



# Neonatal Septic Arthritis - A Case Report

## Neonatal Septik Artrit - Bir Olgu Sunumu

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### Abstract

Neonatal septic arthritis is a rare condition, and yet it is an orthopaedic emergency due to the potential of devastating consequences. Signs and symptoms, laboratory test, and imaging studies might not always be typical. A prompt diagnosis and treatment should be made. We presented a 24-day-old premature neonatal patient was brought to the hospital with complaint of redness and swelling of his left shoulder.

**Keywords:** Septic arthritis, neonatal, shoulder

### Öz

Neonatal septik artrit nadir görülen bir durumdur, ancak yıkıcı sonuçları olma potansiyeli nedeniyle ortopedik bir acildir. Belirti ve semptomlar, laboratuvar testleri ve görüntüleme çalışmaları her zaman tipik olmayabilir. Derhal teşhis ve tedavi yapılmalıdır. Bu çalışmada sol omzunda kızarıklık ve şişlik şikayeti ile hastaneye getirilen 24 günlük prematüre yenidoğan hasta sunulmaktadır.

**Anahtar Kelimeler:** Septik artrit, neonatal, omuz

### Introduction

Septic arthritis is a condition in which bacterial infection invades the synovial joint. Septic arthritis in neonate is a rare condition, however, is an orthopaedic emergency.<sup>1,2</sup> It is more prevalent in the knee or hip and less in the shoulder.<sup>3</sup> Failure of early diagnosis and management in septic arthritis could lead to osteomyelitis and septic shock.<sup>4</sup> Unfortunately, initial clinical symptoms and signs may not be specific. Prompt diagnosis and treatment are important in enhancing patient outcomes.<sup>1</sup>

### Case Report

A 24-day-old, 1.700 grams, male neonate was admitted. His parents complained of redness and swelling of his left shoulder for two days prior to admission. The complaint was accompanied by fever and he was given paracetamol by his parents. There was no history of trauma. He was born via caesarean section at 31<sup>st</sup>-32<sup>nd</sup> week of pregnancy due to severe pre-eclampsia suffered by his mother. History of unspontaneous breathing after birth was reported. Weight

of birth was 1.455 grams. He was admitted in the neonatal intensive care unit (NICU) at other hospital for unknown reasons for 13 days, by which the patient's parents then declined proposed treatment and the patient was self-discharged. He has an older twin brother who presented healthy.

On physical examination, the patient appeared weak, pulse 147 beats/minute, febrile with a temperature of 38.1 °C. There was swelling, redness, heat on the left shoulder. No deformity or wound was seen. Limitation of motion was also shown. On palpation and on the attempt to make a passive movement of his left shoulder, the patient cried.

Laboratory examination results were obtained as followed: White blood cells (WBC) 25,810/mm<sup>3</sup> (reference: 5.0-18.0/mm<sup>3</sup>), erythrocyte sedimentation rate (ESR) 19.00 mm/hour (reference: 0.0-15.0 mm/h), high sensitivity C-reactive-protein (hs-CRP) 197.46 mg/L (reference: 0.1-4.1 mg/L), procalcitonin 0.41 ng/mL (reference: 0.0-0.05 ng/mL). Left shoulder X-ray showed soft tissue swelling and no sign of fracture or dislocation. Ultrasonography of left shoulder detected the presence of joint effusion.

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The patient was referred to the consultant orthopedic surgeon, who decided to proceed with conservative treatment. While waiting for the blood culture, the patient was treated with parenteral ampicillin-sulbactam combination at a dose of 100 mg every 8 hours, and parenteral cefotaxime at a dose of 60 mg every 12 hours. Care was given under close observation.

On the fourth day, the blood culture result was done, identifying a methicillin-sensitive *Staphylococcus aureus*. The isolate was sensitive to meropenem, clindamycin, amoxicillin-clavulanic acid, and was resistant to benzylpenicillin. The antibiotics were then switched to parenteral meropenem with a dose of 24 mg every 8 hours. After seven days of meropenem, blood work was taken for evaluation, and showed improvement: WBC  $12.31 \times 10^3/\mu\text{L}$ ; ESR 13.00 mm/hour; hs-CRP 11.98 mg/L.

Clinical signs and symptoms were remarkably improved after 21 days of treatment. The child was able to move his shoulder. Blood work was obtained, showing WBC  $7.43 \times 10^3/\mu\text{L}$ ; ESR 25.00 mm/hour; hs-CRP 3.16 mg/L; and negative culture. The ultrasound showed normal findings. Antibiotics were switched to oral clindamycin at a dose of 10 mg/kg every 8 hours, and the patient was discharged. At the end of the treatment, the patient showed complete recovery and was able to make active and passive shoulder movement.

## Discussion

In children, acute septic arthritis is often a hematogenous spread infection. Slow blood flow in children's metaphyseal capillaries facilitates the condition, making bones more vulnerable to infection of hematogenous seeding from any trauma or infection.<sup>5</sup> In this case, the child might have a high risk of infection, regarding his vague history of NICU hospitalization for 13 days.

The annual incidence of septic arthritis in developed countries is around 4-5 cases in every 100,000 children. Septic arthritis is more frequent in boys than girls with a ratio of 2:1. The most frequent location are large joints such as hip, knee, and ankle joints,<sup>5</sup> while shoulder constituted only 3-5% of all septic joint incidence.<sup>3</sup> The most common cause of septic arthritis are *Staphylococcus aureus*, group B *streptococcus* and Gram-positive enterococcus, respectively.<sup>2</sup> Though joint aspiration was not done in this case, the blood culture showed a *Staphylococcus aureus*-positive result.

Clinical manifestations in children with septic arthritis may not be specific. The clinical signs of generalized infection are commonly found. Meanwhile, the most consistent sign indicating septic arthritis is pseudo-paralysis, in which the patient tries to maintain the absence of active movement of the infected joint. The posture is generally kept to hold the joint in the position that maximizes intracapsular volume. This

sign is also accompanied by painful sensation on attempted passive motion. There are other suggestive symptoms like fever, malaise, and prominent localizing signs such as erythema, local heat, and significant pain at the affected joint. However, these clinical features are less noticeable if deep joints, like hip, are involved.<sup>6</sup>

Physical examination can be difficult because neonate may present with untypical findings. The child may show irritability, anorexia, lethargy, and unwillingness to move the affected limb. Clinically, limitation of movement and local swelling are shown to be the most important findings in neonatal SA.<sup>2</sup> Our patient had a limited movement of the affected shoulder, giving the impression of pseudo-paralysis. Positive passive movement was also found in this case.

Septicemia does not always result in fever or a toxic appearance, thus patients are often afebrile. Serologic tests consist of WBC count with differential, CRP, ESR, and blood cultures should be taken.<sup>7</sup> Those tests are useful in the evaluation of acute joint, nevertheless are not diagnostic.<sup>3</sup> Synovial culture is the only investigation with predictive laboratory value. However, synovial fluid culture can be found negative in 30-70% SA patients.<sup>5</sup> This is the basis of why our orthopedic surgeon decided not to do a joint aspiration. Besides, synovial white cell count is suggested not to be better than the gold standard, which is clinical diagnosis made by a physician who is an expert in musculoskeletal diseases.<sup>3</sup>

Imaging studies may not always be reliable in distinguishing septic arthritis from other inflammatory joint diseases. Despite that, X-ray should always be performed as baseline test to exclude other underlying diseases. Computed tomography-scan is not recommended for septic arthritis in children, because it is less sensitive than MRI and has a higher radiation. Magnetic resonance imaging (MRI) is not generally indicated for septic arthritis but could add any informative value and should be done if osteomyelitis-septic arthritis or other complication is suspected. Ultrasonography may be the most informative imaging study due to the high sensitivity of joint swelling. Yet it should be noted that sonography has a lower specificity. If fluid is detected in the joint, a diagnostic aspiration under ultrasound guidance can be considered.<sup>5,7</sup>

Other diseases such as transient synovitis and osteomyelitis are also mimic septic arthritis in presentation. Due to a more serious nature, children presenting with joint irritability should be considered to have septic arthritis, until proven otherwise. Manifestation in osteomyelitis is also similar to septic arthritis, in which pain, limping and fever may be found. Bone scan can be used to confirm osteomyelitis.<sup>1</sup> Treatment has to be executed immediately because delay to treatment may lead to avascular necrosis, osteomyelitis, chondrolysis, recurrent SA, and/or systemic sepsis.<sup>4</sup>

Various opinions have been asserted regarding the right management of septic arthritis. The guideline from European Society for Pediatric Infectious Diseases (ESPID) mentioned that joint drainage and irrigation are recommended if the diagnosis of septic arthritis is suspected.<sup>7</sup> Similarly, Wall and Donnan<sup>1</sup> concluded that surgical drainage and lavage of the joint followed by antibiotics are the definitive treatment of septic arthritis.

Nonetheless, other authors have a different point of view. Surgery was reported to have a minor role in uncomplicated cases, even in hip or shoulder arthritis.<sup>8</sup> Castellazi et al.<sup>9</sup> also reckoned that surgery is not necessary for acute uncomplicated osteoarticular infections and is considered if patients do not respond to antibiotic treatment.

Management needs to be started immediately after synovial fluid and blood samples have been taken for analysis. Empiric treatment should primarily cover *S. aureus* and should always take the microbial resistance tendency into judgement. First-generation cephalosporin and clindamycin are the choice of treatment.<sup>5</sup> Once the microorganism has been isolated and sensitivity as well as resistance of microorganism has been confirmed, therapy should always be adjusted according to the result. The length of antibiotic therapy, including intravenous and per oral routes, should be on average of 2-3 weeks. Longer therapy may be needed in some situations: resistant or unusual pathogens (e.g. MRSA, PVL+, and *Salmonella*); newborns and young infants (<3 months); slow/poor response or complications; complex infection involvement of pelvis or spinal column; sepsis or in immunocompromised children.<sup>7</sup>

Intravenous antibiotics should be continued until clinical is improving and the inflammatory markers are normalizing.<sup>1</sup> To monitor patient's recovery, measurement of sequential CRP can be useful, while ESR is not recommended because it reacts too slowly towards the changes of clinical course.<sup>5</sup> The following conditions should be achieved before switching to oral antibiotic: afebrile for 24-48 hours; symptoms improvement (decreased inflammation and pain); decrease of CRP about 30-50% from maximum value; no signs of complications, such as metastatic foci or DVT; absence of virulent pathogens; negative blood cultures if initially positive. Before stopping the therapy, symptoms should have disappeared, and the CRP should reach normal value (<2 mg/dL).<sup>7</sup>

In this case report, the patient was given parenteral ampicillin-sulbactam combination and parenteral cefotaxime as empirical therapy, since *S. aureus* is the most common cause of childhood septic arthritis in all age group. Furthermore, ESPID clinical guideline also suggested the combination of cefazolin and gentamicin or combination of anti-staphylococcal penicillin and cefotaxime as an empirical therapy for up to 3-month-old patients.<sup>7</sup> After blood culture was obtained, patient was

given intravenous meropenem. Aside from the sensitivity of the culture, meropenem was chosen taking into account that its activity against numerous community-acquired and nosocomial pediatric pathogens.<sup>10</sup> The orthopaedist also decided not to do any invasive intervention, regarding the patient's condition.

However, if the drainage of the pus is considered, several approaches are offered, such as joint puncture, arthroscopy, and open arthrotomy.<sup>5</sup> The exact mode of surgery has been the topic of controversy. In the pediatric population, the surgical approach often subjects to the location of affected joint. Arthroscopic approach is generally done in knee and shoulder joints, and arthrotomy is commonly performed for hip and ankle joints. Arthroscopic instruments might be too large for very young children, hence arthrotomy is often preferred.<sup>1</sup> It should be noted that the prognosis of septic arthritis in children depends on the site, age, time to treatment, and the causative pathogen.<sup>11</sup>

Septic arthritis in children can cause horrible consequences however the initial clinical signs and symptoms could be tricky. This is a case with untypical location of septic arthritis. Fortunately, diagnosis was suspected promptly, and treatment was given immediately. At final follow up, the patient showed complete resolution. Therefore, we emphasized on the importance of prompt diagnosis and management in neonatal septic arthritis in order to preserve joint anatomy and function as well as preventing further sequelae or complication.

## Ethics

**Informed Consent:** Informed consent was obtained.

**Peer-review:** Externally peer-reviewed.

## Authorship Contributions

Concept: K.C., H.C., Design: K.C., H.C., Writing: K.C., H.C.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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