Case Report

A case of plastron appendicitis mimicking malignant cecal tumor in flourodeoxyglucose-positron emission tomography/computed tomography study

Ali Ozan Oner, Adil Boz[1], Funda Aydin[1], Can Cevikol[2]

Department of Nuclear Medicine, Afyon Kocatepe University, School of Medicine, Afyon, Departments of [1]Nuclear Medicine and [2]Radiology, Akdeniz University, School of Medicine, Antalya, Turkey

ABSTRACT

In recent years, flourodeoxyglucose-positron emission tomography/computed tomography (FDG PET/CT) has been used intensively in the field of oncology. However, an increase in FDG uptake has been observed both in malignant tissues, and inflammatory processes. Therefore false-positive results have appeared. We present a 70-year-old male patient who presented to the hospital with right lower quadrant pain. A right lower quadrant mass was observed with conventional methods, and PET/CT was performed which revealed a hypermetabolic mass in the right lower quadrant. The patient was referred to the surgery with a suspect malignant mass whose histopathological report indicated plastron appendicitis. Although FDG PET/CT is a reliable method in the evaluation of oncological cases, false-positivities should be taken into consideration in inflammatory processes.

Keywords: Flourodeoxyglucose-positron emission tomography/computed tomography, malignant cecal tumor, mimic, plastron appendicitis

INTRODUCTION

Nowadays flourodeoxyglucose (FDG)-positron emission tomography (PET), is one of the most frequently used modality for the oncological, cardiac and cerebral imaging. However, in recent years, effectiveness of FDG-PET imaging modality in demonstrating inflammation originating from infectious and noninfectious causes has been observed.[1,2] The reason for this is known to stem from activation of macrophages and resultant increased FDG uptake. In the evaluation of FDG-PET in its most frequently used field of medicine that is, oncology, increased uptake of FDG both in malignant and inflammatory cells and areas with increased FDG uptake secondary to infection, lead to false-positive results and these areas can be mistakenly evaluated as malignant lesions.

We present a case in whom we had obtained FDG-PET images with a suspicion of high-grade colonic malignancy, but instead we observed diffuse FDG uptake secondary to inflammation.

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CASE REPORT

A 70-year-old male patient consulted to our hospital with complaints of coughing and right lower quadrant pain persisting for 10 days. Ultrasonography obtained following physical examination and biochemical analyses, revealed an image consistent with a right lower quadrant mass localized in the cecum. Colonoscopic examination demonstrated a patent lumen in the cecal location, but probable existence of an externally compressing mass on the lumen was indicated. Subsequent computed tomography (CT) examination detected a mass lesion in the cecum with dimensions of 6 cm × 7 cm, which reminded us a lesion consistent with a primary colonic tumor. Advanced evaluation with PET/CT disclosed a hypermetabolic mass lesion in the cecum which invaded surrounding tissues (standardized uptake value [SUV] max: 22) [Figures 1 and 2]. The patient was referred to the surgery with the initial diagnosis of suspected malignant mass and his mass lesion was resected. The resected mass was sent to the pathology laboratory with a high index of suspicion for malignancy and histopathologic diagnosis was plastron appendicitis.

Address for correspondence:
Dr. Adil Boz, Department of Nuclear Medicine, Akdeniz University, School of Medicine, Antalya 07070, Turkey. E-mail: boz@akdeniz.edu.tr

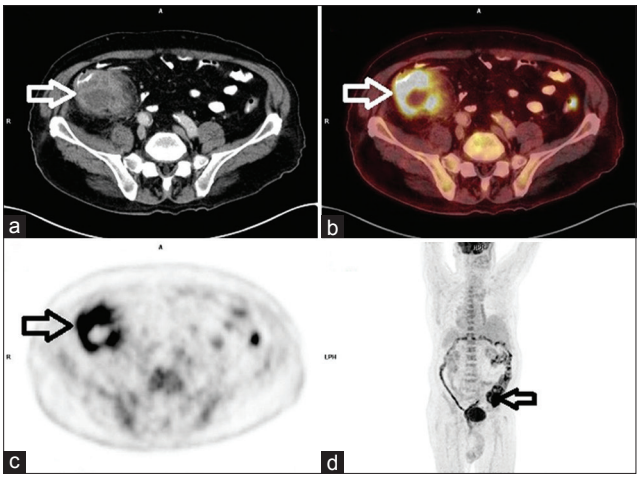

Figure 1: (a) Computed tomography (CT) revealed the cecum to be prominently enlarged. The cecum enlarged to 60 mm × 70 mm and the cecum walls exhibited hypertrophy (arrow). (b) The results of flourodeoxyglucose-positron emission tomography (FDG-PET) coincided with the mass portion observed in CT and abnormal accumulation of FDG was observed. The maximum standardized uptake value was elevated at 22 (arrow). (c and d) The results of FDG-PET coincided with a tumor-like shadow observed in CT and abnormal accumulation of FDG was observed (arrows) (c: Axial image; d: MİP-maximum intensity projection image)

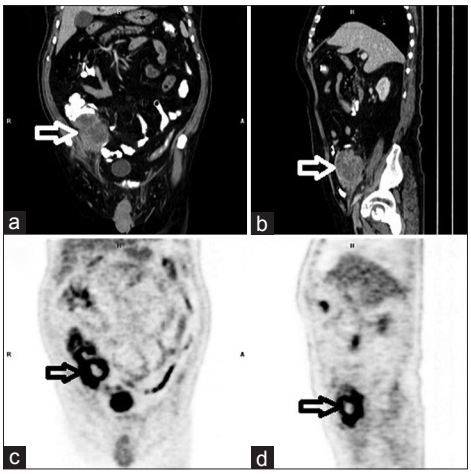

Figure 2: (a and b) Computed tomography (CT) revealed the cecum to be prominently enlarged. The cecum enlarged to 60 mm × 70 mm and the cecum walls exhibited hypertrophy (arrows). (c and d) The results of flourodeoxyglucose (FDG)-positron emission tomography coincided with a tumor-like shadow observed in CT and abnormal accumulation of FDG was observed. The maximum standardized uptake value was elevated at 22 (arrows) (c: Coronal image; d: Sagittal image)

DISCUSSION

In comparison with appendicitis, appendiceal tumors are relatively rare. In a study performed by Collins, in only 57 out of 71,000 cases with appendiceal resections, histopathology was reported as primary appendiceal tumors.[3] In addition, sign and symptoms of tumors observed in the appendices are not typical for these lesions, which create difficulties in discrimination between these two entities. Indeed, in these tumors occlusive symptoms are observed just like in cases with appendicitis. Most of the tumors are diagnosed after the resected material from patients who were operated with presumptive diagnosis of appendicitis is reported as a malignant tumor.

Computed tomography aids in the diagnosis of appendiceal pathologies as appendicitis and appendiceal tumors. In appendicitis, CT reveals appendiceal dilatation, periappendiceal adipose tissue with increased density, consolidation of the appendiceal walls, formation of abscess and ascites.[4] In nonmucinous adenocarcinomas of the appendix, appendix enlarges, its walls thicken, also focal soft tissue mass and involvement of periappendiceal adipose tissue are observed.[5] As is seen, similar CT findings are observed for both of these conditions. Therefore, it is very difficult to differentiate between these two entities relying only on CT findings. In our presented case, CT images suggested the presence of a malignant mass in the appendix; however, histopathologic diagnosis was reported as a plastron appendicitis.

Positron emission tomography/computed tomography is a nuclear medicine imaging technique, which is used in the field of oncology for the diagnosis, staging and evaluation of treatment response of the tumors with increasing frequency especially in recent years. PET/CT device detects and anatomically localizes metabolic abnormalities. FDG-PET is an imaging modality, which uses fluorine-18 (F-18) labeled glucose derivative F-18 FDG. Because of increased rates of cellular proliferation in malignant cells, F-18 FDG is more frequently used by malignant cells relative to normal cells. However, this phenomenon is not only specific to malignant cells. In addition, in acute and chronic infections which induce activation of leukocytes and macrophages, abscesses and inflammatory conditions like lymphadenitis uptake of FDG increases in proportion to the severity of the inflammation, which causes false-positive evaluations. In this case we observed increased FDG activity in the right lower abdominal quadrant. Since clinical symptoms and signs were in consistent with malignancy, the hypermetabolic area we observed on PET was presumably associated with a malignant tissue.

Delayed FDG-PET images obtained increase diagnostic accuracy of FDG-PET. Indeed, in benign lesions, about 1 h after FDG injection, FDG uptake peaks, however in malignant lesions increase in the accumulation of FDG uptake continues beyond 1 h. Therefore delayed enhancement imaging contributes to the diagnosis.[6] However, Imdahl *et al.* indicated that SUV values over 4 in delayed images increased predictive probability of malignant potential of the lesion.[7] In addition, in order to decrease rates of false-positivity, new PET studies with various agents have been conducted. As an example, in a study on rats, FDG and 3-deoxy-3-18F-fluorothymidine (FLT) were compared and tumor-specificity of FLT was found to be relatively higher.[8] Besides, 18F-fluoroethyl-L-tyrosine has been reported to have a higher capability in the discrimination between tumor and inflammation with an increased tumor specificity.[9] We hope that further studies with novel agents will increase diagnostic accuracy

of PET in the differentiation between confusing conditions such as appendicitis and appendiceal tumor.

Since FDG uptake is related to the metabolism of glucose, its distribution is not only restricted to malignant tissues. As is the case in our patient, in infectious entities as plastron appendicitis, an increase in FDG uptake can be observed which might mistakenly lead to false-positive results. Therefore in the evaluation of FDG-PET results, it should be kept in mind that areas of abnormal FDG uptake can also occur secondary to inflammation apart from malignancies. Further studies with novel radiopharmaceutic agents are needed to better discriminate between these two conditions as inflammation and malignancy which cause increased FDG uptake.

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