Septic Arthritis of Native Joints

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KEYWORDS

• Septic arthritis • Arthrocentesis • Synovial fluid • MRSA

KEY POINTS

- Septic arthritis is a true rheumatologic emergency that may lead to disability or death. Prompt evacuation of the joint, either by arthrocentesis at the bedside, open or arthroscopic drainage in the operating room, or imaging-guided drainage in the radiology suite, is mandatory.
- Arthrocentesis is diagnostic and therapeutic in patients with suspected septic arthritis. Patients should be treated empirically for septic arthritis if the synovial fluid white blood cell (WBC) count exceeds 50,000 cells/mm^3. Patients with bacterial arthritis who are debilitated or immunosuppressed may have lower synovial fluid WBC counts.
- Methicillin-resistant *Staphylococcus aureus* (MRSA) is a major cause of septic arthritis in the United States; however, it is less prominent as a cause of septic arthritis in Europe. MRSA joint infection seems to be associated with worse outcomes. This may be due to its greater virulence, delays in initiation of appropriate antibiotics, and the older age of many affected patients.
- Antibiotic courses of 3 to 4 weeks in duration are generally adequate for uncomplicated bacterial arthritis. Treatment duration should be extended to 6 weeks if there is imaging evidence of accompanying osteomyelitis.

PATHOGENESIS

Septic arthritis of native (nonprosthetic) joints is uncommon but not rare, with approximately 2 cases per 100,000 people per year.[1] Occult bacteremia is probably the usual cause. Synovium is a vascular tissue that lacks a protective basement membrane, making it vulnerable to bacteremic seeding.[2] Minute breaks in the skin or mucous membranes may allow staphylococci and streptococci to gain access to the bloodstream. Gram-negative septic arthritis may arise from bacteremia from injection drug use or loss of integrity of the gastrointestinal or urinary tracts. Occasionally, septic arthritis is the direct result of penetrating trauma, such as human or animal bites or

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errant injection drug use. This is the most common means of infection of the small joints of the hands and feet.[3] Rarely, bacterial arthritis may arise as a complication of arthroscopy or therapeutic joint injection with corticosteroids.

Most cases of septic arthritis are caused by gram-positive organisms. Enteric gram-negative rods account for 43% of community-acquired bacteremias, but cause only 10% of septic arthritis.[4,5] This likely relates to the superior ability of gram-positive organisms to bind connective tissue and extracellular matrix proteins. *Staphylococcus aureus*, the commonest cause of septic arthritis, produces several surface adhesins that bind to extracellular matrix proteins. Staphylococcal strains defective in microbial surface components recognizing adhesive matrix molecules are less arthritogenic in animal models.[6]

Joint damage in septic arthritis results from bacterial invasion, host inflammation, and tissue ischemia. Bacterial enzymes and toxins are directly injurious to cartilage. Cartilage may suffer ''innocent bystander'' damage, as host neutrophils release reactive oxygen species and lysosomal proteases. Cytokines activate host matrix metalloproteinases, leading to autodigestion of cartilage.[7] Ischemic injury also plays a role. Cartilage is avascular, and highly dependent on diffusion of oxygen and nutrients from the synovium. As purulent exudate accumulates, joint pressure increases, and synovial blood flow is tamponaded, resulting in cartilage anoxia.[8]

RISK FACTORS

The most robust risk factor for septic arthritis is preexisting joint disease (**Box 1**). Up to 47% of patients with bacterial arthritis have prior joint problems.[3] A high index of suspicion for septic arthritis should be maintained in patients with other rheumatologic conditions, such as rheumatoid arthritis (RA), osteoarthritis, gout, pseudogout, recent trauma, prior joint surgery, and systemic lupus erythematosus. Of these, RA is the most common, and is associated with worse outcomes.

Patients with RA are at high risk for bacterial arthritis from the combination of joint damage, immunosuppressive medications, and poor skin condition. Polyarticular

Box 1
Risk factors for septic arthritis of native joints

- Preexisting joint diseases
  - Rheumatoid arthritis
  - Gout and pseudogout
  - Osteoarthritis
  - Lupus
  - Trauma
  - Recent surgery
- Diabetes mellitus
- Intravenous drug use
- Cirrhosis
- End-stage renal disease
- Prednisone and other immunosuppressive medications
- Skin diseases
  - Psoriasis
  - Eczema
  - Skin ulcers
- Human bite (fight bite)