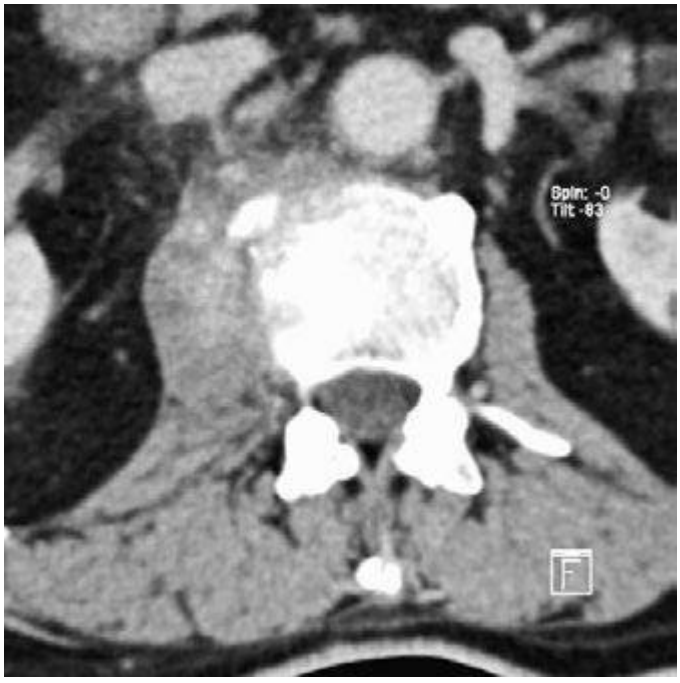

FIGURE 158-1 CT scan of acute vertebral osteomyelitis (L1/L2) due to *Staphylococcus aureus* in a 64-year-old man. Low-grade fever persisted despite appropriate IV antibiotic therapy. The scan revealed a psoas abscess on the right side.

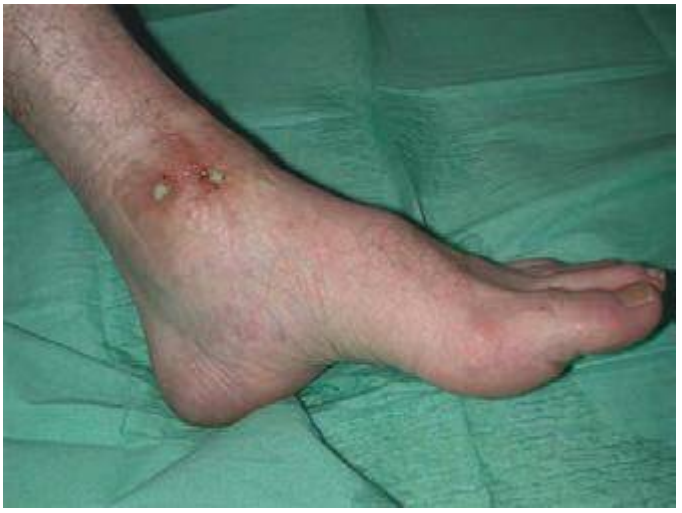

FIGURE 158-2 A 42-year-old man who had had a malleolar fracture 6 weeks previously had persistent pain and slight inflammation after orthopedic repair. His infection was treated with oral antibiotics without debridement surgery. This insufficient management of an implant-associated *Staphylococcus aureus* infection was complicated by a sinus tract.

devices. Chronic osteomyelitis can recur after a symptom-free interval of >50 years. Such recurrences are most common among elderly patients who developed osteomyelitis in the preantibiotic era.

EPIDEMIOLOGY

In adults, most cases of long-bone osteomyelitis are posttraumatic or postsurgical; less frequently, late recurrence arises from hematogenous infections during childhood. The risk of infection depends on the type of fracture. After closed fracture, implant-associated infection occurs in fewer than 1% of patients. In contrast, after open fracture, the risk of osteomyelitis ranges from ~2% up to 16%, with the precise figure depending on the degree of tissue damage during trauma.

MICROBIOLOGY

The spectrum of microorganisms causing hematogenous long-bone osteomyelitis does not differ from that in vertebral osteomyelitis. *S. aureus* is most commonly isolated from adult patients. In rare cases, mycobacteria or fungal agents such as *Cryptococcus* species, *Sporothrix schenckii*, *Blastomyces dermatitidis*, or *Coccidioides* species are found in patients who live or have traveled in endemic regions. Impaired cellular immunity (e.g., in HIV infection or after transplantation) predisposes to these etiologies. Coagulase-negative staphylococci are the second most common etiologic agents (after *S. aureus*) in implant-associated osteomyelitis. After open fracture, contiguous long-bone osteomyelitis is typically caused by gram-negative bacilli or a polymicrobial mixture of organisms.

CLINICAL MANIFESTATIONS

The leading symptoms in adults with primary or recurrent hematogenous long-bone osteomyelitis are pain and low-grade fever. Infection occasionally manifests as clinical sepsis and local signs of inflammation (erythema and swelling). After internal fixation, osteomyelitis can be classified as acute (≤3 weeks) or chronic. Acute long-bone osteomyelitis manifests as signs of surgical site infection, such as erythema and impaired wound healing. Acute implant-associated infection may also follow hematogenous seeding at any time after implantation of a device. Typical symptoms are new-onset pain and signs of sepsis. Chronic infections are usually caused by low-virulence microorganisms or occur after ineffective treatment of early-onset infection. Patients may present with persisting pain, subtle local signs of inflammation, intermittent discharge of pus, or fluctuating erythema over the scar (Fig. 158-2).

DIAGNOSIS

The diagnostic workup for acute hematogenous long-bone osteomyelitis is similar to that for vertebral osteomyelitis. Bone remodeling and thus marker uptake are increased for at least 1 year after surgery. Therefore, the three-phase bone scan is not useful during this interval. However, in late recurrences it allows rapid diagnosis at low cost. If the results are positive, CT is required in order to estimate the extent of inflamed tissue and to detect bone necrosis (sequesters). Implant-associated infection should be suspected if CRP values do not return to the normal range or rise after an initial decrease. Clinical and laboratory suspicion should prompt surgical exploration and sampling.

In chronic osteomyelitis of >1 year's duration, single-photon emission CT plus conventional CT (SPECT/CT) is a good option, either with ^{99m}Tc methylene diphosphonate (^{99m}Tc-MDP)–labeled leukocytes or with labeled monoclonal antibodies to granulocytes. Surgical debridement is needed for diagnostic (biopsy culture, histology) and therapeutic reasons.

TREATMENT OSTEOMYELITIS IN LONG BONES

Treatment for acute hematogenous infection in long bones is identical to that for acute vertebral osteomyelitis (Table 158-1). The suggested duration of antibiotic therapy is 4–6 weeks. In contrast to chronic or implant-associated osteomyelitis, acute hematogenous infection does not require surgical intervention. Initial IV administration of antimicrobial agents is followed by long-term oral treatment. The duration of the initial IV phase of therapy has not been defined. The IV course can be as short as a couple of days if a drug with excellent bioavailability is available. In case of recurrence of chronic osteomyelitis as well as in each type of exogenous osteomyelitis (acute, chronic, with or without an implant), a combination of surgical debridement, obliteration of dead space, and long-term antibiotic therapy is needed.

The therapeutic aims in patients whose infections are associated with internal fixation devices are consolidation of the fracture and prevention of chronic osteomyelitis. Stable implants can be maintained except in patients with uncontrolled sepsis. Appropriate antimicrobial therapies are listed in Table 158-2. The cure rate for