

## NUTRITION

## Copper deficiency after bariatric surgery

Patients who have undergone gastric bypass surgery might have an increased risk of developing copper deficiency, which can cause severe gait abnormalities and anemia. If this condition is not recognized and treated in time, the neurological damage may become irreversible, as the two cases discussed in this article illustrate.

Copper is a vital trace nutrient that, as a cofactor of various oxidative enzymes, is essential for hematopoiesis and normal function of the nervous system, among other bodily functions. Low copper levels are often attributable to insufficient gastrointestinal absorption, which is a well-known consequence of gastric bypass surgery. Nevertheless, multivitamin-mineral preparations that are routinely prescribed after gastric bypass surgery do not contain copper. Moreover, as copper

deficiency is a rare condition, clinicians might not recognize it in time. Griffith and colleagues from Emory University Hospital, Atlanta, GA, describe two patients whose severe copper deficiency was diagnosed more than a decade after gastric bypass surgery; by that time, both patients had serious neurological symptoms.

At presentation, one patient had painful paresthesias in both feet, and the other had numbness and paresthesias in her feet and hands. Both patients had extremely low serum copper levels (0.628  $\mu\text{mol/l}$  and 0.314  $\mu\text{mol/l}$ , respectively), anemia, severe neutropenia and unsteady gait that necessitated use of a wheelchair. Intravenous copper supplementation (2.4 mg daily for 6 days) followed by intravenous copper infusions (2.4 mg weekly) that were combined with oral supplementation (8 mg daily) resulted in normalization of serum

copper levels and hematologic abnormalities within 4–6 weeks in both patients. Their paresthesias, however, did not completely resolve during the same period.

As the authors point out, clinicians should be aware that copper deficiency is a potential complication of gastric bypass surgery, especially as this treatment is used increasingly in the US for patients with morbid obesity. They suggest that copper levels are monitored after gastric bypass surgery, and emphasize the need for studies on the epidemiology and optimal treatment of copper deficiency.

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