

## Severe hemodynamic compromise due to left atrial compression by a dissecting aortic aneurysm

Diseke aort anevrizmanın sol atriyumu sıkıştırması sonucu gelişen ciddi hemodinamik bozulma

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Hemodynamically compromising left atrial (LA) compression by an aortic aneurysm is a rare entity. An 83-year-old woman with a previous diagnosis of congestive heart failure was admitted with worsening shortness of breath (NYHA grade III) and palpitations. The electrocardiogram showed atrial fibrillation. The chest X-ray revealed widening of the mediastinum and congested lung fields. Transthoracic echocardiography demonstrated LA compression by a large descending thoracic aortic aneurysm. Left and right ventricle systolic functions were preserved. Thoracic three-dimensional magnetic resonance imaging showed LA compression by a descending aortic aneurysm and an intramural hematoma. No intimal flap was seen in any part of the thoracic aorta. Emergency surgery was planned, but the patient did not accept surgery and suddenly died after four days of admission. Focal descending aortic aneurysm with an intramural hematoma in the aortic wall causing nearly complete obliteration of the LA cavity has not been reported before.

**Key words:** Aortic aneurysm, thoracic/complications; constriction, pathologic; echocardiography; heart atria/pathology; heart failure/etiology; hematoma.

Hemodynamically compromising left atrial compression by an aortic aneurysm is a rare entity. We present a case of descending thoracic aortic aneurysm causing congestive heart failure due to extensive left atrial (LA) compression.

### CASE REPORT

An 83-year-old woman was referred to our institution with shortness of breath and palpitations that worsened within the past week. She had a previous

Aort anevrizmasının hemodinamik bozulmaya yol açacak derecede sol atriya bası yapması nadir görülen bir durumdur. Daha önce konjestif kalp yetersizliği tanısı olan 83 yaşında kadın hasta, giderek ağırlaşan solunum güçlüğü (NYHA derece III) ve çarpıntı yakınmalarıyla yatırıldı. Elektrokardiyografide atriyal fibrilasyon, göğüs grafisinde mediastumda genişleme ve akciğer alanlarında göllenme izlendi. Transtorasik ekokardiyografide büyük bir inen torasik aort anevrizmasının sol atriya bası yaptığı görüldü. Sol ve sağ ventrikül sistolik fonksiyonları korunmuş bulundu. Üçboyutlu torasik manyetik rezonans görüntüleme, inen torasik aort anevrizmasının sol atriya basısı ile birlikte intramural hematoma izlendi. Torasik aortta intimal flebe rastlanmadı. Acil cerrahi kararı verilen hasta ameliyatı kabul etmedi ve yatışın dördüncü gününde ani ölüm gelişti. Aort duvarında intramural hematoma eşlik ettiği ve sol atriyum boşluğunda tama yakın tıkanmaya yol açan fokal inen aort anevrizması daha önce bildirilmemiştir.

**Anahtar sözcükler:** Aort anevrizması, torasik/komplikasyon; konstriksiyon, patolojik; ekokardiyografi; kalp atriyumu/patoloji; kalp yetersizliği/etyoloji; hematoma.

history of congestive heart failure for which no cause had been found. The degree of dyspnea on admission corresponded to New York Heart Association grade III. Her blood pressure was 100/60 mmHg and she had irregular pulses of 110 beats/min. No precordial murmurs or bruits were audible. There were inspiratory crackles in the basal and mid segments of both lungs. The electrocardiogram showed atrial fibrillation. The chest X-ray revealed widening of the mediastinum and congested lung fields. Transthoracic

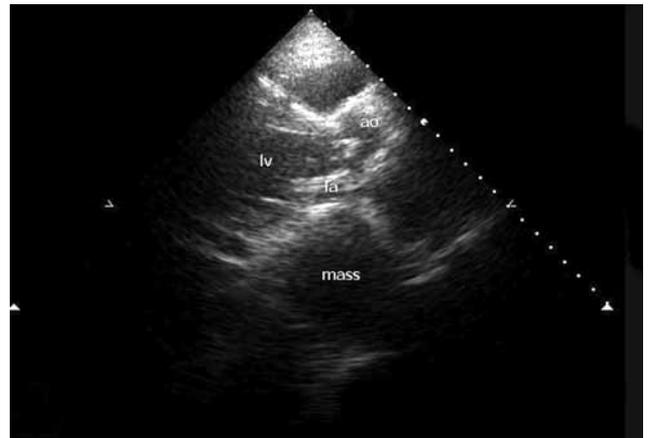
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echocardiography (TTE) in the parasternal long-axis (Fig. 1) and short-axis views demonstrated LA compression by a large descending thoracic aortic aneurysm and a small pericardial effusion. Left and right ventricle systolic functions were preserved with an estimated systolic pulmonary artery pressure of 40 mmHg. Unenhanced thoracic three-dimensional magnetic resonance imaging (MRI) was performed to confirm the diagnosis and to determine the extent of the disease. Left atrial compression by a descending aortic aneurysm was depicted together with an intramural hematoma seen as asymmetrical wall thickening with a hyperintense signal pattern on axial T1- and T2-weighted images (Fig. 2). The aneurysm was focal in the supradiaphragmatic region of the descending aorta with a crescent-shaped high intensity area indicating intramural hematoma on sagittal T2-weighted images (Fig. 3). No intimal flap was seen in any part of the thoracic aorta. Emergency surgery was planned, but the patient did not accept surgery and suddenly collapsed and died after four days of admission.

## DISCUSSION

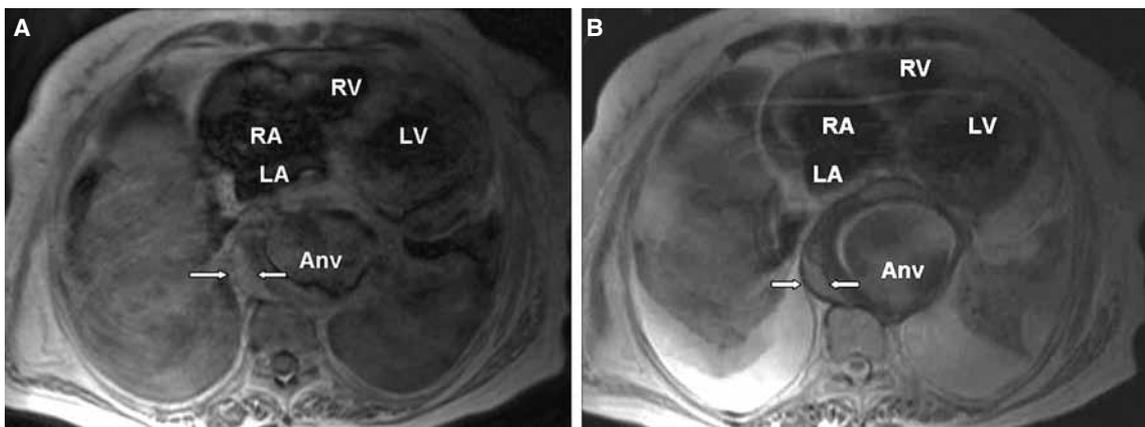
The left atrium is an inferoposteriorly located cardiac chamber with a low intraluminal pressure.<sup>[1]</sup> It has a relatively thin wall, making LA vulnerable to compression caused by various mediastinal structures including bronchogenic cysts, carcinoma, lymphoma, thymoma, diaphragmatic hernia, and aortic aneurysms.<sup>[1,2]</sup> D'Cruz et al.<sup>[3]</sup> classified LA compression into three categories based on the severity of anatomical deformation and its hemodynamic consequences: proximity (a contiguous or adjacent structure without chamber deformation), encroachment (distortion of



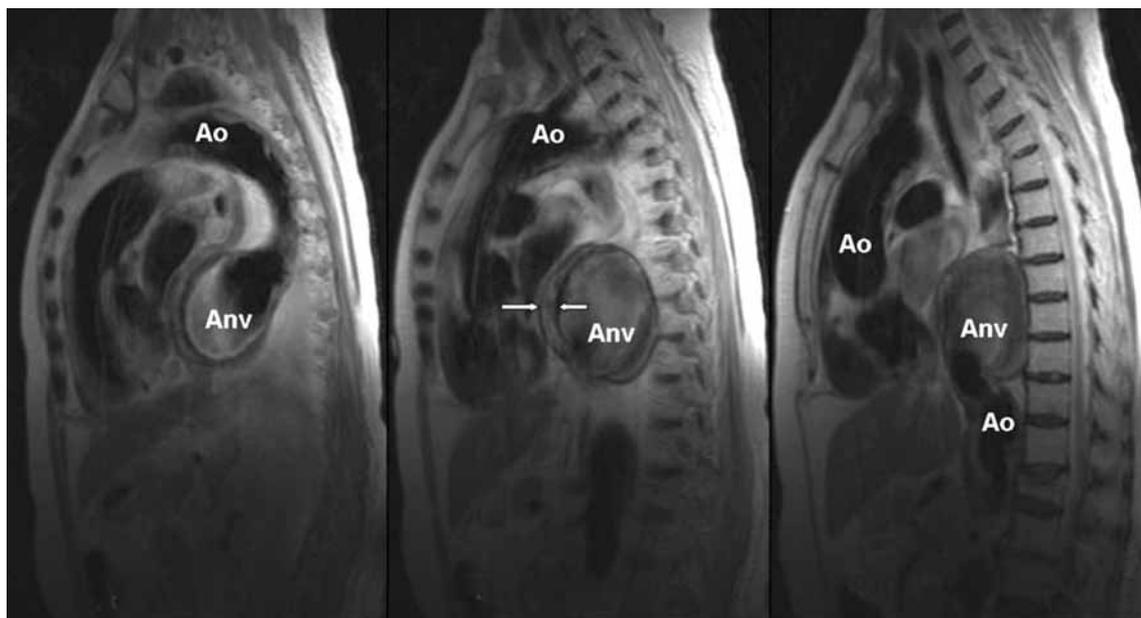
**Figure 1.** Transthoracic echocardiogram in the parasternal long-axis view demonstrating aneurysmal dilatation of the descending aorta. la: Left atrium; lv: Left ventricle; ao: Ascending aorta; mass: Descending aorta.

normal cardiovascular architecture without hemodynamic effect), and compression. Proximity and encroachment are defined as conditions that may not lead to symptoms, whereas compression causes severe inflow obstruction resulting in hemodynamic instability and symptoms such as hypotension, hypoxia, tachypnea, and tachycardia, as in our case.<sup>[3]</sup> Since the descending aorta have parts located very close to the LA, occurrence of both dissecting and nondissecting aneurysms compressing LA is a well-defined, but uncommon entity with few reports in the literature.<sup>[4,5]</sup> However, focal descending aortic aneurysm with an intramural hematoma in the aortic wall causing nearly complete obliteration of the LA cavity has not been reported before.

Aortic intramural hematoma was first described by Krukenberg in 1920 as an aortic dissection without



**Figure 2.** Magnetic resonance images showing left atrial compression by a descending aortic aneurysm. Intramural hematoma appears as asymmetrical wall thickening with hyperintense signal pattern on axial (A) T1 and (B) T2-weighted images. LA: Left atrium; RA: Right atrium; LV: Left ventricle; RV: Right ventricle; Anv: Aneurysm; Arrowheads: Intramural hematoma.



**Figure 3.** Three T2-weighted sagittal spin-echo magnetic resonance images of the entire thoracic aorta showing a saccular aneurysm in the supradiaphragmatic region of the descending aorta accompanied by an intramural hematoma appearing as a crescent-shaped high intensity area. Ao: Aorta; Anv: Aneurysm; arrowheads: Intramural hematoma.

intimal tear.<sup>[6]</sup> The potential role of structural aortic wall fatigue and loss of residual strain resulting in mechanical failure have been suggested as the pathogenic basis.<sup>[7]</sup> It typically appears as wall thickening greater than 0.5-0.7 cm, presenting as a crescentic or concentric pattern of hyperintensity on T1-weighted MRI images.<sup>[8]</sup> The natural course of descending aortic intramural hematomas is thought to be less malignant than that of aortic dissections,<sup>[7]</sup> which may be in part due to the lower frequency of its association with malperfusion syndromes, and there is consensus on medical treatment with follow-up for its evolution to aortic dissection or rupture.<sup>[7,8]</sup> Although late progression to aneurysm or frank dissection may occur, complete resolution of hematoma has been observed in 50-80% of cases.<sup>[7,8]</sup> Since our patient did not complain of pain suggesting an aortic origin and no intimal flap was seen on three-dimensional MRI views obtained a short time before her death, we did not consider aortic dissection or rupture as the cause of mortality. The possible mechanism of congestive heart failure and mortality in our case may be reduced LA volume due to compression leading to low cardiac output. In addition, as LA pressure rises with subsequently elevated pulmonary venous pressure, this may have eventually led to pulmonary edema.

Transthoracic echocardiography is a noninvasive, cheap, and easily applicable method and, thus, is the first choice in investigating the cause of dys-

pnea. The pathological structures dorsal to the LA that may cause compression to the LA and lead to dyspnea can be visualized using standard echocardiographic views, with special attention to the size of the LA and distortion of LA walls.<sup>[1]</sup> When a structure behind the LA is detected by TTE, additional three-dimensional MRI examination can give a more comprehensive view of this structure and its origin, especially in aortic aneurysms and aortic dissections without intimal tear.<sup>[1,8]</sup>

In conclusion, particularly in patients who do not respond to medical therapy for heart failure, compression to the LA must be kept in mind and should be further evaluated by TTE.

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