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PET/CT Imaging of disseminated peritoneal leiomyomatosis: Cases reports

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► ***Case reports***

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ABSTRACT

Disseminated Peritoneal Leiomyomatosis (DPL) is a rare benign illness characterized by numerous smooth muscle nodules over the peritoneal surface of the abdomen and pelvis. It mostly occurs in women of reproductive age, seldom in the postmenopausal women and men. We herein report two DPL cases and both of them took ^{18}F-FDG PET/CT (Fluorine 18 Fluorodeoxyglucose Positron Emission Tomography) examination. On PET/CT images, all DPL nodules presented low to moderate metabolism, and the range of SUVmax (standard uptake value) was 1.9 to 4.4. An unusual diagnosis of DPL was difficult to make.

INTRODUCTION

Disseminated Peritoneal Leiomyomatosis (DPL) is a rare benign illness characterized by numerous smooth muscle nodules over the peritoneal surface of the abdomen and pelvis.[1] Wilson and Peale first described DPL in 1952[2], and Taubert et al. later renamed it as a separate entity [3]. It typically develops in women of childbearing age, more frequently in those who have a history of uterine leiomyomas [4]. The pathophysiology, however, is still under debate, and potential causes include hormonal, genetic, or iatrogenic stimulation [5]. DPL typically presents radiologically as numerous nodules of various sizes, which makes it very difficult to distinguish from widespread malignancy. We collected two DPL cases and had each underwent radiological testing, including PET/CT scans, in order to better understand the disease's imaging characteristics and increase diagnostic accuracy. In addition, some literature was read. This study will go into further detail about this disease's imaging characteristics and differential diagnoses.

Case reports

Case 1

A 36-year-old woman came to our hospital for a routine body check. The patient had regular menstruation, and in 2013 and 2016 she underwent laparoscopic myomectomys because of uterine leiomyoma. She required an ^{18}F-FDG PET/CT (GE Discovery STE 16, USA) scan for a whole body check. Multiple soft-tissue peritoneal masses were discovered on imaging in the mesenteric space, bilateral paracolic gutter, subcapsular liver, and adnexal region. Those well-defined lobulated masses showed a medium glucose metabolism, with the highest SUVmax of 4.4. Although the tumor makes were negative and the patient was asymptomatic, the diagnosis of metastasizing malignancy was difficult to rule out. The patient underwent a total hysterectomy, as well as bilateral salphingo-oophorectomies and peritoneal nodule removal. Histological examination showed that the tumors were comprised of smooth muscle cells with mild to moderate atypia. On immunohistochemical staining, estrogen receptor (ER), progesterone receptor (PR), Desmin and Caldesmon were positive, and the Ki-67 index was 10%. The final diagnosis was disseminated peritoneal leiomyomatosis.

Case 2

A 51-year-old postmenopausal woman came to our hospital because of slight abdominal discomfort. Five years prior, she underwent a myomectomy to remove a uterine leiomyoma. Multiple soft-tissue density masses of varying sizes were detected on contrast-enhanced computed tomography (CECT) of the upper abdomen, with the largest mass measuring 5.8cm × 4.6cm anterior to the left kidney. Those masses were well-circumscribed with homogenous enhancement. On pelvic magnetic resonance imaging

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(MRI), these masses located in pelvis, bilateral iliac fossa and pouch of Douglas, appearing as hypointense on T1-Weighted and slight hyperintense on T2-Weighted. PET/CT (GE Discovery STE 16, USA) was suggestive of low FDG uptake for most masses with a SUVmax of 1.9. Moderate uptake of FDG was observed in pelvic cavity with a SUVmax of 3.1. The patient underwent a laparotomy to remove all masses. Histological examination indicated spindle cell tumor, consistent with the smooth muscle tumor. Immunohistochemical staining showed that the spindle cells were positive for smooth muscle actin (SMA), estrogen receptor (ER), progesterone receptor (PR), Desmin and Caldesmon, and the Ki-67 index was 5%. These results supported the diagnosis of disseminated peritoneal leiomyomatosis.

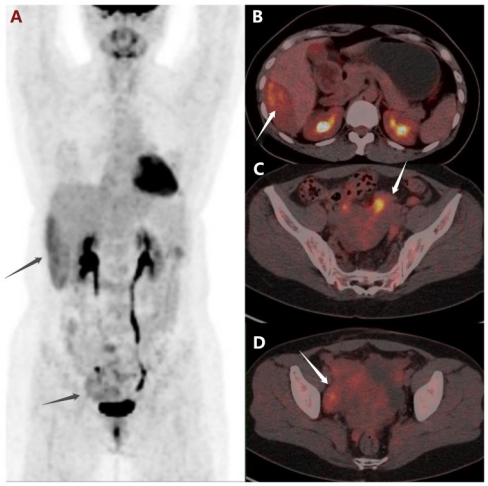

Figure 1. A; The whole-body PET image of case 1. **B;** DPL nodule in the subcapsular liver and the SUVmax is 3.6. C-D Some DPL nodules near the uterus and the SUVmax is 4.4.

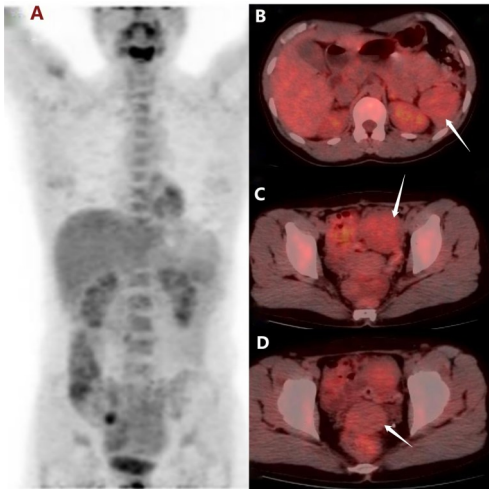

Figure 2. A; The whole-body PET image of case 2. B; DPL nodule anterior to the left kidney and the SUVmax is 1.9. C-D Some DPL nodules in the pelvic cavity and the SUVmax is 3.1.

DISSCUSSION

Disseminated Peritoneal Leiomyomatosis (DPL) is a kind of uncommon benign condition that is characterized by multiple smooth muscle nodules over the peritoneal surface of the the abdomen and pelvis [1]. It normally occurs in women of reproductive age and most of whom have a history of uterine leiomymas. The pathophysiology of DPL is still under debate, however it is increasingly being hypothesized that hormones, particularly estrogen and progesterone, have a significant impact. Additionally, laparoscopic power morcellation is regarded as a crucial element since it has the ability to distribute tiny tumor pieces outside of the uterus into the abdominal and pelvic cavities [6,7].

The majority of LPD patients are asymptomatic, and they are typically first discovered by chance during a body check imaging procedure, usually an ultrasound or CT scan. DPL has appeared radiologically as many masses of various sizes that may be between millimeters and centimeters in size [8]. On CT image, the majority of DPL masses appear as solid nodules with well-defined borders and either homogeneous or heterogeneous densities [5]. They can be close to the liver, spleen and intestinal surface, the boundary is not clear, also can be scattered in the abdominal and pelvic cavity. Small tumor lesions typically have uniform densities, however larger lesions may have irregular densities because of necrosis or degeneration, which is consistent with the imaging results of uterine fibroids. On MRI image, DPL masses typically exhibit hypointense signal on T1-Weighted, and hypointense,iso or hyperintense signal on T2-Weighted, which is similar to that of smooth muscle [9,10]. The contrast-enhancement of these masses also shows a similar pattern to uterine leiomyomas, being homogeneous enhanced.

In several reports, ^{18}F-FDG PET/CT has been performed for further diagnosis and assessment of the disease. Most reported cases of DPL present low to moderate uptake of FDG. While Soni et al. described a case of DPL nodules with a considerable FDG accumulation of 3.3-5.0, the SUVmax of two nodules in Xiao's [11] case were 2.6 and 1.6. Another case reported low FDG-avidity lesions, the highest of which had a SUVmax measurement of 2.2[7]. Both of the two patients in our study took PET/CT scans, and the majority of the nodules displayed mild to moderate FDG accumulation. The SUVmax ranged from 1.9 to 4.4, indicating that glucose metabolism is low in these DPL lesions, which is consistent with earlier research.

It is challenging to diagnose disseminated peritoneal leiomyomatosis because it lacks radiological characteristics and occasionally mimics peritoneal carcinomatosis, leiomyosarcoma or metastases. Most malignancies, however, are hypermetabolic, while most DPL lesions are hypo-isometabolic in PET/CT scans. We believe that majority of malignancies could be ruled out because of the low FDG accumulation of these lesions on PET/CT. Furthermore, most malignant diseases are associated with omental ascites, tumor cake, and irregular peritoneal thickening, which are almost non

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-existent in DPL.

In conclusion, DPL is potential to misdiagnose as malignancy and the radiological image has a limit role. The definitive diagnosis still relies on histopathological examination, and further research on DPL in PET/CT is expected.

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