Unexpected Benefit of the Positron Emission Tomography/Computed Tomography Using ^{18}F -Fluorodeoxyglucose: Report of a Case

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Abstract The positron emission tomography/computed tomography (PET/CT) has been a new tool utilized in the diagnosis and staging of various cancers. However, common worldwide utilization of the PET/CT includes some economic, legal, and ethic controversies. Although PET/CT scanning can detect colorectal premalignant lesions in an early treatable stage, most governments' health care system does not pay for it as a screening test because of its economic burden. Thus, people are forced to make vital decisions about their health because of health policies of their governments. Here, we present an unusual case and discuss the utilization of PET/CT for detection of incidental neoplasms.

Keywords Positron emission tomography · Rectum · Adenocancer

Introduction

The positron emission tomography/computed tomography (PET/CT) using ^{18}F -fluorodeoxyglucose (FDG) has been a new tool successfully utilized in the diagnosis and staging of various cancers [1]. It works by glucose molecules that are labeled with radioactive fluorine to detect areas of increased metabolic activity. The increased uptake of glucose occurs in

areas with inflammation or accelerated cell growth such as cancer tissues. Hence, the malignant changes in the normal tissue can easily be detected by PET/CT. Despite some faults, standardized uptake value (SUV) levels are good indicators for the increased metabolism of cancer tissue [2]. However, nowadays, common worldwide utilization of the PET/CT not only causes some economic, legal, or ethic controversies but also has unexpected results. Here, we present an unusual case and discuss the utilization of PET/CT for the detection of incidental neoplasms.

Case

A 55-year-old completely asymptomatic male, also doctor-himself, underwent routine check-up procedure at a healthcare institute. Screening results were unremarkable except for a suspicious fibrous nodule on the left lung apex detected by plain X-ray of the chest. Moreover, CT scanning of the chest revealed suspicious granulomatous tissue at the same location but possibility of malignancy could not be eliminated owing to history of approximately 25 boxes/year smoking. Hence, patient decided, in conformity with doctors' advice, to undergo a whole-body PET/CT screening for revealing the nature of the suspicious nodule despite, in Turkey, health care system does not pay for PET/CT for screening purposes, and the patient paid the charges himself. Before the PET/CT (Discovery ST, General Electric® Co, Buckinghamshire, UK) study, the patient fasted for over 6 h. Fifty minutes after the administration of 8 mCi of FDG, emission scanning was performed with an 89 mg/dl initial glucose level. PET/CT screening reported that fibrous nodule in the left lung was completely non-metabolic but surprisingly, revealed an increased glucose uptake in the rectum (SUV 7, 5) (Fig. 1). The patient was scheduled for a proctologic examination with the suspicion of rectum tumor, and anorectal examination

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Fig. 1 PET/CT scan showed that increased glucose uptake in the rectum

revealed the presence of a tumor, localized at the posterior wall of the rectum 5 cm away from the anal verge. Colonoscopy was performed confirming that a tumoral mass was present in the rectum (Fig. 2). Histopathologic sample showed high-grade dysplastic areas with adenocarcinoma focuses. So, the patient was scheduled for local excision in order to make sphincter-preserving surgery possible for this low level rectal cancer (Fig. 3). The postoperative course was uneventful, and he was discharged the next day. Histopathologic examination revealed a 2×2 cm tumor located at the rectum with no submucosal involvement, and the final decision was reported as well-differentiated adenocarcinoma of the rectum.

Fig. 2 Endoscopic view of the tumor

Fig. 3 Macroscopic appearance of the resection material

All surgical margins were clear. There was no sign of recurrence in laboratory and endoscopic studies performed at the end of the sixth month. Laboratory data and tumor markers comprised normal values. We do not expect the tumor to relapse, but we scheduled the follow-up plan as every 3 months for the first year, every 6 months for the second year, and afterwards one time a year until the tenth year by physical, biochemical, and endoscopic examinations because of metachronous tumor possibility in the rectum or colon.

Discussion

PET/CT is commonly used in assessing treatment response and staging of cancer, but it has also been found to be useful in suspicious malignancy and some other benign conditions such as predicting severity of the acute radiation pneumonitis [2, 3]. Apart from this, some studies shown that whole-body PET is useful in breast cancer patients with large tumors or recurrent tumors since it can rule out metastatic disease and help tailor surgical therapy. Positron emission mammography (PEM) may detect ductal carcinoma in situ (DCIS) and small tumors that have not been imaged with magnetic resonance imaging (MRI), mammography (MG), or ultrasonography (US) [4]. All these evidence give rise to the strict conflict between the idea of commonly utilization of PET/CT for a various number of indications and government's health policies which are not willing to pay for PET/CT even for screening studies for cancer. In Canada, the total cost for each whole-body PET/CT scan ranges from \$1231 to \$7869, depending on patient volumes, the cost of the FDG radiopharmaceutical dose, physician fees, capital infrastructure costs, and operational costs [5]. In Turkey, the cost of PET/CT, which is performed for limited number of indications, ranges between \$1500 and \$2000.

The findings in our case demonstrate that PET/CT can detect rectum carcinoma in an early treatable stage, and increased glucose metabolism can be detected by PET/CT in rectum carcinoma as well as in primary colonic carcinoma. Also colonic adenomas are clinically important as a premalignant lesion and thus should be resected. Most adenomas can be detected by PET/CT [6], and these lesions are treatable by colonoscopic polypectomy. Their detection by any methods and resection is suggested to have contributed to the reduction in the death rate from colorectal cancer [7].

Consequently, the technical availability of a screening procedure does not necessarily mean that it can be utilized for public benefit. We are hoping the utilization of PET/CT in our country will increase in time with reducing costs. Reduced costs make justified utilization of PET/CT possible among the people living in different countries, thus relieving the burden of making vital decisions about their health just because of health policies of governments.

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