Micronutrient Deficiency in IBD; An Underappreciated Complication

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Case Description

History of Present Illness:

PR is 61-year-old female with history of endometrial cancer status post hysterectomy, ulcerative colitis recently started on Entyvio, and traumatic splenectomy who presented to Maine Medical Center with six month of weakness, failure to thrive, diarrhea, and weight loss.
She reported ongoing poor oral intake and had lost 60lbs over that six-month period. She described a several-week history of watery, nonbloody/nonmelanous diarrhea with intermittent nausea and cramping, but no profound abdominal pain. She also reported some exertional fatigue, tiring after climbing three flights of stairs. She also admitted to emotional challenges after the passing of her mother five months prior to admission.

Social History

Lives in Rangeley, ME with husband. No children
No tobacco or EtOH use
Occasional marijuana, 3-4x/week

Medications

Vedolizumab
Prednisone
Dicyclomine
Ondansetron
Mirtazapine
Potassium Chloride

Physical Exam:

BP 98/66 | HR 104 | T 36.9 °C | Resp 16 | Wt 58.7 kg | SpO2 100% |

General: Awake, alert, oriented. No distress. Lying in stretcher
Eyes: No scleral icterus. No conjunctival injection
HENT: Dry membranes moist. No oral lesions. Normocephalic, atraumatic.
Neck: No lymphadenopathy or masses. No nuchal rigidity.
Cardiovascular: Regular rhythm, tachycardic. No murmurs. 2+ pulses
Pulm: No accessory muscle use. Clear to auscultation bilaterally with good air entry.
GI: Non-distended. Normoactive bowel sounds. Soft, non-tender. No guarding, rebound or rigidity
Musculoskeletal: Full painless range of motion. No joint swelling or erythema.
Neurological: Cranial nerves II-XII intact. No focal deficits.
Skin: No rashes or lesions. Trace peripheral edema
Psych: attention normal, thoughts organized, short term memory intact

Laboratory Data

9.4 / 4.8 / 75 / 27.2	134 / 3.4	99 / 24	18 / 0.6 / 80

MCV 97.1

Calcium 7.2
Mg 1.5
Phos 2.4

Protein 5.0
Albumin 1.8
Bilirubin 1.2
AST 8
ALT 21
Alk Phos 92
INR 1.4

CRP: 100.1
ESR: 1

Calprotectin 296
C diff: negative
Stool cx: negative
Stool O&P: negative
TTG Ab:1.2
FOBT: positive

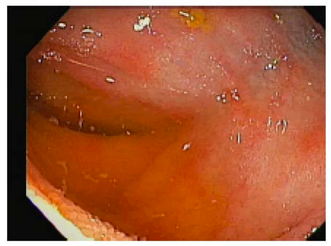
Vit D: 33
Vit B12: 1239

Iron 55
Vit A 5.2 (32-78)
Vit E 7.7 (5.5-17)
Vit C <0.1 (0.4-2.0)
Copper 334 (810-1990)
Zinc 33 (60-130)

Colonoscopy

3 Appendiceal orifice/cecum

4 Terminal ileum



Endoscopic Findings

- Mild erythema of terminal ileum
- Pseudopolyposis throughout ascending, transverse, and descending colon
- Intervening mucosa without erythema, ulceration
- No evidence of active colitis
- Sparing of rectum and rectosigmoid colon

Pathology

- Terminal Ileum: Focal active ileitis with villous atrophy
- Ascending/Transverse Colon: mild/moderate chronic active colitis with cryptitis and crypt abscess formation
- Descending colon: Chronic inactive colitis
- Rectum/Sigmoid: Chronic inactive colitis

Micronutrient Deficiencies

Micronutrient	*Pathophysiology*	*Symptoms*	*Prevalence*
B1 (thiamine)	Unclear	Peripheral Neuropathy Cardiomyopathy	CD: 32% UC: Unknown
B9 (folate)	Poor Intake Malabsorption Medications (MTX, Sulfasalazine)	Megaloblastic Anemia Atrophic Glossitis Stomatitis Depression	CD: 0-26%
B12	Ileitis Ileal Resection	Megaloblastic Anemia Pancytopenia Peripheral Neuropathy Dementia	CD: 11-22% > 60cm ileal resection: 100% 20-40cm resection: 48%
C	Poor Intake	Poor Wound Healing Gingivitis Scaly Skin Arthralgias	CD: > 50%
A	Poor Intake Fat Malabsorption Bile Salt Deficiency	Poor Wound Healing Night Blindness Xeropthalmia	IBD: 0-44%
E	Fat Malabsorption Bile Salt Deficiency	Neuropathy Retinopathy Anemia	Unknown
D	Poor Intake Fat Malabsorption Decreased Sun	Osteopenia	CD: 22-70% UC: 45%
K	Poor Intake Fat Malabsorption Bile Salt Deficiency	Abnormal Bone Metabolism Bleeding Cartilage/arterial calcification	Unknown CD > UC
Calcium	Vitamin D Deficiency Hypomagnesemia Poor Intake Steroid Use	Decreased Bone Density Hypoparathyroidism Hypertension Muscle Cramps Prolonged QTc	IBD: 80-86%
Magnesium	Poor Intake Diarrheal Losses	Bone Health Hypocalcemia	Unclear
Iron	Chronic Blood Loss Poor Intake Impaired Iron Metabolism	Microcytic Anemia Fatigue Glossitis Restless Leg Syndrome	IBD: 36-90%
Zinc	Chronic Diarrhea Malabsorption	Poor Wound Healing Acrodermatitis Poor Taste	Unclear
Selenium	Post-TPN	Cardiomyopathy Cartilage Degeneration Hypothyroidism	Unknown Low in both UC/CD
Copper	Malabsorption Zinc Ingestion	Neuropathy Pancytopenia	Unknown

Hospital Course

- Patient was well-appearing on admission, but quickly deteriorated over her two-week course
- Infectious etiologies were ruled out
- Colonoscopies showed mild to moderate colitis, patient remained on IV steroids
- Due to initial concerns for food aversion and depression, enteral feeds were held for fear of insurance coverage
- Labs ultimately revealed severe macro- and micronutrient deficiencies, enteral feeds were initiated but poorly tolerated
- Patient suffered nutritional hypoglycemia requiring dextrose fluids
- Patient had ongoing pancytopenia leading to bone marrow biopsy which showed no evidence of malignancy
- Prior to TPN initiation, the patient suffered a small bowel perforation → shock → transition to comfort care

Clinical Implications

Given ileal findings on colonoscopy, profound malnutrition, and small bowel inflammation/fistula on CT, Crohn's disease was the most likely etiology despite her previous diagnosis of ulcerative colitis. There are no definitive studies linking micronutrient deficiencies to bowel perforation, but anemia due to iron deficiency has been shown to worsen malabsorption, vitamin D supplementation has been shown to decrease hospitalizations, and vitamin B12 deficiency may increase the likelihood of surgery in Crohn's patients [3,6]. While unrecognized small bowel disease and glucocorticoid use likely lead to this patient's bowel perforation, it remains possible that nutritional deficiencies also contributed towards bowel thinning and eventual perforation. Although enteral nutrition was previously thought inferior to steroids in the treatment of adult Crohn's disease, recent evidence shows similar remission rates among the two therapies. Therefore, in addition to current biologic agents, early enteral nutrition should be considered as a means of targeting both inflammation and malnutrition in Crohn's disease. [4]

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