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Short communication

Bovine aortic arch and idiopathic pulmonary artery aneurysm associated with bronchial compression

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ABSTRACT

The left common carotid artery originating from the brachiocephalic trunk is termed the bovine aortic arch. Although it is the third most-common normal variant found in 9% humans, the origin of this term remains unclear. Until now, It has not been reported in the literature bovine aortic arch togetherness with pulmonary aneurysm and bronchial compression. Herein, we present a case with bovine aorta arch and pulmonary artery aneurysm associated with bronchial compression, which is incidentally detected by X-ray film. A 56-year-old Caucasian female admitted to the cardiology clinic with complaint of chest pain. Physical examination was unremarkable. Blood biochemistry values and cardiac markers were in normal range. Chest radiography revealed a widened mediastinum and prominent pulmonary conus with no active pulmonary disease. A subsequent transthoracic echocardiography revealed left ventricular hypertrophy, left atrial enlargement (diameter: 41 mm), mild mitral and tricuspid valve insufficiency, dilatation of main pulmonary artery (parasternal short-axis view diameter: 33 mm), normal pulmonary artery pressure and normal left ventricular systolic function. Computed tomography revealed bovine aortic arch associated with pulmonary artery aneurysm (diameter: 53 mm). And left main bronch of trachea was critically squeezed by aortic arch. Aortic and pulmonary vascular anomalies should be considered in patients with chest pain. And, identification with imaging modalities is important for prevention of chronic and irreversible complications.

Introduction

The left common carotid artery which originates from the brachiocephalic trunk (BT) is called as the bovine aortic arch (BAA).[1] Although it is the third most-common normal variant found 9% in human, the origin of this term remains unclear. Idiopathic pulmonary artery aneurysm (IPAA) is a rare condition, mostly arising from main pulmonary artery.[2] Even though specific prevalence of PAA is unknown, it has been reported in 1 out of every 14,000 autopsies.[3] Until now, no association of BAA with IPAA and bronchial compression has been reported in the literature. In this paper, we present a case with BAA and IPAA associated with bronchial compression, which is incidentally detected by a chest radiograph.

Case report

A 56-year-old Caucasian female admitted to the cardiology clinic with complaint of chest pain, which was located retrosternal, not induced with exercise. She had history of hypertension and diabetes mellitus. Physical examination was unremarkable. Her blood pressure on admission was 140/95 mm Hg. All routine biochemical tests were normal. An electrocardiogram (ECG) revealed sinus rhythm with normal axis. A chest radiograph done upon admission demonstrated a widened mediastinum and prominent pulmonary conus (Fig. 1A). The treadmill exercise stress test, which was done to determine myocardial ischemia, was normal. A subsequent transthoracic echocardiography (TTE) revealed left ventricular hypertrophy, left atrial dilatation, mild mitral and tricuspid valve insufficiency, dilatation of main pulmonary artery (parasternal short-axis view diameter: 33 mm), no significant trans-pulmonary valve pressure gradient and normal left ventricular systolic function (Fig. 1B). There were no echocardiographic features of right cardiac failure. A computed tomographic scan of thorax revealed bovine aortic arch associated with a massively dilated main pulmonary artery (MPA) as well as dilated right (RPA) and left pulmonary (LPA) arteries. The main pulmonary artery, RPA and LPA were dilated to 53, 33 and 45 mm in diameter, respectively. Additionally, the left main bronchus was compressed by LPA (Figs. 1C, 2A, 2B). Then, the patient was consulted by cardiovascular surgeon. Since our patient did not have an aneurysm 60 mm or greater in diameter, transpulmonary valve pressure gradient, and typical symptoms, it was

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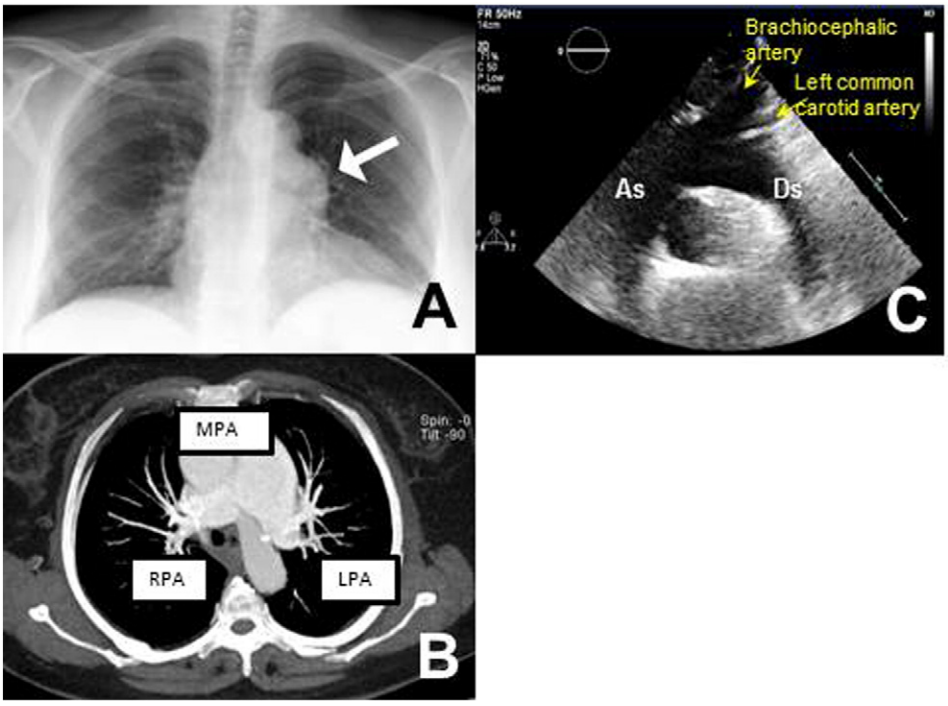

Fig. 1. (A) Posteroanterior chest radiography view demonstrated massive enlargement of the main pulmonary artery (arrow). (B) Axial contrast-enhanced computed tomography imaging revealed dilation of the main pulmonary artery and its branches. (C) Suprasternal view of echocardiography demonstrates bovine aortic arch. As = ascending aorta, Ds = descending aorta. MPA: main pulmonary artery, RPA: right pulmonary artery, LPA: left pulmonary artery.

decided to follow up at the clinic to re-assess her clinical status as well as the trans-pulmonary valve pressure gradient as an index of stability.

Discussion

Pulmonary artery aneurysm (PAA) is a rare condition, mostly arising from main pulmonary artery.[4] The cause of PAA may be idiopathic; however, other causes include congenital shunt disease, infection (tuberculosis, syphilis, osteomyelitis, pneumonia), systemic vasculitides (Hughes–Stovin's disease, Behcet's disease), collagen vascular diseases, connective tissue disorders, (Marfan's syndrome, Ehlers–Danlos syndrome), trauma (direct or blunt chest injury), mucoid vasculopathic changes, valvular pulmonary stenosis, and pulmonary hypertension.[5–7] Greene et al. described idiopathic PAA as one that satisfies the following criteria: a) enlargement of the pulmonary artery with or without

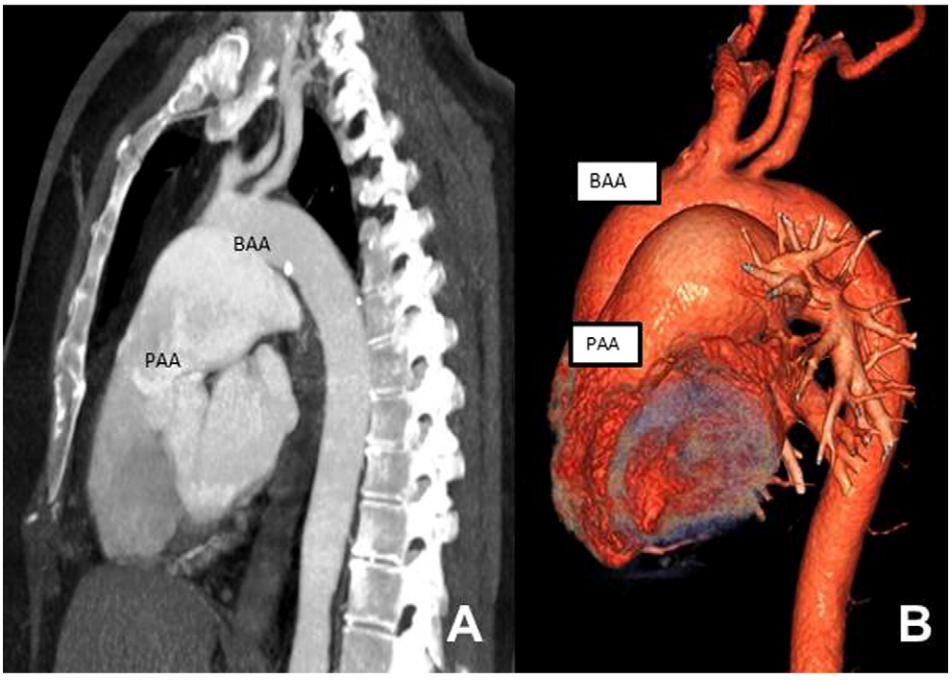

Fig. 2. (A) Lateral image of computed tomography demonstrates severe dilation of the pulmonary artery trunk (diameter: 53 mm) and bovine aortic arch. (B) The three-dimensional computed tomography image demonstrates the anatomy of the bovine aortic arch and pulmonary artery aneurysm. BAA: bovine aortic arch, PAA: pulmonary artery aneurysm.

involvement of the adjacent arterial trunk, b) absence of abnormal extracardiac or intracardiac shunts; c) absence of chronic pulmonary or cardiac disease, and d) more than minimal atheromatosis or pulmonary vascular tree arteriosclerosis or absence of arterial disease.[6] For the patient reported here, the degree of dilatation was marked and both right and left pulmonary arteries were involved. Since other causes of PAA were unavailable in her family and medical history, it was considered as idiopathic PAA. Diagnosis of idiopathic PAA is generally established with echocardiography to confirm a dilated main pulmonary artery and its branches, along with the presence or absence of valvular regurgitation.[4] Pathologically, the artery shows fragmentation of the media with degeneration and with less smooth muscle cells, which lead to progressive dilatation of the artery. These aneurysms are generally considered to be benign and less lethal, and there are no clear guidelines for the management of these aneurysms. Treatment ranges from simple follow-up with periodic echocardiographic assessments to surgical intervention. Surgical intervention has been recommended for those with an aneurysm that has a diameter of 60 mm or greater.[7] It was showed that long-term follow-up for several decades is possible in different studies.[4,6,7] One congenital variation of human aortic arch (AA) branching pattern in which the left common carotid artery (LCCA) originates from the BT is called as BAA. Although both BAA and idiopathic PAA have been reported separately in literature, no case has been reported as having both BAA and PAA.

Conclusion

We report the case of a patient with BAA associated with idiopathic PAA and bronchial compression, which was diagnosed by a simple chest radiograph. Since idiopathic PAA is a possible cause of rupture or dissection of pulmonary artery, and cardiac sudden death, it is considered to be in asymptomatic patients as well and needs a multidisciplinary approach for diagnosis and treatment.

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