Childhood Pelvic Osteomyelitis Presenting As a "Cold" Lesion on Bone Scan: Case Report

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A case of occult pelvic osteomyelitis is presented. The involved portions of the left pubis and left ischium presented as "cold" areas on the original bone scan with ^{99m}Tc-diphosphonate. The presumed mechanism for this unusual finding in osteomyelitis is compression of the microcirculation to bone by subperiosteal and intraosseous pus.

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Abscess or osteomyelitis in a septic child may defy all conventional attempts at localization, particularly around the pelvis (*1–3*). In a critically ill child, occult pelvic osteomyelitis was located by bone imaging with ^{99m}Tc-diphosphonate. Some unusual features of these images and their value in locating occult infection are discussed.

CASE REPORT

Three days before hospital admission, a previously healthy 8.5-year-old boy complained of pain in his left leg. Examination showed an oral temperature of 106°F, left lower abdominal pain and tenderness, and bladder distention. Initial laboratory studies showed a white blood cell count of 18,900 with 77% polymorphonuclear leukocytes. The radiographic studies showed soft-tissue swelling adjacent to the left hip and along the floor of the left hemipelvis; the bones and chest were interpreted as normal.

Fever persisted around 105–106°F and bladder distention recurred. Motion of the left leg became more painful. Arthrocentesis and then exploration of the left hip were performed, but no purulent material was found by either procedure. Blood cultures and cultures from the left hip were obtained. The patient's condition worsened, with persistent fever, hip and thigh pain, and urinary retention. Antibiotics were not effective. The child was transferred to San Diego Children's Health Center.

On this admission his temperature was 103.6°F orally. Because of the striking findings referrable to the left hip (pain, swelling, and limitation of motion), this joint and the area around the proximal left femur were aspirated using local anesthesia and sedation, but no pus was obtained. Antibiotics were continued in large doses. On the fifth day after the onset of symptoms, the previous blood and hip cultures showed coagulase-positive *Staphylococcus aureus*.

Because the site of infection had not been located adequately and the patient continued a septic course, bone imaging was performed with ^{99m}Tc-diphosphonate. Zones of absent activity were seen in the left pubis and ischium, with no abnormal accretion in either hip or proximal femur. These findings correlated with the soft-tissue swelling along the left pelvic floor, suggesting osteomyelitis of the left pubis and ischium with probable vascular compromise in these regions (Fig. 1A). Repeat pelvic and hip radiographs again showed no bone abnormalities. The left pelvic soft-tissue mass persisted.

On the sixth day, a selective left common iliac arteriogram showed significant capillary blush around the left pubis and ischium without evidence of large-vessel occlusion (Fig. 2). Immediate pelvic surgery revealed the left pubic bone to be grossly intact, but its periosteum had been lifted from the adjacent surface. This abnormality correlated well with one of the "cold" zones on the bone scan. Nearly 150 cm^3 of pus under pressure was evacuated from the closed subperiosteal space, and a surgical drain was in-

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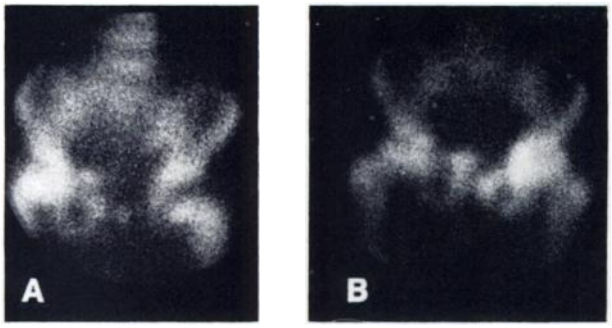

FIG. 1. (A) Bone image taken with ^{99m}Tc-diphosphonate shows areas of absent activity in left pubis and ischium on third day of hospitalization. (B) Bone image taken with ^{99m}Tc-diphosphonate 1 month after surgery shows activity returning in left pubis and ischium and increased activity in left hip. There was no radiographic or clinical evidence of osseous necrosis on followup examinations up to 1 year after admission.

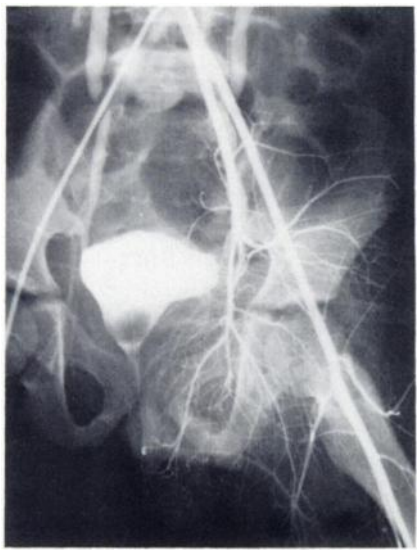

FIG. 2. Selective left common iliac arteriogram excludes large-arterial occlusion. Note bladder displacement to right by subperiosteal pubic abscess and adjacent soft-tissue edema.

stalled. Rapid defervescence occurred and the subsequent clinical course was uncomplicated. Followup bone imaging (Fig. 1B) showed a gradual return of radioactivity in the previously "cold" areas and x-rays gave no evidence of sequestrum formation.

DISCUSSION

Bone imaging provides a sensitive, but nonspecific means of identifying both benign and malignant bone disease. Increased bone uptake has been found in many skeletal diseases, including primary and metastatic bone tumors, osteomyelitis, fractures, various arthritides, postsurgical changes, discitis, aseptic necrosis, hypertrophic pulmonary osteoarthropathy, and in such metabolic disorders as gout, Paget's disease, hyperthyroidism, rickets, and hyperparathyroidism (*4–7*).

With the development of tracers with shorter physical half-lives, bone imaging in children with non-neoplastic diseases has become more common (*8*). Some investigators have reported varying degrees of ^{87m}Sr accretion in osteomyelitis (*9*), while others have uniformly observed increased uptake of ^{87m}Sr and suggest that the absence of such uptake offers strong evidence against active infection of bone or joint (*10*). Soft-tissue inflammation adjacent to involved bone may cause abnormally increased uptake of ^{18}F to show on the scan several days before a positive x-ray can be obtained (*11*).

The selective concentration of the technetium-labeled phosphate compounds, perhaps due to chemisorption to the hydroxyapatite crystals of bone (*12,13*), is primarily dependent upon regional blood flow (*14,15*). In our patient with acute osteomyelitis, the atypical absence of ^{99m}Tc-diphosphonate accretion in the involved bones is presumed to be due to compression of the microcirculation by the subperiosteal and intraosseous pus. The arteriogram gave no evidence of compromised blood flow through the hypogastric artery or its major branches.

Following surgical drainage of the abscess area, serial scintillation images with ^{99m}Tc-diphosphonate showed increased tracer uptake in the formerly cold zones. This finding is consistent with improved microcirculation. Thus, decreased tracer accretion can occur in some cases of active osteomyelitis in the presence of frank accumulations of osseous or subperiosteal pus.

From the many possibilities considered in our patient's differential diagnosis, bone imaging excluded femoral involvement and pointed to the pubis and ischium. The rapid postsurgical return of normal bone uptake correctly predicted the return of bone viability.

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