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A Rare Adult Case of Congenital Heart Disease: Co-presence of Patent Ductus Arteriosus and Postductal Coarctation

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Abstract

Both patent ductus arteriosus and postductal coarctation of the aorta are among the most common congenital heart defects. However, it is extremely rare to have both conditions occur simultaneously. In this report, we present an interesting case in which both patent ductus arteriosus and postductal coarctation occur simultaneously. Other aspects such as embryological background, epidemiology, and clinical complications are also discussed.

Keywords: Aorta, congenital heart disease, ductus arteriosus, pulmonary aneurysm

Introduction

Ductus arteriosus (DA) is an important embryologic structure that is characterized as a shunt between the descending portion of the aorta and the pulmonary artery. In the fetus, the lungs are filled with amniotic fluid and are not capable of oxygenating the blood coming from the heart. Therefore, the fetus receives oxygenated blood from the placenta through the umbilical vein, and DA helps the blood bypass the underdeveloped lungs. Ductus arteriosus normally closes spontaneously 2 or 3 days after birth and permanently closes within 2-3 weeks.[1] Therefore, the persistence of DA after the first few weeks of life is considered abnormal. Patent ductus arteriosus (PDA) is one of the most common congenital heart defects in newborns, representing 5%-10% of all cases.[2] However, if children with "silent" patent ductus (which is discovered accidentally by echocardiography) are considered, the number of incidences can rise as high as 1 in 500. The pathophysiological impact and clinically significance of PDA depend on its size and the pulmo nary–cardiovascular status of the patient.[3]

Coarctation of the aorta (CoA) is a common congenital heart defect, accounting for approximately 6% of all congenital heart disease cases.[4] Postductal coarctation of the aorta (PD-CoA) refers to the narrowing of the descending aorta distally to the insertion of DA. Postductal coarctation restricts blood perfusion to the lower extremities; as a result, there is a difference in systolic blood pressures between the upper and the lower extremities. Patients with PDC typically present with hypertension in the upper extremities and hypotension in the lower

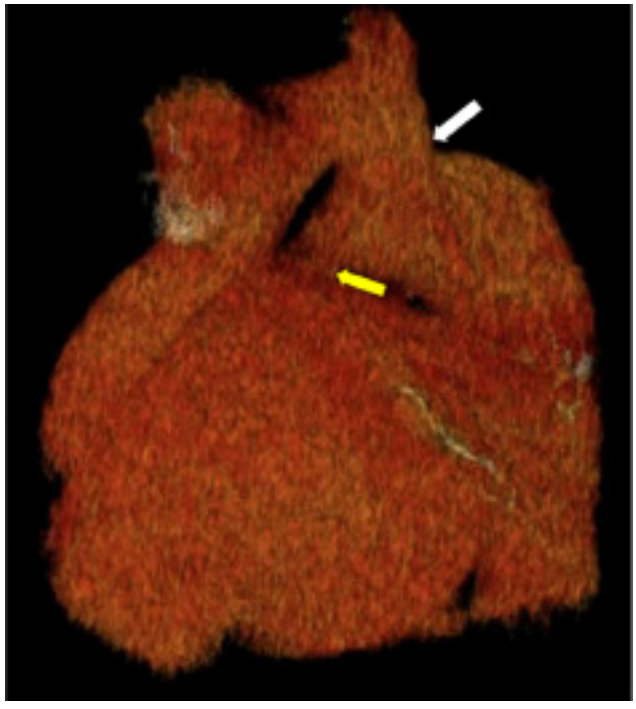

Figure 1. 3D volume-rendered CT image illustrating a patent ductus arteriosus (yellow arrow) and postductal aortic coarctation (white arrow). CT, computed tomography.

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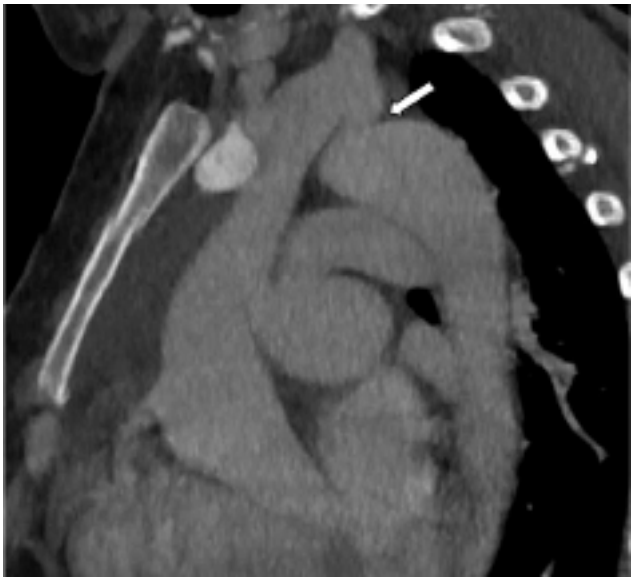

Figure 2. Sagittal CT image demonstrating a postductal aortic coarctation (white arrow). CT, computed tomography.

extremities. Though the pathophysiology of CoA is unknown, in some pediatric patients, it is thought that the tissue from the wall of DA proliferates into the tissue of the aorta at a specific point. When the DA closes, the tissue tightens, and this tissue may also tighten and narrow the aorta.[5] With that being said, it is rarely for PDA and PD-CoA to present at the same time.

In this report, we present an interesting case of co-occurrence of a PDA and a PDC in a 32-year-old male patient. Regurgitation can occur due to the stenosis of the aorta and the presence of a PDA. As a result, pressure builds up in the pulmonary artery and the right ventricle, causing an excessive dilatation of the pulmonary artery, which is also known as pulmonary artery aneurysm (PAA), and right ventricular hypertrophy.

Case Presentation

A 32-year-old male patient presented to our clinic with mental retardation, dyspnea, and chest pain. Computed tomography angiography was utilized as a part of the diagnostic process. Computed tomography angiography of the chest demonstrated various findings including PD-CoA, PDA, and PAA.

Discussion

The co-existence of PDA and PD-CoA is rarely seen (Figure 1). In fact, there have been a few documented case reports of the simultaneous presence of PDA and CoA; however, the position of coarctation was not included in these cases as the paper mainly emphasized the treatment for patients with aortic coarctation associated with PDA.[6] There has only been 1 case report of a patient with large PDA-preductal coarctation of descending thoracic aorta.[7]

Figure 3. Sagittal CT image demonstrating a patent ductus arteriosus (black arrow). CT, computed tomography.

Stenosis of the aorta decreases blood perfusion, causing dilatation of the vessel wall distal to the area of stenosis, and if severe enough, blood can backflow, damaging pre-stenotic structures (Figure 2). Due to the presence of a PDA (Figure 3), blood can flow back to the pulmonary artery. Pressure builds up in the pulmonary artery, leading to the dilatation of the vessel (Figure 4). Furthermore, increased pressure in the pulmonary artery causes the right ventricle to work harder. In

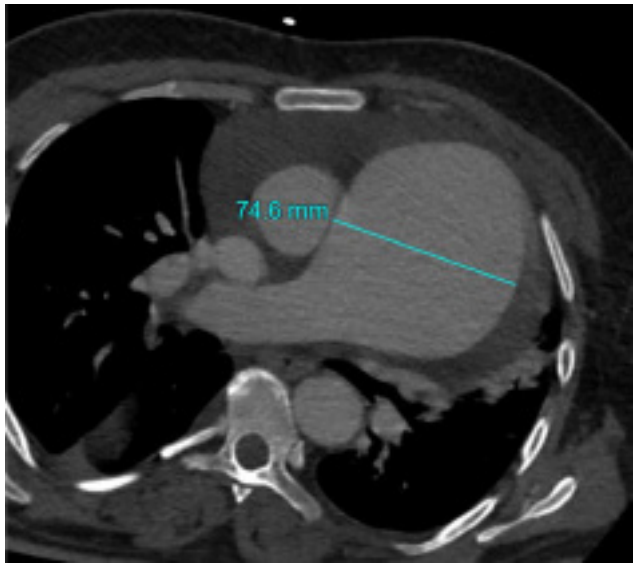

Figure 4. Axial CT image demonstrating a pulmonary artery aneurysm. CT, computed tomography.

Main Points

- Congenital heart diseases
- Patent ductus arteriosus and postductal coarctation of the aorta were simultaneously presented in an adult patient.
- The presence of multiple heart defects leads to pulmonary artery aneurysm and right ventricular hypertrophy.

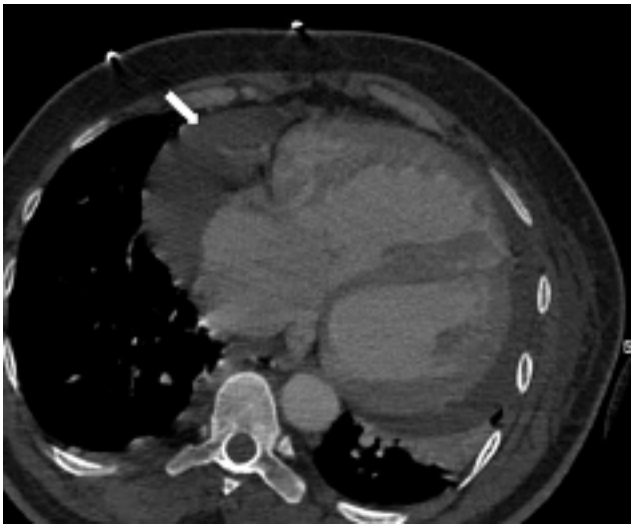

Figure 5. Axial CT image demonstrating an enlarged and hypertrophied right ventricle with flattening of the septum indicative of increased right sided heart pressures. Other findings include a moderate circumferential pericardial effusion (white arrow). CT, computed tomography.

order to compensate for increased pressure, the right ventricle thickens to decrease wall tension; therefore, the right ventricle enlarges as shown in Figure 5. Additionally, the right ventricle is overloaded due to the backflow of blood from the pulmonary artery and the normal, forward blood flow from the right atrium. Increased hydrostatic pressure in the right ventricle may lead to pericardial effusion (indicated in Figure 5), which refers to the accumulation of excess fluid in the pericardial cavity.

The patient undoubtedly presented with dyspnea due to hypoxia. Blood was under-delivered by the descending aorta to the lower extremities and organs. Immediate treatment should be considered to restore regular blood flow for the patient.

Informed Consent: Informed consent is not required for this case report because there is no identifiable patient information.

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