A Case of Severe Left Atrial Compression by a Mid-Esophageal Metastatic Mass

Aws Polina¹, John Dawdy¹, and Luis Afonso¹

¹Wayne State University

June 26, 2023

Abstract

Left atrial (LA) compression by an esophageal mass is a rare structural finding and may lead to life-threatening manifestations. Often, LA compression is the result of the neighboring organs of the heart. Extracardiac etiologies of LA compressions are usually incidentally noted and better characterized with multiple imaging techniques. We present a case of a middle-aged man evaluated for sinus tachycardia, who was found to have severe LA compression secondary to an esophageal mass. This patient’s pathology was uniquely depicted in multiple imaging modalities.

Keywords: Left atrial compression, esophageal mass, extracardiac compression.

Case:

A Case of Severe Left Atrial Compression by a Mid-Esophageal Metastatic Mass

Aws Polina¹ MD, John Dawdy² MD, Luis Afonso² MD

¹Department of Internal Medicine, Wayne State University, Detroit, MI
²Department of Cardiology, Wayne State University, Detroit, MI

Running title: Left Atrial Compression by an Esophageal Mass

Corresponding author:

Aws Polina

Department of Internal Medicine 4201 St. Antoine, UHC 5C Detroit, MI 48201

Email: el8494@wayne.edu

Phone: 586-646-3452

Fax: 629-600-5269

Abstract:

Left atrial (LA) compression by an esophageal mass is a rare structural finding and may lead to life-threatening manifestations. Often, LA compression is the result of the neighboring organs of the heart. Extracardiac etiologies of LA compressions are usually incidentally noted and better characterized with multiple imaging techniques. We present a case of a middle-aged man evaluated for sinus tachycardia, who was found to have severe LA compression secondary to an esophageal mass. This patient’s pathology was uniquely depicted in multiple imaging modalities.
A 45-year-old man with a past medical history including squamous cell carcinoma of the hypopharynx post chemoradiation two years prior and currently in remission, presented to the hospital with six weeks of progressive dysphagia. He reports that his dysphasia was initially only to solids but had progressed to include liquids and was associated with nausea and emesis after meals, at times streaked with blood. Evaluation of his dysphagia was initiated with a modified barium swallow, which demonstrated prompt initiation and propagation through the oral and pharyngeal phases with abrupt narrowing in the mid-esophagus and persistent proximal dilation concerning for mass or stricture (Figure 1). At the same time, he had a transthoracic echocardiogram (TTE) ordered as part of an evaluation for sinus tachycardia, which demonstrated a large external mass causing severe compression of the left atrium (Figure 2 & Video 1). There was also right ventricular and atrial dilation with ventricular septal flattening in both systole and diastole. Subsequently, computed tomography (CT) with contrast of the thorax was performed to further evaluate this external mass. CT imaging demonstrated a large mid-thoracic esophageal mass measuring 4.1 cm by 8.7 cm causing severe compression of the left atrium along with numerous bilateral sub centimeter pulmonary nodules concerning for metastatic disease (Figures 3 & 4). In order to further characterize the mass, an esophagogastroduodenoscopy (EGD) with biopsy was performed. EGD directly visualized a large mid esophageal friable mass causing approximately 90% obstruction of the esophageal lumen. The biopsy was consistent with squamous cell carcinoma. Given the significant esophageal obstruction and metastatic nature of his disease, a gastrostomy tube was placed for nutritional needs, underwent intervention radiology-guided embolization of the right T5 intercostal artery that appeared to be supplying the esophageal mass, followed by palliative chemo and radiation therapies. He was discharged home for further outpatient oncology follow-up.

Discussion:
Cardiac imaging modalities are valuable diagnostic tools not only for cardiac conditions, but also for the diagnosis of pathologies of adjacent organs. A study by Alkhouli et al showed that the most common extracardiac finding on TTE was pleural effusion. Although TTE was obtained for evaluation of this patient’s persistent sinus tachycardia, it added valuable information regarding the etiology of his presenting symptoms. Anatomically, the mid-esophageal area lies posterior to the LA; therefore, masses arising from this area can lead to LA compression. Symptoms of LA compressions are usually acute and subtle in presentation; they may present as new onset acute heart failure, mitral valve prolapse, atrial arrhythmia (atrial tachycardia, atrial fibrillation, narrow complex tachycardia, etc.), syncope, and even hemodynamic compromise causing cardiopulmonary arrest. The etiologies of esophageal-associated LA compression can be as simple as a food bolus or as severe as achalasia and malignancy. Furthermore, instrumentation of the esophagus and esophageal stents have been associated with LA compression in the literature.

There are several imaging techniques available to identify and characterize intra- and extra-cardiac masses, including but not limited to TTE, transesophageal echocardiography (TEE), CT, magnetic resonance imaging (MRI), and positron emission tomography (PET). TTE is usually the preferred initial study for cardiac architecture assessment given its relatively low cost, high accessibility, and robust diagnostic power. The characterization properties of TTE in esophageal pathologies can be enhanced by giving a carbonated liquid which allows delineation of structures within the esophagus. TEE is more invasive than TTE, but it allows better visualization of cardiac masses which may be overlooked in precordial images. However, TEE might not be ideal for patients with risk for esophageal complications such as perforation, strictures, and bleeding. CT, MRI, and PET scans can be used separately or in combination with an echocardiogram to enhance characterization of tumor location, morphology, and its relationship with neighboring structures. This is especially true when evaluating metastatic disease such as in our patient’s case.

Conclusion:
We present a rare case of LA compression due to a metastatic mid-esophageal mass. Although cardiac imaging is usually used to evaluate cardiac pathologies, it often highlights extracardiac findings that are essential for the patient’s diagnosis. Furthermore, it is important to understand how neighboring structures
of the heart affect cardiac physiology in order to enhance diagnostic power, improve outcome, and prevent complications. There are no universal guidelines indicating which imaging modality is ideal for extra-cardiac mass evaluation. Therefore, it is important to consider the advantages and disadvantages of various imaging techniques based on each patient’s unique presentation and needs.

References:


Figures and Video:
Figure 1. Modified barium swallow study showing proximal esophagus dilation (red arrow) and mid-
esophagus narrowing (blue arrow).

**Figure 2.** Transthoracic echocardiography in parasternal long-axis view with biplane imaging through the aortic valve (AV) plane demonstrating left atrial (LA) compression by esophageal mass (red arrow). AO = aorta, LV = Left ventricle

**Figure 3.** Computed tomography imaging demonstrating a transverse section at the level of the left atrium with esophageal mass (red arrow) notably causing significant compression of the left atrium (LA).
**Figure 4.** Computed tomography imaging demonstrating a sagittal section through the left atrium with esophageal mass (red arrow) notably causing significant compression of the left atrium (LA). Left ventricle = LV

**Video 1.** Transthoracic echocardiography in parasternal long-axis view with biplane imaging through the aortic valve (AV) plane demonstrating left atrial (LA) compression by esophageal mass