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PET-CT diagnosis of cardiac cavernous hemangioma with large pericardial effusion

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Abstract. – INTRODUCTION AND CASE REPORT: A 44-year-old patient was admitted because of chest pain and pressure. The echocardiography revealed pericardial effusion. The symptoms improved after pericardiocentesis and diuretics. Shortly, the patient was re-admitted because shortness of breath. The echocardiography showed an area of dark liquid measuring 15 × 3 mm; however, the chest enhanced CTA and coronary CTA scans did not corroborate this finding. Subsequently, PET-CT scan was done and indicated potential malignancy with pericardial thickening. The patient was transferred to the Cardiac Surgery Department and underwent an open chest surgery. The operation and subsequent pathology exam identified right atrial cavernous hemangioma.

CONCLUSIONS: This case report highlights the importance of PET-CT scan in the diagnosis of suspected cardiac tumors, specifically, hemangiomas.

Key Words:
PET-CT, Hemangioma, Pericardial effusion, Diagnosis.

Case report

A 44-year-old man was admitted to our Hospital in June 2013 because of repeated precordial dull pain that developed in the past two months. Initially, the patient experienced chest pain with no clear trigger. The pain intensity was most intense below the xiphoid and increased after physical effort. The pain episodes lasted several minutes each. The patient reported of two episodes occurring during defecation; these were relieved with patient taking rest. The patient did not seek medical help with regard to these episodes until a month ago when he was admitted to a local hospital. Echocardiography suggested pericardial effusion. Pericardiocentesis yielded hemorrhagic fluid of about 330 ml that solidified after standing. The fluid did not reveal any abnormalities. The symptoms improved after administration of diuretics and anticoagulation agents. No definite diagnosis was made at that time. Shortly before admission to our Hospital, the patient experienced chest tightness and shortness of breath, and both symptoms lasted without relief for several hours. He was transferred to our Hospital for a definite diagnosis. Since the beginning of this condition, the patient experienced no chills, cough, expectoration, or lower extremity edema. The patient was previously healthy and reported no blood hypertension, coronary heart disease or tuberculosis. Upon physical examination, blood pressure was 130/80 mm Hg, heart rate was 75 beats/min, the patient had regular cardiac rhythm and showed no abnormalities upon heart and lung auscultation. No pleural friction rub was found. Repeated pericardial ultrasound showed an area of dark liquid of 15 × 3 mm in the right ventricular anterior wall near the apex and pericardial thickening. ECG revealed T wave changes on the anterior leads. Laboratory tests showed troponin of < 0.01 μg/ml, creatine kinase of 7 U/L, erythrocyte sedimentation rate of 14 mm/hour, negative tumor markers, D-dimer of 5.99 μg/ml, B-type natriuretic peptide of < 20 pg/ml, hypersensitive C-reactive protein of 7.22 mg/L, and normal markers of thyroid function and immunity. The antinuclear antibody spectrum was normal. The sputum smear showed negative acid-fast bacilli. The chest X-ray showed bilateral inflammation in the lower lung lobes. Enhanced chest CT did not reveal pleural effusions, while a small amount of pericardial effusions could be seen (Figure 1). To follow up on this, a 320-slice coronary CT scan was done and showed muscle bridge in the middle segment of the anterior descending branch.

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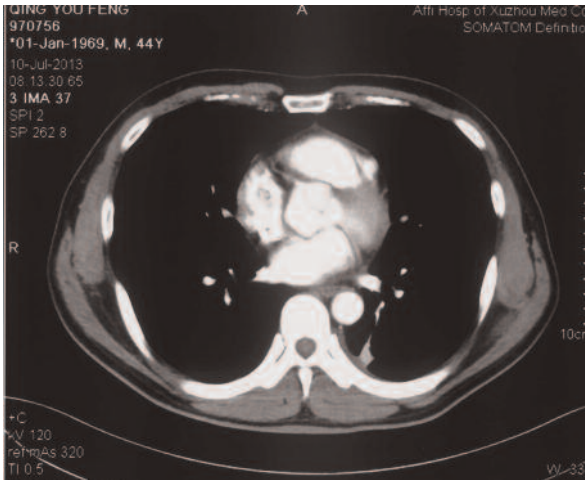

Figure 1. Chest aorta CT.

The findings were otherwise normal (Figure 2). Then, a positron emission tomography (PET-CT) scan was carried out and showed a mass next to the right atrium with abnormally increased fluorodeoxyglucose uptake. Further, there were pericardial effusions and a soft tissue nodule next to the right oblique fissure with slightly increased fluorodeoxyglucose uptake. The initial diagnosis was of potential malignancy with pericardial thickening. The nodule was considered benign at that moment. No evidence of malignant or metastatic lesions was found elsewhere in the body (Figure 3). The final diagnosis was primary tumor of the right atrium.

Figure 2. Coronary CT.

The patient was transferred to the Cardiac Surgery Department of our Hospital for right atrial tumor resection and reconstruction with cardiopulmonary bypass under mild hypothermia (rectal temperature of 30ºC). A longitudinal incision was made to the pericardium, and mild pericardial cellulose adhesions and light bloody pericardial effusions of 150 ml were found. The heart was slightly enlarged, and the tumor was seen protruding to the surface of the right atrium. The tumor size was 5 × 4 × 3 mm. The tumor was palpable inside the atrial cavity, and had solid body and moderately tough feel. Its diameter was about 6-7 cm. No pericardial occupation was identified. The right atrium was cut open for exploration. The tumor was found to be in an irregular shape with relatively intact envelope, invading the right atrioventricular groove, supplied by a branch of the right coronary artery. The tumor was then completely removed. Pathology exam revealed dark red gross with complete envelope (Figure 4). Microscopically, there were a high number of thin-walled vessels of different diameters filled with red blood cells and differentiated mature vascular endothelial cells, and fibrous connective tissue between the vessels (Figure 5). The pathological diagnosis was of right atrial cavernous hemangioma.

Discussion

Cardiac hemangiomas are rare. According to the literature, myxoma accounts for 40.8% of all primary benign cardiac tumors, lipoma for 14.2%, and hemangioma for 4.7%[1]. Cardiac hemangiomas can occur in patients of all ages. The hemangiomas are often small and immobile, and look like polypoid endocardial vegetations with a sponge-like structure. Histologically, they can be divided into capillary, cavernous, and arteriovenous hemangiomas[2]. Benign tumors are red, can bleed, are formed by the vascular endothelium in the size of 20-40 mm, with immobilized or polypoid subendocardial growth. Anatomically, hemangiomas can occur in any part of the heart. A mass in the septal or atrioventricular node can cause complete atrioventricular block or sudden

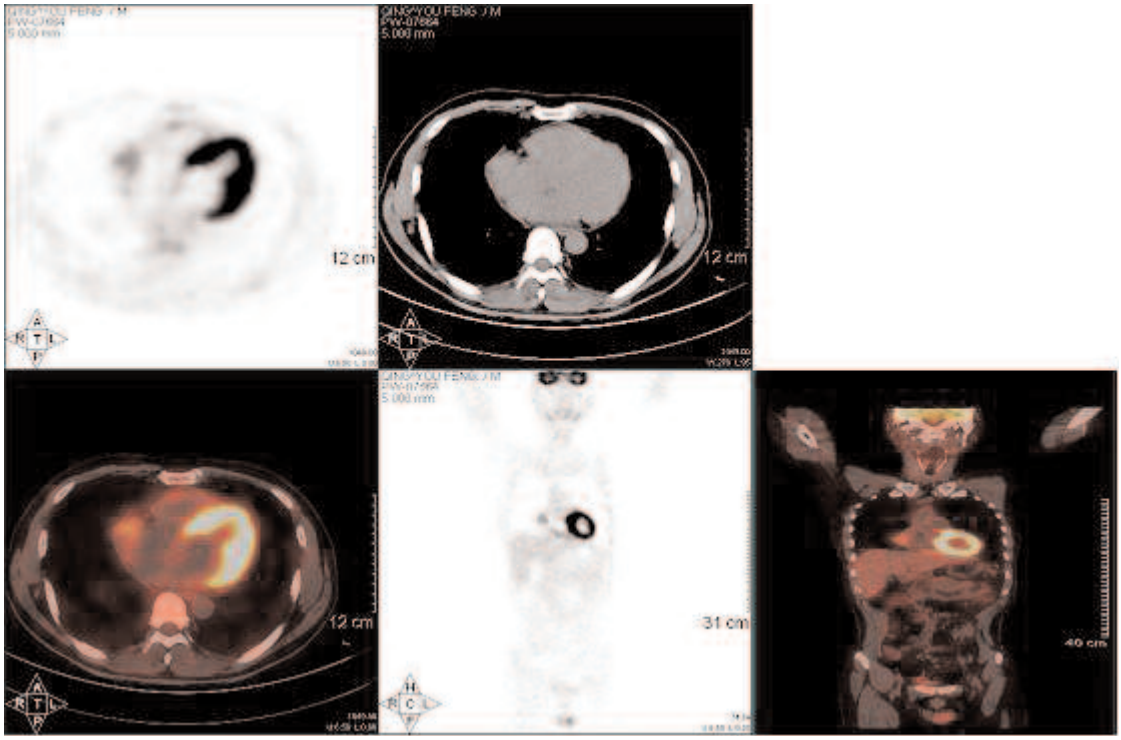

Figure 3. PET-CT.

death. An outflow tract obstruction or compression of the heart may cause shortness of breath, pericardial effusion and right heart failure after exertion. If mass ruptures, this may result in bloody pericardial effusion[3].

It is difficult to make the diagnosis of cardiac hemangioma without surgery. Because of the presence of intratumoral blood flow signal, echocardiography, thoracic aorta CT, and chest coronary CT may misdiagnose these tumors. Since the vascular tumor is often supplied by a coronary arterial branch, coronary angiography has a very high clinical diagnosis value. However, this method is invasive and bears potential

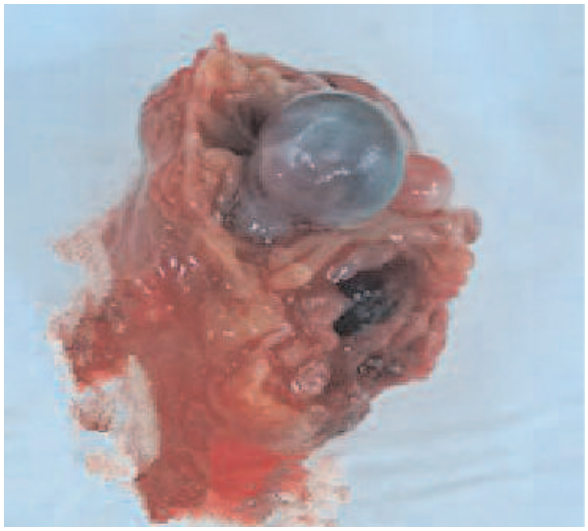

Figure 4. Gross tumor specimen.

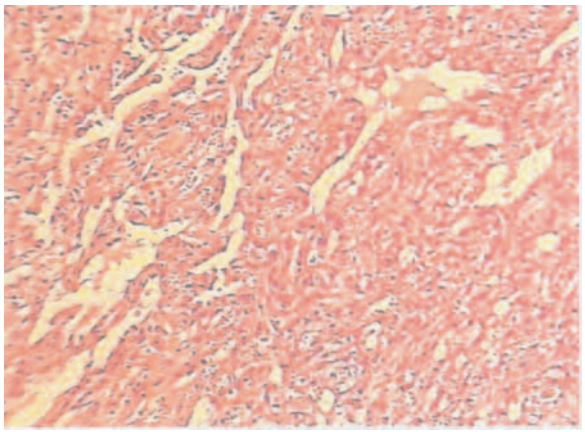

Figure 5. Microscopic view of multiple thin-walled vessels of different diameters filled with red blood cells, differentiated mature vascular endothelial cells, fibrous connective tissue between the vessels (HE x 100).

risks[4,5]. By contrast, PET-CT is the best non-invasive imaging test that has emerged in the recent years[6]. The PET-CT myocardial metabolic imaging is the most accurate method to assess myocardial cell activities, and can be used as a "gold standard" to determine and differentiate myocardial necrosis and reversible myocardial ischemia. It is not surprising that this technique has become an essential diagnostic method for intervention and coronary artery bypass surgery. This technique can also predict post-operative recovery of cardiac function[7]. In this patient, PET-CT scan revealed focal abnormal accumulation of radioactive distribution shadows characteristic for cardiac hemangioma.

Surgical resection is the best treatment method for cardiac hemangiomas[8]. The surgical site is affected by the tumor site and the extent of involvement of coronary blood vessels. In the present patient, the tumor was found in the right atrium and was a clear case of encapsulated cavernous hemangioma. Therefore, it was completely resectable. No pericardial effusions were found in the follow-up echocardiography one month after the surgery.

Conclusions

In patients with bloody pericardial effusions, after exclusion of tuberculosis and other diseases, primary cardiac tumors should be considered. The PET-CT scan is of great assistance to exclude metastatic tumors and to guide toward the diagnosis of cardiac hemangioma.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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