

Right atrial compression due to idiopathic right diaphragm paralysis detected incidentally by transthoracic echocardiography

Transtorasik ekokardiyografi ile rastlantısal saptanan
idiyopatik sağ diyafram paralizisine bağlı sağ atriyum basısı

Yelda Tayyareci, M.D.,¹ Pelin Bayazıt, M.D.,² Çağla Pınar Taştan, M.D.,² Hakan Aksoy, M.D.³

Departments of ¹Cardiology, ²Pulmonary Diseases, and ³Urology, Merzifon State Hospital, Merzifon, Amasya

Unilateral diaphragm paralysis (UDP) is an important and often unrecognized cause of dyspnea. We report a 72-year-old man in whom UDP was incidentally detected by transthoracic echocardiography. He was asymptomatic at rest, but experienced dyspnea on exertion. Chest radiography was not pathognomonic in this case because the heart silhouette obscured the left diaphragmatic contour. Transthoracic echocardiography showed an extrinsic compression to the right atrium. Right atrial collapse was obvious during heart movements with variation upon respiratory movements. There was no pericardial effusion nor any solid mass lesion. Fluoroscopic sniff test demonstrated a significant paradoxical elevation of the paralyzed right diaphragm in inspiration. Thoracic and abdominal computed tomography scans did not show any other pathology. The diagnosis was made as idiopathic UDP.

Key words: Diaphragm/pathology; echocardiography; heart atria/pathology; respiratory paralysis/complications.

Unilateral diaphragm paralysis (UDP) is an important and often unrecognized cause of dyspnea. It may be caused by phrenic nerve injury due to natural or surgical trauma, infections, vasculitis, motor neuron diseases; it may be idiopathic, as well. Unilateral diaphragm paralysis is usually diagnosed incidentally on chest radiograms. We presented a case of UDP which was incidentally detected by transthoracic echocardiography.

CASE REPORT

A 72-year-old man was referred to our cardiology clinic for evaluation before transurethral prostatic operation.

Tek taraflı diyafram paralizisi genellikle kaynağı bilinmeyen nefes darlığının önemli nedenlerinden biridir. Bu yazıda transtorasik ekokardiyografi sırasında rastlantısal olarak tek taraflı diyafram paralizisi saptanan 72 yaşında bir erkek hasta sunuldu. İstirahatte semptomsuz olan hastanın egzersizle dispne yakınması vardı. Kalp silüeti sol diyafram sınırlarını örttüğünden göğüs röntgenogramı tanı koydurucu özellikte değildi. Transtorasik ekokardiyografide sağ atriyumun dışardan basıya maruz kaldığı görüldü. Sağ atriyum kollapsı, solunum hareketi ile değişmekle birlikte, kalp hareketleri sırasında belirgindi. Hastada perikard efüzyonu veya herhangi bir solid kitle yoktu. Fluoroskopik solunum testinde, paralizili sağ diyaframın inspirasyonda paradoksal elevasyonu görüldü. Göğüs ve batin bilgisayarlı tomografi incelemelerinde başka soruna rastlanmadı. Tanı idiyopatik tek taraflı diyafram paralizisi olarak kondu.

Anahtar sözcükler: Diyafram/patoloji; ekokardiyografi; kalp atriyumu/patoloji; solunum paralizisi/komplikasyon.

He was asymptomatic at rest, but experienced dyspnea on exertion and exhibited decreased exercise performance. He had hypertension of two-year history and was on amlodipin (5 mg/day) treatment. On physical examination, his blood pressure was 130/80 mmHg, and heart rate was 76 beat/minute. Examination of the respiratory system showed dullness to percussion and absence of breath sounds over the right lower chest. Cardiac auscultation and other system examinations were normal. Electrocardiography showed sinus rhythm. The results of hemogram and biochemical tests were all within normal ranges. Chest radiography showed small lung volumes and an increased

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Correspondence: Dr. Yelda Tayyareci. Florence Nightingale Hastanesi, Kardiyoloji Kliniği, 34381 Çağlayan, İstanbul, Turkey.
Tel: +90 212 - 224 49 50 Fax: +90 212 - 224 49 82 e-mail: yeldatayyareci@hotmail.com

cardiothoracic ratio (Fig 1). Transthoracic echocardiography was performed. Cardiac dimensions and left ventricular functions were found to be normal. On apical four-chamber views, an extrinsic compression to the right atrium was observed, causing partial diastolic and systolic collapse (Fig 2). Right atrial collapse was obvious during heart movements, with variation upon respiratory movements. There was no pericardial effusion nor any solid mass lesion to explain extrinsic right atrial compression. These findings were suggestive of unilateral diaphragm paralysis causing extrinsic compression to the right atrium. Fluoroscopic sniff test performed demonstrated a significant paradoxical elevation of the paralyzed right diaphragm in inspiration. After confirming the cause, thoracic and abdominal computed tomography (CT) scans were obtained to evaluate the potential causes of diaphragm paralysis. Thorax CT scans showed no lesion other than the significantly elevated right diaphragm. Abdominal CT was also normal. The diagnosis was made as idiopathic unilateral diaphragm paralysis. Additionally, pulmonary function tests were performed to investigate whether the pathology would cause any respiratory problem that might complicate the operation. Pulmonary function tests showed decreased lung volumes (FVC 1.6 l, FEV₁ 1.48) and a restrictive respiratory pattern (FEV₁/FVC 89.2%).

DISCUSSION

Diaphragm paralysis may be unilateral or bilateral. Unless the prognosis of UDP is complicated by a potentially fatal comorbid illness, death from respiratory insufficiency does not occur.^[1] Unilateral diaphragm paralysis is often discovered incidentally on chest radiograms. Patients are usually asymptomatic at rest, but experience dyspnea on exertion and exhibit decreased exercise performance. Patients may have

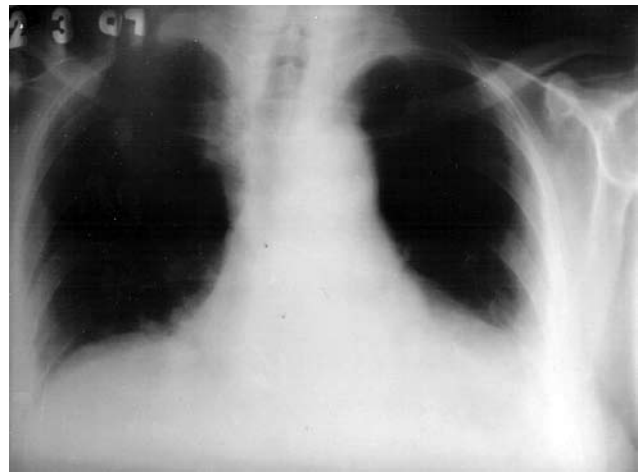


Figure 1. The chest radiogram showing decreased lung volumes in both hemithoraxes and moderate cardiomegaly.

dyspnea at rest in the presence of an underlying lung disease. Unilateral diaphragm paralysis is mostly due to nerve compression of tumoral etiology (30%). Other risk factors include prior head-neck and cardiac surgery, lesions adjacent to the phrenic nerve such as pneumonia, pleurisy, aortic aneurysm, substernal goiter, herpes zoster, infections, and vasculitis.^[2,3] It may also be idiopathic.^[4]

Unilateral diaphragm paralysis can usually be diagnosed on chest radiograms. Fluoroscopy supports the diagnosis.^[5] M-mode ultrasonography can be used to evaluate the paralyzed diaphragm.^[6] The affected diaphragm shows no active caudal movement with inspiration and an abnormal paradoxical movement particularly with the sniff test. Computed tomography and magnetic resonance imaging may be necessary to evaluate the potential causes of diaphragmatic paralysis. Most patients with UDP remain asymptomatic and do not need treatment. Plication of the diaphragm may be an option in patients with severe lung disease.^[7,8]

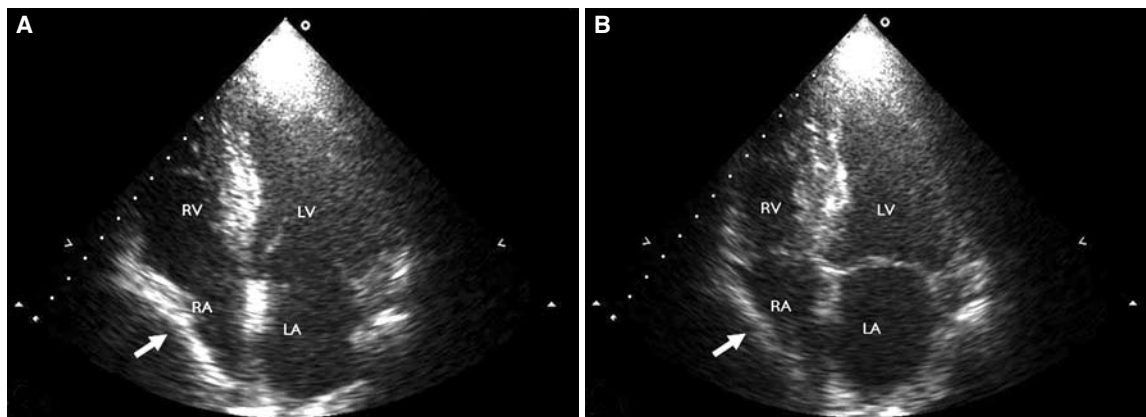


Figure 2. Transthoracic echocardiography views showing extrinsic right atrial compression in (A) diastole and (B) systole.

In our case, UDP was incidentally detected by transthoracic echocardiography. In contrast to bilateral disease, UDP can usually be diagnosed by radiographic studies per se. Although lung volumes were observed to be decreased in both hemithoraxes, UDP could not be visualized on the chest radiogram because the heart silhouette obscured the left diaphragmatic contour. Observation of extrinsic compression of the right atrium by transthoracic echocardiography was most helpful to suspect the presence of UDP in this case.

There are a few cases reported on right atrial extrinsic compression by large pleural or pericardial effusions and extracardiac tumors.^[9,10] To our knowledge, this is the first case of UDP incidentally diagnosed by echocardiography, causing right atrial extrinsic compression without hemodynamic disturbance.

In conclusion, diaphragm paralysis should also be remembered as one of the underlying causes of extrinsic right atrial compression.

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