**Admission Purpose and Patient Introduction**

Patient CK is a 26 year old female who was diagnosed with ulcerative colitis (UC) in November of 2013 at Sharp Hospital. Five months later, she suffered from an UC exacerbation requiring her to seek further medical treatment. On March 5th, 2014 CK was admitted to Thornton Hospital (TH) through the Emergency Department (ED) with the chief complaint of bloody diarrhea and abdominal pain.

**Condition Information**

*Overview*

UC is a form of inflammatory bowel disease (IBD) which causes chronic inflammation of the colon (1). Unlike Crohn's Disease, UC does not affect the small intestine. 50% of UC patients experience the disease localized in one specific location of the rectum, while for others, the disease invades their colon entirely (2). Common symptoms that are seen in patients with UC include abdominal cramping, explosive or bloody diarrhea, anemia, fatigue, anorexia, and pus or mucus discharge between stools. Other complications can include skin rashes, cirrhosis, arthritis, stomatitis, endocarditis, and splenomegaly (1). This disease is thought to have a strong genetic association considering that 5-15% of IBD patients have a family history of the disease. Other contributing factors are environmental in nature such as smoking, infectious agents, intestinal flora, and physiological changes in the small intestine (2).

*Pathophysiology*

One theory which investigates hereditary causes of UC claims that an abnormal immune response takes place. This immune response releases cytokines that destroy the intestinal mucosa through an excessive and abnormal inflammatory reaction. Typically, acute UC involves only the first two layers of intestinal tissue -- the mucosa and the superficial submucosa. In cases of

chronic UC, the intestinal wall can become so thin that deeper ulcerations can be caused as well (2).

*Diagnostic Procedure*

Serum levels that can be tested to assist in the diagnosis of UC include interleukins, tumor necrosis factor, and anti-glycan antibodies. Acute-phase markers that can be tested in an active UC exacerbation include C-reactive protein, erythrocyte sedimentation rate (ESR), white blood cell count, and the presence of leukocytes in the stool. Additional tools that are used to assist in a diagnosis include abdominal ultrasound, MRI, and CT (2).

*Treatment*

Various treatments are used to reduce the acute and chronic inflammation of UC with the ultimate goal being remission. These Treatments include immunosuppressant medications, adrenocorticosteroids, anti-inflammatory medications, antidiarrheal, steroids, biologic therapies, and antibiotics. In some cases surgery is required which may include a total colectomy, subtotal colectomy, total proctocolectomy with Brooke ileostomy, or restorative proctocolectomy with ileal pouch-anus anastomosis (2).

*Prognosis*

UC is a chronic disease that rotates between exacerbation and remission. While most cases of UC can be managed with medications and diet changes, an average of 30% of UC patients do require surgery. Patients who have localized UC hold the best prognosis because surgery is rarely required and they have a normal life expectancy (2).

*Medical Nutrition Therapy*

Poor nutritional status is common for UC patients as a result of anorexia, restrictive diets, side effects of medications, protein losses from ulcerated mucosal lesions, blood loss or wound

healing requirements, bacterial overgrowth, or malabsorption (1). Energy requirements can be calculated using Harris-Benedict or Mifflin-St. Jeor equations with increased needs based on previous weight loss. If oral intake can be initiated it is best to order a low-residue, lactose-free diet with small frequent meals; other gas-producing foods may need to be restricted (2). For low BMI (<15) may require 35-45 kcal/kg whereas a low-normal BMI of 15-19 may require 30-35 kcal/kg. A normal-overweight BMI of 20-29 may require 25-30 kcal/kg and a high BMI (>30) may only require 15-25 kcal/kg (1). It is recommended to provide these patients with a multivitamin and additional supplementation of zinc, calcium, magnesium, and copper (2). In addition these patients should be provided with 1500mg of elemental calcium and 800-1000 IU of vitamin D (3). Nutrition support is often required to correct nutritional status during periods of exacerbation. In instances when adequate oral intake cannot be achieved, the initiation of TPN is a desired option to reverse any nutritional detriments and provide adequate energy (4). Evidence does not support the use of enteral nutrition as a primary therapy in the treatment of ulcerative colitis. Overall it is rare for a patient with UC exacerbation and larger stool output to be placed on enteral nutrition (3).

**Patient's History**

Patient CK is a 26 year old female who was admitted to Thornton Hospital on March 5, 2014 with the chief complaint of bloody diarrhea and abdominal pain. Abdominal pain, described as cramping and sharp, was assessed to be 2 on a 10-point scale and was localized to the lower abdomen. CK had several episodes of severe bloody diarrhea for three weeks leading up to the admission. This diarrhea was accompanied by fevers, appetite loss, and a 20 pound (or 17%) weight loss over the course of 3-4 weeks. The patient reported upon admit that she sent in a previous stool sample which came back negative for c-diff.

CK denies tobacco and alcohol use and has no significant past medical history. She denies suffering from any UC contributing illnesses such as unspecified asthma, chronic airway obstruction, congestive heart failure, unsuspected hypothyroidism, atrial fibrillation, chronic ischemic heart disease, or unspecified essential hypertension. Her significant family medical history reports only heart problems with paternal grandfather. According to social work, CK and her husband were trying to conceive prior to her sickness. This diagnosis was very overwhelming for CK and patient was concern about logistics of possibility getting pregnant. No other social background was available.

**Nutrition Care Process**

*Assessment*

Patient CK was assessed by clinical nutrition on the night of admission as a result of a nutrition consult for weight loss. CK reported an unintentional 20 pound (17%) weight loss over the course of a month leading up to her admission. The patient attributed the weight loss to her diagnosis of UC and constant diarrhea for three weeks. CK reported her usual body weight to be 120 pounds and was admitted at 100 pounds with a BMI of 15.42 based on patient's height of 5'7". At this time she was only 74% of her deal body weight of 135 pounds. This weight loss was considered significant and placed CK at high nutritional risk.

At the time of the visit CK was on a clear liquid diet with plans for nothing by mouth (NPO) after midnight in preparation for a flexible sigmoidoscopy the following day. According to the registered nurse's (RN) head-to-toe assessment the patient had a soft, flat abdomen, positive bowel sounds, and bloody diarrhea. According to the gastroenterology fellow's consult, CK was experiencing greater than 25 bloody bowel movements daily with abdominal cramping, significant nausea, and no vomiting. A stool sample was analyzed for c-diff on 2/25/2014 and

came back negative but laboratory orders for new stool samples had been placed.  The patient's skin was noted to have acupuncture needle patches on her back, ear, and buttocks. 24 hours of input/output documentation were not available at the time of this medical chart review.

CK was admitted with additional diagnoses of hypernatremia, leukocytosis, anemia, and hypokalemia. Abnormal lab values upon admission on are included in Table 1 on page 5. Prealbumin was not check with a serum CRP level at this time. See Table 3 on page 10 for progression of lab values over course of admission. Medication of nutritional relevance at the time of admission included Zofran, Dextrose 5%, methyl-Prednisone, Falgyl, Golytely, normal saline, and potassium chloride. See Table 2 on page 5 for medications and relevance.

**Table 1: Abnormal Lab Values Upon Admission**

| Component | Value | Out of Range |
|---|---|---|
| Sodium | 126 mmol/L | Low |
| Potassium | 3.1 mmol/L | Low |
| Chloride | 91 mmol/L | Low |
| Calcium | 8.0 mg/dL | (corrected to 9 within normal limits) |
| Albumin | 2.8 g/dL | Low |
| C-reactive Protein | 14.9 mg/dL | High |

**Table 2: Medications of Nutritional Relevance**

| Medication | Use |
|---|---|
| Zofran | Anti-nausea |
| Dextrose 5% | Hydration |
| Methyl-Prednisone | Reduce inflammation |
| Flagyl | Antibiotic |
| Golytely | Clean out intestines |
| Normal Saline | Hydration |
| Potassium chlorise | Replete low potassium |

*Diagnosis and Needs*

CK's estimated needs were based on 45.4kg by using the Mifflin-St. Jeor equation. CK's resting energy expenditure (REE) came out to be 1130 and was then multiplied by a stress factor of 1.2-1.5. With this range of stress factor her needs came out to be 1356-1695 calories/day (30-37 calories/kg body weight). CK's protein needs were calculated out to be 46-55 grams/day (1.0-1.2 grams/kg body weight). Fluid needs were calculated to be 1.4-1.7 liters/day (using 1 mililiter/calorie).

CK was diagnosed with altered GI function related to compromised GI tract function as evidenced by bloody diarrhea and diagnosis of UC.

*Intervention/Goal*

The goal for this patient was that she received greater than 75% of nutritional needs with acceptable tolerance. The plans and recommendations for this patient following the initial nutritional assessment included the following:

1. Advance diet per MD: Suggest clear liquids → full liquids → low residue (low fiber) diet

2. Check prealbumin to better assess nutritional status

3. Daily weights to trend

4. Consider adding daily multivitamin with minerals

5. Consider adding zinc sulfate due to persistent diarrhea

*Monitoring and Evaluation*

The disposition for this patient was pending clinical course. Education would be provided if/when appropriate. The plans and recommendations were discussed with the care team members and the Registered Dietitian was going to monitor intake/tolerance/adequacy, labs, weight, and follow up per department policy.

**Progress of Treatment**

On hospital day (HD) #1 gastroenterology performed a flexible sigmoidoscopy and took biopsies from the rectum and sigmoid colon. The endoscopic diagnosis from this procedure was severe colitis. A discharge criterion was set at five bowel movements or less while on a regular diet.

CK was next seen by clinical nutrition on HD#2 and remained at high level of nutritional risk. Upon this visit patient reported that her appetite was much improved and she was back on a regular diet following the flexible sigmoidoscopy. At this visit the patient's estimated needs, diagnosis statement, and goal all remained the same. Recommendations that were included in the follow-up include: -1- Continue regular diet and encouraged small, frequent meals. -2- Will send snacks TID and Gatorade TID. -3- Daily weights to trend. -4- Consider adding daily multivitamin with minerals. -5- Consider adding zinc sulfate due to constant diarrhea. Education and handouts on UC were provided to the patient at this time.

CK was seen again by clinical nutrition on HD#6. At this time she had a PICC line placed with plans to initiate TPN later that day. Per MD note, CK did not respond appropriately to IV steroids as the patient was still having more than five bowel movements in a 24-hour period. The follow up C-diff stool studies came back negative. Upon this visit the patient was doing well with PO intake; however, was feeling full quickly. TPN was discussed with the patient at this time which she felt positively towards as it reduced pressure for increased oral intake. Progression of lab values and weight trends can be seen in Table 3 on page 10 and Table 4 on page 10. At this visit the patient's estimated needs, diagnosis statement, and goal all remained the same. Recommendations for this follow-up included: -1- Continue regular diet with snacks and Gatorade TID. -2- Begin TPN per MD once PICC line placed: Recommend D15% AA5% @

60ml/hr x 24hrs + 240ml lipids (@ 20ml/hr x 12hrs) to provide 1502 calories and 72g protein, 3.3mg dextrose/kg/min GIR, and 1.05 g/kg fat load. Check triglycerides for baseline and then weekly to trend. Start @ 40ml/hr for first day then increase to goal of 60ml/hr. -3- Check prealbumin and CRP level weekly to trend. -4- Daily weights to trend. Additional education was not provided at this follow-up.

On HD#8 CK was again visited by clinical nutrition for a nutrition consult placed for enteral nutrition goals in hopes to wean TPN. At the time of visit TPN was actively infusing and CK had received a total of 1426ml in the previous 24 hours. At this visit the patient's estimated needs, diagnosis statement, and goal all remained the same. Follow-up recommendations included: -1- Continue regular diet with snacks and Gatorade TID. -2- Will start resource breeze supplement TID with meals (each resource breeze = 250 calories and 9g protein). -3- Will continue high calorie/high protein dense snacks between meals. -4- Continue current D15% AA5% @ 60ml/hr x 24hrs + 240ml lipids (@ 20ml/hr x 12hrs) to provide 1502 calories and 72g protein, 3.3mg dextrose/kg/min GIR, and 1.05 g/kg fat load. Check triglycerides baseline then weekly to trend. If able to tolerate meals and meet at least 755 of nutritional needs via PO intake of meals and maintain/gain weight, then can D/C TPN. -5- Check prealbumin and CRP level weekly to trend. -6- Daily weights to trend. No additional education was provided at this visit.

Clinical nutrition visited CK for the last time on HD#9 to perform a brief follow-up regarding a nutrition consult for TPN. Recommendations for 12 hour TPN infusion were provided and it was advocated to provide a cyclic regimen: run 40ml/hr x 30mins, 80ml/hr x 30min, 132ml/hr x 10hrs, 80ml/hr x 30mins, 40ml/hr x 30mins then stop.

On HD#10 patient CK was discharged having met the goals of decreased bowel movement frequency, stool having a more formed consistency, and the sensation of abdominal

fullness subsided. For the treatment of CK's anemia the patient received a blood transfusion as an inpatient and was discharged with oral iron supplements. Upon discharge the patient was status post 2 cycles of Remicade (HD#4 and HD#7) and went home on Prednisone which was to be tapered down over the following two weeks. For malnutrition CK was sent home on a 12-hour TPN regimen. Home TPN provides a positive alternative to prolonged hospitalization. A study in the Journal of Gastrointestinal Surgery found that home TPN improved the overall quality of life as patients are able to regain independence and go about normal daily activities. It also found that short term, outpatient use of TPN at home resulted in low rates of complications and readmissions. This home care option also allows for economic benefits and shared health-care costs (5).

An overview of hospital events and clinical nutrition interventions can be found in Table 5 on page 10.

CK was scheduled to be seen two-days after discharge at the Inflammatory Bowel Disease Center.  At this visit, the TPN and prednisone dose tapering was planned and the patient was advised to get another flexible sigmoidoscopy in four months to assess for healing. No further visits were scheduled.

**Conclusion/Discussion**

In conclusion, this case study analyses the complexities of caring for a patient with UC. It also promotes the practice of using TPN as both an inpatient and outpatient treatment.  This UC study brings to light the challenges that come with addressing weight loss and providing adequate nutrition to reverse any nutritional detriments. Depending on the severity of the disease, UC patients may experience multiple hospitalizations, multiple procedures, and multiple surgeries. It is the job of clinical nutrition to understand how to best treat these patients in order

to maintain positive nutritional status. In the case of CK, early nutrition support interventions were provided with the help of clinical nutrition and gastroenterology services which led to an improved nutritional status based on the prealbumin trend seen in Table 3 on page 10. The case study of CK represents the important roles that clinical nutrition plays in the treatment of hospitalized patients.

**Table 3: Lab Value Trends**

| Component | 3/5/14 | 3/7/14 | 3/11/14 | 3/13/14 |
|---|---|---|---|---|
| Sodium | 126 (L) | 134 (L) | WNL | WNL |
| Potassium | 3.1 (L) | WNL | 3.3 (L) | WNL |
| Chloride | 91 (L) | WNL | WNL | WNL |
| Calcium | 8 (C-9) | 8 (L) | 8 (L) | 8.2 (C-9.3) |
| Albumin | 2.8 (L) | -- | -- | 2.6 (L) |
| CRP | 14.9 (H) | 5.4 (H) | 3.5 (H) | 1 (H) |
| Glucose | WNL | 118 (H) | 143 (H) | 132 (H) |
| Prealbumin | -- | -- | 17 (L) | 19 |

**Table 4: Weight Trends**

| Date | Weight |
|---|---|
| 3/5/14 | 100lbs |
| 3/7/14 | 106lbs |
| 3/12/14 | 100lbs |
| 3/12/14 | 100lbs |

**Table 5: Clinical Nutrition Overview**

| Visit | Significant Events | Nutrition Intervention |
|---|---|---|
| Day of admission | Nutrition consult | Initial assessment |
| HD#2 | s/p flexible sigmoidoscopy | Provided IBD education |
| HD#6 | Placement of PICC line | TPN recommendations |
| HD#8 | Nutrition consult for weaning TPN | Snacks and supplements added |
| HD#9 | Nutrition consult for home TPN | 12 hour TPN recommendations provided |

**References:**

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