ImageTJH-2018-0104.R1
Submitted: 18 March 2018
Accepted: 30 April 2018

Vacuolization in Myeloid and Erythroid Precursors in a child with Menkes Disease

Menkes Hastalıklı Bir Çocukta Myeloid ve Eritroid Öncüllerde Vakuolizasyon

Seçil Sayın M.D.[1], Şule Ünal Prof.[1], Mualla Cetin Prof.[1], Fatma Gumruk Prof.[1]

[1] Hacettepe University, Faculty of Medicine, Department of Child Health and Diseases, Hematology Unit, Ankara, Turkey

Keywords: hematologic manifestations of systemic disprders, hematopoietic stem and progenitor cells< hematopoiesis, enzyme disorders <red cells, other

Conflict of Interest: The authors of this paper have no conflicts of interest, including specific financial interests, relationships, and/or affiliations relevant to the subject matter or materials included.

Corresponding Author:
Seçil Sayın, M.D.
Hacettepe University, Faculty of Medicine,
Department of Child Health and Diseases, Hematology Unit
Ankara, Turkey
Phone: +90 312 305 5000
Fax: +90 312 305 5000
E-mail Address: drsecilgonen@hotmail.

Vacuolization in Myeloid and Erythroid Precursors in a child with Menkes Disease

A five year-old boy, who was under follow-up with a clinical and biochemical diagnosis of Menkes Disease (MD) since ten months of age, was admitted with diarrhea. On examination he had a characteristic cherubic face hypopigmented, sparse hair, hepatosplenomegaly, hypotonia with brisk deep tendon reflexes. Hemogram revealed: Hb:5.5g/dL, Hct:16.2%, RBC:1.69x10^{12}/L, MCV:95.8fL, MCH:32.3pg, RDW:19.2%, WBC:2.2x10^{9}/L and platelet count;157x10^{9}/L. Serum vitamin B12 level was 575pg/mL. Serum copper level was 81µg/dL and serum zinc level was 152µg/dL. Peripheral blood smear revealed 34% PMNL, 62% lymphocyte, 4% monocytes. Bone marrow examination revealed normocellular with megaloblastic changes and widespread cytoplasmic vacuolization in myeloid and erythroid progenitors (Figure 1).

Menkes disease is a neurodegenerative disorder due to mutations in the *ATP7A* gene, which ends-up with deficiency of copper dependent enzymes.

Cytoplasmic vacuoles at myeloid and erytroid lineages have been described in patients with copper deficiency (2), Pearson Syndrome (3) and acute alcoholic intoxication (4). There have also been reports of megaloblastic changes in copper deficiency (2). Herein, we exibited both erythroid and myeloid vacuolizations and severe megaloblastic changes together in a patient with MD. All of these morphological findings in our patient were attributed to copper deficiency.

References:

1- Kaler SG, Holmes CS, Goldstein DS, Tang J, Godwin SC, Donsante A, Liew CJ, Sato S, Patronas N. Neonatal diagnosis and treatment of Menkes disease. N Engl J Med 2008; 7;358(6 PubMed):605-614.

2- Tamura H, Hirose S, Watanabe O, et al. Anemia and neutropenia due to copper deficiency in enteral nutrition. JPEN J Parenter Enteral Nutr 1994; 18: 185-189.

3- Rezan Topaloğlu, Anne S. Lebre, Erkan Demirkaya, Barış Kuşkonmaz, Turgay Coşkun, Diclehan Orhan, Aytemiz Gürgey, Fatma Gümrük. Two new cases withPearson syndrome and review of Hacettepe experience. The Turkish Journal of Pediatrics 2008; 50: 572-576.

4- Yeung KY, Klug PP, Lessin LS. Alcohol-induced vacuolization in bone marrow cells: ultrastructure and mechanism of formation. Blood Cells 1988;13:487-502.

Keywords: Menkes Disease, copper deficiency, vacuolization, bone marrow

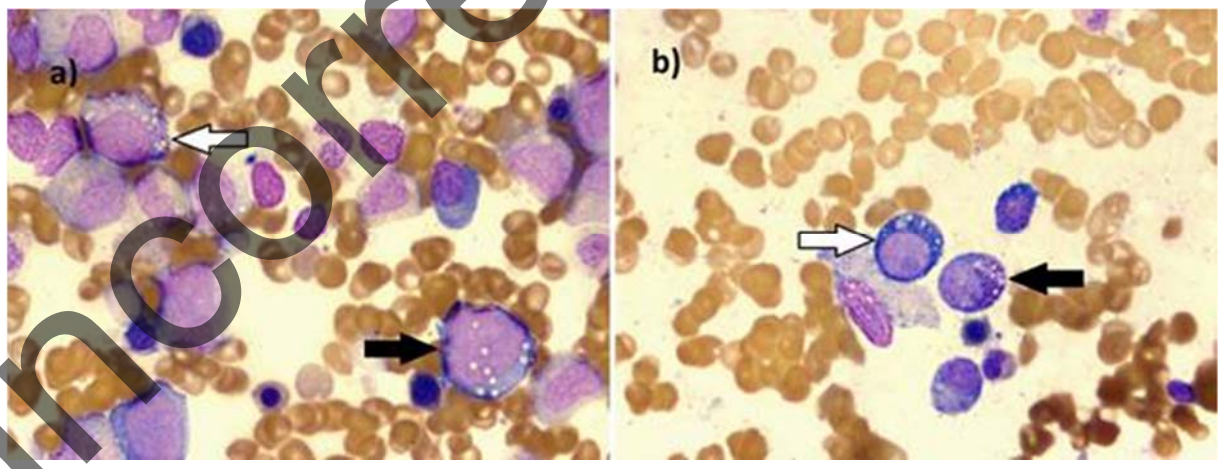

Figure 1. Bone marrow aspiration smears. (a) Cytoplasmic vacuolization in myeolid precursors (white arrow) and erythroid precursors (black arrow) (b) Cytoplasmic vacuolization in myeolid precursors (black arrow) and erythroid precursors (white arrow) (MGG-Giemsa stain, original magnification 100x)