Cardiology in the Young

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Percutaneous device closure of hemodynamically significant coronary fistula following endomyocardial biopsy in a pediatric heart transplant patient

Stephen T. Dalby[1,2] and Michael J. Angtuaco[1]

[1]Department of Pediatrics, University of Arkansas for Medical Sciences and Arkansas Children's Research Institute, Little Rock, AR, USA and [2]Department of Pediatrics, University of California San Diego, Rady Children's Hospital, San Diego, CA, USA

Brief Report

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Corresponding author: S. Dalby;
Email: SDalby@RCHSD.org

Abstract

Coronary artery fistula is a rare but well-documented complication of right ventricular endomyocardial biopsy, particularly in the adult population. Typically, these fistulae never reach clinical or hemodynamic significance, but some may cause coronary steal and ventricular dysfunction. We report a case of a significant coronary artery fistula requiring device closure in the cardiac catheterization laboratory with subsequent improvement of clinical symptoms and cardiac function.

Clinical case

A 17-year-old patient presented to the cardiac catheterization laboratory for routine catheterization and right ventricular endomyocardial biopsy after undergoing orthotopic heart transplant as an infant secondary to failed stage I palliation for hypoplastic left heart syndrome. She had been diagnosed with a small coronary artery fistula from the left anterior descending coronary artery to the right ventricle following right ventricular endomyocardial biopsy three years prior and reported a six-month history of new-onset exercise intolerance and substernal chest pain with exercise. Echocardiogram demonstrated persistent coronary artery fistula, left coronary artery and biventricular dilation, and echo-brightness of the anterolateral papillary muscle suggestive of myocardial ischemia in the territory of the left anterior descending (Fig. 1). Angiography demonstrated diffuse dilation of the left main coronary artery and left anterior descending, along with enlargement of the coronary artery fistula (Fig. 2a, b). Despite the absence of a detectable left to right shunt by oximetry data, she had significant elevation of the left ventricular end-diastolic pressure to 17 mmHg. Newly elevated filling pressures along with symptoms and echocardiographic findings suggestive of coronary steal led to the decision to close the fistula percutaneously.

The coronary artery fistula was cannulated retrograde from the femoral artery, and an arteriovenous wire loop was made by advancing a wire through the fistula into the right ventricle and pulmonary artery followed by snaring and externalisation of the wire through the femoral vein sheath. A 4 French Glide catheter was advanced prograde over the wire into the coronary artery fistula. A 6 mm Amplatzer Vascular Plug 4 device (Abbott, Chicago, Illinois) was delivered through the Glide catheter. Angiography following device deployment demonstrated no significant residual shunt through the fistula and no obstruction to the normal coronary flow (Fig. 2c, d). Dual antiplatelet therapy was initiated for coronary prophylaxis. She subsequently had resolution of symptoms and repeat catheterization one year later demonstrated normalization of left ventricular diastolic pressure to 10 mmHg with no residual shunt through the device. Additionally, follow-up echocardiograms demonstrated normalization of ventricular size.

Discussion

Coronary artery fistula following right ventricular endomyocardial biopsy has been well described in the literature. While there are no current major guidelines, management is typically conservative as these fistulae will often either close spontaneously or fail to reach hemodynamic significance.[1] In extreme cases, the fistulae can become haemodynamically significant[2] or even cause myocardial ischaemia from coronary steal.[3] Our case highlights the importance of following these patients closely with diligent investigation of new symptoms. Percutaneous closure of hemodynamically significant coronary artery fistula remains a reasonable treatment option in these rarely encountered circumstances.

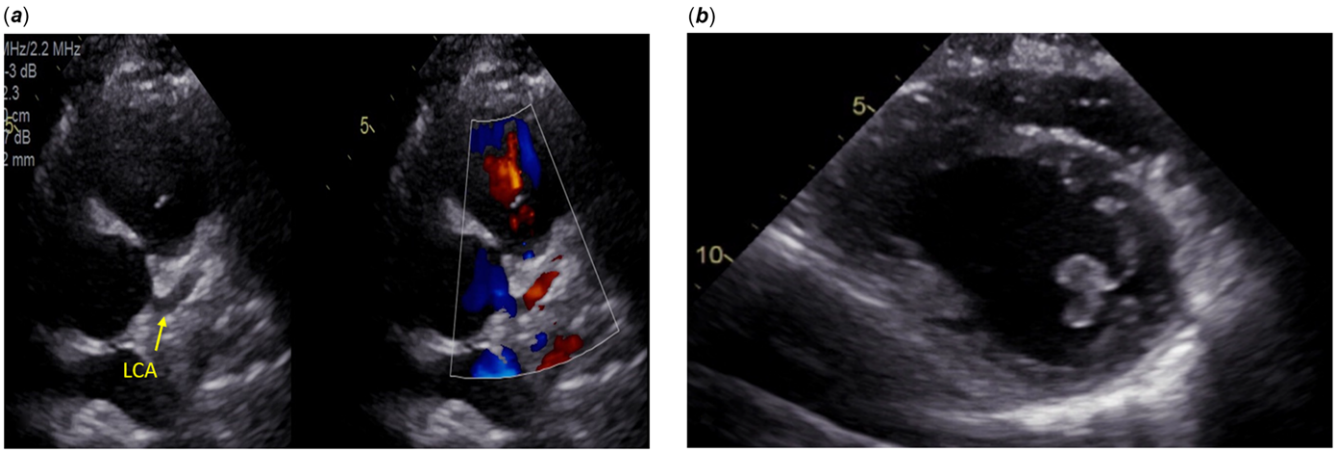

Figure 1. Echocardiographic findings: ***a***) colour compare image of the dilated left main coronary artery and left anterior descending, ***b***) short axis image of dilated left ventricle and echo-bright anterolateral papillary muscle.

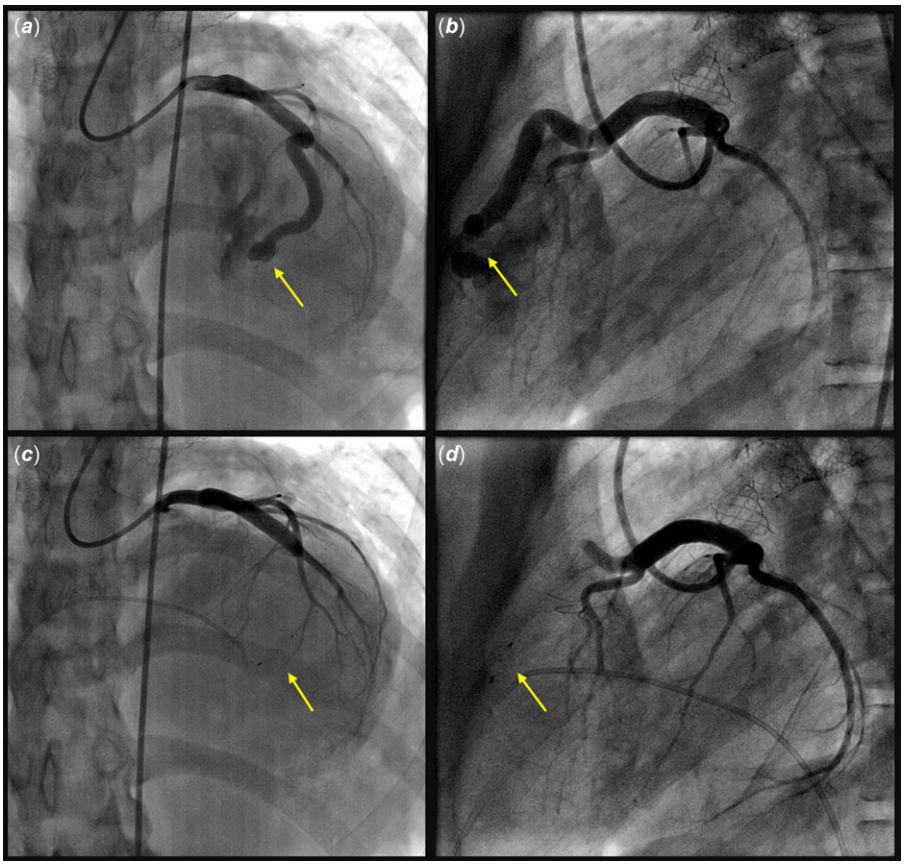

Figure 2. Angiographic findings: ***a***,***b***) selective angiography of left coronary artery prior to device deployment demonstrates dilated left main and left anterior descending coronary arteries with a large fistulous connection (yellow arrows) to the right ventricle in AP and lateral projections; ***c***,***d***) following device deployment (yellow arrows), there is no residual flow through the fistula and no obstruction to coronary flow.

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Competing interests. None.

Ethical standard. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national guidelines on human experimentation (please name) and with the Helsinki Declaration of 1975, as revised in 2008, and have been approved by the institutional committee.

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