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Case Report of Bone Metastases from Esophageal Cancer

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Abstract **Case Report**

Esophageal cancer is the eighth most common cancer worldwide. The most common sites of distant metastasis of esophageal cancer are the liver, distant lymph nodes, and the lungs. Metastasis to the bone is uncommon and the prognosis is poor. The authors describe a case of a 54-year old-man whose presentation of back pain with neuropathy and hoarseness of his voice led to the diagnosis of esophageal cancer with metastasis to his spine. Due to the patient's poor prognosis, the patient was referred to oncology for radiation and chemotherapy in addition to pain management. This unique case presents the insidious onset of symptoms associated with spinal metastasis.

Keywords: Esophageal cancer, oncology, Bone Metastases, diagnosis.

INTRODUCTION

Malignancy of the esophagus is a relatively uncommon diagnosis and is estimated to affect roughly 450,000 individuals worldwide [1]. The incidence in the United States is approximately 19,000 cases per year, [2] and the diagnosis carries a five-year survival rate of 17% for white women, 18% for white men, and further decreased survival in African American men (10.4%) and women (12.6%) [1], the dismal survival rate is explained in part by the insidious onset of symptoms, with over 30% of patients presenting with metastatic illness before noticing signs of disease. Commonly experienced symptoms include dysphagia, early satiety, weight loss, fevers, night sweats, cough, and vocal changes. The mainstay of treatment includes surgical resection with adjuvant or neoadjuvant chemotherapy with or without targeted radiation.

Esophageal cancer can be further divided into histological subtypes including Squamous Cell Carcinoma, Adenocarcinoma, Small Cell Carcinoma, and other rare variants. Squamous cell carcinoma is the most commonly found, and adenocarcinoma is the second most observed culprit. Treatment amongst the variants varies little in approach. Surgery involving the affected segment is the mainstay of therapy. Removal of the entire esophagus (esophagectomy) or esophagus and proximal stomach (esophagogastrectomy) are typically reserved for severe and metastatic illness but are also therapeutic. Surgical resection of nonmetastatic disease is thought to be curative; however, if metastases are present the 5-year survival rate merely improves to 47%, as opposed to the formerly mentioned survival rates of roughly 17% [3]. Adjuvant and neoadjuvant radiation and chemotherapies are also reserved for systemic illness, as localized lesions are generally cured with surgical resection.

The most common subtype worldwide is Squamous Cell Carcinoma (SCC) as the esophagus is naturally covered in an epithelial lining containing simple squamous cell layers. Lesions that are found to be squamous cell in origin have been associated with heavy use of alcohol and tobacco, with an increased incidence into the seventh decade of life with a male predominance [2]. Diagnosis typically involves initial evaluation with a Barium Swallow, further evaluated with endoscopy and biopsy confirmation. SCC of the esophagus tends to present in the upper two-thirds of the esophageal mucosa, as opposed to Adenocarcinoma (ADC) which has a predisposition for the lower third of the organ.

Barrett's esophagus is a metaplastic change of the lining of the esophageal mucosa from squamous epithelium to the columnar (intestinal) epithelium. The squamocolumnar junction (also known as the Z-line) is the area where the squamous epithelium of the esophagus meets the columnar mucosa of the stomach. This columnar epithelium usually is present in the distal-most 1-2 cm of the esophagus. Barrett's esophagus is typically identified during upper endoscopies where there is cephalad displacement of

the squamocolumnar junction by at least 1 cm above the GEJ and increased presence of columnar epithelial projections. Barrett's esophagus is caused by long-standing gastro esophageal reflux disease (GERD), with risk factors including GERD >5 years, male gender, age >50, and obesity [4]. This change of the lining of the esophageal mucosa from squamous to columnar glandular epithelium increases the risk for Adenocarcinoma, cancer that arises from gland cells [3]. In patients diagnosed with Adenocarcinoma (ADC) of the esophagus, 11.8% had a previous diagnosis of Barrett's esophagus, and 57% were diagnosed with Barrett's esophagus at the time of cancer diagnosis [5].

Once the diagnosis of esophageal cancer has been made, the cancer must be staged by evaluating for loco regional disease and distant metastases. The tumor, node, metastasis (TNM) staging system is universally used for esophageal cancers of squamous cell or adenocarcinoma origin. Loco regional staging for esophageal cancer is usually done by endoscopic ultrasound, with fine-needle aspiration if there is suspicion of local lymph node involvement. Evaluation for distant metastases is carried out via cross-sectional imaging; the most common modalities being the PET scan or an integrated CT/PET [6]. The most common pattern of esophageal cancer metastases is to the lymph nodes, lungs, and liver, and less often to the bones, adrenal glands, and brain [7]. Initial treatment modality is highly dependent on biopsy and clinical stage of the cancer at diagnosis.

CASE REPORT

A 54-year-old Caucasian male presented to the medical facility with a chief complaint of back and neck pain with radiating pain into his upper and lower extremities. These pains began three to four months before the visit and have been progressively getting worse. The pain was worse with movement and changing positions. The patient was noted to have some mild hoarseness in his voice. He had experienced some nausea during this period but denied dysphagia, dyspeptic symptoms, or any other changes in intestinal habits. He was a veteran that served in Desert Storm and had been exposed to oil well fire smoke and had a long-standing history of GERD. Past medical history is significant for Barrett's esophagus.

On 03/09/2021 cervical and lumbar radiography was done. The cervical spine radiography disclosed moderate to severe degenerative disc disease at the C6-7 level (See Figure 1A). The lumbar spine radiography revealed moderate to severe degenerative disc disease at L4-5 and L5-S1 levels with moderate facet arthropathy within the lower lumbar spine (See Figure 1B).

Given the findings of the radiography, an MRI of the cervical and lumbar spine was completed on 04/02/2021 to further investigate the patient's symptoms. Cervical MRI revealed- Multiple bone metastases extending from C2-T3. Severe narrowing of the C6-C7 disc. Mild right-sided neural foraminal impingement at the C4-C5 level by spurring. Very small central disc protrusion at the C3-C4 level (See Figures 2A and 2B). Lumbar MRI revealed- Diffuse skeletal metastases throughout the lumbar spine without pathologic compression fracture (See Figures 2C and 2D).

Extra spinal metastatic tumor in the right side at the L4-5 and L5-S1 levels with measurements as described. There is an extension of this tumor into the right L4-5 and L5-S1 neural foramina and is most likely responsible for accounting for the patient's pain. Moderate to severe narrowing of the L4-5 and L5-S1 discs. Additional metastatic bone metastases are seen in the upper sacrum.

To investigate the origins of the metastasis a positron emission tomography (PET) scan was completed revealing a metabolically active right Para tracheal low-density mass. Confirmed on PET was widespread metastasis with a dominant lytic mass located on the L5 transverse process. A diagnosis of Stage [4] esophageal cancer was made. The patient was referred to oncology for the management of bone metastases and pain associated with metastasis.

Unfortunately, the patient was diagnosed with pneumonia due to COVID-19. He died several days after being admitted to the hospital.

FIGURES

1. A

Figure 1.A: Lateral cervical radiograph showing degenerative disc disease of C6-7 level

1. B

Figure 1.B: Lateral lumbar spine radiography showing degenerative disc disease at L4-5 and L5-S1

2. A

Figure 2.A: Lateral cervical MRI- T1 weighted- Multiple bone metastases extending from C2-T3. Severe narrowing of the C6-C7 disc

2. B

Figure 2.B: Lateral cervical MRI- T2 weighted- Mild right-sided neural foraminal impingement at the C4-C5 level by spurring. Very small central disc protrusion at the C3-C4 level

2. C

Figure 2.C: Lateral Lumbar MRI- T1 weighted- Diffuse skeletal metastases throughout the lumbar spine without pathologic compression fracture

2. D

Figure 2.D: Lateral Lumbar MRI- T2 weighted- Moderate to severe narrowing of the L4-5 and L5-S1 discs. Additional metastatic bone metastases seen in the upper sacrum

DISCUSSION

In this report, we provide a case of Esophageal Cancer that has acted in a fashion that is not expected in typical cases. Typically, esophageal cancer would be anticipated to metastasize to organs such as the liver, lungs, and lymph nodes, rather than to bone. Metastasis to the spine is incredibly rare in the literature and is often overlooked due to the lack of treatment options once it occurs. Upon discovery of spinal metastases, treatment is typically supportive with surgery for decompression and symptomatic relief.

The mechanism by which esophageal cancer metastasizes to the spine is poorly described in the literature. The aggressive infiltrative nature of this carcinoma allows it to spread to nearby structures such as lymph nodes, as well as hematogenously. The venous plexus in the spinal cord is well known for being a valve less system, making the retrograde flow of hematogenous carried malignant cells a likely explanation. This case provides a medical reference to the rare spread of esophageal carcinoma and recognizes the need for increased research into the mechanism of spread in rare cases such as this. The patient was seen by the same medical team throughout their entire workup at the hospital, allowing the medical team to be incredibly familiar with the case and its accuracy.

While this case provides a unique example of alternative metastases of esophageal cancer, it is limited by the lack of literature associated with this outcome. Rarely do we find a similar constellation of hospital stays, and more research is needed to fully describe the mechanism behind this morbidity and the outcomes associated. However, this does provide a reference for clinical practitioners who encounter similar scenarios and allows for increased awareness of potentially overlooked sequela of this form of cancer. It is the goal of this case to provide broad differentials and thorough physical examination when evaluating patients with esophageal cancer, as it may be easy to overlook symptoms of spinal metastases as degenerative changes or alternative etiology.

CONCLUSION

This case demonstrates a patient with back pain and hoarseness whose workup led to the diagnosis of stage-4 esophageal cancer with metastasis to the spine. This presentation is unique not only due to the rarity of metastasis of esophageal cancer to the spine but also due to the insidious onset of symptoms that this patient endured. This case should be a reference in medical practices to increase awareness of the importance of physical exams and screening to identify potentially overlooked sequela in patients with similar scenarios.

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AUTHOR CONTRIBUTIONS

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; All authors drafted the article or revised it critically for important intellectual content; All authors gave final approval of the version of the article to be published, and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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