Case Study #33 Esophageal Cancer Treated with Surgery and Radiation

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**I. Understanding the Disease and Pathophysiology**

1. **Mr. Seyer has been diagnosed with adenocarcinoma of the esophagus. What does the term adenocarcinoma mean?**

Adenocarcinoma is cancer found in the secretory cells of the body. These type of cells secrete mucus, digestive juices, saliva, or other fluids into the body. Common adenocarcinoma cancers are found in the breast, prostate, esophagus, pancreas, lungs, and colon (NCL Dictionary of Cancer Terms).

1. **What are two most common types of esophageal cancer? What are the risk factors for development of this malignancy? Does Mr. Seyer’s medical record indicate that he has any of these risk factors?**

Two of the most common types of esophageal cancer include adenocarcinoma and squamous cell carcinoma. Adenocarcinoma is the most common of the two in the United States, and is typically found in lower part of the esophagus, close to the stomach. Common risk factors of Adenocarcinoma include obesity, acid reflux, and Barrett esophagus disease. Squamous cell carcinoma is more often found in upper parts of the esophagus, and risk factors for this type of cancer include drinking heavily or being a smoker. According to his medical record, Mr. Seyer has had heartburn for about a year, has smokes two packs a day, and drinks a moderate amount of alcohol, all of which are risk factors for esophageal cancer (Types of Esophageal Cancer).

1. **Mr. Seyer’s cancer was described as Stage IIB (T1, N1, M0). Explain this terminology used to describe staging for malignancies.**

Stage IIB of the esophagus is described as the cancer that has grown into layers below the epithelium and has been found in 1 or 2 of the nearest lymph nodes, but has not yet spread to lymph nodes far away to the esophagus (NCI). The TNM system is often used to stage esophageal cancer, based on how far the primary tumor (T) has grown. The higher the number that is correlated with T the further the tumor has grown, 1 means the tumor has grown into the lamina propria, muscularis mucosae, or submucosa. N, if whether or not it has reached the lymph nodes, number 1 means the tumor has metastasized to 1 or 2 nearby lymph nodes. M, means the tumor has spread to another organ in the body, thankfully in Mr. Sayer’s case his cancer has not yet spread to other organs (Esophageal Cancer Treatment).

1. **Cancer is generally treated with a combination of therapies. These can include surgical resection, radiation therapy, chemotherapy, and immunotherapy. The type of malignancy and staging of the disease will, in part, determine the types of therapies that are prescribed. Define and describe each of these therapies. Briefly describe the mechanism for each. In general, how do they act to treat a malignancy?**

*Surgical Resection*

A surgical resection, or a removal of tissue, is done to remove the cancerous tumors or cells in the body. Often surgery will be done with a combination of radiation therapy and/or chemotherapy.

*Radiation Therapy*

This type of therapy is used to kill cancer cells by sending high doses of radiation to the cancer cells of the tumor. Radiation keeps cancerous cells from growing and metastasizing. Unlike chemotherapy, radiation therapy only treats the tumor whereas chemo treats the whole body. It can be administered from a machine outside of the body or from objects put inside of the body.

*Chemotherapy*

Chemotherapy uses medicines and drugs to treat cancer. The type of drugs used is dependent on the type of cancer a patient has and what stage of cancer they are in. It works by keeping the cancer from spreading to other parts of the body, slowing its growth, killing cancerous cells, or shrinking tumors.

*Immunotherapy*

Immunotherapy is a cancer treatment which uses the immune system of the patient to fight off the malignant cells. This can be done by stimulating the patient’s own immune system to work harder and smarter to attack the cancerous cells specifically. Another form of immunotherapy is injecting man made immune system proteins (antibodies) that helps the patient's immune system function. Antibodies work as a type of immunotherapy to target the proteins that aid in the growth of cancer cells, they bind to these proteins and dissolves them (American Cancer Society).

1. **Mr. Seyer had a transhiatal esophagectomy on 9/7. Describe this surgical procedure. How may this procedure affect his digestion and absorption?**

A transhiatal esophagectomy is a procedure that removes the esophagus, due to a condition that interferes with the passage of food and liquids to the stomach, such as cancer. In this procedure, the infected part of the esophagus is removed without opening the chest, through the diaphragmatic hiatus. An incision is first made through the abdomen and the neck, then the surgeons hand is inserted through the abdomen, and frees the diseased part of the esophagus, then attaches the stomach to what remains of the healthy esophagus. A problem often seen in patients who undergo this type of operation is that after eating meals they experience regurgitation, or backwash of stomach contents. The solution to this problem is keeping the patient from laying down for a period of time after a meal (Transhiatal Esophagectomy).

**II. Understanding the Nutrition Therapy**

1. **Many cancer patients experience changes in nutritional status. Briefly describe the potential effect of cancer on nutritional status.**

Cancer can have dramatic effects on the nutritional status of patients. Not only will many patients experience symptoms that influence nutritional intake such as pain, vomiting, taste changes, and diarrhea, but additionally, metabolic changes are taking place in the body, all of which contributing to cachexia. Cachexia is emaciation and wasting away of individuals who are going through serious, chronic, or lethal diseases. When a cancer tumor is growing, the body goes through metabolic changes related to protein, fat, and carbohydrates, due to the increased demands of the cancer cells. Changes in carbohydrate metabolism include insulin resistance, increased glucose synthesis, gluconeogenesis, increased cori cycle activity, and decreased glucose tolerance and turnover. All of these changes are attributed to meeting the metabolic demands of the tumor, and result in a significant increase of energy expenditure. Amino acid and protein metabolic changes include a depletion of lean body mass, increased protein catabolism, and decreased protein synthesis. Lastly, changes in lipid metabolism include an overall increase of lipid metabolism, decreased activity of lipoprotein lipase, decreased lipogenesis, and a depletion of total body fat. When all of these metabolic changes are happening at the same time throughout the body, it is common to see most cancer patients in a state of cachexia (Nelms, 708-711).

1. **Both surgery and radiation affect nutritional status. Describe potential nutritional and metabolic effects of these treatments.**

Surgery and radiation can cause many nutritional side effects for patients with cancer. Surgery often will have an impact on digestion and absorption of nutrients, especially with a surgery performed within the gastrointestinal tract. They can cause difficulty swallowing and chewing, as well as altered organ function, and physical appearance. Common effects in radiation therapy include delayed wound healing, mucositis, dysgeusia, xerostomia, dysphagia, odynophagia, and esophagitis. These side effects often will require the placement of a jejunal feeding tube, in order for the patient to receive an adequate supply of nutrients. Chemotherapy can also cause nausea, vomiting, and GI distress which often leads to a decrease in appetite (Nelms, 708-711).

**III. Nutrition Assessment**

1. **Calculate and evaluate Mr. Seyer’s %UBW and BMI.**

Wt= 198# /2.2#/kg= 90kg

Ht= 6’3”= 75 inches= 190.5cm= 1.905m

BMI= 90kg/ (1.905m)^2= 24.8kg/m^2

%UBW= (100 x CW)/ UBW= (100 x 198#)/ 228#= 86.8% UBW

1. **Summarize your findings regarding his weight status. Classify the severity of his weight loss. What factors may have contributed to his weight loss? Explain.**

According to his BMI, Mr. Seyer’s weight is in the healthy range, however his percent usual body weight indicates that he is 86.8% of what he normally weighs, and he has lost 30# within the past few months. This classifies Mr. Seyer as experiencing a severe weight loss since he has lost more than 10% of his UBW in a short timeframe. There are a few factors that could have contributed to this significant weight loss. He has not been wanting to eat due to pain and heartburn, and now he is experiencing difficulty swallowing foods of certain texture. Additionally, Mr. Seyer’s diagnosis of cancer increases his caloric needs in order to maintain his body weight due to the fact that cancer cells cause increased energy demands and change the metabolism of fat, protein and carbohydrate in the body (Nelms, 48).

1. **What does research tell us about the relationship between significant weight loss and prognosis in cancer patients?**

Research tells us that there is a strong correlation between significant weight loss and prognosis of patients with cancer. In patients who are malnourished, there is an increased risk of morbidity and mortality and an overall decreased quality of life. Additionally, weight loss is often an indicator of a poor prognosis. Patients who get adequate nutrition should better maintain their weight and nutrition stores as well as get relief from nutrition impact symptoms and a better quality of life. However in patients who do not get adequate nutrition, treatment side effects tend to be more severe, and they also will have an increased risk of infection and lower chances for survival (National Cancer Institute).

Weight loss could also be due to chemotherapy and radiation treatments. When going through treatment patients often experience a severe decrease in their lack of appetite. Nausea and vomiting are also side effects of chemotherapy therefore the patient can easily become dehydrated, adequate food intake and fluid intake is very important for a patient going through treatment (Nelms 708-711).

1. **Estimate Mr. Seyer’s energy and protein requirements based on his current weight.**

*REE According to Mifflin-St. Jeor:*

Men= 10x wt. (kg) + 6.25 x ht (cm) – 5 x age + 5

Mr. Seyer= (10 x 90kg) + (6.25 x 190.5cm) – (5 x 58yrs) + 5= 1,805 kcal

REE x PAL= Total energy requirements

1,805 kcal x 1.3= 2347 kcal/day

Slightly hypermetabolic patients or those patients who need to gain weight, or are anabolic= 30-35 kcal/kg.

30 kcal x 90kg= **2,700 kcal**

35 kcal x 90kg=3,150 kcal

*Protein Needs*

Increased protein needs (hypermetabolism, extreme wasting)= 1.5-2.5g/kg

1.5g x 90kg=**135g**

2.5g x 90kg=225g

For his current weight, Mr. Seyer should be taking in about 2,300 calories per day. However due to his diseased state and increased energy needs because of his illness, it would be recommended that his intake is increased to 2,700-3,150 kcals/day. His calculated protein needs range anywhere from 135g-225g daily (Nelms, 719-721).

1. **Estimate Mr. Seyer’s fluid requirements based on his current weight.**

Fluid needs= 30-35 mL/kg

30mL x 90kg=2,700 mL

35mL x 90kg=3,150mL

Mr. Seyer should be getting between 2,700-3,150 mL of fluid daily.

1. **What factors noted in Mr. Seyer’s history and physical may indicate problems with eating prior to admission?**

Mr. Seyer was experiencing dysphagia, heartburn, pain with eating, and a hard time eating foods of certain textures. All of these are indicative of problems with eating, can reduce the desire to eat, and his severe weight loss is evidence of this.

1. **Mr. Seyer is currently receiving enteral nutrition, specifically Isosource HN at 75 mL/hr.**

Isosource HN= 1.2kcal/mL

18% pro

53% fat

29% carb

1. **Calculate the amount of energy and protein that will be provided at this rate.**

Kcals= 75 mL/hr x 24 hr=1,800 mL x 1.2kcal/mL= 2,160 kcal

Protein=2,160 kcal x .18 protein= 388.8kcal from protein / 4 kcal/g protein= 97.2g protein

1. **Next, by assessing the information on the intake/output record, determine the actual amount of enteral nutrition he received on September 11.**

On September 11 Mr. Seyer received 1,735 mL of formula via enteral nutrition.

1,735 mL x 1.2kcal/mL=2,083 kcal

2,083 kcal x .18 protein= 374 kcal from protein/ 4 kcal/g protein= 93.7 g protein

1. **Compare this to his estimated nutrient requirements.**

His estimated nutrient requirements were 2,700-3,150 kcal, 135-225 g protein, and 2,700-3,150 mL fluid. Mr. Seyer is currently not getting an adequate supply of calories, protein, or fluid that his body needs.

1. **Compare fluids required to fluids received. Is he meeting his fluid requirements? How did you determine this? Why would you evaluate his output when assessing his fluid intake?**

Fluids required= 2,700-3,150 mL

Fluids received= 2,400 mL (IV) + 150mL (flush)= 2,550 mL

Mr. Seyer needs 150mL more of fluids per day in order to meet his recommended intake. However, according to his chart, he is at a positive fluid balance of 285mL, which could be evidence that he is developing edema. Daily fluid intake should be equal to fluid output, so this will need to be closely monitored, and either his fluid prescription would need to be changed, or he will need to be given medication to combat his developing edema if the problem persists.

1. **What type of formula is Isosource HN? One of the residents taking care of Mr. Seyer asks about a formula with a higher concentration of omega-3-fatty-acids, antioxidants, arginine, and glutamine that could promote healing after surgery. What does the evidence indicate regarding nutritional needs for cancer patients and, in particular, nutrients to promote postoperative wound healing? What formulas may meet this profile? List them and discuss why you chose them.**

Isosource HN is a high nitrogen high protein concentrated nutrition supplement that provides 1.2kcal/mL. It is made up of 100% soy protein, and is made up of 18% protein, 53% carbohydrate, and 29% fat. To promote postoperative wound healing patients, such as Mr. Seyer need a higher amount of protein and calories (Nelms 721). Insource 1.5 would meet his calorie and protein need however it doesn’t have a high percentage of omega-3, this is why insource HN is the best option for Mr. Seyer at this time.

1. **Are any clinical signs of malnutrition noted in the patient’s admission history and physical?**

There are signs of malnutrition noted in the patients history and physical. As mentioned earlier, Mr. Seyer has lost 30 lbs in the past few months and is 86% of his usual body weight. This means he is not taking in enough energy. Additionally, it should be noted that his lab results showed low total protein, albumin, and prealbumin levels, all indicating that he is also not taking in enough protein.

1. **Review the patient’s chemistries upon admission. Identify any that are abnormal and describe their clinical significance for this patient, including the likely reason for each abnormality and its nutritional implications.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Lab Results** | **Reference Range** | **9/5** | **Reason for abnormality** | **Nutritional Implications** |
| Protein, total (g/dL) | 6-8 | 5.7 | Low protein intake | Increase protein intake |
| Albumin (g/dL) | 3.5-5 | 3.1 | Low protein intake, metabolic stress, dehydration | Increase protein intake, fluids |
| Prealbumin (mg/dL) | 16-35 | 15 **!** | Low protein intake, metabolic stress, surgery | Increase protein intake |
| PT (sec) | 12.4-14.4 | 12 **!** |  |  |
| RBC (x 10^6/mm^3) | 4.5-6.2 | 4.2 **!** | Side effect of cancer | Increase Iron, B12, Folate |
| Hemoglobin (Hgb, g/dL) | 14-17 | 13.5 **!** | Low RBC count, anemia, protein-energy malnutrition | Increase Iron, B12, Folate |
| Hematocrit (Hct, %) | 40-54 | 38 **!** | Low RBC count, dehydration, anemia | Increase Iron, fluids, B12, Folate |
| Mean cell Hb (pg) | 26-32 | 32.4 **!** | Low RBC count | Increase Iron, B12, Folate |

(Nelms, 54-57)

1. **Mr. Seyer has been diagnosed with a life-threatening illness. What is the definition of terminal illness?**

A terminal illness is referred to as a condition or disease for which these is not a cure for and the patient will most likely die from complications of the disease regardless of intervention (Nelms, 703).

1. **The literature describes how a patient and his family may experience varying levels of emotional response to a terminal illness. These may include anger, denial, depression and acceptance. How may this affect the patients nutrition intake? How would you handle these components in your nutritional care? What questions might you have for Mr. Seyer or his family? List three.**

Due to the fact that Mr. Seyer is having a hard time getting in enough nutrients because of his persistent heartburn and his difficulty swallowing, encouraging him to eat more if he does not have a positive outlook on his illness will be difficult. In his case it is important to encourage the idea that his health can improve through receiving proper nutrients. If he accepts the fact that he has a terminal illness and can never be healthy again he will be less motivated to eat properly. It is important to keep him motivated by having his family try to stay positive and encourage him to meet his daily goals. It is also important for his family not to force him to eat foods when he says he is hungry even if he hasn’t met his goal. Since he had surgery his capacity for food has been greatly reduced forcing him to eat more than he can handle can cause issues.

How important is it for you to stay as healthy and active as long as possible?

What is your overall feeling about increasing your food intake?

What are your fears about increasing your intake?

Do you have any doubts that getting proper nutrition will be beneficial to you even if it causes discomfort?

**IV. Nutrition Diagnosis**

1. **Select two high-priority nutrition problems after Mr. Seyer’s surgery and complete the PES statement for each.**

PES 1: Malnutrition related to decreased appetite and pain while eating as evidenced by weight loss of 30# over past several months.

PES 2: Inadequate protein intake related to changes in metabolism due to cancer state as evidenced by weight loss and low total protein, prealbumin, and albumin levels.

**V. Nutrition Intervention**

1. **For each of the PES statements you have written, establish an ideal goal (based on the signs and symptoms) and an appropriate intervention (based on the etiology).**

*PES 1 Goal/Intervention:*

Increase caloric intake to at least 2,700 kcal/day. This is within the recommended range for a patient with cancer of his size. His previous intake was 2,083kcal, so with an increase of about 600 kcal/day he should begin to gain some of the weight back that he has lost in the past several days. The intervention would be administered by the medical team since he is on an enteral nutrition formula.

*PES 2 Goal/Intervention:*

Increase protein to 135g/day in order to get Mr. Seyer’s total protein, prealbumin, and albumin levels back within the normal range. Since Mr. Seyer is on an enteral nutrition regime, the intervention for this goal would be up to the medical team, as his formula prescription would have to be altered.

1. **Does his current nutrition support meet his estimated nutritional needs? If not, determine the recommended changes. Discuss any areas of deficiency and ideas for implementing a new plan.**

No, according to his 24 hour recall and using the exchange method he was taking in

around 600 kcal, 58.5 g carbs, 26.5g fat, and 27g protein prior to hospital admission. Through his enteral nutrition he is receiving 2,160 kcal and 97.2g protein per day.

 We are recommending he increase his caloric intake to 2,700 kcal per day with a minimum of 135 g protein. He will get these added kcal and protein by changing his enteral nutrition formula to Isosource HN 1.2kcal at 105 mL/hr x 24 hours.

Kcals= **105 mL/hr** x 24 hr=2,520 mL x 1.2kcal/mL= **3,024 kcal**

Protein=3,024 kcal x .18 protein= 544 kcal from protein / 4 kcal/g protein= **136 g protein**

With the alterations in his formula, he is now getting adequate calories and more protein. We will have to closely monitor Mr. Seyer to ensure he does not undergo refeeding syndrome, which is why we made the changes we did. Refeeding syndrome could set Mr. Seyer back even further, and cause him to lose more weight than he has already lost. Additionally, if the pain and discomfort from his surgery subsides, we will start adding thin, clear liquids to his diet. Once he is able to to take in watery liquids comfortably we will introduce liquids that are thickened with a thickening agent and pureed foods. Hopefully we will eventually be able to move him onto a soft foods and pureed diet without the need of supplemental nutrition.

1. **How may these interventions (from #21) change as he progresses postoperatively? Discuss how Mr. Seyer may transition from enteral feeding to an oral diet.**

Mr. Seyer’s nutrition interventions will most likely change as he progresses after his surgery. When the pain and discomfort from the transhiatal esophagectomy subsides, he can begin slowly weaning off his enteral nutrition formula, and move towards thin clear liquids, then after he is able to take in clear liquids sufficiently we will introduce thickened liquids and nutrient dense shakes. Once he is able to adequately swallow thickened liquids pureed foods will be introduced in small amounts. Eventually we hope that he will be able to eat a semi-normal diet that includes small portions of soft or softened foods this would include foods like mashed potatoes, cooked vegetables, and foods with gravy or water mixed in. He will be able to prepare pureed and softened foods at home after proper education.

One complication that the medical team will have to look out for will be dehydration. Often cancer patients will easily become dehydrated, especially those undergoing radiation therapy in the head and neck area. Mr. Seyer will have to stay adequately hydrated, and when he begins drinking clear liquids again, he should not be drinking anything containing caffeine as this can negatively affect acid reflux. To prevent nausea, he should eat small meals, 6-8 times a day. Additionally, when undergoing radiation, there may be taste aversions that Mr. Seyer experiences so he may not want to eat meats along with other types of foods. If this happens, he would be encouraged to eat other types of high protein foods such as peanut butter, cottage cheese, cheese, fish pastes and soy substitutes. Additionally, a multivitamin and mineral supplement should be given to Mr. Seyer daily that contains <150% of the DRI. This is because radiation therapies can cause deficiencies of vitamins and minerals (including folate, vitamin, C, retinol, magnesium, zinc, copper, and iron) (Nelms, 717-723).

**VI. Nutrition Monitoring and Evaluation**

1. **List the factors you should monitor for Mr. Seyer while he is receiving enteral nutrition therapy.**

While receiving his enteral nutrition therapy, there are many aspects of Mr. Seyer’s health that need to be closely monitored. Changes in his weight need to be looked at, to ensure he is gaining and not losing more weight. His daily input/output should be routinely checked to ensure all of his IV’s and formula are correctly being administered, and to be sure that his urine does not show evidence of dehydration or overhydration. When his labs are being taken, his total protein, albumin and prealbumin need to be checked as they were abnormally low upon intake. It may take a few weeks for these labs to get back within the normal range, but as long as the levels are not getting any lower and are slowly increasing that is good. His Patient Generated Subjective global assessment (PG-SGA) should be taken routinely as it is a method often used with cancer patients. This assessment tool is a rating system of nutritional status that correlated with the results of anthropometrics and lab values such as albumin and total cholesterol.

1. **Mr. Seyer will receive radiation therapy as an outpatient. In question #7, you identified potential nutritional complications with radiation therapy. Choose one of these nutritional complications and describe the nutrition intervention that would be appropriate.**

One common nutritional complication of radiation therapy is dysgeusia, or alterations in taste. This is a common side effect, especially for patients undergoing radiation therapy of the head and neck region, such as Mr. Seyer. Taste alterations that can occur include a metallic taste, no taste sensation, a heightening of certain tastes, and aversions to foods previously liked by the patient prior to treatment. For patients who have a metallic taste in their mouth, plastic utensils should be used instead of metal and nutritional supplements should be drank out of a glass to avoid the taste of the metal container. Meats are often disliked, in which case high protein foods should be provided such as peanut butter, cottage cheese, cheese, and soy meat substitutes. Patients with no taste sensation (ageusia) should eat more high flavor and spiced foods (Nelms, 723).

1. **Identify major assessment indices you would use to monitor his nutritional status once he begins therapy.**

To monitor his nutritional status once he begins therapy there are a variety of assessments and tools that should be used to ensure that he is being renourished properly. According to Krause’s Food, Nutrition, and Diet Therapy the following measures should be taken of a patient on enteral nutrition:

* Weight (3x week)
* Signs of edema (daily)
* Signs of dehydration (daily)
* fluid intake and output (daily)
* nitrogen balance (weekly)
* stool output and consistency (daily)
* urine glucose (weekly)
* serum electrolytes, BUN, creatine, and blood count (weekly)
* chemistry profile such as proteins, calcium, magnesium, phosphorus, LFT’s (weekly)

(Krause, 420)

References

American Cancer Society. Treatment Types. (n.d.). Retrieved October 2, 2014, from

http://www.cancer.org/treatment/treatmentsandsideeffects/treatmenttypes/index.

Definition of adenocarcinoma - NCI Dictionary of Cancer Terms. (n.d.). Retrieved September

22, 2014, from <http://www.cancer.gov/dictionary?cdrid=46216>

Esophageal cancer treatment. (2014). National Cancer Institute. Retrieved from

<http://www.cancer.gov/cancertopics/pdq/treatment/esophageal/HealthProfessional/page3>.

National Cancer Institute, (NCI). What You Need To Know About" Cancer of the Esophagus.

(2013, April 4). Retrieved September 22, 2014, from

<http://www.cancer.gov/cancertopics/wyntk/esophagus/page5>

Nelms, M. (2011). Nutrition therapy and pathophysiology (2nd ed., p. 48. Belmont, CA:

Wadsworth, Cengage Learning.

Nutrition in Cancer Care (PDQ®). (2014, September 3). Retrieved October 1, 2014, from

[http://www.cancer.gov/cancertopics/pdq/supportivecare/nutrition/HealthProfessional/p](http://www.cancer.gov/cancertopics/pdq/supportivecare/nutrition/HealthProfessional/page1)

[age1](http://www.cancer.gov/cancertopics/pdq/supportivecare/nutrition/HealthProfessional/page1).

Transhiatal Esophagectomy (THE). (2012, May 8). Retrieved October 2, 2014, from

<http://surgery.med.umich.edu/thoracic/patient/what_we_do/esophagectomy_faq.shtml>

Types of Esophageal Cancer. (2013, April 4). Retrieved September 22, 2014, from

<http://www.cancer.gov/cancertopics/wyntk/esophagus/page4>.

Witte, S., & Mahan, L. (1996). *Krause's food, nutrition and diet therapy*(9th ed.). Philadelphia:

 Saunders.