

Can ¹⁸Fluoro-deoxy-glukose-Positron Emission Tomography/Computed Tomography be a Useful for Decision of Elective Surgery in Thoracic Aortic Aneurysm

Abstract

Thoracic aortic aneurysm (TAA) should be treated before the complications with prophylactic surgery. However, important number of ruptures have been occurred below the cut-off size for surgery. In addition, in some cases, who in the cut-off value limit, decision of surgery may sometimes be difficult. ¹⁸Fluoro-deoxy-glukose positron emission tomography/computed tomography (¹⁸FDG-PET/CT) may useful such situations. We present a case that, TAA in ¹⁸FDG-PET/CT in a patient with larynx carcinoma. He had a TAA with near the cut-off value and increased metabolic activity in baseline imaging. After 3 months, SUV_{max} value increased and elective surgery was performed. We think that aneurysms may be another pathology that ¹⁸FDG-PET/CT potentially be useful apart from imaging malignant diseases.

Keywords: ¹⁸Fluoro-deoxy-glukose-positron emission tomography/computed tomography, aneurysm, surgery

Introduction

Thoracic aortic aneurysm (TAA) is a rare, asymptomatic disease. In general, it is associated with connective tissue pathologies. The mortality rate is very high if acute complications are occurred such as dissection or rupture.^[1] Determining to the risk of complications is very important for the decision of prophylactic surgery. The basic predictive parameter for this purpose is size. However, some of the small aneurysms can be ruptured. In addition, if the patient's aneurysm is at the near the cut-off value and if there is another important pathology in the patient, decision of the surgery may be more difficult. At this point, some additional parameters might be facilitating to decision of prophylactic surgery. It has been reported that ¹⁸Fluoro-deoxy-glukose positron emission tomography/computed tomography (¹⁸FDG-PET/CT) is associated with inflammatory response in aortic aneurysms and may be an independent parameter for the prediction of rupture.^[2,3] However, its use is often overlooked except in malignant cases. We present an interesting case that, the decision of prophylactic surgery was facilitated by ¹⁸FDG-PET/CT.

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Case Report

A 67-year-old male patient was diagnosed as larynx carcinoma about a year ago. After the six cycles of chemotherapy, ¹⁸FDG-PET/CT was performed. There were not any findings consistent with primary disease or metastasis. However, a lesion was detected about 50.4 mm × 40.8 mm of size in the upper mediastinum. Its SUV_{max} was 2.97 and thought as TAA. Elective surgery was not a first choice of the surgeon due to two main reasons. First, the patient had laryngeal carcinoma. Second, size of TAA was near the cut-off value. He underwent close follow-up. Three months later, ¹⁸FDG-PET/CT was performed. Lesion's size was 51.5 mm × 42.1 mm, and the SUV_{max} value was 3.72. Comparison of the images was shown in Figure 1. Then, contrast-enhanced CT was obtained. Contrast-enhanced CT, unenhanced CT, fusion images are shown in Figure 2. Because of the following findings, it was decided that risk of rupture was high after the second imaging. Size of TAA was near the cut-off value in first ¹⁸FDG-PET/CT and increased in the second. SUV_{max} was >2.5 in both images

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Fikri Selcuk Simsek, Mustafa Cagdas Cayir¹, Muhammet Arslan², Dogangun Yuksel

Departments of Nuclear Medicine, ¹Cardiovascular Surgery and ²Radiology, Faculty of Medicine, Pamukkale University, Denizli, Turkey

Address for correspondence:

Dr. Fikri Selcuk Simsek, Department of Nuclear Medicine, Faculty of Medicine, Pamukkale University, Denizli, Turkey.
E-mail: fselcuksimsek@gmail.com

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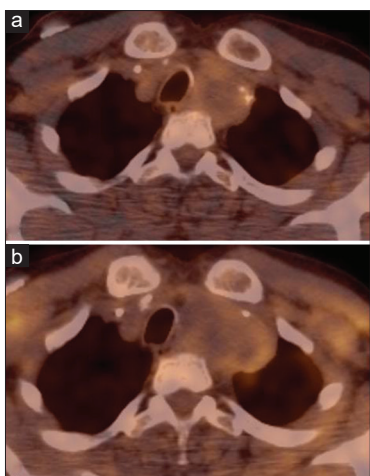


Figure 1: The axial images of an aneurysm in first (a) and second (b) fluoro-deoxy-glucose positron emission tomography/computed tomography. The growth of the aneurysm within 3 months can be noticed. In addition, second images SUV_{max} value increased about 25%

and increased in the second. Thoracic endovascular aortic repair was performed electively and patient underwent follow-up. Informed consent forms were obtained before each procedure.

Discussion

The TAA should be treated before the complications, due to high mortality rates. The cut-off value for prophylactic surgery accepted as >5.0 cm generally. Important number of the ruptures occurred in <5.0 cm.^[4,5] On the other hand, if cut-off value is reduced, the number of surgery candidates are increased dramatically as a disadvantage. In addition, if the patient's aneurysm is at the near the cut-off value and if there is another important pathology in the patient, decision of the surgery may be more difficult. At this point, considering also mortality rates as high as 8% after the elective surgery, additional parameters may be facilitating the decision.^[6]

The ^{18}F FDG-PET/CT may be beneficial about the subject. As known, ^{18}F FDG is a glucose analogue and if there is a high uptake in the aneurysm wall, rupture/dissection risk is increased.^[2,3,7] Sakalihasan *et al.* reported that acute complication rate was 67% in ^{18}F FDG-PET/CT-positive cases whereas this rate was 20% in negative ones.^[7] Similarly; 82% of the patients with $SUV_{max} >2.5$ developed progressive disease, whereas stable disease/regression was detected in 55% of patients with <2.5 without surgical treatment.^[8] Tahara *et al.* found a correlation between aneurysm dissection and doubling time of ^{18}F FDG uptake.^[9] In a recent case report, abdominal aortic aneurysm was detected in a patient. Lesion's SUV_{max} value was 3.68. When the patient was receiving medical treatment, intermittent ^{18}F FDG-PET/CTs were performed. Lesion's last SUV_{max} value was calculated as 5.18. Authors reported that this patient died due to rupture after the last imaging.^[10]

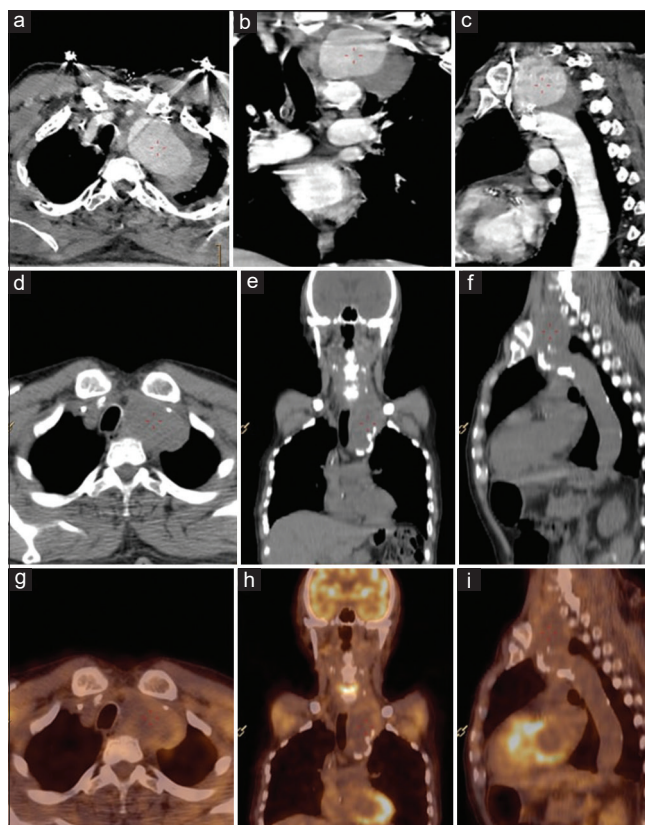


Figure 2: The axial (a,d,g), coronal (b,e,h), and sagittal (c,f,i) images of the aneurysm. Upper images are contrast enhanced computed tomography, middle images are unenhanced computed tomography, and lower images are belonging to ^{18}F fluoro deoxy glucose positron emission tomography/computed tomography. Contrast enhanced computed tomography axial (1a), coronal (1b), and sagittal (1c) images clearly demonstrate that the saccular thoracic aortic aneurysm pushes trachea to the right in upper mediastinum

Our patient had larynx carcinoma, and TAA with near the cut-off value for elective surgery. At this point, we thought that, needed an additional parameter to decision. Lesion's SUV_{max} was above the 2.5 in first imaging and increased approximately 25% within 3 months. We have also considered these additional findings and decided to elective surgery. Then, the patient underwent follow-up.

^{18}F FDG-PET/CT may be an additional and useful method for the decision of elective surgery in TAA patients who near cut-off value and had another important pathology. We think that aneurysms may be another pathology that ^{18}F FDG-PET/CT potentially be useful apart from imaging malignant of diseases. Prospective studies may clarify this subject.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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