Case Report: Nutrition Management for Left Aspect Medulla Oblongata Infarction

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Abstract

Lateral medullary stroke is typically associated with increased likelihood of occurrence of dysphagia and exhibits the most severe and persistent form. Little research exists on dysphagia in brainstem stroke worldwide. The Lateral medullary syndrome is not a very common stroke. Mr. MJ, 64 year old African American male, non-diabetic, non-hypertensive, but smoker presented with shortness of breath, respiratory failure with an O2 saturation of 84%, and dizziness. He was clinically and radiologically diagnosed with a case of Lateral Medullary Syndrome (Stroke). Speech and physical therapy treatment for this patient is ongoing at a long-term rehabilitation center.

The paper also documents two cases of the severity and management approaches of dysphagia in brainstem stroke. For the first patient, cranial MRI had shown an acute ischemic stroke in the left lateral medullar region and the diagnosis of Wallenberg syndrome was established. The patient is administered PEG feeding after the diagnosis followed by a progressive rehabilitation to food intake. For the second patient, clinical dysphagia evaluation was done by a dysphagia specialist, which included a detailed history of the subjective complaints and medical status, cranial nerve testing, and an examination of the phases of swallowing. Cervical auscultation and respiratory status examination were also conducted. The patient was administered a traditional dysphagia therapy and VitalStim therapy. Despite being diagnosed with a severe forms of dysphagia followed by different treatment interventions, both patients had complete recovery of the swallowing function.
Disease Description

The Wallenberg’s syndrome also known as the Left Aspect Medulla Oblongata Infraction, is a rare syndrome involving part of the medulla oblongata with consequent loss of pain, temperature, taste, gag reflex, and ataxia. Wallenberg syndrome was initially reported by Gaspard Vieusseux, MD of Geneva in 1810 at the Medical and Chirurgical Society of London. He described his own affliction as “vertigo, unilateral facial numbness, loss of pain and temperature appreciation in the opposite limbs, dysphagia and hoarseness, minor tongue involvement, hiccups (cured by the taking of the habit of a morning cigarette) and a dropped eyelid.” ²

Wallenberg’s syndrome is a neurological condition caused by a stroke in the inferior cerebral artery of the brain stem, but what causes the stroke is still unknown. This stroke occurs in the medulla and cerebellum. The medulla controls important functions such as swallowing, speech articulation, taste, breathing, strength, and sensation. The cerebellum is important for coordination. The blood supply to these areas is via a pair of vertebral arteries and its branch, called the posterior inferior cerebellar artery (PICA). ¹

During the first 48 hours after the stroke, patients’ report dizziness, vertigo, facial pain, double vision, feeling sea sick with nausea/vomiting, and difficulty walking. The facial pain can be sharp pins around the eye, ear, and forehead. Objects appear in double, at an incline, or moving. This in combination with ataxia makes it impossible for the patient to walk. Other symptoms include hoarse voice, slurred speech, loss of taste, difficulty swallowing, hiccups, and altered sensation in the limbs of the opposite side. ¹
Evidence-Based Nutrition Recommendations

As presented in the Pan African Medical Journal, a case study conducted by El Mekkaoui and Irhoudane et al in the University Hospital of Fez investigated different types of evidence pertaining to lateral medullary infarction syndrome (Wallenberg’s syndrome) caused by dysphagia in particular. A 68-year-old man, with history of insulin-dependent diabetes was referred to the hospital for a severe dysphagia associated with false passages and nasal regurgitations evolving for 10 days. Clinical examination found neurological signs as contralateral Horner’s syndrome, ipsilateral palatal paresis, gait ataxia and hoarseness. Videofluoroscopy showed a lack of passage of contrast medium to the distal esophagus and the EGD (esophagogastroduodenoscopy) was normal. The cranial MRI had shown an acute ischemic stroke in the left lateral medullary region and the diagnosis of Wallenberg syndrome (WS) was established. The cranial MRI had shown an acute ischemic stroke in the left lateral medullary region and the diagnosis of Wallenberg syndrome (WS) was established. Though the patient had a small unilateral brainstem lesion, dysphagia was severe.

Dysphagia is more prominent and lasts longer in WS patients than in hemispheric stroke patients. In LMI (lateral medullary infarction), dysphagia is managed using compensatory strategies: early nasogastric feeding, thickened fluids or percutaneous endoscopic gastrostomy feeding, followed by a progressive deglutition rehabilitation program. The investigators suggested the effectiveness of therapeutic repetitive transcranial magnetic stimulation. A PEG feeding was set up for the patient at the
beginning and then a progressive rehabilitation to food intake was established. Two months later, there was a net regression of dysphagia and the patient was able to eat normally. There were no competing interests or reported limitations. As implicated, the neurogenic origin of acute oropharyngeal dysphagia should be explored in the practice of gastroenterology.

The second case study presented by Gupta and Banerjee et al found that evidence of combined traditional therapy and VitalStim therapy to treat dysphagia due to Lateral Medullary Stroke. A 29-year-old male patient from New Delhi had severe dysphagia and late intervention but recovered and achieved complete ability to swallow, eat, and drink by mouth. The patient had a history of right medullary stroke (infarction) one year back. While hospitalized, patient acquired severe pneumonia. A nasogastric tube (NGT) was placed for nutritional support. He was hospitalized for two months where all of his functions recovered except swallowing. On completion of 79 sessions of VitalStim therapy treatment in a period of 18 weeks, the patient attained fully functional (MMT) hyolaryngeal excursion and started swallowing food without clinical signs of laryngeal penetration and aspiration. Patient’s refusal for undergoing fiberoptic endoscopic evaluation of swallowing (FEES) has been the limitation of this study. Technologic advances like VitalStim therapy, transcranial magnetic stimulation (TMS), and functional magnetic stimulation (FMS) have enhanced the assessment and treatment of patients with dysphagia by permitting better quantification of impairment and treatment effectiveness. This study signifies the chances of spontaneous recovery of dysphagia followed by lateral medullary infarct are less compared to dysphagia following a hemispheric stroke. Both studies reflect two
approaches to assisting patients with lateral medullary infarction syndrome and dysphagia.
Case Presentation

MJ is a 64 year old African American male; non diabetic, non hypertensive, but smoker was admitted to the hospital from the Emergency Room for shortness of breath, respiratory failure with an O2 saturation of 84%, and dizziness. He required a BIPAP in the ED and was noted to be tachycardic. Patient reported he has eaten some garfish when he became sick with nausea and vomiting for 4 days. On the second day of hospital admission patient woke with trouble swallowing (dysphagia), slurred speech, feeling dizzy when sitting up, hiccups, ataxia of the gait, and having double vision that improved when he closed one eye. On assessment patient was thought to have possible left eyelid droop and severe dysphagia. This is when Neurology and Speech Therapy was consulted.

Modified Barium Swallow study (MBS) was conducted the third day of patient’s hospitalization. Speech Language Pathologist placed Mr. MJ on NPO due to paralysis of the vocal cords and larynx causing the patient to have tracheal aspiration and dysphagia. Parenteral Nutrition (PPN) was started after patient had been NPO for 4 days. TPN was started on day 8 after patient adamantly refused placement of percutaneous endoscopic gastrostomy tube (PEG). On day 13 PEG tube was successfully placed and enteral tube feedings were started. After being admitted for twenty days at XYZ Hospital, Mr. MJ was deemed medically stable and was transferred to an acute rehab facility to continue progress with speech and physical therapy.
Nutrition Care Process: Assessment

The first step in the Nutrition Care Process is assessment. This includes nutrition screening which is composed of patient’s clinical and medical history, anthropometric measurements, biochemical and laboratory values, medication and supplement use, and food and nutrition intake and history.

Client History

The patient lives at home with his wife. He is a retired federal worker. Mr. MJ’s admitting diagnoses to XYZ Hospital is lateral medullary syndrome. Patient does not have a medical history as he did not have a primary care physician for over 30 years. Patient smokes 1-2 packs of cigarettes a day. He denies drug abuse. He socially drinks a few beers a month. His family history was reviewed and is non-contributory. The RD was consulted due to the patient’s severely compromised nutritional status.

Food/Nutrition Related History

In terms of food and nutrition related history, the patient was noted to experience dysphagia with tracheal aspiration when attempting to swallow. However upon admit, Patient reported he has eaten some garfish when he became sick with nausea and vomiting for 4 days. Patient reported he initially vomited mucus and bile and then it turned coffee ground/black. According to Mr. MJ he has no history of food allergies and prior to admission he was following a regular diet with no difficulty chewing or swallowing.

Nutrition Focused Physical Findings and Malnutrition Identification
The patient presented to the hospital with nausea and vomiting for four days and upon initial assessment the patient had consumed less than 50% of estimated energy requirements for 5 days due to development. Patient had moderate loss of subcutaneous fat around the orbital region and triceps and mild muscle wasting in the temporal region and clavicle. Overall my assessment of the patient was that he appeared to be moderately compromised and qualified for non-severe malnutrition.

**Anthropometric Measurements**

Upon initial assessment, the patient is 167 centimeters tall (5’6”) and weighed 94.04 kg (207 lb) upon admission. At 5’6”, his ideal body weight (IBW) is 142 lbs. Therefore at admission he was 145% of his IBW and had a Body Mass Index (BMI) of 33.72 kg/(m²) which is classified as Obesity Class I. More information regarding his basic anthropometrics measurements can be found on Table 1 and Table 2.

**Biochemical Data, Medical Tests, and Procedures**

Nutrition related lab values and corresponding data upon admission of Mr. MJ’s hospital stay can be found in Table 4. The main lab values that were being monitored were BUN, creatinine, calcium, RBC, H/H, glucose, chloride, and sodium. Patient underwent several medical scans such as upper endoscopy, esophagram, urinalysis, MRI of the brain, CAT scan of the thorax, MRA of the head and neck, PICC line and PEG tube placement, and a barium swallow study.

**Nutrient Needs**

Mr. MJ’s estimated nutrient requirements were based on his admitting weight of
94.04 kg. For the initial assessment his nutrient needs were, 2181 calories/day, 109 grams of protein/day, and 2363 mL of fluid/day. During follow up assessments, estimated nutrient requirements remained unchanged. Calculations for estimated nutrient needs can be found in Table 3.

**Aramark Nutrition Care Level**

Upon initial assessment, the patient has been NPO for greater than 4 days (priority points: 4), is of a high BMI of 33.72 (priority points: 0 BMI not greater than 40), with a primary diagnosis of sepsis (priority points: 4), with estimated energy intake of less than or equal to 50% of estimated energy requirements for greater than or equal to 5 days (priority points 4), and with reported evidence of 1-2% weight loss in 1 week (priority points: 3). Combining all the priority points designated the patient to be of High Level of Nutrition Care per Aramark’s Policy and Procedure, requiring nutrition reassessment within 1-2 days. Aramark’s Policy and Procedures for Level of Nutrition Care can be found in the appendix under Handout 1. Three follow ups were completed during patients stay at the hospital. Priority points for each, are listed in Table 5.

**Nutrition Care Process: Diagnosis**

The second step in NCP is nutrition diagnoses. During this step, patient’s area of concern and needs are identified, prioritized, and documented. A Nutrition Diagnosis includes a PES Statement. This statement documents the problem, etiology, and signs and symptoms. To form a PES Statement eNCPT, electronic nutrition care process
terminology, is used. For Mr. MJ two nutrition diagnosis were identified.

Acute disease or injury related malnutrition related to stroke resulting in dysphagia as evidence by mild muscle and fat wasting, 1% weight loss in the last 5 days, and less than or equal to 50% of estimated energy requirements for greater than or equal to 5 days.

Altered nutrition related laboratory values related to GI Bleed as evidence by medical diagnoses and decreased hemoglobin and hematocrit from laboratory values.

**Nutrition Care Process: Interventions**

The third step in the NCP is nutrition intervention. Nutrition care can and should be driven by the extent of a nutrition problem rather than solely by a diet order or medical condition. Though medical conditions affect a person’s need for and ability to consume, digest, metabolize, and utilize nutrients, the nutrition diagnosis rather than the medical diagnosis determines the specific type of nutrition intervention.

**Medical Intervention**

Upon admission patients blood pressure was accelerated and he was tachycardic with heart rate in the 120s. Patient was admitted to the ICU unit and placed on BiPAP which his oxygen saturation improved from 84% to 96%. The patient had coffee ground emesis and blood cultures were done in the emergency room which came back negative. Patient was placed on broad-spectrum antibiotic therapy with Zosyn and Vancomycin due to medical diagnosis of sepsis.

GI services were consulted considering patient’s coffee ground emesis. An upper
endoscopy was done which revealed severe esophagitis with suspected partial thickness tear with active oozing along the mucosal duodenum. Patient also had an esophagram conducted which revealed tracheal aspiration. Thus, speech therapy was consulted, and patient was diagnosed with dysphagia. Urinalysis was conducted which did not suggest UTI. Patient was then downgraded to a regular floor.

Patient presented with slurred speech so an MRI of the brain was done which showed medullary oblongata acute nonhemorrhagic infarction. Thus, neurology was consulted and surgical hospitalists were consulted for possible Mallory-Weiss tear and no surgical intervention was recommended. CAT scan of the thorax was conducted which showed 2.7 cm thyroid pass and questionable recurrent laryngeal nerve compression. MRA of head showed an occluded distal left vertebral artery and a hemodynamically significant stenosis in the distal right vertebral artery.

**Nutritional Intervention**

The Nutritional Interventions conducted for Mr. MJ, were Peripheral Parenteral Nutrition (PPN), Total Parenteral Nutrition (TPN), and Enteral Nutrition (EN). PPN and TPN are provided to patients who do not have any other source of nutrition. PPN is provided by the peripheral IV and TPN can provided by a Peripherally Inserted Central Catheter (PICC). Enteral Nutrition is provided by different types of tubes such as Nasogastric (NG), Naso-Jejunal (NJ), Percutaneous Endoscopic Gastrostomy (PEG), Percutaneous Endoscopic Gastrostomy Jejunal Extension (PEG-J), and Orogastric (OG).

Mr. MJ had been NPO for greater than four days and less than or equal to 50% of
energy needs had been met for five days. Patient had also witnessed 1-2% weight loss in one week. Therefore, PPN Clinimix 4.25%/10% + IV IntraLipids daily 20% @ 83 mL/hr. This will provide the patient with 1515 calories (69% of needs), 85 grams of protein (78% of needs and 1992 mL of fluids (84% of needs) was recommended. During this time, speech therapy had not diagnosed the patient with dysphagia. PPN is not preferred means of providing nutrition support secondary to not being able to stimulate the gut, causing gut atrophy.

Upon first follow up, PPN had been running for three days providing the patient with 69% of needs. Speech therapy had diagnosed the patient with tracheal aspiration with dysphagia secondary to MRI result of acute stroke. Thus, recommended a PEG tube be placed for long term nutrition. Patient advised on secondary route of nutrition by gastroenterologist. Patient refused PEG tube placement due to loss of quality of life. TPN at this time would be recommended, however, no central line was in place. PPN was recommended to be continued and Enteral nutrition recommendations were entered, if patient choose to insert PEG.

Eight days after initial assessment, patient was still NPO and PPN had been infusing for six days. TPN was indicated in this case when Enteral Nutrition was not expected to be feasible in seven to ten days. Advised central line to be placed and TPN was recommended.

On the ninth day, central line was placed. Two days later, TPN consultation was received. Total Parenteral Nutrition is provided when a patient is not receiving any other
type of nutrition. TPN is of higher concentration and can only be administered through a central line. The following TPN recommendations were given: 726 mL 15% Amino Acids, 523 mL of 70% Dextrose, 250 mL 20% lipids. This provided the patient with 2181 calories (100% of needs) and 109 grams of protein (100% of needs) per day. During the patient’s visit, speech language pathologist, dietitians, gastroenterologist, as well as the hospital physician were educating the patient on the importance of long term nutrition care through a PEG tube. Gastroenterologist noted that with the help of patient’s wife, patient had agreed to a PEG tube placement. Patient was taken to the GI lab to have a PEG inserted. Later that day, TPN was started due to unsuccessful attempt at placement.

Patient was on TPN for 1 day and the PEG was placed surgically after unsuccessful attempt at placing it endoscopically. Patient was started on Osmolite 1.2 cal @ 20 mL/hr increasing slowly to goal rate of 75 mL/hr. This will provided the patient with 2160 calories (99% of needs), 99 grams of protein (90% of needs), and 1476 mL of fluid (62% of needs). Patient had 880 mL of free water flushes. Considered 200 mL flushes 4 times a day. Refeeding risks were taking into consideration.

**Nutrition Care Process: Monitoring and Evaluation**

The fourth step of the NCP is nutrition monitoring and evaluation. This step involves the monitoring and evaluation of the effects of the nutrition interventions. The RD will first determine indicators that should be monitored. These indicators should match the signs and symptoms identified during the assessment process and provide objective data to demonstrate effectiveness of nutrition interventions. ⁴
In this case study, the RD is to monitor parenteral/enteral nutrition intake and electrolyte profile which include sodium, potassium, chloride, magnesium, and phosphorus. Monitoring of triglycerides and glucose to assess TPN tolerance, and monitoring weight change. The RD is to also monitor anthropometric measurements, malnutrition physical assessment, medications that are nutritionally relevant, and medical plan of care.

Initial Assessment (11/3/16)

Assessment

Upon initial assessment patient presents with continuous nausea and vomiting. Patient reports ground emesis since he began vomiting. He denies abdominal pain. Patient is hoarse from vomiting and has a burning throat. Per labs, BUN (45 mg/dl) and Creatinine (3.37 mg/dL) were elevated. Per Gastrointestinal Physician, CT of the Thorax showed moderate wall thickening of the entire esophagus with questionable focal wall thickening near GE junction; possibility of esophagitis from persistent vomiting. Electrocardiogram identified severe inflammation and friability of the esophagus. MRI confirmed nonhemorrhagic medulla oblongata infraction. Per Speech Therapy, patient continues to present with dysphagia and remains unsafe for PO intake. Esophagram supported tracheal aspiration per SLP.

Diagnoses:

1. Acute disease or injury related malnutrition related to stroke resulting in dysphagia as evidence by mild muscle and fat wasting, 1% weight loss in the last 5 days, and
less than or equal to 50% of estimated energy requirements for greater than or equal to 5 days.

2. Altered nutrition related laboratory values related to GI Bleed as evidence by medical diagnoses and decreased hemoglobin and hematocrit from laboratory values

Goal:

- **Initial Goal**: Maintain Weight throughout Hospitalization
- **Initial Goal**: Meet Greater than 75% of Nutritional needs by discharge
- **Initial Goal**: PO Intake 75-100% of Meals/Snacks by follow up

Nutrition Recommendations:

- Advance to GI Soft Low residue diet when medically appropriate per MD and SLP rec's
- Recommend Clinimix 4.25% / 10% + IV intralipids 20% @ 83 mL/hr. This will provide the patient with 1515 calories (69% of needs), 85 grams of protein (78% of needs and 1992 mL of fluids (84% of needs)
- If NG/OG/PEG tube is placed consider Osmolite 1.2 cal @ 20 mL/hr increasing slowly to goal rate of 75 mL/hr. This will provide the patient with 2160 calories (99% of needs), 99 grams of protein (90% of needs), and 1476 mL of fluid (62% of needs). Patient will have 880 mL of free water flushes. Consider 200 mL flushes 4 times a day.
Follow up #1 (11/7/16)

Assessment

Patient is currently unable to swallow secondary to stroke. According to Modified Barium Swallow, performed by Speech Language Pathologist, recommended for the patient to be NPO (nothing by mouth). Due to severe dysphagia with tracheal aspiration, Percutaneous endoscopic gastrostomy (PEG) was recommended. However, patient adamantly refusing secondary route of nutrition. Patient refused PEG tube because he had personally witnessed the difficulties and challenges associated with living life with a PEG tube. Patient stated that his father-in-law did not enjoy his life because of the adversities he faced which included pain and daily flushing and cleaning of tube. Patient did not want PEG tube to hinder his ability to take part in everyday life. Per labs, Glucose is elevated 130 mg/dl. Hemoglobin (11.7 mg/dl) and Hematocrit (34.8 %) are low secondary to possible GI Bleed per endoscopy. Clinimix 4.25% / 10% + IV intralipids 20% @ 83 mL/hr was started by physician from previous nutrition recommendation. Patient is still against Enteral Nutrition.

Diagnoses

1. Acute disease or injury related malnutrition related to stroke resulting in dysphagia as evidence by mild muscle and fat wasting, 1% weight loss in the last 5 days, and less than or equal to 50% of estimated energy requirements for greater than or equal to 5 days.

2. Altered nutrition related laboratory values related to GI Bleed as evidence by
medical diagnoses and decreased hemoglobin and hematocrit from laboratory values

Goal

- **Progressing Upon Follow up**: Maintain Weight throughout Hospitalization
- **Progressing Upon Follow up**: Meet Greater than 75% of Nutritional needs by discharge
- **Goal Not Met**: PO Intake 75-100% of Meals/Snacks by follow up

Nutrition Recommendations

- Continue PPN Clinimix 4.25% / 10% + IV intralipids 20% @ 83 mL/hr. This will provide the patient with 1515 calories (69% of needs), 85 grams of protein (78% of needs) and 1992 mL of fluids (84% of needs).

- If patient agrees to PEG tube placement consider Osmolite 1.2 cal @75 mL/hr. This will provide the patient with 2160 calories (99% of needs), 99 grams of protein (90% of needs), and 1476 mL of fluid (62% of needs). Patient will have 880 mL of free water flushes. Consider 200 mL flushes 4 times a day.

Follow up #2 (11/10/16)

Assessment

TPN Consult Received. Noted PICC line placed on 11/8/16. Patient has been NPO since 11/2/16 (8 days). Noted patient had hiccups for 2 days. Patient also has not had a BM since 10/31/16 secondary to no PO intake. Patient has finally agreed to a PEG placed
due to encouragement and persistence from his wife. GI Physician and Physician Assistant entered the room during rounds and informed the patient about the procedure of placing a PEG tube and that feeding will start 12 hours after the PEG has been placed. Patient is more receptive to the idea of tube feeding and is getting more comfortable. Per physician assistant TPN will not be administered and PPN will continue to run until PEG tube has been placed. TPN recommendations were still listed in case something changed drastically and enteral nutrition was not plausible.

Diagnoses

1. Acute disease or injury related malnutrition related to stroke resulting in dysphagia as evidence by mild muscle and fat wasting, 1% weight loss in the last 5 days, and less than or equal to 50% of estimated energy requirements for greater than or equal to 5 days.

2. Altered nutrition related laboratory values related to GI Bleed as evidence by medical diagnoses and decreased hemoglobin and hematocrit from laboratory values.

Goal

- **Progressing Upon Follow up:** Maintain Weight throughout Hospitalization
- **Progressing Upon Follow up:** Meet Greater than 75% of Nutritional needs by discharge
- **New Goal Established:** Tolerate Enteral Feeding at Goal Rate
**Nutrition Recommendations**

- **TPN Consult Received**: Since patient has been NPO since 11/02/16. 726 mL 15% Amino Acids, 523 mL of 70% Dextrose, 250 mL 20% lipids. This provides the patient with 2181 calories (100% of needs) and 109 grams of protein (100% of needs) per day.

- Once PEG tube has been placed, start Osmolite 1.2 cal @ 20 mL/hr increasing slowly to goal rate of 75 mL/hr. This will provide the patient with 2160 calories (99% of needs), 99 grams of protein (90% of needs), and 1476 mL of fluid (62% of needs). Patient will have 880 mL of free water flushes. Consider 200 mL flushes 4 times a day.

- Patient is at risk for ReFeeding syndrome. Patient has had no PO intake since (11/2/16). Will monitor phosphorus, magnesium, potassium levels. If low serum levels are detected, repletion should occur, and the enteral feeding rate should not be advanced until serum levels are within normal limits.

**Follow up #3**

**Assessment**

PEG tube placement endoscopically was unsuccessful due to thick endometrial lining. TPN was started. Later that day, PEG placement surgically was attempted and was successful. GI Physician started tube feeding after 5 hours and patient was tolerating tube feeding at goal rate.
Diagnoses

1. Acute disease or injury related malnutrition related to stroke resulting in dysphagia as evidence by mild muscle and fat wasting, 1% weight loss in the last 5 days, and less than or equal to 50% of estimated energy requirements for greater than or equal to 5 days.

2. Altered nutrition related laboratory values related to GI Bleed as evidence by medical diagnoses and decreased hemoglobin and hematocrit from laboratory values.

Goal

- **Progressing Upon Follow up**: Maintain Weight throughout Hospitalization
- **Goal Met**: Meet Greater than 75% of Nutritional needs by discharge
- **Goal Met**: Tolerate Enteral Feeding at Goal Rate

Nutrition Recommendations

- Continue Osmolite 1.2 cal @ 20 mL/hr increasing slowly to goal rate of 75 mL/hr. This will provide the patient with 2160 calories (99% of needs), 99 grams of protein (90% of needs), and 1476 mL of fluid (62% of needs). Patient will have 880 mL of free water flushes. Consider 200 mL flushes 4 times a day.

- Monitor Phosphorus, Magnesium, and Potassium secondary to refeeding risk.

Conclusion

The above case study demonstrates the critical role of a patient having adequate
nutrition at all times. Patient was able to recover from sepsis and come to a manageable state of the Wallenbergs Syndrome to transferred to a rehabilitation facility. Patient's course of treatment was very well handled due to the fact that nutrition intervention happened earlier in his disease state. Even though a PEG tube placement was refused for a few days, TPN was started to meet patient's nutrient needs. Patient is now at an inpatient rehabilitation center, where he is receiving physical therapy and occupational therapy for his ataxia and weakness as well as speech therapy to recover from dysphagia. Patient is receiving enteral nutrition and has been educated on proper cleaning and feeding techniques.

“Early nutrition help can improve quality of life and not hinder it, thank you the entire medical staff.” ~Mr.MJ
Appendix

Table 1: Anthropometric Data

<table>
<thead>
<tr>
<th>Height</th>
<th>Weight (upon admission)</th>
<th>Body Mass</th>
<th>Usual Body Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>167 cm 5 ft 6 in</td>
<td>94.04 kg 207 lbs</td>
<td>33.72 kg/m²</td>
<td>95.45 kg 210 lbs</td>
</tr>
</tbody>
</table>

Table 2: BMI Classification

<table>
<thead>
<tr>
<th>BMI Classification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 40</td>
<td>Obesity- Grade III</td>
</tr>
<tr>
<td>35 - 39.9</td>
<td>Obesity- Grade II</td>
</tr>
<tr>
<td>30 - 34.9</td>
<td>Obesity - Grade I</td>
</tr>
<tr>
<td>25 - 29.9</td>
<td>Overweight</td>
</tr>
<tr>
<td>18.5 - 24.9</td>
<td>Normal</td>
</tr>
<tr>
<td>≤ 18.4</td>
<td>Underweight</td>
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</tbody>
</table>

Table 3: Estimated Nutrient Requirements

<table>
<thead>
<tr>
<th>Estimated Nutrient Requirements</th>
<th>Energy</th>
<th>Protein</th>
<th>Fluid</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2181 kcal/day</td>
<td>109 grams/day</td>
<td>2363 mL/day</td>
</tr>
<tr>
<td>Mifflin St Jeor 1677 x (stress factor 1.3)</td>
<td>20% of total calorie requirement</td>
<td>25 mL/kg 25 mL x 94.04 kg = 2363 mL</td>
<td></td>
</tr>
<tr>
<td>2181 kcal x .20= 436.2 kcal of protein / 4 = 109 grams of protein</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormal Laboratory Values Upon Admission</td>
<td>Patients Value</td>
<td>Normal Value</td>
<td>Rationale of Lab Value</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td><strong>BUN</strong></td>
<td>22.0 mg/dL (HIGH)</td>
<td>7-18 mg/dL</td>
<td>Renal insufficiency, dehydration, shock, stress</td>
</tr>
<tr>
<td><strong>Creatinine</strong></td>
<td>1.38 mg/dL (HIGH)</td>
<td>0.6-1.3 mg/dL</td>
<td>Renal insufficiency, infection</td>
</tr>
<tr>
<td><strong>Calcium</strong></td>
<td>8.0 mg/dL (LOW)</td>
<td>8.5-10.2 mg/dL</td>
<td>Weakened bones, kidney stone risk</td>
</tr>
<tr>
<td><strong>RBC</strong></td>
<td>4.60x10/mcL (LOW)</td>
<td>4.7-6.1 x10/mcL</td>
<td>Blood loss</td>
</tr>
<tr>
<td><strong>Hgb</strong></td>
<td>11.8 gm/dL (LOW)</td>
<td>13.5-17.5 gm/dL</td>
<td>Blood loss</td>
</tr>
<tr>
<td><strong>Hct</strong></td>
<td>35.0% (LOW)</td>
<td>38.8-50%</td>
<td>Blood loss</td>
</tr>
<tr>
<td><strong>Chloride</strong></td>
<td>110 mmol/L (HIGH)</td>
<td>96-106 mmol/L</td>
<td>Blood volume, blood pH, blood pressure</td>
</tr>
<tr>
<td><strong>Sodium</strong></td>
<td>146 mmol/L (HIGH)</td>
<td>136-145 mmol/L</td>
<td>Fluid/electrolyte/mineral balance, heart problems, critically ill</td>
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</tbody>
</table>
### Table 5: Follow up Priority Points

<table>
<thead>
<tr>
<th>Nutrition Care Indicator</th>
<th>Initial Assessment (11/3/16)</th>
<th>Follow Up #1 (11/10/16)</th>
<th>Follow Up #2 (11/11/16)</th>
<th>Follow Up #3 (11/14/16)</th>
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</thead>
<tbody>
<tr>
<td>Nutrition/Diet Order or anticipated</td>
<td>NPO &gt; 4 days (4 points)</td>
<td>New Parenteral Nutrition (Clinimix 4.25%/10% + IV IntraLipids) (4 points)</td>
<td>New Parenteral Nutrition (TPN) (4 points)</td>
<td>New Enteral Nutrition (Osmolite @ 75 mL/hr.) (4 points)</td>
</tr>
<tr>
<td>Weight Status</td>
<td>BMI. 33.72 (0 points)</td>
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</tr>
<tr>
<td>Primary Diagnosis/ Contributing Condition</td>
<td>Sepsis (4 points)</td>
<td>Sepsis (4 points)</td>
<td>Sepsis (Slowly Resolving) (4 points)</td>
<td>Sepsis (Resolving) (0 points)</td>
</tr>
<tr>
<td>Energy Intake</td>
<td>&lt;=50% of estimated energy requirements for &gt;/ 5 days (4 points )</td>
<td>&lt;=50% of estimated energy requirements for &gt;/ 5 days (4 points )</td>
<td>&lt;=50% of estimated energy requirements for &gt;/ 5 days (4 points )</td>
<td>Meeting greater than 75% of needs because of use of TPN (0 points)</td>
</tr>
<tr>
<td>Interpretation of Weight Loss</td>
<td>1-2% in 1 week (3 points)</td>
<td>1-2% in 1 week (3 points)</td>
<td>1-2% in 1 week (3 points)</td>
<td>1-2% in 1 week (3 points)</td>
</tr>
<tr>
<td>Total Points</td>
<td>15 points High Risk</td>
<td>14 points High Risk</td>
<td>11 points High Risk</td>
<td>7 points Moderate Risk</td>
</tr>
</tbody>
</table>
References: