Case 6
Osteomyelitis

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History

A 68-year-old diabetic female with a nonhealing left hallux valgus ulcer (Fig. 6.1).

Diagnosis

Osteomyelitis

Findings

- Hyperintense T1 signal involving the first proximal and distal phalanxes extending across the interphalangeal joint consistent with osteomyelitis (white arrow).
- Hyperintense STIR signal (asterisk) involving the first proximal and distal phalanxes compared to the normal marrow of the tarsal bones. A large plantar ulcer is also seen.
- Plantar surface ulcer with adjacent STIR hyperintensity involving the subcutaneous tissues consistent with soft tissue cellulitis (arrowheads).
- PET/MRI fusion image showing intense hypermetabolic FDG activity compatible with bone and soft tissue infection.
- PET images show area of absent of radiotracer uptake indicating necrosis (black arrow).

Discussion

Osteomyelitis is an infection of the bone typically due to a bacterial infection. Other less common pathogens include tuberculosis, syphilis, and fungal etiologies. In adults, it usually results from contiguous spread, often from a diabetic ulcer, of infection. Other routes of spread include hematogenous (more often in children and spinal infections) and postoperative.

The current modality of choice to diagnose osteomyelitis is MRI, which can determine the extent of osseous and soft tissue involvement. The simplest method of confirming osteomyelitis on MRI is to identify a deep ulcer or a sinus tract from a foot ulcer that leads to the bone surface and determine the signal characteristics of the underlying bone marrow. Findings of low T1-weighted signal, high STIR signal, and post-contrast marrow enhancement confirm the presence of osteomyelitis. MRI can also help evaluate associated soft tissue findings such as foreign bodies, abscesses, and soft tissue involvement. Chronic bone infection changes make MRI interpretation more difficult, and distinguishing diabetic foot with Charcot arthropathy from bone infection on MRI is a modest challenge.

FDG PET is emerging as an effective way to diagnose osteomyelitis providing higher-resolution tomographic images and in combination with MR

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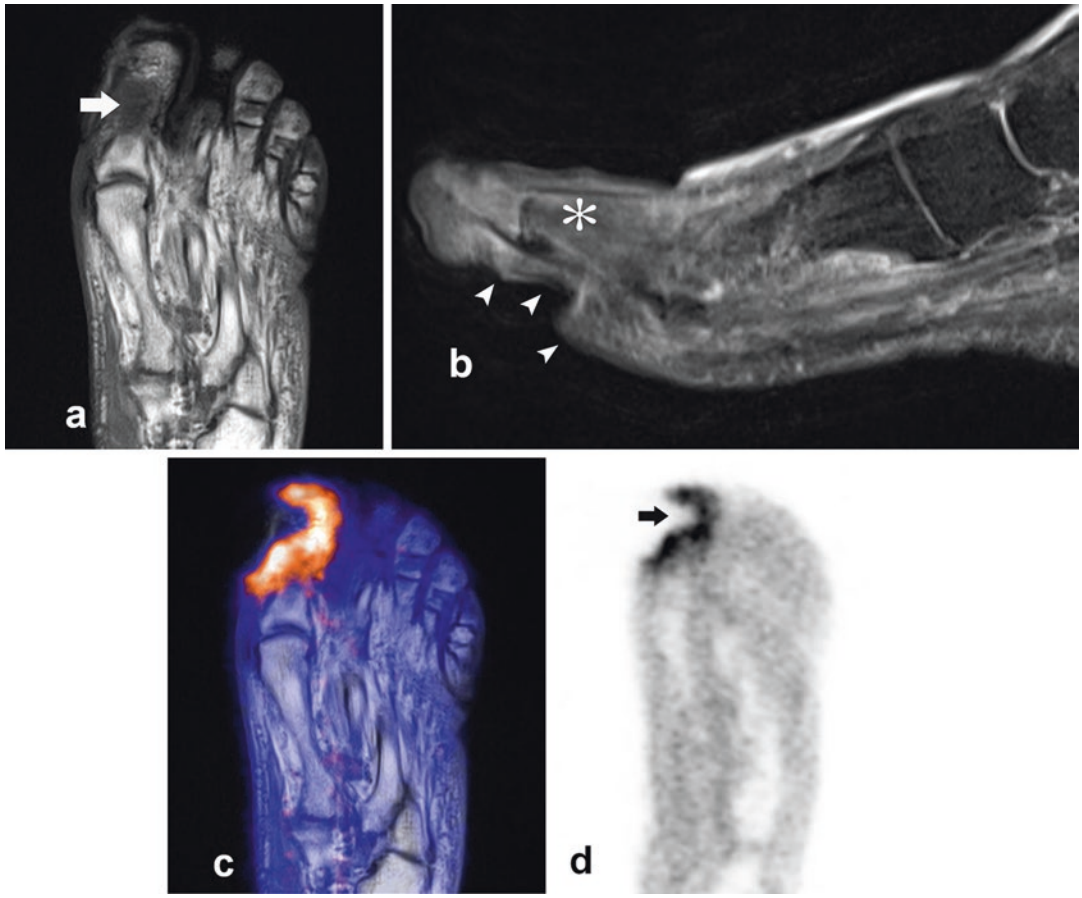

Fig. 6.1 T1-weighted axial (**a**), STIR sagittal (**b**), PET/MRI T1-weighted axial fusion (**c**), and PET axial (**d**)

anatomical location of the infection site. Multiple studies have determined high accuracy of FDG PET in the diagnosis of osteomyelitis being superior to other nuclear medicine procedures including bone scan, gallium scan, and the labeled white blood cells. FDG PET has a potential advantage over MRI in the diagnosis of osteomyelitis superimposed on Charcot arthropathy and postoperative infections. Combined use of both, FDG PET and MRI, offers benefits of obtaining high sensitivity for the presence of infection by PET and exact location of infection by MRI due to superior tissue resolution.

Suggested Reading

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Kagna O, Srour S, Melamed E, Militianu D, Keidar Z. FDG PET/CT imaging in the diagnosis of osteomyelitis in the diabetic foot. Eur J Nucl Med Mol Imaging. 2012;39:1545–50.