Transient Vitamin B_{12} Malabsorption In A Patient With Mixed Nutritional Anemia

Inez Pagnotta, M.D.

Abstract: A 47-year-old nonvegan woman presented to my rural family practice with an anemia and was found to be deficient in iron, folate, and vitamin B_{12}. Initial vitamin B_{12} malabsorption was documented by Schilling test and was reversed by nutritional repletion alone. This case illustrates that simple lack of intrinsic factor is not the only cause of vitamin B_{12} malabsorption in primary care patients and that inadequate diets may cause significant pathological consequences in ambulatory patients. (J Am Bd Fam Pract 1989; 2: 130-3.)

The most common cause of vitamin B_{12} malabsorption in North Americans is lack of intrinsic factor or small intestinal disorder.[1] Reports of dietary deficiencies of B_{12} in nonvegans or dietary deficiencies of other nutrients inducing B_{12} malabsorption are unusual.

This case illustrates that nutritional inadequacies in ambulatory patients can cause severe anemia and B_{12} malabsorption.

History

A 47-year-old white woman came to my rural family practice in May 1987 complaining of anxiety, fatigue, generalized abdominal pain and bloating, and leg swelling. Her symptoms had begun 1 month previously, but she was able to maintain her full-time job at a cosmetics factory despite recent distress over discovery of a marital infidelity by her husband, a chronic alcoholic. She denied alcohol use herself.

For the past 2 years, the patient had followed what she called the "grapefruit diet." This consisted of unrestricted breakfast, dinner, and snacks, but no lunch except for a grapefruit. She described choosing a variety of vegetables and eating meat regularly in normal portions. Two years ago her weight was 190 pounds (85.5 kg), but it fluctuated between 125 and 140 pounds (56.25–63 kg) for 4 months prior to her visit.

She had been under psychiatric treatment for chronic depression for the past 10 years; her only medications were imipramine, 100 mg at bedtime and alprazolam, 0.5 mg 3 times a day.

She had no recent hospitalization and her family history was noncontributory. She denied melena, hemetemesis, diarrhea, hemoptysis, and dyspnea.

She had had no menstrual period for 6 months; a recent gynecologic examination excluded pregnancy, and the amenorrhea was believed to reflect the onset of menopause. She was the mother of a 20-year-old.

Examination revealed a pale, sad woman without orthostasis. Her weight was 130 pounds (58.5 kg); height, 5 feet 1 inch (ideal weight 110 pounds [49.5 kg]). Oral mucosa, chest, cardiac, and abdominal examinations were unremarkable. Anorectal examination was also normal, and her stool was brown, of normal consistency, and tested negative for blood. There was 3+ pitting edema of the lower extremities bilaterally. No neurological abnormalities were detected.

Her outpatient hematocrit was 19 percent, hemoglobin 5 gms/dL, with normocytic, hypochromic indices (mean corpuscular volume 83 μm^3, mean corpuscular hemoglobin 25 g/dL). The patient was hospitalized. Urine analysis showed 1+ protein without casts; 24-hour urinary excretion of protein and creatinine were normal. White-cell count, differential, platelets, prothrombin, and partial thromboplastin times were normal. Serum transferrin was estimated at 228 mg/dL (normal 200–400),[2] and thyroid function tests were normal. Initial laboratory values are shown in Table 1, and selected tests before and after treatment are presented in Table 2.

From a private practice. Address reprint requests to Inez Pagnotta, M.D., 2 Willett Street, Fort Plain, NY 13339.

J Am Board Fam Pract: first published as 10.3122/jabfm.2.2.130 on 1 April 1989. Downloaded from http://www.jabfm.org/ on 23 April 2024 by guest. Protected by copyright.

Table 1. *Initial Laboratory Values, May 1987.*

System	Component	Initial Values	SI Values
S	albumin	2.6 g/dL	26 g/L
S	protein, total	5.1 g/dL	51 g/L
S	iron	13 μg/dL	2 μmol/L
S	iron-binding capacity	339 μg/dL	60 μmol/L
S	folate	2.1 ng/dL	4 nmol/L
S	vitamin B_{12}	160 pg/mL	118 pmol/L
P	cholesterol	149 mg/dL	3.85 mmol/L
S	BUN	10 mg/dL	3.57 mmol/L
S	lactate dehydrogenase (LD)	134 U/L	2.23 μkat/L
S	aspartate/aminotransferase (ASAT) (SGOT)	25 U/L	0.41 μkat/L
S	alkaline phosphatase	88 U/L	1.46 μkat/L

An air-contrast barium enema, barium swallow with small bowel follow-through, and a sonographic study of the liver and pancreas were normal. Part I of the Schilling test showed depression of 24-hour B_{12} excretion at 6.6 percent (normal is 7 percent or greater).

Treatment and Course

Because of progressive fatigue, the patient received three units of packed red cells, and her hematocrit increased to 32 percent. A regular diet was prescribed with multivitamin supplementation, plus folic acid 1 mg orally daily, iron sulfate 325 mg orally twice daily, and monthly subcutaneous injections of B_{12} as 100 μg cyanocobalamin (after 1 week of daily injections).

The leg edema resolved after several days, and the patient returned to full-time work within 2 weeks. Seven months after hospitalization, her hematocrit was 42 percent with normal red-cell indices; serum B_{12}, folate, iron, albumin, and protein levels were normal (Table 2). Repeat Schilling test Part I, 24-hour B_{12} excretion, was 13.7 percent, well within normal limits.

Parenteral B_{12} was then stopped, as was all oral vitamin supplementation. Three months later, her hematocrit and indices remained normal. The pa-

Table 2. *Selected Tests before and after Treatment.*

	Initial Values (May 1987)		Seven Months after Supplementation (December 1987)		Normal Values	
	Present Unit	SI Values	Present Unit	SI Values	Present Unit	SI Values
Hemoglobin (g/dL)	5	50 g/L	14	140 g/L	12.3–15.5	123–155 g/L
Hematocrit (%)	19	0.19	42	0.42	37–47	0.37–0.47
Iron (μg/dL)	13	2 μmol/L	111	19.88 μmol/L	46–186	8.26–33.31 μmol/L
Iron-binding capacity (μg/dL)	339	60 μmol/L	265	47.46 μmol/L	217–440	38.86–78.80 μmol/L
Folate (ng/mL)	2.1	4 nmol/L	35	79.31 nmol/L	4–20	9.06–45.32 nmol/L
B_{12} (pg/mL)	160	118 pmol/L	660	486 pmol	200–900	147–664 pmol/L
Albumin (g/dL)	2.6	26 g/L	3.9	39 g/L	3.2–4.8	32–48 g/L
Total protein (g/dL)	5.1	51 g/L	6.5	65 g/L	6–8.5	60–85 g/L
24-hour B^{12} excretion in Schilling test Part I	6.6%	0.066	13.7%	0.137	7% or greater	≥0.07

J Am Board Fam Pract: first published as 10.3122/jabfm.2.2.130 on 1 April 1989. Downloaded from http://www.jabfm.org/ on 23 April 2024 by guest. Protected by copyright.

tient also stopped taking imipramine and alprazolam and claimed adherence to a balanced diet despite generalized feelings of apathy. Menses did not return, and her weight did not fluctuate more than 5 pounds (2.25 kg) from a 130-pound base (58.5 kg) during the follow-up year.

Discussion

Dietary B_{12} deficiency in strict vegetarians[3] and nutritionally induced megaloblastic anemias in alcoholics and in seriously disturbed psychiatric patients[4-6] have been described in the literature. Although my patient had received long-term outpatient psychiatric medication for depression, she was able to hold a full-time job and was not alcoholic or vegetarian; hence, she would not be considered ordinarily at risk for development of nutritional anemia.

Her diet history was reviewed by a dietician who thought it unlikely to be deficient in B_{12}; however, on closer scrutiny, it is possible that the patient did not fully reveal her dietary weight-loss schemes. Moreover, dietary deficiency of folate is easy to achieve because body stores are limited, and sources of folate are easily destroyed by overcooking vegetables.[7]

While medications such as phenytoin and phenobarbital can induce megaloblastic anemia, this patient's imipramine and alprazolam are not known to impair B_{12} or folate utilization. Chronic depression and home problems might have worsened her poor eating habits, which suggest that her low level of folate on hospital admission probably was nutritionally induced.

Iron deficiency was also found on admission and might have resulted from earlier unrecognized menstrual and gestational blood losses, but it probably also was compounded by dietary indiscretions. Gastrointestinal blood loss, the most common cause of iron deficiency in her age group, was excluded by normal radiographic studies.

Gradual depletion of iron and folate might have induced gastrointestinal changes that caused B_{12} malabsorption. To absorb B_{12} normally, gastric parietal cells must secrete intrinsic factor; pancreatic secretion is necessary for release of B_{12} from food and R binders; and normal ileum must be present with B_{12} intrinsic factor receptors. Iron and folate deficiencies can cause atrophic gastritis,[1] which impairs intrinsic factor production. The intestinal mucosa may also be sufficiently damaged by folate deficiency and protein caloric malnutrition so that absorption of several nutrients, including B_{12}, may be impaired.[8]

By itself, a low serum B_{12} level does not prove B_{12} deficiency. Folate deficiency may cause a maldistribution of B_{12} that can correct when folate alone is replenished.[4] Supplementation with folate and subsequent monitoring of B_{12} levels were not undertaken in this patient in view of the added testing costs to her if B_{12} failed to correct. Parenteral B_{12} was chosen over oral B_{12} supplementation because it was unclear how long it would take for normal intestinal absorption to resume, and it was important to avoid neurologic sequelae of progressive B_{12} depletion.

Whether the patient had total B_{12} deficiency is unclear, but malabsorption of B_{12} was shown by the first Schilling test. Adding intrinsic factor, pancreatic enzymes, or antibiotics are all modifications of the Schilling test that were considered, but after nutritional repletion alone, B_{12} malabsorption was completely reversed and demonstrated by the second Schilling test.

Because of normal upper gastrointestinal and small bowel barium studies, in the absence of steatorrhea, and with the ability of the patient to maintain a stable weight and normal folate levels without a gluten-free diet, it is unlikely that she had malabsorption secondary to any intestinal syndrome.

Conclusion

It seems likely that this patient's anemia was rooted in dietary deficiencies. She suffered a malabsorption of B_{12} that reversed when her nutrition improved. The pathological consequences of depression-associated anorexia in ambulatory patients should not be underestimated. Family physicians may encounter patients with severe dietary inadequacies that cause significant anemias or lead to malabsorption of essential nutrients, which compounds the anemia.

References

1. Wintrobe MM. Clinical hematology. Philadelphia: Lea and Febiger, 1981:566,579.
2. Blackburn GL, Bistrian BR, Maini BS, Schlamm HT, Smith MF. Nutritional and metabolic assessment of the hospitalized patient. J Parenter Enteral Nutr 1977; 1:11-22.
3. Hines JD. Megaloblastic anemia in an adult vegan. Am J Clin Nutr 1966; 19:260-8.

J Am Board Fam Pract: first published as 10.3122/jabfm.2.2.130 on 1 April 1989. Downloaded from http://www.jabfm.org/ on 23 April 2024 by guest. Protected by copyright.

4. Forshaw J, Moorhouse EH, Hardwood L. Megaloblastic anaemia due to dietary deficiency. Lancet 1964; 1:1004-8.
5. Pollycove M, Apt L, Colbert M. Pernicious anemia due to dietary deficiency of vitamin B_{12}. N Engl J Med 1956; 255:164-9.
6. Godt P, Kochen M. Vitamin B_{12} deficiency due to psychotic-induced malnutrition. Lancet 1976; 2:1087.
7. Gough KR, Read AC, McCarthy CF, Waters AL. Megaloblastic anemia due to nutritional deficiency of folic acid. Q J Med 1963; 32:243-56.
8. Herbert V. Transient (reversible) malabsorption of vitamin B_{12}. Br J Haemotol 1969; 17:213-9.

J Am Board Fam Pract: first published as 10.3122/jabfm.2.2.130 on 1 April 1989. Downloaded from http://www.jabfm.org/ on 23 April 2024 by guest. Protected by copyright.