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Case Report

Lipomatous hypertrophy of the interatrial septum: A potential pitfall resolved on comparing previous PET/CT ☆

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ABSTRACT

In this case report, we describe a rare case of inter-atrial septal lipomatosis occasionally found in a PET-CT scan performed in an 81-year-old patient with a history of periprosthetic endocarditis post aortic prosthesis implantation. The patient reappeared in 2022 in the emergency department complaining of symptomatology of worsening asthenia, fever, and elevated inflammatory indices. He was hospitalized in Cardiology department on suspect of recurrence of endocarditis and underwent PET-CT examination that showed an increased metabolic finding at the interatrial septum. On possible suspicion of recurrence of infective endocarditis or cardiac tumor pathology, further diagnostic investigation by cardio-RM examination was requested. However, after radiologic consultation, the previous performed FDG-PET/TC examinations were re-evaluated and a misdiagnosed uptake at this level was revealed, which was assumed to be due to the endocarditis condition because of widespread uptake throughout the perivalvular area.

☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Introduction

Lipomatous hypertrophy of the interatrial septum (LHIS) is a benign cardiac pathology characterized by an unencapsulated mass of adipose tissue that infiltrates the atrial septum [1,2].

LHIS is usually found incidentally during diagnostic examinations and its incidence is reported as 1% in autopsies, 2%-8% in echocardiograms and 2.2% in CT [1].

LHIS may resemble a focal mass, but it differs from true intracardiac lipomas because it lacks a distinct capsule and contains both mature adipocytes and fetal fat cells, or brown fat [3]. Myocardial fibers gradually disrupt and disorganize as septal fat infiltration increases, leading to fibrosis. These alterations play a role in the etiology of altered electrical conduction and contractility, which may explain the uncommon correlation between LHIS and sudden death and supraventricular arrhythmias [4,5].

In LHIS, mass-like fat deposits are not encapsulated, but may appear to be bounded at the edges by normal structures such as the pericardium, fossa ovalis, atrial walls, and atrioventricular groove.

The presence of unremarkable fat density on a CT scan or fat signal intensity within the distinctly shaped lesion or on an MRI confirms the diagnosis [6].

Occasionally, increased FDG uptake has been observed in LHIS in PET or PET/CT scans. This observation could be explained by brown fat, which has been linked to increased FDG uptake and may be present in the LHIS [7].

Case study

An 81-year-old patient with a previous history of cryoablation for previous vertebral fracture [8], abdominal aortic aneurysm [9] and peri-prosthetic bacterial endocarditis of the aortic valve, diagnosed by FDG PET-TC examination in 2009, comes to our observation in June 2022 for the sudden onset of progressive asthenia, dyspnea and chest pain.

On suspicion of disease recurrence, the patient was admitted to the Department of Cardiology and underwent laboratory tests, ECG, echocardiogram and FDG PET-TC.

FDG PET-TC was performed using a PET/CT GE Discovery IQ. The patients fasted for at least 6 hours before scanning, and blood glucose levels were measured before injection of FDG. From 15 to 20 mCi (555-740 GBq) of FDG was administered IV as a bolus, and static emission images were obtained 60 minutes later in multiple bed positions.

Image reconstruction was performed with ordered subset expectation maximization algorithms. The dose, time of injection, and the patient's body weight were used to calculate the peak standardized uptake value (SUV).

PET CT showed focal increased up- take corresponding to the regions of interatrial sept on CT (Fig. 1). The SUV of the interatrial septum was 7.6. (SUV max mediastinum blood pool 2.3; SUV max liver 2.6).

In the site of metabolic uptake the CT evaluation showed a focal adipose-dense area with bilobed morphology and a maximum thickness of 21 mm.

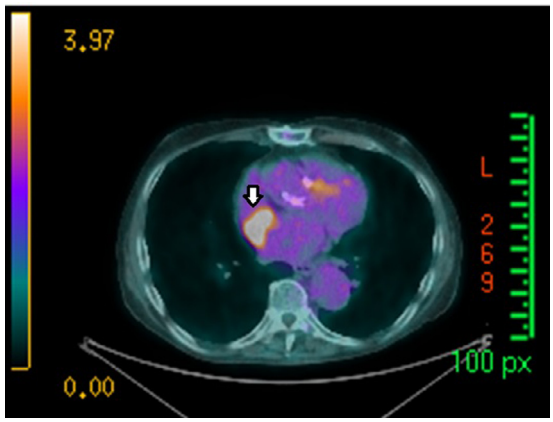

Fig. 1 – PET-TC (June 2022). Focal pathological uptake of FDG at the level of the interatrial septum (black arrow).

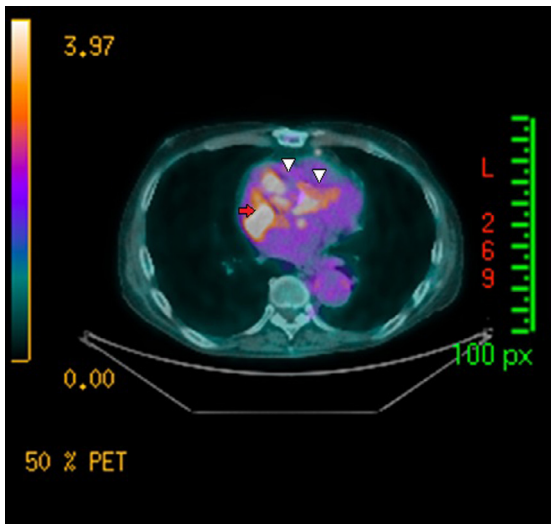

Fig. 2 – PET-CT (October 2009). The examination showed an avid peri-valvular uptake extended to the cardiac chambers (white arrowheads) but a focal pathological uptake of FDG at the level of the interatrial septum was already present (red arrow).

Initially, the finding was interpreted by the cardiology specialist as a possible recurrence of infective endocarditis or possible cardiac tumor pathology.

Cardiac MRI was requested as an additional examination to investigate its etiology, but the patient declined the examination because he was claustrophobic.

However, after radiologic consultation, previous FDG-PET/TC examinations from 2009 were retrieved and reevaluated. The 2009 examination showed an avid uptake of the peri-valvular endocardium and the inner walls of the cardiac chambers to be related to the ongoing acute inflammatory process (Fig. 2).

The massive uptake masked the already evident focal increased metabolic activity at the level of the interatrial septum, which corresponded on CT to a focal area of fat density with bilobed morphology (Fig. 3). Therefore, this finding was misdiagnosed.

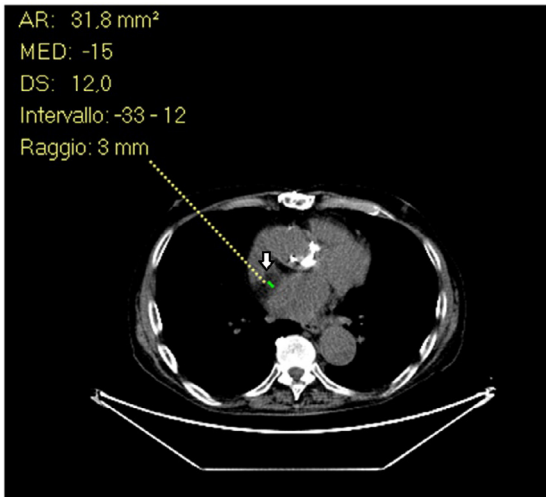

Fig. 3 – CT (June 2022). Focal area of fat density corresponded to FDG uptake (black arrow).

Comparison of the 2 PET-CT examinations showed a stable morphological and radiological picture over the years. In relation to the morphologic analysis and densitometric features of the lesion deposed for lipomatosis of the interatrial septum.

Discussion-conclusion

LHIS is a histologically benign process in which adipose tissue, a normal component of the interatrial septum, increases and infiltrates between myocardial fibers. LHIS occurs more frequently in obese or elderly persons, with higher incidences in women and in patients with metabolic disorders such as cerebrotendinous xanthomatosis or mediastinoabdominal lipomatosis [1]. LHIS has also been described in patients undergoing long-term parenteral nutrition [10].

Clinically, LHIS has been associated with atrial arrhythmias [1,4,5]. The infiltrated septum may play a central role as an ectopic source and re-entry zone, with autonomic tone as a key regulator. Conduction disturbances related to fat infiltration, inflammation, tissue fibrosis and/or connexin abnormalities (which interfere with atrial myocyte architecture) would predispose patients to atrial arrhythmic rhythms. However, in most cases LHIS does not cause any symptoms and does not require any treatment, although surgery may be indicated in rare cases where there are symptoms secondary to compression of structures such as the vena cava and pulmonary veins [7,11].

The diagnosis of LHIS is therefore usually detected as an incidental finding [1,6].

Multiple studies have documented marked preferential FDG uptake within the atrial septa of patients diagnosed with LHIS [7]. Not all patients with LHIS show increased FDG uptake on PET scan and it has been hypothesized that the variable presence of brown fat in LHIS may be responsible for this finding [3,12]. PET examination, whose use is increasing, for the diagnosis and follow-up of infectious and tumor, cardiac and extracardiac diseases has led to the identification of numerous cases of focal metabolic uptake at the interatrial septum [7,10]. This finding has generated many difficulties of interpretation, which has often necessitated the use of additional diagnostic examinations such as MRI [3,11], biopsies and unnecessary medical and surgical treatment.

An increased FDG uptake in the LHIS can potentially mimic a malignancy in the myocardium. With PET scan alone, focal increase of FDG uptake in the brown adipose tissue of the mediastinum may be misinterpreted as a primary esophageal neoplasm, primary lymphoma or lymph node metastasis, resulting in tumor upstaging or unnecessary medical or surgical intervention. Fusion PET/CT helps to clarify the region of localized FDG uptake and to confirm that it is located in the LHIS region rather than in the adjacent right hilum, mediastinum or pleura [1,13].

Positron emission tomography (PET/CT) with 18-fluorodeoxyglucose (FDG) combines a high-sensitivity technique to detect inflammatory-infective activity (PET) and a high anatomical resolution technique to assess structural lesions (CT) [13].

CT with M.D.C. also allows us to obtain data on the degree of vascularization of the lesion: by analyzing the ROI of the lesion in the basal scan and in the post-contrastographic phases, we obtain the intensity of the lesion enhancement measured in H.U. and its kinetics.

The diagnostic sensitivity of PET in combination with angio-CT (PET/CT) obtained by cardiac electrical synchronization further increases the diagnostic accuracy and anatomical resolution by discriminating in detail cardiac structural alterations and eliminating with the right patient preparation cardiac motion artefacts.

Our case demonstrates that integration of functional PET data with atomic CT data increases diagnostic accuracy. The diagnosis was correctly determined using PET/CT compared to PET or CT alone.

In addition, the retrieval of any diagnostic examinations performed in previous years as in our case can possibly confirm the presence and stability of LHIS, thus avoiding unnecessary diagnostic investigations.

MRI can be used to obtain a definitive diagnosis, but it is an expensive examination that is only performed in specialized centers and requires greater patient compliance.

Ethics human rights

The authors declare that the work described has been carried out following the Declaration of Helsinki of the World Medical Association revised in 2013 for experiments involving humans.

Author contributions

All authors attest that they meet the current International Committee of Medical Journal Editors (ICMJE) criteria for Authorship.

Availability of data and material

Not applicable.

Patient consent

The authors declare that this report does not contain any personal information that could lead to the identification of the patient. Informed consent was obtained from the patient.

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