Case Study 33: Esophageal Cancer Treated with Surgery and Radiation
DFM 484- Medical Nutrition Therapy I
San Francisco State University
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Case Study 33: Esophageal Cancer Treated with Surgery and Radiation

I. Understanding the Disease and Pathophysiology:
1. Mr. Seyer has been diagnosed with adenocarcinoma of the esophagus. What does the term adenocarcinoma mean?

Adenocarcinoma refers to a cancerous/malignant tumor in the glands. In the case of Mr. Seyer, his tumor is in the glands of the esophagus.

4. 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 malignancy?

**Surgical Resection**- The surgical removal of a tumor. This type of therapy is used when the removal of the tumor can be done without damaging too much of the surrounding area. Best when the tumor is localized or has limited local-regional spread.

**Radiation Therapy**- Most common treatment for certain types of head and neck cancers. Can also be used to control a malignant disease when a tumor cannot be removed surgically. Radiation therapy is delivered with electromagnetic rays and charged particles. RT destroys cancer cells by altering cellular and nuclear material, especially DNA.

**Chemotherapy**- Includes medications that interrupt different stages of cell cycle replication. Chemotherapeutic agents are most lethal to cells that are undergoing continual proliferation. Cells of the bone marrow, epithelial lining of the gastrointestinal tract and cells of hair follicles are also affected, since they are also rapidly dividing.

**Immunotherapy**- Works by stimulating your own immune system to work harder or smarter to attack cancer cells. This can be done by giving the patient immune system components, such as man-made immune system proteins.

In general, these therapies work by removing or attacking the rapidly dividing cancer cells.

II. Understanding the Nutrition Therapy:
6. Many cancer patients experience changes in nutritional status. Briefly describe the potential effect of cancer on nutritional status.
Cancer patients experience changes in nutritional status due to the treatments they undergo and the side effects that result. Signs and symptoms such as pain, infection, anemia, fatigue, malnutrition may result from the effects of the tumor on nearby body systems. Nutritional manifestations such as cancer cachexia are frequently present in patients with cancer.

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

Many patients who are receiving treatment for cancer may undergo a series of side effects such as nausea, vomiting, early satiety, diarrhea, constipation, weight loss, anemia, etc. These side effects can place the patient at nutritional risk. In radiation therapy in particular, the most harmful tissue disruption is due to the alteration of the DNA molecule within the cells of the tissue. Ionizing radiation breaks the strands of the DNA helix, leading to cell death. As with chemotherapy, the cells that are actively proliferating are the ones most sensitive to the effects of radiation. These include epithelial cells, bone marrow cells, lymph tissue and hair cells. Common effects of radiation therapy to the head and neck area include fatigue, mucositis, dysgeusia, odynophagia, xerostomia, dysphagia, odynophagia and severe esophagitis. Radiation therapy to the abdomino pelvic area can result in radiation enteritis. Additionally, surgery can place the patient at risk. After surgery, patients often have a loss of appetite and tend not to eat.

III. Nutritional Assessment:
8. Calculate and evaluate Mr. Seyer’s % UBW and BMI.

Mr. Seyer’s BMI is calculated as follows:

\[
\frac{90 \text{ kg}}{1.9 \text{ m}^2} = 24.9
\]

His % UBW is: \((198/228) \times 100 = 87\%\)

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

Based on his BMI of 24.9, Mr. Seyer is considered borderline overweight. However, his % UBW is 87, which means that his % body weight change is 13%. A weight change of about 13% body weight is severe in his case due to the short amount of time that the weight was lost.

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

Based on Mr. Seyer’s current weight of 90kg, his energy needs are:
REE (M): 66.5 + 13.8 (90 kg) + 5 (190.5 cm) – 6.8 (58) = 1,866 or 1900 kcals
1900 x 1.3 = 2470 kcals to 1900 x 1.4 = 2660 kcals
Energy needs = **2470 to 2660 kcals/day**

For protein intake, his needs are as follows:
90 kg x 1 = 90g to 90 kg x 1.4 = 126g

**90 g to 126 g of protein/day**

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

Mr. Seyer’s fluid requirements are calculated according to 30-35 ml/kg for the average adult.
90kg x 30 ml = **2700 ml (2.7 L)** to 90kg x 35 ml = **3150 ml (3.2 L).**

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

As noted in Mr. Seyer’s history and physical, the constant hearburn and the use of TUMS, Alka-Seltzer and Pepcid may indicate problems with eating. He specifically states that he has not been able to eat because of the pain and heartburn. He also has difficulty swallowing foods, especially foods with texture, experiences dysphagia and odyniophagia, which are signs of decreased oral intake. Additionally, his 30 lbs weight loss and his 13% weight change, are clear indicators of decreased oral intake. In terms of physical signs, he appears thin, pale and his eyes are sunken which are also consistent with decreased oral intake.

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

Yes, there are some clinical signs of malnutrition. According to the patient’s admission history and physical, Mr. Seyer lost 30 lbs in the last months due to his difficulty swallowing and the heartburn pain. Additionally, he has evidence of muscle wasting on the physical exam. He also has a 13% weight change, which is also a concern.

17. *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.*

Upon admission, Mr. Seyer’s chemistries indicated that his total protein level (g/dL), his albumin level (g/dL) and his prealbumin level (g/dL) are all lower than the normal values. Appropriate nutritional implications would be to increase protein intake and kcal intake. Also, his albumin
level may be an indicator of dehydration, so rehydrating is also a good nutritional implication. Additionally in his chemistries, his coagulation rate is low, his RBC count is low, his hemoglobin is low, his hematocrit is low and his mean cell hemoglobin is high. This may be an indication of anemia and may also be due to his malabsorption and low amount of RBC. Good nutritional implications would be to increase iron, b12, folate and supplementation until he can tolerate an oral diet. The patient’s albumin and pre-albumin are also affected by the immune response with cancer. Additionally, his hematocrit, hemoglobin and red blood cell count is low, indicating that he might be suffering from anemia of chronic disease.

IV. Nutrition Diagnosis:
20. Select two high-priority nutrition problems after Mr. Seyer’s surgery and complete the PES statement for each.

Low protein intake PES #1: Inadequate protein intake related to poor appetite associated with heartburn and inability to swallow textured foods as evidenced by low levels of albumin and prealbumin in the blood.

Low iron intake PES #2: Inadequate iron intake related to poor appetite associated with heartburn and inability to swallow textured foods as evidenced by low levels of RBC, hemoglobin, hematocrit.

V. Nutrition Intervention:
21. For each 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: Increase protein intake to get his total protein to at least 6g/dL, his total albumin to at least 3.5mg/dL and his prelabumin to at least 16 mg/dL. Intervention: Put patient on dysphagia diet and fortify his formula with additional protein.

PES #2: Increase iron intake to get his RBC to at least 4.5 x 10^6 mm^3, his hemoglobin to at least 14g/dL, and hematocrit to at least 40%. Intervention: Supplement his formula with iron, B12 and folate to fix and monitor anemia.

VI. Nutrition Monitoring and Evaluation:
25. 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 of the potential nutritional complications that can be associated with radiation therapy is additional pain and inflammation in the area where the radiation therapy is being applied. Also, mucositis, xerostomia, and odynophagia can result from the therapy. Additionally, his esophagus may become even more irritated. A feeding tube that bypasses the esophagus with adequate nutrients can be used as a nutrition intervention.

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

In order to monitor his nutritional status once he begins therapy, laboratory blood work results would be analyzed in addition to his weight. The specific assessment indices that we would pay attention to are serum albumin, pre-albumin, and total protein. Additionally, his hematology values such as RBC, Hgb, Hct, MCH and MCHC should also be monitored closely in order to monitor and prevent anemia.