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The incidental lung lesion: effect of cardiac stress on the MIBI uptake in the lung mass

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► ***Case report***

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ABSTRACT

A discrete MIBI avid lung lesion was found in cinematic views of myocardial perfusion imaging (MPI) of a 59 year-old woman. Interestingly, the abnormal uptake in the lung was detectable only in the rest phase images and not in the images acquired in the stress phase. MPI was performed for pre-operation cardiac risk assessment before correction surgery for spinal canal stenosis. She had no past medical history or symptoms concerning pulmonary problems. The clinical examination of the pulmonary system was normal. MPI was reported normal but for the lung lesion she was sent for consultation with pulmonologist. The pulmonologist diagnosed the lesion was an old inflammatory/infective lesion probably secondary to tuberculosis. No histopathological examination was done. By reporting this case we intended to highlight the possibility of the effect of stress on uptake of MIBI in tumoral lesions as a tumor agent in nuclear medicine.

Keywords: *MIBI, tumor uptake, stress, myocardial perfusion imaging.*

BACKGROUND

MIBI is a tumor agent used in nuclear medicine for years in evaluation of intrathoracic tumors [1] traditionally used for myocardial perfusion imaging (MPI)[2]. It is recommended that MPI images should be reviewed for incidental uptakes in the entire field of imaging [3,4] particularly in the sites of known tumors and inflammation [5,6]. In MPI, extra-cardiac activities not only are of reconstruction concern but also may point out potentially treatable lesions [7-9]. It is reported that dipyridamole stress exerts no significant change on the extracardiac uptake [10]. The denoted extracardiac activities are not independent of the application of the stress. Here we present a case indicating the possibility of the negative effect of cardiac stress on uptake of the MIBI in the lung lesions.

CASE PRESENTATION

A 59-years old female patient was candidate for surgery on spinal canal stenosis. She had experienced lower extremity paresis and low back pain for months. She weighed 79 kg and also had exertional dyspnea with a one year history of hypertension. The pre-operation cardiac risk evaluation suggested further cardiac risk assessment with MPI.

Two day stress and rest protocol for MPI with 99^{m} Technetium labeled MIBI was employed. MIBI injection was done 4 minutes after infusion of 0.56 mg/kg dipyridamol during 4 minutes. Imaging was done 45 and 90 minutes after tracer injection in stress and rest phases, respectively. SPECT data were acquired using a dual head Forte ADAC gamma camera (Philips, CA, USA) over 180° circular rotation from the 45° right anterior oblique position to the 45° left

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posterior oblique position. ECG gated SPECT mode was employed with the following specifications: 32 stop; 30 second each stop; 64×64 matrix; and 8 bin for each cardiac cycle. Filter (ramp and Butterworth) back projection was done to reconstruct the short and long axis images for visual interpretation without attenuation correction.

There was no stress induced cardiac hypoperfusion and the MPI was reported normal. Nevertheless reviewing the row images of the SPECT there was a focus of MIBI uptake in the rest phase in hillum of the right lung (figure 1). The uptake was moderate to intense. Interestingly there was no remarkable abnormal uptake in this region in stress images (figure 2). The patient was referred to pulmonologist and the final conclusion indicates the presence of an old inflammatory/infective lesion possibly due to tuberculosis.

DISCUSSION

We underscore the possibility of negative effect of stress on uptake of MIBI in tumoral or inflammatory lesions. MIBI uptake in tuberculosis is documented [11]. Nevertheless the uptake is high possibly in active lesions in contrast to inactive tuberculosis or old lesions [12]. Our finding may infer either presenting a case of MIBI uptake in an inactive tuberculosis

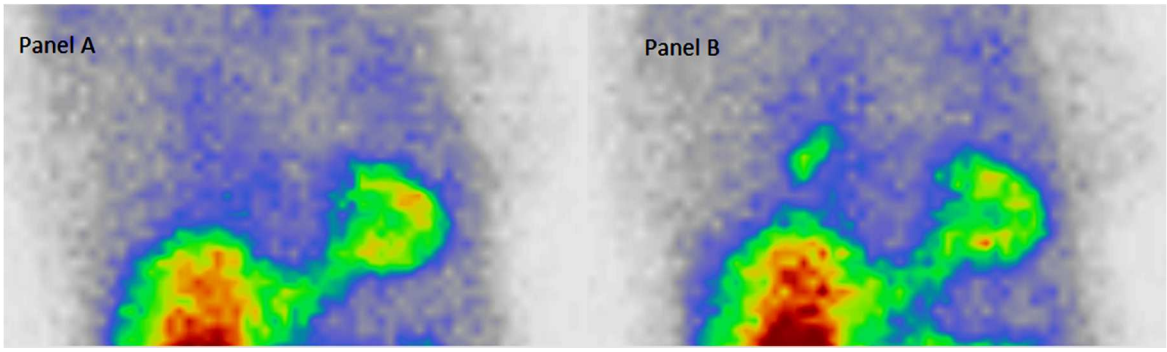

Figure 1. Anterior projection of the myocardial perfusion imaging of a 59 years old lady without history or symptoms of pulmonary disease; Normal uptake in lung fields in post stress (dipyridamol) image (A) but a single discrete lesion in the hilum of the right lung in rest phase (B).

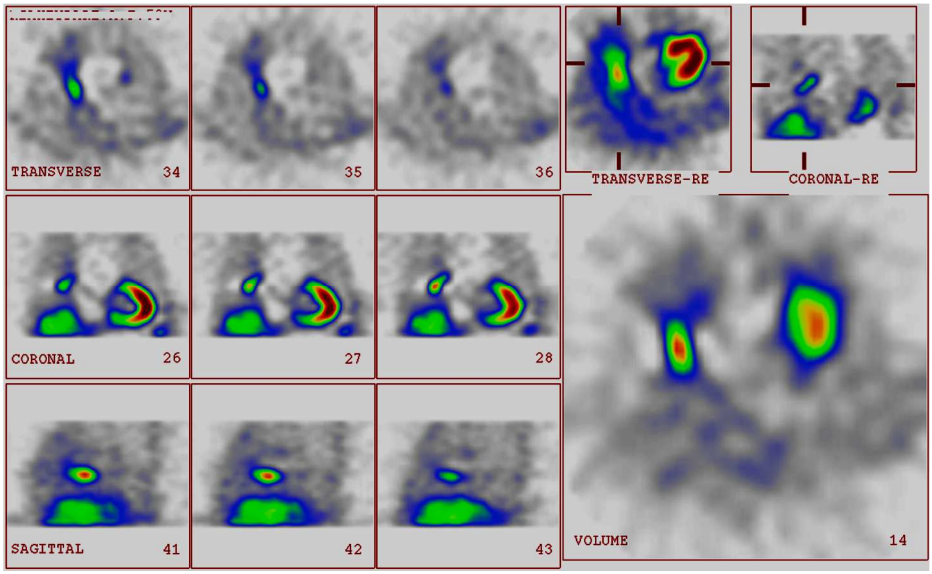

Figure 2. SPECT images of the chest of a 59 years old lady without history or symptoms of pulmonary disease at 20mCi 99mTc MIBI rest phase ; a discrete single lesion in the hilum of the right lung.

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or the wrong diagnosis of tuberculosis by pulmonologist. The mechanism of uptake for the MIBI in tumor and inflammatory sites is one or combination of the following: 1- augmented blood flow, 2- increased capillary permeability and 3- high metabolic activity of neoplastic cells which is strictly dependent on the cell and mitochondrial membrane potentials [13,14]. The uptake in the lung lesion of the presented case was significant in rest images while there was no corresponding abnormality in the stress images. The patient had no drug history showing possible interference with the MIBI uptake. Based on the basic concept of the availability of the tracer for uptake in lesions [15] and the theoretical possibility of reduced perfusion of the extracardiac viscera in cardiac stress [15], we suppose that the cardiac stress has reduced the tracer availability for uptake in the mentioned lung lesion in stress phase secondary to increased coronary flow. This is the first time that the possible effect of stress on MIBI uptake in the lung lesions is reported. Certain reports indicate that the other tracer, MIBG, presents competition between the myocardium and the tumor cells with reduced heart uptake of MIBG in patients with MIBG avid tumors [16]. Our finding is important either in the basic or clinical views. We suggest further clinical studies to clarify the subject.

Conflicts of interest: *none to declare.*

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