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CASE REPORT | INFLAMMATORY BOWEL DISEASE

Vitamin C Deficiency: An Under-Recognized Condition in Crohn's Disease

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ABSTRACT

Although many nutritional deficiencies are associated with Crohn's disease (CD), vitamin C deficiency is less frequently diagnosed and reported despite its prevalence. Vitamin C deficiency may be more difficult to diagnose in patients with CD because symptoms from active CD may overlap with scurvy. Identification of the deficiency is vital, however, because treatment can lead to swift, marked resolution of symptoms. We present a patient with long-standing CD who presented with gum bleeding and was found to have scurvy.

INTRODUCTION

Several nutritional deficiencies are well documented in patients with Crohn's disease (CD), the most common being iron, vitamin B12, vitamin D, zinc, and calcium.[1] Although less frequently acknowledged, vitamin C (ascorbic acid) deficiency remains a fairly prevalent yet underdiagnosed problem in CD. Previous smaller studies of patients with CD have noted inadequate vitamin C intake and suboptimal serum ascorbic acid levels in 22%–70% and 15%–84%, respectively.[2–6] Vitamin C deficiency is a prevalent, easily reversible condition in CD. Scurvy, or symptomatic vitamin C deficiency, may overlap with active CD. Thus, a more concerted effort should be made to identify this deficiency in these at-risk patients. We report a woman with a medical history of long-standing CD who presented with gum bleeding and was found to have vitamin C deficiency.

CASE REPORT

A 58-year-old woman with a 47-year history of stricturing ileocolonic Crohn's disease after remote ileocolonic resection (1 year after initial presentation), Hashimoto's thyroiditis, and quiescent Sjogren syndrome presented to the clinic with gum bleeding for several months. She denied any recent change in gastrointestinal symptoms, including xerostomia, oral ulcers, dysgeusia, worsened oral intake, bloating, or obstructive symptoms. She had been maintained on a low-residue, low-fermentable oligo-, di-, mono-saccharides and polyols diet. After her remote surgery, her CD had remained in remission. Her only current medications were cholestyramine 4 g twice daily for possible bile acid diarrhea and mesalamine 250 mg 4 times daily. She did not take a multivitamin. Harvey-Bradshaw index was 5, notable for mild abdominal pain and 3 loose stools a day. A colonoscopy 5 months earlier showed total aggregate simple endoscopic score of 4, with $<$0.5 cm aphthous ulcers (Rutgeerts i1) in the ileum and benign-appearing moderate stenosis 2 cm in length, 1 cm distal of the previous ileocecal anastomosis (Figure 1). Biopsies of the ileal aphthous ulcers showed normal small intestinal mucosa.

Physical examination revealed gingival swelling and bleeding, and slightly distended abdomen, but was otherwise unremarkable. Laboratory workup comprised of complete blood count, complete metabolic panel, iron studies, thyroid studies, vitamin D, vitamin B12, and folate, all of which were within the normal limits. C-reactive protein was $<$0.4 mg/dL, erythrocyte sedimentation rate was 37 mm/hr, and fecal calprotectin was 76 μg/g. However, her vitamin C level was found to be $<$5 μmol/L. She was initiated on 100 mg ascorbic acid 3 times a day with resolution of her symptoms within a few weeks. She failed to return for a follow-up—thus, her vitamin C levels were unable to be checked to confirm adequate supplementation.

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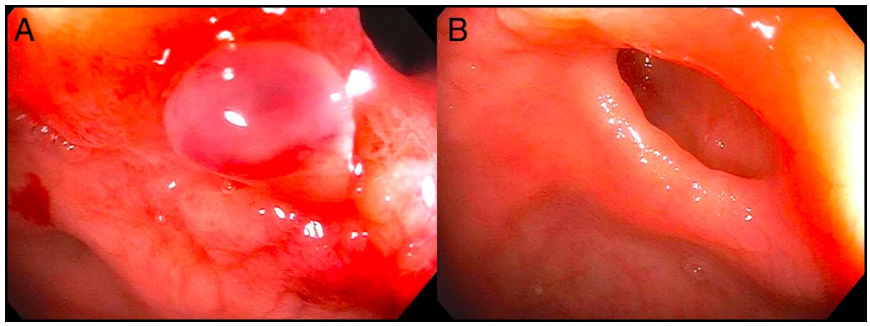

Figure 1. Colonoscopy showing (A) aphthous ulcers in the ileum and (B) benign-appearing moderate stenosis.

DISCUSSION

Although scurvy is one of the oldest conditions known to man,[7] the disease has seldom been reported in the modern developed world, except in at-risk populations. Among those at risk are patients with poor vitamin C intake and malabsorptive processes, notably patients with CD. A few small studies have reported the prevalence of inadequate vitamin C intake and low serum vitamin C levels in patients with CD. In 137 patients with CD, Imes et al[3] reported that 28% of patients had insufficient vitamin C intake and that 15% and 37% had low serum and leukocyte ascorbate levels, respectively. Furthermore, ascorbate levels were not associated with disease severity. In a study involving 54 patients with quiescent CD, Filippi et al[2] noted that 70%–80% of patients had low vitamin C consumption and 84% of patients had low plasma concentration of vitamin C. Smaller reports have described low dietary vitamin C in 22%–23% and low leukocyte ascorbate level in up to 70% of patients.[4–6] Whether luminal disease activity affects vitamin C absorption or whether vitamin C deficiency exacerbates luminal inflammation has yet to be studied. Although there is notable variability among these studies, the overarching message is that patients with CD, independent of disease activity, are at risk of vitamin C deficiency.[8,9]

In CD, scurvy is believed to arise primarily from insufficient consumption and malabsorption of vitamin C. To decrease gut motility and bacterial fermentation from fiber, low-residue diets are often recommended in patients with active CD; these regimens typically lack fresh fruit and vegetables, the 2 main sources of vitamin C.[2] However, these diets allow for consumption of dairy, meat, and breads/cereals, which may explain why our patient lacked other nutritional deficiencies. Furthermore, vitamin C is chiefly absorbed in the jejunum and ileum, frequent sites of Crohn's involvement.[10] There are no data to suggest cholestyramine—which our patient was taking—interferes with vitamin C absorption.

The sequelae of vitamin C deficiency can masquerade as active CD itself and include arthralgias, anemia, fatigue, edema, oral ulcers, bleeding, and poor wound healing. More specific symptoms include follicular hyperkeratosis, perifollicular hemorrhage, and gingivitis, which was seen in our patient.[11] The most common laboratory abnormalities are a normochromic, normocytic anemia, and, of course, low serum or leukocyte ascorbic acid levels. Scurvy manifests clinically because vitamin C is a reducing agent or cofactor, playing a central role in collagen synthesis, prostaglandin and prostacyclin metabolism, reduction of free radicals, and iron absorption.[12,13]

Scurvy is ultimately a clinical diagnosis. However, serum vitamin C levels below 20 μmol/L—less than 11.4 in the case of severe deficiency, as was seen in our patient—can support the diagnosis.[11] Treatment is 300 mg ascorbic acid divided into multiple daily doses. Notably, treatment with supplementation results in rapid resolution of symptoms within weeks.[12]

In conclusion, our case and review of the literature highlight that vitamin C deficiency is often underappreciated in patients with CD, given the overlap in symptoms between scurvy and CD. Because CD carries marked morbidity and complications, identifying vitamin C deficiency is low-hanging fruit that can lead to rapid resolution of symptoms. Further studies examining vitamin C deficiency in larger CD cohorts—especially regarding disease severity and luminal disease—are warranted.

DISCLOSURES

Author contributions: BL Gordon wrote the article and is the article guarantor. J. Galati, S. Yang, PO Katz, and EJ Scherl approved the final manuscript.

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Informed consent could not be obtained from patient despite several attempts. All identifying information has been removed from this case report to protect patient privacy.

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