Leukemoid Reaction in a Preterm Infant: diagnostic challenge in resource poor setting. Case report

Chukwudi Okoli[1], Nwaoma Nwaogu[2], and Ifeyinwa Nwafia[3]

[1]Lifeline Children's Hospital
[2]Georges Memorial Hospital Lekki Phase 1
[3]University of Nigeria Faculty of Medical Sciences and Dentistry

September 21, 2020

Abstract

A preterm neonate delivered at 28 weeks gestation, mother had antenatal steroid. Blood counts showed leukemoid reaction, blood culture, procalcitonin and peripheral blood film was normal. Baby was stabilized in the NICU, recovered and the WBC count done serially showed a downward trend. The leukemoid reaction was presumed to come from antenatal steroid use. The diagnostic and management challenges encountered in managing the infant in resource constrained environment like ours is presented alongside

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Okoli Chukwudi,[1] Nwaogu Nwaoma,[2]Nwafia Ifeyinwa[3]

[1]Lifeline Children's Hospital Lekki, Lagos Nigeria

[2]Georges Memorial Hospital Lekki,Lagos Nigeria

[3]College of Medicine University of Nigeria Ituku Ozalla Campus Enugu Nigeria

Corresponding Author

Okoli Chukwudi

Department of Haematology / Oncology

Lifeline Children's Hospital Lekki, Lagos.

drchuksokoli@yahoo.com, chukwudi.okoli@npmcn.edu.ng,

Abstract: 73

Word count: 634

WBC	White Cell Count
CRP	C-reactive protein

Running Statement: Leukemoid reaction, Preterm, Resource poor

Abstract

A preterm neonate delivered at 28 weeks gestation, mother had antenatal steroid. Blood counts showed leukemoid reaction, blood culture, procalcitonin and peripheral blood film was normal. Baby was stabilized in the NICU, recovered and the WBC count done serially showed a downward trend. The leukemoid reaction was presumed to come from antenatal steroid use. The diagnostic and management challenges encountered in managing the infant in resource constrained environment like ours is presented alongside.

Introduction

Leukemoid reaction is an extreme form of leukocytosis similar to that seen in leukemia but caused by other conditions .Leukocytosis exceeding 50,000wbc/mm^2 with increase in early neutrophil precursors in the neonatal period is known as neonatal leukemoid reaction (1).

Leukemoid reaction in the neonatal period can be associated with sepsis, congenital leukemia, bronchopulmonary dysplasia , prematurity antenatal steroid use and congenital abnormalities.(2) The incidence of leukemoid reaction in neonate range between 1.3% – 15%.(3)

We report a case of leukemoid reaction in a preterm infant and the challenges in managing such diagnosis in resource poor environment.

Case

A preterm female baby was delivered caesarean section at 28 weeks + 4days on account of antepartum hemorrhage and preterm pre labour rupture of membranes. Apgar scores were 8 and 10 in the first and fifth minute respectively. Birth Weight was 1450 grams. Baby had respiratory distress and was admitted and nursed in an incubator with CPAP in the Neonatal Intensive care Unit. Investigations such as complete blood count (CBC), C-reactive protein, blood culture, procalcitonin, and peripheral blood film were sent. Intravenous antibiotic ceftazidime and amikacin was commenced and later stopped when blood culture did not reveal any organism. Babies initial investigation results ; WBC 81,000 m/mm^3 , Neutrophils 66%, Lymphocytes 25%, monocytes 9% Hb 12.8g/dl, Platelets 311 m/mm^3 on first day of life and by the 3^{rd} day of life it was ; WBC 93,000 m/mm^3 , Neutrophils 74%, Lymphocytes 22.9%, monocytes 3.1% Hb 11.9g/dl, Platelets 260,000 m/mm^3 . The blood culture did not yield any organism, procalcitonine and CRP were normal while peripheral blood film did not show any abnormal cells and Lumber puncture was normal. Repeated CBC done alternate day showed a decreasing trend. Bone marrow aspiration and karyotype was not done. Baby continued to improve and was discharge home and has been seen for follow up with the complete blood count now normalized.

Discussion

Leukocytosis is a common finding in newborns in the first few days of life (4). This increase in leucocytes is from a surge or burst in cytokines (Granulocyte colony stimulating factor and Granulocyte-macrophage colony-stimulating factor) (5)

Leukemoid reaction have been demonstrated in up to 15% of preterm infants in the absence of any identifiable factor.(5) However it has been found to be more common in preterm infants , infections , antenatal steroid use , congenital leukemia and transient leukemoid reaction seen in Down Syndrome.(6)

In our reported case, patient's mother was on progesterone from the 7^{th} – 15^{th} week of pregnancy and had one dose of dexamethasone 48 hours prior to delivery, this history led credence to steroid use by mother being the cause of the leukemoid reaction in our case.

Our sepsis work-up in the patient was extensive despite the diagnostic difficulties and challenges faced especially in getting investigation results in real time in our environment.

Other diagnosis such as congenital leukemia was considered, however the peripheral blood film result did not reveal any abnormal cells or blast and the lactate dehydrogenase levels was not elevated. Bone marrow aspiration was not done due to financial challenges as patient could not afford it.

Our patient did not get the benefit of a karyotype as this investigation is not readily available in our environment and when available the turnaround time is in excess of 4 weeks. The index case did not have any dysmorphic features hence the possibility of transient myeloproliferative disease also known as transient abnormal myelopoiesis a form of leukemia seen in Down syndrome was excluded. (7)

Conclusion

Diagnosing leukemoid reaction in preterm infants in very challenging due to lack of adequate diagnostic equipment, cost and prolonged turnaround time of the investigations. These limitations not withstanding any WBC $>$ 30,000 in any neonate should be thoroughly investigated to exclude the possibilities of sepsis, congenital leukemia and transient myeloproliferative disorders.

Conflict of Interest: No conflict of interest to declare.

Reference

1. Hill JM, Duncan CN. Leukemoid reactions. Am J Med Sci 1941; 201:847-857.
2. Leukemoid Holland P, Mauer AM. Myeloid leukemoid reactions in children. Arch PediatrAdolesc Med 1963; 2013:568-75
3. Blanchette V, Dror Y, Chan A. Hematology. In: MacDonald MG, Mullett MD, Seshia MM, editors. Avery's Neonatology – Pathophysiology and management of the Newborn. 6th ed. Philadelphia: Lippincott Williams and Wilkins; 2005. pp. 1169–234.
4. Pesce MA. Reference ranges for laboratory tests and procedures. In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF, editors. Nelson Textbook of Pediatrics. Philadelphia: Saunders; 2008. pp. 2943–53.
5. . Rastogi S, Rastogi D, Sundaram R, Kulpa J, Parekh AJ. Leukemoid reaction in extremely low birth weight infants. Am J Perinatol. 1999;16:93–7
6. Sushanth, Avabratha KS, Tauro KJ, Shwethadri GK. Hyperleukocytosis in a neonate: A diagnostic dilemma. *Indian J Med Paediatr Oncol* . 2010;31(3):86-88. doi:10.4103/0971-5851.73596
7. Apollonsky N, Shende A, Ouansafi I, Brody J, Atlas M, Aygun B. Transient myeloproliferative disorder in neonates with and without Down syndrome: A tale of two syndromes. J Pediatr Hematol Oncol. 2008;30:860–4