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Non – Operative Treatment Outcome of Hematogenous Osteomyelitis of the Femur in Infants: A Case Series

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ABSTRACT

Introduction: Osteomyelitis is a bacterial infection involving bone, its marrow, and the adjacent structures. The most common mechanism of infection in children is hematogenous, thus called hematogenous osteomyelitis (HO). There is an absolute requirement of antibiotic therapy. Surgery is considered in some cases. This is a report presenting 2 cases of distal femur HO in infants treated non – operatively with intravenous antibiotic alone.

Case Presentation: Case 1: A one month old male infant was admitted due to swollen knee with pus producing sinus on the medial side for the last one month, without any systemic manifestation. Laboratory showed leucocytosis and increased erythrocyte sedimentation rate (ESR). Cytology showed granulomatous inflammation. Plain radiograph showed bone destruction with periosteal reaction and MRI showed heterogenic hyperintense lesion with penumbra sign on the distal femur. Intravenous Ampicillin Sulbactam 225 mg/6h and Amikacin 50 mg/24h were given for 7 days were given, continued with oral of Co-Amoxiclav 3 x 2.5 mg / day for another week. The patient showed marked clinical and laboratory improvement after therapy; Case 2: A three-month old male infant with similar sign and symptoms was admitted, but it was on the right limb. Laboratory showed leucocytosis, increased ESR, and increased C-reactive protein (CRP). Plain radiograph and MRI examinations showed similar results with the first case. Intravenous Ceftriaxone 350 mg/12h for 7 days, continued with Cefadroxil 2 x 150 mg / day for another week was given. The similar clinical and laboratory outcomes with the first were achieved.

Discussion: Whether or not surgical intervention is required, the successful treatment of all forms of osteomyelitis requires appropriate antibiotic therapy. Studies have shown that appropriate antibiotic therapy alone without surgical intervention may suffice for 90% of cases of HO. In some cases of complicated HO, surgical incision and drainage (including multiple procedures) may be indicated.

Conclusion: HO in infant patients may be adequately treated by antibiotic alone with satisfactory result. Drug of choice, course of administration, and duration of treatment are important factors. Nevertheless, surgery should also be considered in a failed conservative treatment.

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INTRODUCTION

Osteomyelitis is a bacterial infection of the bone associated with inflammation and bone destruction (1). It involves the bone, bone marrow, periosteum, and surrounding soft tissue, resulting in sequestrum and destruction of the bone (2). The most common mechanism of infection in children is hematogenous inoculation of the bone during an episode of bacteremia, thus called hematogenous. Osteomyelitis can also be classified as acute (duration of symptoms <2 weeks), subacute (duration of symptoms 2 weeks to 3 months),

and chronic (long-standing infection that evolves over months to years) (1).

Hematogenous osteomyelitis (HO) is an infection that usually affects the growing skeleton, involving primarily the most vascularized regions of the bone. It has an incidence of 8–10 per 100,000 in developed countries and an even higher incidence, up to 80 per 100,000, in developing countries (3). Epidemiological studies suggested that HO was not only resulting in health problem, but also exposed socioeconomic consequences (4).

While the precise pathogenesis of HO in children is not completely clear, it is generally believed to be a consequence of the unique anatomy of growing bones combined with transient bacteremia. Blood vessels in the growing metaphyses of children form tight hairpin loops which create an area of relative vascular stasis/sluggish flow. These areas of the metaphysis may be susceptible to microhematomas or microthrombi with relatively minor blunt trauma which can, in turn, serve as a nidus for infection (5).

The management of HO in children is multidisciplinary, involving pediatricians, pediatric infectious disease specialists, orthopedic surgeons, and radiologists. Studies have shown that appropriate antibiotic therapy alone without surgical intervention may suffice for 90% of cases. In some cases of complicated HO, surgical incision and drainage (including multiple procedures) may be indicated (1).

This is a report presenting 2 cases of distal femur HO in infants treated non – operatively with intravenous antibiotic.

Case Presentation

Case – 1

A one-month old male infant was admitted to our centre with the chief complaint of swollen left knee which had been going for a month. It was accompanied with redness on the and pain. Sinus was found on the medial side with secretion of pus. There was no history of fever or any other systemic manifestation. History of previous infectious diseases was also denied by the parents. Cytology examination had been taken in the previous hospital and showed benign smear with granulomatous inflammation. Laboratory results showed leucocytosis (26,630/µl) and increased ESR (79 mm/h). Plain radiograph showed bone destruction and periosteal reaction of the left distal femur. MRI examination showed heterogenic hyperintense lesion around distal end of the femur with penumbra sign. Initial clinical picture, plain radiograph, and MRI results are shown in Figure 1 – 3 below.

Figure 1. Case 1 – Initial Clinical Appearance

Figure 2. Case 1 – Plain Radiograph

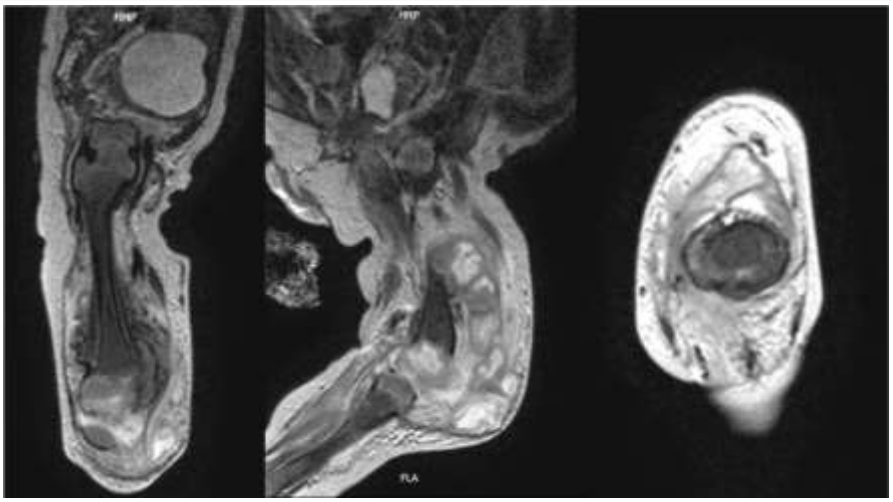

Figure 3. Case 1 – MRI

The patient was hospitalized and received intravenous antibiotic therapy. Ampicillin Sulbactam 225 mg/6h and Amikacin 50 mg/24h were given for 7 days. Wound care was performed on the sinus site. Bacterial culture was also taken but showed negative result. Post antibiotic treatment laboratory examination was taken and showed marked improvement of leucocyte count (12,170/µl) and slight decrease of ESR (79 mm/h). The patient was discharged after one week of hospitalization and continued with oral antibiotic therapy of Co-Amoxiclav 3 x 2.5 mg / day for another week. Clinical improvement 2 weeks after initial admission was observed in the outpatient clinic. Resolved swelling and sinus closure were achieved (Figure 4).

Figure 4. Case 1 – Post Treatment Clinical Appearance

Case – 2

A three-month old male infant was admitted with the chief complaint of swollen and pain on the right knee which had been going for a month. He also had redness and sinus on the medial side. There was no history of fever or any other systemic manifestation. History of previous infectious diseases was also denied by the parents. Laboratory results showed leucocytosis (12,180/µl), increased ESR (74 mm/h), but normal C-reactive protein (CRP) (3.07 mg/l). Plain radiograph showed bone destruction of the right distal femur. MRI examination showed heterogenic hyperintense lesion around distal end of the femur. Initial clinical picture, plain radiograph, and MRI results are shown in Figure 5 – 7 below.

Figure 5. Case 2 – Initial Clinical Appearance

Figure 6. Case 2 – Plain Radiograph

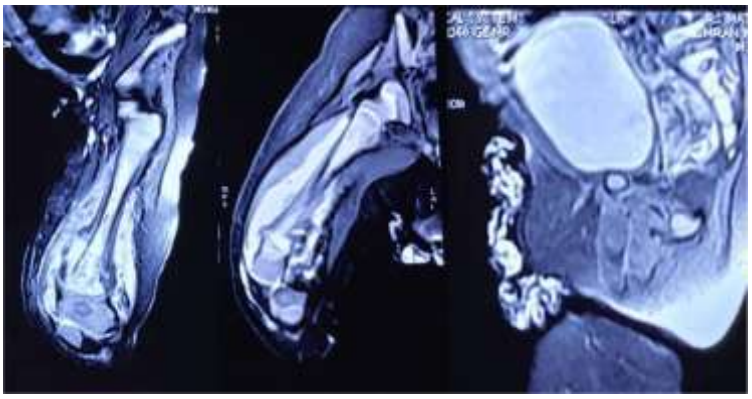

Figure 7. Case 2 – MRI

The patient was given intravenous antibiotic therapy of Ceftriaxone 350 mg/12h for 7 days. Wound care on the sinus site was also performed. Bacterial culture showed negative result. Post antibiotic treatment laboratory examination showed decrease of leucocyte count (11,650/µl) and ESR (45 mm/h). The patient was discharged and continued with oral antibiotic therapy of Cefadroxil 2 x 150 mg/day for another week. Satisfactory clinical improvement one week after discharge was achieved.

Figure 8. Case 2 – Post Treatment Clinical Appearance

DISCUSSION

This report presents 2 cases of HO in infants with treated with antibiotic alone. The patients were admitted to our centre with similar complaints of swollen knee with redness and sinus tract on the medial side which had been going for a month.

The clinical manifestation of osteomyelitis can vary. The signs and symptoms of infection are not always present, and diagnostic blood tests and imaging studies may be non- specific. Over the last century, changes in the epidemiology of osteomyelitis have led to changes in its clinical presentation and further diagnostic difficulty. For older children, the most common presentation is musculoskeletal pain and limp (6).

Clinical presentation of HO is highly variable and depends on multiple factors, including age, causative organism, anatomical site, and presence of an underlying disease. Symptoms' onset is often insidious, especially in newborns and younger patients. Moreover, while the lower extremities are more frequently affected compared to the upper ones, the involvement of a single bone segment is much more frequent than multifocal infections (7).

Laboratory results showed marked increase inflammatory on inflammatory markers, but bacterial culture were all negative. Studies showed that 24% – 68% of children HO had negative bacterial culture, whether the specimen was taken from blood or direct biopsy. Negative blood cultures are common, but combined with imaging they may present the extent of diagnostic evaluation because the practice of routinely obtaining a bacterial sample from the focus is controversial.8 Nevertheless, blood cultures should always be obtained when osteomyelitis is suspected, though they are often negative (9).

Imaging studies both plain radiograph and MRI in these patients showed similar results of bone destruction with periosteal reaction and heterogenic hyperintense lesion with penumbra sign. Both metaphysis and epiphysis were involved in all patients.

Paediatric radiology plays a pivotal role in the diagnosis of childhood osteomyelitis. In children, compared to adults, the periosteum is loosely attached to the bone, and in case of infection it can easily be lifted, thereby creating a space for pus collection. In subacute HO, it shows more classical signs on conventional imaging, including single or laminated periostal reactions, and well-circumscribed metaphysical lucency in the long bones, also known as Brodie's abscess. After 7 to 21 days, lytic lesions can be seen in affected bones. Eventually, this can lead to marked destruction of the bone with extension into the cortex ("endostal scalloping"). Bone destruction can appear as lucency but also in a permeative pattern (10).

HO is often difficult to distinguish from a bone tumor because clinical findings are noncontributory and radiological features can mimic a bone tumor. Recently, the penumbra sign, a higher signal intensity feature of the thin layer of granulation tissue which lines the abscess cavity on T1-weighted MRI, has been reported to be helpful for discriminating subacute osteomyelitis. Shimose et al. concluded the penumbra sign and a high CRP level support the diagnosis of osteomyelitis and may help to exclude the presence of a tumor (11).

Whether or not surgical intervention is required, the successful treatment of all forms of osteomyelitis requires appropriate antibiotic therapy. Intravenous antibiotics are typically initiated empirically in patients with known or suspected HO (12). Studies have shown that appropriate antibiotic therapy alone without surgical intervention may suffice for 90% of cases of HO. In some cases of complicated HO, surgical incision and drainage (including multiple procedures) may be indicated (1).

Matsumoto et al., in their publication, reported a successful treatment of a rare infant rib osteomyelitis by antibiotic alone. The treatment showed satisfactory result despite the formation of chest wall abscess before treatment (13).

In geographic regions with prevalence of methicillin-sensitive Staphylococcus aureus (MSSA) >90%, the initial empiric antimicrobial therapy for HO beyond the neonatal period should include beta (β)-lactams, including an antistaphylococcal penicillin (eg, oxacillin or nafcillin) or first-generation cephalosporin. Clindamycin is the preferred option if the patient is not critically ill in communities where the prevalence of methicillin-resistant Staphylococcus aureus (MRSA) is >10%-15% and clindamycin resistance in MRSA isolates is <10%. Vancomycin is recommended for empiric therapy if the prevalence of clindamycin-resistant S aureus is >10%-15% or if the patient has severe illness (1).

CONCLUSION

HO in infant patients may be adequately treated by antibiotic alone with satisfactory result. Drug of choice, course of administration, and duration of treatment are important factors. Nevertheless, surgery should also be considered in a failed conservative treatment.

REFERENCES

1. Thakolkaran N, Shetty AK. Acute Hematogenous Osteomyelitis in Children. Ochsner Journal 2019; 19: 116–122.
2. Irianto KA, Gema A, Sukmajaya WP. Acute hematogenous osteomyelitis in children: a case series. Paediatr Indones 2019; 59: 222–8.
3. Jaramillo D, Dormans JP, Delgado J, et al. Hematogenous Osteomyelitis in Infants and Children: Imaging of a Changing Disease. Radiology 2017; 283: 629–643.
4. Lu S, Wang L, Luo W, et al. Analysis of the epidemiological status, microbiology, treatment methods and financial burden of hematogenous osteomyelitis based on 259 patients in Northwest China. Front Endocrinol (Lausanne); 13. Epub ahead of print 4 January 2023. DOI: 10.3389/fendo.2022.1097147.
5. McNeil JC. Acute Hematogenous Osteomyelitis in Children: Clinical Presentation and Management . Infect Drug Resist 2020; Volume 13: 4459–4473.
6. Baker ADL, Macnicol MF. Haematogenous osteomyelitis in children: epidemiology, classification, aetiology and treatment. Paediatr Child Health 2008; 18: 75–84.
7. Krzysztofiak A, Chiappini E, Venturini E, et al. Italian consensus on the therapeutic management of uncomplicated acute hematogenous osteomyelitis in children. Ital J Pediatr 2021; 47: 179.
8. Paakkonen M, Kallio MJT, Kallio PE, et al. Significance of Negative Cultures in the Treatment of Acute Hematogenous Bone and Joint Infections in Children. J Pediatric Infect Dis Soc 2013; 2: 119–125.
9. Fritz JM, McDonald JR. Osteomyelitis: Approach to Diagnosis and Treatment. Phys Sportsmed 2008; 36: 50–54.
10. van Schuppen J, van Doorn MMAC, van Rijn RR. Childhood osteomyelitis: imaging characteristics. Insights Imaging 2012; 3: 519–533.
11. Shimose S, Sugita T, Kubo T, et al. Differential diagnosis between osteomyelitis and bone tumors. Acta radiol 2008; 49: 928–933.
12. Harik NS, Smeltzer MS. Management of acute hematogenous osteomyelitis in children. Expert Rev Anti Infect Ther 2010; 8: 175–181.
13. Matsumoto Y, Shimozawa K, Yamanaka J, et al. Successful Treatment with Antibiotics Alone for Infant Rib Osteomyelitis. Case Rep Pediatr 2022; 2022: 1–5.