

TC-99M MIBI MİYOKARD PERFÜZYON SİNTİGRAFİSİNDE RASTLANTISAL OLARAK TESPİT EDİLEN TİMOMA

Incidental Detection of Thymoma During Tc-99m MIBI Myocardial Perfusion Scintigraphy

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ÖZET

Tc-99m hexakis 2-methoxy-2-methylpropylisonitrile (Tc-99m MIBI) ile yapılan miyokard perfüzyon sintigrafisi, koroner arter hastalığı tanısında yaygın olarak kullanılan bir tekniktir. Tc-99m MIBI de vücutta dağılır ve çeşitli dokularda birikir, aynı zamanda tümör tarayıcı özelliği olduğu da bildirilmiştir. Yapılan çalışmalarda, Tc-99m MIBI'nin çeşitli tümör dokularında tutulduğu gösterilmiştir.

Biz burada miyokard perfüzyon sintigrafisi çalışması sırasında rastlantısal olarak tespit edilen timomalı bir olguu sunuyoruz.

Anahtar kelime: *Miyokard perfüzyon sintigrafisi, Tc-99m MIBI, Timoma*

ABSTRACT

Myocardial perfusion imaging performed with the radiopharmaceutical agent technetium-99m hexakis 2-methoxy-2-methylpropylisonitrile (Tc-99m MIBI) is a technique that is widely used in the diagnosis of coronary artery disease. Tc-99m MIBI is distributed throughout the body and accumulates in multiple tissues, but is also reported to have potential tumor-screening properties. In previous studies, Tc-99m MIBI uptake has been showed in various malignant diseases.

We herein present a patient with incidentally detected thymoma during myocardial perfusion scintigraphy study.

Key words: *Myocardial perfusion scintigraphy, Tc-99m MIBI, Thymoma*

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INTRODUCTION

Technetium-99m hexakis 2-methoxy-2-methylpropylisonitrile (Tc-99m MIBI) is the radiopharmaceutical agent commonly used in myocardial perfusion scintigraphy study (1). The mechanism of cellular uptake is not entirely clear, but it seems to be related to the concentration of mitochondria inside the cells and the electrochemical gradient across the cell membrane (2). It was originally developed for myocardial perfusion studies and has recently been used as a tumor-imaging agent for various malignancies. A number of studies have described the uptake of Tc-99m MIBI by tumors including thyroid nodules (benign or malignant), parathyroid adenomas, lung malignancies, breast malignancies, bone tumors, lymphomas, brain tumors, sarcomas, infectious processes and granulomas (3,4).

We report a patient who underwent noninvasive cardiac testing, in which Tc-99m MIBI myocardial perfusion scintigraphy with the aid of single photon emission computed tomography (SPECT) testing led to a diagnosis of a previously unsuspected thymoma.

CASE REPORT

A 74-year-old woman was presented from the cardiology outpatient clinic to our department with history of chest pain and shortness of breath on exertion, under the impression of acute coronary syndrome. Clinical examination was unremarkable. Electrocardiography (ECG) showed sinus rhythm with T wave inversion in leads V4 to V6. Because of this finding myocardial perfusion imaging with SPECT was performed. Stress and rest images of 99mTc-MIBI myocardial perfusion scintigraphy were performed under pharmacologically stress (after intravenous injection of 0.143 mg/kg/min dipyridamole).

For imaging, SPECT datas were acquired in the supine position with the double-head SPECT γ camera (Phi

lips, BrightView; Netherlands) equipped with a high-resolution low-energy collimator. The SPECT acquisition was performed using 180° rotational tomography, extending from the 45° right anterior oblique position to the 45° left posterior oblique position. Thirty-two projections were obtained during the 180° rotation, with each being imaged for 45 s. 99mTc-MIBI showed no evidence of inducible myocardial ischaemia, but a single abnormal focus of tracer uptake was noted within the mediastinum on both the stress and rest images (Figure 1). CT of the thorax demonstrated a lobulated 2.5 x 4.1 x 4 cm homogeneous soft tissue mass within the anterior mediastinum with no evidence of local invasion (Figure 2).

The patient was referred to a chest surgeon, and total resection of the anterior mediastinal tumor was performed. Pathological examination revealed thick bands of collagenous material separating lobules of small to medium sized lymphoid cells consistent with a predominantly cortical thymoma.

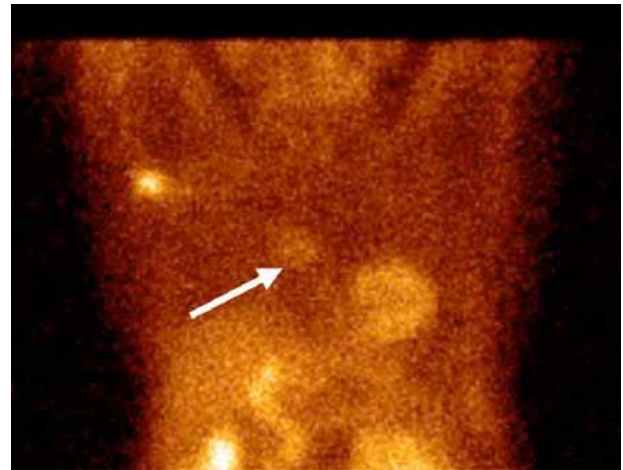


Figure 1. Coronal images from the source data of a 99Tcm-MIBI myocardial scintigram show an abnormal focus of uptake within the mediastinum (arrows). Furthermore there is a tracer uptake in right axillary lymph node due to extravasation. Physiological tracer uptake is also seen within the heart, bowel, liver and gallbladder.



Figure 2. Non-contrast-enhanced CT showing the superior component of a lobulated homogeneous soft tissue mass within the anterior mediastinum. Hystopathologic examination of the mass confirmed this to be a thymoma (arrow)

DISCUSSION

Myocardial perfusion scintigraphy with the aid of single photon emission computed tomography (SPECT) is a noninvasive cardiac test that is commonly used in the diagnosis of coronary artery disease (1). In common with other radiopharmaceutical agents, Tc-99m MIBI is distributed throughout the body and accumulates in multiple tissues. After intravenous administration, these agent is physiologically taken up by the salivary glands, thyroid, heart, liver, and spleen. There is physiologic hepatobiliary and renal clearance of it (5). Its use, other than in the evaluation of myocardial perfusion, has expanded to include tumor imaging.

In the case discussed above, Tc-99m MIBI led to a diagnosis of a previously unsuspected malignant tumor and to earlier treatment of this disease. Thymic neoplasia is the most common cause of an anterior mediastinal mass (6). Incidental scintigraphic detection of a thymoma has been described on myocardial perfusion scintigraphy performed using

Thallium-201, ^{99m}Tc -1, 2-bis (bis (2-ethoxyethyl) phosphino) ethane (Tetrofosmin) and ^{99m}Tc -2-methoxy-isobutyl-isonitrile (MIBI) tracers (7-9). This case reminds us once again that the interpretation of myocardial perfusion imaging should not be limited to the heart.

The field of view of unprocessed SPECT data varies, in accordance with the size of the camera crystal and the size of the patient, but it usually includes the entire chest, the liver, the spleen, and part of the bowel; occasionally, the thyroid gland and the kidneys are also included (10). Therefore, the interpreting physician has the opportunity to evaluate other organs and should take advantage of it. When interpreting studies that involve this radiotracer, the physician must be aware of its physiologic distribution, in order to recognize abnormal uptake. The unprocessed data include the physiologic or pathologic radiopharmaceutical uptake in the imaged body, it is important that the interpreting physician evaluate all the information available; incidental findings in the other organs may lead to an earlier diagnosis of pathologic conditions that require treatment. Because the ultimate goal is the well-being of the patient, any available information should be examined and interpreted.

In conclusion, although the primary goal of myocardial perfusion imaging is the evaluation of myocardium, interpretation of myocardial perfusion imaging should not be limited to the heart, since the failure to identify incidental abnormal findings delays diagnosis and treatment.

REFERENCES

1. Zaret B, Beller G. Clinical Nuclear Cardiology. 3rd ed. Philadelphia, PA: Mosby; 2005;216.
2. Chiu ML, Kronauge JF, Piwnica-Worms D. Effect of mitochondrial and plasma membrane potentials on accumulation of hexakis (2-methoxyisobutylisonitrile) technetium in cultured mouse fibroblasts. J Nucl Med 1990;31(10):1646-53.
3. Abdel-Dayem HM. The role of nuclear medicine in primary bone and soft tissue tumors. Semin Nucl Med 1997;27(4):355-63.
4. Taki J, Sumiya H, Tsuchiya H et al. Evaluating benign and malignant bone and soft-tissue lesions with technetium-99m-MIBI scintigraphy. J Nucl Med 1997;38(5):501-6.
5. Li QS, Solot G, Frank TL et al. Myocardial redistribution of technetium-99m-methoxyisobutyl isonitrile (SESTAMIBI). J Nucl Med 1990;31(9):1069-76.
6. Santana L, Givica A, Camacho C. Best cases from the AFIP: Thymoma. RadioGraphics 2002;22(1):95-102.
7. Maticke GJ, Sokol JA, Jozwiak J, Ruisi JA. Detection of thymoma by SPECT thallium imaging. J Nucl Cardiol 1998;5(4):449-50.
8. Hashimoto T, Goto K, Hishinuma Y et al. Uptake of 99mTc-tetrofosmin, 99mTc-MIBI and 201Tl in malignant thymoma. Ann Nucl Med 2000;14(3):293-8.
9. Hawkins M, Scarsbrook AF, Pavlitchouk S, Moore NR, Bradley KM. Detection of an occult thymoma on 99Tcm-Tetrofosmin myocardial scintigraphy. Br J Radiol 2007;80(952):72-4.
10. Chatziioannou SN, Alfaro-Franco C, Moore WH, Alanis-Williams L, Dhekne RD, Ford PV. The Significance of Incidental Noncardiac Findings. Tex Heart Inst J 1999;26(3):229-31.