

## Case Study: Diverticulitis

### Pathophysiology

Diverticulosis is characterized by an abnormal occurrence of pockets on the outer wall of the small intestine or colon; these are called diverticula. In order for diverticula to form in the colon, a few muscles contract at the same time, delaying the motility of the colon. When this happens, feces become trapped and puts pressure on the wall of the colon. The pressure then turns into pockets on the outer wall of the small intestine or colon, otherwise known as the diverticula.

There are a few different possible causes of diverticulosis. These include: low fiber intake, past occurrences of constipation, and long-term increased pressure on the colon (1). There are other issues that can increase the risk of diverticulosis. These include; obesity, sedentary life style, steroids, alcohol intake, caffeine intake, and smoking (1). It is also believed that low fiber intake increases the risk of inflammation in the colon, which will increase the risk of diverticulitis.

Diverticulosis can turn into diverticulitis if the diverticula become inflamed. Fecal matter can accumulate in the diverticula and cause infection. Complications that may result from diverticulitis are: bleeding, abscess, obstruction, fistula, or perforation (1).

Diverticulosis is normally asymptomatic, meaning that there are no symptoms and it can easily go unnoticed. The only way to diagnose diverticulosis is with a colonoscopy. After the diverticula become inflamed and turn into diverticulitis, the signs and symptoms begin to appear. Symptoms can include fever, abdominal pain, gastrointestinal bleeding, constipation, diarrhea, elevated white blood cell count, increased flatus, and anorexia (1, 2). A diagnosis can possibly be made using radiology testing, as in an ultrasound, or CT scan.

The epidemiology of Diverticulosis is hard to determine because it is asymptomatic in most people. Yet it is estimated that the incidence of this condition is most common in Western and Industrialized countries; where by the age of 50, five to ten percent of the population will develop diverticula. As the population ages, the incidence will increase to about sixty-five to seventy percent for people over the age of 85 (1). The prevalence of diverticulitis is estimated that twenty percent of people with diverticula will have complications, and develop diverticulitis (1).

Our patient, Mr. Gonzalez, has experienced many of the symptoms of diverticulitis. About a year ago, he experienced abdominal discomfort in the lower left quadrant when he had colicky pain; he also had an increased amount of flatus. The symptoms lasted a few days, and then went away. The pain and flatus was most likely due to the diverticula becoming inflamed. The symptoms continued to come and go very frequently. He became aware of the pain and flatus when he ate foods that normally gave him gas. The foods that normally gave him gas were very irritating to him because they were very fibrous and continued to irritate his diverticula. He also began to have constipation problems. The constipation did not help to heal the diverticula; instead it increased the pressure in the colon, causing the chance of more diverticula.

About a month ago Mr. Gonzalez had a very severe attack. He experienced pain in the lower left quadrant, tenderness, fever, and diarrhea. These symptoms were even more severe than the last time, meaning that his condition had most likely turned into diverticulitis. This was confirmed when the doctor ordered a barium enema and the results showed diverticulitis in the sigmoid and descending colon. He was put on medications and told to follow a diet order. After a while his symptoms went away, so he figured it was acceptable to stop his treatments. Last week he had severe pain and diarrhea and stopped eating because of the discomfort. Another symptom of diverticulitis is anorexia, which Mr. Gonzalez was experiencing, as evidenced by his lack in oral intake. One day he decided to eat an entire bag of popcorn after watching a commercial for it. He woke up in the middle of the night with severe cramps, flatus, and weakness. He began to have diarrhea, and when he went to the bathroom, there was bright red blood in the stool. He was most likely experiencing the weakness due to the blood loss in his stool. All of Mr. Gonzalez's symptoms are related to the diverticulitis.

### Biochemical Measurements

<b>Test</b>	<b>Result</b>	<b>Normal</b>	<b>Test</b>	<b>Result</b>	<b>Normal</b>
<b>Hgb</b>	11g/dl	14-18 g/dl	<b>BUN</b>	12mg/dl	10-20 mg/dl
<b>Hct</b>	33%	42-52 %	<b>Creat</b>	0.9mg/dl	0.6-1.2 mg/dl
<b>K+</b>	3.4 mEq/L	3.5-5 mEq/L	<b>Cl<sup>-</sup></b>	97mEq/L	95-102 mEq/L
<b>Na+</b>	133mEq/L	136-145 mEq/L	<b>WBC</b>	13 X 10 <sup>3</sup> /mm <sup>3</sup>	4.3-10 x 10 <sup>3</sup> / mm <sup>3</sup>

Mr. Gonzalez has a few abnormal lab values that were taken during a non-fasting state. These abnormal values include his hemoglobin, hematocrit, potassium, sodium, and white blood cell count. His hemoglobin was low because of his blood loss in the feces. He also may have some protein-energy malnutrition due to the fact that he was not eating much prior to being admitted to the hospital. His

hematocrit level was also low because of the blood loss in the feces. It may also be low due to his dietary deficiencies prior to entering the hospital. His potassium level was just below the normal range, but it would still be considered low. The potassium is decreased because of his diarrhea, which causes excessive potassium loss due to ongoing fluid and electrolyte losses (3). His sodium is lower than normal because of the diarrhea he was experiencing, sodium in the GI tract is lost with the fluid. His white blood cell count is higher than normal because he is trying to fight off an infection.

### Anthropometric Measures

Mr. Gonzalez's IBW:

$$\text{IBW} = 106\text{lbs} + 6\text{lbs} (7) = 148 \text{ lbs}$$

Mr. Gonzalez's %IBW

$$\% \text{IBW} = 208 \text{ lbs} \div 148 \text{ lbs} \times 100 = 140.5 \%$$

Mr. Gonzalez's BMI

$$\text{BMI} = 208 \text{ lbs} \times 703 \div (67 \text{ in} \times 67 \text{ in}) = 32.6$$

Mr. Gonzalez would be classified as obese based on his BMI and his % IBW.

### Drug- Nutrient Interactions

Mr. Gonzalez has been taking lisinopril for five years. This is an antihypertensive drug used to treat high blood pressure. Some adverse reactions of lisinopril are dry mouth, nausea and vomiting, GI irritation, diarrhea, constipation, hypotension, dizziness, weakness, and photosensitivity (4). Some rare side-effects could be gout, pancreatitis, jaundice, and hyponatremia (4). Nutrition-related issues with lisinopril are: sodium and calcium will need to be decreased, potassium and magnesium intake will need to be increased. It is also recommended to avoid natural licorice. Anorexia and increased thirst may occur (4).

Mr. Gonzalez was just recently prescribed ampicillin for his diverticulitis. Ampicillin is an antibiotic; it can be taken orally or parenterally. Some of the adverse reactions of ampicillin are taste changes, glossitis or inflammation of the tongue, stomatitis or inflammation of the mucous layer in the mouth, oral candidiasis or a yeast infection in the mouth occurs with long term use, nausea and vomiting, inflamed colon, rash, and diarrhea (4). It is rare, but an allergic reaction can happen, and it can be fatal. Some nutrition related consequences are change in eating habits because of the adverse reactions, this can lead to malnutrition. It is important to take ampicillin with water on an empty

stomach one hour before or two hours after a meal. If the medication is taken with food, it will decrease the rate and extent of absorption (4).

### Medical Nutrition Therapy Recommendations

Mr. Gonzalez has food and nutrition related knowledge deficit (NB-1.1) related to a recent removal of his colon as evidenced by having no previous knowledge on the subject.

Immediately following surgery Mr. Gonzales should be NPO. He should begin drinking plenty of fluids once he is able to handle liquids. He may then advance to a clear liquid diet and then to a low residue/low fiber diet as tolerated. The low fiber diet should be followed for about eight weeks. He should avoid foods that can cause obstruction for 6-8 weeks; this would include stringy foods with tough skin, tough meats, certain vegetables, nuts and seeds. Mr. Gonzalez's calorie needs right after surgery are 2660 calories per day. He will be on bed rest following the surgery, and he will need an adequate amount of calories to promote healing after surgery. He should also have about 103 g of protein, because he just had a major surgery. He should make sure to chew his foods thoroughly, and eat in small amounts. By around the eighth week he should be able to have a wider range of foods, yet should still continue with bland foods to prevent obstructions and promote healing. If he is experiencing watery stool, he can increase his soluble fiber intake so that it will bulk up the stool. Some foods that will do this are bananas, rice, applesauce, and toast. He will also want to decrease foods that give him gas, because of irritation to the sensitive area. It is very likely he will have odor issues after the surgery, to decrease the odor and gas he can eat yogurt, parsley, and buttermilk (1). His main goals are to lower his possibility of obstruction, and stay well hydrated.

#### Calculations for Mr. Gonzalez's energy needs right after surgery:

$$\%IBW = 208 \div 148 = 140.5 \%$$

$$\text{Adjusted weight} = [(208-148) \times .25] + 148 = 163 \text{ lbs}$$

$$BEE = 66.5 + (13.8 \times 74.1) + (5 \times 170.18) - (6.8 \times 68) = 1477.58 \text{ kcals/ day}$$

$$TEE = 1477.58 \times 1.2 \times 1.5 = 2660 \text{ kcals/ day}$$

$$\text{Protein needs} = 1.4 \times 74.1 = 103.74 \text{ g/day}$$

For long term nutrition recommendations, there are a few things I would suggest. The first is that Mr. Gonzalez's calorie and protein needs have changed since his surgery. He now only requires 2305 calories a day. This is because he is now ambulatory and he is not under as much metabolic stress as he

was post-surgery. His protein needs have also decreased to 74.1 g a day. He still needs a higher amount of protein than normal because he is still healing from his surgery. The next suggestion is that he should make sure to eat foods that do not give him gas, or cause diarrhea because it can lead to irritation. He can do this by avoiding caffeine, certain juices, and highly seasoned fruits for preventing diarrhea. He can prevent gas by eating slowly and chewing thoroughly, he also should not drink from bottles or cans nor sip from a straw. Some other foods that can cause irritation or obstruction are nuts and seeds, cabbage, mushrooms, coconut, etc. He will also need to keep his fluid balance maintained because he will have decreased absorption due to the colostomy. The second thing I would recommend would be for Mr. Gonzalez to try to get in some physical activity during the day. He has a family history of coronary heart disease, and if he exercises just a little bit each day it may help reduce his risk of a heart attack. He may also lose some weight in the process. He has four children who are able to help out. It would be great if they could help Mr. Gonzalez stick to his new diet plan because he has not been able to follow diet orders in the past.

Calculations for Mr. Gonzalez's energy needs once he has healed from surgery are:

$$\%IBW = 208 \div 148 = 140.5 \%$$

$$\text{Adjusted weight} = [(208-148) \times .25] + 148 = 163 \text{ lbs}$$

$$BEE = 66.5 + (13.8 \times 74.1) + (5 \times 170.18) - (6.8 \times 68) = 1477.58 \text{ kcals/ day}$$

$$TEE = 1477.58 \times 1.3 \times 1.2 = 2305 \text{ kcals/ day}$$

$$\text{Protein needs} = 1.0 \times 74.1 = 74.1 \text{ g/day}$$

## References

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