Unexpected Extramyocardial Tc-99m MIBI Uptake: Detection of Non-Myastenic Thymoma

Tc-99m MIBI is a routine used radiopharmaceutical in myocardial perfusion studies. It is also a tumor seeking agent. We report a 45 year old female who underwent Tc-99m MIBI myocardial perfusion study due to atypical chest pain. Abnormal MIBI uptake in the thorax was detected in raw images although myocardial perfusion was normal. This single finding led to further investigation and to resection of thymoma by which Tc-99m MIBI uptake is very rare. This case also showed the importance of checking raw images and evaluating extracardiac uptake for mediastinal tumors.

Key Words: Thymoma, mediastinal mass, Tc-99m MIBI, perfusion, SPECT

Authors have no conflicts to disclose.

Case Report

A 45 year-old white female underwent stress-rest technetium-99m hexakis 2-methoxy isobutyl isonitrile (Tc-99m MIBI) myocardial perfusion single photon emission computed tomography (SPECT) study due to atypical chest pain. A treadmill stress test was performed using modified Bruce protocol. At peak exercise 10 mCi Tc-99m MIBI was administered and SPECT myocardial imaging was performed 30 minutes after injection. Three hours later, 25 mCi Tc-99m MIBI was
reinjected and rest images were obtained 30 minutes after injection. Cardiac emission tomography was performed using a single headed rotating gamma camera system (Siemens Medical Systems, USA) fitted with low-energy, high resolution, parallel hole collimator. Dynamic data acquisition was performed with step and shot rotation, images were recorded at 2.81° intervals over 180° orbit (45° right anterior oblic to 45° left posterior oblique) in 64X64 matrix using 20% energy window centered at 140keV. Tc-99m MIBI myocardial imaging did not show any abnormal perfusion in the left ventricle. However, an abnormal extra-cardiac mediastinal accumulation was detected during control of raw projection images for motion artefact (Fig. 1). After that, thorax SPECT study was obtained to confirm finding and to make better localization of abnormal mediastinal MIBI uptake (Fig. 2). The patient was referred to thoracic surgery for further evaluation of the SPECT abnormality. Physical examination and laboratory studies were normal. However, chest radiography clearly demonstrated a compact mass on the hilar, lower paraaortic level in the left thorax (Fig. 3). Contrast-enhanced chest CT scanning also demonstrated a 3.5x5cm, lobulated mass lesion in anterior mediastinum, which is definitely separated from arcus aorta and mediastinal fat tissue (Fig. 4).

Median sternotomy was accomplished. Thymic tissue was concordant with the patient age. Thymus and a mass with 4x4cm in diameter on the left lower lobe together with the surrounding fat tissue were resected by maximal thymectomy. There was no complication. The drain was taken out at the 24th. postoperative hours and the patient was discharged on the 5th. postoperative day.

Fig. 1. Selected images from the raw projection data acquired during the exercise portion of the myocardial perfusion study. An extracardiac tracer activity is seen in the left thorax.
Pathologic examination demonstrated type B1 thymoma, with extension through the capsule (stage IIA, MASAOKA) (PT2,TNM). Patient was referred to oncology department for further evaluation and follow up. She was free of chest pain at the time of this report.

**Discussion**

Thymomas are the most frequent tumors of the anterior mediastinum, and chest pain is one of the
major presentation symptoms. Although they are usually diagnosed initially by CT, all of thymomas found, 70% will be positive on TI-201 scanning.

There are also significant numbers of reports in the literature about Tc-99m tetrofosmine and Ga-67 citrate uptake by thymic carcinomas.

In addition to Tc-99m MIBI’s widely usages in myocardial imaging, it is also used as a tumor-seeking agent in nuclear medicine. While vast majority of thymic tumors reported as Tc-99m MIBI avid are malignant thymomas, there are very rare reports in the literature showing Tc-99m MIBI uptake in the benign thymoma. Adalet et al described a 72 year old man with exertional chest pain, TI-201 reversible myocardial defects, and Tc-99m MIBI and TI-201 uptake in a benign thymoma. Second case was reported by Lanka et al in 2002. The authors reported an unusual case of a thymoma that accumulated both Tc-99m pertechnetate and Tc-99m MIBI. Our case is probably the third case reported in the literature which shows Tc-99m MIBI uptake in the benign thymoma.

Our case report is also special by means of being an unsuspected discovery. While myocardial perfusion was normal, there was extracardiac uptake in the mediastinum discovered during control of raw projection images. This single nuclear finding led to further investigation and ultimately to resection of a stage IIA thymoma.

More then 80% patients with type B1 thymoma can be expected to present with a Masaoka stage I or II tumor and will be amenable to complete thymoma resection. Although some authors have considered postoperative radiotherapy in completely resected thymomas in Masaoka stage II beneficial, local recurrence rate is very low (<5%). Our patient was referred to oncology department for further evaluation and follow up after maximal thymus and mass resection, however she was considered as suitable case for neither radiotherapy nor chemotherapy.

In conclusion, we report an unusual discovery of an unsuspected stage IIA thymoma during Tc-99m MIBI stress and rest myocardial perfusion SPECT study. This case emphasizes the importance of viewing the projection images of myocardial perfusion imaging studies. Not only do the projection images provide information about patient motion and confirm the presence of attenuation of myocardial activity, but they also may reveal extracardiac abnormalities of the thorax which may be missed on the standard SPECT myocardial perfusion images. This also shows that extracardiac uptake should lead to further studies to exclude mediastinal tumor. Tc-99m MIBI uptake by thymomas might also provide a sensitive means of detecting recurrency after surgery.

REFERENCES