

Detection of cold bone metastasis by Tc-99m MIBI imaging

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We present a case of renal cell carcinoma metastasis to the skull, appearing as a photopenic area on Tc-99m MDP bone scan and with focal uptake in the same region on Tc-99m MIBI imaging.

Key words: renal cell carcinoma, Tc-99m MIBI, bone scan, Tc-99m MDP

INTRODUCTION

RENAL CELL CARCINOMAS (RCC) account for 85 to 90% of all renal cancers in adults.¹ RCC commonly metastasizes to bone and lung. Tc-99m MDP bone scan has been routinely used to detect bone metastasis of RCC and staging of the disease.² Tc-99m MIBI is an imaging agent used in the diagnostic work-up of various primary and metastatic tumors.³⁻⁵ We present a case of renal cell carcinoma metastasis to the skull that was photopenic on bone scan and showed focal uptake of Tc-99m MIBI in the same region.

CASE REPORT

A 61-year-old man was operated on for a right renal mass suggesting renal tumor six months ago in another hospital, and histopathologically renal cell carcinoma was diagnosed. The patient was assessed for follow-up by radiologic methods including X-ray and a CT for the diagnosis of metastatic spread of the tumor because of the long waiting list for a bone scan in that hospital. This metastasis survey included spine, ribs, femuri and chest. No metastases were found by these methods in those regions. The patient was then evaluated by Tc-99m MDP bone scan for the evaluation of bone metastasis at Ultra-tek Diagnostic Imaging Center. Anterior-posterior whole body images were acquired three hours after the IV injection of

740 MBq Tc-99m MDP. A photopenic focal area (cold lesion) was observed in the posterior part of the skull on bone scan (Fig. 1). X-ray of the skull revealed a small well-defined lytic lesion in this area with increased radio-nuclide uptake. Two days later, the patient was injected with 740 MBq Tc-99m MIBI to evaluate the nature of this cold lesion (benign vs. malignant). Images were acquired 10 minutes and 3 hours after injection. Planar and SPECT images of the skull for the discrimination of the intracranial lesion and whole body images in anterior and posterior projections for the evaluation of the other metastases were obtained. SPECT imaging of the head was performed with a single head gamma camera. Tc-99m MIBI uptake was observed in the corresponding area of the skull on planar images (Fig. 2) and SPECT slices (not included). No other pathologic uptake was seen on the whole body images. After radiological and scintigraphic studies; biopsy was performed to the skull lesion and RCC metastasis was diagnosed histopathologically.

DISCUSSION

RCC arise from the tubular epithelium of kidneys. One of the most notable characteristics of this tumor is its tendency to metastasize extensively. The most common sites of metastases are the lungs and bones.

Tc-99m MDP bone scan is routinely used for the detection of various primary and metastatic tumors in bone. Almost all metastatic deposits in bone are observed as a focus of preferential accumulation or hot spots due to osteoblastic response or tumor vascularity. In some tumors, a deposit is not associated with a typical osteoblastic response. Such deposits often appear as photopenic lesions without accumulation. This appearance may occur in very aggressive and rapidly growing tumors or

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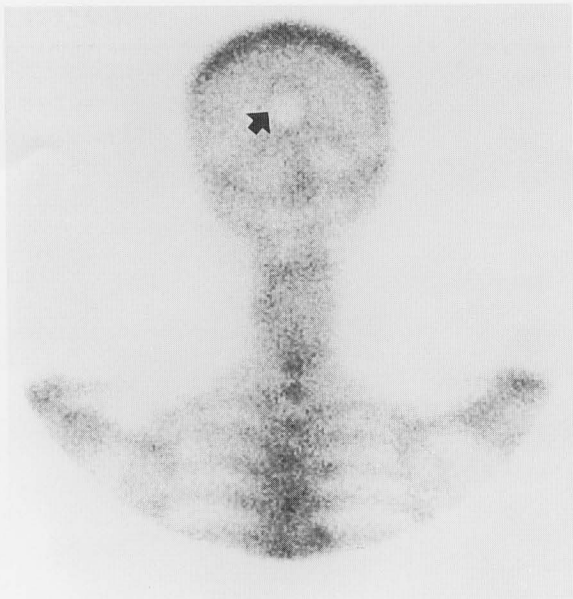


Fig. 1 Photopenic area is seen at the parieto-occipital region on Tc-99m MDP bone scan (posterior).

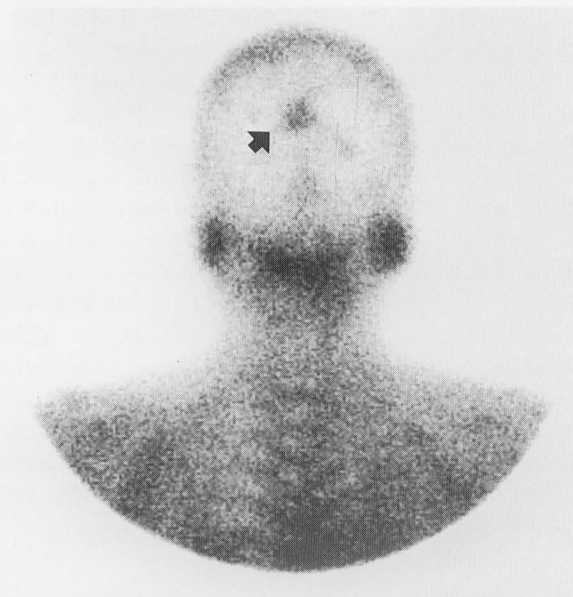


Fig. 2 Increased Tc-99m MIBI uptake at the corresponding site of the skull is seen on planar image (posterior).

conversely in some slow growing tumors such as thyroid carcinoma.⁶ The frequency of cold lesions associated with kidney tumors is relatively high.⁷

Tc-99m MIBI is a non-specific tumor screening agent. It is increasingly used in the evaluation of various primary and metastatic tumors.³⁻⁵ Although Tc-99m MIBI has been studied in bone metastases of various tumors and Tc-99m MIBI uptake in soft tissue metastasis of RCC was previously reported,¹¹ to the best of our knowledge, no report on bone metastasis of RCC showing Tc-99m MIBI

uptake has yet been published.^{5,8-10} In our case, we observed a cold area in the cranium on the bone scan, due to RCC metastasis and a hot area on a Tc-99m MIBI scan in the same region. The lesion was first detected by radionuclide bone scan, and X-ray retrospectively confirmed a lesion in that area.

Photopenic lesions on bone scan may cause false negative results. Cold lesions in the cranium may be detected more easily than in other areas of the skeleton but if the lesion is small, it may be overlooked. Because cold bone metastases are observed frequently in some tumors including RCC, Tc-99m MDP bone scans may be inadequate for the detection of bone metastasis. In such circumstances, other tumor seeking agents including the Tc-99m MIBI can be helpful for the evaluation of bone metastases. As a result a combination of Tc-99m MDP and Tc-99m MIBI scans is recommended for the evaluation of some tumors which commonly show photopenic bone metastasis.

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