Images in Aortic Disease

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Post-Traumatic Aortic Arch Aneurysm Complicated by Aorto-Pulmonary Fistula

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Abstract

We report a rare case of presumed post-traumatic aortic arch aneurysm complicated by an aorto-pulmonary artery fistula. Contrast-enhanced computed tomographic pulmonary angiography completed by dynamic cardiac magnetic resonance imaging allowed adequate preoperative visualization of an 8-mm large fistula between the aneurysm and the left pulmonary artery. The patient underwent successful total aortic arch replacement and closure of the fistula using a patch.

Key Words

Aortic aneurysm · Aorto-pulmonary fistula · Computed tomography scan · Magnetic resonance imaging scan

Introduction

Herein we illustrate the clinical usefulness of modern multimodality imaging techniques for assessing a rare case of likely post-traumatic aortic arch aneurysm complicated by aorto-pulmonary artery fistula.

Case Presentation

A 73-year-old patient was admitted to our hospital for chest discomfort with worsening dyspnea (New York Heart Association functional class III). His medical history included systemic hypertension, type II diabetes mellitus, and chronic renal insufficiency. Thirty-three years before admission, he had suffered a major motor vehicle accident with violent chest trauma complicated by left hemothorax requiring percutaneous drainage. However, no further vascular investigation was undertaken at the time.

Present physical examination revealed signs of congestive heart failure. A systolic ejection murmur (4/6) was noted at the 2nd right intercostal space but no abnormal murmur was noted on the left side. No recent episodes of fever, shivering, or peripheral signs of endocarditis were noted. Laboratory results revealed a normal white blood cell count. No hemocultures were performed.

On admission, chest X-ray showed lung congestion, bilateral pleural effusion, tracheal shift to the right side, and aortic arch dilatation. Initial echocardiogram revealed left ventricular hypertrophy with normal systolic function, moderate aortic valve stenosis (mean transvalvular pressure gradient 30 mm Hg; indexed effective aortic valve area 1.3 cm^2/m^2) with mild mitral valve regurgitation and systolic pulmonary hypertension estimated at 60 mm Hg. A thoracic aortic aneurysm was suspected but incompletely evaluated because of limited acoustic window.

An ECG-gated aortic computed tomographic angiogram with iodinated contrast injection was then

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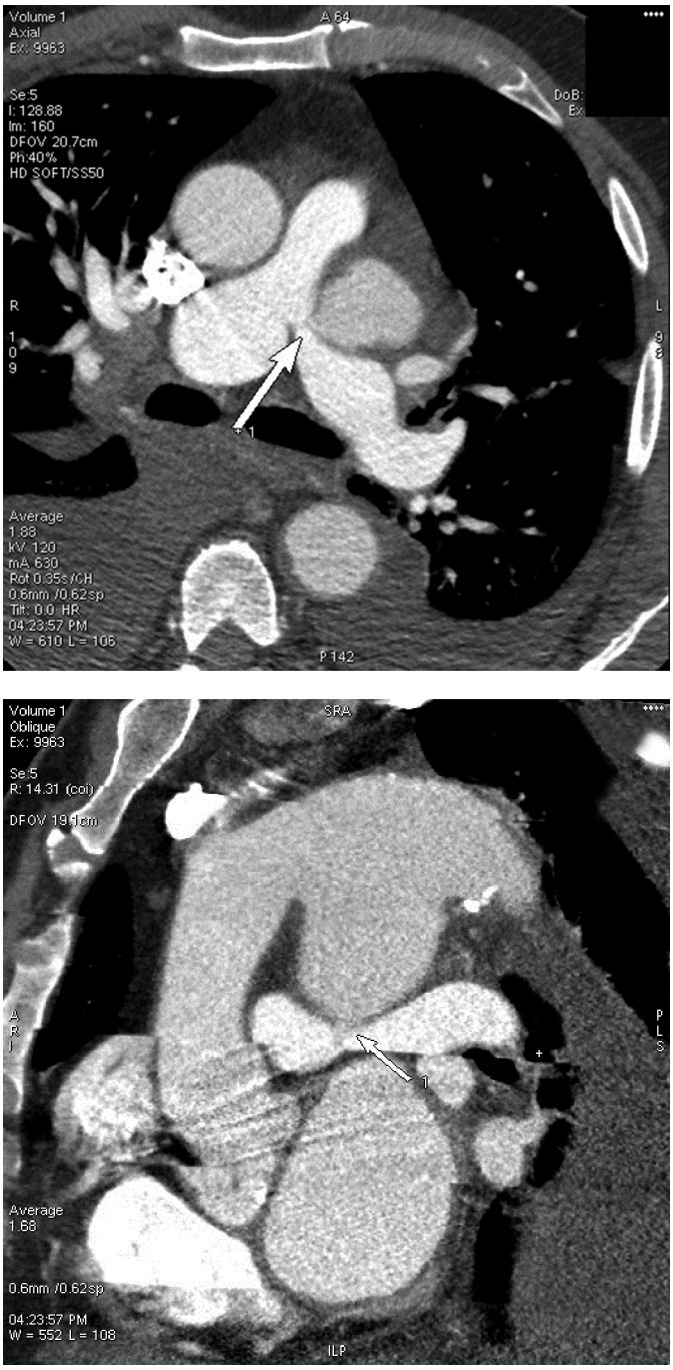

Figure 1. Contrast-enhanced computed tomographic pulmonary angiography showing a fistula between the aortic arch aneurysm and the origin of the left pulmonary artery (**arrows**). A. Axial view passing through the pulmonary bifurcation. B. Sagittal oblique view passing through the aortic arch. Note the contrast agent jet (same density as seen in the aorta) in the left pulmonary artery, suggesting a left-to-right shunt through the fistula.

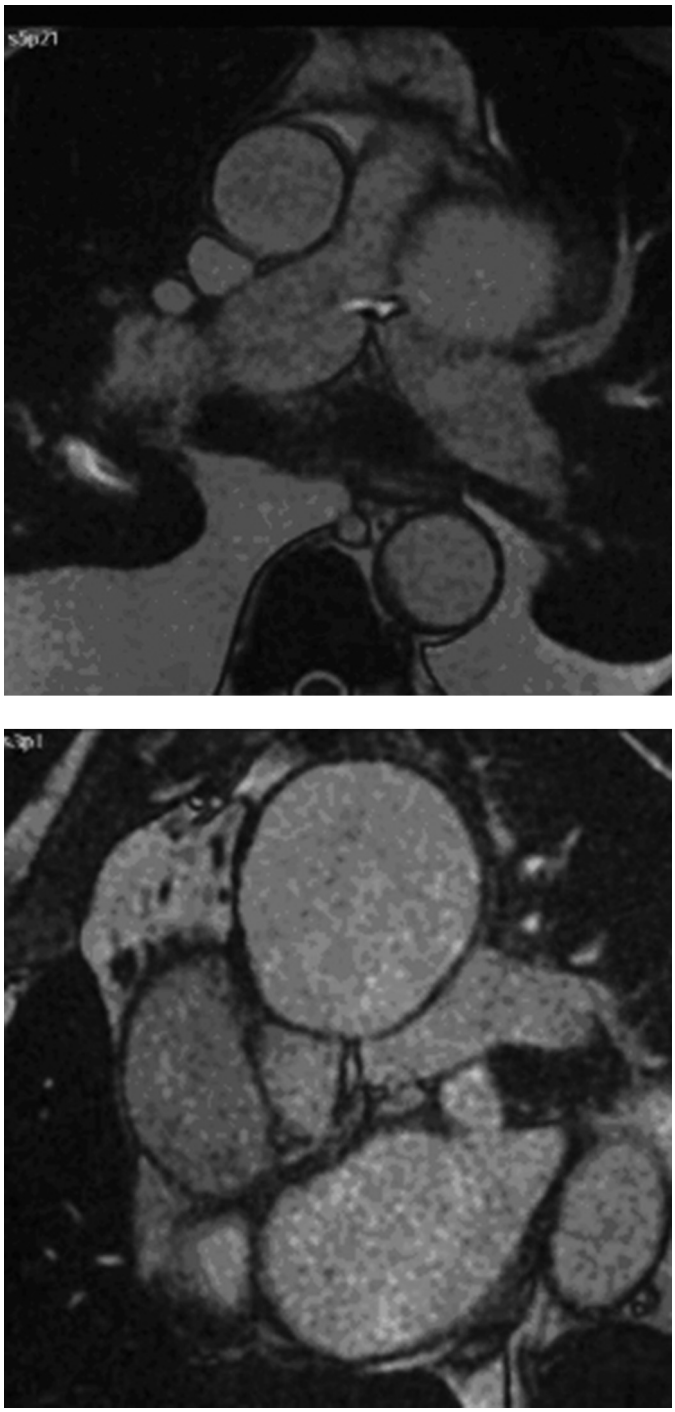

Figure 2. Dynamic cardiac MRI for evaluation of the aorto-pulmonary fistula using cine-steady-state-free-precession sequence at the same levels as seen on computed tomography. Note the high-velocity shunt through the fistula between the aortic arch aneurysm and the left pulmonary artery.

performed to explore this finding. It revealed a large sacciform aortic aneurysm with a maximum diameter of 90 mm within the concavity of the aortic arch resulting in compression of the left pulmonary artery. A communication between the aortic aneurysm and the origin of the left pulmonary artery was suspected (Fig. 1). Thus, cardiac magnetic resonance imaging (MRI) was performed and confirmed the diagnosis of aorto-pulmonary fistula by demonstrating a high-velocity left-to-right shunt between the aortic arch aneurysm and the left pulmonary artery [Fig. 2, Movies I (http://dx.doi.org/10.12945/j.aorta.2014.14.035.vid.01) and II (http://dx.doi.org/10.12945/j.aorta.2014.14.035.vid.02)].

Surgical repair was performed through median sternotomy. Cardiopulmonary bypass was established between the right atrium and the right axillary artery. Aortic arch repair was performed using moderate hypothermic systemic circulatory arrest (24°C, 43 minutes) complemented by unilateral antegrade cerebral perfusion through the right axillary artery. Total aortic arch replacement with short elephant-trunk extension into the descending aorta was performed using a 24-mm woven polyester graft (Polythese®, Perouse Medical, Ivry le Temple, France). Because the origin of the left subclavian artery was involved in the aneurysm, it was reimplanted into the ascending aorta using a 10 mm Gelweave™ graft (Vascutek Ltd, Renfrewshire, Scotland). As expected, an 8-mm fistula was found between the aortic arch aneurysm and the left pulmonary artery and was obliterated through the inside of the aneurysmal sac using a small Gore-Tex® patch (W.L. Gore & Associates Inc., Flagstaff, AZ, USA).

Postoperative CT scan control at 3 months confirmed satisfactory exclusion of the aortic aneurysm, closure of the fistula and decompression of the left pulmonary artery.

Conflict of Interest

The authors have no conflict of interest relevant to this publication.

Comment on this Article or Ask a Question

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EDITOR'S QUESTIONS

1. Are you certain that this case was the result of a traumatic aneurysm? The position is not classic. Was there any evidence of possible degenerative atherosclerotic aneurysm?

The traumatic etiology in our case remains speculative. However, preoperative imaging studies and intraoperative inspection did not reveal significant atherosclerotic aortic disease. On the other hand, our patient had a history of a high-velocity motor vehicle accident, which remained largely unexplored. Five to 25% of traumatic intimal tears of the aorta remain asymptomatic and undiagnosed. In some of these cases, chronic post-traumatic aneurysm might develop and subsequently erode into the pulmonary artery.