Acquired origin of the left anterior descending coronary artery from the pulmonary artery: A complication of the arterial switch operation

Levent Saltik, Safa Baris[1], Isa Ozyilmaz, Ayse Güler Eroğlu
Departments of Pediatrics, Pediatric Cardiology, Cerrahpasa Faculty of Medicine, Istanbul University, [1]Pediatrics, School of Medicine, Marmara University, Turkey

ABSTRACT

The prevalence of coronary anomalies in the transposition of the great arteries is high. Transfer of the coronary arteries during arterial switch operation is the principle step and incomplete transport of the coronary arteries to the neoaortic root results into iatrogenic coronary problems. We present a case with the residual left anterior descending coronary artery originating from the pulmonary artery as a complication of the failure of transfer during the arterial switch operation.

Keywords: Arterial switch, coronary anomalies, transposition of the great arteries

INTRODUCTION

The transposition of the great arteries is the most common cyanotic heart disease in newborns.[1] The transfer of the coronary arteries during arterial switch operation is the principal step; the long-term morbidity and mortality of this operation depend on the status of the coronary perfusion, and coronary obstruction is an important cause of death.[2] However, severe coronary artery lesions may occur in asymptomatic patients, and unfortunately, many noninvasive tests are not sensitive enough to show stenosis or occlusion. This may be related to retrograde perfusion from collateral arteries which protect the myocardium.[2] We present an asymptomatic patient with a left anterior descending coronary artery originating from the pulmonary artery as a complication of incomplete transport during the arterial switch operation.

CASE REPORT

A 16 year old post-operative, asymptomatic boy was undergoing cardiovascular evaluation. The patient had undergone arterial switch operation at 4 months of life for transposition of the great arteries, ventricular septal defect, and pulmonary hypertension and was discharged without any problem. Following the arterial switch operation, he had been followed up with no symptoms until when an echocardiographic examination at 5 years of age revealed mild-to-moderate aortic valve insufficiency and a flow disturbance in the interventricular septum. Cardiac catheterization and angiography demonstrated that the left circumflex artery was arising from the right coronary artery and the left anterior descending coronary artery from the pulmonary artery which accompanied abundant intramyocardial collaterals [Figures 1 and 2]. When we reviewed the details of surgery, we noticed that the single coronary artery was transported to the neoaortic root, whereas the small conal artery was not transported because of technical difficulty (possibly this was the left anterior descending artery). The child was reevaluated at 15 years of age, after an irregular follow-up period, during which he had no symptoms. His electrocardiogram was normal, with no change in the ST-T segment. We performed thallium scintigraphy which revealed no myocardial ischemia. Repeat coronary angiography revealed mild-to-moderate aortic valve insufficiency and stenosis of the pulmonary bifurcation similar to the previous examination. Because of the high risk of sudden death, surgical intervention was planned.

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DISCUSSION

Coronary events after arterial switch operation are

Address for correspondence: Dr. Safa Baris, Department of Pediatrics, School of Medicine, Marmara University, Tophanelioğlu Cad. No. 13-15, Altunizade 34660, Istanbul, Turkey. E-mail: safabaris@hotmail.com

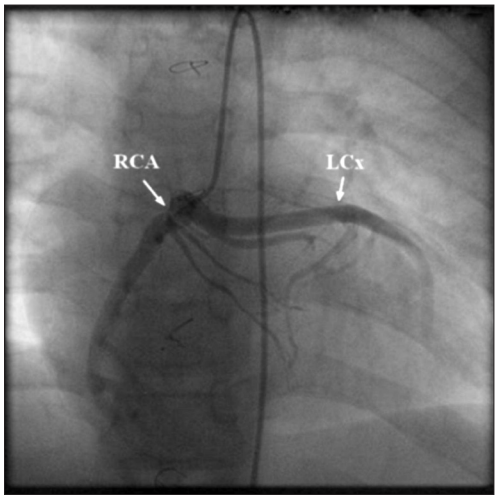

Figure 1: Selective right coronary angiography, early phase, the left circumflex artery (LCx) originating from the right coronary artery (RCA)

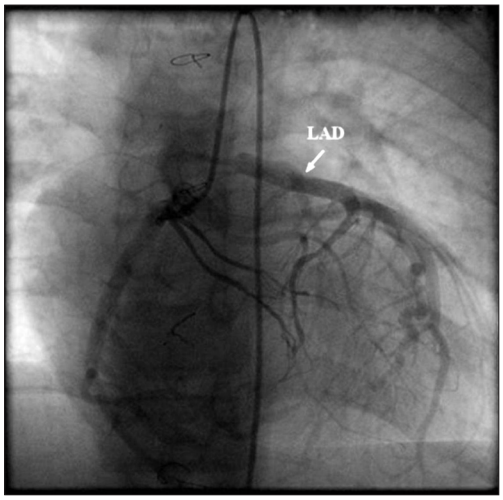

Figure 2: Late phase of contrast injection to the right coronary artery demonstrated retrograde filling of the left anterior descending coronary artery (LAD) via intramyocardial collaterals and shunting to pulmonary artery

not uncommon and may cause late death; patients should be followed up and screened at regular periods. Conventional angiography and multislice computed tomography should be widely performed in this patient group.[3,4] Imperfect or incomplete transfer of the coronary arteries to the neoaorta is related with severe ischemic changes and acute or subacute cardiac failure. Our patient, in spite of incomplete transfer of coronary artery, was asymptomatic due to the development of intramyocardial collaterals originating from the aortic region leading to retrograde perfusion and steal into the neopulmonary region.

Anomalous origin of the left anterior descending artery from the pulmonary artery is very rare. There are several reports on the isolated left anterior descending artery originating from the pulmonary artery, but to our knowledge this is the first case report associated with arterial switch operation. The anomaly is usually found in adulthood, and may be clinically asymptomatic due to adequate collateral circulation or symptomatic secondary to myocardial ischemia.[4,5] Isolated left anterior descending arterial anomalies from the pulmonary artery require surgical treatment because of the sudden death risks.[6] However, treatment options for asymptomatic patients are unclear because of the rarity. Possible surgical treatment options might include ligation of the LAD artery ostium and performing aortocoronary bypass graft or transferred LAD (without tension) back to the neoaorta.[7]

We learn from this case that patients with the transposition of the great arteries who underwent arterial switch operation should be evaluated carefully for any acquired coronary anomalies associated with arterial switch operation. The anomalous origin of the left anterior descending artery from the pulmonary artery may potentially lead to sudden death which warrants consideration of the surgical correction in high-risk subjects.

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