Bone and Joint Infections

Markus Pääkkönen, MD, PhD[a,*], Heikki Peltola, MD, PhD[b]

KEYWORDS

• Septic arthritis • Osteomyelitis • Arthrocentesis • Trepanation • Clindamycin

KEY POINTS

- The treatment of childhood acute osteoarticular infections can be simplified.
- For the treatment of uncomplicated childhood osteoarticular infections, in which fever and symptoms resolve rapidly, 2 to 4 days of intravenous antibiotics can be followed by high-dose oral antibiotics, for a total antibiotic course of 3 weeks for osteomyelitis and 2 weeks for septic arthritis.
- Oral antibiotics should be well absorbed, provide good bone penetration, and be given in sufficiently high doses. Clindamycin or first-generation cephalosporins should be given 4 times a day.
- Serum C-reactive protein measurements are reliable and inexpensive in the diagnosis and follow-up of osteomyelitis and septic arthritis.

INTRODUCTION

In contrast to developing countries, acute osteoarticular infections (AOI) of children, osteomyelitis (OM), septic arthritis (SA), and OM with adjacent SA (OM+SA), are rare diseases in high-income settings.[1–3] The annual incidence of AOI varies regionally between 10 and 25 per 100,000 population, of which OM constitutes two-thirds.[1,4,5] The incidence is increased in immunocompromised patients and those with sickle-cell disease. The infection is considered acute if the time from the onset of symptoms to the presentation to a hospital is less than 2 weeks. Most cases are hematogenous in origin, although direct inoculation from trauma or spread from an adjacent tissue occurs as well. Boys predominate girls with an approximate ratio of 2:1.[1,4,5]

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[a] Department of Orthopaedics and Traumatology, Turku University Hospital, University of Turku, PO Box 52, Kiinamyllynkatu 4–8, Turku 20521, Finland; [b] Department of Pediatrics, Children's Hospital, Helsinki University Central Hospital, University of Helsinki, PO Box 281, 11 Stenbäck Street, Helsinki 00029, Finland
* Corresponding author.
E-mail address: Markus.Paakkonen@helsinki.fi

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Cultures frequently fail to disclose the causative agent, but when tested positive, almost all cases show only a single organism.[1,4,6] Overwhelmingly, the most common agent is *Staphylococcus aureus*, followed by respiratory pathogens *Streptococcus pyogenes, Streptococcus pneumoniae* (pneumococcus), and *Haemophilus influenzae* type b (Hib).[7–13] *Kingella kingae* is a common cause of OM and SA in some areas and requires special culture techniques or real-time polymerase chain reaction for diagnosis.[14] Current vaccinations have caused decreased incidence of Hib and pneumococcus in some countries.[12,13] *Salmonella* spp are a common agent in the tropics and in children with sickle-cell disease,[15] and neonates may be affected by bacteria such as *Streptococcus agalactiae*.[1]

PATIENT HISTORY

The classical presentation of AOI is a locally swollen, warm limb or joint combined with high fever with no prior history of trauma. In a high-income setting the time from onset of symptoms is 2 to 5 days, and rarely more than a week.[6,16–19] Focal symptoms are not always remarkable, especially in OM, and fever of unknown origin may be the only remarkable sign present in an OM patient visiting the emergency department.[20] Prior trauma is documented in one-third of the cases.[5]

PHYSICAL EXAMINATION

The limb or joint may be too painful to allow thorough palpation or testing of joint motion, but plenty of useful information may be obtained from the disease history and mere observation of the patient. The child may be limping or refuse to use an extremity. Newborns may be irritable and may present as pseudoparalytic, whereas older children show more clear signs such as focal tenderness.[1] Fever may be absent or high, up to 40°C.[5,21] Generally, children with SA are clinically more ill than those with OM, which has a more insidious onset. Mild reddish color with no swelling may be the only visible focal sign in OM. Gonococcal arthritis, previously more common than today in the western settings, may present in the newborn only with unspecific irritability and poor feeding.[1]

Focal symptoms and signs vary according to localization, causative organism, and the age of the child (**Table 1**). *S aureus* causes clear focal symptoms compared with the insidious onset of *K kingae*, and culture-negative cases tend to present milder symptoms.[6,14] Spinal osteomyelitis may manifest as unspecific back pain. The diagnosis of pelvic osteomyelitis is difficult; the mean diagnostic delay in 1 study was 12 days.[22] OM in a long bone of a child beyond the neonatal age might show local pinpoint tenderness, which can be provoked by percussing the bone away from the affected area. Calcaneal osteomyelitis is characterized by slowly developing symptoms, and thus, late presentation.[23] Sacroilitis may present as pain in the sacrum or lower back, provoked by digital dorsal compression in rectal examination.[1] The swelling in hip arthritis of a neonate may pass detection unless the child has sought a characteristic position, with the affected hip flexed and externally rotated. Pain is elicited by compression of the head of the femur into the acetabulum.

DIAGNOSTIC EVALUATION

Further evaluation is warranted whenever an acute AOI is suspected. **Box 1** summarizes the commonly performed tests, and **Box 2** lists some of the examinations to be considered in the differential diagnosis. Blood tests are used to assess the extent of inflammation. Blood leukocyte count (white blood cell count) is unspecific