

Case of the Quarter

Abnormal Stomach Tissue Concentration of Tc-99m Diphosphonate

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Case History

A 68-year-old woman was presented to the emergency room with severe abdominal pain in the left upper quadrant. After being admitted, the patient's abdominal pains subsided, but she displayed symptoms of general weakness, nausea, vomiting, and confusion. The patient had a long, known history of multiple myeloma and had been receiving cyclic chemotherapy. A workup was initiated to rule out peptic ulcer disease and progression of multiple myeloma.

Complete blood count (CBC) and sed rate were normal; platelets were adequate. Serum calcium levels, however, were extremely elevated, exceeding the limit $15 \mu\text{g/ml}$ of the SMA chart. Stomach and small-bowel x-rays were essentially normal except for slow transit of barium through the small bowel and areas of general demineralization of bone in the rib cage, lumbar spine, and pelvis. A Tc-99m sulfur colloid liver-spleen scan was normal. A bone scan was performed three days later with 15 mCi of Tc-99m diphosphonate (Union Carbide: 1-hydroxy-ethylidene-1, 1-disodium phosphonate), utilizing a Raytheon dual-probe rectilinear scanner with 5:1 minification and 10% contrast enhancement. The total-body bone scan (Fig. 1) showed abnormal activity overlying the skull, right anterior ribs, and midlumbar spine, as well as periarticular activity involving the shoulders, knees, and ankles. Also noted was an area of concentrated activity in the left anterior abdomen. The areas of increased bone activity were believed due to periarticular bone resorption and associated osteoblastic activity as a result of the multiple myeloma (1).

The question still remained: What was the cause of the concentrated abdominal activity?

- (1) Residual sulfur colloid activity.
- (2) Free technetium pertechnetate in the stomach.
- (3) Labeled technetium diphosphonate within stomach tissue.

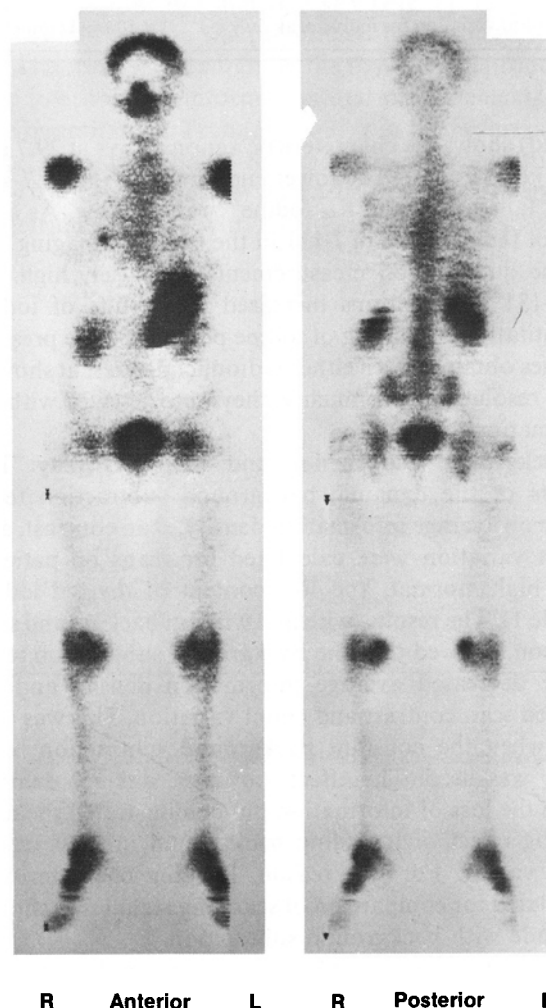


FIG. 1. Total-body bone scan, 3-hr delay: Tc-99m HEDSPA. Note abnormal bone areas plus extremely concentrated activity in stomach on anterior view.

Discussion and Solution

Residual sulfur colloid activity was impossible since the liver-spleen scan was performed three days prior to the bone scan. Free pertechnetate was ruled out as a cause since (a) no significant thyroid or small-bowel ac-

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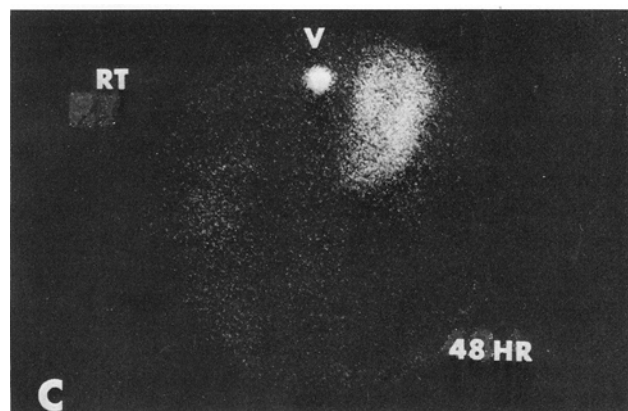
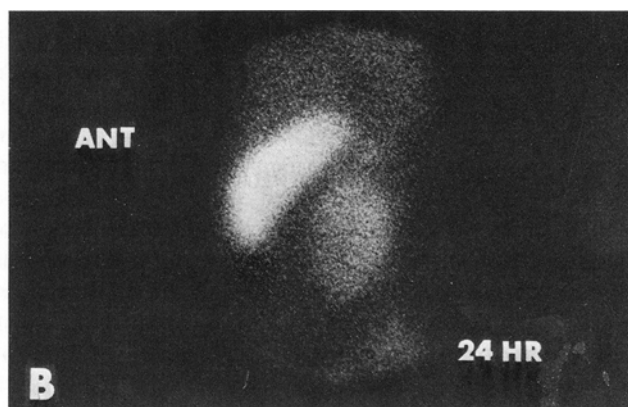
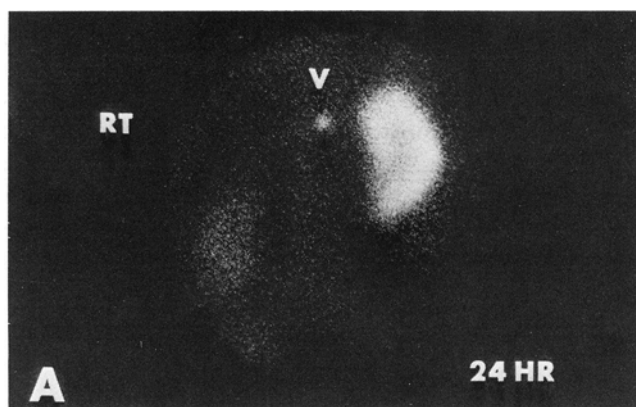


FIG. 2. (A) 24-hr anterior view. (B) 24-hr left lateral view. (C) 48-hr anterior view. Point source (arrow) is on xyphoid in A and C. Note how activity in wall outlines lumen of stomach on all views. Activity is definitely localized in stomach tissue; it is not moving through gastrointestinal tract. Kidney is visualized behind stomach on lateral view (B).

tivity was seen on the bone scan (Fig. 1); (b) two other bone scans performed the same day with the same bone kit displayed no significant free activity; and (c) radiochromatography of the bone kit 24 hr after labeling revealed only 3.5% free technetium pertechnetate, 6.5% reduced technetium, and 90% labeled diphosphonate.

Solution: The activity is labeled technetium diphosphonate localized in microscopic calcium deposits within the wall of the stomach. Scintiphotos were obtained after 24 hr and 48 hr (Fig. 2). Note position, persistence, and immobility of the activity on the anterior views (Figs. 2A and 2C) and the left lateral view (Fig. 2B). The central filling defect seen on all the views is the lumen of the stomach outlined by the activity in the wall. The patient's hypercalcemia because of multiple myeloma (2) was the probable cause of the soft tissue calcium deposits within the stomach wall. A considerable amount of Tc-99m diphosphonate was therefore concentrated within the patient's stomach wall, owing to the ability of technetium phosphates to localize in nonosseous, calcified areas (3).

The patient expired because of advanced multiple myeloma one month after admission. Since an autopsy was not performed, no conclusive evidence of microscopic calcium deposits within the stomach wall was obtained, but the analysis of this report and similar findings elsewhere (2, 4-6) show this to be the only reasonable cause.

References

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