Zinc-Induced Copper Deficiency: Masquerade of Myelodysplastic Syndrome

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Excess zinc ingestion is a rare cause of copper deficiency that can lead to sideroblastic anemia and neutropenia that often is not recognized clinically. We present a case of a 55-year-old man with a 3-week history of fatigue and generalized weakness. Laboratory testing detected macrocytic anemia (Hb, 5.9 g/dL; MCV, 107.9 fl), severe leukopenia (1.5 × 10^3/µL) with absolute neutropenia (0.2 × 10^3/µL). Serum vitamin B₁₂, red cell folate levels, serum iron, and percentage of transferrin saturation were within normal limits, but the serum ferritin level was increased (1,357 ng/mL). A bone marrow aspirate and core biopsy demonstrated decreased granulopoiesis with left-shifted granulocytic maturation and vacuolization of early granulocytes (myelocytes and few promyelocytes). Myeloblasts were not increased. Erythropoiesis was moderately increased with mild megaloblastoid changes, and cytoplasmic vacuoles (1-2 µm), mostly restricted to basophilic normoblasts and pronormoblasts, were present in 15% to 20% of erythroid precursors. The myeloid-erythroid ratio was 1:1. Megakaryocytes were normal in number and morphology. Iron stores were increased with scattered ringed sideroblasts. Iron granules in some plasma cells were noted. Karyotyping was normal. A repeat bone marrow study after 2 months showed a similar picture. Further history revealed that the patient was taking multivitamins with excess zinc. Serum analysis demonstrated increased zinc levels of 2.8 µg/mL (reference range, 0.66-1.1 µg/mL) and decreased copper levels of less than 0.1 µg/mL (reference range, 0.7-1.4 µg/mL). Replacement of multivitamins without zinc and oral copper supplementation resulted in normal serum levels in 3 months. Subsequent CBCs were normal. Thus, the described case highlights that the bone marrow morphologic manifestations of copper deficiency may mimic myelodysplastic syndrome but are sufficiently characteristic to suspect the diagnosis.

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