Case Study:
Celiac Disease
MNT I
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I. Understanding the disease and pathophysiology

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?

The small intestine normally has finger like projections called villi or villous that are lined with intestinal cells. At the base of the villi are crypts or circular like collections of intestinal cells. The bowel biopsy indicates that the flattening of the villi accompanied by signs of inflammation indicate damage from the storage of the gluten protein. The anatomy of the small intestine has gone from full and functioning to small, flat, with spots that contain no villi.

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

Celiac disease is a genetic predisposition disease where the amino acid sequence found in wheat and rye products trigger an immune system response that causes damage to the small intestinal mucosa, inflammation and villous atrophy which may lead to malabsorption of nutrients. With regards to Mrs. Gaine’s history of lifelong diarrhea which is a sign of the damage to the small intestine mucosa. She has a very low weight and shows signs of malnutrition because the damage to the small intestine will not allow for the absorption of the nutrients and regular nutritional health and growth. diarrhea, wasting, malabsorption, failure to grow, bloating, and abdominal cramps, not all individuals have symptoms.


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

   a. Celiac disease is an autoimmune disease where the body cannot tolerate Gluten, which is the protein part of wheat, rye, barley, and other related grains. Some people cannot tolerate these food items because the body does not absorb gluten proteins; gliadin and glutenin and when it comes in contact with the small intestine it causes an autoimmune response where the intestine lining eventually atrophies and becomes dysfunctional.

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

   AGA and EMA antibodies are auto antibodies that the body produces as part of an inappropriate immune response to dietary proteins found in wheat, rye, and barley which are the cause of celiac disease. AGA is an autoantibody against the gliadin portion of the amino acid. EMA is the thin connective tissue layer that covers individual muscle fibers. EMA antibodies are developed in reaction to the ongoing damage to the intestinal lining. It has been found that tTg is the substance
detected in this test. Almost 100% of patients with active celiac disease will have Anti-EMA and AGA antibodies.

5.) What is a 72-hour fecal fat test? What are the normal results of this test?
The fecal fat test measures the amount of fat that is eliminated in stools. This test evaluates digestion of fats by determining excessive release of lipids in patients demonstrating signs of malabsorption, such as weight loss and scaly skin. You need to collect the entire stools for the last 72 hours (3 days) of the high fat diet and put in a clean container then it is sent to a laboratory. Reference values vary from laboratory to laboratory, but are generally found within the range of 5-7 g of fecal fat/24 hr.

6.) Mrs. Gaines’s laboratory report shows that her fecal fat was 11.5g fat/24hours. What does this mean?
According to the results and the suggested above healthy range for a 72-hour fecal fat test, Mrs. Gaines has fat malabsorption and steatorrhea.

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 patient was placed on a 100-g fat diet because it is the recommendation in order to take the 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?
   a. Gluten is a special type of protein that is commonly found in rye, wheat and barley. Therefore, it is found in most types of cereals and in many types of bread. Not all foods from the grain family, however, contain gluten. Examples of grains that do not have gluten include wild rice, corn, buckwheat, millet, amaranth, quinoa, teff, soybeans, and sunflower seeds.

9.) Can patients on a gluten –free diet tolerate oats?
   Incorporating oats uncontaminated with wheat, barley or rye, into a gluten-free dietary pattern for people with celiac disease is generally safe and improves compliance. However, many studies report that the introduction of oats may result in gastrointestinal symptoms such as diarrhea and abdominal discomfort.

10.) What sources other than foods might introduce gluten to the patient?
Non food sources that contain gluten and the patient may be exposed to include glue used on likable envelopes and stamps, self-stick labels and stickers, art supplies such as paints, clay, play dough, and glue, as well as lipstick, lip balm, sunscreen, shampoos, soaps, cosmetics, skin lotions, toothpaste, and mouthwash, household products such as cleaning solutions, detergents, and even bar soap may contain gluten in some form which is usually in powdered form.

11.) Can patients with celiac disease also be lactose intolerant? Why?
Lactose intolerance is frequently a side effect of celiac disease. Celiac’s who eat gluten become lactose intolerant after the villi in their small intestine become damaged and are no longer capable of catching and breaking down the lactose molecule. The problem usually disappears when celiac disease remove gluten from their diet, which allows the damaged villi and microvilli to grow back. Lactose intolerance symptoms can continue for a long time after a celiac has gone on a 100% gluten-free diet.


III. Nutrition Assessment
12.) Calculate the patient’s percent UBW and BMI, and explain the nutritional risk associated with each value.
   a. UBW: (92lbs/115lbs.)X100=80%, which indicates a weight loss of 20% which is a severe weight loss because it was unintentional.
   b. BMI: (92lbs./ 62in.^2)X 703=16, which indicates Mrs. Gaines is below normal weight when comparing her height and weight.
13.) Calculate this patient’s total energy and protein needs using the Harris-Benedict equation.
   a. Kcal needs: 655+(9.6X41kg)+(1.8X160)-(4.7X36)= 1,168Kcals/day total
   b. Protein needs: ((92lbs./115lbs.)X.25)+115= 115.2/2.2kg=52X1.3=68g protein/day
14.) Evaluate Mrs. Gaines’ 24-hour recall for adequacy.
She becomes very sick and now limits her food intake for fear of diarrhea becoming worse. She consumes whole-wheat toast which is counter intuitive for the condition she has been diagnosed with. The same can be said about the butter, she has probably become lactose intolerant and depending on the brand and kind of butter she uses the lactose might not be absorbed in her body. Her lunch is somewhat well balanced considering her fear for diarrhea. The chicken noodle
soup may have high amounts of fat depending on the brand. Otherwise there is no gluten control and no high fiber and low fat foods in her diet.

15.) From the information gathered within the intake domain, list possible nutrition problems using the diagnostic term.
- Inadequate oral food/beverage intake (NI-2.1)
- Evident protein-energy malnutrition (NI-5.2)
- Imbalance of nutrients-(NI-5.5)
- Inadequate fat intake- (NI -51.1)
- Inadequate protein intake-(NI- 52.1)
- Inadequate vitamin intake, Folate and Vitamin B12-(NI-54.1)
- Inadequate mineral intake, Iron – (NI-55.1)
- Altered GI function- (NC-1.4)
- Involuntary weight loss-(NC-3.2)
- Food and nutrition-related knowledge deficit- (NB-1.1)

16.) Evaluate Mrs. Gaines’s laboratory measures for nutritional significance. Identify all laboratory values that support a nutrition problem.
- Albumin: It is low, a 2.9 which indicates she has mildly depleted visceral protein stores.
- Total protein: Is low, her overall proteins stores are low.
- Prealbumin: Is lo, a 13L indicate she has mildly depleted visceral proteins, which indicates metabolic stress.
- Hgb: Hemoglobin is low which may indicate depleted iron stores and less RBC circulating in her blood and thus less nutrients circulating to her body.
- Hct: Hematocrit is low, ma help diagnose iron deficiency but it indicates that there may be incomplete formation of the Hemoglobin.
- Vitamin B12: No absorption of the vitamin because of the atrophy to the small intestine. For fear of having severe diarrhea she will not consume beef which contains B12.
- Folate: Increase turnover of folic acid material, which can lead to inflammation. The atrophy to the stomach mucosa does not allow for folate absorption.

17.) Are the abnormalities identified in question 16 related to the consequences on celiac disease? Explain.
Yes, all of the abnormalities in the lab values, which are mostly low, indicate that they are consequences for celiac disease. They all contribute to overall stores of proteins and availability of nutrients to the body. Not only is the patient not consuming enough but when she does consume, she does not receive the nutrients. These all contribute to celiac disease because the amino acid proteins aren’t being absorbed and results in low energy stores as well.

18.) Are any symptoms from Mrs. Gaines’s physical examination consistent with her laboratory values? Explain.
- Fatigue, Pale skin, and Weakness because cells lack nutrients due to low Hgb and low Hct: protein energy malnutrition due to low albumin, prealbumin which also cause fatigue and weakness.
- Diarrhea and Diminished bowel sounds coincide with low Vitamin B12 and low Folate because of lack of nutrient digestion/absorption. The nutrients do not come in contact with the intestinal lining long enough to be absorbed due to flushing syndrome.

19.) Evaluate Mrs. Gaines’s other anthropometric measurements. Using the available data, calculate her arm muscle area.

\[ AMA = \frac{180 mm}{4 \pi} \left( \pi X 7.5 mm \right)^2 = 19.5 cm^2 \] AMA

- Interpret this information for nutritional significance.

She is >5th %, which indicates that she is malnourished.

20.) From the information gathered within the clinical domain, list possible nutrition problems using the diagnostic term.

- Inadequate fat intake-(NI-51.1)
- Inadequate protein intake-(NI-52.1)
- Inadequate vitamin intake: Folate and Vitamin B12-(NI-54.1)
- Inadequate mineral intake: Iron-(NI-55.1)
- Altered GI function-(NC-1.4)
- Involuntary weight loss- (NC-3.2)
- Food and Nutrition-related knowledge deficit-(NB-1.1)

IV. Nutrition Diagnosis

21.) Can you diagnose Mrs. Gaines with malnutrition? If so, what type? What is our rationale?

I would diagnose Mrs. Gaines with secondary malnutrition because she has a disease which does not allow her to absorb nutrients derived from foods. The food is available to her to consume but it is out of her control and her environment and other factors that she cannot absorb the nutrients.

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

1. Involuntary weight loss (NC-3.2) related to fatigue, weakness and diarrhea as evidenced by low BMI and a 20% weight loss over a 3 month period.
2. Food and nutrition-related knowledge deficit (NB-1.1) related to newly diagnosed with celiac disease as evidenced by whole-wheat intake of bread, diarrhea, steatorrhea, never questioned lifelong problem with diarrhea.

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 etiology).
   1.) An ideal goal would be to try and gain 3lbs in 1month. An intervention would
be to speak to her about how to maintain a regular body weigh through the foods
she decides to eat and what will bring her weight up.
   2.) An ideal goal would be to teach/inform her about celiac disease so she can
realize that what she was eating before was not the right choice and teaching her
how to read a food label and look for gluten free foods. An intervention would be
to teach her, give her tutorials, inform her and her husband on celiac disease.

24.) What type of diet would you initially begin when you consider the potential
intestinal damage that Mrs. Gaines has?
   I would start her on a gluten free diet, as well as a low fat diet, and a lactose free
diet so that her intestine will stop suffering from the malabsorption.

25.) Mrs. Gaines’s nutritional status is so compromised that she might benefit from
high-calorie, high-protein supplementation. What would you recommend?
   I would recommend high calorie diet, the most important factor to take care of is
the loss of energy her body is not receiving, there could possibly be a problem
with the high protein seeing that she is limited on what she can have. Restoring
her weight and energy would be a priority.

26.) Would glutamine supplementation help Mrs. Gaines during the healing process?
   What form of glutamine supplementation would you recommend?
   Glutamine supplementation would help during the healing process. I would
recommend any form of glutamine supplements that some from all natural animal
sources. I would only recommend this if she does not feel comfortable consuming
animal products.

27.) What result can Mrs. Gaines expect from restricting all foods with gluten? Will
she have to follow this diet for very long?
   If Mrs. Gaines follows the recommendations, she will see a huge decrease in
diarrhea, more weight gain, better skin, more energy, decrease in fatigue,
weakness and an overall quality of life. She will have to stay on this diet for her
entire life in order to maintain her health.

28.) Evaluate the following excerpt from Mrs. Gaines’s food diary. Identify the food
that might not be tolerated on a gluten/gliadin-free diet. For each food identified, provide
an appropriate substitute.
   Cornflakes            Gluten Free Corn Flakes
   Bologna slices       Fresh slices of whole meat roasted turkey
   Lean Cuisine-Ginger Garlic
   Stir fry with chicken Make at home with non-gluten products
   Skim Milk            Almond Breeze, lactose free diet
   Cheddar cheese spread Tolerated
Green Bean Casserole  Tolerated
Coffee              Tolerated
Rice Crackers       Corn tortilla chips
Fruit cocktail      Tolerated
Sugar               Tolerated
Pudding             Tapioca, if made at home
V8 juice            Tolerated
Banana              Tolerated
Cola                Tolerated

Bibliography
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