

SOFT-TISSUE CONCENTRATION OF ^{99m}Tc-PHOSPHATES ASSOCIATED WITH INJECTIONS OF IRON DEXTRAN COMPLEX

Hyo H. Byun, Steven G. Rodman, and Ki Eun Chung

Loyola University Medical Center, Maywood, and Illinois Masonic Medical Center, Chicago, Illinois

An unusual concentration of ^{99m}Tc-phosphates appeared in the gluteal area in bone scans of three patients who had recently had intramuscular injections of iron dextran complex. These cases indicate one more cause for extraosseous accumulation of these bone-seeking radiopharmaceuticals.

Extraosseous concentration of ^{99m}Tc-phosphates has been reported in a variety of conditions, including soft-tissue calcification (1-3), amyloid (4), abscess formation (5), a healing surgical wound (6), and extraosseous malignancies (6-14). We have observed diffuse high concentration of ^{99m}Tc-phosphates in both buttocks in the bone scans of three patients who had recently received intramuscular injections of iron dextran complex for hypochromic microcytic anemia. To the best of our knowledge, a soft-tissue concentration of this kind has not previously been reported.

MATERIALS AND METHODS

Each of our patients received 15 mCi intravenously of either ^{99m}Tc-diphosphonate, prepared from an Osteoscan kit (Procter & Gamble, Cincinnati, Ohio), or ^{99m}Tc-stannous pyrophosphate, prepared from a Technescan PYP kit (Mallinckrodt, St. Louis, Mo.). The entire axial skeleton was scanned with an Ohio-Nuclear dual-probe scanner 2-4 hr after injection. The iron dextran complex used was Imferon (Lakeside Laboratories, Milwaukee, Wis.), with a daily dosage of 2 cm³ in either buttock.

CASE REPORTS

Case 1. A 72-year-old man was admitted on March 22, 1975, because of fatigue, dyspnea, and weight loss. Initial laboratory study showed hypochromic microcytic anemia with a hemoglobin concentration of 6.1 gm, serum iron of 24 μg/dl (normal 50-150), and iron-binding capacity of 455 μg/dl (normal

250-400). The patient's anemia was treated with injections of iron dextran complex March 29 through April 10. Radiographic examination of the lower gastrointestinal tract revealed a neoplastic lesion in the cecum which subsequently proved to be adenocarcinoma. A bone scan, done on April 1, showed an unusual concentration of radionuclide in both buttocks, but no abnormal accumulation in the skeletal system (Fig. 1).

Case 2. A 58-year-old woman, admitted March 31, 1975, had left flank pain, abdominal bloating, and heaviness of the epigastric region. Radiographic studies showed an annular constricting lesion of the ascending colon, and a liver scan showed numerous filling defects compatible with metastatic disease. Since the patient was also found to have hypochromic microcytic anemia, she received iron dextran complex on April 4, 5, and 6. A bone scan on April 7 showed radionuclide concentrations in both buttocks, but no skeletal abnormalities.

Case 3. A 48-year-old woman was admitted Jan. 24, 1975, because of dysphagia and melena. Laboratory tests showed hypochromic microcytic anemia, for which the patient was given iron dextran complex Jan. 30 through Feb. 3 and Feb. 9 through Feb. 15. Radiographic examination, esophagoscopy, and biopsy revealed an infiltrating squamous-cell carcinoma of the esophagus. A bone scan on Feb. 20 showed no skeletal abnormalities, but an unusual concentration of radionuclide in both buttocks.

DISCUSSION

The bone scans of these three patients showed a concentration of radiopharmaceutical in the outer aspect of the gluteal area, the prescribed site for injection of iron dextran complex. We believe the

Received Aug. 11, 1975; revision accepted Dec. 15, 1975.

For reprints contact: Hyo H. Byun, Nuclear Medicine, Loyola University Medical Center, 2160 S. First Ave., Maywood, Ill. 60153.

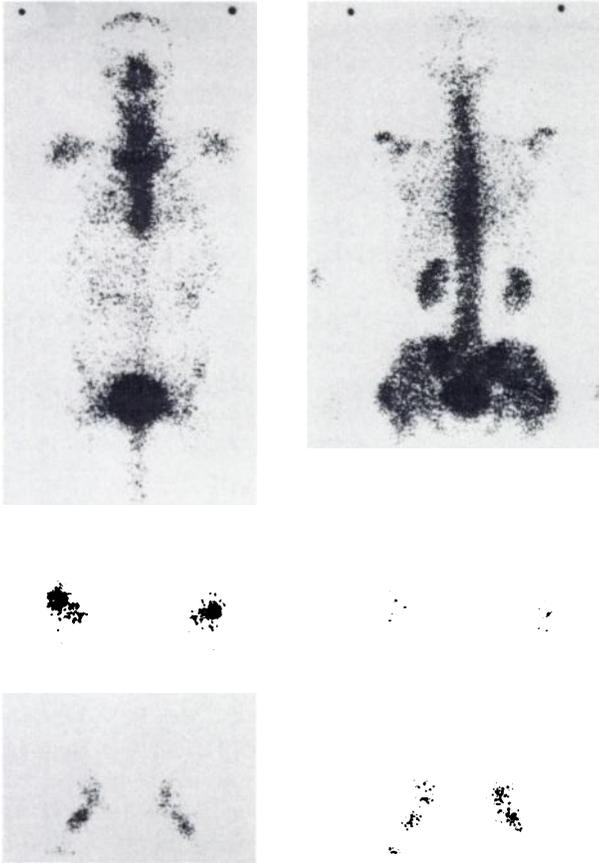


FIG. 1. Whole-body scan of 72-year-old man (Case 1). Anterior view (left) shows no abnormal concentration of activity, but posterior view (right) shows increased diffuse concentration of activity in both buttocks.

gluteal concentration of the bone-seeking compound is related to the injections. The exact mechanism is not yet clear.

Concentration of ^{99m}Tc -phosphates has been reported both in soft-tissue calcifications (1-3) and in abscess formation (5). A review of pelvic radiographs of our three patients, however, showed no evidence of gluteal calcification or other unusual findings. In addition, two patients (Cases 1 and 2) were examined by a physician soon after their bone scans were done, and no clinical evidence of inflammation was found. In the gluteal areas in these two patients, no discoloration or erythema of the skin was seen, and no tenderness or localized mass was found on palpation.

Skin contamination by urine was also considered, but all three patients denied incontinence during the scanning, and the technologists who were present also denied that the patient voided during the procedure. Subclinical inflammation at the site of the injections is another possible cause of the unusual concentration. Formation of iron ^{99m}Tc -phosphate complex or

dextran ^{99m}Tc -phosphate complex are also possibilities. Further investigation is needed.

Anemia is not uncommon in patients referred for bone scanning. When an accumulation of ^{99m}Tc -phosphate is found in the gluteal area in a bone scan, iron dextran complex injections should be considered as a possible cause. Moreover, if the iron dextran complex is the responsible factor, the effect of the injections may last much longer than the few days seen in our cases. Grimes (15) reported that 20-35% of iron dextran complex remains in muscle 4 weeks after injection.

REFERENCES

1. RICHARDS AG: Metastatic calcification detected through scanning with ^{99m}Tc -polyphosphate. *J Nucl Med* 15: 1057-1060, 1974
2. MCLAUGHLIN AF: Uptake of ^{99m}Tc bone-scanning agent by lungs with metastatic calcification. *J Nucl Med* 16: 322-323, 1975
3. SARMIENTO AH, ALBA J, LANARO AE, et al: Evaluation of soft-tissue calcifications in dermatomyositis with ^{99m}Tc -phosphate compounds: Case report. *J Nucl Med* 16: 467-468, 1975
4. VAN ANTWERP JD, O'MARA RE, PITT MJ, et al: Technetium-99m-diphosphonate accumulation in amyloid. *J Nucl Med* 16: 238-240, 1975
5. CHAUDHURI TK, CHAUDHURI TK, GULESSERIAN HP, et al: Extrasosseous noncalcified soft-tissue uptake of ^{99m}Tc -polyphosphate. *J Nucl Med* 15: 1054-1056, 1974
6. THRALL JH, GHAED N, GESLIEN GE, et al: Pitfalls in ^{99m}Tc -polyphosphate skeletal imaging. *Am J Roentgenol Radium Ther Nucl Med* 121: 739-747, 1974
7. BERG GR, KALISHER L, OSMOND JD, et al: ^{99m}Tc -diphosphonate concentration in primary breast carcinoma. *Radiology* 109: 393-394, 1973
8. ISITMAN AT, KOMAKI S, HOLMES RA: A benign uptake of ^{99m}Tc -polyphosphate after radical mastectomy. *Radiology* 110: 159-161, 1974
9. SCHMITT GH, HOLMES RA, ISITMAN AT, et al: A proposed mechanism for ^{99m}Tc -labeled polyphosphate and diphosphonate uptake by human breast tissue. *Radiology* 112: 733-735, 1974
10. BROWER AC, TEATES CD: Positive ^{99m}Tc -polyphosphate scan in case of metastatic osteogenic sarcoma and hypertrophic pulmonary osteoarthropathy. *J Nucl Med* 15: 53-55, 1974
11. GHAED N, THRALL JH, PINSKY SM, et al: Detection of extrasosseous metastases from osteosarcoma with ^{99m}Tc -polyphosphate bone scanning. *Radiology* 112: 373-375, 1974
12. MATSUI K, YAMADA H, CHIBA K, et al: Visualization of soft tissue malignancies by using ^{99m}Tc -polyphosphate, pyrophosphate and diphosphonate (^{99m}Tc -P). *J Nucl Med* 14: 632-633, 1973
13. MCDUGALL IR, PISTENMA DA: Concentration of ^{99m}Tc -diphosphonate in breast tissue. *Radiology* 112: 655-657, 1974
14. SIEGEL ME, WALKER WJ, CAMPBELL JL: Accumulation of ^{99m}Tc -diphosphonate in malignant pleural effusions: Detection and verification. *J Nucl Med* 16: 883-885, 1975
15. GRIMES AJ, HUTT MSR: Metabolism of ^{99m}Tc -dextran complex in human subjects. *Br Med J* 2: 1074-1077, 1957