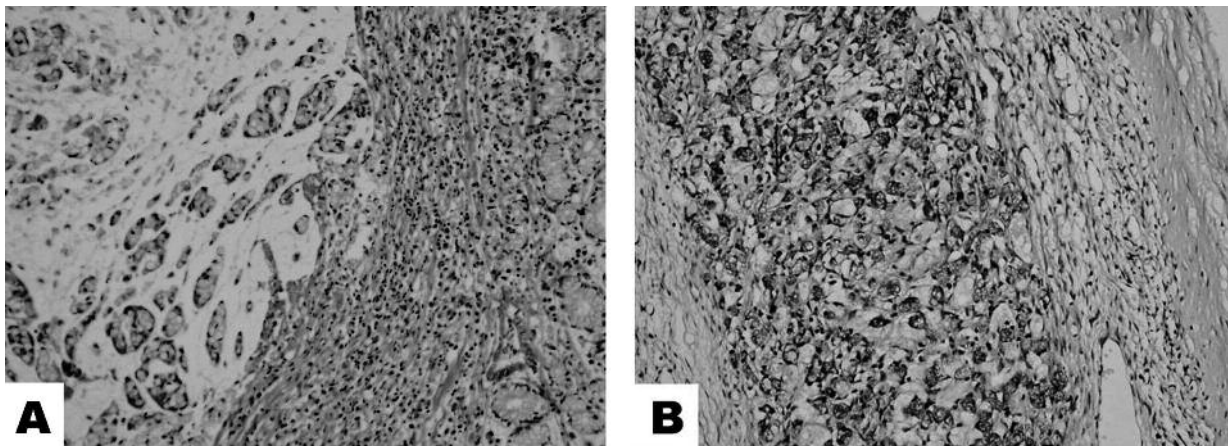


Figure 2. A, The gastric body showed (H&E, $\times 100$) normal gastric foveolar epithelium on the right side and signet-ring cells with intracytoplasmic mucin accumulation on the left. B, Histology revealed diffuse stromal proliferation of signet-ring cells in ovary (H&E, $\times 100$).

ovarian cancer should undergo a careful and detailed work-up to exclude a primary tumor that is metastatic to the ovary².

Several Authors have reported the features of ovarian metastases using ultrasonography, computed tomography, and magnetic resonance imaging, few characteristics that are specific to this entity have been described and it is difficult to differentiate primary ovarian cancer from ovarian metastasis. Accurate diagnosis of ovarian metastases by imaging techniques is important for determining the appropriate therapy management and predicting the patient's prognosis⁵.

Metastatic ovarian cancer, primary ovarian cancer, and presents abnormal FDG uptake, it is difficult to accurately distinguish secondary from primary ovarian malignancies due to similar SUVmax levels. Moreover, physiological ovarian FDG accumulation is often evident around the time of ovulation in premenopausal healthy women. However, PET/CT is useful for evaluating the whole-body state in terms of micro- metastasis and is able to detect metastatic lesions^{5,10}.

The FDG affinity of signet-ring cell carcinoma mucinous adenocancer is low¹⁰, however we were able to detect the metastasis on FDG PET/CT. The unique feature of our case is that the Krukenberg tumor detected by FDG PET/CT is unilateral and solitary, which is overall exceptional.

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