

Bone scan ^{99m}Tc -MDP imaging of malignant mesothelioma with osseous differentiation

To the Editor: Pleural malignant mesothelioma (MM) is an uncommon neoplasm with poor prognosis, strongly related to asbestos exposure, arising from mesothelial cells of the pleura. Pleurodynia is its most usual symptom, whereas the presence of pleural effusion combined with thickened pleura and calcified plaques in both computed tomographic (CT) images and respective histopathological findings set the diagnosis. Bone scan is rarely used in the diagnostic algorithm of MM. There are only two reports in the literature of incidental detection of this pathology via bone scan [1-2]. We describe an 80 years old man with history of prostate cancer, prostatectomy and past history of talc pleurodesis because of excessive pleural effusion and left pleurodynia. Past pleural effusion cytology was negative.

Chest CT study revealed left pleural effusion surrounded by a thickened, calcified pleura, raising the suspicion of mesothelioma. The patient was referred to us for technetium- ^{99m}Tc -bone scan, which demonstrated diffuse intense uptake of ^{99m}Tc -MDP in the left hemithorax, intense in both anterior and posterior images. These findings were attributed to malignant pleural effusion, although coexistent areas of osteoblastic reaction and/or ^{99m}Tc -MDP uptake on talc deposits could not be excluded (Fig. 1). Histology after pleural biopsy and rib resection revealed MM with osseous differentiation (Fig. 2).

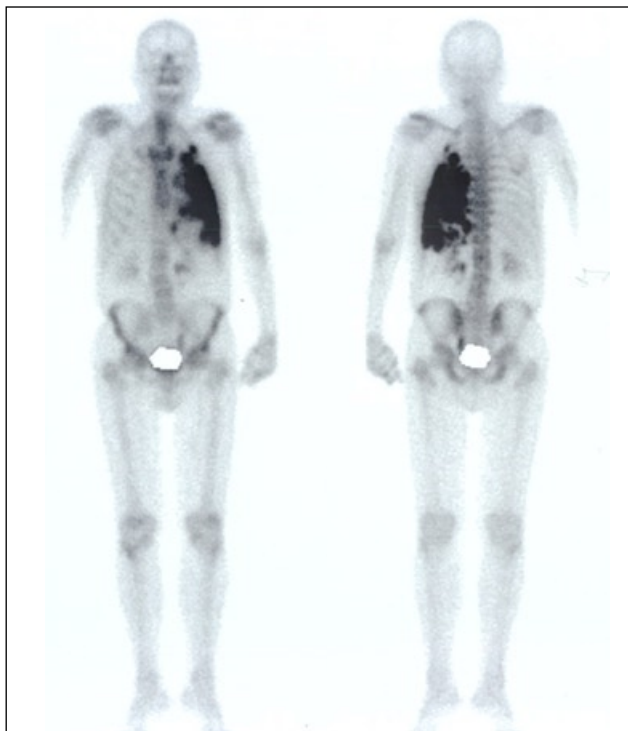


Figure 1. Whole body bone scan: Diffuse uptake of ^{99m}Tc -MDP in the left hemithorax, intense in both anterior and posterior images

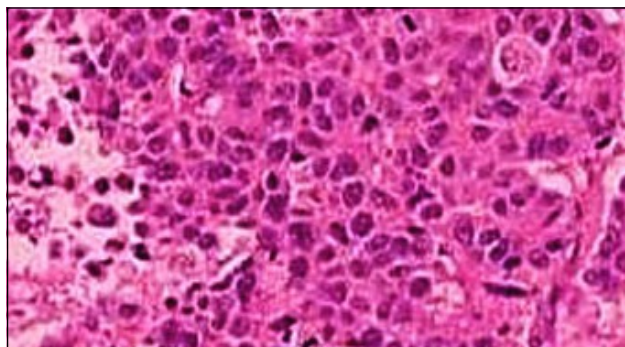


Figure 2. Malignant mesothelioma with osseous differentiation

Malignant mesotheliomas are rare tumors that usually originate from the pleura, and occasionally from the peritoneum and pericardium, often treated with talc pleurodesis. There are very few reports of MM detected by bone scan, imaged as a markedly increased uptake of the radionuclide at the pleura, or as a photopenic lesion [1, 2]. Although there is no explanation for this discrepancy it might be attributed to the volume of the effusion, causing photon attenuation or to impaired diffusion of the tracer into the pleural cavity, which is filled with fluid under tension. Another possible mechanism of impaired ^{99m}Tc -MDP uptake in the pleura is the altered capillary permeability of the pleura due to tumor invasion and/or tumor induced increase of the amount of calcium and phosphorus in the effusion [3, 4]. Furthermore, talc pleurodesis may cause false positive pleural examination by fluorine-18-fluorodeoxyglucose-positron emission tomography (^{18}F -FDG PET). Uptake of ^{18}F -FDG in calcified plaques of the pleura can take place even five years later, due to talc-stimulated macrophage inflammatory response and release of interleukin-8, in addition to macrophage chemoattractant protein 1 (MCP-1) [5-7]. This inflammatory reaction following pleural talc administration refers to both visceral and parietal pleura and results to the formation of granulomas and pleural fibrosis which could explain the ^{99m}Tc -MDP uptake on talc deposits.

The authors declare that they have no conflicts of interest.

Bibliography

- Huang YC, Tu DG, Wu JD, Lee MY. Malignant pleural mesothelioma presenting as low back pain: diagnosed by bone scan coordinating with ^{18}F -FDG PET/CT. *Spine* 2009; 34(21): E780-3.
- Hon Chi S, Sudholt B, Anderson WM et al. Malignant Mesothelioma with Osseous Differentiation. *Ann Thorac Surg* 2002; 73: 665.
- Balan KK, Ramkumar S, Faraj K, Choudhary AK. Reduced Hemithoracic Uptake on ^{99m}Tc -MDP Bone Scintigraphy: An Underrecognized Sign of Massive Pleural Effusion - A Case Report. *J Nucl Med Technol* 2003; 31: 25-6.

4. Sandler DE, Hattner RS, Parisi MT, Miller TR. Clinical Utility of Bone Scan Features of Pleural Effusion: Sensitivity and Specificity for Malignancy Based on Pleural Fluid Cytopathology. *J NuclMed* 1994; 35: 429-31.
5. Sager S, Ergul N, Ciftci H, Cermik TF. False positive ¹⁸F-FDG-PET/CT findings in a patient with talc pleurodesis. *Hell J Nucl Med* 2010; 13(2): 179-80.
6. Kwek BH, Aquino SL, Fischman AJ. Fluorodeoxyglucose positron emission tomography and CT after talc pleurodesis. *Chest* 2004; 125: 2356-60.
7. Ahmadzadehfar H, Palmedo H, Strunk H et al. False positive ¹⁸F-FDG-PET/CT in a patient after talc pleurodesis. *Lung Cancer* 2007; 58: 418-21.

Irini Kotsalou¹ MD, PhD, Panagiotis Chronopoulos² MD, Aggeliki Mella³ MD, PhD, Antonios Zouboulidis¹ MD, Nikolaos Dimakopoulos¹ MD, PhD

1. Nuclear Medicine Department and
2. Radiology Department and
3. Histopathology-Cytology Department, NIMTS Hospital, Athens, Greece

Irini Kotsalou MD, PhD

Ippokrinis 37-39, Zografou, 15773, Athens-Greece
Tel: + 00306974614067, E-mail: kotsiren@otenet.gr

