Osteogenic Sarcoma with Osseous, Pulmonary, and Pericardial Metastases Simultaneously Demonstrated on Bone Scintigraphy at Initial Presentation

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초기 골스캔에서 뼈, 폐와 심낭으로의 전이를 보인 골육종

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국문초록

Purpose: A 6-year-old boy with osteogenic sarcoma of the left humerus underwent bone scintigraphy. Tc-99m MDP was accumulated not only in the primary tumor but also in the osseous and extraosseous (pulmonary and pericardial) metastases. Osteogenic sarcoma directly produces osteoid, both in the primary and metastatic lesions. Tc-99m MDP is avidly taken up by tumor osteoid. At initial presentation, only 2% of cases have both pulmonary and osseous metastases. The patient had osseous, pulmonary, and pericardial metastases at presentation. This case presents that increased uptakes of Tc-99m MDP by the primary and metastatic tumor were demonstrated on bone scintigraphy at presentation.

Key Words: Osteogenic sarcoma, metastases, extraosseous uptake, Tc-99m MDP, bone scintigraphy

Legends

Fig 1. A 6-year-old boy had a painful swelling in the left shoulder and arm in a two-week period. The patient developed cough and dyspnea 2 days before admission. The initial chest radiograph revealed massive pleural effusion of the left thorax and multiple pulmonary nodules in the right lung field that were compatible with hematogenous lung metastases. Drainage by chest tube was performed. Although pleural fluid showed bloody, cytology confirmed that there were no malignant cells. Radiographs revealed a lesion consistent with osteogenic sarcoma that involved the left entire humerus. A bone biopsy confirmed the diagnosis of osteogenic sarcoma.

Osteogenic sarcoma is the most common primary

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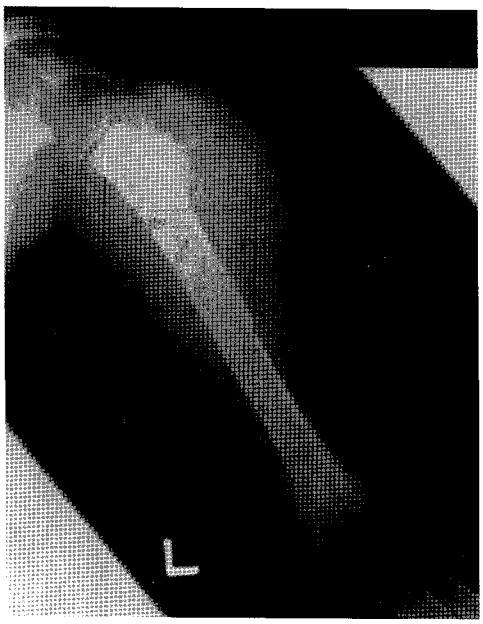

Fig 1

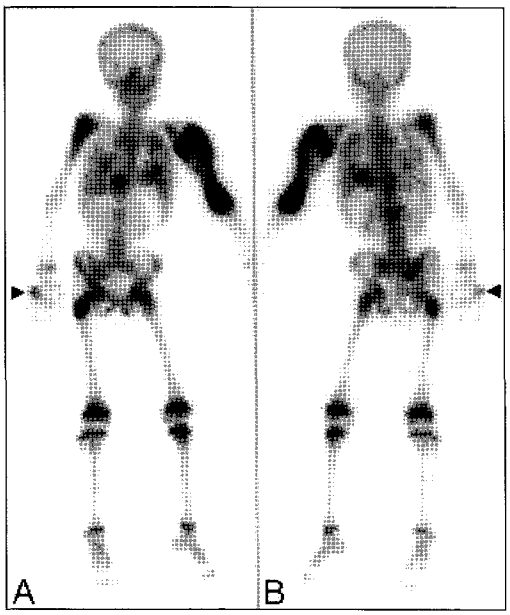

Fig 2

malignant bone tumor of childhood and adolescence. It is more common in males than in females, with greatest incidence between the ages of 10 and 25 years. Approximately 90% of osteogenic sarcomas arise in the long bones. The most common sites of occurrence were in the region of the knee (80%) and the upper end of the humerus (9%).[1)]

Fig 2. The patient underwent Tc-99m methylene diphosphonate (MDP) bone scintigraphy for the evaluation of bone metastases. (A) Anterior and (B) posterior images showed an intense uptake of Tc-99m MDP with central decreased uptake and bulging in the left humerus, corresponding to the primary site of osteogenic sarcoma. There were also abnormal increased uptakes in the multiple sites such as the right proximal humerus, both proximal femurs, ribs, L1 and L2 vertebrae, sacrum, and the left acetabulum, representing multiple osseous metastases. In addition, there were multiple foci of pulmonary activities in both lung fields and increased uptakes along the right pericardium with diffuse uptake in the left hemithorax. These activities corresponded to the pulmonary nodules and pericardium with ossifying areas, and massive pleural effusion seen on the chest computed tomography (CT). Focal uptake of radioactivity in the right hand was injection site (arrowheads).

Osteogenic sarcoma metastasizes by the hematogenous route to the lung, bone, liver, and kidney, most frequently to the lung. Rarely, other organ involvements such as pleura, soft tissue, mediastinum, brain, pericardium, and peritoneum were reported.[2-8)] Although pulmonary metastases generally precede osseous metastases, the incidence of metastatic disease at presentation was rare. Only 2% had both pulmonary and osseous metastases at presentation.[1,9)] This case had pulmonary, pericardial, and osseous metastases at presentation.

Osteogenic sarcoma generally appeared intense uptake of Tc-99m MDP on bone scintigraphy.

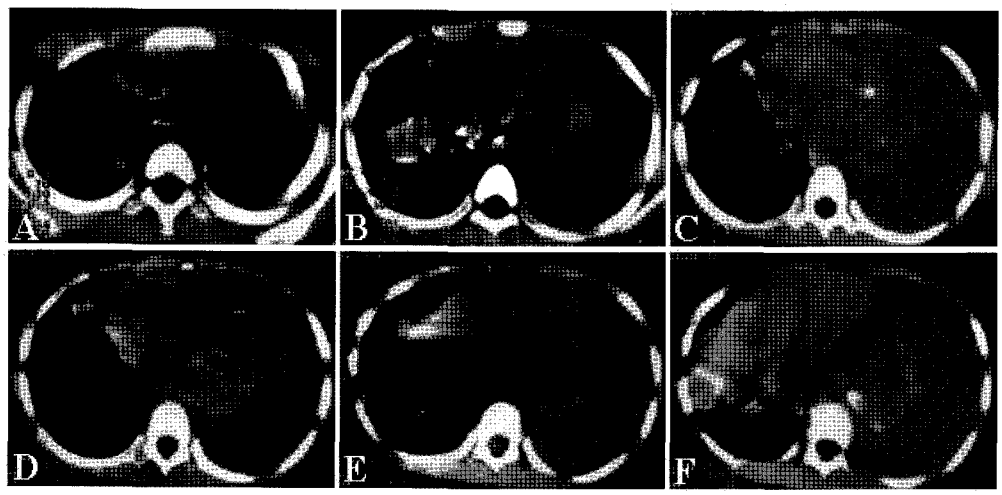

Fig 3

Rarely, this tumor appeared as a cold lesion on the bone scintigraphy.[10] Tumor necrosis associated with the rapidly progressing osteogenic sarcoma has been described. Occasionally, extraosseous uptakes of bone agents in pulmonary,[2] pleural,[3,4] soft tissue,[5,7] mediastinal,[6] brain,[7] pericardial,[8] and peritoneal[4] metastases of osteogenic sarcoma have been reported. Osteogenic sarcoma directly produces osteoid, both in the primary and metastatic lesions. Tc-99m MDP is avidly taken up by tumor osteoid and is seen as areas of increased uptake on bone scintigraphy. This case demonstrates increased uptakes of Tc-99m MDP by primary osteogenic sarcoma and metastatic lesions (bone, lung, and pericardium).

Diffuse increased uptake in the left hemithorax was caused by accumulation of Tc-99m MDP in a nonmalignant pleural effusion confirmed by cytology. These have been reported in the literature.[9]

Fig 3. (A-F) Subsequent chest CT scan without contrast enhancement showed numerous pulmonary nodules with ossifications in the right lung and ossified lesion along the right pericardium, and atelectasis of the left lung caused by massive pleural effusion with multiple sites of ossifications, corresponding to the sites of Tc-99m MDP uptakes visualized on the bone scintigraphy.

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