

A 12 Day- Old Female Infant Diagnosed with Pelvic Osteomyelitis in the Pediatric Emergency Department

Mehmet Ali Oktay^{1*}; Okşan Derinöz Güteryüz²; İbrahim Murat Hirfanoğlu³; Özlem Çolak⁴; Songül Tomar Güneysu⁵

¹Gazi University, Faculty of Medicine, Ankara, Turkey

²Okşan Derinöz Güteryüz; Pediatric Emergency Department, Department of Child Health and Diseases, Gazi University Faculty of Medicine, Ankara, Turkey.

³İbrahim Murat Hirfanoğlu; Neonatology Department, Department of Child Health and Diseases, Gazi University Faculty of Medicine, Ankara, Turkey.

⁴Özlem Çolak; Pediatric Emergency Department, Ankara, Turkey.

⁵Songül Tomar Güneysu; Pediatric Emergency Department, Ankara, Turkey.

Received Date : Jan 16, 2022
Accepted Date : Feb 12, 2022
Published Date : Mar 04, 2022
Archived : www.jcmimagescasereports.org
Copyright : © Mehmet Ali Oktay 2022

***Corresponding Author:** Mehmet Ali Oktay, Department of Pediatrics, Gazi University, Faculty of Medicine, Ankara, Turkey.
Email: malii-71@hotmail.com

Abstract

Osteomyelitis (OM) is a bacterial disease that is very rare in newborns and has devastating consequences. Neonatal OM is seen in 1-3 in 1000 babies. We presented a 12-day-old female baby who was brought to the Pediatric Emergency Department (PED). Because she could not move her leg. She did not have fever and septic appearance and had a history of hospitalization in Neonatal Intensive Care Unit; acute phase reactants were high and radiological imaging performed gradually was consistent with OM. Our patient is the youngest patient who was diagnosed with pelvic OM upon admission to the PED. Early diagnosis and treatment prevent complications and sequels.

Keywords: Osteomyelitis; newborn; pediatric emergency.

Introduction

Osteomyelitis often occurs secondary to the hematogenous spread of microorganisms into the blood-rich metaphysis of the developing bone. When left untreated, it leads to complications such as joint destruction and decreased range of motion [1]. Osteomyelitis (OM) of the hip is rare in newborns. Signs and symptoms are quite different compared to older children. This may cause difficulties/delays in diagnosis and permanent disability [2]. Successful management of OM in the neonatal period has been associated with rapid correct diagnosis and adequate correct treatment [2, 3]. The incidence of OM in the pediatric age group is 1/5000 cases. About 50% of pediatric OM cases are under the age of five. The incidence of neonatal OM is 1-3/1000 cases [3]. Although there are studies on patients diagnosed with osteomyelitis while staying in neonatal intensive care unit (NICU) [1, 4, 5], cases diagnosed upon PED (Pediatric Emergency Department) admission are very rare [6]. This article presents the youngest case in literature who went to the PED and was diagnosed with pelvic and

acetabular OM.

Case Report

A 12-day-old girl, born from the first pregnancy of a 28-year-old mother, was admitted to the PED with complaints of restlessness and inability to move her right leg. The day before the application, it was stated by her mother that she did not move her leg, that she was agitated when forced to move, and could not be consoled. The baby did not have a history of fever or trauma, her feeding was good, and her urine and defecation were normal. From her history, it was learned that she was born at 36 weeks and 3 days of gestation and had intrauterine growth retardation compatible with 31 weeks gestational age, and she was born by emergency cesarean section due to pre-eclampsia. The patient, who was hospitalized in the NICU due to temporary tachypnea of the newborn after birth, was discharged on the sixth postnatal day. During the follow-up in the NICU, umbilical catheterization was not applied to the patient. She had not received antibiotic treatment and no growth was

Citation: Mehmet Ali Oktay, Okşan Derinöz Güleriyüz, İbrahim Murat Hirfanoğlu, Özlem Çolak, Songül Tomar Güneysu. A 12 Day- Old Female Infant Diagnosed with Pelvic Osteomyelitis in the Pediatric Emergency Department. J Clin Med Img Case Rep. 2022; 2(2): 1094.

detected in blood cultures taken before discharge.

At her evaluation in the Pediatric Emergency Department triage area, she was a restless baby with a good general appearance. Vital signs; body temperature was 37°C, heart rate was 140/min, respiratory rate was 42/min, pulse oximetry was 98%, and mean arterial pressure was 45 mmHg. There was no pathological finding in the physical examination, and it was observed that the patient's discomfort increased due to the position given to the hip and leg while changing the diaper. While abducting the right thigh from the hip in the supine position, there was limited range of motion compared to the left. No swelling or redness was detected on the joint surface.

Laboratory and radiological examinations were planned for the patient with a preliminary diagnosis of septic arthritis. In laboratory tests: hemoglobin (Hb) 14.6 g/dL, RBC (Erythrocyte) - $3.361 \times 10^6/\mu\text{L}$, hematocrit (Hct) 40.04%, white blood cell (WBC) $16.82 \times 10^3/\mu\text{L}$, neutrophil percentage 59.8%, C-reactive protein (CRP) 25.9 mg/L, erythrocyte sedimentation rate (ESR) 51 mm/hr, procalcitonin (PCT) 2.95 ng/mL, IL-6 145.6 pg/mL detected. On direct radiographs of the lower extremity and pelvis, the right femoro-acetabular distance was observed to be increased (Figure 1). Long bone radiographs were normal. In the superficial tissue ultrasound (US) performed for the right hip joint, bilateral hip joints were compared with each other, and no significant effusion was observed on the



Figure 1: There is an increase in the right acetofemoral distance compared to the left.

right side. The patient was consulted to the Orthopedics and Traumatology department with a preliminary diagnosis of septic arthritis. MRI was requested from the patient for the differential diagnosis of septic arthritis.

Bilateral hip MR imaging showed "The right femoral head is small and irregular in appearance, and an area of pathological signal change in the right femur proximal metaphysis, medullary bone marrow, and solid periosteal reaction in the lateral proximal section is observed. Widespread edema was observed in the surrounding muscle planes, fascial surface and subcutaneous adipose tissue adjacent to the hip joint. In addition, medullary bone marrow edema was observed in the right acetabulum (osteomyelitis). Areas of pathological signal changes consistent with diffuse edema are observed in the right obturator externus, pectineus, quadriceps muscles, gluteal muscle planes and iliacus muscle (myositis). Minimal free



Figure 2: Osteomyelitis in the proximal metaphysis of the femur.

fluid was observed in the right hip joint space. Findings were primarily evaluated as compatible with osteomyelitis and myositis." (Figure 2).

Due to the history of hospitalization in the intensive care unit, the patient was diagnosed with OM secondary to hematogenous spread and, according to the age, to include possible infectious agents, vancomycin (15mg/kg/dose x3), ceftazidime (30 mg/kg/dose x 3), fluconazole loading (12 mg/kg/dose) and maintenance (6 mg/kg/dose) treatment was started. Blood culture was taken before antibiotic treatment. Our patient, who received antibiotic doses only one day before the operation, was operated on the postnatal 13th day.

The patient was operated by the Orthopedics and Traumatology department and the intra-articular pus was drained. From the material; joint fluid culture, fungal culture, tuberculosis PCR, ARB staining, fungus search was sent. There was no growth in the blood culture, but because of the growth of ceftazidime-resistant *Klebsiella pneumoniae* in the joint fluid culture, ceftazidime was discontinued and meropenem (20 mg/kg/dose x3) treatment was started. Fluconazole was discontinued on the 8th day because there was no growth in the fungal culture. The patient was discharged with oral trimethoprim-sulfamethoxazole treatment after 25 days of vancomycin and 27 days of meropenem treatment. Trimethoprim-sulfamethoxazole was discontinued 22 days after discharge. The regression of the inflammation was seen in the MRI taken under the control of the outpatient clinic. verbal consent was obtained from the patient's parents for the publication of the article.

Discussion

This case demonstrates the importance of detailed investigation of newborn infants admitted to PED. Although OM in newborns is rare, there are difficulties in diagnosing and treating it. High suspicion is required for early diagnosis and observation of clinical signs is very important.

Risk factors for osteomyelitis in newborns are stated as immature host-defense mechanisms, invasive intervention such as umbilical catheterization. It has been shown that half of the cases diagnosed with neonatal OM have a history of umbilical catheterization. It has been observed that the pregnancy and delivery history of the mother is also important in the development of OM, and maternal complications such as maternal hypertension, preeclampsia, ablatio placentae, infection are present in approximately half of the infants who develop

OM [7]. Particular attention should be paid to the evaluation of newborn cases, especially in PEDs where is crowded and the number of patient admissions is high. Newborns are among the patients at risk for PED and require special care. Application complaints and prenatal, natal and postnatal history should be questioned in detail. It was observed that the mother of our case had preeclampsia during pregnancy, but umbilical catheterization was not applied to the baby.

In studies conducted in newborns with neonatal osteomyelitis, the most common sites of involvement were reported as femur, humerus, and tibia, respectively [1, 4, 8]. The pelvis is a rare site of hematogenous disseminated OM for neonates.

Pelvic OM constitutes 2.3% of all childhood osteomyelitis cases [3]. Our case also had pelvic (acetabular) OM, which is a rare site of OM involvement. Involvement was also demonstrated in the proximal region of the right femur.

Pelvic OM was defined in three cases at 5, 15, and 18 days in the neonatal period [3, 9, 10]. In the literature, it has been observed that mostly cases hospitalized in the NICU were diagnosed with osteomyelitis [1, 3, 4, 8-10]. As far as we can find in the literature, a 4-week-old case with a diagnosis of distal tibial OM and culture of GBS has been

reported, just like our case [6]. Our case is the youngest OM

Table 1: Comparison of cases with neonatal osteomyelitis in the literature.

Author	Zang et al.	Zang et al.	Berkowitz et al.	Sandal et al.	Bülbül et al.	Choma et al.	Our case
Week of birth/ calendar age	32 weeks 3 days/-	36 weeks 1 day/-	Term/4 weeks	35 weeks/5 days	35 weeks/18days	-/15 days	36 weeks 3 days/12 days
Maternal risk factor	Preeclampsia	Placenta previa	-	-	-	-	Preeclampsia
Catheter/picc	Picc+	-	-	-	-	-	-
Blood culture	Klebsiella	Klebsiella	-	-	-	-	-
Joint fluid culture	-	-	GBS	Methisiline sensitive s.aureus	-	GBS	Klebsiella
Involvement	Femur Humerus Radius	Femur Radius	Tibia	Iliac	Iliac	Iliac	Acetabular region, Femur
Finding	Fever, sepsis	Fever, sepsis, inability to move right arm	Inability to move lower extremities	Widespread swelling, stiffness, tenderness on movement	Swelling, crying while changing diapers	Inability to move lower extremities, crying with passive extension	Inability to move lower extremities

case diagnosed in the emergency department, except for the case in the literature. The clinical features, presentation symptoms, cultures and risk factors of cases diagnosed with neonatal osteomyelitis in the literature are shown in (Table 1).

Clinical symptoms are related to the bone or joint area involved in newborns. Swelling and local inflammation findings are common findings in the neonatal osteomyelitis group. Systemic findings such as fever are seen in fewer of these cases. A highly variable rate of fever was found in 9.1-76.5% of patients with extensive neonatal osteomyelitis. In addition, it has been shown that the WBC count, CRP and ESR levels are high in the cases [1, 4, 8, 11]. In our case, there was no fever, but there were complaints of inability to move her right leg and restlessness. Laboratory parameters were high and consistent with the literature. In cases with osteomyelitis, direct radiographs can guide the correct diagnosis, exclude other diagnostic possibilities, or provide clues for underlying pathological conditions [12]. Soft tissue swelling on plain radiographs can be seen within days of the onset of infection. It can also show periosteal reaction, lytic lesions, joint effusions and destructive bone changes 7-10 days after the onset of infection [13]. US findings begin with nonspecific swelling in the soft tissues adjacent to the bone. US can show thickening and elevation of periosteal and subperiosteal fluid collections as early as 3 days [14]. In a study comparing osteomyelitis groups, it was shown that the diagnostic value of US was statistically higher in the newborn group compared to the other groups, regarding the capacity of detecting subperiosteal abscesses [11]. In

our case, however, an increased femoro-acetabular distance was observed on direct X-ray, but no finding was found on US. This supports the view that the primary step in the pediatric emergency department in patients with suspected osteomyelitis should be started with direct X-ray as recommended in the literature.

MR imaging is the most useful imaging technique for evaluating suspected OM, allowing early detection of osteomyelitis and assessment of the extent of involvement and disease activity. MRI is very sensitive in detecting OM 3-5 days after the onset of infection [12]. As seen in our case, it still remains the gold standard. However, we recommend hospitalization in order not to miss the newborn cases because MRI is difficult in emergency conditions.

In infants, osteomyelitis and septic arthritis often coexist. While Staphylococcus aureus is the most common organism causing osteomyelitis at all ages, GBS and Escherichia Coli are important pathogens to be considered in newborns [6]. Culture is found to be negative in 22-50% of the cases [15]. Antibiotics to be used in neonatal OM should be effective against these pathogens [16]. In our case, treatment with antibiotics covering these pathogens was applied and Klebsiella pneumoniae growth was observed in the pus culture.

We think that even with rapid diagnosis and aggressive treatment, there are orthopedic sequelae and inadequate treatment increases the risk of chronic osteoma [16], therefore, in cases who apply to the pediatric emergency department with

these complaints, early diagnosis and treatment of neonatal OM should be planned in a timely manner to minimize long-term sequelae.

In conclusion, a detailed anamnesis should be taken and a careful physical examination should be performed in newborns who present to the PED with limited range of motion at joints. Neonatal OM cases mostly consist of cases diagnosed while staying in the NICU. Pelvic involvement is rare and our case is the youngest pelvic OM case diagnosed in the PED.

References

1. Roversi M, Chiappini E, Toniolo RM, Cirillo M, Natale F, Deriu D, et al. Neonatal osteomyelitis: an Italian multicentre report of 22 cases and comparison with the inherent literature. *Journal of Perinatology*. 2021;1-11.
2. Samora JB, Klingele K. Septic arthritis of the neonatal hip: acute management and late reconstruction. *JAAOS-Journal of the American Academy of Orthopaedic Surgeons*. 2013; 21(10):632-41.
3. Sandal G, Uras N, Akar M, Oguz SS, Erdevi O, Dilmen U. Iliac osteomyelitis in a newborn: a case report. *Journal of Pediatric Orthopaedics B*. 2012; 21(5):404-6.
4. Zhan C, Zhou B, Du J, Chen L. Clinical analysis of 17 cases of neonatal osteomyelitis: A retrospective study. *Medicine*. 2019; 98(2).
5. Knudsen C, Hoffman E. Neonatal osteomyelitis. *The Journal of bone and joint surgery British volume*. 1990; 72(5):846-51.
6. Berkowitz T, Young D. An infant not moving her leg. *The American journal of emergency medicine*. 2016; 34(4):756.e1-. e2.
7. Asmar BI. Osteomyelitis in the neonate. *Infectious disease clinics of North America*. 1992; 6(1):117-32.
8. Hu Y, Chen Q-X. Clinical analysis of 7 cases of neonatal hematogenous osteomyelitis. *Zhongguo Dang dai er ke za zhi= Chinese Journal of Contemporary Pediatrics*. 2013; 15(9):785-7.
9. Choma TJ, Davlin LB, Wagner JS. Iliac osteomyelitis in the newborn presenting as nonspecific musculoskeletal sepsis. *SLACK Incorporated Thorofare, NJ*. 1994; 632-4.
10. Bulbul A, Okan F, Yekeler E, Can E. Acute osteomyelitis of the iliac bone presenting with gluteal syndrome in a newborn. *European journal of pediatrics*. 2009; 168(12):1529-32.
11. Musso P, Parigi S, Bossi G, Marseglia GL, Galli L, Chiappini E. Epidemiology and Management of Acute Hematogenous Osteomyelitis, Neonatal Osteomyelitis and Spondylodiscitis in a Third Level Paediatric Center. *Children*. 2021; 8(8):616.
12. Pineda C, Espinosa R, Pena A, editors. Radiographic imaging in osteomyelitis: the role of plain radiography, computed tomography, ultrasonography, magnetic resonance imaging, and scintigraphy. *Seminars in plastic surgery*; 2009: © Thieme Medical Publishers.
13. Blickman J, Van Die C, De Rooy J. Current imaging concepts in pediatric osteomyelitis. *European Radiology Supplements*. 2004; 14(4):L55-L64.
14. Dessie A, Constantine E. Neonate With a Swollen Thigh. *Annals of emergency medicine*. 2016; 68(5):e87-e8.
15. Gutierrez K. Bone and joint infections in children. *Pediatric Clinics*. 2005; 52(3):779-94.
16. Zhang J, Lee BH, Chen C. Gram-negative neonatal osteomyelitis: two case reports. *Neonatal Network*. 2011; 30(2):81-8.