Journal of Pediatric Surgery Case Reports
Open access
0.3
CiteScore

Volume 76

In progress (January 2022)
This issue is in progress but contains articles that are final and fully citable.

Download full issue

Previous vol/issue | Next vol/issue

Actions for selected articles
Select all / Deselect all

Download PDFs
Export citations
Show all article previews

Receive an update when the latest issues in this journal are published

Sign in to set up alerts

Case report • *Open access*
Stomach perforation as a complication of non-diagnosed pyloric atresia type I
Silke Steiner, Ammar Alazki, Steffan Loff
Article 102096
Download PDF | Article preview

Case report • *Open access*
Osteomyelitis and septic arthritis in neonatal lupus erythematosus patients
Virany Diana, Risa Etika, Martono Tri Utomo, Kartika Darma Handayani, Quri Meihaerani Savitri
Article 102095

Journal of Pediatric Surgery Case Reports | Open access
Submit your article
Articles & Issues | About | Publish | Search in this journal | Guide for authors

Case report • *Open access*
Osteomyelitis and septic arthritis in neonatal lupus erythematosus patients
Virany Diana, Risa Etika, Martono Tri Utomo, Kartika Darma Handayani, Quri Meihaerani Savitri
Article 102095
Download PDF | Article preview

Case report • *Open access*
Esophageal atresia with proximal and distal tracheo-esophageal fistulae
Muhammad Afzal, Muhanad Burhan Attal, Ahmed Ahmed Tabash, Ehsan Ali Essa Sulais
Article 102106
Download PDF | Article preview

Case report • *Open access*
Torsion of juvenile granulosa cell ovarian tumor
Şenay Kurtuluş, Bülent Demir, Nilüfer Aylanç
Article 102093
Download PDF | Article preview

ISSN: 2213-5766

Journal of Pediatric Surgery Case Reports

Editorial Board

29 editors in 9 countries/regions

US United States of America (19) DE Germany (3) AR Argentina AU Australia IN India IT Italy JP Japan ZA South Africa ES Spain

Editor-in-Chief

Steven Stylianos, MD

NewYork-Presbyterian Morgan Stanley Children's Hospital, New York, New York, United States of America

Editorial Board

Samuel Alaish, MD

Johns Hopkins Hospital and Health System, Baltimore, Maryland, United States of America

Michael Caty, MD, MMM

Yale-New Haven Children's Hospital, New Haven, Connecticut, United States of America

Robert Cowles, MD

Yale University School of Medicine, New Haven, Connecticut, United States of America

Vijai Upadhyaya, MD, MBBS

Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

Jeffrey Upperman, MD

Monroe Carell Junior Children's Hospital at Vanderbilt, Nashville, Tennessee, United States of America

Juan José Vázquez Estévez, MD

Quiron Madrid Hospital, Madrid, Spain

John H.T. Waldhausen, MD

Seattle Children's Hospital, Seattle, Washington, United States of America

Chris Westgarth-Taylor, FC Paed Surg (SA)

University of the Witwatersrand, Johannesburg, South Africa

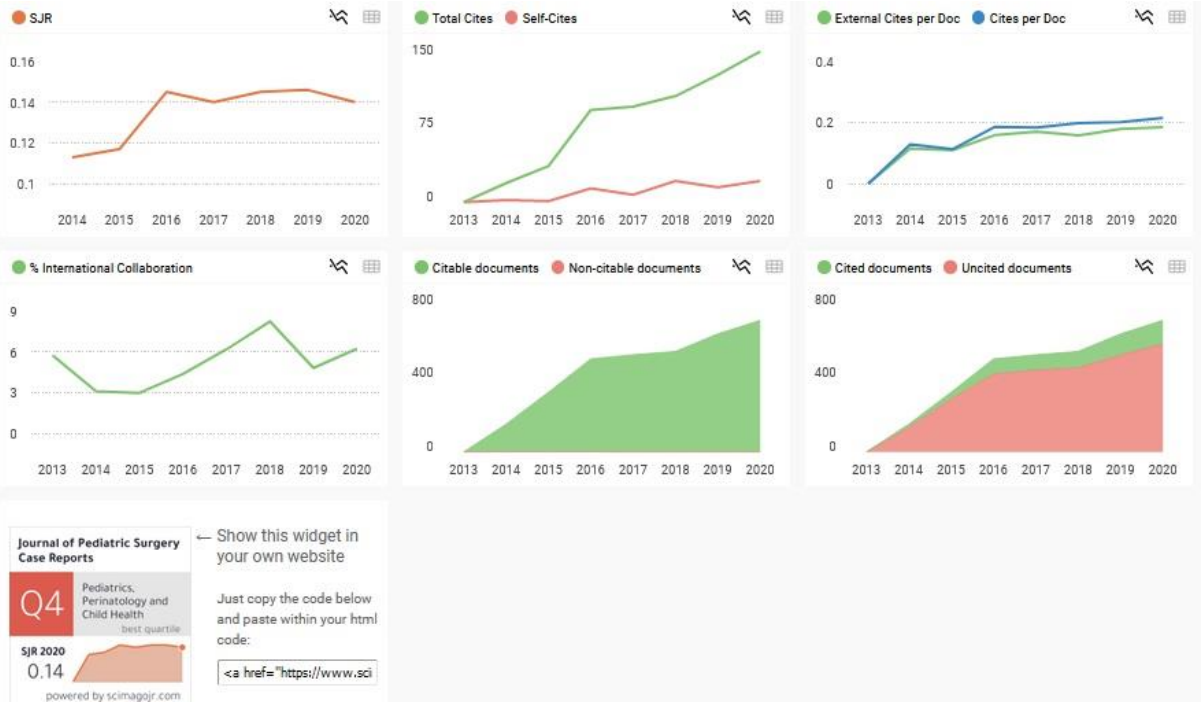
Atsuyuki Yamataka, MD, PhD

Juntendo University School of Medicine Graduate School of Medicine, Tokyo, Japan

Journal of Pediatric Surgery Case Reports

COUNTRY	SUBJECT AREA AND CATEGORY	PUBLISHER	H-INDEX
United States Universities and research institutions in United States	Medicine – Pediatrics, Perinatology and Child Health – Surgery	Elsevier BV	8

PUBLICATION TYPE	ISSN	COVERAGE	INFORMATION
Journals	22135766	2013-2020	Homepage How to publish in this journal Contact



← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.sci
```

Journal of Pediatric Surgery Case Reports 76 (2022) 102095

Contents lists available at ScienceDirect

Journal of Pediatric Surgery Case Reports

journal homepage: www.elsevier.com/locate/epsc

Osteomyelitis and septic arthritis in neonatal lupus erythematosus patients

Virany Diana [a], Risa Etika [a], Martono Tri Utomo [a,*], Kartika Darma Handayani [a], Quri Meihaerani Savitri [b]

[a] Department of Child Health, Faculty of Medicine, Universitas Airlangga/Dr. Soetomo General Academic Hospital, Jl. Mayjend Prof. Dr. Moestopo No. 6-8. Surabaya, Jawa Timur, 60285, Indonesia
[b] Faculty of Medicine, Universitas Airlangga/Dr. Soetomo General Academic Hospital, Jl. Mayjend Prof. Dr. Moestopo No. 6-8. Surabaya, Jawa Timur, 60285, Indonesia

ARTICLE INFO

Keywords:
Autoimmune
Neonatal lupus erythematosus
Osteomyelitis
Septic arthritis

ABSTRACT

Osteomyelitis in neonates is quite uncommon and often appears without a typical sign. Clinicians' late diagnosis and inappropriate treatment may result in severe sequelae. We report a rare case of osteomyelitis and septic arthritis infant with a mother's previous medical history of systemic lupus erythematosus at nine years old. Anti Lupus Anticoagulant (LA) result shows the infant also suffers from neonatal lupus erythematosus (NLE). Early diagnosis and proper management of the patient may produce better outcomes.

1. Introduction

Acute osteomyelitis is a rare complication in neonates. However, due to their immature immune response, neonates are more susceptible to osteomyelitis than older children. The neonatal osteomyelitis diagnostic and management are challenging for the clinician. Preterm infants are at high risk for osteomyelitis because of frequent blood drawing, invasive monitoring procedures, intravenous catheter utilization, ventilatory support, and bacteremia due to nosocomial pathogens [1]. The overall incidence rate for bone and joint infections is 0,12 per 1000 live births and 0.67 per 1000 neonatal intensive care unit admissions, with a mortality rate of 7.3% [2]. Some recent studies have reported an estimated 1–3 per 1000 hospital admissions for neonatal osteomyelitis [3]. Septic arthritis is an infection of joints in the neonatal period, commonly due to hematogenous spread from distant infectious sites. In the neonatal period, the metaphysis and joint space are connected because, within the first 12 months of life, capillaries originated from the metaphysis in long bones passing the epiphysis line vertically. Therefore, septic arthritis and osteomyelitis frequently occur during the neonatal period [4].

Neonatal Lupus erythematosus (NLE) is an autoimmune disease in the neonatal period caused by transplacental passage of maternal IgG autoantibodies to the newborn. It manifests as a wide clinical spectrum of cutaneous, cardiac, hematology, hepatobiliary, central nervous, and pulmonary systems. The incidence of NLE approximates to 2% in mothers with autoantibodies with an 18%–20% recurrence rate in the following pregnancies [5]. In this case, we report an extraordinary case of neonatal osteomyelitis and septic arthritis in an infant with NLE.

* Corresponding author.
E-mail addresses: viranydiana@gmail.com (V. Diana), risa_etika@yahoo.com (R. Etika), mrmartono73@gmail.com (M.T. Utomo), kartika09rama@gmail.com (K.D. Handayani), qurimeihaerani@gmail.com (Q.M. Savitri).

https://doi.org/10.1016/j.epsc.2021.102095
Received 11 October 2021; Accepted 25 October 2021
Available online 27 October 2021

2. Case presentation

A female infant was born at 35–36 weeks gestational age by cesarean section due to fetal distress and IUGR. The Apgar scores were 6 and 7 at one and 5 min, respectively, birth weight was 1565 g, length was 42 cm, and the head circumference was 29 cm. She was breathing spontaneously with tachypnea and an increase of work breathing. The initial laboratory results were within normal limits. The platelet count was 232x109/L, white blood count 11.720/mL, hemoglobin 14,5 g/dL, and TSH screening 0,9 mIU/mL. The radiography examination showed hyaline membrane disease grade 1. The echocardiography showed moderate patent ductus arteriosus (PDA) with a diameter of 2 mm and mild secundum atrial septal defect (ASD). The baby was diagnosed with neonatal preterm, low birth weight (LBW), asymmetrical small for gestational age (SGA), hyaline membrane disease, PDA, and mild secundum ASD. The infant was admitted to the neonatal intensive care unit and was supported by Continuous Positive Airway Pressure for three days due to respiratory distress (Fig. 1**).**

The patient developed marked jaundice and pale skin, poor feeding, and lethargy on the eighth day of admission. The patients' general condition was stable, with a temperature of 36.6 ˚C, a respiratory rate of 48 breaths/minute, and a heart rate of 154 beats/minute. On physical examination, abdominal distention, cutaneous erythematous lesions, knee swelling, decreased leg movement, and irritability were found. We noticed pale conjunctiva, icteric sclera, generalized jaundice, swollen labia majora and hip joint, and erythematous lesions on the skin around the knees and ankles (Fig. 2A–B). There was an ulcer on both ankles (Fig. 3A–B). We applied soft restraints to immobilize the lower extremities. Both liver or splenic enlargement were not found. We noticed a heart murmur on auscultation. However, the signs of arrhythmia or heart block in ECG examination were absent.

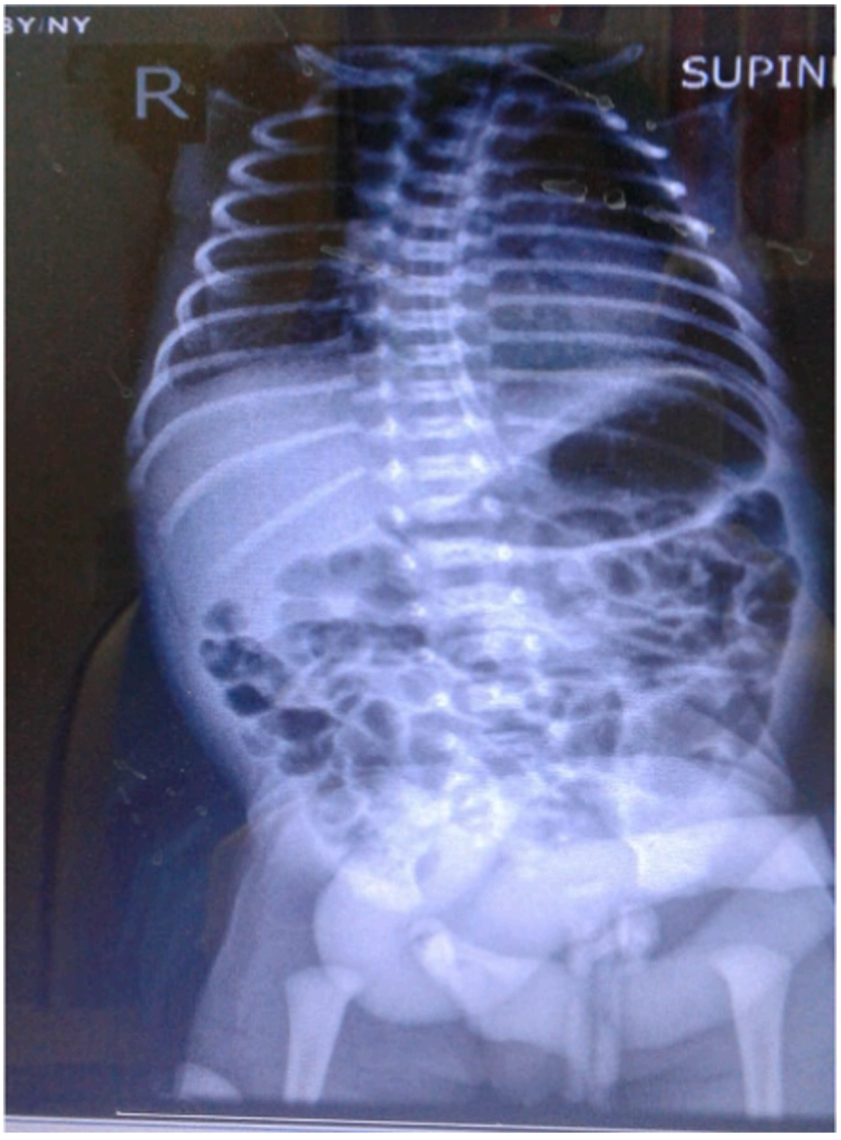


Fig. 1. Baby gram of the baby on the first day of life.

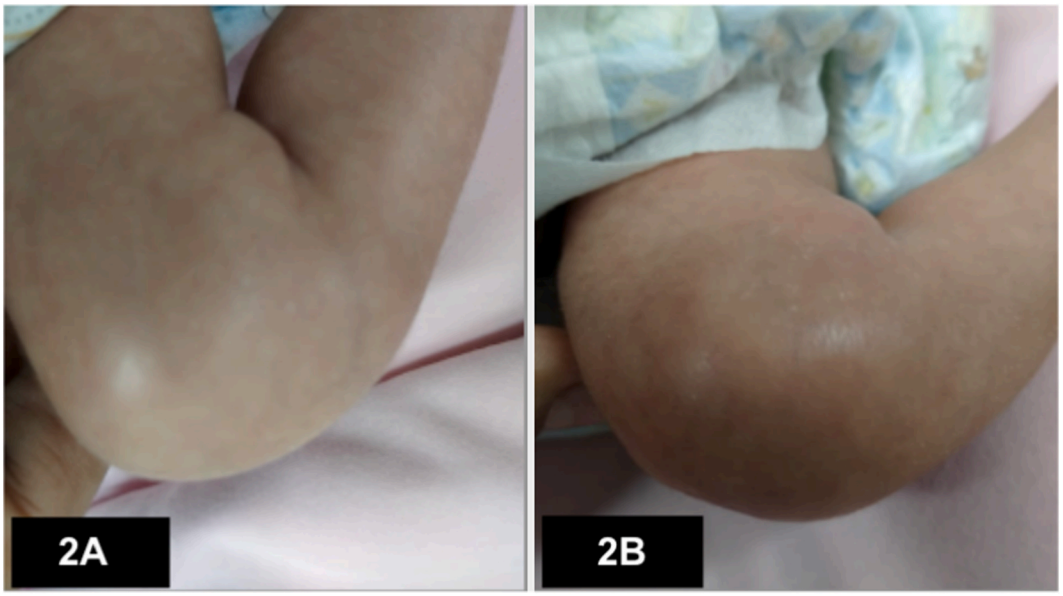


Fig. 2. A–B. The skin on the knee area appears swollen and red. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

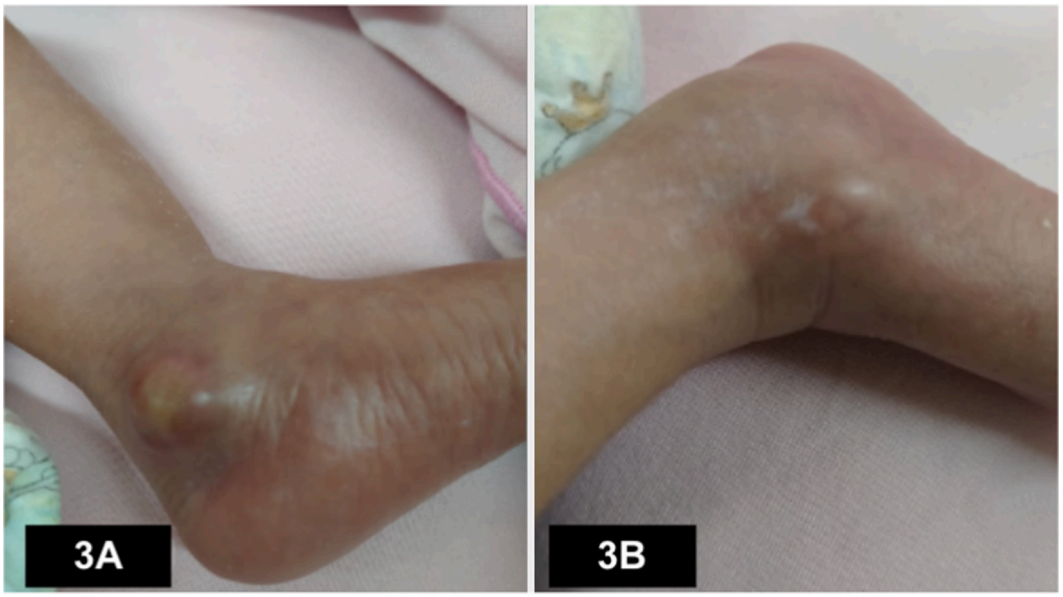


Fig. 3. The ulcers affect both ankles.

Based on the suspicion of sepsis, we performed diagnostic work-ups. Laboratory examination showed a decline in the platelet counts 4×10^9/L, hemoglobin 10.2 g/dL, white blood count 3460/mL, elevated reticulocyte 3.4%, elevated CRP of more than 200 mg/L. Hepatobiliary screening showed high total bilirubin 11.1 mg/dL with direct bilirubin 1.79 mg/dL, elevated AST 55 U/L, and decreased albumin 2.6 g/dL. Blood culture revealed a sterile result. The ankles' pus specimens were cultured and showed *Klebsiella pneumoniae* isolates susceptible to chloramphenicol, doripenem, meropenem, and imipenem fosfomycin, levofloxacin, and netilmicin. (see Table 1)

Radiological examination showed hyaline membrane disease and necrotizing enterocolitis grade two. The femur X-Ray showed osteomyelitis on the metaphysis of the proximal right femur (Fig. 4). It was confirmed by hip ultrasonography that showed thickening of the right hip synovial and minimal joint effusion with erosion (Fig. 5).

Neonatal osteomyelitis and septic arthritis diagnosis were established. Following the antibiogram test results from the isolation of *Klebsiella pneumonia,* 20 mg/kg/dose meropenem was administered. No surgical procedure is needed, according to the orthopedic surgeon.

Table 1
Laboratory results of the patients.

Laboratory Examination	1st day	3rd day	8th day	17th day	27th day
Hemoglobin	14.5		10.2	13.7	
Leucocyte	11,720		3460	19,420	
Platelets	232,000		4000	64,000	
Reticulocyte	5%		3.4%	1.9	
C-Reactive Protein	2		>200	77	
Albumin	2.9		2.6	2.7	
Total Bilirubin		7.11	11.1		
Direct Bilirubin		0.42	1.79		
AST			55	30	
ALT			9	23	
Lupus Anticoagulant-1					68.7
Lupus Anticoagulant-2					40
LA1/LA2					1.7
Anti SS-A(Ro)					negative
C3					98.41
C4					21.29

The mother has a clinical history of systemic lupus erythematosus. She underwent arthritis and nephrotic lupus symptoms at nine years old and consumed steroids from a pediatrician. According to the mothers' clinical history and cutaneous and hematological findings, we suspected NLE and performed further laboratory investigations. The patients' serological test revealed the positive result of Anti Lupus Anticoagulant 1 and Anti Lupus Anticoagulant 2, negative of Anti Ro, and normal range of complement C3 and C4. Serological evaluation of the mother was positive for anti-LA, anti-Ro, and anti-dsDNA.

Methylprednisolone tablets 0.9 mg twice daily for 30 days began administered at 28th year old. The patient's received exclusive breastfeeding. The patient's body weight increased to 1875 g, length 45 cm, and head circumference 31 cm on the follow-up visit. The screening of ROP, audiology, and head ultrasound were within normal. After three weeks of treatment, a depletion in CRP and white blood cell count were noticed, and the clinical improvement was remarkable. The patient was discharged home after a month of nursing. On the outpatient follow-up visit, we found the recovery of joint movements and improvement of the patient's overall condition without sequelae.

3. Discussion

Osteomyelitis is an inflammation of the bone caused by infection of bacteria or other pathogens involving the bone and/or bone marrow. Osteomyelitis in neonates is uncommon. The incidence of acute neonatal osteomyelitis is 1–3 per 1000 NICU admissions. The overall incidence of neonatal osteomyelitis is 1 per 5000–15,000 live births [3]. The diagnosis is challenging and often delayed because it is frequently presented with a nonspecific sign, unlike older children. Diagnosis is typically based on positive pus cultures with bone destruction in radiographic findings at the time of presentation. Neonatal osteomyelitis risk factors include chorioamnionitis, perinatal asphyxia, prolonged rupture of the membrane, prematurity, frequent blood drawing, invasive monitoring or procedures, intravenous catheter, ventilatory support, and bacteremia due to nosocomial pathogens [1]. S*taphylococcus aureus*, group B *Streptococcus*, and Gram-negative bacteria such as *Escherichia coli* and *Klebsiella pneumoniae* are the most common causes of acute osteomyelitis [4].

Our patient's osteomyelitis symptoms were knee swelling, limitation, and pain of motion in the affected limbs. Risk factors of osteomyelitis in our patient were prematurity and intravenous catheter. Elevated CRP, a reliable inflammatory marker, was remarkable in the laboratory test. The radiology examination of swollen joints showed osteomyelitis at the metaphysis of the proximal right femur. The sensitivity pattern of isolated *Klebsiella pneumonia* from pus specimens exhibited high sensitivity to several antibiotics, including meropenem.

Septic arthritis, the infection of joints, frequently occurs with osteomyelitis in the neonatal period. The disease usually occurs due to haematogenously spread from distant infectious sites. There is communication between epiphyseal and metaphysis blood vessels in the first 12 months of life allowing the spread of infection into the joint space. Septic arthritis and osteomyelitis in neonates tend to involve the lower limbs than the upper limbs (70–80% vs. 10–20%). The most often clinical findings are soft tissue swelling and pseudoparalysis. Neonatal septic arthritis-associated risk factors are prematurity, low birth weight, asphyxia, bacteremia, intravenous or umbilical catheter, and heel prick test [5].

We found soft tissue swelling and pseudoparalysis, but no fever was present in our case. Fever is missing in half of neonates' septic arthritis cases. *Streptococcus aureus*, group B *staphylococcus,* and gram-positive enterococcus are the most frequent neonatal septic arthritis pathogens. Before immunization with conjugate vaccines, *Hemophilus influenza* type B was responsible for over half of bacterial arthritis cases in infants. In recent years, *Klebsiella pneumoniae* is the most common cause of nosocomial infections. The examination of purulent fluid is a gold standard for detecting microorganisms in gram staining and specimen culture. After the diagnosis is established, antibiotic treatment should be initiated early [6].

In this case, *Klebsiella pneumoniae* was detected on pus examination. A regular CRP test is needed to monitor treatment response and to determine the complications. The antibiotics of choice for neonatal osteomyelitis are the combination of penicillin or ampi-

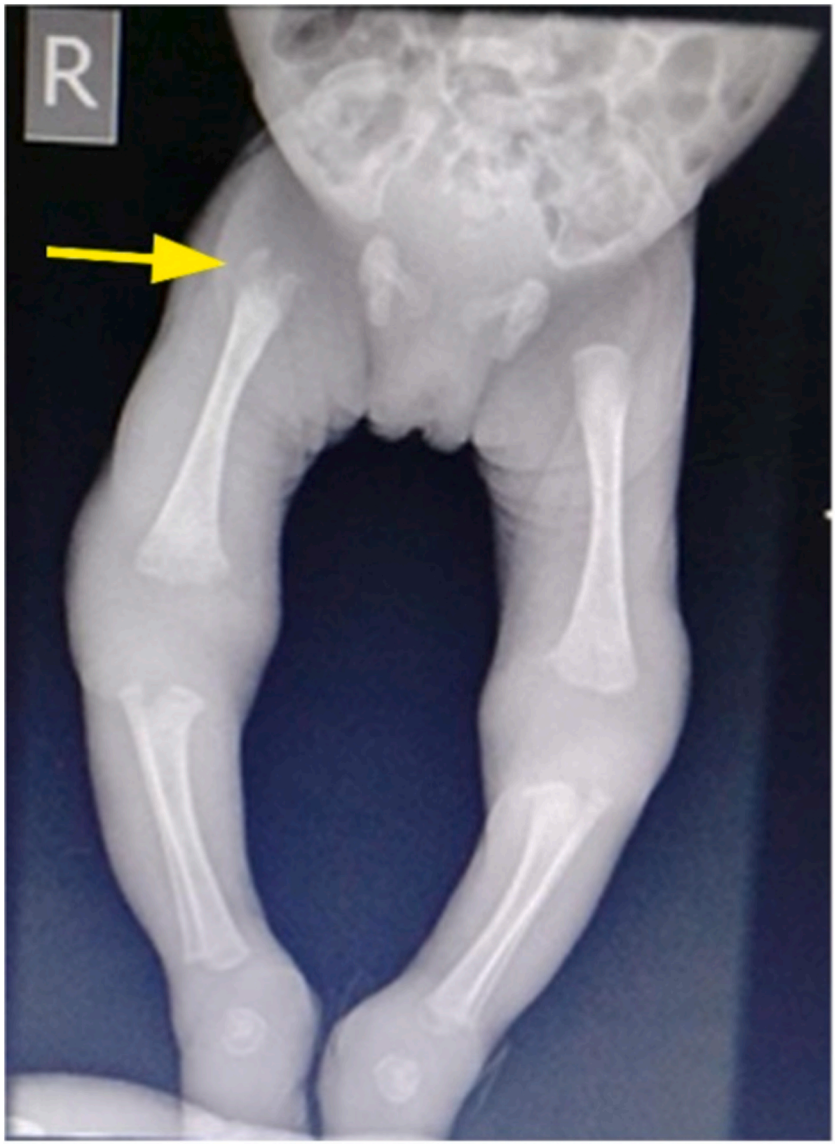


Fig. 4. Osteomyelitis at the metaphysis of the proximal right femur (Yellow arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

cillin with cefotaxime sodium, ceftriaxone, cefuroxime sodium, MRSA infection vancomycin, or a selection of clindamycin. The patient shows improvement, and the inflammatory markers show normal limits in 3–6 weeks. Joint cavity decompression, drainage of pus, and other supportive therapies are necessary depending on the severity of symptoms [6].

Neonatal lupus erythematosus (NLE) is an autoimmune disease in the neonatal period caused by transplacental passage of maternal IgG autoantibodies against Ro/SS-A, La/SS-B, and U1 ribonucleoprotein. These autoantibodies invade the normal protein in the cell's nucleus, which causes tissue impairment. Transplacental IgG autoantibodies bind specifically to apoptotic cells in selected fetal organs. Human IgG apoptosis cell complexes are detected in the heart, skin, liver, and newly formed bone of fetuses, similar to the organ involvement in NLE. It causes a broad clinical spectrum of cutaneous, cardiac, and systemic abnormalities in infants. This condition was first described in 1954 by McCuistion and Schoch, who reported a case of a transient lupus skin lesion in an infant with an ANA-positive mother [7].The most common presentation is cutaneous lupus erythematosus, although other systems such as cardiac, hematological, hepatobiliary, central nervous, pulmonary, and musculoskeletal systems may be involved. Skin lesions may not present at birth but start to develop during the first weeks of life.The condition is usually benign and self-limited but sometimes may be associated with severe sequelae [8].

Our patient presents with a spectrum of cutaneous manifestations that erythematous and swelling skin at the ankle and knees. The patient also suffered from thrombocytopenia and anemia that presented in the second week. Hematological complications occur in

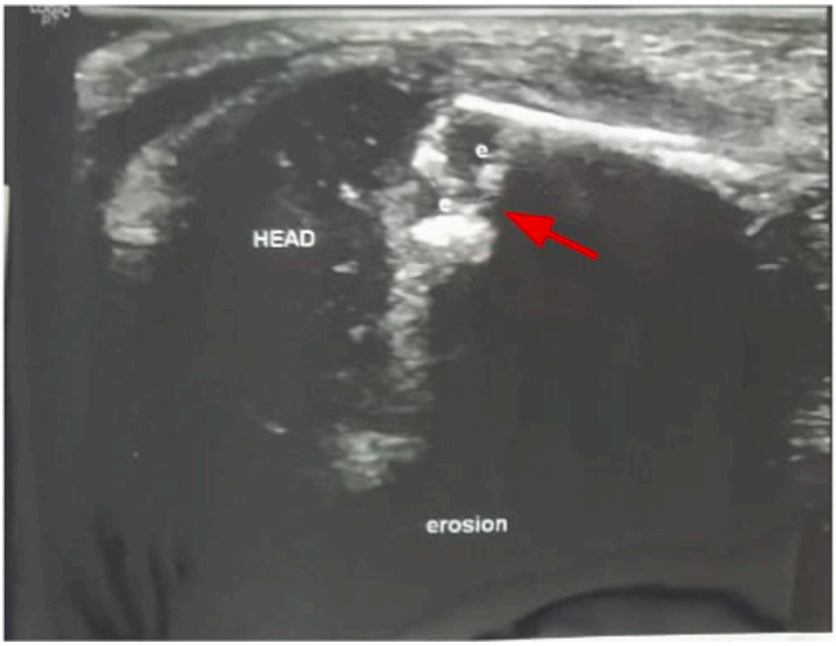


Fig. 5. Ultrasonography of the hip joint reveals thickening of the right hip synovial and minimal joint effusion with erosion (Red arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

approximately 10%–35.3% of the NLE cases. The hematological manifestations may not be present at birth and develop over time, and are often associated with other NLE manifestations.

Hematological manifestations of NLE are anemia, neutropenia, thrombocytopenia, bone marrow failure, disseminated intravascular coagulation, and thrombosis. Cytopenias are the classic hematological presentation of NLE mainly due to immune suppression of the bone marrow by maternal autoantibodies and to a lesser extent due to peripheral destruction of blood components. Maternal auto-antibodies SSA/Ro and SSB/La are associated with neonatal cytopenia and antiplatelet antibodies have been described in association with thrombocytopenia. Infants with severe hepatic and hematological involvement may require systemic corticosteroids, intravenous immunoglobulins, or immunosuppressive agents [9]. NLE should be considered a potential diagnosis of a neonate with thrombocytopenia, neutropenia, and anemia, especially if present with concurrent rash, hepatitis, or heart block. The presence of autoantibodies in the mother or infant can establish the diagnosis. There may be an underestimation of the incidence of NLE because of the mild or transient nature of symptoms. Nonetheless, NLE patients and their asymptomatic mothers require monitoring of autoimmune disease development. Future siblings are at risk for NLE. Therefore, counseling and prenatal monitoring are recommended. Symptoms typically disappear with the clearance of maternal antibodies from the neonatal circulation, except when the disease is extensive or involves vulnerable tissues. Early diagnosis, intensive monitoring, and appropriate treatment with the immunosuppressive agent may protect the organ in selected cases [10,11].

NLE diagnosis in our case was established based on the cutaneous erythematous, hematological abnormality, and detection of autoantibodies anti-LA in the mother and the patient. The histopathological examination should be performed if in doubt, which presents the same characteristics of subacute cutaneous lupus. Early diagnosis is essential in NLE to avoid permanent sequelae and even death due to cardiac complications. The association of osteomyelitis with NLE is infrequent. Osteomyelitis could be a complication of infection triggered by transplacental transmission of maternal autoantibodies from the mother that causes immune suppression of the bone marrow, induced thrombocytopenia, anemia, and leucopenia. Autoantibodies that cross the placenta also cause developmental abnormalities of the organ, including bone. The bone immaturity makes it susceptible to any infection, especially in premature infants who experience invasive procedures.

NLE requires a multidisciplinary approach for detection and early intervention in some cases. Intensive monitoring is required for all infants with nonspecific symptoms of late-onset septicemia and NLE. Early diagnosis is vital since NLE directly impacts the growth, development, and quality of life of the infant in the future [11].

4. Conclusion

Osteomyelitis and septic arthritis were rare in the neonatal period. Prematurity, umbilical catheter, and immunodeficiency due to NLE were presumed to be the risk factors. Early diagnosis and appropriate management were crucial since it directly impacts the infant's growth, development, and quality of life in the future.

Statement of ethics

Patient's family gives permission for patient information and photographs to be published in the scientific journals anonymously.

Funding sources

No funding or grant support.

Author contributions

All authors attest that they meet the current ICMJE criteria for authorship.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Kiechl-Kohlendorfer U, Griesmaier E. Neonatal osteomyelitis. Bernhard Resch IntechOpen; 2013. https://doi.org/10.5772/54320.
[2] Fisher R. Neonatal osteomyelitis. NeoReviews 2011;12:e374.
[3] Zhang J, Lee B, Chen C. Gram-negative neonatal osteomyelitis: two case reports. Neonatal Network 2011;30:81–7. https://doi.org/10.1891/0730-0832.30.2.81.
[4] Zhan C, Zhou B, Du J, Chen L. Clinical analysis of 17 cases of neonatal osteomyelitis: a retrospective study. Medicine 2019;98:1–6.
[5] Jiao F, Yan X. A special and rare case with osteomyelitis: a case report. Open J Pediatr 2013;3:177–9.
[6] Ozsari T, Bora G, Ozdemir O, Kilic I. A neonatal septic arthritis case caused by Klebsiella pneumoniae: a case report. J Clin Diagn Res 2016;10 SD01–2.
[7] Vanoni F, Lava S, Fossali E, Cavalli R, Simonetti G, Bianchetti M, et al. Neonatal systemic lupus erythematosus syndrome: a comprehensive review. Clin Rev Allergy Immunol 2017;53:469–76.
[8] Lun Hon K, Leung A. Neonatal lupus erythematosus. Autoimmune diseases. 2012.
[9] Chao M, Luchtman-Jones L, Silverman R. Hematological complications of neonatal lupus: case report and review of the literature. J Pediatr Hematol Oncol 2013;35:e344–6.
[10] Silverman RA, Jaeggi E. Non-cardiac manifestations of neonatal lupus erythematosus. Scand J Immunol 2010;72:223–5.
[11] Kelly T. Maternal medical disorders of fetal significance. Avery's disease of the newborn. tenth ed. Philadelphia: Elsevier; 2018. p. 108–9.