

False Positive Bone Scan Due to Skin Fold Artifact: Case Report

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A number of hot and cold imaging artifacts can be encountered in nuclear medicine practice. Most commonly observed as a hot artifact is a curved band of increased activity produced by overlying breast tissue in liver-spleen scanning. A similar artifact can also be produced by skin folds in technetium-99m (^{99m}Tc)-methylene diphosphonate bone scanning.

Whole body scanning using ^{99m}Tc -methylene diphosphonate (MDP) is routinely performed for a variety of reasons. Because of the reliability of the results (high sensitivity), bone scanning has become the most requested study in nuclear medicine today. The most common indication for a bone scan is to rule out metastatic bone disease. Bony metastases are noted as an area of increased or decreased uptake within the skeletal system. This depends on the types and natures of malignancies. Photon scatter or attenuation can produce respective areas of increased or decreased activity and possibly confuse interpretation. A linear band of increased activity on liver scans just inferior to the crescent margin of the breast called a "stripe sign" is most commonly seen (1). We recently noted similar effects of photon scatter caused by skin folds during bone scanning in two patients, resulting in false-positive scans.

METHODS

Twenty millicuries (740 mBq) of ^{99m}Tc -MDP was administered intravenously to perform whole body skeletal imaging on two patients. Both patients were imaged 2–3 hr after injection using a scintillation camera with a square crystal and a single-pass low energy collimator. The scan speed on the whole body unit was 10 cm/min with a divergence setting of 30° and a detector height of 10 cm. The photopeak was set for ^{99m}Tc using a 20% window. Both patients were imaged supine for posterior view and prone for anterior view with the detector beneath the table. One patient had had a scan 1 yr previously on a whole body imager with a scan speed of 5 cm/min for the trunk and 10 cm/min for the lower extremities.

CASE HISTORY AND RESULTS

Two patients were sent to nuclear medicine for bone scanning with known breast carcinoma. Patient A was sent for a follow-up scan after a baseline scan 1 yr previously. The baseline image demonstrated an area of increased uptake at approximately the level of L-3 (Fig. 1) in 1985. One year later

patient A returned for a follow-up study. This image showed a linear band of increased activity that crossed the L-3 area (Fig. 2) attributable to the scattering of photons by a skin fold. Patient B demonstrated the same hot artifact at the level of L-3 for the same reason (Fig. 3).

DISCUSSION

In brain scanning, a hot band artifact can be caused by a braid or toupee (2), and most commonly this stripe artifact is seen in liver scanning (1). Causes of hot spots on liver scans may be: portocaval shunts (3), venacaval obstruction (4), and tricuspid valve insufficiency (5). Compton scattering of ^{99m}Tc photons in superficial tissues of the head and neck during radionuclide angiography may create a hot artifact that simulates jugular venous reflux (6).

As bone scanning is relied upon in the diagnoses of metastatic diseases, a linear band of activity or "skin fold artifact" that overlies a potential hot spot should be interpreted cautiously.

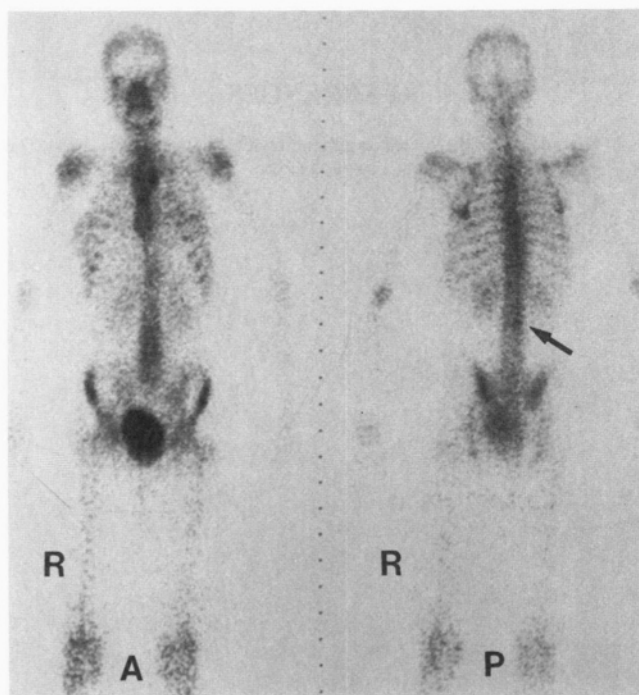


FIG. 1. Previous bone scan of patient A has an area of increased uptake (arrow) seen at the level of L-3 on posterior view. A, anterior; P, posterior; R, right.

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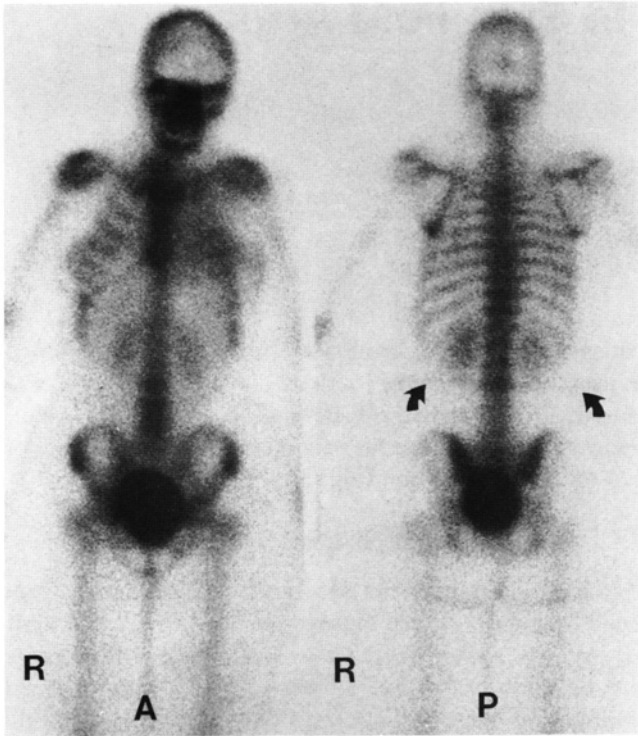


FIG. 2. Scintillation camera scan of patient A demonstrates linear band of activity crossing the L-3 area due to the scattering of the photons by skin folds (arrows) in this obese patient.

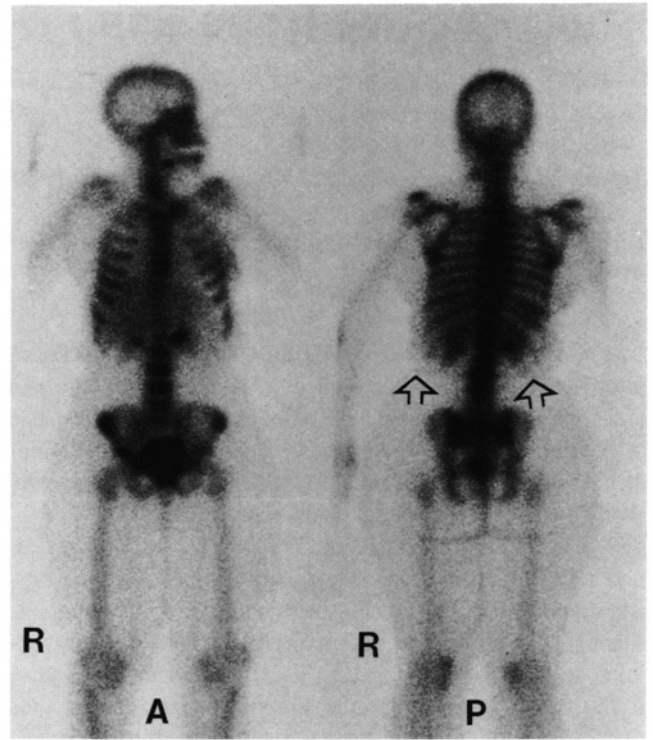


FIG. 3. Increased activity in L-3 (arrows) is also seen in patient B due to scattered photons.

ly. Skin fold artifacts will be most prominent in obese patients. The cause of this artifact may not be evident on a scan obtained with high contrast as in patient A, whose first bone scan was done using a whole body scanner.

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