

hip arthritis [13]. Open arthrotomy had been considered the gold standard at the time of his study. The latter study reported no statistical differences in clinical results (according to Bennett's clinical assessment criteria), such as prolonged post-operative joint aches, joint range of motion limitations or infection recurrence [13]. Mean hospital length of stay was shorter for the arthroscopic group compared to the arthrotomy group (mean of 3.8 days versus 6.4 days, $p < 0.0001$) [13]. The results of this study suggest that hip arthroscopy is a valid alternative to hip arthrotomy for septic arthritis of the hip joint. Similar findings were reported by another study [5].

For septic arthritis of the knee, arthroscopy tends to be the operative choice [12,13]. Again, data is lacking to support these claims. Other studies have suggested that arthrotomy may be better for septic arthritis of the shoulder and the hip joint due to the tight space in these joints to allow entry of arthroscopic instruments [10,12]. Baker et al. noted that arthroscopy can be a viable alternative as well in the shoulder and ankle joints [12]. Conversely, Peltola et al. report in their prospective randomized trial that most of the included patients in their study did not require any operative procedures beyond a diagnostic aspiration [16]. Despite the debate over the technique and necessity of surgical interventions, the literature does emphasize that early diagnosis and prompt treatment are paramount when caring for suspected septic arthritis patients [5,8,10,13].

Other studies have attempted to streamline the diagnostic approach to patients with suspected septic arthritis. Kocher et al. established a clinical algorithm in order to aid in early diagnosis of pediatric septic hips [14]. Their criteria included the inability or refusal of the patient to bear weight, history of fever (defined as an oral temperature $>38.5^{\circ}\text{C}$), a serum WBC count greater than 12,000 cells/mm³ and an erythrocyte sedimentation rate (ESR) greater than 40 mm/hr [14]. Later studies found greater efficacy when incorporating CRP into this algorithm [17–19]. However, this clinical algorithm has not been fully validated across all populations and further studies must be carried out before it can be applied universally [15,20].

Despite significant heterogeneity in the literature regarding surgical indications and operative techniques for osteomyelitis and septic arthritis, there is more of a consensus on the use of CRP and ESR for aiding in diagnosis and monitoring treatment response [8,17]. CRP has been proven as an effective test for diagnosis and monitoring of response to treatment [5,8,10,16]. ESR was classically associated as a laboratory marker for osteomyelitis but has now been widely replaced by CRP [10]. The short half-life of CRP allows for more precise monitoring for efficacy of treatment. Decreasing CRP levels are indicative of treatment efficacy [8,16]. Pääkkönen et al. found that even with persistent pyrexia, decreasing CRP levels could be used to justify switching antibiotics from intravenous to oral [10]. They also report that they were able to safely discontinue antibiotics after 10 days as long as CRP levels were less than 20 mg/dL [10,16]. In circumstances when the CRP levels does not decline or continues to

increase, further workup or additional interventions may be necessary as this suggests a suboptimal clinical response to the current treatment [16].

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QUESTION 2: How radical should surgery be for osteomyelitis/septic arthritis?

RECOMMENDATION: In pediatric patients with osteomyelitis/septic arthritis who require surgical intervention, aggressive debridement and copious irrigation of the infected joint is required.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 89%, Disagree: 7%, Abstain: 4% (Super Majority, Strong Consensus)

RATIONALE

The treatment of choice for septic arthritis in children is irrigation and debridement of the septic joint to clear the joint of bacteria and destructive enzymes and also decrease the intra-articular pressure to avoid articular cartilage damage and ischemia [1,2].

Septic arthritis of the hip joint has been posited as an emergent condition in pediatric patients often requiring open arthrotomy as soon as confirmation of the disease is made with joint aspiration [1–5].

There are a few reports that show equivalent outcome for treatment of hip septic arthritis when arthroscopy versus arthrotomy was employed [6,7]. Repeated aspirations of the hip joint under ultrasound guidance was shown to be effective in 85% of children without the need for an arthrotomy [4,8–11]. The indication for surgical treatment of septic arthritis of other joints remains controversial. Drainage of any large effusion present in joints is usually advocated. In ankle, knee and shoulder joints, arthroscopic irrigation or aspiration and lavage may be appropriate [13].

There is no consensus for the time, type and extent of surgical procedures in patients with osteomyelitis [1]. Surgery is recommended in the presence of subperiosteal abscess, bone necrosis or direct invasion of the growth plate that may be seen in magnetic resonance imaging (MRI) images [2]. It is also indicated if a patient does not respond to antibiotic therapy, based on clinical examination, laboratory indices and imaging studies (particularly MRI) [1].

The decision to drain a subperiosteal collection seen on ultrasound cannot be based purely on the size of collection but needs to take into account the clinical findings of the patient and the response to antibiotic therapy [12–14].

During surgical intervention often a cortical window is created [1,15], but the optimal treatment for sub-periosteal abscess remains controversial in terms of whether or not a corticotomy or intramedullary drainage needs to be performed [1,16,17]. There is limited evidence to suggest that subperiosteal drainage alone is adequate management for a subperiosteal abscess [18–20].

Montgomery et al. [21] in a retrospective comparative study demonstrated that in patients with subperiosteal abscess, intramedullary drainage significantly decreased the need for repeat surgery. Another factor to consider when dealing with pediatric patients with septic arthritis is the virulence of the infective organism. In patients with methicillin-resistant *Staphylococcus aureus* (MRSA) infections, more aggressive surgical intervention is warranted, as these patients are at risk of relapse and often need repeated surgeries [15,22–24].

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QUESTION 3: Is there a role for arthroscopic washout in children with septic arthritis?

RECOMMENDATION: Yes. Arthroscopy is a useful tool in the treatment of septic arthritis in children.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 83%, Disagree: 10%, Abstain: 7% (Super Majority, Strong Consensus)