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Aortic arch aneurysm (RCD code: I-2A.O)

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Abstract

An aortic aneurysm is defined as a pathologic dilatation to more than 1.5 times the normal diameter of the aorta. The prognosis is serious; several segments of the aorta can be dilated concomitantly. The wall of the aorta can be weakened by several processes: atherosclerosis, genetic predisposition (Marfan syndrome, Ehlers-Danlos syndrome type IV), infectious processes and trauma. The clinical course is asymptomatic in approximately 40% of patients, in the rest it can cause symptoms due to the pressure on periaortic structures. Thoracic aorta aneurysms are most commonly located in the ascending segment, then in the descending segment and most rarely in the aortic arch. We present a case of an isolated aortic arch aneurysm in 48-year-old man. JRCD 2015; 2 (4): xx–xx

Key words: aortic disease, mediastinal widening, surgical treatment

Introduction

An aortic aneurysm is defined as a pathologic dilatation to more than 1.5 times the normal diameter of the aorta. The prognosis is serious; several segments of the aorta can be dilated concomitantly. The wall of the aorta can be weakened by several processes: atherosclerosis, genetic predisposition (Marfan syndrome, Ehlers-Danlos syndrome type IV), infectious processes and trauma [1]. The clinical course is asymptomatic in approximately 40% of patients, in the rest it can cause symptoms due to the pressure on periaortic structures [1,2]. Thoracic aorta aneurysms are most commonly located in the ascending segment, then in the descending segment and most rarely in the aortic arch. We present a case of an isolated aortic arch aneurysm.

Case report

A 48-year-old patient with a history of recurring dizziness with the concomitant feeling of weakness without loss of consciousness and moderate, periodically occurring chest pain radiating to the throat was admitted to the cardiology ward for further evaluation of the mediastinal widening on routine chest radiograph indicating an aortic arch aneurysm or a mediastinal tumor (Figure 1). The patient did not have a history of any significant concomitant diseases or significant risk factors for atherosclerosis.

Patient was in a good general condition with a normal blood pressure 120/80 mm Hg, regular heart rate and rhythm (70 bpm) without murmur. Lungs were clear to auscultation and there were no signs of cardiac decompensation. His peripheral pulse was feeble.

The electrocardiogram revealed a sinus rhythm of 67 bpm with a normal axis, J-point elevation in leads I, II, aVL, V6 and sinistrogyration.

Transthoracic echocardiography showed thickening of the ascending aortic wall without dilatation, normal aortic valve annulus diameter. Heart chambers were normal. Left ventricular systolic function was preserved. Interventricular septum was insignificantly thickened (up to 12 mm). All valves, including aortic, were functioning normally. Their morphology was normal (Figure 2). Suprasternal view revealed a spherical aneurysm of the aortic arch with the diameter of 40 mm (Figure 3). Subcostal view showed a normal diameter of the abdominal aorta.

Magnetic resonance imaging revealed the aortic arch aneurysm localized between the origin of the left common carotid artery and origin of the left subclavian artery. Aneurysm on that side was directed into the superior thoracic aperture, it compressed the trachea (Figure 4A). Its diameters were $43 \times 43 \times 65$ mm. The image of the blood vessels arising from the aortic arch were normal. Additionally, anomaly of the right lung in the form of azygos lobe was found.

Conflict of interest: none declared. Submitted: August 4, 2015. Accepted: October 12, 2015.

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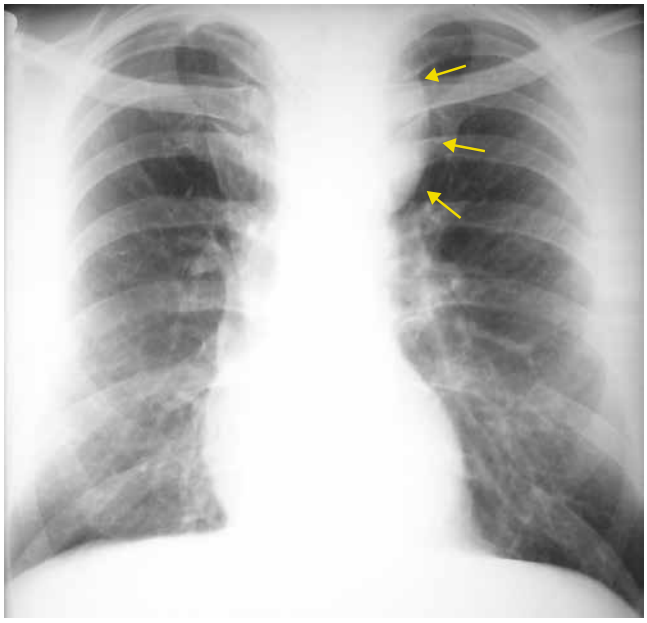


Figure 1. Chest radiograph. Widening of the upper chest mediastinum (arrows)

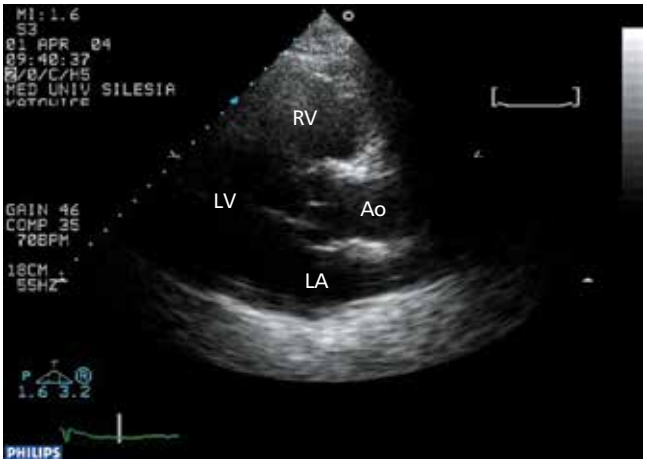
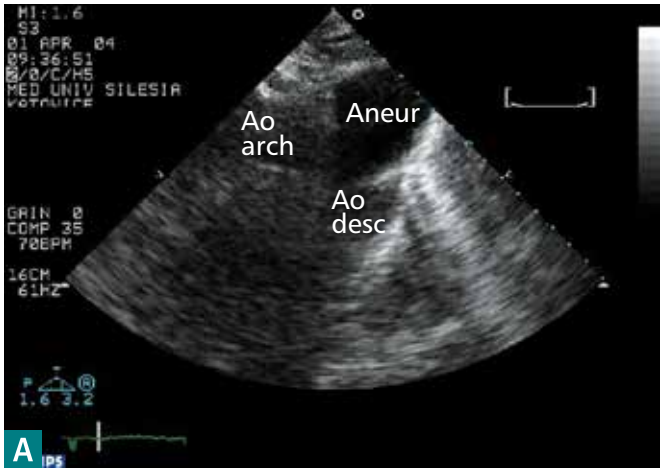
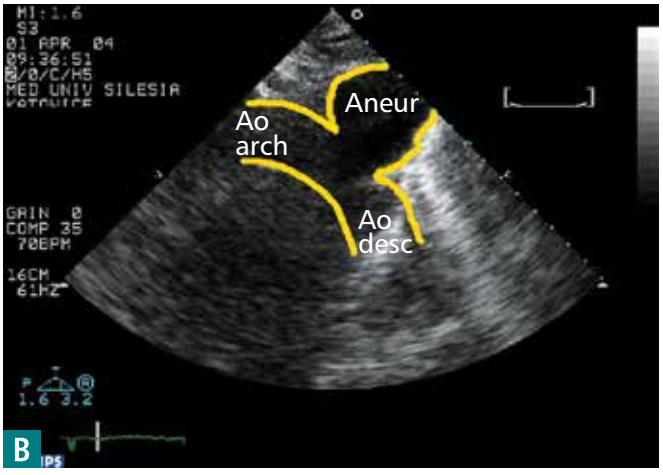


Figure 2. Transthoracic echocardiography. Parasternal long-axis view. Thickening of the ascending aortic wall, normal diameter of the aorta and aortic valve annulus. LV – left ventricle, RV – right ventricle, LA – left atrium, Ao – aorta





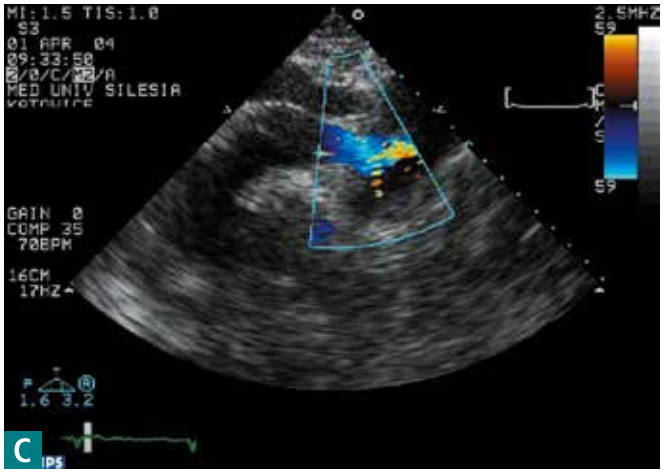


Figure 3. Transthoracic echocardiography. Suprasternal view. Panel A – Spherical aneurysm of the aortic arch (Aneur). Panel B. Outline of the aortic arch and the aneurysm. Panel C. Color Doppler ultrasound shows turbulent blood flow to the aneurysm during systole. Ao desc – descending aorta, Ao arch – aortic arch

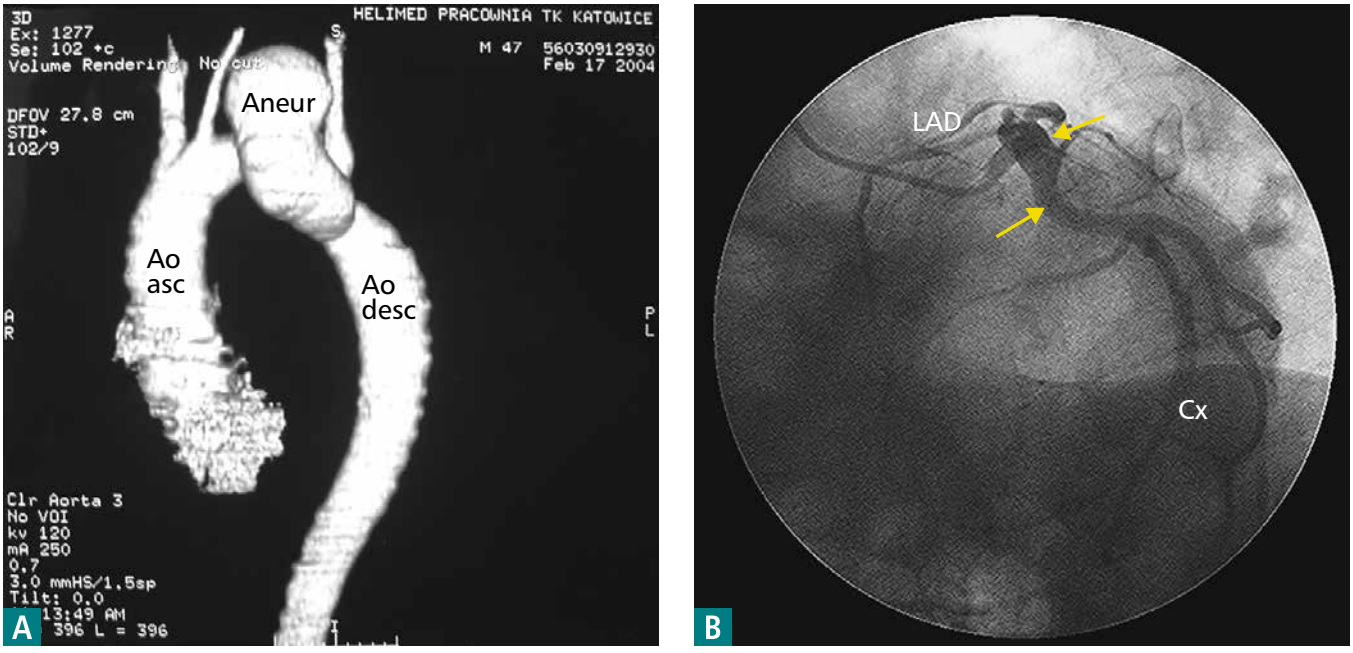


Figure 4. Panel A. 3D magnetic resonance imaging reconstruction of the thoracic aorta, presence of an aortic arch aneurysm. Panel B. Coronarography, aneurysmatic dilatation of the left main coronary artery and of the proximal segment of the circumflex coronary artery (yellow arrows). Ao asc – ascending aorta, Ao desc – descending aorta, LAD – left anterior descending artery, Cx – circumflex artery

Invasive examinations – coronarography and aortography via the right brachial approach – confirmed the presence of an aortic arch aneurysm and showed the aneurysmatic dilatation of the left main coronary artery and the proximal segment of the circumflex coronary artery (Figure 4B.). There were no significant narrowing of the coronary arteries.

After taking into account all the clinical data, the patient was qualified for the resection of the aortic arch aneurysm. Pharmacological treatment with bisoprolol 1x2,5mg was maintained.

Review of literature

The presented patient is a man in whom mediastinal widening was found accidentally on routine chest radiograph and then an aortic arch aneurysm was diagnosed. Echocardiographic examination, as well as the magnetic resonance imaging allowed for the precise description of the type, localization and diameter of the aneurysm.

It is difficult to define the etiology of the aneurysm. The character of the lesion, normal coronarography and the lack of significant risk factors speak against the arteriosclerotic pathogenesis. There is also a lack of data indicating the infectious etiology. We must consider, however, the probability of the previous existence of a congenital arterial anomaly or posttraumatic lesion that was not examined earlier. The local dysfunction/damage of the vessel wall associated with the collapse of the collagen or elastin fibers in the tunica media has the potential meaning [3]. Simultaneously observed aneurysmatic dilatation of the left main coronary artery indicates the connective tissue pathology.

The prognosis of the conservative treatment of the thoracic aorta aneurysms is poor – overall 1-, 3-, 5-year survival rate is respectively: 65, 36 and 20% [2,4]. About 32–68% of patients suffer from the aortic rupture with the mortality rate of 54% during first 6 hours and 76% after 24 hours. What is important, there is no correlation between the segment of the aorta dilated and the probability of rupture. There are following indications for the operative treatment:

- diameter of an aneurysm:
  - ascending aorta ≥5.5–6.0 cm
  - descending aorta ≥6.0 cm
- aneurysm growth rate >0,5 cm/year
- occurrence of the significant aortic valve regurgitation
- occurrence of the clinical symptoms

The initial diameter of an aneurysm >5.0 cm remains the only independent risk factor of fast progression of the disease and its impaired prognosis [5].

Surgical treatment of aortic arch aneurysms carries great risk of stroke. This is due to the fact that brachiocranial vessels must be resected from the arch before the aneurysm. In presented case consulting cardiac surgeon considered the possibility of the aneurysm closure by its ligature what would significantly decrease the operational risk.

The management principles of patients with aortic aneurysms are analogical to those in patients requiring secondary prevention of coronary artery disease. Maintaining the normal blood pressure has the particular meaning. Strict blood pressure control in this subset of patients is of utmost importance. Beta-blockers were proven particularly beneficial – propranolol 200 mg per day [1].

References

1. Isselbacher E.M. Diseases of aorta [w:] Braunwald E., Zipes D.P., Libby P. Heart disease: A textbook of cardiovascular medicine. W.B. Saunders Company, Philadelphia 2001: 1422.
2. Pressler V., McNamara J.J. Thoracic aortic aneurysm: Natural history and treatment. J. Thorac. Cardiovasc. Surg. 1990; 79: 489.
3. Masuda Y., Takanashi K., Takasu J. et al. Expansion rate of thoracic aortic aneurysms and influencing factors. Chest 1992; 102: 461–466.
4. Crawford E.S., DeNatale R.W. Thoracoabdominal aortic aneurysm: Observations regarding the natural course of disease. J. Vasc. Surg. 1996; 3: 578.
5. Dapunt O.E., Galla J.D., Sadeghi A.M. et al. The natural history of thoracic aortic aneurysms. J. Thorac. Cardiovasc. Surg. 1994; 107: 1323–1332.