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Case Study: Celiac Disease

1. The small bowel biopsy results state, "flat mucosa with villus atrophy and hyperplastic crypts – inflammatory infiltrate in lamina propria." What do these results tell you about the change in the anatomy of the small intestine?

Damage has occurred and symptoms are congruent with Celiac disease. Disease has progressed with continual intake of foods that contain gluten (gliadin), fat, and dairy. The above results can cause malabsorption, maldigestion, and a decrease and/or elimination of enzymes especially lactase. (2), (p402)

2. What is the etiology of celiac disease? Is anything in Mrs. Gaines's history typical of patients with celiac disease? Explain.

Celiac disease can be brought on by genetics, environmental, and autoimmune factors. When gluten is ingested the gliadin component of gluten causes an immune response and leads to inflammation of the intestinal mucosa, flattened atrophied villus, reduced enzymes. Antibodies to the gliadin in gluten are also formed as an autoimmune response. Her typical Celiac disease symptoms are foul smelling diarrhea (steatorrhea), weight loss, weakness, fatigue, anemia, and pale skin. (2), (p402)

3. How is celiac disease related to the damage to the small intestine that the endoscopy and biopsy results indicate?

Mrs. Gaines' endoscopy and biopsy results show "flat mucosa with atrophied and hyperplastic crypts-inflammatory infiltrate in lamina propria". These results are directly related to continual ingestion of gluten in her diet and a toxic and an inflammatory response to gluten (gliadin). The intestinal mucosa and the immune response will continue to break down the mucosal wall. Cytotoxic T-cells build up and this causes a build up of necrotic debris in the lamina, antibodies to form, and hyperplastic crypts. (2), (p402)

4. What are AGA and EMA antibodies? Explain the connection between the presence of antibodies and the etiology of celiac disease.

Anti-gliadin (AGA) and antiendomysial (EMA) antibodies are formed when gluten (gliadin) is introduced to the small intestine of an individual with allergies to gluten. The immune system reacts with an inflammatory response causing inflamed intestinal mucosa and white blood cells invade and produce AGA and EMA antibodies. Hyperplastic crypts and flattened-atrophied villus may follow suit if not diagnosed. This may further lend to anemia, weakness, fatigue, weight loss, osteoporosis and steatorrhea (diarrhea). These specific genes that may cause reactions are HLA, DQ2 and HLA-DQ8 are present in 95% of celiac disease patients. A non-breastfed baby (or short term), early introduction to gluten, and viral infections during infancy are some causes of environmental factors. (2), (p402)

5. What is a 72-hours fecal fat test? What are the normal results for this test?

For the 72-hour fecal fat test, for 2 to 3 days prior and during the test, patients will be required to ingest 50 – 150 g of fat (long chain triglycerides). All stools must be collected during the test. Follow the doctors' dietary recommendations for the test. If the fecal fat measurement is 2 to 6 g, but < 7g then it is normal. Any higher indicates steatorrhea. (1), (Fecal Fat)

6. Mrs. Gaines's laboratory report shows that her fecal fat was 11.5 g fat/24 hours. What does this mean?

A normal fecal fat test is 2 to 6 grams (but < 7) therefore a fecal fat test of 11.5 g fat/24 hours indicates malabsorption and/or maldigestion and steatorrhea. In Mrs. Gaines's case it also means intestinal inflammation of mucosa, flattened and atrophied villus, hyperplastic crypts, obstructions, and reduced or depleted enzyme production. Fat is unable to be absorbed and/or digested. All of these results lend to steatorrhea. (1), (Fecal Fat test results)

7. Why was the patient placed on a 100 g fat diet when her diet history indicates that her symptoms are much worse with fried foods?

The 100 g of fat x 3 days is part of her 72 hours fat test. This test will determine if and how much fecal fat is excreted and may give a reason for the foul smelling diarrhea. (1), (Fecal Fat test)

II. Understanding the Nutrition Therapy

8. Gluten restriction is the major component of the medical nutrition therapy for celiac disease. What is gluten? Where is it found?

The proteins that are in gluten such as wheat (gliadin), barley (hordein), rye (secalin), and oats (cross contamination from other foods) cause individuals with a gluten allergy to have an immune response when eaten. Here is a more in depth list of gluten: "barley, bran, bulgur, couscous, durum, einkorn, emmer, farina, faro, graham flour, kamut, matzo flour, orzo, panko, rye, seitan, semolina, spelt, triticale, udon, wheat, wheat bran, wheat germ, and wheat starch. These ingredients are often found in breads, cereals, pasta, pizza, cakes, pies, and cookies and many processed food items." (3), (2), (p402)

9. Can patients on a gluten-free diet tolerate oats?

The protein in oats has been tested and the results suggest that individuals with celiac disease probably will not be harmed by oat protein if eating no more than 50 g/d. The issue with oats is that it is often processed on machinery that has processed other gluten containing foods, therefore contaminating the oats with gluten. Certified gluten free oats can be eaten and the patient most likely will not be harmed as long as it hasn't shared equipment and been contaminated. (3), (2), (p403)

10. What sources other than foods might introduce gluten to the patient?

Makeup, coating on foods such as nuts, contaminated dishes, food coloring such as caramel syrup or in baked goods, vitamins and minerals, prescription medications, play doh, beer, brown rice syrup. (3)

11. Can patients with celiac disease also be lactose intolerant?

Yes, patients can be lactose intolerant. When there is an issue such as stress, disease, damage, etc. with the intestines the enzyme lactase is often the first to be decreased and or eliminated therefore lactose will be maldigested and malabosrbed and/or can no longer be digested and absorbed. This may be reversed with good intestinal health. (2), (403)

III. Nutrition Assessment

A. Evaluation of Weight/Body composition

12. Calculate this patient's percent UBW and BMI, and explain the nutritional risk associated with each value.

*92 actual body weight/112 usual body weight x 100 = 82 %UBW; Moderate weight loss over a 6-month period. This translates to 18% severe unintentional weight loss for a 6-

month period. She is at an increased risk for nutritional risk and health complications. (2), (p48)

*92 lbs. / 63"/63" = 16 BMI, she has a low BMI at 16; she is underweight and at increased risk for disease. Individuals who are underweight have an increased risk of chronic obstructive pulmonary disease, cancer, and congestive heart failure. (2), (p246)

B. Calculation of Nutrient Requirements

13. Calculate this patient's total energy and protein needs using the Harris Benedict equation or Mifflin-St. Jeor equation.

BEE = 655 + (9.6 x 41.8 kg) + (1.8 x 160 cm) – (4.7 x 36 years) = 1,175 kcals

TEE = 1,175 x 1.3 = 1,833 + 350 kcals (additional kcals added) = 2,183 kcals

Protein needs: 41.8 kg x (1.3 g/kg/d) = 54.3 g/d of protein needed. (6)

C. Behavioral Domain

14. Evaluate Mrs. Gaines's 24-hour recall for adequacy.

Her diet consists of ~ 703 calories, 7.25 g of fat, 158.0 g of carbohydrates (4.6 fiber and 104.5 g sugar), 15.1 g protein, 2,284 mg sodium, 73.8 mg calcium, 174.7 mg potassium, 33 mg cholesterol.

Melissa is eating an extremely small amount of calories. She is in an anabolic state and needs extra calories to enhance her nutrient requirements. She should be ingesting ~ 2, 183 kcals as discussed above. She has inadequate intake of the following: carbohydrates RDA 130 g/d; fiber AI 25 g/d; protein RDA 46 g/d; sodium AI ~ 1500 mg/d; calcium AI is 1,000 mg/d; potassium AI is 4,700mg/d. Her carbohydrates are on the upper end of AI, but it is full of sugar and should be more complex carbohydrates. (4)

15. From the information gathered within the behavioral domain, list possible nutrition problems using the diagnostic term.

Knowledge and Beliefs (1): NB-1.1, Food and nutrition-related knowledge deficit; NB-1.7, Undesirable food choices

Physical Activity and Function (2): NB-2.2, Physical inactivity; NB-2.5, Poor nutrition quality of life. (6), (Aug. 29th)

D. Clinical Domain

16. Evaluate Mrs. Gaines's laboratory measures for nutritional significance. Identify all laboratory values that support a nutrition problem.

The following labs are lower that normal. Albumin Hgb 9.5 g/dl reflects metabolic stress and late stages of iron deficient anemia; Total Protein 5.5 g/dl reflects possible immune response issues; Prealbumin 13 mg/dl reflects metabolic stress and Protein Energy Malnutrition; Hgb 9.5 g/dl reflects depleted iron stores and late stage anemia; Hct 34% reflects incomplete Hgb formation and microcytic hypochromic (30g/dl), red blood cells; Ferritin 12 mg/ml is consistent with iron deficient anemia and also individuals with inflammation and autoimmune disorders. Vitamin B12 and Folate are both low. If B12 is low then folate can't be released and protein synthesis decreases or fails. When folate is low RBC's will not divide and can lead to reduced Red Blood Cell count. Cholesterol is a little low and may be related to steatorrhea and maldigestion, malabsorption. ZPP is higher than normal and may indicate inflammation, infection, anemia, and chronic disease. (5), (6), (Aug. 29)

17. Are the abnormalities identified in question 16 related to the consequences of celiac disease? Explain.

Yes, these abnormalities are related to celiac disease. When the mucosa becomes inflamed and the villus becomes flattened, atrophied and hyperplastic crypts form, the absorptive surface is reduced and digestive enzymes are decreased and/or depleted. Nutrients are not well and are unable to cross the intestinal wall creating severe malabsorption, weight loss, and protein-energy malnutrition. (2), (p402)

18. Are any symptoms from Mrs. Gaines's physical examination consistent with her laboratory values? Explain.

Yes, fatigue, weakness, and being tired, pale skin, weight loss, and diminished bowel sounds are symptoms that can be caused from iron deficient anemia, low: albumin, total protein, Prealbumin, Hgb, Hct, B12 and low Folate. Pale sclera is caused from severe anemia.

19. Evaluate Mrs. Gaines's other anthropometric measurements. Interpret this information for nutritional significance.

*Mrs. Gaines is 5'3" and 92 lbs.

*IBW is 115 lbs.

*%IBW is 80% and she has mildly depleted energy stores
*%UBW is 82% and she has moderate weight loss, however at
18% severe unintentional weight loss within 6 months
*BMI is 16 and is at increased risk for disease and nutritional issues (6)
20. From the information gathered within the clinical domain, list possible nutrition problems using the diagnosis term.

Functional (1): NC-1.4, Altered GI function
Biochemical (2): NC-2.1, Impaired nutrient utilization; NC-2.2, Altered nutrition-related laboratory values
Weight (3): NC-3.1, Underweight; NC-3.2, Involuntary weight loss

IV. Nutrition Diagnosis

21. Using the VA Nutrition Screening Form, what is this patient's nutrition status level?
Her overall nutrition status level is 3. She will need a full nutrition assessment. (6)

22. Select two high-priority nutrition problems and complete the PES statement for each.

PLEASE SEE ATTACHMENT (not available)

V. Nutrition Intervention

23. For each of the PES statements that you have written, establish an ideal goal (based on the signs and symptoms) and an appropriate intervention (based on the etiology).

PLEASE SEE ATTACHMENT (not available)

24. What type of diet would you initially begin when you consider the potential intestinal damage that Mrs. Gaines has?

A gluten (gliadin) and Lactose free diet. Also, a low fat, water miscible fat-soluble vitamins, and Medium Chain Triglyceride oil. Also, a low Oxalate diet which consists of many foods

such as soy milk, v8 juice, chocolate milk, blackberries, kiwi, star fruit, buckwheat, wheat & wheat flour, millet, rye, almonds, black beans, cashews, peanut butter, stevia, date sugar, chocolate, milk thistle, beets, steamed broccoli and brussel sprouts, raw & steamed carrots, raw celery, chard, olives, spinach, and various other foods. (7)

25. Mrs. Gaines's nutritional status is so compromised that she might benefit from high-calorie, high protein supplementation. What would you recommend?
Optimental would be a good choice to add for a patient with metabolic stress, malabsorption, and in need of immune support. It is gluten free and suitable for patients with lactose intolerance. It can be oral and tube fed. Some of the nutrients are partially hydrolyzed for ease of digestion/absorption. Fat content is low and added protein to her diet is essential. (6)
26. Would glutamine supplementation help Mrs. Gaines during the healing process? What form of glutamine supplementation would you recommend?
Yes, a glutamine supplement in pill or capsule form will be useful in addition to appropriate energy, protein, and fluid needs. Glutamine should be increased for Enterocytes wound healing. (2), 167

27. What result can Mrs. Gaines expect from restricting all foods with gluten? Will she have to follow this diet for very long?

Yes, Mrs. Gaines will need to follow a gluten free diet for life and a lactose free diet short term. She may gain weight, feel rested, have energy, no more diarrhea (steatorrhea), and regain color in her skin and sclera. Increase her lab values albumin, prealbumin, total protein, Hgb, Hct, iron, and increase overall absorption and digestion. As her digestive enzymes return to a normal level and the villus extend and are no longer atrophied the absorptive area will increase considerably and allow much needed nutrients to be absorbed. (9)

VI. Nutrition Monitoring and Evaluation

28. Evaluate the following excerpt from Mrs. Gaines's food diary. Identify the foods that might not be tolerated on a gluten/gliadin-free diet. For each food identified, provide an appropriate substitute.

Cornflakes: Kellogg's Rice Krispies - Gluten Free Whole Grain Brown Rice

Bologna slices: Dietz & Watson - Black Forest Beerwurst (10)

Lean Cuisine – Ginger Garlic Stir Fry with Chicken: Amy's Asian Noodle Stir Fry

Skim Milk: So Delicious Coconut Milk (8)

Cheddar cheese spread: Cheddar style spread creamy Sheese (100% vegan and gluten free)

Green bean casserole: Healthy Traditional Green Bean Casserole recipe (gluten-free, dairy-free and grain-free) note: if you type this exact line in the link will pop up with recipe.

Coffee: Plain black coffee

Rice Cracker: Back to Nature Sesame Seed Gluten Free Rice Thin Crackers

Fruit cocktail: Gluten And Lactose Free Wegmans Brand Products, fruit cocktail

Pudding: Zen Soy-soy pudding- gluten and nut free and vegan (man flavors, my favorite is chocolate)

Sugar: ok to consume in moderation

V8 Juice: ok to drink

Banana: ok to eat

Cola: Publix brand cola