

Case Questions

I. Understanding the Disease and Pathophysiology

1. Small bowel biopsy: “flat mucosa with villus atrophy and hyperplastic crypts—inflammatory infiltrate in lamina propria” indicates that the
 - Intestinal cells are not functioning appropriately and have been damaged due to exposure to α -gliadin and other protein components of gluten.
 - Malabsorption and maldigestion will occur due to decreased enzyme production and surface area of villi (Nelms, 2007)
2. Etiology of CD:
 - Small intestine exposure to gliadin and other protein components of gluten causes a toxic and inflammatory response
 - IgA antigliadin and antiendomysial antibodies are produced
 - Research indicates genetic link to disease (Nelms, 2007)

Mrs. Gaines’s history is typical of patients with CD

- Cycle of diarrhea
 - Difficult to associate symptoms with one specific food because of gluten exposure in vast amounts of foods
 - Weight loss and malnourishment related to diarrhea
 - Fatty foods worsen symptoms
 - Maldigestion, malabsorption, malnutrition (Nelms, 2007)
3. Intestinal mucosa exposure to protein components in the prolamin section of wheat (gliadin), rye (secalin), and barley (hordein) results in a toxic and inflammatory response. This causes the villi to flatten, which decreases the absorptive surface area and therefore leads to decreased nutrient absorption/atrophy. Another result of the intestinal response is decreased production of digestive enzymes (Nelms, 2007)
 4. Celiac disease is an autoimmune disease. The body initiates an immune response by sending white blood cells with antibodies to gliadin termed AGA and antibodies to endomysium termed EMA as a response to these and other protein components in gluten. These AGA and EMA antibodies in the serum are used to diagnose Celiac disease, but a biopsy is a better indicator (Nelms, 2007).
 5. 72-hour fecal fat test is to see if there is excessive fat being lost in the stool due to malabsorption of fat. Malabsorption can be the result of malfunctioning liver, pancreas or gallbladder. The patient is put on a high-fat diet of 100 grams of fat per day for 24hrs up to three days. Stool is collected to measure the amount of fat left over after absorption in the gastrointestinal tract. Diagnosis is at 7g fat loss/24 hours (Dugdale, 2010).
 6. Mrs. Gaines’s laboratory report result of 11.5g fat/24 hours indicates that she is experiencing fat malabsorption, or steatorrhea. $11.5\text{g fat} \times 9\text{kcal/g fat} = 103.5\text{ kcal loss/24 hours}$.
 7. The patient is placed on a 100 g fat diet
 - Fecal fat test
 - Fat malabsorption test

II. Understanding the Nutrition Therapy

8. Gluten is a protein formed from the combination of glutenin and gliadin. It is found in the endosperm of wheat, rye and barley (Nelms, 2007).
9. Patients on a gluten-free diet should be able to tolerate oats, but many oats are processed on equipment shared by foods containing gluten, or exposed to gluten during packaging, or cross-contamination from bulk food bins and during preparation if ordered from a restaurant.
 - Oats can be purchased from facilities claiming to be gluten-free/safe on the package
10. A person with CD can be exposed to gluten from hidden sources:
 - Packaging
 - Equipment used to process gluten-containing food that has not been cleaned properly before processing gluten-free food
 - Food coloring
 - Natural flavors
 - Thickeners
 - Molds grown on wheat (mold used to make Blue cheese)
 - Cross-contamination during preparation
 - Medication
11. Patients with Celiac Disease can be lactose intolerant, or experience varying degrees of intolerance, especially during times of inflammation.

III. Nutrition Assessment

A. Evaluation of Weight/Body Composition

12. % UBW= $92/112 \times 100 = 82\%$ severe weight loss

$$\text{BMI} = (92/63/63) \times 703 = 16 \text{ underweight}$$

Nutritional Risk: Mrs. Gaines has experienced severe weight loss and has depleted energy stores as indicated by 18% weight loss and a BMI less than 18.

B. Calculations of Nutrient Requirements

13. Total Energy needs: $655 + (9.6 \times W) + (1.8 \times H) - (4.7 \times A) = \text{BEE}$

$$655.1 + (9.6 \times 42) + (1.8 \times 160) - (4.7 \times 36) \times \text{AF} + \text{kcal for anabolism}$$

$$\text{BEE} = 655.1 + 403 + 288 - 169 = 1177 \times 1.3 \times 300 = 1830 \text{ kcal/day}$$

$$\text{Total protein needs} = 42 \text{ kg} \times 1.3 \text{ g/kg} = 54 \text{ g protein/day}$$

C. Intake Domain

14. 24-hr Recall Evaluation for adequacy (fitday.com)

- Total kcal: 444
- Total fat: 7.8g
- Total CHO: 86.7g
- Total Protein: 7.3g
- Micronutrient insufficient (see attached graph)

15. Possible Nutrient problems

- Inadequate energy intake (NI-1.4)
- Inadequate oral food/beverage intake (NI-2.1)
- Inadequate protein-energy intake (NI-5.3)
- Imbalance of nutrients (NI-5.5)
- Inadequate fat intake (NI-51.1)
- Inadequate Protein intake (NI-52.1)
- Inadequate fiber intake (NI-53.5)

D. Clinical Domain

16. Nutritional significance of laboratory values

- Total protein: low
- Albumin: 2.9g/dL indicates mildly depleted serum proteins
- Prealbumin: 13mg/dL indicates mildly depleted serum proteins
- Magnesium cation low indicates fat malabsorption
- Osmolality low indicates to fat malabsorption/ diarrhea
- HgB and Hct low indicates iron deficiency anemia
- Ferritin/transferrin low indicates iron deficiency anemia
- B12 low indicates pernicious iron deficiency
- Folate low indicates iron deficiency

17. Celiac disease is related to abnormalities in laboratory values because it causes inflammation and atrophy of the intestinal villi, leading to malabsorption and maldigestion of nutrients and diarrhea. Dietary intake of nutrients also decreases because of discomfort in the abdomen related to the disease. For these reasons, patients with CD may experience protein energy malnutrition, iron deficiency anemia and other micronutrient deficiencies.

18. Symptoms from physical examination consistent with laboratory values (Services, 2011)

- Thin appearance (PEM)
- Pale skin (iron deficiency)
- Pale sclera (iron deficiency)
- Weakness/fatigue (iron deficiency and PEM)

19. Anthropometric measurement evaluation

TSF 7.5 mm: below average

MAC 180mm: moderate under nutrition (Collins, July 2000)

20. Possible nutrition problems

- (P) Involuntary weight loss (NC-3.2)
- (P) Impaired nutrient utilization (NC-2.1)

IV. Nutrition Diagnosis

21. "Using the VA Nutrition Screening Form, what is this patient's nutrition status level?"

- 3 (please see attached form)

22. High priority nutrition problems (PES)

- (P) Food and nutrition-related knowledge deficit (NB-1.1) related to (E) recent diagnosis of Celiac Disease as evidenced by (S) patient unaware of dietary choices to alleviate symptoms.
- (P) Altered GI function related to (E) diarrhea after the consumption of food, as evidenced by (S) severe weight loss of 18%, depleted energy stores and mildly depleted protein stores

V. Nutrition Intervention

23. Per PES listed above: Ideal goals based on sign/symptoms and appropriate intervention based on etiology

- Diagnosis of Celiac Disease:
 - Goal: Patient demonstrates understanding of basic principles of her new diet.
 - Intervention: Comprehensive Nutrition Education (E-2). Educate patient on gluten-free diet, plus a temporary low-fat, lactose free diet.
- Altered GI function
 - Goal: Eliminate steatorrhea/diarrhea; normalize labs (hgb, Hct, alb, etc)
 - Intervention: Meals and Snacks (ND-1) Change diet to gluten free, low fat, lactose free)

24. Therapeutic Diet:

- Begin with gluten-free, lactose-free, GI Soft diet due to the potential damage to the GI tract that Mrs. Gaines may have. Advance diet to Gluten free, regular diet as tolerated.
- Focus on hydration and electrolyte replacement to alleviate imbalance caused from diarrhea
- Add Ensure protein supplements three times per day with meals to increase kcals, protein and micronutrients.

25. Due to her compromised nutritional status, I would recommend a high-protein nutritional supplement that is lactose and gluten-free. Have patient try Ensure to see how it is tolerated.

26. Glutamine is an amino acid that is related to intestinal mucosa homeostasis. It is used as a supplement for Celiac disease patients who are experiencing intestinal cell atrophy to promote restoration of villous height and healing by induction of apoptosis. The supplement form appropriate for Mrs. Gaines is L-Glutamine, which is the free amino acid form (Papaconstantinou, 2000).

27. Mrs. Gaines should expect relieved symptoms within two weeks for as long as she follows a strictly gluten-free diet. This diet will have to be followed for the rest of her life. She should have follow-up evaluations to ensure compliance and complete understanding of the diagnoses.

VI. Nutrition Monitoring and Evaluation

28. Food Diary recommendations*

- Cornflakes: Kellogg's Cornflakes contains gluten, but there are Gluten-free cornflakes that you can purchase at a health food store or Trader Joe's.
- Bologna slices: Some bologna contains fillers, food which contain gluten, but reduced fat and fat free bologna might be ok. Read the label and look out for fillers, artificial colors and artificial flavors as well as vegetable gum and malts which may contain gluten.
- Lean Cuisine-Ginger Garlic Stir Fry with Chicken: most Lean Cuisine products contain gluten, but like all Nestle products, they do state if their products contain ingredients with gluten. Amy's products and others are prepackaged frozen meals that are gluten-free.
- Skim milk: as long as she is tolerating lactose, this should be okay. If not, Lactose-reduced milk, Rice, Soy, Almond, coconut or other dairy-free substitute can be used.
- Cheddar cheese spread: Check the ingredient list for fillers, artificial colors and artificial flavors. Real cheddar cheese can be substituted.
- Green bean casserole (mushroom soup, onion, green beans): Make sure that the mushroom soup does not contain gluten. Campbell's soup may contain gluten whereas Progresso may not.
- Coffee: It is a good idea to buy whole bean coffee because the lines used to process the beans are sometimes coated with flour. During a flare-up, avoid drinking coffee to allow the intestines to recover.
- Rice crackers: rice crackers and cakes are great as long as they are not processed with gluten-containing products. Read the label and make sure that there are not any hidden sources. Lundberg is a company that makes gluten-free rice cakes.
- Fruit cocktail: is gluten-free
- Sugar: is gluten-free
- Pudding: Kraft is another brand which labels all of their ingredients which may contain gluten. Jell-O is a craft product which makes pudding that are mostly all gluten-free.
- V8 juice: is gluten-free
- Banana: is gluten-free
- Cola: is gluten-free

*Keep track of all of your gluten-free purchases and you can write them off on your taxes at the end of the year (Gluten-Free Indy Celiac Support Group).

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