CME

Practice Guidelines

Acute Bacterial Arthritis in Children: Guidelines From the Pediatric Infectious Diseases Society and Infectious Diseases Society of America

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KEY POINTS FOR PRACTICE

- Initial evaluation of suspected acute bacterial arthritis in children should include blood cultures before antimicrobial treatment, plain radiography, and consideration of a CRP level for monitoring treatment response without serum procalcitonin level or erythrocyte sedimentation rate.
- Although joint aspiration is recommended, it may be more important to determine the presence of associated osteomyelitis because more than one-third of these patients experience complications.
- For ill-appearing children, antibiotic treatment should not be delayed for joint aspiration.
- Initial antibiotic treatment duration of 10 to 14 days is recommended for common pathogens.

From the *AFP* Editors

Acute bacterial arthritis affects up to 1 in 10,000 children annually. It most often is the result of hematogenous spread to a synovial joint such as the knee, ankle, elbow, or shoulder. The hip is the most commonly infected, in up to 40% of cases. The knee, ankle, elbow, and shoulder also are commonly infected. Bacterial infection of fibrocartilaginous joints without synovial fluid, such as intervertebral joints, the pubic symphysis, and sacroiliac joints, is rare and difficult to diagnose.

The most common cause of acute bacterial arthritis in children is *Staphylococcus aureus*. This type of acute bacterial arthritis often manifests with rapid progression of symptoms and is associated with the greatest risk of long-term complications. *Kingella kingae* can be the infecting organism in children younger than 4 years and causes milder symptoms and an indolent course. The Pediatric Infectious Diseases Society and Infectious Diseases Society of America have published guidelines for evaluation and treatment of suspected acute bacterial arthritis in otherwise healthy children older than 1 month.

EVALUATION

It is important to differentiate between acute bacterial arthritis and synovitis due to similar presentation of joint pain.

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G-TRUST SCORECARD

Score	Criteria
Yes	Focus on patient-oriented outcomes
Yes	Clear and actionable recommendations
Yes	Relevant patient populations and conditions
Yes	Based on systematic review
Yes	Evidence graded by quality
Yes	Separate evidence review or analyst in guideline team
No	Chair and majority free of conflicts of interest
No	Development group includes most relevant specialties, patients, and payers
	Overall – useful

Note: See related editorial, Where Clinical Practice Guidelines Go Wrong, at https://www.aafp.org/afp/gtrust.html.

G-TRUST = guideline trustworthiness, relevance, and utility scoring tool.

Transient nonbacterial synovitis is the most common cause of acute painful hip in children. It consists of self-limited joint pain and mild inflammation caused by viral synovitis, reactive synovitis, or unrecognized *K kingae* infection.

Acute bacterial arthritis often presents with joint pain, swelling, erythema, and systemic signs of infection. Joint tenderness and increased pain with movement are common. The clinical presentation of acute bacterial arthritis can vary based on the affected joint, causative bacteria, and patient age.

Initial Laboratory Analyses

A complete blood cell count should be performed in children with suspected acute bacterial arthritis because the white blood cell count tends to be higher in acute bacterial arthritis than transient nonbacterial synovitis. A serum C-reactive protein (CRP) level can be considered on initial evaluation to establish a baseline for sequential monitoring to assess treatment response. Erythrocyte sedimentation rate and serum procalcitonin level do not have roles in initial evaluation because they do not differentiate between bacterial and nonbacterial causes.

Blood culture should be performed for children with suspected acute bacterial arthritis before starting antimicrobial treatment. Although only 20% of children with acute bacterial arthritis have positive results, blood culture is quick to perform, and results can help guide treatment.

Imaging

Plain radiography of the affected joint and adjacent bones is recommended, primarily to identify other causes of joint pain, including fracture, tumor, slipped capital femoral epiphysis, or Legg-Calvé-Perthes disease. Radiography has a sensitivity of 25% for osteoarticular infections.

Although joint effusion sometimes can be detected clinically, ultrasonography can visualize effusion and capsular thickening when clinical results are uncertain. Ultrasonography should be used before other types of imaging in patients who require further imaging to detect joint effusion. It has an 81% sensitivity for acute bacterial arthritis overall, yet the sensitivity is 65% or less in the presence of osteomyelitis. For all imaging modalities, comparison of the affected joint with the joint on the opposite side is recommended.

In cases of negative ultrasound results, magnetic resonance imaging can be considered. It has a sensitivity of 83% and specificity of 93% or greater in differentiating acute bacterial arthritis of the hip from transient nonbacterial arthritis. Computed tomography has uncertain accuracy and results in radiation exposure. Magnetic resonance imaging is recommended if osteomyelitis is suspected.

Diagnostic Testing

Arthrocentesis with white blood cell count and differential, Gram stain, and aerobic culture of the synovial fluid is recommended before starting antimicrobial therapy. This is a conditional recommendation because the complication rate in children with primary acute bacterial arthritis is less than 1%.

Determining the presence of osteomyelitis in patients with acute bacterial arthritis is important because more than one-third of these patients experience complications. Osteomyelitis risk is determined through a systematic evaluation of available patient data (eg, laboratory tests, imaging studies).

In ill-appearing children, joint aspiration can be delayed until antibiotic therapy has been initiated. Aerobic joint fluid culture yields a result in only 40% of acute bacterial arthritis cases and studies have suggested comparable yield when synovial fluid samples are taken before and after antibiotics have been given. Storage of joint fluid should be considered for future testing, including polymerase chain reaction (PCR) testing for *K kingae*, resistance genes, *Brucella,* and *Borrelia*. *K kingae* is isolated from less than 1% of samples with bacterial culture, but up to 12% of samples with PCR.

If synovial fluid is grossly purulent, immediate surgical procedures should be considered. The advantage of initial surgical arthrotomy with irrigation over needle aspiration is unclear.

In areas in which Lyme disease is endemic, arthritis caused by *Borrelia burgdorferi* can be difficult to distinguish from acute bacterial arthritis. Lyme disease most often affects the knee, and severe pain and systemic toxicity are unlikely. Although initial management decisions depend on clinical factors, serum antibody and joint fluid PCR test results can clarify after empiric treatment.

TREATMENT

Antimicrobial Therapy

When suspected acute bacterial arthritis is associated with sepsis, starting antibiotics in less than 3 hours reduces mortality. Sepsis bundles that include empiric antibiotic treatment within 1 hour of presentation reduce in-hospital mortality in children. In such cases, empiric antibiotics should not be delayed for joint aspiration. Delaying antibiotic therapy in acute bacterial arthritis may increase the risk of the rare outcome of chondrolysis.

Recommended empiric therapy for acute bacterial arthritis primarily is focused on *S aureus* coverage (Table 1). When the risk of methicillin resistance is low, cephalosporins such as cephalexin at 100 mg/kg per day are recommended, with cefazolin used during admission. When methicillin-resistant *S aureus* is suspected and the risk of resistance is low, clindamycin should be prescribed. Intravenous therapy with clindamycin or ceftaroline (Teflaro) is preferred over vancomycin. When *K kingae* is suspected, adding ampicillin or a cephalosporin should be considered, and vancomycin, clindamycin, and linezolid should be avoided. Treatment courses of 10 to 14 days typically are recommended with appropriate monitoring.

Adjunctive Corticosteroids

The guidelines recommend against adding a corticosteroid to antibiotic treatment for joint infections. This is due to the risk of common adverse effects that outweighs the potential for slight improvements, which has been shown in small studies.

MONITORING TREATMENT RESPONSE

Effective antibiotic therapy results in resolution of fever within 4 days and a reduction in joint symptoms. Patients can be transitioned to oral therapy after adequate clinical response and a 50% or greater decrease in CRP level, which should be monitored every 2 or 3 days until consistent decreases are observed. Clinical symptom recurrence or plateauing or increasing CRP level suggests a persisting focus of infection. Magnetic resonance imaging should be considered for patients with a poor clinical response after 96 hours of appropriate therapy.

TABLE 1

Empiric Antibiotic Therapy for Acute Bacterial Arthritis in Children

Community-acquired methicillin resistance level in *Staphylococcus* infection	Intravenous antibiotics	Oral antibiotics
< 10%	Preferred: cefazolin, nafcillin, oxacillin Alternatives: clindamycin, vancomycin	Preferred: cephalexin Alternative: clindamycin
> 10%	Preferred: clindamycin (unless high local resistance rates) Alternatives: ceftaroline (Teflaro), linezolid, vancomycin	Preferred: clindamycin (unless high local resistance rates) Alternatives: linezolid, doxycycline, trimethoprim-sulfamethoxazole

Editor's Note: This guideline contains several new practice recommendations. Although joint aspiration is still recommended, the game changer for me is the evidence that finding osteomyelitis appears to be more important than obtaining synovial fluid. Complication rates with adjacent osteomyelitis are much higher than without, and synovial fluid cultures are only positive in 40% of arthritis cases. The emerging milder infections caused by *K kingae* when joint fluid is sent for PCR testing make me question how many of these patients I diagnosed with transient nonbacterial synovitis.

—Michael J. Arnold, MD, MHPE, Assistant Medical Editor

Guideline source: Pediatric Infectious Diseases Society, Infectious Diseases Society of America

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