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CASE REPORT

A Neonatal Hip Septic Arthritis Caused by Klebsiella pneumonia at Hawassa University Comprehensive Specialized Hospital Neonatal Unit, Hawassa, Sidama, Ethiopia

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Background: Neonatal hip septic arthritis is one of the rarest clinical conditions epidemiologically but with momentous long-term sequelae. Early detection and proper intervention have a paramount role in alleviating the shattering long-term effects. The clinical presentation of neonatal hip septic arthritis is very non-specific, with limited movement of the extremities and excessive crying during manipulations such as diaper changing. Our case was a 17-day-old male newborn who presented to our hospital after a family noticed decreased left leg movement and crying while changing diapers for 5 days, with the associated complaint of holding the left leg in a flexed position. The newborn then underwent all the available investigations and the diagnosis of hip septic arthritis was made. We were stunned by the culture result, which isolated Klebsiella pneumonia from the sample that had been taken from joint fluid, which is a very unusual isolate.

Conclusion: Hip septic arthritis is an orthopedic emergency, especially in neonates. It should be considered in newborns presenting with pseudoparalysis as the presentation is non-specific. Considering a less common microorganism with culture and sensitivity is very important, especially if the response to treatment is delayed. We endorse proper workup and timely intervention as hip arthritis has a poor prognosis when the management is delayed.

Keywords: neonate, hip septic arthritis, Klebsiella pneumonia

Introduction

Bacterial joint infections are the commonest cause of septic arthritis. Hip joints are commonly involved, especially during the neonatal period.[1–3]

In all age groups, *Staphylococcus aureus* is the leading cause of bacterial arthritis, and the proportion of Streptococcus pneumonia is more prevalent in the first two years of life, particularly in the absence of vaccination against this bacteria. Gram-negative bacteria are also reported to cause septic arthritis, especially *Kingellakingae* in children less than 4 years old. Group B streptococcus and *Neisseria meningitidis* require special attention during the neonatal period because they are more prevalent than at other times of life.[2,4,5]

Unlike in the past, Gram-negative bacteria are now being identified as a cause of hip septic arthritis. A study done by Devi et al. reported that Klebsiella pneumonia was the most common Gram-negative organism, which constitutes about 36% of the cases, followed by *Escherichia coli* and *Staphylococcus aureus*.[6,7]

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Klebsiella pneumonia must enter the bloodstream or the respiratory tract to cause a bloodstream infection or pneumonia. It is easily transmitted through person-to-person contact, especially in settings with inadequate infection prevention and control. Being on ventilators, IV lines and surgical wounds are other potential sources of Klebsiella pneumonia in the health-care setting.[8]

Hematogenous spread is the primary route of infection in most healthy children even though invasive procedures and intramuscular and intraarticular medication injections are also associated with septic arthritis.[4,9]

Most of the time, septic arthritis involves a single joint, but there are reports of bilateral involvement of the hip joint.[2,10,11] Multiple joint involvement was also reported in about 10% of cases, especially in neonates infected with *Neisseria* species.[5,12,13]

The classical presentation of septic arthritis is acute onset of fever, swelling and joint pain accentuated by range of motion. These classical presentations are usually subtle in neonates and prior antibiotic administration. The site of infection will also affect the clinical presentation.[1,2]

Septicemia characterized by poor feeding, irritability, vomiting and fever without the primary focus are the typical presentations of septic arthritis in neonates. Joint involvement is distinguished by tetrads of pseudoparalysis, discomfort when handled, unilateral swelling of the involved area, and positional preferences.[2,3,10,11,14,15]

Even if there is a scarcity of evidence and clues, it is strongly advised to consider septic arthritis in neonates.

Ethical Review

Written informed consent was obtained from the father of the neonate for the publication of this case report after a letter of permission was gained from Hawassa University Institutional Review Board (IRB).

Case Summary

A 17-day-old male neonate was born to a 25-year-old para I mother who could not remember her last normal menstrual period (LNMP) but claimed to have been amenorrheic for the previous 9 months. The delivery was performed via cesarean section (CS) due to the presence of a non-reassuring fetal heart pattern (NFHP) and persistent tachycardia, with the result of a male newborn weighing 2.2 kg and receiving an APGAR score of 8 and 9 at the 1st and 5th minutes, respectively. After 2 days of hospital stay, she was discharged with postnatal care, and the newborn was vaccinated for age as per the national guidelines.

The neonate was brought in after the family noticed decreased left leg movement and crying while changing diapers for 5 days, with the associated complaint of holding the left leg in a flexed position. A low-grade fever and two episodes of vomiting of ingested matter were also reported 2 days before arriving at our hospital.

When the neonate arrived at our hospital, he appeared to be acutely ill. The vital signs at admission were PR of 158 beats per minute, respiratory rates of 44 breaths per minute, and temperature of 37.8 degrees centigrade (mild fever), oxygen saturation of 96% with atmospheric air. On musculoskeletal examination, the relevant physical finding was a flexed left leg at the hip joint, with decreased range of motion, hot to touch, and tenderness at the left hip joint. With this, the newborn was investigated with the following pertinent results; RBS = 108 mg/dl, CBC-WBC = 11.6×10^3 with neutrophils and lymphocytes of 81.2 and 14.6 respectively. Qualitative CRP-reactive and quantitative CRP was 114.75 mg/dl, and ESR was 28mm/h. The CSF analysis was done, and it was non-revealing. The serum electrolytes were also in the normal ranges. The hip X-ray was unremarkable. The hip ultrasound done at admission showed an 8 mm deep left hip space fluid collection with echo-debris with the most likely diagnosis of left hip joint effusion secondary to likely septic arthritis. We also sent the blood culture for analysis, and put the neonate on cefotaxime and cloxacillin with the impression of Left hip Septic Arthritis + Low Birth Weight (LBW) + Small for Gestational Age (SGA). The blood culture result was returned on the third day of admission and there was no growth. The orthopedic department was consulted on the first day of admission, and they decided on surgical drainage. A COVID19 sample was also taken as part of preoperative workup, and it was returned negative and the newborn was prepared for operation after 3 days of admission. On this day, the CRP was raised to 168.3 mg/dl, and the hip ultrasound showed left hip joint space collection which has internal echo debris measuring 1.1 cm in depth with synovial hyperemia. The impression here again was left hip joint septic arthritis, and we changed cloxacillin to vancomycin, thinking of methicillin-resistant *Staphylococcal aureus* (MRSA). On the next day (day 7 after admission), the neonate was taken to surgery after informed consent was obtained from the mother and incision and drainage was done, and about 15 cc of pus fluid was evacuated, and a sample from the left hip abscess was sent for culture analysis. The neonate was continued on the above

antibiotics, and after 3 days of post operative time, the culture result was returned with the growth of Klebsiella pneumonia which was sensitive to meropenem, imipenem, cefotaxime and gentamicin but resistant to cotrimoxazole and augmentin. Because of the fatality of hip arthritis, and considering the commonest etiology being *Staphylococcus aureus*, we decided to continue vancomycin in addition to cefotaxime. Of course, the false negative aspects of the culture were also considered. After incision and drainage, the CBC, CRP, and ultrasound were all sent, and the results all showed significant improvements, particularly the CRP, which was reduced from 168.3 mg/dl to 32.4 mg/dl, and the hip ultrasound, which showed left hip joint septic arthritis with minimal loculated collection and interval radiologic improvement. The clinical conditions of the newborn also showed great improvement. The managing teams (from pediatrics and orthopedics) then agreed to continue the same antibiotics, and finally the infant was linked back to the nearby hospital for the family's convenience to continue the next 2-week dosage with the same antibiotics (2-week dosage had already been given here in our hospital), and was booked an appointment 2 weeks after antibiotics completion. On the day of referring back, the CRP was than 5 mg/dl, and it was less than 1 mg/dl after 1 week of referring back, meaning in the 4th week of antibiotics. The family brought the newborn to the hospital as per the appointment schedule and the child was apparently healthy.

Discussion

Given the subtle nature of the presentation in neonates, as well as the prevalence of polyarticular infections, septic arthritis in neonates necessitates special attention. The risk of concomitant osteomyelitis is also more common in this age groups. Above all, the fatal complication associated with hip joint infection seeks meticulous evaluation.[2,3,10,11,14,15]

Isolating the causative agents with a drug sensitivity test has a pivotal role in the management of infections, especially in a deep site like hip septic arthritis.

When the hip joint is involved, the presentations in neonates are thigh swelling, leg flexion, crying during diaper changing, precedent history such as invasive procedure in the proximity of the joint.[10,11,16–18]. But these presentations are very non-specific and clinicians should have a high index of doubt in approaching such patients. Hip joint arthritis is an orthopedic emergency because of grievance of its complications.[4,18]

Etiologically, *Staphylococcus aureus* is the number one cause of hip septic arthritis in all age groups. Our case, and also a report by Ozsari et al., tell us other bacteria could also lead to hip septic arthritis in neonates. It emphasizes also the necessity of drug and sensitivity tests as evidenced by drug resistant isolates in both reports.[7]

Despite its rarity, Klebsiella pneumonia is increasingly being reported as a cause of septic arthritis, particularly in trauma, extremes of age, IV drug users, and those with compromised immunity.[19]

A case report by Tamer et al. showed an isolated case of Klebsiella pneumonia from the joint fluid culture of a 17-day-old neonate after presenting with a complaint of unrest, and a diagnosis of septic arthritis was made.[20]

A study done by Devi et al. reported that Klebsiella pneumonia was the most common Gram-negative organism, which constitutes about 36% of the cases, followed by *Escherichia coli* and *Staphylococcus aureus*.[6,8]

Hip joint arthritis has a tendency to present as abdominal mass via extension through obturator internus, posing a diagnosis challenge.[18] So it is wise to think of hip joint origin for abdominal mass, and it highlights the use of abdominopelvic sonography in such cases.

The serious outcomes of hip arthritis such as hip deformity and avascular necrosis are more pronounced among neonates compared with older children. In other words, the earlier the infection, the more devastating the consequences. Hence, to prevent the devastating complications of hip arthritis in neonates, timely diagnosis and appropriate therapy are found to be the most important determinant factors.[21]

In general, age less than 6 months, symptom presentation greater than 4 days amid ongoing damage, hip joint involvement, and concomitant osteomyelitis are all poor prognostic factors in pediatric septic arthritis.[3,4,22,23]

A study done by Usha et al. showed as long as 7 days of pre-intervention period and restricted joint mobility at discharge were shown to be the independent determinants of poor overall outcome in neonatal septic arthritis.[6]

The radiological prognosis was found to be poorer among neonates who had comorbidities, a longer duration of symptoms, and pus drainage. Of all these, the duration of symptoms is the most important predictor of a poor radiological prognosis.[2,3]

Of these, our case has at least three poor prognostic factors; age, late presentation and hip joint involvement.

We recommend proper follow-up of this patient, and also applaud similar reporting of such cases.

Conclusion

Neonatal hip septic arthritis presentation is very non-specific, and is associated with poor prognosis, especially if the detection and intervention is delayed. Hence, vigilant evaluation is important for early identification and proper management so that shocking long-term effects can at least be curtailed. It is recommended to have etiologic identification because unusual microorganisms with drug resistance have been reported as a cause of neonatal hip septic arthritis, as has been evidenced in our report, though further research is recommended before final conclusion of Klebsiella pneumonia as one of the causes of hip septic arthritis in neonates.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors reported no conflicts of interest for this work.

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