Hyperleukocytosis in Newborn: A Diagnosis of Concern

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Received: 22 June 2012 / Accepted: 1 July 2013 / Published online: 9 July 2013
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Abstract Leukocytosis is well recognised in neonate; mostly it is physiological but the counts rarely exceed 30,000/mm³. Hyperleukocytosis defined as WBC count of more than 100,000/mm³ is rare and imposes a diagnostic challenge and should be investigated for leukaemia, leukocyte adhesion defect and myeloproliferative disorders. We report a classic case to highlight this entity.

Keywords Hyperleukocytosis · Leukemia · Neonate

Introduction

Leukocytosis refers to an increase in the total number of white blood cells, usually it is physiological or infectious in neonate and the counts rarely exceed 30,000/mm³. Hyperleukocytosis (WBC > 100,000/mm³) is rare and can be due to leukaemia, leukocyte adhesion defect and myeloproliferative disorders. Early diagnosis and timely intervention is needed to cure the patient.

Case

A 1 day old preterm (32 weeks gestation) female, abandoned baby was admitted to our PICU due to septic shock. On examination, the baby weighed 1.39 kg and was lethargic. Baby was immediately managed as per the protocol for septic shock. Her initial investigations revealed WBC count 101,100/mm³ (84.1 % neutrophils, 15.4 %

lymphocytes, 0.4 % monocytes); Hb 8.9 gm/dl; platelet 277,000/mm³. Retics 7.22 %, Hematocrit 26.9 %; MCV 102.8; MCH 34.1, MCHC 33.1; RDW17.7. Peripheral smear revealed all stages of myeloid series with no abnormal cells. Serum electrolytes were normal. G6PD-normal; DCT-negative. Thyroid function test was normal. HIV screen, hepatitis screen, TORCH screen and blood virology study were negative. CRP was initially positive with titre of 12 mg/L but repeated came normal after the course of antibiotics; blood culture was positive for klebsiella but MRSA screen was normal. Lumbar puncture was done and CSF analysis came normal. Cranial ultrasound was normal. CD-18⁺ for leukocyte adhesion defect came normal (CD-18⁺ 99 %). Bone marrow biopsy was done to rule out leukaemia, but it turned out to be normal.

The patient was started on IV broadspectrum antibiotics and supportive care. The baby was closely monitored for the complications of hyperleukocytosis like renal failure, intracranial hemorrhage and respiratory failure. The complete blood count was repeated every other day and showed decreasing trend. Cranial ultrasound was normal. The patient responded well to supportive care. The WBC count on 14th day of life was 11,000/mm³. The patient was thriving well and was shifted to general ward for further care.

Discussion

The total WBC count and neutrophil count in neonates younger than 1 week are physiologically higher than those of children and adults and the counts usually range from 9,000 to 30,000/mm³ [1]. Leukocytosis can be a reaction to various infectious, inflammatory, and, in certain instances, physiologic processes [1, 2]. This reaction is mediated by

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several molecules, which are released or upregulated in response to stimulatory events that include growth or survival factors (e.g., granulocyte colony-stimulating factor, granulocyte–macrophage colony-stimulating factor, c-kit ligand), adhesion molecules (e.g., CD11b/CD18), and various cytokines (e.g., interleukin-1, interleukin-3, interleukin-6, interleukin-8, tumor necrosis factor) [3]. Hyperleukocytosis (WBC count $>100 \times 10^9/L$, or $>100 \times 10^3/\mu L$) occurs in leukaemia, Leucocyte adhesion defect and myeloproliferative disorders as in Down's syndrome [1, 3]. If the neutrophil count exceeds $30,000/\mu L$ as a reaction to extrinsic factors, such as infection, it is sometimes called a leukemoid reaction. A higher frequency of leukemoid reaction (neutrophils $> 30,000/\mu L$) was reported in extremely low birth weight ($\leq 1,000$ g) infants without obvious causes of leukocytosis and in association with longer ventilatory support and a higher frequency of bronchopulmonary dysplasia (BPD) [1, 4, 5].

Infants with Down syndrome frequently have leukocytosis, neutrophilia, differential shift to the left, and immature forms (blasts) in the blood (myeloproliferative disorder) during the postnatal period [1, 6]. In most cases, this change is transient (referred to as transient myeloproliferative disorder); however, some develop acute leukemia.

Congenital leukemia occurs rarely, yet carries high mortality rates and poses special problems for the perinatologist and hematologist. Although the etiology is unknown, the presence of leukemia at birth suggests genetic abnormalities and possibly intrauterine exposures to drugs or other toxins as contributing factors. Most of the neonatal cases reported have acute non-lymphocytic leukemia, in contrast to the pre-dominance of acute lymphoblastic leukemia found in later childhood. The clinical signs of leukemia may be evident at birth with hepatosplenomegaly, petechiae and ecchymosis [7]. Leukemic cell infiltration into the skin (leukemia cutis) is commonly found when the disease appears at birth and has also been noted in still born premature infants with leukaemia [8]. Patients with hyperleukocytosis should be closely

monitored for its well-known complications like acute respiratory failure, pulmonary hemorrhage, CNS infarction, hemorrhage, splenic infarction, myocardial ischemia, renal failure due to renal vessel leukostasis [1, 5].

In our case the hyperleukocytosis was probably due to leukemoid reaction secondary to sepsis and all other diagnostic possibilities were ruled out as the peripheral smear, bone marrow biopsy and CD-18 were normal.

Conclusion

Hyperleukocytosis in neonates is a rare entity and should be thoroughly investigated to rule out possibilities of leukaemia, transient myeloproliferative disorder and leucocyte adhesion defect.

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