IV. 1. Differential Diagnosis of Idiopathic Fibrosis with PET

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Introduction

Idiopathic retroperitoneal fibrosis and sclerosing peritonitis are a family of multifocal idiopathic fibrosis\(^1\). The process is characterized by chronic or granulomatous inflammation, and scar tissue in the end stage\(^2\). The symptoms of both are mainly due to constriction and compression of retroperitoneal or peritoneal structures and are non specific\(^3\). Also radiological appearances are mimicked by malignant lymph adenopathy\(^4\).

Differential diagnosis of retroperitoneal fibrosis from malignant adenopathy has been studied with CT scan \(^5,6\), ultrasound \(^7\) and magnetic resonance imaging \(^8\). Although there are some morphologic clues suggesting the correct diagnosis, it may be not easy to distinguish retroperitoneal fibrosis from malignant adenopathy with these modalities. Positron emission tomography (PET) using 2-deoxy-2-\([^{18}\text{F}]\) fluoro-D-glucose (FDG) has successfully showed biological characteristics of individual tumor such as benign or malignan\(^9,10\), grade of malignancy\(^11\). In order to differentiate the idiopathic fibrosis from malignancy, we performed FDG-PET study on a retroperitoneal fibrosis, a sclerosing peritonitis and a malignant lymphoma.

Case reports

Case 1.

A 55-year-old man was notified elevated blood sedimentation rate (90mm/hr) in his medical check up. He had lower back pain a month ago otherwise unremarkable history, physical examination, blood biochemical examination and blood cell counts. A gallium-67 whole body scan revealed an increased uptake in the middle of lower abdomen. Abdominal CT demonstrated thin homogeneous mass enveloping the inferior vena cava and aorta from the renal hilum to the upper sacral level (Fig. 1a). Drip infusion urography showed left hydrenephrosis and hydroureter narrowing at the level of fifth lumbar vertebra. PET imaging
30 min after injection of 2.9 mCi of FDG showed a warm area corresponding to the mass and a hot spot representing a urinary excretion of FDG in dilated left ureter (Fig. 1b). The region of interests were set in the mass and in the back muscle as previously\textsuperscript{10}, and the mass to muscle radioactivity ratio was 2.0. After the PET study, needle biopsy guided by ultrasound demonstrated retroperitoneal fibrosis.

Case 2.

A 64-year-old woman complained abdominal fullness three months after the last steroid therapy for sclerosing peritonitis. Five years ago she had laparotomy and diagnosis of sclerosing peritonitis. She had received the steroid therapy twice, two years ago and three month ago, due to abdominal fullness, led edema and elevated blood urea nitrogen. CT scan showed fibrous mass in the peritoneum and the paraaortic lesion. PET images obtained 35 min after injection of 4.6 mCi of FDG showed low uptake of FDG in the mass lesion and the mass to muscle ratio was 1.9.

Case 3.

A 71-year-old woman complained systemic lymphadenopathy in the neck, supraclavicular and axillary lesion. She had malignant lymphoma 4 years ago and received 8 courses of chemotherapy. Abdominal CT showed multiple mass lesions extending over the inferior vena cava and the aorta (Fig. 2a). The PET images obtained 40 min after injection of 5.1 mCi of FDG clearly showed high tracer uptake by the tumors suggesting malignant lymphadenopathy. Tumor to muscle ratio was 9.4 (Fig. 2b). After the PET study, she had chemotherapy and the lymphadenopathy was disappeared.

Discussion

Gallium scintigraphy played a role of identifying the lesion of retroperitoneal fibrosis\textsuperscript{12}. The accumulation mechanism of Gallium-67 in retroperitoneal fibrosis was considered to be the same as that in inflammation\textsuperscript{13}. There may be slight difference from the positive gallium scan for retroperitoneal fibrosis and that for malignant lymphadenopathy, but its clear distinction is difficult. In this study, cases of retroperitoneal fibrosis and recurrent sclerosing peritonitis showed low FDG uptake whereas high FDG uptake in malignant lymphadenopathy was observed. High FDG uptake by malignant lymphoma\textsuperscript{14} and metastatic lymphadenopathy\textsuperscript{15} have been reported. Strauss et al. reported that the postoperative scar tissue showed low FDG accumulation and it produced good contrast to high FDG concentration in the recurrent colon cancer\textsuperscript{9}. Idiopathic fibrosis consisting of granulomatous or chronic inflammation seems to have the same low FDG uptake as the post-
operative scar. However, abdominal abscesses were reported to have high FDG uptake. The mechanisms of FDG uptake in abscess but not in fibrosis nor in scar were not clear. We demonstrated the usefulness of FDG-PET study for the differential diagnosis of idiopathic fibrosis from malignant lymphadenopathy for the first time.

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References

Fig. 1 A case of retroperitoneal fibrosis.
(a) A mass enveloping the inferior vena cava and aorta with CT.
(b) FDG image with PET (PT931/04, CTV) showing a hot spot of dilated ureter (arrow head) and a warm tumor with low contrast to muscle (arrow). Tumor/muscle ratio was 2.0.

Fig. 2 A case of malignant lymphoma.
(a) Multiple paraaortic nodules with CT.
(b) FDG image with PET showing high radioactivity in the tumor. Tumor / muscle ratio was 9.4.