Patient SS Case Study: End-stage Renal Disease Secondary to Diabetic Nephropathy

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Patient Profile

Patient SS is a 43-year old female who was admitted to the hospital for a living donor kidney transplantation (LDKT) from her sister, who is a haploidentical match. She is a high school graduate who is currently unemployed, but worked five years ago as a secretary for a family practice. For the past three years, she has been caring for her terminally ill father until he passed away two weeks prior to her surgery. Patient SS currently resides with her supportive husband of 15 years. She also has a 22-year old daughter in college and three stepsons between the ages of 21 and 28. She was dialyzing at a facility for three hours and 45 minutes, three times per week. However, her lifestyle of caring for her terminally ill father required that she begin dialyzing in Michigan to be closer to him. During this time, she admits she did not follow her diet as closely as she should have, resulting in a 30 lb. weight gain a few months before her scheduled kidney transplantation. Patient SS has active Medicare A and B and Blue Cross Blue Shield of Michigan insurance coverage that assisted in paying the costs of her extended hospital stay. Medicare has become the main insurance provider for the dialysis population in recent years (1).

Past Health/Medical History

At the age of seven, SS was diagnosed with Type 1 DM which progressed into diabetic retinopathy with retinal laser treatments, cataract surgery (2012), and the use of corrective lenses. In addition to T1DM, SS eventually developed hypertension (HTN) and subsequent diabetic nephropathy. Over time, the patient's chronic kidney disease (CKD) advanced to end-stage renal disease (ESRD) requiring chronic hemodialysis (HD) beginning in January 2009. In March 2009, she switched to peritoneal dialysis (PD) until February 2011. At this time, SS underwent a Roux-En-Y Gastric Bypass (RNYBG) jejunostomy, which bypassed roughly 150 cm of the gastrointestinal (GI) tract. Moreover, it resulted in a sizeable amount of weight loss and improved her hyperlipidemia. Research supports laparoscopic RNYGB as a method for improving the candidacy of transplantation patients through BMI reduction which may be safely recommended for patients in any stage of chronic kidney disease (CKD) or post-transplantation (2).

One month after her bypass SS restarted HD via a right foreman arteriovenous (AV) fistula. To gain access for PD and HD, SS had a lengthy history of procedures: failed Tenckhoff catheter placement (12/2008), successful Tenckhoff catheter placement (3/2009), right forearm fistula (5/2009) with a revision (7/2010) and ligation after symptoms of dialysis-associated Steal Syndrome (11/2010), Tenckhoff catheter removal (2/2011), and a left antecubital AV fistula (3/2011) with a revision (6/2011).

In addition to her procedures, SS also had anemia of CKD, renal osteodystrophy secondary to hyperparathyroidism, hypothyroidism, and a history of urolithiasis. Furthermore, she had left carpal tunnel surgery (8/2007) related to a diagnosis of mild osteoarthritis. Her history of urolithiasis resulted in a cystourethrogram with bilateral retrograde pyelograms (11/2009, 5/2012) and eventually a cholecystectomy (10/2011). At the time of admission, she had active diagnoses of hepatic steatosis, gastroesophageal reflux disease (GERD), herpes zoster, chronic acne, chronic anxiety, and depression for which she took medications.

Some of her diagnoses spawned from relevant family medical history. Her mother died at the age of 40 with DM, HTN, and a bowel perforation. Her father, whom she was caring for until two weeks prior to her transplant, died with DM, HTN, thyroid disease, chronic obstructive pulmonary disease (COPD), and multiple cancers (lung, prostate, skin). SS is one of six siblings: a sister who was her living kidney donor, a brother who died at 50 years old of DM and ESRD, a sister with DM, and a brother with COPD.

Patient SS reported typically having a good appetite, which improved overall since her RNYGB. She attempts to get eight hours of sleep each night, usually waking up at 8:00 or 9:00 A.M. SS tries to exercise three to five times per week. Her workout routine revolves mostly around strength training, but she also actively walks on the treadmill or the stair stepper. Her maximum weight was 305 lbs. with a BMI of 56 prior to the RNYGB. After the surgery, SS was able to lose 130 lbs. At the time of her evaluation for transplantation eligibility (9/2012), SS weighed 186 lbs. with a BMI of 34. Unfortunately in the months leading to her scheduled surgery, she gained 30 lbs. from dietary indiscretions related to the stress of caring for her terminally ill father. The day before her scheduled kidney transplantation, SS was 220 lbs. with a BMI of 40.6. Patients with a BMI greater than 40 require further evaluation from the nephrologist and surgeon, as well as an overall metabolic profile prior to surgery (3).

Upon admission to the hospital, SS denied any GI upset or problems. She did have a history of GERD and RNYGB with lysis of adhesions that may have resulted in mild malabsorption. She had no handicaps related to eating, procuring, or preparing meals. Her teeth were in good condition and she exhibited no signs of dysphagia. SS does not smoke, drink alcohol, or have any history of recreational drug use. She believes nutrition has become a crucial element of her life which she is used to after being diagnosed with Type 1 DM thirty-six years ago. She has an insulin pump but also follows a diabetic, renal diet and eats smaller portions related to her RNYGB. She is very accepting of the nutritional guidance provided by educators. SS attends a support group once a month for her bariatric surgery that she finds extremely helpful and uplifting.

Prognosis

In this specific case study, the patient's BMI prior to transplantation was just above 40. Based on recent research, individuals with morbid obesity have an increased risk of delayed wound healing, surgical site infection, and prolonged hospitalization (3). A link between high BMI and increased risk of delayed graft function, defined as needing dialysis the first week post-transplant, has been found. Transplants in obese patients offer significantly lower mortality rates, but this has not been observed in patients with BMI greater than 40 (3). To better determine the outcome of a transplant, patients with BMIs between 35 and 40 require further evaluation by a nephrologist and surgeon, while persons with BMI greater than 40 require an overall metabolic profile. Although pre-transplant healthy weight loss may be recommended, it is infrequently seen in ESRD and could cause additional nutrition stress, resulting in a worse prognosis post-transplant (3). Poor nutritional status before or after is also associated with poor outcomes, including increased mortality and reduced graft survival (4).

Medical/Surgical Assessment and Treatment

Patient SS was evaluated as a kidney transplantation candidate on September 18, 2012. At that time, she weighed 186 lbs. (BMI 34). The nephrologist spoke with her regarding important statistics and outcomes of renal transplants. For instance, 5-10% of renal transplants fail as a consequence of surgical complications, wound infection/abscess, drug nephrotoxicity or other causes. Diabetic nephropathy typically recurs in the allograft within 8-10 years post transplantation, but can be delayed by optimizing long-term blood pressure and mean glycemic control. In addition, those who are obese and have diabetes have greater problems with wound healing.

SS was deemed an acceptable candidate for renal transplantation, with no identified contraindications to general anesthesia, transplant surgery, or systemic immunosuppression at that time. On February 7, 2013, she was re-evaluated by a cardiologist related to an abnormal cardiac stress test. However, the only noted concern by the doctor was a high LDL cholesterol level. A dobutamine echocardiogram performed on February 12, 2012 determined whether a cardiac catheterization was needed prior to the surgery.

According to the hospital's kidney transplant recipient candidate selection criteria, a patient with ESRD can be considered for a transplant unless there is a contraindication. Contraindications include advanced heart disease, severe chronic lung disease, severe atherosclerotic pelvic and lower extremity arterial occlusive disease, active infections, active systemic vasculitis or glomerulonephritis, current or recent malignancy, inadequate bladder capacity, morbid obesity (BMI >40), active psychiatric illness, active substance abuse, advanced liver cirrhosis, lack of financial resources, or a poor psychosocial situation that would not support post-transplant follow-up care. Chronic viral hepatitis, chronic liver disease, uncontrolled DM, advanced age (>80 years old) are also considered high risks. The surgeon addressed the patient's morbid obesity (BMI 40.6) prior to surgery and decided to proceed.

The Course of Events

Patient SS was admitted to the hospital on February 9, 2014 and received HD to pull off extra fluid prior to surgery. The living kidney donor transplant was performed on February 10, 2014. Immediately after the operation, SS was resting comfortably, yet still lethargic and sedated with signs of initial slow graft function. She was taken to the Operating Room (OR) in the evening for a thrombectomy of the renal artery. A renal ultrasound demonstrated improved arterial blood flow post-surgery. SS went into post-operation circulatory shock, systemic inflammatory response syndrome (SIRS) with presumed sepsis secondary to possible aspiration pneumonia, and acute hypoxic respiratory failure related to airway edema. She was transferred to the ICU, intubated, put on a heparin infusion, insulin infusion for glucose control, and high dose dopamine for hypotension. Although a right internal jugular (IJ) PICC was placed, tube feedings were initiated through the oral gastric tube after transfer. She remained easily arousable, followed commands, and nodded to questioning.

The patient received three more rounds of HD on February 13, 17, and 18, 2014 for expanded extracellular fluid. On February 18, 2014, patient SS was taken back to the OR for re-exploration of the right iliac fossa for evacuation of the perinephric hematoma which was caused by the heparin infusion and a renal biopsy. She was extubated post-operation and put on a nasal cannula. An MRI from that morning did not give an adequate view of the transplanted kidney, but a power Doppler showed no blood flow. Biopsy results confirmed predominantly cortical necrosis with little viable tissue. Delayed graft function was believed to be secondary to re-exploration for the arterial thrombosis. On February 19, 2014, a transplant nephrectomy was performed. SS received HD on the 20th, and 21st. She was transferred

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Table 1. Abnormal Lab Values on Post-Renal Transplant Day #0 (2/10)

LAB	NORMAL VALUE	PATIENT'S VALUE	FACTORS AFFECTING ABNORMAL VALUE
Sodium	135-145 mEq/L	129 L	IVF, ESRD, Fluid Retention
CO2	22-33 mEq/L	20 L	Fluid retention, ESRD, Metabolic Acidosis
Glucose	70-100 mg/dL	164 H	Dietary Indiscretions, ESRD
BUN	5-25 mg/dL	51 H	ESRD secondary to Diabetic Nephropathy
Creatinine	0.0-1.5 mg/dL	7.52 H	ESRD secondary to Diabetic Nephropathy
Calcium	8.5-10.5 mg/dL	7.3 L	Kidney Transplant
WBC Count	4.8-10.8 K/uL	15.6 H	Kidney Transplant
Hgb A1C	<7% (considered good control)	8.4% H	High blood sugars averaging 192 mg/dL over the past 3 months, dietary indiscretions secondary to the stress of caring for her father.

Table 2. Abnormal Lab Values on Post-Kidney Transplant and Post-Thrombectomy Day #1 in ICU (2/11)

LAB	NORMAL VALUE	PATIENT'S VALUE	FACTORS AFFECTING ABNORMAL VALUE
Sodium	135-145 mEq/L	134 L	IVF, Fluid retention, Last HD session (2/9)
CO2	22-33 mEq/L	19 L	Fluid Retention, Metabolic Acidosis
Glucose	70-100 mg/dL	200 H	DM, AKI
BUN	5-25 mg/dL	54 H	AKI secondary to Septic Shock
Creatinine	0.0-1.5 mg/dL	7.88 H	AKI secondary to Septic Shock
Calcium	8.5-10.5 mg/dL	7.4 L	Kidney Transplant
WBC Count	4.8-10.8 K/uL	12.6 H	Kidney Transplant, Sepsis status post Thrombectomy
Hemoglobin	12.0-16.0 g/dL	11.5 L	Blood Loss from 2 Recent Surgeries
Hematocrit	37.0-47.0%	36.1% L	Blood Loss from 2 Recent Surgeries
GFR	>90 mls/min/1.73m^2	6 L	AKI secondary to Septic Shock
Phosphorus	2.5-4.5 mg/dL	6.5 H	AKI secondary to Septic Shock
Albumin	3.5-5.5 g/dL	3.0 L	Septic Shock *Not a good indicator of nutritional status
PTT	20-36 sec	43.5 H	Heparin, Delayed Graft Function status post Thrombectomy

Table 3. Abnormal Lab Values One Day Prior to Discharge (2/25)

LAB	NORMAL VALUE	PATIENT'S VALUE	FACTORS AFFECTING ABNORMAL VALUE
Sodium	135-145 mEq/L	134 L	Fluid Retention, Last HD session (2/21)
Glucose	70-100 mg/dL	129 H	ESRD status post Nephrectomy (2/19)
Creatinine	0.0-1.5 mg/dL	4.97 H	ESRD status post Nephrectomy (2/19)
Hemoglobin	12.0-16.0 g/dL	10.1 L	Anemia of CKD
Hematocrit	37.0-47.0%	31.8 L	Anemia of CKD
GFR	>90 mls/min/1.73m^2	10 L	ESRD status post Nephrectomy (2/19)
Phosphorus	2.5-4.5 mg/dL	4.7 H	ESRD status post Nephrectomy (2/19)
Albumin	3.5-5.5 g/dL	2.6 L	ESRD status post Nephrectomy (2/19) *Not a good indicator of nutritional status

out of critical care and back to the general surgery floor two days after the nephrectomy. She had serous sanguineous drainage from the right lower quadrant abdominal wound from the initial kidney transplant. Wound care was consulted and a wound VAC was placed. Patient SS was discharged from the hospital on February 26, 2014 after receiving HD, 17 days after she was admitted.

Medical Nutrition Therapy/Nutrition Care Process

A) Assessment: Due to the complications following her procedure, the registered dietitian (RD) frequently assessed the patient's case. On her initial assessment following her kidney transplant, SS weighed approximately 218 lbs. after her HD the day before, totaling a BMI of 41. That evening she had a thrombectomy and was transferred to the ICU. No new weight was taken at that time, but tube feedings were initiated. Two days later on February 13, 2014 she weighed 273 lbs. most likely related to being on intravenous fluids (IVF) and not having HD to pull off extra fluids for two consecutive days. Four days later, her weight continued to increase to 279 lbs. Her last nutrition follow-up documented two days prior to discharge showed a weight of 257 lbs. At that time, SS was on an oral diet, receiving HD, and IVF were discontinued.

Calculations of Calorie/Nutrient Needs

Based on her estimated needs from the Ireton-Jones Energy Equation (IJEE) 2002, SS required 1,579 to 2,057 kcal/day. She was on the ventilator at this time, and there was concern regarding overfeeding. When calculating an appropriate rate for her tube feeding via the oral gastric tube, a lower rate was chosen since she was on propofol infusion at a rate of 14.9 ml/hr. Nepro with Carb Steady (1.8 kcal/kg) was chosen as the most suitable formula related to the patient's ESRD and DM diagnoses.

After her failed kidney transplant, SS resumed inpatient HD. For this reason, her protein needs were increased to a range of 1.2 to 1.4 g/kg of her adjusted body weight. Her daily protein needs were estimated as 75 to 87 grams protein. Her enteral nutrition support only provided 68 grams of protein. One packet of Prostat (30 ml) was added to increase her protein intake. SS received 1,977 calories and 83 grams of protein and was 198% of her ideal body weight. After she was extubated, her energy needs were calculated using the range of 25 to 30 kcal/kg of her adjusted body weight (62.3 kg). Her energy needs once she was extubated were approximately 1,558 to 1,869 kcal/day.

Factors Affecting Future Compliance:

The patient had diagnoses of chronic anxiety and depression, for which she currently takes medications. However, the recent death of her father could worsen her depression and possibly cause further dietary indiscretions. On the other hand, not having the responsibility to care for her father could also relieve the stress she felt before and give her more time to concentrate on her own care.

SS has Type 1 DM and is insulin pump dependent. At admission, she had a hemoglobin A1C of 8.4% whereas good control of diabetes is considered $\leq$ 7.0%. If her average blood glucose levels remain high she could develop diabetic neuropathy, or worsen her pre-existing nephropathy or retinopathy. When I spoke with patient SS before discharge, she mentioned returning to her support group for post bariatric surgery patients which could help her get back on track for further weight loss.

Factors Resulting in Diagnoses

B) Nutrition Diagnosis Factors Resulting: At the patient's initial nutrition assessment she had just undergone kidney transplantation. The focus of her MNT was diet education for post-transplant patients with higher protein intake and further weight loss since her BMI was greater than 40. However, when she was transferred to the ICU after going into septic shock and requiring intubation, the emphasis was on ensuring she maintained an adequate caloric intake via enteral nutrition support. While intubated she was still receiving HD, which increased her protein needs and required the addition of the nutritional supplement, Prostat. After her nephrectomy and intra-operation biopsy, she was extubated and allowed to progress to an oral diet at her own pace.

Adequacy of Enteral Support

C) Nutrition Intervention/Care Adequacy of Enteral Support: When the patient developed acute hypoxic respiratory failure requiring intubation, enteral nutrition support was initiated the following day. Indirect calorimetry is the 'gold standard' for measuring resting energy expenditure for critically ill patients (6). Unfortunately, due to cost restraints and availability of proper equipment, the Ireton-Jones Energy Equation was utilized instead after intubation. A Prostat nutritional supplement was added later on to increase protein intake while on HD. Although this practice has yet to be validated, 21 kcal/kg of actual bodyweight is considered a reasonable strategy for the critically ill-obese patient (6). Based on this estimated calculation, SS would require 2,100 calories daily. Another approach is hypocaloric underfeeding, which provides 60-70% of the target energy needs and at least 2 g/kg IBW of protein/day. Recent studies have supported this 'permissive' underfeeding to prevent complications of overfeeding, such as hyperglycemia and fluid retention (6).

Table 4. Ordered Medications During the Hospital Stay (5)

MEDICATION	PURPOSE	SIDE-EFFECTS ESPECIALLY RELATED TO NUTRITION	DRUG/NUTRIENT INTERACTIONS
Antivert	Antihistamine	Nausea, Vomiting, May inhibit lactation	Avoid alcohol.
Ativan	Anxiety Disorder	N/A	Caution with grapefruit, sedative herbal products, stimulant products. Avoid St. John's wort and alcohol.
Calcium Gluconate	Calcium Deficiencies	Nausea	Caffeine slightly increases calcium excretion.
Cefazolin	Antibiotic	Diarrhea, Mouth Ulcer, Vomiting, Nausea	Long-term use in malnourished may decrease vitamin K synthesis.
Cellcept	Lower the immune system	Loss of Appetite, Nausea, Vomiting, Rapid Weight Gain	Take Mg supplement or antacid separately from drug. Caution with soy allergy.
Colace	Stool Softener	Bitter Taste, Bloating, Cramping, Diarrhea, Gas	Maintain high fiber diet with 1500-2000 mL fluid/day.
Dilaudid	Pain/Narcotic	Anorexia, Decreased Weight, Increased Thirst, Dehydration	Avoid alcohol. Ensure adequate hydration throughout the day.
Dulcolax	Stimulant Laxative	Abdominal Discomfort, Nausea, Cramps, Diarrhea	Maintain high fiber diet with 1500-2000 mL fluid/day.
Elavil	Antidepressant	N/A	Limit caffeine. Avoid alcohol and St. John's wort. Caution with grapefruit.
Lantus	Insulin	Hypoglycemia with Nausea, Excessive Hunger	Use alcohol with caution.
Lasix	Diuretic	Diarrhea	Avoid natural licorice. Limit alcohol.
Lopressor	Diuretic	Dry mouth, Increased Thirst, Loss of Appetite, Nausea, Vomiting	Avoid natural licorice. Decrease sodium and calcium intake.
Mylanta	Acid Indigestion	Constipation, Diarrhea	Take separately from citrus fruit/juice by 3 hrs. Juice increases aluminum absorption.
Nephrocaps	Multivitamin	Upset Stomach, Mild Breath Odor	N/A
Phenergan	Antihistamine	Nausea, Vomiting, Dry Mouth	Increased need for riboflavin. Avoid alcohol.
Prograf	Lower the immune system	Nausea, Vomiting, Loss of Appetite, Diarrhea,	Avoid alcohol, grapefruit, St. John's wort, salt substitutes, K supplements.
Protonix	Proton-Pump Inhibitor	N/A	Avoid alcohol.
Sensipar	Lower PTH	Nausea, Vomiting, Diarrhea	May interact with grapefruit and related citrus.
Sinemet	Parkinson's Disease	Anorexia, Decreased Weight	Take MVI or minerals separately. Caution with Fava beans.
Solumedrol	Steroid	Weight Gain, Nausea, Vomiting	Caution with grapefruit. Limit caffeine. Avoid alcohol.
Synthroid	Hypothyroidism	Appetite Changes, Decreased Weight	Caution with grapefruit. Decreased Absorption with soy products, walnuts, cottonseed meal, and high fiber foods.
Temazepam	Treat Insomnia	N/A	Limit caffeine under 500 mg/day. Caution with grapefruit, sedative herbal or stimulant products. Avoid St. John's wort and alcohol.
Zaroxolyn	Diuretic	N/A	Avoid natural licorice.
Zofran	Anti-Nausea	Caution with lactation.	N/A

Table 5. PES Statements Used During the Hospital Stay

DATE/EVENT	NUTRITION PROBLEM LIST	PLAN FOR INTERVENTION
2/10: Post-LKDT	Nutrition-related knowledge deficit related to post-transplant MNT recommendations.	Diet education as able: focus on MNT after transplant and a healthy weight loss.
2/11: Post-Thrombectomy	Inadequate oral intake related to acute respiratory failure requiring vent support AEB status NPO.	Initiate Tube Feedings via oral gastric tube: Nepro to goal of 35ml/hr (1512 kcal, 68g PRO)
2/17: Post-Renal Biopsy Before Nephrectomy	Altered nutrition-related lab values related to acute kidney injury AEB increased BUN and creatinine.	Increased Protein needs related to patient starting HD. Added 1-Prostat daily (1584kcal, 83g PRO)
2/24: Prior to Discharge	Increased nutrient needs related to wound healing, protein needs on dialysis AEB goal of 75-87g PRO/day.	Patient on oral diet. Renal diet (1,500 mL Fluid Restriction) with modified protein restriction of 80 grams per day and 1,800 calorie diet restriction.

The tube feeding rate administered was closer to 21 kcal/kg and fit within the protein recommendations for an individual on HD (1.2-1.4 g/kg of ABW). SS received 35 ml/hr of Nepro with CarbSteady formula via the oral gastric tube. The tube feedings and propofol infusion provided 1,905 calories and 68 grams protein daily which fit the patient's estimated energy needs. The addition of Prostat provided 1,977 calories and 83 grams of protein. According to Krause, patients should receive standard formulas before they try a "specialty" formula unless electrolyte or fluid concerns arise (7). Standard formulas may cause elevations in serum potassium, magnesium, and phosphorus (8). In this case, health professionals may choose Nepro with CarbSteady ®, an Abbott Nutrition Product specially formulated to meet the needs of patients receiving HD with ESRD. The consistent carbohydrates element can also aid with blood glucose control. Use of Nepro has shown substantial increases in serum albumin and prealbumin concentrations after six months on HD (4).

Counseling

SS never required post-transplant diet education after the course of events during her hospital stay. She was discharged on a renal diet with an elevated protein restriction of 80 grams and a consistent carbohydrate 1,800-calorie restriction. The patient was admitted to the hospital with ESRD on HD since 2009, Type 1 DM diagnosis since the age of seven, and was status post RYNGB (2011) prior to her scheduled kidney transplantation. She was very familiar with these diets after receiving nutrition counseling countless times in the past. We had a brief discussion reviewing the basic diet guidelines and she required no nutritional handouts. The Evidence Analysis Library states that sessions with an RD for two hours per month for up to one year may be effective intervention for adults with CKD, MNT, and should be initiated at least 12 times prior to dialysis or transplant (8). The emphasis of these RD sessions should be on lab tests and results, use and effect of phosphate binders, food/drug interactions, role of food and medications on renal function, role of blood pressure control and blood glucose control, bone disease management, and anemia management (9). An outpatient RD would have the time to build a rapport with the patient and help them make the best nutritional choices over an extended period of time through motivational interviewing and cognitive behavior therapy. SS was disappointed she would have to return to these strict diet plans, but was determined to follow the guidelines. She spoke about returning to her bariatric surgery support group and was strongly encouraged to do so.

Coordination of Care

After intubation, enteral nutrition support was initiated, but was turned off often because SS was taken to the OR for multiple procedures and tests. Coordination with nurses was important to ensure that free water flushes were given every six hours and Prostat was provided daily. Health professionals collaborated to determine when extubation was possible and an oral diet could be resumed. SS was discharged home with her supportive husband and plans to return to her outpatient HD facility. The RD spoke with her prior to discharge to review the basics of her diet regimen. An outpatient RD is federally mandated at each dialysis unit to work alongside with a nurse, social worker, and nephrologist as part of the interdisciplinary team (7).

D) Nutrition Monitoring and Evaluation: Patient SS stayed in the hospital for a total of 17 days related to renal-transplant failure and SIRS, which could not have been shortened by MNT. Enteral nutrition support during intubation helped to improve labs. Adequacy of tube feedings was difficult to assess based on frequent weight changes secondary to IVF, fluid retention, and HD. Labs did not reveal if the 30 ml of Prostat with 15 grams of protein had any affect since she developed AKI secondary to septic shock after the thrombectomy. However, BUN lab values had returned within normal limits, while creatinine labs improved as shown in Table 4. However, serum albumin levels had decreased by date of discharge. At that point, SS had not had

HD in the four days prior and was not receiving Nepro long enough to notice an improvement in serum albumin levels.

SS was initially on Cellcept and Prograf to help lower her immune system post-transplantation, but these were both discontinued shortly after surgery. In addition, she was on Lopressor, Lasix, and Zaroxolyn to decrease water retention. Water-soluble vitamins are lost rapidly through dialysis and 1mg/day folate supplementation is recommended based on extra losses (7). SS was started on Nephrocaps to provide ascorbic acid, folic acid, niacin, thiamine, riboflavin, pyridoxine, cyanocobalamin, pantothenic acid, and biotin. No vitamin labs were acquired to assess the effectiveness.

Table 6 shows the progression of PES statements during the patient's stay. Throughout her hospitalization, morbid obesity per a BMI of greater than 40 was also listed. However, this was never a major focus of MNT interventions. Reasons for PES changes are explained under the "Nutrition Diagnosis" section.

Standards of Care

The MNT standard of care for an ESRD patient is focused on preventing deficiencies and maintaining good nutrition status, controlling edema and electrolyte imbalances, preventing renal osteodystrophy, and providing nutrition education (7). Since the initial kidney transplantation failed, providing education for a post-transplant diet would have been irrelevant. SS was taking a Nephrocap multivitamin to prevent deficiencies and receiving HD to pull off extra fluid. At the time of discharge, an ESRD and DM diet were reviewed. Critical times were met through a follow-up system. At every nutrition assessment or referral, patients were rated as an A (high), B (moderate), or C (low) nutrition risk. SS had six nutrition follow-ups total. Four of these were high risk, which required vigilant watch over the patient's progress while in the ICU. This system allowed enteral nutrition tube feedings to be started the day after intubation and education to be provided prior to discharge. Ideal nutritional treatment would have been providing diet education on the post-transplant diet that SS would only have to follow for two months before returning to a DM diet. After the renal biopsy confirmed cortical necrosis of the renal artery, MNT could not change the course of events.

Summary

Patient SS was admitted to the hospital for a LKDT with a past medical history of Type 1 DM, ESRD on HD since 2009, RNYGB (2011), and other diagnoses. Before surgery, SS was re-evaluated by the nephrologist, who decided that despite a BMI of greater than 40 they would move forward with the procedure. After the transplantation, the patient had a renal thrombectomy, which spurred SIRS and acute hypoxic respiratory failure, requiring intubation and transfer to the ICU. In the ICU, she received enteral nutrition support until extubation, followed by a nephrectomy. SS was discharged on an oral diabetic 1,800 calorie, renal diet. The length of stay was 17 days because of the necessary subsequent tests done to determine delayed graft function.

As stated before, research shows sessions with an RD for two hours per month for up to one year may be an effective intervention for adults with CKD, MNT, and should be initiated at least 12 times prior to dialysis or transplant (8). In a case such as this, where the PES statement changes at almost every follow-up assessment, an RD is essential in providing different forms of MNT to cater to the patient's needs.

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