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CASE IMAGE

18F-FDG PET/CT imaging of several asymptomatic skeletal muscle metastases of mixed germ cell ovarian cancer

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Key Clinical Message

Metastasis to muscles caused by ovarian cancer is very rare and has a poor prognosis. Performing a whole-body F18-FDG PET/CT scan makes it possible to examine the whole body in one study and detected lesions in unexpected places.

KEYWORDS

F18-FDG PET/CT scan, ovarian cancer, skeletal muscle metastases

1 | INTRODUCTION

Ovarian cancer is one of the most common cancers in women and it mostly develops in the peritoneal cavity.[1,2] Extrapelvic involvements in this cancer cause upstage of the disease. Distant metastasis in ovarian cancer commonly involves the lungs, kidneys, brain, and liver.[3,4] Positron emission tomography by 18F-Fluorodeoxyglucose (18F-FDG PET/CT scan) has the ability to identify distant metastases.

2 | CASE PRESENTATION

A 25-year-old female pregnant woman, with no known underlying disease, was diagnosed with a small-sized, cystic-like lesion in the right ovary during routine care in the course of the first trimester of pregnancy. The preoperative tumor marker, alpha-fetoprotein, was 6.8 ng/mL (with a normal range of up to 8.5 ng/mL). Owing to pregnancy, a decision is made to follow up with the patient with an ultrasound of the abdomen and pelvis to check the size and appearance of the lesion throughout pregnancy. At the time of pregnancy, the lesion increased in size, and the feature of a malignant lesion appeared. After delivery, a spiral CT scan of the abdomen and pelvis with and without IV contrast was performed and a lesion with slight enhancement in the portal and delayed phases with a diameter of 90 mm in the posterior Cul-de-sac, fat stranding, and a collapsed cyst with a diameter of 22 m in the right ovary were reported. Eventually, right ovarian lesion excision and biopsy from omentum and bladder serousa were done. Postoperation pathology revealed a mixed germ cell tumor consisting of immature teratoma (grade 3 about 90%) and yolk sac tumor (about 10%), with involvement of the adjacent lymph nodes (measuring 1.8 cm in greatest

dimension) and also omentum. After that, the patient underwent four sessions of chemotherapy. The initial stage involved four rounds of BEP (bleomycin, etoposide, and cisplatin) followed by TIP (paclitaxel, ifosfamide, and cisplatin). Postchemotherapy abdominopelvic spiral CT scan revealed a malignant tumoral residue in the pelvis with pressure effect over distal ureters, peritoneal seeding, as well as the involvement of the rectal wall.

Then, 18F-FDG-PET/CT scan was requested for restaging.

A whole body 18F-FDG PET/CT scan was obtained 1 h after administration of 226 MBq 18F-FDG, with a blood glucose level of 113 mg/dL at injection time. The scan demonstrated metabolically active abdominal peritoneal seeding. Figure 1 shows the depiction of multiple muscle metastases foci as illustrated in the MIP 18F-FDG PET scan. Also, metabolically inactive huge pelvic peritoneal mass and multifocal left lung metastases were detected. Several focal muscular metastatic involvements were demonstrated in several muscles including bilateral arm and thigh muscles, left first intercostal, right infraspinatus, right pectoralis minor, multiple paraspinal muscles, left latissimus dorsi, and left abdominal wall muscles with normal CT part of the study (Figure 1). Figure 1 features the infraspinatus muscle (B, C, D), paraspinal muscle (E, F, G), left rectus femoris muscle (H, I, J), and sartorius and posterior knee flexor muscle (K, L, M) metastases. Currently, the patient is undergoing advanced chemotherapy.

3 | DISCUSSION

The diagnosis of ovarian cancer in its early stages is problematic as it can develop without noticeable symptoms or with only minor symptoms. To evaluate patients with suspected ovarian cancer before surgery, CA-125 circulating levels are typically measured. However, this marker is not specific and may be elevated in benign or other cancerous conditions.[5] CT with contrast is usually the preferred technique for initial staging as it can identify the involvement of the uterine serosa and pelvic ureter as well as metastases in other organs. Its main limitation is its inability to detect implants smaller than 5 mm.[6] PET, especially when

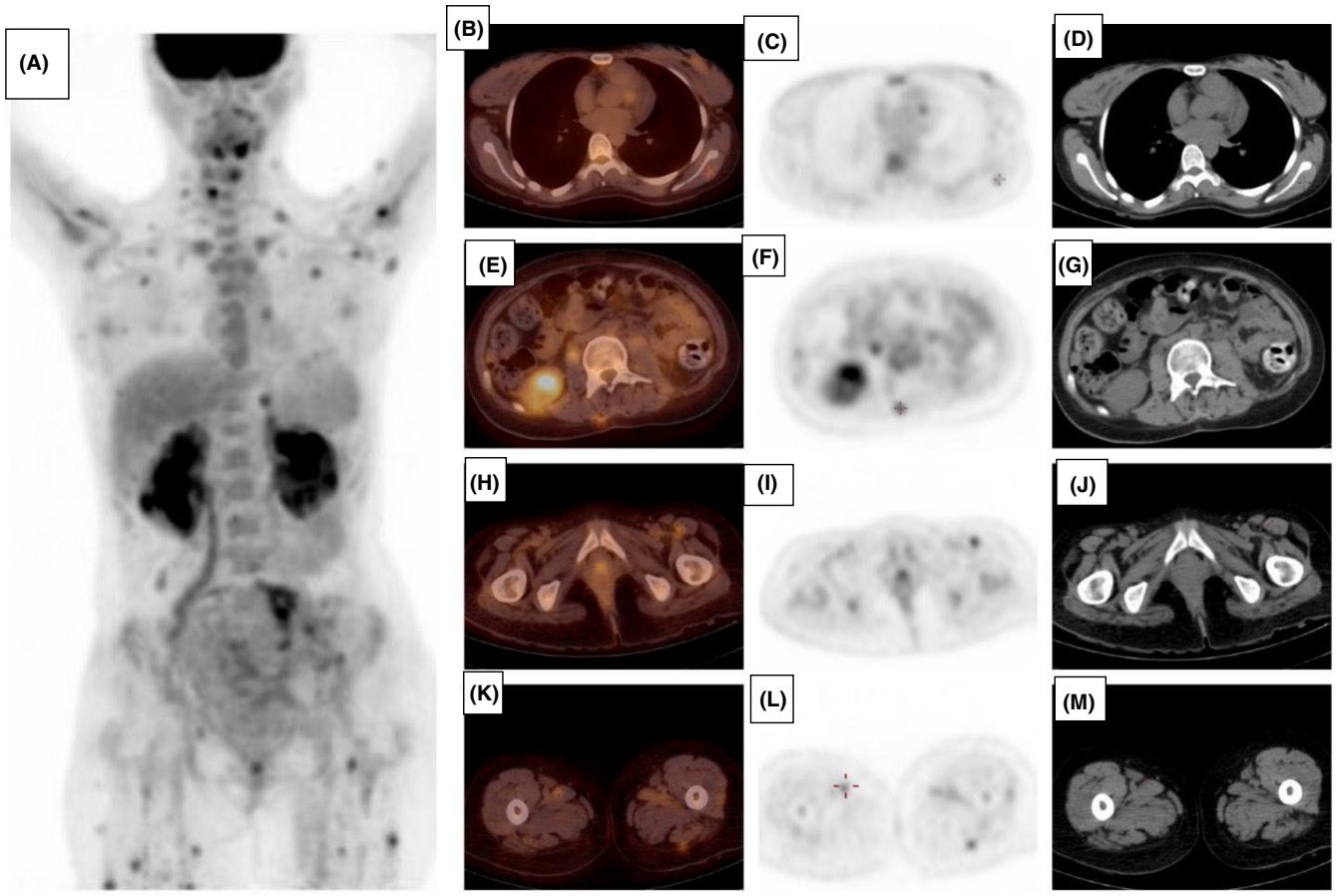

FIGURE 1 MIP 18F-FDG PET scan illustrates multiple foci of muscle metastases throughout the body along with pelvic mass (A). Multiple levels of trans-axial PET/CT (Left column), PET only (Mid-column), and CT (right column) images show the left infraspinatus muscle (B–D), paraspinal muscle (E–G), left rectus femoris muscle (H–J), and sartorius and posterior knee flexor muscle (K–M) metastasis.

used with CT, is very beneficial for diagnosis and staging in advanced stages and is more accurate than CT in detecting disease in the peritoneum. In cases where conventional imaging is inconclusive, 18F-FDG PET/CT may assist in confirming or excluding recurrence, and may also provide information regarding other undetected diseases, potentially altering the proposed therapy approach.[7]

Metastatic skeletal muscle involvement is very rare and it has a range between 0.8% and 16%. Lung, kidney, and colon carcinoma are the most malignancy with soft tissue metastasis.[8] In a study that was conducted, the prevalence of muscle metastasis in urological tumors was 13.2%, and the most common location was the thigh muscles, the extraocular musculature, and the gluteal and paravertebral muscles.[9] Any kind of painful mass in the muscle, particularly in a cancer patient with extensive involvement of the peritoneum, is very suspicious for muscle metastasis.[10] Metastasis in the muscle is a delayed event in the course of the disease and is associated with a poor prognosis.[11]

4 | CONCLUSION

Metastasis to muscles caused by ovarian cancer is very rare and has a poor prognosis. Performing a whole-body F18-FDG PET/CT scan makes it possible to examine the whole body in one study and detected lesions in unexpected places.

AUTHOR CONTRIBUTIONS

Maryam Abdinejad: Project administration; writing – review and editing. **Mehrosadat Alavi:** Project administration; supervision; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no data sets were generated or analyzed during the current study.

CONSENT STATEMENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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