Evaluation by SPECT-CT of an incidental finding of a thymoma and breast cancer in a myocardial perfusion SPECT with $^{99m}$Tc-MIBI


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A R T I C L E   I N F O

Article history:
Received 20 September 2012
Accepted 29 October 2012
Available online 23 December 2012

Keywords:
SPECT-CT
Thymoma
Breast cancer
Myocardial perfusion SPECT

A B S T R A C T

We present a case of a 78-year-old female with effort angina. A myocardial perfusion SPECT (MPS) showed increased tracer uptake in two synchronic tumor lesions, a thymoma and a breast cancer. This case highlights the contribution of SPECT-CT in the characterization of these findings and its essential role in rapid decision-making. The patient underwent surgery of both lesions that had gone undetected prior to the conduction of the MPS.

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Introduction

Sometimes unexpected extracardiac findings are revealed in myocardial perfusion SPECT (MPS). In particular, $^{99m}$Tc-metoxi-isobutil-isonitrile ($^{99m}$Tc-MIBI) is an oncotropic radiotracer, besides being used to assess myocardial perfusion. Due to this property, if there were any tumors in the MPS acquisition field, they could be detected. As it is widely known, functional imaging is most often nonspecific. Nowadays, in the era of the hybrid imaging, we can accurately diagnose by means of the improvement in localization and with the information on morphological characteristics of the lesions shown in the CT.

We present a case where the MPS detected two unsuspected synchronic lesions, which were evaluated by SPECT-CT.

Case report

A 78 year-old-patient, with chronic stable coronary artery disease, and sporadic episodes compatible with stable angina, was referred to the Department of Nuclear Medicine to assess inducible myocardial ischemia. A MPS, following a two days protocol, one hour after $^{99m}$Tc-MIBI injection (740 MBq each day) was acquired. The stress was performed by pharmacological stimulation with dipyridamole. While the MPS was normal, two pathological deposits of the tracer were identified on the raw projection images, one in the thorax and the other one close to left axillary region (Fig. 1).

In view of these findings, a thorax SPECT-CT was performed to complete the study. A high tracer uptake mass was identified in the anterior mediastinum (Fig. 2A). In addition, the low dose CT allowed localizing the smaller focus in a nodular lesion within the left breast (Fig. 3A). After these findings, the patient was referred to the Departments of Thoracic Surgery and Gynecology.

A mamography was performed (Fig. 3B), showing an ill-defined nodule, of about two centimeters in maximum diameter, located in the superior-external quadrant of the left breast, with microcalcifications, as well as coarse calcification, compatible with invasive ductal carcinoma BIRADS 4b. The patient underwent surgery revealing an intraductal carcinoma. Regarding the mediastinal tumor, a contrast enhanced CT was performed (Fig. 2B), where a contrast enhanced solid mass (52 mm x 45 mm), located in the anterior mediastinum, was confirmed. Because its localization, it was suggestive of a thymoma. A new surgery was performed through an anterior thoracotomy, performing a tumor resection,
confirming as a thymoma type A of fusiform cells, with invasion through the capsule (stage IIA of MASAOKA Staging System).

Discussion

Although the visualization of relevant extracardiac findings on MPS is not common, the importance of assessing the raw projection images for its possible detection has been widely described.\textsuperscript{1–3} Thymoma,\textsuperscript{3–5} benign and malignant breast tumors,\textsuperscript{3,6} and lung cancer,\textsuperscript{2} among other findings, have been described performing this technique. In this sense, extracardiac uptake has been described in other tumors and in non-tumoral pathology, for instance the duodenogastric reflux\textsuperscript{7} and a hematoma in the breast,\textsuperscript{8} as well as bilateral breast uptake in lactating patients.\textsuperscript{9} Although the association between thymoma and other tumors is not uncommon, the incidental finding of the two tumors in a MPS is rare. On the other hand this case shows the role of SPECT-CT in the characterization of these findings. SPECT-CT was particularly useful to locate a focus of increased uptake in the breast instead of in the axillary region as it was suggested by the MPS. Nowadays, with the addition of the CT to the SPECT\textsuperscript{10} it is possible for a Nuclear Medicine Department to complete the study achieving a more accurate diagnosis. This allows accelerating the patient evaluation, and thereby the diagnosis and therapy.

![Fig. 1. Myocardial perfusion SPECT: raw projection image. Two pathological deposits of the tracer are shown: a larger deposit in the thorax, middle line (→→), and a second one close to left axillary region (→).](image)

![Fig. 2. Thorax SPECT-CT (A): a high uptake mass (→) was visualized in the anterior mediastinum, in the prevascular space. This finding was evaluated by contrast enhanced CT (B) where an enhanced solid mass (52 mm × 45 mm) compatible with thymoma was confirmed.](image)

![Fig. 3. Thorax SPECT-CT (A): the small focus of uptake appears in a nodular lesion (→), with soft tissue density and a peripheral calcified area, within the left breast. Mammography (B) identifies an ill-defined nodule (two centimeters in maximum diameter), located in the superior-external quadrant of the left breast, with microcalcifications and an coarse calcification.](image)
References