Cardiac Imaging

Diastolic Flow Within the Pulmonary Trunk in Children: Differential Diagnosis

Nikolaos G. Eleftherakis, Athina Vekiou

Department of Pediatric Cardiology, "Agia Sofia" Children's Hospital, Athens, Greece

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Address:
Nikolaos G. Eleftherakis

Department of Pediatric Cardiology
"Agia Sofia" Children's Hospital
Thivon and Papadiamantopoulou St.
115 27 Goudi
Athens, Greece
e-mail: ngeleftherakis@hotmail.com

During the color Doppler echocardiographic examination of children, the occurrence of low velocity diastolic flow within the main pulmonary artery is not rare. Illustrated in the transverse transthoracic axis, at the level of the sinuses of Valsalva, it is directed inwards from the external pulmonary wall and towards the pulmonary valve, nearly perpendicular to the wall (Figure 1A, B).

The anatomic substrate ranges from a primary fistula of a small coronary artery branch that drains into the pulmonary trunk (Figure 1A, B) to an abnormal origin of a significant coronary artery branch from the main pulmonary artery (Figure 2A & Figure 3). The flow in the latter case is caused as follows. The abnormal coronary artery has multiple connections with normal coronaries, which supply the myocardial territory it feeds. Simultaneously, there is a reflux of blood to the pulmonary artery because the diastolic pulmonary pressure is less than the pressure in the coronary arteries.

The clinical significance of this flow ranges widely. It is clinically insignificant in the case of a fistula, but in case of an abnormal coronary artery origin it usually requires immediate surgical repair.[1] Some asymptomatic children we studied exhibited a small communication through a fistula between the coronaries and the main pulmonary artery (solitary vessel or convoluted vessels with aneurysm formation). The coronary arteries were not dilated (Figure 1C, D) and needed no further intervention.[2]

In two symptomatic children we found an abnormal coronary artery origin from the main pulmonary artery. The first, with abnormal origin of the left main coronary artery, was five months old with tachypnea, a dilated and poorly functioning left ventricle (Figure 2B) on the echocardiogram, and Q waves in aVL and the left precordial leads (Figure 2C) on the resting electrocardiogram. The second was a boy aged 10 years with chest pain (Figure 3) and anomalous origin of the left anterior descending artery. There was an extensive collateral network from the circumflex (Figure 4A, B) and right coronary arteries (Figure 4C, D) to the anterior descending artery.

References

1. Isomatsu Y, Imai Y, Shin'oka T, Aoki M, Iwata Y. Surgical intervention for anomalous origin of the left coronary artery from the pulmonary artery: the Tokyo experience. J Thorac Cardiovasc Surg. 2001; 121: 792-797.
2. Said SA, Landman GH. Coronary-pulmonary fistula: long-term follow-up in operated and non-operated patients. Int J Cardiol. 1990; 27: 203-210.

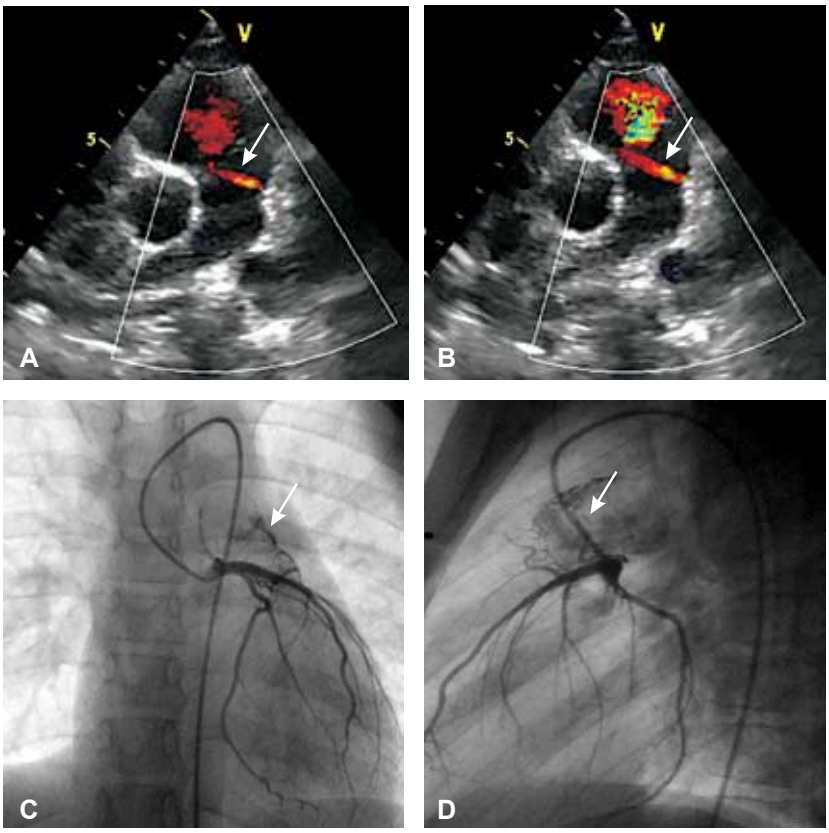

Figure 1. Color Doppler diastolic flow in the main pulmonary artery (arrow) in early (A) and mid (B) diastole. Pulmonary end of the fistula (arrow) between a branch of the left anterior descending artery and pulmonary trunk in anteroposterior (C) and lateral (D) view.

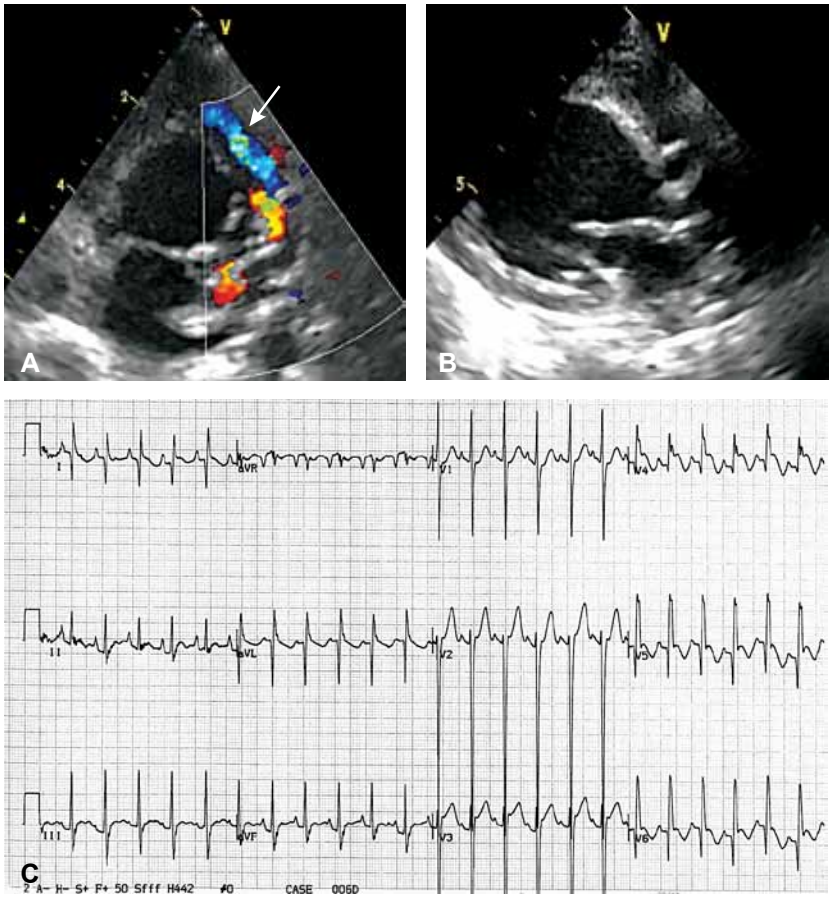

Figure 2. Color Doppler diastolic flow in the main pulmonary artery (arrow) in a five -month-old infant (A) with cardiac failure and dilated left ventricle (B). Resting electrocardiogram with Q waves in leads aVL, V_4, V_5, and V_6 (c).

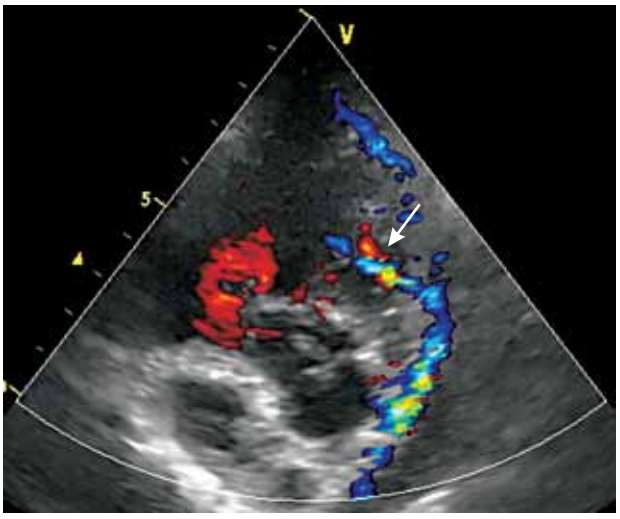

Figure 3. Color Doppler diastolic flow in the main pulmonary artery (arrow) in a boy aged ten with chest pain on exertion.

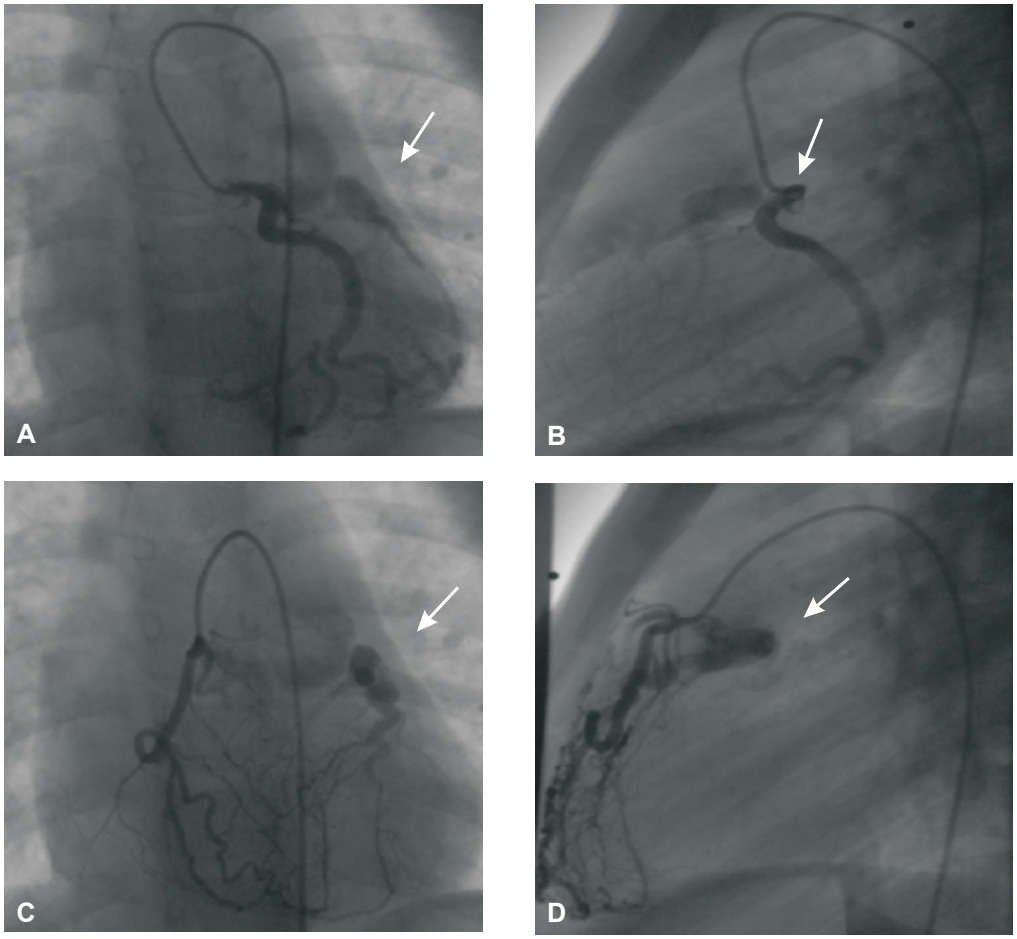

Figure 4. Anomalous origin of the left anterior descending artery from the pulmonary artery in the boy of Figure 3. Angiogram of the left coronary artery in anteroposterior (A) and lateral (B) view. Angiogram of the right coronary artery in anteroposterior (C) and lateral (D) view. There is an extensive collateral network with the anomalous coronary artery and retrograde flow in the pulmonary artery.