Acta Scientific Clinical Case Reports

Volume 3 Issue 10 October 2022

Case Report

Neonatal Nosocomial Pseudomonas Sepsis Presenting as a Leukemoid Reaction

Gerald H Katzman*

Department of Pediatrics, Clinical Associate Professor, Wayne State University, USA

***Corresponding Author:** Gerald H Katzman, Department of Pediatrics, Clinical Associate Professor, Wayne State University, USA.

Received: August 19, 2022

Published: September 27, 2022

Abstract

Pseudomonas sepsis has been a significant problem in neonatal intensive care units (NICU) for a number of years [1-5]. Mortality from this organism has been very common, particularly in low birth weight new borns [1,2]. This case report deals with the successful treatment of a clinically asymptomatic new born whose only apparent initial manifestation of sepsis was a leukemoid reaction noted on a routine complete blood count.

Keywords: Neonatal Nosocomial *Pseudomonas aeruginosa* Sepsis; Leukemoid Reaction; Empiric Antimicrobial Therapy

Case Report

This infant female was delivered to a Gravida 4, Term 1, Abortion 2, Living 1 black female at 30 weeks gestation according to the expected date of confinement. The mother had prenatal care. RPR was non—reactive and HBsAg was negative. The mother presented to the hospital in preterm labor with possible rupture of fetal membranes. Vaginal culture, obtained on admission, grew Beta Hemolytic Streptococci Group F. Magnesium sulfate was administered for tocolysis. Two doses of betamethasone were administered about 24 and 12 hours prior to delivery. Ampicillin was begun about 18 hours prior to delivery because of maternal temperature of 100.5 degrees Fahrenheit. Delivery was carried out by repeat cesarean section because of fetal distress and probable chorioamnionitis. At delivery, very foul-smelling amniotic fluid was noted. The infant was intubated because of respiratory distress.

Apgars were 8 at one and 9 at 5 minutes. Umbilical venous and arterial catheters were placed. The catheters were removed on day four and day three of life respectively. One dose of survanta was given. Initial vital signs included a blood pressure of 51/32 with a mean blood pressure of 40 mm Hg, temperature of 96.2 degrees fahrenheit, heart rate 160 per minute and respiratory rate of 64 per minute. Birth weight was 1120 gm, length 36.8 cm and head circumference 26.5 cm. Physical exam revealed a preterm infant with nasal flaring and mild chest wall retractions. There were no dysmorphic features. Ballard Assessment was consistent with 30 weeks gestation. Blood culture taken on admission was negative. Ampicillin and cefotaxime were started. CBC on day one showed WBC 12, 800/mm^3, hematocrit of 36.8 volume %, 271,00 platelets/mm^3, 67% segmented neutrophils and 6% band forms. C Reactive Protein (CRP) day two was negative. The infant weaned quickly from assisted ventilation and was extubated on day two. Oxygen was discontinued on day five at which time the infant had no respiratory distress. Small feedings were also begun. Lumbar puncture on day three showed spinal fluid with 7 WBC/mm^3, 930 RBC/mm^3 glucose 79 mg/dL, protein 126 mg/dL. Spinal fluid culture was negative. A per cutaneous 28 gauge catheter (L—CathR) was placed on day three in the right hand and threaded to about the level of the right subclavian vein. The catheter was removed on day five due to occlusion. There were no signs of inflammation around the catheter insertion site. The infant accepted small gavage feedings well. There was no respiratory distress, abdominal distention, apnea or bradycardia.

Flexor muscle tone was good. There was mild pallor with good peripheral perfusion. Vital signs on the morning of day seven indicated a heart rate of 138/min. respiratory rate 46/min, temperature 98.6 degrees fahrenheit and blood pressure 64/34.

Routine CBC on day seven revealed WBC 95, 600/mm^3, hematocrit 35.5 volume %, platelet count 384, 000/mm^3, 79% segmented neutrophils and 13% band forms. Due to the marked leukocytosis, a repeat blood culture was taken. Ampicillin and cefotaxime were discontinued. Vancomycin and ceftazidime were instituted. Subsequent alterations in the WBC, platelet count and immature neutrophil to total neutrophil ratios are indicated in figures 1, 2, and 3. RBC morphology on day eight revealed few poikylocytes schistocytes and burr cells with occasional toxic granulation. Chest x—ray on day 1 showed granular infiltrates without air bronchograms. On day seven, chest x—ray showed clear lung fields. Repeat spinal fluid exam on day ten showed 88 WBC/mm^3 with 92% segmented neutrophils and 8% lymphocytes, RBC 150/mm^3 glucose 54 mg/dL, protein 140 mg/dL and was culture negative.

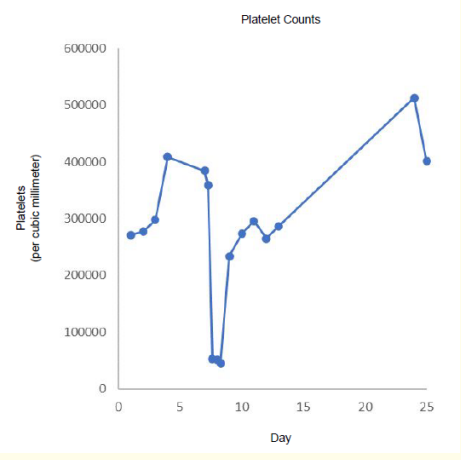

Figure 1

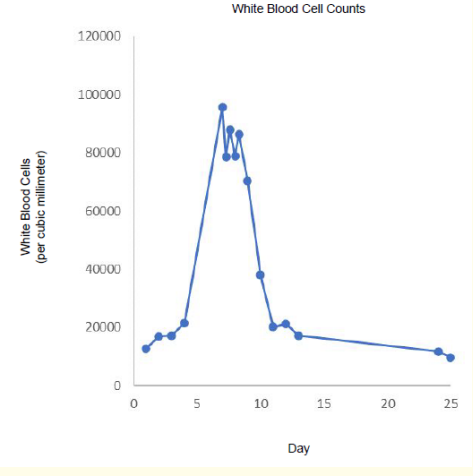

Figure 2

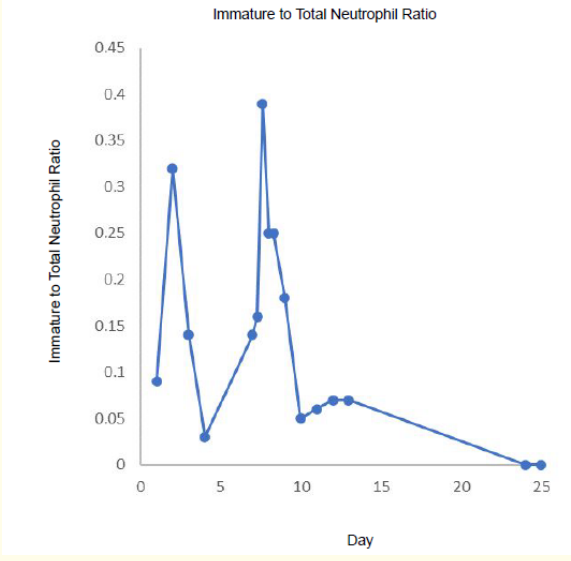

Figure 3

Blood culture from day seven grew *Pseudomonas aeruginosa* sensitive to ceftazidime, amikacin, ciprofloxacin, piperacillin and resistant to tobramycin, cephalothin and gentamicin.

Initially, tobramycin was added to the ceftazidime for synergism. However, because of erratic blood levels amikacin was substituted for the tobramycin for the remainder of the 21 days of antibiotic therapy. Blood culture from day ten was negative.

A 10 cc transfusion of platelets was administered on day weight, when the platelet count decreased to 45,000/mm^3. Packed RBC transfusions for anemia were administered on day eleven and day twenty—four. Head ultrasound exams were negative. Pneumogram, eye exam and brain stem evoked response audiometry were all negative prior to discharge. The infant tolerated feedings well and gained weight steadily. Discharge occurred at 48 days of age. At discharge the infant weighed 2005 gm, length was 41 cm and head circumference was 33 cm.

Discussion and Conclusion

Leukemoid reactions have been reported to occur in newborns [6-9] secondary to Down syndrome and prenatal betamethasone administration to the mother. In the cases reported where betamethasone was thought to be the cause, markedly elevated leukocyte counts were present at birth. Interestingly, in the present case report, the leukemoid reaction was not noted until the seventh

day of life. A blood culture taken at that time grew *Pseudomonas aeruginosa*. This would make it likely that Pseudomonas sepsis was the actual cause of the leukemoid reaction. The elevated WBCs in the spinal fluid, thrombocytopenia and elevated immature to total neutrophil ratios all point to the presence of an acute infectious process.

Pseudomonas aeruginosa sepsis in newborns, particularly very low birth weight newborns (VLBW), has been reported to have a high mortalityl 2. In a recent report [2] there were no survivors of *Pseudomonas aeruginosa* sepsis in VLBWs presenting in the first week of life (2 cases) and only one survivor with disease onset in the second week (5 cases). Possibly, by the time clinical signs and symptoms are apparent in the VLBW, the pathophysiologic process is often irreversible.

It is likely that the presence of the indwelling vascular catheters in this case provided portals of entry for the organism, although there are other possible mechanisms for invasion [3-5]. The empiric institution of ceftazidime may have been life—saving, since the resistance of the organism to other commonly used agents would not have been known for about 72 hours after the drawing of the blood culture. The marked thrombocytopenia, noted about 18 hours after the first dose of ceftazidime, reflects the toxicity which was developing. Prompt recovery and sustained elevation of the platelet count after platelet transfusion are further indications of the efficacy of the antibiotic in eradicating the organism and minimizing toxicity.

Nosocomial sepsis in very low birth weight newborns may have its onset after 48 hours of age [10]. Staphylococcus epidermidis has been the most common organism causing NICU-acquired nosocomial sepsis[10]. Bacteria causing nosocomial sepsis are often resistant to antibiotics routinely used to treat in-utero acquired infection. In addition to bacteria, investigation for evidence of Candida infection is especially important in the VLBW [1,12,13].

Nosocomial sepsis is so common in the VLBW that it is important to provide around the clock scrutiny for signs of infection. Apneic and bradycardic episodes, gastric residuals, abdominal distention and increasing ventilator and oxygen requirements are all clinical signs which should raise the suspicion of sepsis. Disturbingly, however, in the case reported herein, there were no apparent signs of sepsis, except for mild pallor. This pallor was probably explained by a low hematocrit. Thus, the leukemoid reaction was the main indication that a septic process was underway on day seven. For this reason, it is probably important that the VLBW undergoing intravenous therapy be screened daily with CBC and platelet count for evidence of infection. A falling platelet count is particularly characteristic of Candida infection [11,12], although it often occurs in gram negative and other bacterial infections, as demonstrated in this case. A plot of the platelet count as in figure 2 may be very helpful to identify a falling platelet count. Usually, the decrement in the platelet count with systemic Candida infections is not as precipitous as the fall seen in this case of Pseudomonas sepsis (personal observation). The presence of leukocytosis, leukopenia and an elevated immature to total neutrophil ratio should also be evaluated daily. Since the VLBW is at such high risk for sepsis while receiving supportive treatments, consideration might also be given to determining C Reactive Protein when infection is suspected [14]. In summary, the case reported herein demonstrates how effective empiric antimicrobial therapy, instituted in a timely fashion, may result in successful treatment of infections which often overwhelm high risk newborns.

Bibliography

1. Gupta AK., *et al*. "Epidemiology of Pseudomonas aeruginosa Infections in a Neonatal Intensive Care Unit". *Journal of Tropical Pediatrics* 39 (1993): 32-36.

2. Leigh L., *et al*. "*Pseudomonas aeruginosa* infection in very low birth weight infants: a case—control study". *Pediatric Infectious Disease Journal* 14 (1995): 367-371.

3. Kotloff KL., *et al*. "Nosocomial sepsis in the neonatal care unit". *SJ Medicine* 82.6 (1989): 699-704.

4. Phillips I and Spencer G. "*Pseudomonas aeruginosa* cross infection due to contaminated respiratory apparatus". *Lancet* (1965).

5. Jell ard CH and Churcher GM. "An outbreak of Pseudomonas aeruginosa (pyocyanae) infection in a premature baby unit, with observation on intestinal carriage of *Pseudomonas aeruginosa* in the newborn". *Journal of Hygiene* (1967).

6. Sawyer JR., *et al*. "Karyotype Evolution in a Patient with Down Syndrome and Acute Leukemia Following a Congenital Leukemoid Reaction". *Medical and Pediatric Oncology* (1994).

7. deCastro MF., *et al*. "Transitory T— Lymphoblast ic Leukemoid Reaction in a Neonate with Down Syndrome". *The American Journal of Pediatric Hematology/Oncology* 12.1 (1990): 71-73.

8. Teng RJ., *et al*. "Transient Leukemoid Reaction in an Extremely Premature Neonate". *Zhonghua Min Guo Xiao Er Ke Yi Xue Hui Za Zhi* 35 (1994): 225-227.

9. Cohen A., *et al*. "Leukemoid reaction induced by prenatal administration of betamethasone". *Acta Paeddiatrica Japonica* 35 (1993): 534-536.

10. Gray J E., *et al*. "Coagulase— Negative Staphylococcal Bacteremia Among Very Low Birth Weight Infants: Relation to Admission Illness Severity, Resource Use and Outcome". *Pediatrics*.

11. Leibovitz E., *et al*. "Systemic Candida Infections Associated with Use of Peripheral Venous Catheters in Neonates: A 9— Year Experience". *Clinical Infectious Diseases* 14 (1993): 495-491.

12. Rowen J., *et al*. "Endotracheal colonization with Candida enhances risk of systemic candidiasis in very low birth weight neonates". *The Journal of Pediatrics* 124.5 (1994): 789-794.

13. Butler KM., *et al*. "Amphotericin B as a single agent in the treatment of systemic candidiasis in neonates". *Pediatric Infectious Disease Journal* 9 (1990): 51-56.

14. Pourcrous M., *et al*. "Significance of Serial C—Reactive Protein Responses in Neonatal Infection and Other Disorders". *Pediatrics* 92 (1993): 431-435.