CASE REPORT

Asymptomatically Synchronous Esophageal Cancer Incidentally Detected by F-18 Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography in a Prostate Cancer Patient

Jainn-Shiun Chiu1, Guang-Uei Hung1, Tai-Yi Chen2*

1 Department of Nuclear Medicine, Chang Bing Show Chwan Memorial Hospital, Changhua, Taiwan
2 Department of Radiology, Chang Bing Show Chwan Memorial Hospital, Changhua, Taiwan

1. Introduction

Positron emission tomography/computed tomography (PET/CT) has emerged as a paramount hybrid imaging modality in the field of oncology through the success of metabolic imaging, mainly with F-18 fluorodeoxyglucose (FDG). The clinical value of F-18 FDG PET/CT is increasingly being used for diagnosis, staging, restaging, recurrence detection, treatment monitoring, prognostication, prediction, and surveillance in patients with different types of cancers, and aids clinical decision making and changing intended management in a considerable number of patients.1,2 Moreover, whole-body F-18 FDG PET/CT has additional merit for detection of a second primary cancer with high sensitivity and positive predictive value.3 Several reports have demonstrated the feasibility of F-18 FDG PET to detect such unsuspected and serendipitous second malignancies.4–8 Here, we describe a rare case of asymptomatically synchronous esophageal cancer incidentally discovered by pretreatment F-18 FDG PET/CT in a 65-year-old prostate cancer patient, and the therapeutic plan was accordingly changed.

2. Case report

A 65-year-old man presented to his urologist with a high serum prostate specific antigen level of 10.7 ng/mL. Transrectal ultrasound-guided needle biopsy exhibited prostate adenocarcinoma. After signing an informed consent and before any treatment, he underwent whole-body F-18 FDG PET/CT as a baseline study to monitor response to subsequent treatment.9 The results demonstrated an intense FDG uptake in the prostate gland (Figure 1). Besides, marked esophageal wall thickening with a short segmental pattern of intense FDG uptake was unexpectedly found in the upper thoracic esophagus (Figure 2). The concurrent appearance of metabolic and morphological characteristics led to an incidental diagnosis of esophageal cancer in addition to prostate cancer. However, the patient had no gastrointestinal symptoms and signs. He was referred to a gastroenterologist, and the esophagogastroduodenoscopic biopsy confirmed squamous cell carcinoma of the esophagus, agreeing with PET/CT findings. This esophageal cancer, a malignant neoplasm of a different site and histological type than the original prostate cancer, was considered as a separate primary malignancy. The treatment plan was accordingly changed to esophagectomy with colon interposition and jejunostomy after neoadjuvant chemotherapy and radiotherapy.

3. Discussion

Second primary cancer has become an important issue of concern in oncology because patients with primary cancer have a much higher risk of secondary malignancy compared with the general population. However, several large datasets have generally revealed a decreased overall risk of second primary cancer after...
diagnosis of prostate cancer, even though prostate cancer is the most commonly diagnosed cancer in elderly men. Nevertheless, one study has shown an increased incidence rate of urologic carcinoma and male breast carcinoma after having prostate carcinoma. In addition, the metachronous increase in urinary bladder and rectal malignancies in men with previous prostate cancer seems to be plausible. In fact, the incidence of synchronous second primary esophageal cancer in a prostate cancer patient is exceedingly rare, and then, asymptomatic esophageal cancer can be actually detected by a baseline F-18 FDG PET/CT scan in a prostate cancer patient, as in the present patient. To the best of our knowledge, this unusual presentation of prostate cancer followed by esophageal cancer has never been synchronously discovered by F-18 FDG PET/CT.

Whole-body PET/CT often unveils unexpected second primary malignancies in patients with known cancers for the purpose of staging and restaging, detection of recurrence, or monitoring the response to treatment. In one pilot study, Ishimori and colleagues have retrospectively evaluated F-18 FDG PET/CT for the detection of unexpected FDG-avid additional primary cancers in 1912 patients with known or suspected malignant lesions. They have observed that whole-body F-18 PET/CT can incidentally detect histopathology-confirmed additional primary malignancies at a rate of at least 1.2%. In another prospective study, Choi and coworkers have identified a total of 27 second primary malignancies in 26 of 547 patients (4.8%) undergoing F-18 FDG PET/CT at the time of initial staging. They have advocated performing F-18 FDG PET/CT with high sensitivity and positive predictive value as a useful tool for examining a second primary malignancy at the time of initial cancer staging. Even–Sapir and colleagues have retrospectively scrutinized PET/CT reports and have found that 41 of 2360 (1.7%) patients had unexpected malignancies. In one latest study, Ozkol and coworkers have retrospectively analyzed the malignant potential and clinical value of incidental FDG-avid foci on PET/CT images. Newly discovered second primaries were pathologically proven in 19 of 2370 patients (0.8%). The foregoing studies generally have revealed that the rate of unexpected second primary malignancy detected by F-18 FDG PET or PET/CT is <2%, except in the study by Choi and coworkers. This might be the result of geographic variations and the differences between retrospective and prospective studies.

The interpretation of unexpected FDG-avid foci on PET/CT images principally relies on the metabolic patterns. However, the characteristics of the accompanying CT findings on PET/CT images corresponding to the FDG-avid lesions, even without contrast enhancement for CT images, are still helpful for accurate anatomical localization of PET abnormalities where metastasis of first primary cancer is unlikely, aiding differential diagnosis between benign and malignant lesions, and minimizing false-positive results. Concurrently reading PET and CT findings from

Figure 1 Serial transaxial fused positron emission tomography/computed tomography images exhibit an asymmetrically hypermetabolic pattern of intense fluorodeoxyglucose activity in the prostate.
a dedicated integrated PET/CT system allows a nuclear medicine physician to make a more trustworthy and clear ascertainment of PET-associated foci that warrants further investigations. Agress and Cooper only utilized F-18 FDG PET to analyze retrospectively the malignant potential of unexpected foci of abnormal hypermetabolism in 1750 patients with a variety of known or suspected malignancies. Their study showed that nine other abnormal foci were benign and another three represented false-positive findings. We suppose that these benign and false-positive results may be further decreased by taking advantage of simultaneous reading of PET and CT findings on an integrated PET/CT scanning system. Choi and coworkers have suggested that PET/CT is superior to PET for examination of second primary cancer. The complementary PET/CT interpretation provided augmented information in 48.9% of the abnormal FDG-avid lesions that were representative of a second primary cancer with an accurate anatomic localization and concurrent anatomic abnormality. The current case shows that F-18 FDG PET/CT displayed metabolically short segmental uptake in the upper chest and revealed corresponding wall thickening in the upper thoracic esophagus. As a result of this simultaneous interpretation, F-18 FDG PET/CT directed subsequent endoscopy-guided biopsy for this serendipitous lesion.

The unforeseen detection of an additional malignancy has a significant clinical impact on patients with known malignant disease because patient management is often modified to include treatment of the new diagnosis. Ishimori and colleagues have reported that the treatment plan was changed and an operation was performed to diagnose or treat the new lesion in about 75% of the patients with additional primary malignancies detected by PET/CT, exactly as in the present case. This substantial impact that alters the therapeutic strategy may reflect the convenient nature of one-stop evaluation by virtue of whole-body F-18 FDG PET/CT scanning in all organs and systems. By contrast, several conventional work-ups usually center on the primary malignant disease, and incidental coexistence of second or even multiple synchronous primary malignanct lesions may be missed. Our prostate cancer patient had a second primary cancer that arose unexpectedly in an unfavorable site, such as the esophagus, which has a poor prognosis, and early diagnosis is difficult in such an asymptomatic presentation of esophageal cancer. Without the help of F-18 FDG PET/CT to detect the esophageal lesion in this patient, there could have been a catastrophic misdiagnosis and the following treatment could have failed completely.

Our patient is representative since detection of a second primary malignancy is a vital approach to lessen the morbidity or even mortality related to second cancers, especially in patients without symptoms that are indicative of a second primary malignancy. Taking advantage of exploring the entire body by means of integrated physiopathological and anatomical functions, F-18 FDG PET/CT can increase the detection rate of an unsuspected second primary cancer. We hope that our report of this case in a prostate cancer patient with synchronous esophageal cancer suggests that PET/CT is a promising diagnostic method to detect a second primary cancer efficiently.
References


