I. Imaging of Acute Hematogenous Osteomyelitis and Septic Arthritis In Children

II. Authors

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KEY POINTS

ISSUES:

1: What are the clinical findings that raise the suspicion for acute hematogenous osteomyelitis and septic arthritis?

2: What is the diagnostic performance of the different imaging studies in acute osteomyelitis and septic arthritis?

3: What is the natural history of osteomyelitis and septic arthritis and what are the roles of medical therapy versus surgical treatment?

4: Is there a role for repeat imaging in the management?

5: What is the diagnostic performance of imaging of osteomyelitis and septic arthritis in the adult?
IV KEY POINTS:

• The clinical presentation of acute osteomyelitis and septic arthritis can be nonspecific and sometimes confusing (Moderate Evidence).

• When signs and symptoms cannot be localized, bone scintigraphy is preferred over MRI (Moderate Evidence).

• When signs and symptoms can be localized, MRI is preferred. (Moderate to Limited Evidence)

• Ultrasound is the preferred imaging modality for evaluating joint effusions of the hip (Moderate Evidence)

• MRI is highly sensitive for the detection of osteomyelitis and its complications (abscess), but incurs added cost (moderate evidence).

• No data was found in the medical literature that evaluates the cost effectiveness of the different imaging modalities in the evaluation of hematogenous osteomyelitis and septic joint (Limited Evidence).

• Overall, MR is the imaging modality of choice to evaluate for osteomyelitis and septic arthritis in the adult population, including the diabetic patient and intravenous drug users. The ability to localize symptoms and the inherent high spatial resolution allows exact anatomic detail that may be helpful for surgical planning (Limited to Moderate Evidence).

X. Issues

Issue 1: What are the clinical findings that raise the suspicion for acute hematogenous osteomyelitis and septic arthritis to direct further imaging?
Summary

The clinical presentation of acute hematogenous osteomyelitis and septic arthritis can be confusing and nonspecific in the pediatric population. No single clinical finding in isolation leads to the diagnosis of osteomyelitis or septic arthritis. Repeat high resolution imaging may be required to determine the need for surgical debridement, including extension into soft tissues or complications that are not amenable to systemic antibiotic therapy (Limited Evidence).

Issue 2: What is the diagnostic performance of the different imaging studies in acute hematogenous osteomyelitis and septic arthritis?

Summary

Although plain radiographs are neither sensitive or specific, their low cost, ready availability, and ability to exclude other diseases that can produce similar symptoms (fractures, tumors) argue for their continued use as the initial evaluation (Moderate to Limited Evidence).

Several studies have shown that MRI and radionuclide bone scintigraphy have high sensitivity for detection of osteomyelitis (Moderate Evidence). Their relative merits have not been established. Bone scintigraphy has the advantage of whole body imaging when symptoms cannot be localized, but has decreased specificity. This is especially true in the presence of superimposed disease processes such as a joint under pressure, or underlying bone diseases such as sickle cell or Gaucher’s disease (Moderate to Limited Evidence).
MR has the advantage of higher specificity and higher resolution to evaluate for soft tissue extension or complications, but has limited coverage of the body. This can be limiting if symptoms cannot be localized or if there is polyostotic involvement (Moderate to Limited Evidence).

Ultrasound is highly sensitive for the detection of a joint effusion, but not specific for the presence of infection. Based on the clinical predictors proposed by Kocher et al, a decision to aspirate an effusion can be reliably made to exclude septic arthritis (Moderate Evidence).

**Issue 3: What is the natural history of Osteomyelitis and Septic arthritis and what are the roles of systemic antibiotic therapy and surgical intervention?**

**Summary**

Most uncomplicated cases of osteomyelitis require hospitalization and the institution of systemic intravenous antibiotic therapy. If there is a delay of more than 4 days prior to institution of therapy, there is increased poor outcomes and long term sequelae (Moderate Evidence).

Approximately 5-10% of cases will require surgical intervention after initial antibiotic therapy, and up to 20-50% of all cases eventually require some form of surgery, including reconstruction and repeat debridements.

Approximately 5-10% of all cases have long term sequelae such as growth disturbance, loss of function, malalignment, and deformity. Approximately 6% of cases develop chronic osteomyelitis.
Issue 4: Is there a role for repeat imaging in the management?

Summary

Most patients respond clinically to systemic antibiotics within 48 hours. If there is no clinical response to therapy, repeat imaging should be performed to exclude complications that would require surgical intervention such as abscess collections, extensive soft tissue extension, or necrotic tissue. The performance characteristics of MRI are ideal in this setting. (Moderate to Limited Evidence).

Issue 5: What is the diagnostic performance of imaging in osteomyelitis and septic arthritis in the adult?

Summary

Overall, MR appears to be the imaging modality of choice to evaluate for osteomyelitis and septic arthritis in the adult population, including the diabetic patient and intravenous drug users. The ability to localize symptoms and inherent high spatial resolution allows exact anatomic detail that may be helpful for surgical planning (Limited to Moderate Evidence).