



A Case of Diffuse Pulmonary Calcification with Multiple Myeloma

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Authors' contributions

This work was carried out in collaboration between all authors. Author YWC performed the background literature review and manuscript preparation. Author YFH drafted the manuscript. Author YCT performed the manuscript revisions. Authors CCH, CCC and CYL assisted with image selection, image presentation, manuscript preparation and manuscript revisions. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

A 40 year old male with a 4-year history of multiple myeloma (MM) had recurrent episodes of extensive bone involvement. A ^{99m}Tc -MDP bone scan revealed unusual radiotracer accumulations within bilateral pulmonary fields. There was no radiographic evidence of calcification in the lungs. It may represent metastatic pulmonary calcification and can be clinically correlated with hypercalcemia in MM.

Keywords: Bone scan; hypercalcemia; calcification; multiple myeloma.

1. INTRODUCTION

Multiple myeloma (MM) is the most common primary bone tumors in adults. Currently, the leading method to evaluate bone involvement in MM is plain film radiography [1,2]. Occasionally bone scintigraphy is helpful in patients with MM in regions having difficulties to be evaluated with routine radiography such as ribs and sterna [3]. A bone scan should also be considered when patients have bone pain and negative results of radiographs. Hypercalcemia is a common complication of MM. In addition, a relatively high prevalence of metastatic pulmonary calcification was found in patients with MM. However, only a few cases have been clinically and radiologically detected [4,5]. We described the accidental pulmonary uptake in this case who developed hypercalcemia and performed a whole-body bone scan to evaluate bone involvement.

2. CASE PRESENTATION

A 40 year old male was diagnosed with MM, IgG-lambda type, ISS stage III, Durine-Salmon stage IIIB. The initial presentation was L2, L5 collapse after falling down and MM with IgG λ monoclonal gammopathy. The lumbar spine involvement was diagnosed from another hospital 4 years ago. The L5 corpectomy with bone cement was executed at that time; chemotherapy, radiotherapy and thalidomide clinical trial for recurrent tumor with paraspinal extension were performed during these years. He recently complained of dizziness, right leg pain and weakness. He had hypercalcemia and his serum ionized calcium level was 7.8 mg/dL (normal range: 4.64 - 5.28). The measurements of patient's blood urea nitrogen (BUN) and creatinine (CRE) were 42.2 and 2.9 mg/dL, respectively. In comparison with the test results obtained 6 months earlier, which were 41 mg/dL for BUN, 2.6 mg/dL for CRE, and 4.9 mg/dL for serum ionized calcium, it is more likely to be MM-induced hypercalcemia rather than the induction from hyperparathyroidism in renal failure. In addition, other laboratory findings included serum

IgG of 2360 (normal range: 917.2-1891.2 mg/dL), IgA of 74.7 (normal range: 188-322.3 mg/dL), IgM of 20.9 (normal range: 102.6-200.2 mg/dL), β MG of 139.0 (normal range: 70-340 mg/dL). For the evaluation of a possible progressive bone involvement, the whole body bone scan was performed for 3 hours after the injection of 740 MBq (20 mCi) ^{99m}Tc MDP.

3. RESULTS

The bone scan revealed diffusely increased radioactivity long bones of the 4 limbs, and diffuse extraosseous uptake in both pulmonary fields (Figs. 1 and 2). These hot spots in Fig. 2 are seen in only one projection (anterior or posterior view). They seemed to involve most likely in the ribs, not in the lungs. This appearance, which was not noted on the previous test 1 year ago (Fig. 3), suggested metastatic pulmonary calcification associated with MM-induced hypercalcemia. The chest X-ray showed no obvious calcification in bilateral pulmonary fields (Fig. 4).

4. DISCUSSION

Bone scintigraphy is not the best method to evaluate bone involvement in MM. However, bone scan should also be considered when these patients have bone pain and negative results of radiographs, or in regions having difficulties to be evaluated with routine radiography such as ribs and sterna. The bone scintigraphy in metabolic bone diseases shares similar scintigraphic findings [6-8]. In hypercalcemia, soft tissue activities may be found in lungs, stomach and elsewhere as a result of metastatic calcifications. Metastatic pulmonary calcification is a common complication of MM and it is the result of high levels of calcium-phosphate products deposited in alveolar and vessel walls of normal lungs. Only a few cases have been clinically and radiologically detected [4,5]. The costal lesions of this case, such as metastatic bone disease, cannot be completely ruled out because this

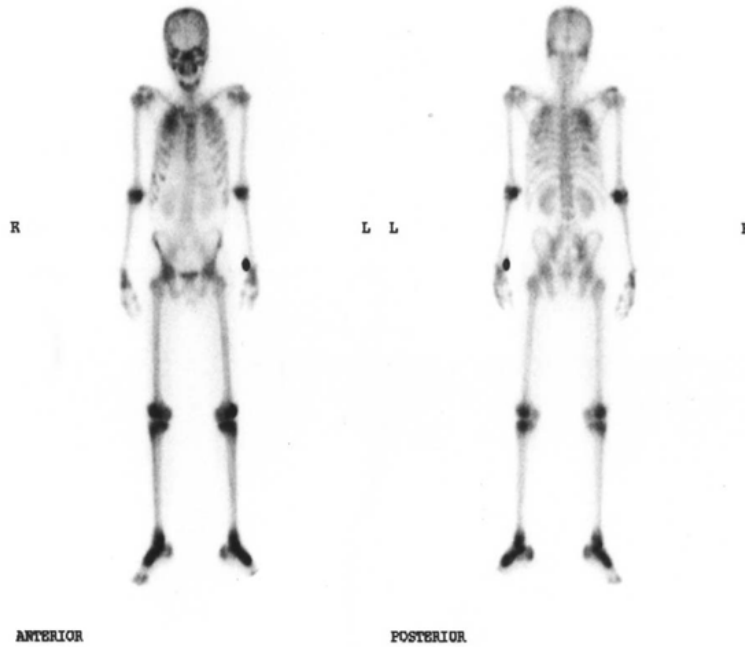


Fig. 1. The whole body bone scan showed hot spots in bilateral rib cages. Cold spots, line surrounded with heterogeneously increased radioactivity over L4-5 and upper portion of sacrum, which may be due to previous surgical manipulation and orthopedic hardware insertion or osteonecrosis. However, diffusely increased uptake was noted throughout the skull, 4 limbs and bilateral pulmonary fields

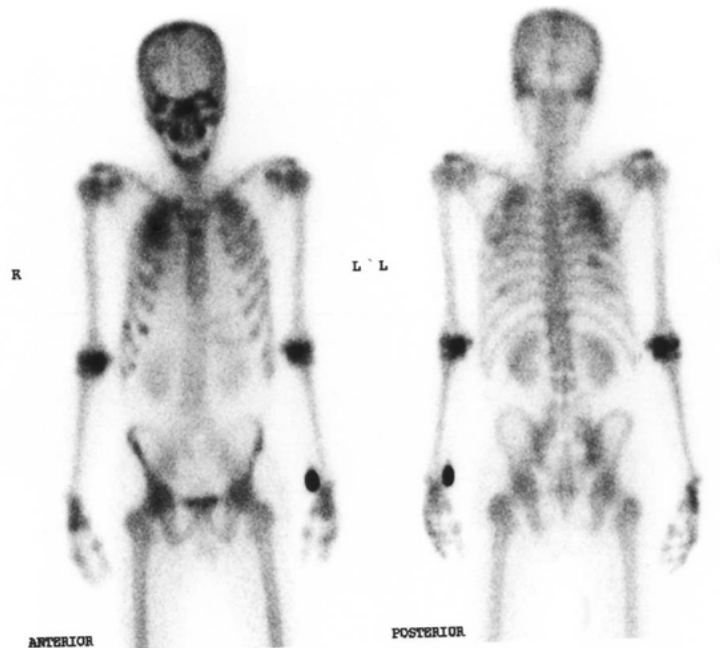


Fig. 2. Diffuse extraosseous radiotracer accumulation in bilateral pulmonary fields (especially upper portion), which may indicate metastatic calcification or soft tissue deposition of Tc-99m MDP agent. Abnormally increased uptake in ribs was also noted and not illustrated by radiographs. However, diffuse lung uptake was the most significant finding

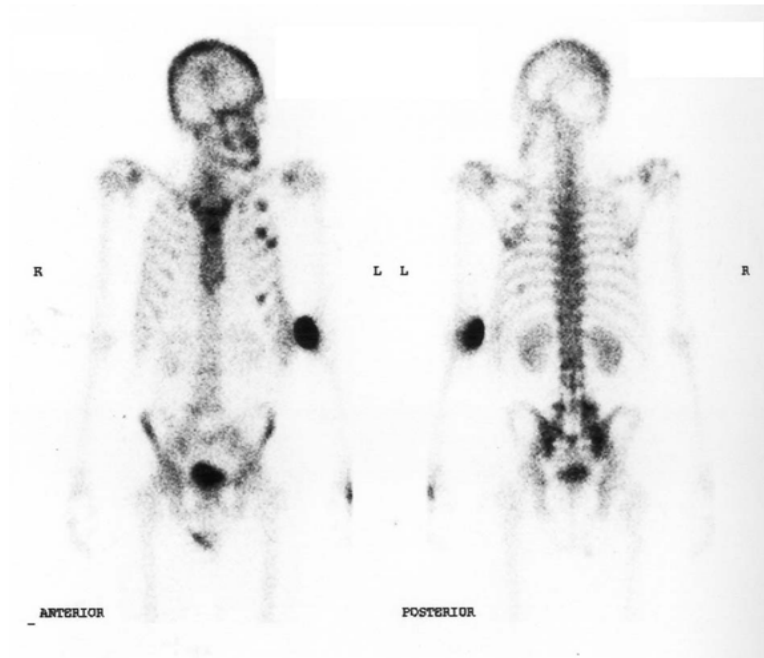


Fig. 3. The previous bone scan performed 1 year ago only showed hot spots in anterior aspect of left rib cage. The same cold spots, line surrounded with heterogeneously increased radioactivity over L4-5 and upper portion of sacrum due to previous surgical manipulation and orthopedic hardware insertion

patient denied any recent trauma history. In addition, dyspnea or obvious chest discomfortable symptoms were not present in this case, and his chest x-ray showed unremarkable pulmonary fields. Chest CT was not performed at that time. Metastatic pulmonary calcification may remain undiagnosed and untreated without this uncommon lung uptake on bone scintigraphy.

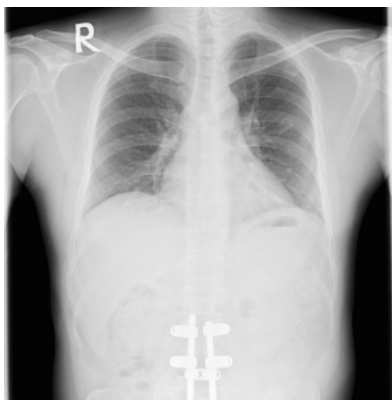


Fig. 4. The chest X-ray showed internal fixation internal rods and screws fixations for L4 and L5. Pulmonary fields was unremarkable

5. CONCLUSION

Early metastatic pulmonary calcification is an asymptomatic condition, and generally not detectable by chest X-ray films due to the size of the deposits. It may remain undiagnosed and untreated, progressing to irreversible lung damage and respiratory failure. The bone scintigraphy is useful in early detection for prompt treatment of this condition. The routine radionuclide bone scan of this case showed abnormally increased uptake in ribs not illustrated by radiographs. However, diffuse lung uptake was the most significant finding. In addition, the concentration of serum calcium was 7.8 mg/dl, compatible with previously suspicious hypercalcemia.

CONSENT

All authors declare that written informed consent was obtained from the patient for publication of this case report and any accompanying images.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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