

## Compression of the heart chambers by the gastric structures

### *Kalp Boşluklarına Bası Yapan Sindirim sistemi Organları*

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#### Özet

Kalp boşluklarının komşu yapılar veya sindirim organları tarafından basya uğraması kalp hastalığına benzer semptomlara neden olabilmektedir. Burada sindirim organlarının herniasyonunun kalp boşlukları üzerinde semptomatik basısına neden olan iki olgu sunulmuştur. Yorgunluk ve nefes darlığı ile başvuran ilk vaka da ekokardiyografi de sol atriumun posterior tarafından bası yapan ekolüsent kitle tespit edilmiş, kesin tanı için çekilen bilgisayarlı tomografi de bunun bir hiatal herni olduğu saptanmıştır. Bir kaç aydır eforla artan yorgunluk ve alt ekstremitelerde ödem ile başvuran 62 yaşındaki ikinci vakada, sağ kalp boşlukları üzerine baskı yapan büyük bir diyafragmatik gastrik herni tespit edildi. Burada sunulan hastalarda diyafragmatik ve hiatal herni tanıları öncelikle ekokardiyografi ile daha sonrada tomografi ile konulmuştur. Ekokardiyografide herni keselerinin kalp boşlukları üzerindeki bası yapıcı etkisi açıkça tespit edilmiştir.

**Anahtar Kelimeler:** Sindirim organları, hiatal herni, diyafragmatik herni, kalp boşlukları.

#### Abstract

Heart chamber compression by neighboring structures or digestive organs can give clinically symptoms mimicking intrinsic heart diseases. We describe here two persons who developed gastric hernia leading to symptomatic compression on heart chambers. The first case presented with chief complaint of fatigue and shortness of breath. Echocardiogram revealed an echolucent mass showing compression on the posterior aspect of the left atrium. Computed tomographic imaging ultimately identified that the mass was a hiatal hernia sac. The second case was a case of a large diaphragmatic hernia associated with right atrium and right ventricular compression in a 62 year old man who presented with increasing effort fatigue and pitting edema in lower extremities during the previous months. The present diagnosis of hiatal and diaphragmatic hernia was made firstly on the basis of echocardiogram and subsequent computed tomography. Echocardiography showed clearly the compressive effect of the hernia sacs on the heart chambers.

**Keywords:** Gastric structures, hiatal hernia, diaphragmatic hernia, heart chambers.

#### Introduction

Extrinsic heart chambers compression is a rare phenomenon but has important clinical consequences mimicking heart disease (1). Mediastinal structures causing heart chambers compression with varying degree are gastrointestinal tract diseases; mediastinal masses (thymoma/schwannoma, mediastinal lymphoma, thymic cyst, teratom cyst); pulmonary diseases (lung tumor, bronchogenic cyst) and aorta/pericardial diseases (ascending/ descending aortic aneurysm, hematoma from rupture of type B aortic dissection, pericardial cyst and hematoma) (2). The esophagus and the descending aorta would be expected more to produce left atrial compression because of anatomic proximity (2). We report two cases of gastric hernia, in one who had hiatal hernia leading to left atrial compression and in other who had a large diaphragmatic hernia compressing the right heart chambers.

#### Case 1

A 68 year-old woman presented with fatigue and shortness of breath, worsening during the past 2 months. The patient's vital signs were as follows: pulse rate, 95 beats/min; respiration rate, 17 breaths/min; and blood pressure, 140/90 mm Hg. A grade 2/6 systolic ejection murmur was heard over the left sternal border. Her chest was clear to auscultation bilaterally. Because the patient's symptoms was consistent with congestive heart failure, although in the absence of considerable clinical signs, Transthoracic echocardiography (TTE) was performed and showed incidentally an echolucent mass having a maximum diameter of 70 x 90 mm and compressing the left atrium from posterolateral site. Also noted were normal left ventricular function, an ejection fraction of 61, and mild mitral valve regurgitation. For further evaluation of this extracardiac echolucent mass, contrast echocardiography was also performed. This revealed no microbubble or flow in

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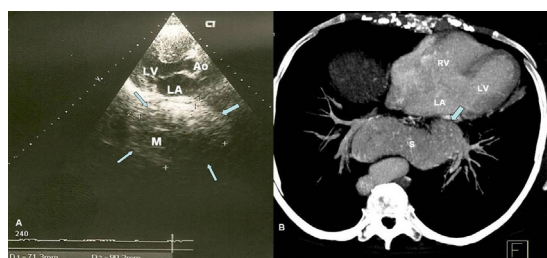
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this structure. Because these testing had been unrevealing for the clear diagnosis up to this point, it was decided to take computed tomography of the chest for an assumption of extrinsic mass compressing the left atrium.

Findings on chest computed tomography (CT) was a large hiatus hernia visualized in the posterior mediastinum with the intrathoracic migration of a large part of the stomach. Furthermore, anterolateral mild compression of the left atrium and left upper pulmonary vein by hiatus hernia was noted to be on CT.

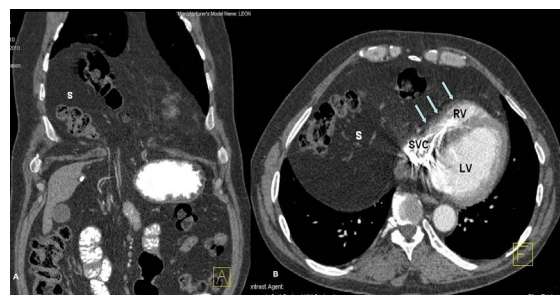


**Figure 1.** (A) Parasternal long axis view demonstrating the mass (arrows) distorting posterolateral wall of left atrium. The left atrium was small in size. (Ao: Aorta, LA: Left atrium, LV: Left ventricle, M: Mass.) (B) Axial contrast enhanced CT image demonstrates hiatal hernia; making extrinsic mild compression left atrium and left upper pulmonary vein (arrow). (LV: Left ventricle, LA: Left atrium, RV: Right ventricle, S: Stomach.)

Because the patient's symptoms were resulted from the mass effect of the hiatus hernia by compressing left atrium, he was referred to further assess the potential need for surgical treatment, but he refused.

## Case 2

A 62 year-old man presented with symptoms of increasing effort fatigue and pitting edema in lower extremities during the previous months. Cardiac examination revealed sinus tachycardia and elevated jugular venous pressure. TTE revealed a left ventricular ejection fraction of 74%, a prominent compression of right ventricle and atrium from lateral site by an extrinsic mass, and a dilated inferior vena cava. Right atrial and right ventricular were in diameters of 24 mm and 23 mm respectively. Furthermore turbulent inflow was seen across the tricuspid valve.



**Figure 2.** (A) Coronal CT image revealing intrathoracic displacement of a large part of stomach (S: Stomach). (B) Prominent extrinsic compression of right atrium and ventricle (arrow) and distorted superior vena cava is clearly seen. (LV: Left ventricle, RV: Right ventricle, SVC: Superior vena cava S: Stomach.)

The echocardiographic findings suggested a diagnosis of extrinsic right heart compression, making chest CT logical for the clear cause of the right heart compression. Ct demonstrated a massive diaphragmatic hernia with a large portion of the stomach in the mediastinum, making a prominent compression on the right heart chambers and displacement of superior vena cava. The patient was advised to surgery for elimination of mass effect on the heart chambers. The patient refused the surgery and remained on medical therapy.

## Discussion

There have been many reports in the literature of patients with extrinsic left atrial compression by mediastinal structure causing significant clinical manifestations. To our knowledge, no case of a large diaphragmatic hernia compressing right atrium / ventricle and distorting superior vena cava has been reported. Furthermore, none of these cases has occurred in association with other cardiac diseases. Attributing compression to extracardiac cause remains a diagnosis of exclusion after thorough cardiac work-up. Patient with an extracardiac heart chambers compression present usually with typical symptoms of cardiac diseases such as dyspnea, hypotension, chest pain, respiratory distress, hypoxia, tachycardia, pulmonary venous congestion and arrhythmia. Heart chambers compression by an extracardiac structure is an important consideration in patients with these cardiopulmonary symptoms (1-3).

Gastrointestinal structures, i.e. diaphragmatic and esophageal hernia, esophageal leiomyosarcoma and hematoma, achalasia, chronic gastric volvulus by a para-esophageal hernia, diffuse large B cell lymphoma originating from esophageus, pancreatic pseudocyst may be causes of such symptomatic compression(1-7). The clinical presentation can range from the dyspnea to impaired respiratory function, acute heart failure and hemodynamic collapse (3).

The left atrium is an infero-posteriorly located cardiac chamber with a low intraluminal pressure and has relatively thin wall, making very susceptible to compression from any abnormal adjacent structure, and causing obstruction of left atrial inflow and direct impairment of ventricular filling (2). This mechanism explains decreased cardiac output and pulmonary venous congestion resulting in tachycardia, hypotension, arrhythmia and dyspnea (1). Extracardiac impression of the heart should remain in the differential diagnosis for those patients especially who do not respond to medical therapy of heart failure (2).

However, patients present with any other symptoms such as postprandial syncope. After the meal, hernia sac enlarges and makes much more effect on the heart, stimulating epicardial receptors by triggering non sustained ventricular tachycardia or when in proximity with left atrium, causes left atrial inflow obliteration, thus finally resulting in postprandial syncope (4).

Echocardiography has been shown to be useful for the investigation and diagnosis of extracardiac mediastinal masses compressing the heart. Various intracardiac and extracardiac lesions can resemble the echocardiographic appearance of each other. In this setting, to differentiate a gastric structure i.e., achalasia, hiatal and diaphragmatic hernia, chronic gastric volvulus from any other lesions, several features may help to distinguish between extrinsic gastrointestinal masses and a mass on two dimensional echocardiography. Firstly, extrinsic masses, when lie proximity with heart chambers, move asynchronously (1). Secondly, the echo reflections from a gastric structure that

contains food and air will demonstrate changing echo densities within the mass. If given orally carbonated beverage to the patient during examination, this phenomenon will be augmented (4). The intravenous infusion of echocardiographic contrast agents, particularly in combination with orally given carbonated beverages, may facilitate the characterization of the investigated structure, according to the degree of enhancement and the communicating with cardiac chambers(3).

CT is the preferred imaging technique for the detailed evaluation of extracardiac mediastinal masses after pursuing a diagnosis of a structure neighboring the heart, especially behind the left atrium with TTE. CT excellently depicts the structures peripheral to the heart in the thorax and provides a variety of information and more insight into its origin (2-3). Additionally computed tomography reveals anatomic distortion due to a mass effect on heart chambers.

During surgery, the stomach is pulled down into the abdomen to restore the anatomical position of gastro-esophageal junction, making the opening in diaphragm smaller. Traditionally open trans-thoracic/abdominal approaches were used. The approach to repair has shifted from thoracic to open abdominal to laparoscopic, which appears to be the current standard. Laparoscopic repair results in a shorter overall hospital stay and less post-operative complication. Symptomatic recurrences with laparoscopic procedures appear to be similar to those seen with open abdominal procedures. If laparoscopic expertise is available, there may be benefits from this approach, preventing the spectrum of co-morbidities that arise from open surgery (8).

The cases reported illustrate the identification and also the evaluation of the structural and functional effects of a mediastinal mass on the heart by echocardiographic techniques. Final treatment is surgery by enabling to remove mass effect on the heart chambers



## **Kaynaklar**

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