Axillary Lymph Node Uptake of Technetium-99m-MDP

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We sought to determine the frequency and significance of axillary lymph node visualization on bone scans performed with diphosphonates. **Methods:** Consecutive ^{99m}Tc-methylene diphosphonate (^{99m}Tc-MDP) bone scans (2435) were inspected for axillary soft-tissue uptake. In positive cases, the results of physical examination, correlative imaging studies and serial bone scans were recorded, as was the site of venipuncture. **Results:** Forty-eight studies (2%) showed axillary uptake ipsilateral to the injection site. Extravasation of tracer, documented by focal activity near the injection site, was present in every case. There was no association with axillary adenopathy, mass, induration or radiographically visible calcification. On some images, foci adjacent to the axilla were superimposed on the rib, scapula, or humerus. The bone-to-background ratio was frequently reduced; repeat imaging after 1–2 hr usually improved osseous detail. **Conclusion:** Ipsilateral axillary lymph node visualization due to extravasation of ^{99m}Tc-MDP is frequently associated with additional foci superimposed on osseous structures simulating pathology. Delayed skeletal uptake is common in such cases and necessitates a greater time interval between injection and imaging.

Key Words: technetium-99m-methylene diphosphonate; lymph node visualization; bone scan; soft-tissue uptake

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Technetium-99m-methylene diphosphonate (MDP) and hydroxymethylene diphosphonate (HMDP) are the current radiopharmaceuticals of choice for skeletal imaging. With these agents, the kidneys and bladder are the only nonosseous structures normally visualized. Recently published lists ("gamuts") of malignant, benign and artifactual extraosseous uptake on bone scans (*1–3*) have omitted axillary lymph node visualization. In fact, except for sporadic case reports, the phenomenon has not been systematically studied with MDP or HMDP. Based on work with ^{99m}Tc-pyrophosphate, the frequency of axillary node visualization was reported as less than 1% and attributed to "colloidalization" (resulting in hepatic uptake) of extravasated tracer. With diphosphonates, we observed the phenomenon accompanied by foci adjacent to the scapula, ribs and humerus, but the liver was never visualized. We sought to determine the frequency of axillary node visualization, its clinical significance and the extent to which it simulates pathology in bone.

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METHODS

We prospectively assessed the 2435 bone scans performed at our medical center between 1987 and 1994. Technetium-99m-MDP was used in each study. Skeletal phase imaging performed 2–4 hr after intravenous injection excluded only the distal upper extremities. A posterior chest view for 1000 kcts was followed by sectional images preset at isotime. An all-purpose or high-resolution, low-energy collimator was used.

RESULTS

Forty-eight of 2435 (2%) reviewed studies showed focal uptake in one axilla (Figs. 1–3), but none of the studies demonstrated tracer in the liver. The axillary uptake occurred ipsilateral to the venipuncture in every case, and imaging of the injection site always revealed extravascular tracer that had infiltrated the soft tissues. Physical examination of the 48 axillae consistently failed to reveal adenopathy, mass, or induration; nor was there radiographic evidence of ectopic calcification on chest x-rays of these 48 patients. Osseous detail was frequently suboptimal by subjective observation. In several, delayed images obtained an hour or more later improved the bone-to-background ratio. Four patients had repeat scans within a week, and the remainder had semiannual or annual interval studies. In no case was axillary visualization duplicated.

DISCUSSION

Little attention in the scintigraphic literature has been focused on axillary node uptake of diphosphonates. An isolated report cited five such cases in scans using ^{99m}Tc-pyrophosphate; all were associated with liver visualization and represented less than 1% of the study group (*4*). The authors assumed that the tracer extravasated into the soft tissues and attributed the hepatic and lymphatic uptake to colloidalization of infiltrated tracer. They did not investigate the possibility of liver metastases, neoplastic nodes or that a technetium colloid liver scan may have been performed the previous day.

The lymphatic system is an accessory route for drainage of interstitial fluid. Large molecular weight substances, such as proteins and other particulate matter which cannot be directly absorbed into capillaries, are readily accommodated by lymphatics and incorporated into the chylous network draining into regional nodes (*5*). Technetium-99m-

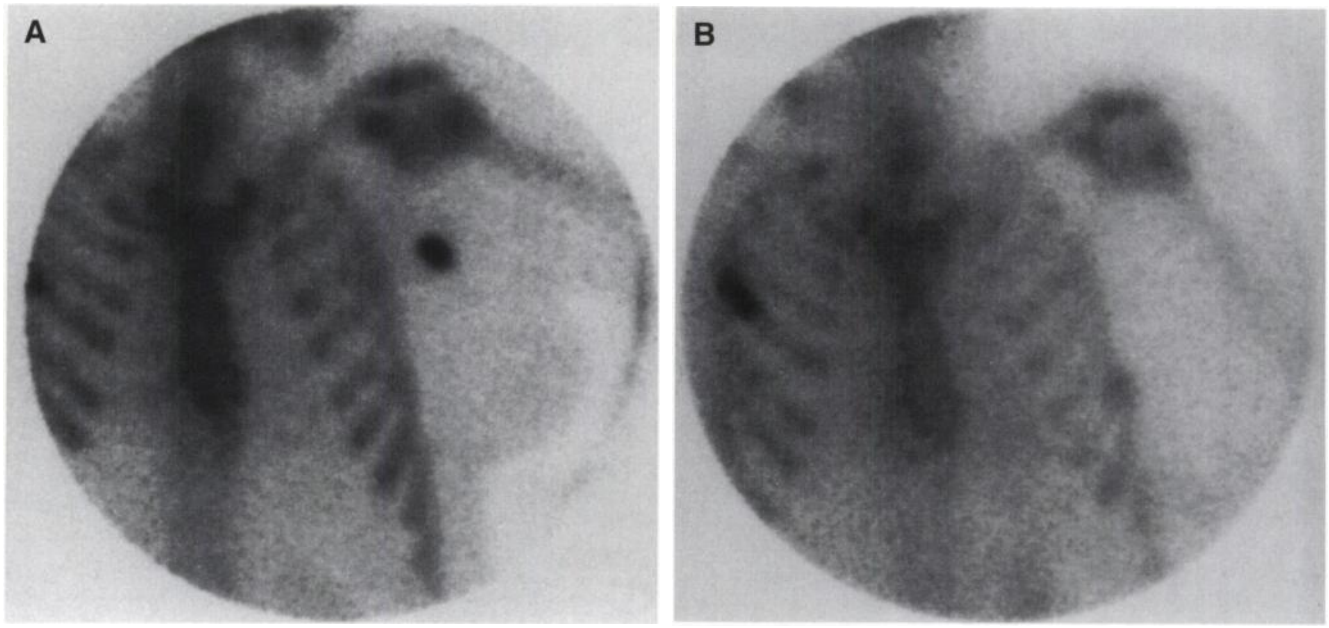

FIGURE 1. (A) Focal soft-tissue uptake in the left axilla, presumably in the lymph node. There is focal uptake in the right fourth rib. (B) Disappearance of lymph node visualization. Focus in the right fourth rib is more intense but faded without treatment on follow-up scans, indicating a benign etiology.

MDP, with a molecular weight of 176, when injected interstitially, is most likely captured by the lymphatic system (*6*). Colloidalization was a highly unlikely mechanism since liver visualization did not occur in any patient.

When focal uptake in the axilla is superimposed on bony structure, additional views in different obliquities and arm positions will usually clarify the activity source being either in the skeleton or soft tissues.

CONCLUSION

Ipsilateral axillary lymph node visualization with ^{99m}Tc-MDP occurs in association with extravenous extravasation of injected tracer. In such cases, a greater time interval between injection and imaging may improve the bone-to-background ratio. Furthermore, awareness of this phenomenon should prevent misinterpretation of a focus as pathologic (*7*).

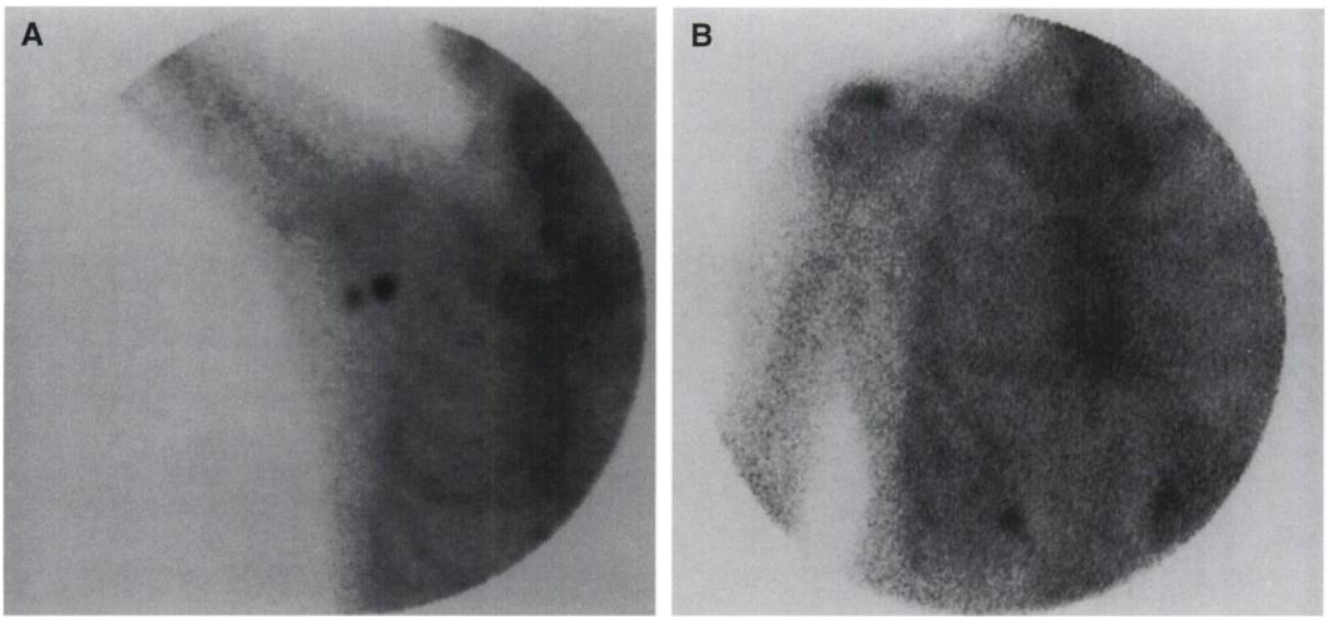

FIGURE 2. (A) Soft-tissue focus in the right axilla implies superimposition of an additional focus on the scapula is also soft tissue. Additional views did not sufficiently clarify the location. (B) Repeat scan 5 mo later shows disappearance of foci. There was no treatment between scans.

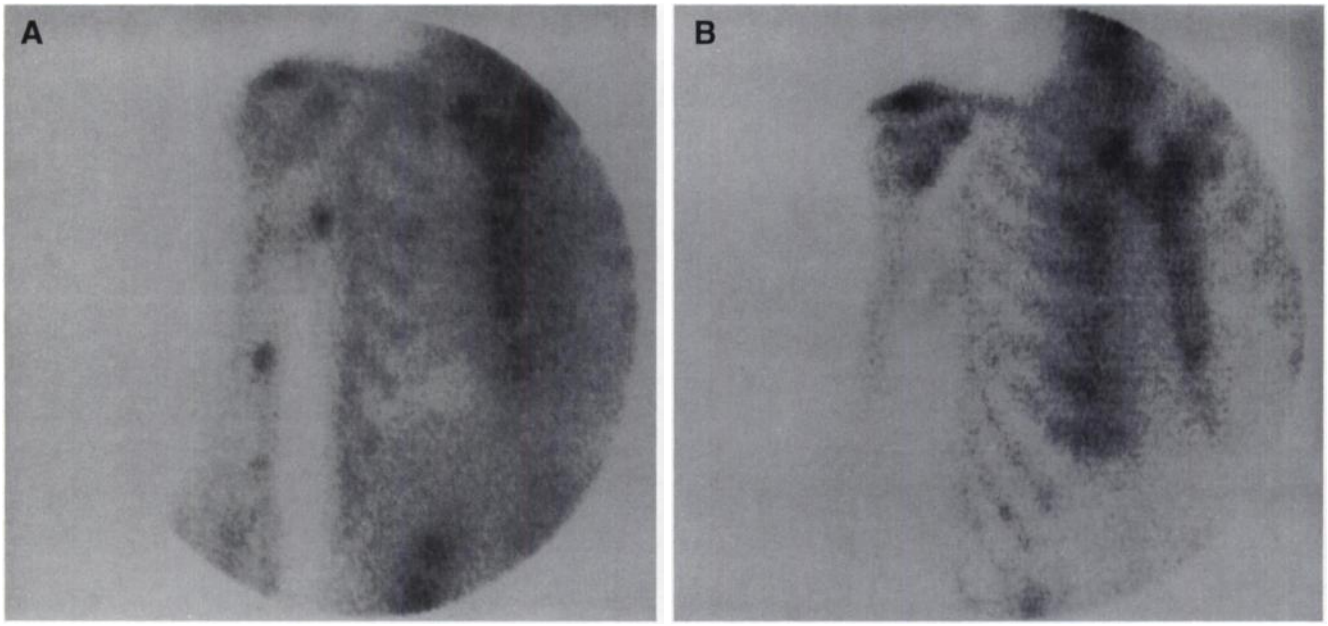

FIGURE 3. (A) Focus superimposed on the right humerus is accompanied by axillary uptake. (B) Repeat study with left-sided injection. Foci are no longer present.

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