

IMAGING GAMUT

Painful diabetic foot ulcer

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Key words: *Diabetic foot ulcer, complex regional pain syndrome, bone Scan, labelled WBC scan, SPECT/CT*

Background A 53-years-old diabetic man was referred to the nuclear medicine department for infection imaging because of a clinical suspicion of osteomyelitis. The patient was a known insulin-dependent diabetic for the last 18 years with poorly controlled blood sugar. One year ago, the patient had sustained a burn injury to the sole of his left foot, for which he underwent extensive debridement along with skin grafting. The patient next presented to the orthopaedic clinic with 2-week history of an ulcer at the planter aspect of the left foot in the mid sole and was treated with local debridement along with appropriate antibiotic therapy. The patient was referred to nuclear medicine to investigate possible osteomyelitis.

Procedure 3-phase bone scan (TPBS) was performed after intravenous injection of 750 MBq of ^{99m}Tc-MDP. Planar blood flow (immediate), blood pool (5 minutes) and delayed (3 hours) images of the feet were acquired, followed by a SPECT-CT scan of the feet. A ^{99m}Tc-HMPAO labelled WBC scan of the feet was performed 3 days later. An x-ray of left foot was also taken (Figure 1).

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Figure 1 *Lateral projection x-ray of the left foot showing soft-tissue swelling in the mid sole with air lucency. The adjacent bone is normal.*

Figure 2 *Bone scan blood-flow phase images in the anterior projection showing increased activity in the distal left lower extremity*

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Figure 3 *Blood pool phase image (left) and 3-hour delayed bone scan image (right). There is increased activity seen in the mid foot region on both scan images*

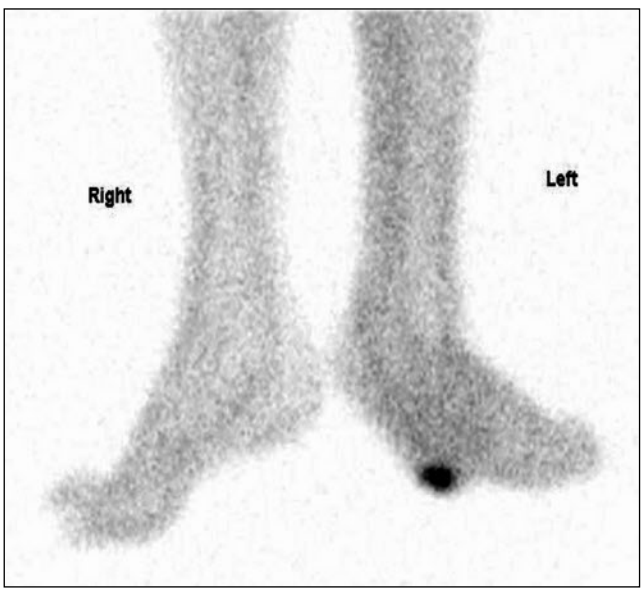

Figure 4 *^{99m}Tc-HMPAO WBC image in the anterior projection showing a focus of intense increased uptake at the ulcer site*

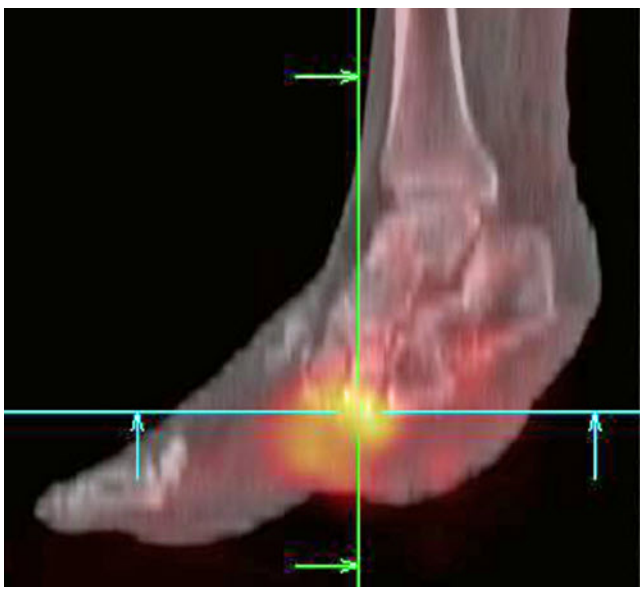

Figure 5 *SPECT-CT fusion image of the left foot showing increased uptake in left mid foot corresponding the mid tarsal region*

Findings The blood flow images (Figure 2) showed increased flow to the distal left lower extremity with the blood pool and the planar as well as the SPECT-CT bone scan images additionally showed intense increase uptake in the left mid-foot (Figures 3&5). The WBC scan images showed intense focal increased uptake at the planter aspect of the left foot corresponding to the known ulcer at this site with normal uptake seen elsewhere in the left foot (Figure 4).

Conclusion The scan appearances were typical of reflex sympathetic dystrophy syndrome (RSDS) secondary to the known infected/ inflammed skin ulcer as documented on the WBC scan. No

Comments Despite the strikingly abnormal bone scan, the appearances were however nonspecific and could be attributed to different causes including RSDS - generalised increased left foot activity in all the 3 phases [1, 2], Charcot osteoarthropathy or infective arthropathy - increased distal tarsal activity on the TPBS and SPECT-CT, or even osteomyelitis [3-5]. However, this combination scintigraphic study uniquely provided a *cause-and-effect diagnosis* with the WBC scan dinlineating the underlying *cause* that triggered the RSDS resulting in left foot pain and the bone scan scan depicting the *effect* of the disease process.

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