Usefulness of nuclear whole-body bone scanning for diagnosis of leprosy

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Leprosy, or Hansen’s disease, is rare in the United States. Given its rarity, as well as the pathognomonic dermatologic findings, there are few cases in which nuclear medicine imaging plays a role in the diagnostic workup. We present a 39-year-old man who presented with chronic abdominal pain, skin ulcers, and hypercalcemia who underwent computed tomography of the chest and a whole-body bone scan to evaluate for possible underlying neoplasm due to his profound hypercalcemia. Although the diagnosis of leprosy had been established by lower-extremity skin biopsy upon admission, workup for other potential concurrent etiologies of hypercalcemia was performed before initiating therapy. We present the computed tomography scans, nuclear medicine images, and corresponding skin findings of this case.

Leprosy, or Hansen’s disease, is rare, with <200 cases reported annually in the United States (1). Hypercalcemia related to leprosy is uncommon and seen in only a small fraction of patients. In leprosy it is likely caused by granulomatous tissue causing high serum concentrations of 1,25-dihydroxyvitamin D (2). In contrast, hypercalcemia of malignancy is common, with a reported incidence as high as 30% in patients with malignancies (3). Multiple myeloma and lung and breast carcinoma have the highest associations with this complication (4). Four major mechanisms lead to hypercalcemia of malignancy: tumor production of calcitriol, osteolytic metastases, production of parathyroid hormone-related peptide by the tumor, and production of parathyroid hormone by the tumor (5). The purpose of this report is to demonstrate a rare disease and the role of nuclear whole-body bone scanning in the diagnosis.

CASE DESCRIPTION

A 39-year-old man presented to the emergency department with several months of chronic abdominal pain and profoundly elevated serum calcium (>14 mg/dL), along with nonhealing ulcers (Figure 1b, 1c) and numbness in his legs. Chest computed tomography was performed for evaluation of any possible underlying malignancy, which identified multiple lung opacities, including a small cluster of nodules in the right upper lobe.
measuring up to 1.5 \times 3.0 \text{ cm} (\text{Figure 1d, 1e}). A biopsy of the lower extremity yielded the diagnosis of leprosy. A 99m Tc-methylene diphosphonate whole-body bone scan was performed 4 weeks after initial presentation to assess the causes of the osseous disease—whether infectious, metabolic, or metastatic—based on the combination of hypercalcemia with lung nodules and biopsy-proven leprosy. This scan demonstrated a classic pattern and distribution of uptake related to leprosy (6), including diffuse uptake in the face and distal upper and lower extremities consistent with periostitis (\text{Figure 2}).

\textbf{DISCUSSION}

A prior study of two patients with leprosy and bone scintigraphy was published in 1976, which showed findings similar to our case (7). Leprous periostitis is an infrequent manifestation of leprosy, found in 3\% to 45\% of leprosy patients with deformities (8), and is often associated with atrophic neuropathic osteoarthropathy, which represents a spectrum of bone and joint destructive processes associated with neurosensory deficits (9). Periostitis and osteitis in patients with leprosy have usually been described as confined to the small bones of the face, hands, and feet (9). Multiple prior discussions by clinicians as well as paleopathologists examining remnants from medieval times, when leprosy was more prevalent, argue that the tibia and fibula are among the most common sites of periosteal disease manifestation (10). Although leprosy is an uncommon disease, the use of bone scintigraphy can help determine if there is periostitis and the extent of involvement.