

# Acute hematogenous osteomyelitis in young children – clinical and radiological features

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## Abstract

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Acute haematogenous osteomyelitis is a bacterial infectious disease which mainly affects the paediatric age group. The incidence seems to decline through the last decade.

The authors analyzed the clinical, bacteriological and radiological features of acute hematogenous osteomyelitis in 49 young children. Their age ranged from 12 days to 2.9 years (19 newborns and 30 babies). The most affected locus was the femur (46.9 %), followed by the humerus (40.9 %) and tibia (6.2 %). The adjacent joint was involved in 38.8 %. Up to the third day after onset of symptoms were admitted 32 children (65.3 %). A bacteriological diagnosis has been achieved in only 19 cases (38.8 %) which underwent different surgical procedures. *Staphylococcus aureus* (9 children; 64.3 %) was the most common causative species.

Radiological characteristic showed mainly widening of joints, destruction of cartilage, bone destruction and osteoporosis. The median duration of antibiotic therapy was 31 days. Nine children underwent needle aspiration while another 10 required local incision or open surgery with debridement or sequestrectomy. Definitive clinical restoration was observed in 42 cases (85.7 %).

## AUTORS TRANSLATION

### Introduction

Acute haematogenous osteomyelitis is a bacterial infection of the bones, especially affecting early childhood<sup>2,6</sup>. In the recent years a decrease of the incidence of the disease is observed<sup>1,4,5</sup>. A leading factor in the timely diagnosis are the primary clinical symptoms and local signs, which are often underestimated<sup>1,9</sup>. Radiological picture of joint and bone damage is typical, but its manifestation are observed in the advanced stage of the disease, so the delayed diagnosis can cause long-term disability and chronic lesions<sup>2,7,10</sup>.

In this retrospective study we focus our attention on the characteristic radiographic changes in the haematogenous osteomyelitis in infancy established at various stages of the disease.

### Results

At the 3-rd day of the onset of complaints were admitted 32 children (65.3%). The remaining 17 children were hospitalized from the 4-th to 9-th day with advanced surgical complications due the infectious process. With clinical evidence of sepsis were received 9 children (18.4%). In 41 (83,7%) of the patients there was a single location, that is as follow:

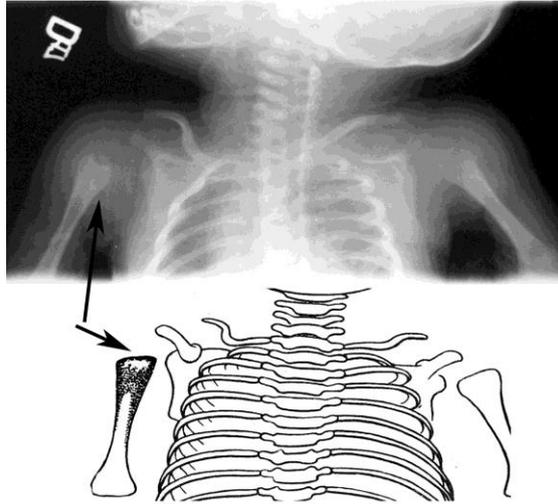
**femur - 46.9 %**

**humerus - 40,9 %**

**tibia - 6.2 %**

**radius, clavícula, phalanges – 6 %**

Involvement of the adjacent joint was present in 19 children (38.8%), of which the hip - 9 children, the shoulder joint - 5 and knee - 5 children.



Non-operative treatment included antibiotics, infusion and substitution therapy and immobilization performed in 61.2% of cases.

Bacterial probe is verified only in patients which necessitated surgery. Positive bacterial growth occurred in 14 children, while the remaining 5 children culture was negative. The most common cause is *Staphylococcus aureus* - 9 children, followed by *Streptococcus pyogenes* - 2, *Proteus* - 1 and *Pyocianeus* - 1 child.

In the course of the disease in 21 children (42.9%) were observed the following complications: sepsis (12 children), metastatic pneumonia (6 children), multiple abscesses (2 children) and retroperitoneal phlegmona (1 child). Antibiotic treatment included *Lincosamides* (Lincomycin), combined with an *Aminoglycosides* or/and *Cephalosporines*.

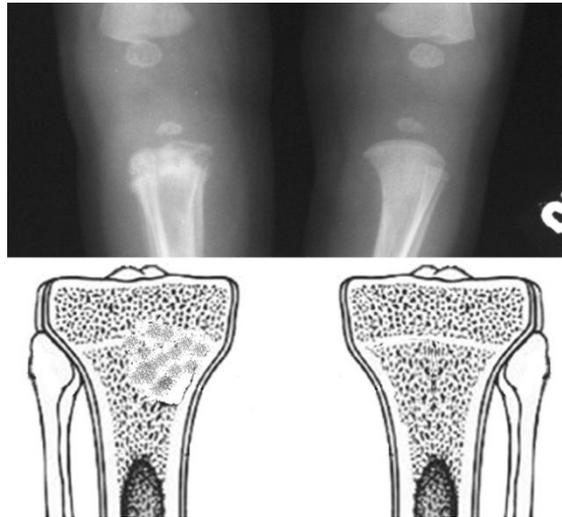
The indications for surgery included advanced purulent osteoarthritis, parosseous abscess, bone marrow phlegmona. The following procedures are performed - joint paracentesis (9 children), arthrotomy (2 children), soft tissue incisions (5 children), sequestrectomy (3 children). In 16 children (82.4%) surgery was performed on the third day of the disease.

Definitive cure was achieved in 42 (85.7%) children. We record chronification in only 1 (2%) child and long-term disability in 3 (6.1%) children. Another 3 children (6.1%) died from sepsis.

## Discussion

Etiopathogenesis, clinical course, radiological and morphological characteristics, as well as complications and prognosis of osteomyelitis in the newborn infant vary significantly in comparison with those in late childhood<sup>1,4,5,9</sup>. Specificity of haematogenous osteomyelitis in earliest childhood is basically determined by the specific vascularization<sup>2,6</sup>. The blood supply to the epiphysis is carried out by the metaphysis while later the vascularization of the epiphysis and metaphysis is separated. The cortical bone is thin and weak, the vessels are wide, which determines the ability to drain spontaneously the bone marrow canal from the inflammatory exudate.

Early in the acute stage a spontaneous decompression of the medullary canal occur that leads to development of subperiosteal abscess. As a rule, it do not form a bone marrow phlegmone, because the pathological process remains localized at the level of metaepiphysis. The characteristic location and mechanism of early "natural drainage" are the reason not to be formed sequestrers, which avoid a chronification of the disease. Epiphyseal localization of bone destruction leads to early involvement of the adjacent joint - in 38.8 % according our material.

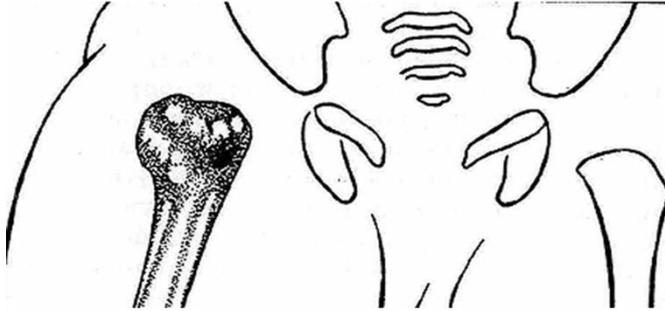


The consequences of the osteomyelitis in early age might be as follows: epiphysiolysis, partial melting of the epiphysis with growth disorders, bone deformity and disability, as found in 6.1% of our patients. Typically for the disease is the good regenerative response with intensive periosteous bone formation (involucrum) with further ossifying of the young osteoid tissue.

The specific factor that featured the development of osteomyelitis at early age, determine the specific diagnosis and treatment<sup>3,8</sup>. It can be prospectively only in early diagnosis, i.e. - *restitutio ad integrum*<sup>2</sup>. **The early diagnosis is only the alleged one; the confirmed diagnosis is already a belated diagnosis.**

Clinical symptoms motivating suspected diagnosis are: fever, pain, and guarding the limb position; leukocytosis and often manifestation of sepsis was observed in 18.4% of our patients. The advanced local finding as swelling and redness as well the early even discrete X-ray features presents late symptoms.

Radiographic signs of osteomyelitis in infants occur relatively sooner than in other age groups. Typical are manifestation of soft tissue swelling, paraosseous overshadow and periosteous reaction, which are established discretely at the end of the first or beginning of the second week. Epiphyseal osteolytic foci and destructive processes are observed at the end of the second and the beginning of the third week. Progressively at the end of the first month a severe destructions are established, that present a critical point when located in joint areas, especially hip. When early diagnosed and by timely initiated adequate complex treatment, the clinical outcome is very good – so 85.7% of our cases.



## Conclusion

Acute hematogenous osteomyelitis in newborns and young children has a different specificity as compared to older children. We could talk for an early diagnosis only within the first two – three days of the very onset of the disease. It is determined by fever, pain, limb sparing position, leukocytosis, CRP. The characteristic X-ray changes occur late in the disease; therefore timely diagnosis and adequate treatment should not be dependent on radiographic findings, even if it is negative. On the other hand, it confirms the diagnosis and defines the indication for different kind of surgical treatment. Systematic follow up of radiological dynamics of the inflammation poses the criteria for its evolution and the outcome of conservative and surgical treatment.

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