

BONE AND JOINT INFECTION CLINICAL PRACTICE GUIDELINE

This clinical guideline has been developed to ensure appropriate diagnosis, evaluation, and treatment for children presenting with symptoms suggestive of septic arthritis or osteomyelitis. Please direct any questions to Dr. Logan Murray, BBCH Pediatric Hospitalist, at 207-662-2541.

SIGNS AND SYMPTOMS OF SEPTIC ARTHRITIS:

Fever, acute onset of pain, limited motion of joint should be considered septic arthritis until proven otherwise.

INITIAL EVALUATION:

- 1.) Baseline lab testing: CBC with differential, CRP, ESR, blood culture.
- 2.) In most cases, obtain plain radiographs (look for joint space widening or evidence of capsular distension) and rule out pathologic fracture, SCFE, or mass. Hip x-rays should be AP pelvis and frog pelvis.
- 3.) Patient needs to be assessed by attending physician (pediatric attending, ED attending, or pediatric ID consultant) prior to further imaging being ordered.
- 4.) If highly suspicious of septic arthritis after attending review or any symptoms in an infant joint, call ortho trauma attending on call after 5 pm or on weekends/holidays, (MaineOrtho at 774-5113 days) and Pediatric ID for consultation.

NEXT STEPS FOR SUSPECTED SEPTIC ARTHRITIS

- 1.) If plain radiographs are negative but high suspicion for septic arthritis may consider further imaging:
 - a. Hip – ultrasound is available 24 hours per day, 7 days a week. Note that all ultrasounds should be ordered through radiology.
 - b. Other joints – MRI of selected joint or 3-phase bone scan.
- 2.) If plain radiographs or ultrasound are positive, need to obtain joint fluid urgently:
 - a. Hip – contact radiology (662-4735) for imaging guided tap (8 am - 5 pm Monday-Friday will be pediatric radiologist, other times will be IR service 662-4517, option 9)
 - b. Other joint – per orthopedics (Ortho trauma attending or MaineOrtho at 774-5113 as above)
 1. call rheumatology (Rheumatology Associates at 774-5761) if high suspicion for inflammatory etiology
 2. other physicians who may perform tap of knee e.g. ED attending
- 3.) Arrange sedation for the procedure. If procedure will be performed in the ED, confirm ED attending is available to help. If procedure will be performed on the IPU or in radiology, and it's between 7 am and 2 pm Monday – Friday, check with the pediatric hospitalist service to see if a sedation credentialed hospitalist is available. For other times and locations, contact the anesthesia floorwalker (pager: 662-4800, enter 0610) for assistance.
- 4.) Specimen management for radiology and IR taps should be by the pediatric team. Specimen management for orthopedic surgeon taps is per the surgeon with pediatrics available to assist. Fluid specimen is preferred over swab. Priority for synovial fluid is culture and gram stain so first put at least 1 ml of fluid in a sterile culture container. Next, use regular size (not microtainer) purple top K2EDTA for cell counts (>2ml if possible, but lab will attempt cell counts on smaller volumes). If further fluid is available and patient is 3 months to 5 years put remaining fluid in a pink top blood culture bottle.
- 5.) If any of the following are present (positive gram stain or otherwise high clinical suspicion for septic arthritis) consult orthopedics, admit patient, obtain blood culture (if not previously obtained) and start empiric antibiotic coverage.
- 5.) If studies are not definitive but high suspicion remains for septic arthritis, obtain pediatric orthopedic consultation.
- 6.) If joint fluid obtained and the above risk factors not present, consider Lyme arthritis, viral arthritis, reactive arthritis, or transient synovitis. Consider obtaining Lyme serology if not already obtained.

EMPIRIC ANTIBIOTIC COVERAGE WHILE AWAITING CULTURE RESULTS

- Infants from birth to 3 months: Vancomycin IV: 15 mg/kg/dose every 6 hours and ceftriaxone IM, IV: 50 mg/kg/day in 1-2 divided doses; maximum daily dose: 2000 mg/day (or for under 1 month, use cefotaxime 200 mg/kg/day divided every 6-8 hours instead of ceftriaxone)

Note that infants under 2 months with suspected septic arthritis or osteomyelitis need full sepsis evaluation prior to starting parenteral antibiotics (blood, urine, and CSF cultures)

- Greater than 3 months: should provide coverage for methicillin-sensitive and resistant *Staph aureus*, *Streptococcus pyogenes*, *Streptococcus pneumoniae* & *Kingella kingae*

Vancomycin IV: 15 mg/kg/dose every 6 hours and ceftriaxone IM, IV: 50 mg/kg/day in 1-2 divided doses; maximum daily dose: 2000 mg/day

SUSPECTED OSTEOMYELITIS

Younger than 2 years – have high index of suspicion for osteomyelitis; may have systemic signs of infection; may show evidence of pain on movement or decreased use of a limb, localized soft tissue swelling

Older than 2 years – sometimes febrile but rarely toxic; more likely to indicate a specific site of pain and point tenderness may be easy to elicit

- 1.) Obtain baseline lab testing: CBC with differential, CRP, ESR, blood culture
- 2.) Obtain plain radiographs of suspected area (sensitivity for osteomyelitis is only 43-75%, specificity only 75-83%, often no radiographic evidence until 3 weeks of infection). Plain radiographs are also needed to rule out alternate etiologies for pain such as malignancy.
- 3.) Patient needs to be assessed by attending physician (pediatric hospitalist, ED attending, orthopedist, or pediatric ID consultant) prior to further imaging being ordered.
- 4.) If plain radiographs are positive for evidence of osteomyelitis, obtain blood cultures if not already obtained, and admit patient and consult pediatric ID. If child is non-toxic appearing it is best if area can be sampled for culture prior to starting antibiotics to avoid possibility of not identifying the causative organism. If blood culture is positive, the sampling of bone tissue may not be required.
- 5.) If radiographs are negative but suspicion for osteomyelitis is high, consider further imaging (e.g. 3 phase bone scan or MRI).

Need for empiric antibiotic coverage while awaiting culture results should be decided in consultation with Pediatric ID.

References:

- 1.) Liu, C. et al., "Clinical practice guidelines by the Infectious Diseases Society of America for the treatment of methicillin-resistant *Staphylococcus Aureus* infections in adults and children", Clinical Infectious Diseases (2011):1-38.
- 2.) Hatzenbuehler, J & Pulling, T. "Diagnosis and management of osteomyelitis", Am Fam Physician (2011):84(9):1027-1033.
- 3.) Kocher, MS, Zurakowski, D, Kasser, JR. "Differentiating between septic arthritis and transient synovitis of the hip in children: An evidence-based clinical prediction algorithm" J. Bone Joint Surg Am, 81.12 (1999): 1662-70
- 4.) Faust, SN, et al., "Managing bone and joint infection in children" Arch Dis Child. (2012): 97:545-553
- 5.) Brannan, SR, Jerrard DA. "Synovial Fluid Analysis" Journal of Emergency Medicine. (2006): 30(3):331-339

Algorithms are not intended to replace providers' clinical judgment or to establish a single protocol. Some clinical problems may not be adequately addressed in this guideline. As always, clinicians are urged to document management strategies.

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