

Acquired acrodermatitis enteropathica secondary to sleeve gastrectomy

Sir,

Acrodermatitis enteropathica is a rare disease caused by impaired absorption of zinc from gastrointestinal tract which can either be genetic (congenital) or acquired, or by poor consumption of the mineral. The classical triad of acrodermatitis enteropathica includes skin lesions predominantly localized on acral and periorificial regions, diffuse alopecia and watery, non-bloody diarrhea.¹

Here we report a case of acquired acrodermatitis enteropathica after sleeve gastrectomy and review of the literature. This review was prepared by a comprehensive search of the PubMed and Google scholar databases. The following terms “acrodermatitis enteropathica and bariatric surgery” and “acrodermatitis enteropathica and sleeve gastrectomy or mini gastric bypass or duodenal switch or gastric balloon or gastric banding or biliopancreatic diversion or Sadi’s surgery,” which are the types of bariatric surgery, have been used.

A 40-year-old woman presented to our clinic with complaints of mouth ulcers, redness and blisters on her hands, feet and legs for 3 months. She had been treated with systemic methylprednisolone and topical clobetasol propionate approximately for 3 months by different clinics with the diagnosis of drug eruption and erythema multiforme. We ascertained that before all these complaints, she had diarrhea that was treated with ornidazole with the diagnosis of

infectious gastroenteritis. Two weeks after her recovery from diarrhea, her dermatological complaints had appeared. The patient had a history of sleeve gastrectomy 4 years ago. She is a social drinker and a 20 pack-year smoker. The patient lost 46 kg after sleeve gastrectomy which is 48% of her preoperative weight. She was also on follow up for epilepsy since a year. On cutaneous examination, irregular-edged, sharply demarcated, erythematous, scaly, hemorrhagic crusted, eczematous plaques,



Figure 1a: Eczematous plaques located bilaterally on the dorsal surfaces of the hands and feet extending to the pretibial area.

several tense blisters and cracks were observed bilaterally on her hands and on dorsal side of the feet extending to the pretibial area [Figure 1a]. Perioral dermatitis and cheilitis were also seen [Figure 1b]. However, the anogenital region, skin folds, conjunctiva and nails were normal. Diffuse alopecia was present. On histopathological examination, the skin biopsy tissue showed hyperkeratosis and focal parakeratosis, epidermal eosinophilia and cytoplasmic pallor in the upper layer of keratinocytes. The granular layer was absent [Figure 2]. According to the laboratory tests, the patient's plasma zinc level was 46 $\mu\text{g}/\text{dL}$ (reference range = 70–114 $\mu\text{g}/\text{dL}$). In addition, microcytic hypochromic anemia (hemoglobin = 9.0 g/dL), fecal occult blood positivity (fecal occult blood = 258; reference range = 25–50), hypoalbuminemia (albumin = 3.4 g/dL; reference range = 3.9–4.9) and hypoproteinemia (total protein: 6.03; reference range = 6.6–8.7) were detected. Serum electrolytes (Na, K, Cl), total and direct bilirubin, kidney and liver function tests were normal. The levels of copper, vitamin B12 and folate were also normal. The test results and

blood smear were evaluated by an internal medicine specialist and the anemia was considered as related to acrodermatitis enteropathica. Oral elementary zinc replacement therapy at the dosage of 100 mg/day was started, and a zinc-rich diet was recommended. The plasma zinc level was 77 $\mu\text{g}/\text{dL}$ in the second week and 87 $\mu\text{g}/\text{dL}$ in the third week. Significant improvement was observed in the clinical presentation after 2 weeks therapy [Figure 3a and b]. Therefore, the diagnosis of acquired acrodermatitis enteropathica was considered due to the clinical and histopathological findings along with the low plasma zinc level and the response to zinc therapy.

Acrodermatitis enteropathica is a rare disease caused by zinc deficiency. The disease is divided into two groups: the congenital form occurs as a result of an inborn error of zinc metabolism (due to mutation of the SLC39A4 gene, results in a dysfunction of the ZIP4 protein) that is inherited as an autosomal recessive disorder and, the acquired form occurs as a result of inadequate dietary zinc (e.g. alcoholism, anorexia



Figure 1b: Oral and perioral blisters and cheilitis picture

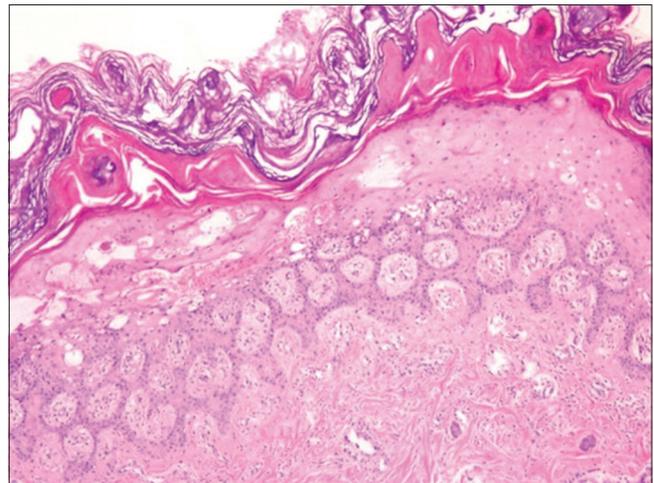


Figure 2: Focal parakeratosis, psoriasiform hyperplasia, and cytoplasmic pallor in the upper layers of keratinocytes



Figure 3a: Complete resolution of the acral eczematous lesions with postinflammatory hyperpigmentation after zinc replacement therapy

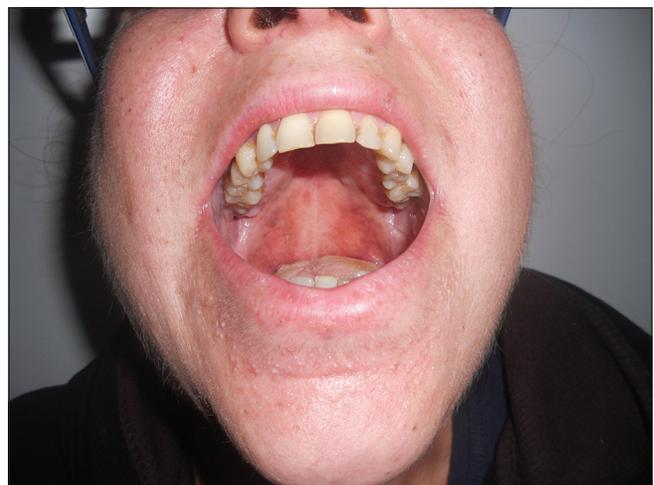


Figure 3b: Complete resolution of the oral-perioral blisters and cheilitis picture after zinc replacement

Table 1: The cases of acquired acrodermatitis enteropathica after bariatric surgery in the literature

Literature	Sex of the case	Age of the case	Type of bariatric surgery	Onset of the symptoms after surgery	Time of the diagnosis after the dermatological symptoms
Bae-Harboe <i>et al.</i> ¹	Male	62	Gastric bypass	3 years	4 weeks
Rana <i>et al.</i> ⁵	Female	39	RYGB	13 years	3 years
Mankaney and Vipperla ⁶	Female	54	RYGB	8 years	4 months
Monshi <i>et al.</i> ⁷	Female	29	SG, subsequently modified RYGB	7 years	4 months
Lewandowski <i>et al.</i> ⁸	Female	43	RYGB	6 months	2 months
Vick <i>et al.</i> ⁹	Female	38	Gastric bypass	10 years	3 months
Cunha <i>et al.</i> ¹⁰	Female	30	SG and jejunioleal bypass*	7 months	
Shahsavari <i>et al.</i> ¹¹	Male	39	RYGB	6 years	
Weismann <i>et al.</i> ¹²	Female	29	Small intestine bypass	14 months	
This case	Female	40	SG	4 years	3 months

*A non routine combination of techniques in BS. RYGB: Roux-en-Y gastric bypass, SG: Sleeve gastrectomy, BS: Bariatric surgery

nervosa) or chronic diseases such as chronic diarrhea, Crohn's disease, celiac disease and pancreatic insufficiency. The clinical presentation and histopathology of acquired and congenital acrodermatitis enteropathica are similar. Acrodermatitis enteropathica, belonging to the family of necrolytic erythema and also referred as "deficiency dermatoses," is a common finding in many nutritional deficiencies and is not specific. In addition, multiple deficiencies can be seen at the same time and may manifest in the same clinical presentation. This results in difficulty of isolating a single cause for these cases.

Excess body weight is a global public health problem and the prevalence of bariatric surgeries is rising. Fortunately, most of the deficiencies are subclinical, and dermatological manifestations are rare. Although there are many bariatric surgery procedures, bariatric surgery methods can be divided into two main groups based on the primary mechanism of action as follows: restrictive (e.g., gastric banding) and malabsorptive (e.g., biliopancreatic diversion). Mixed procedures (e.g., Roux-en-Y gastric bypass) are also described. In general, postoperative macronutrient and micronutrient complications are more common in patients undergoing malabsorptive procedures rather than restrictive ones.² There are many studies that have documented that zinc deficiency or decreased plasma zinc concentrations in long-term follow-up of the bariatric surgeries were often subclinical.³ Regardless of whether the patient takes zinc supplements routinely, zinc deficiency is possible, particularly if essential sites of absorption (duodenum and proximal jejunum) are bypassed. Therefore, patients with Roux-en-Y gastric bypass are especially susceptible to zinc deficiency.⁴ Table 1 shows that acquired acrodermatitis enteropathica is more common in patients undergoing malabsorptive procedures. The disease develops years after surgery and can be diagnosed months after symptoms appear. As recommended in "American Society for Metabolic and Bariatric Surgery (ASMBS) Nutrition Guidelines: Micronutrients," post Roux-en-Y gastric bypass and post biliopancreatic diversion/duodenal switch patients should be screened at least yearly for zinc deficiency.¹³ We also recommend that the serum levels of

the following micronutrients should be monitored before the operation and yearly after the operation: vitamins B1 and B12, folate, iron, vitamins A, D, E and K, calcium, copper and zinc.

In conclusion, acquired acrodermatitis enteropathica should be kept in mind as one of the long-term side effect of the bariatric surgeries due to zinc malabsorption. The present report indicates that long-term postoperative follow-up is mandatory for a patient undergoing bariatric surgery in order to minimize nutritional deficiencies.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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