

False-positive diagnosis of uterine malignancy with raised 18F-fluorodeoxyglucose activity in adenomyosis: A case report

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Abstract

Positron Emission Tomography - Computed Tomography (PET-CT) has been used to diagnose malignancy before surgery. However, there may be an increase in 18F-fluorodeoxyglucose (FDG) uptake in PET scans in benign conditions, leading to a false-positive diagnosis of malignancy and unnecessary surgery. This PET-CT investigation is expensive and is not without risk, including radiation and drug or contrast hypersensitivity. Although variable uterine uptakes of FDG activities in PET-CT had been reported in the literature, unawareness of its possibility in benign conditions could lead to a false alarm of malignancy. This paper reported a patient with a false-positive FDG finding presenting as a malignant uterine lesion for surgery, aiming to raise the clinical awareness of this finding.

Keywords: False-positive diagnosis; PET-CT; Adenomyosis; 18 F-fluorodeoxyglucose; Raised CA125

1. Introduction

Computed Tomography (CT) scan with contrast and fine cut in a suspected lesion to diagnose malignancy is the gold standard before PET-CT has replaced CT scans for such purposes. It is also common to use PET-CT to diagnose gynaecological malignancy before surgery [1]. However, there may be an increase in ¹⁸F-fluorodeoxyglucose (FDG) uptake in benign uterine conditions [2]. It was reported that adenomyosis generally showed mild FDG uptake in premenopausal women; higher uptake was also sometimes seen during menstruation and ovulation [3]. Wong 2017 had reported a case of false-positive PDG positron emission / computed tomography diagnosis of pelvic lymph node recurrence following surgical treatment of Stage 1 endometrial cancer [4]. It was due to an ovulatory ovary. This had led to a false alarm and unnecessary surgery.

Dr Yu et al. 2011 described variable uterine uptakes of FDG activities in PET-CT when they reported a 44-year-old woman with adenomyosis showing increased FDG uptake mimicking malignant tumours during concurrent chemoradiation therapy for cervical cancer [5]. PET-CT has been arranged to rule out malignancy whenever available in many hospitals. It is almost mandatory for the planning and management of cancer. However, this investigation is expensive and is not without risk, including radiation and drug or contrast hypersensitivity. This paper would like to highlight a patient with a false-positive FDG finding presenting as a malignant uterine lesion for surgery to raise the clinical awareness of this condition.

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2. Case report

A 40-year-old nulliparous patient had a history of left ovarian cystectomy performed in January 2019. In August 2020, she presented with a recurrent left ovarian cyst, enlarged 12 weeks size uterus, menorrhagia and severe dysmenorrhea; she was offered surgery for ovarian cystectomy and myomectomy in a private hospital. However, due to extensive pelvic bowel adhesion, only left ovarian cystectomy and salpingectomy could be performed. The pathology confirmed an endometriotic cyst and hydrosalpinx. Her postoperative course was complicated by left deep vein thrombosis (DVT) and pulmonary embolism, treated with anticoagulants (Clexane, Atixaba). She sought treatment again for abdominal distension, pelvic pain, menorrhagia and severe anaemia in November 2021. An enlarged 28 weeks uterus on pelvic ultrasound examination showed a large posterior adenomyoma (7.7 cm x 5.7 cm x 6.9 cm) and a large multiloculated hypoechoic cyst (11.3 cm x 7.4 cm x 7.8 cm). Her CA 125 was raised to 552 U/ml, and her haemoglobin was 6.3 g/dL. She requested a second opinion of management.

A PET-CT was ordered to exclude malignancy because of the rapidly enlarged uterus and ovarian cyst. The PET-CT found an enlarged uterus with an ill-defined hypodense mass and moderate metabolic activity at the posterior uterine wall measuring 9.43 cm x 7.52 cm x 10.96 cm. The radiological features suggested underlying malignant lesions with adenomyoma. The right large multiloculated hypodense cystic lesion (16.9 cm x 9.12 cm) showed multiple septations, no internal calcification, no solid component or fat density.

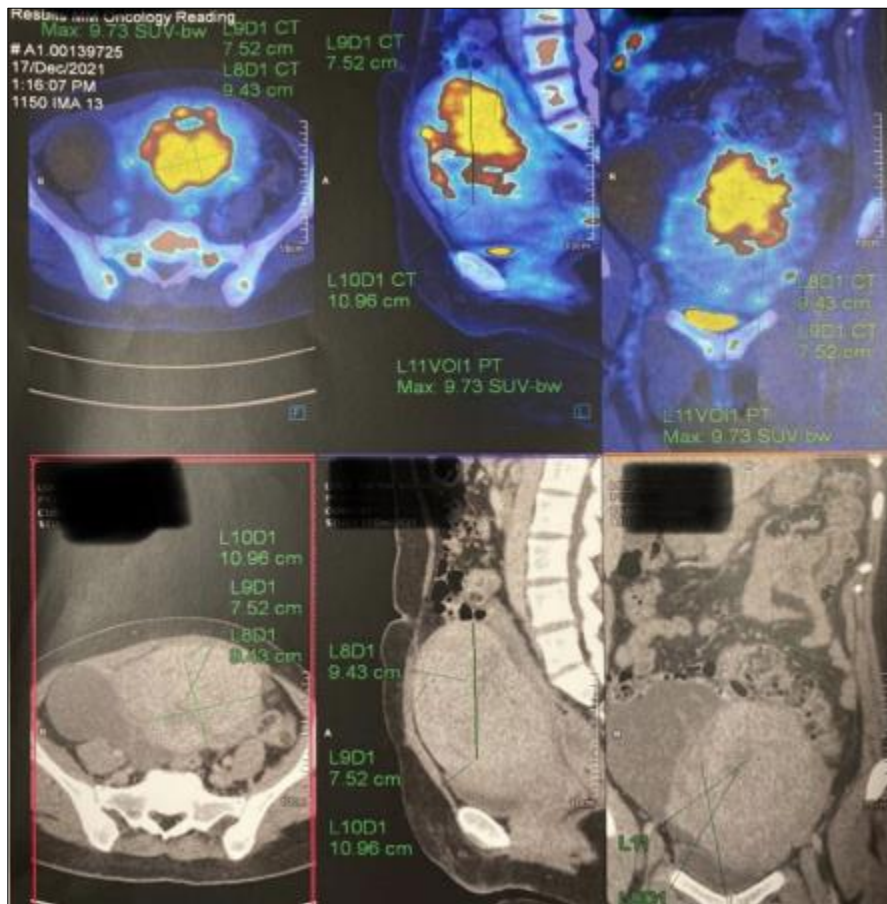


Figure 1 A PET CT showed an enlarged uterus up to the level of the umbilicus. Ill-defined CT hypodense mass with moderate FDG metabolic activity is seen at the posterior uterine wall measuring 9.43 cm x 7.52 cm x 10.96 cm. The radiological features suggested underlying malignant lesions with adenomyoma. The right large multiloculated hypodense cystic lesion (16.96 cm x 9.12cm) showed multiple septations, no internal calcification, no solid component or fat density

Given her severe anaemia, dysmenorrhoea and suspected uterine malignancy, she was counselled for hysterectomy, right salpingo-oophorectomy and bowel adhesiolysis. Blood transfusion and proper bowel were done before surgery. A total hysterectomy with right salpingo-oophorectomy was performed after laborious bowel adhesiolysis. A frozen section of the uterus showed an adenomyoma and fibroids (figure 2). The surgery took 2.5 hours with a total blood loss

of 2000 ml. She recovered well, and she was discharged home on day 7 post-operatively. She was given oral anticoagulant Xarelto 20 mg daily for five weeks.



Figure 2 A large uterine adenomyoma with multiple small fibroids with no pathological features of malignancy

3. Discussion

In the clinical management of gynaecological patients, demographic data, clinical history, examination, appropriate investigations, and imaging are important to point toward the most likely diagnosis and the planning for subsequent management. PET-CT is now used extensively for staging and monitoring patients with malignancy. It also helps the pre-operative diagnosis of malignancy by reviewing the nature of the tumour to determine the types of surgery and the need for adjuvant therapy in malignancy at pre-operative counselling. PET-CT's principle of action is based on the high glucose metabolism of malignant lesions; then, the ¹⁸F-fluorodeoxyglucose (FDG) generally accumulates in malignant lesions. However, FDG uptake is not specific for cancer cells, and increased uptake also occurs in actively growing cells or inflammatory cells. Therefore, it may result in a false-positive diagnosis of malignancy.

The accurate interpretation of raised PDG activities remains a challenge to doctors, especially when the physiology and pathophysiology of findings on FDG-PET/CT are not well understood. The author reported a previous false-positive PET-CT case due to a physiologically ovulatory ovary [4]. Uterine adenomyosis in a premenopausal woman can also result in false-positive ¹⁸FDG-PET [2]; thus, the paper aims to alert doctors of this possibility to help delineate the diagnosis and guide subsequent surgery.

In our case, the factors contributing to the increased FDG accumulation in the adenomyoma may include increased vascularity of the adenomyosis, presence of inflammatory cells, and a high number of rapidly growing cells per volume of the adenomyoma. In our patient, her surgery was necessary despite the false-positive diagnosis of uterine malignancy. Her menstrual symptoms, severe anaemia, and large ovarian cyst found her surgery necessary. We had done the appropriate preparations for bowel adhesiolysis, prevention of DVT and intraoperative frozen section; therefore, her surgery could be safely performed, and she recovered quickly from her suffering. In other cases with similar PET CT findings, it is important to assist the PET-CT diagnosis of malignancy by various means, i.e. clinical, other imaging, surgery, and a prior biopsy or frozen section during surgery would be recommended. Finally, a piece of advice to interpret whole-body PET-CT imaging is to consider the various physiological and technical factors that can affect FDG uptake that had been widely reported in the literature [2, 6].

4. Conclusion

PET CT utilization has been ever-increasing. Other than the cost, radiation and availability, a false-positive diagnosis of malignancy seems to be one of the most important aspects that warren further investigations and enhancement. Our

case report and the previous one could help raise arousal for clinicians and radiologists of such an important issue. Given the above, there is a need for further development in PET-CT in future.

Compliance with ethical standards

Disclosure of conflict of interest

Both authors declare no conflict of interest.

Statement of informed consent

Informed consent was obtained from the patient in this paper.

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Author's short Biography



Professor Felix Wong is a retired Professor at the University of New South Wales. He is renowned for his contribution to medical education in Asia Pacific Countries. For his contribution and achievement in Endoscopic surgery, he was awarded the Lifetime Achievement Award by APAGE in 2017 and the Outstanding Contribution Award by the ESGE in 2018. Professor Wong has published 14 books and more than 240 papers in local and international journals.