CASE REPORTS

Echocardiographic Detection of Coronary Artery Fistula into the Pulmonary Artery

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A rare case of left coronary artery–pulmonary artery fistula is reported. Transoesophageal echocardiography was capable of precisely demonstrating the origin, the course and the drainage site of the fistula. In contrast, transthoracic echocardiography could visualise a drainage flow in the pulmonary artery only. In conclusion, transoesophageal echocardiography may be helpful in the diagnosis or exclusion of the form of coronary artery fistula.

Introduction

Coronary artery fistula is an abnormal communication between a coronary artery and a cardiac chamber, great vessel, or other vascular structure[1]. Clinical diagnosis of coronary artery fistula can be made occasionally by detecting a continuous heart murmur in the upper precordial area. The presence of the fistula is usually identified by angiography. With advances in echocardiography, especially transoesophageal echocardiography, the diagnosis of coronary artery fistula could be made non-invasively with identification of the fistula from its origin through its course to the site of drainage. We report here an adult patient with left coronary artery–pulmonary artery fistula in whom transthoracic echocardiography imaged only the abnormal flow of the drainage in the pulmonary artery, but transoesophageal echocardiography was capable of precisely demonstrating the origin, the course and the drainage site of the fistula. The left coronary artery–pulmonary artery fistula was confirmed by coronary angiography and occluded successfully by transcatheter coil embolization.

Case Report

A 51-year-old male was admitted to our hospital because of palpitations and dyspnoea. No definite murmur was detected in the upper precordial area on auscultation. Chest X-ray film, electrocardiogram (ECG) and bicycle exercise test were normal.

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Transoesophageal echocardiography was performed using a Power Vision 7000 ultrasound unit (Toshiba Corp., Tochigi, Japan) and a 5 MHz multiplane transoesophageal transducer. As the array was steered to 75° at the middle oesophageal level, a diastolic turbulent flow from the aortic side draining into the main pulmonary artery at approximately 1.5–3 cm above the pulmonary valve became visible. Pulsed wave Doppler
demonstrated the abnormal flow occurring during diastole only. When the array steered to 15° at the same level, it was demonstrated that the abnormal turbulent flow was connected with the left anterior descending coronary artery. The left main coronary artery was not dilated (Fig. 1).

Cardiac catheterization detailed no oxygen step-up and normal pulmonary pressures. Left ventricular angiography was normal and coronary angiography revealed no obstructive coronary lesions. A fistula that originated from left anterior descending coronary artery and drained into the main pulmonary artery was detected (Fig. 2). A 2–3 mm fibred platinum coil (Target Therapeutics, Boston Scientific Corp., Massachusetts, U.S.A.) was deployed in order to occlude the fistula. After placement of the coil, angiography demonstrated no residual flow into the pulmonary artery. The patient had no symptoms and was discharged from the hospital.

Discussion

Coronary artery fistula is an infrequent abnormality. The overall population incidence of coronary artery fistula is estimated as 0·002%. It occurs as an incidental finding in 0·1%–0·2% of the coronary angiograms[3–4]. Most instances of coronary artery fistula are congenital. It may develop when enlargement of the capillary network occurs during the embryogenesis of coronary circulation or when the main coronary arteries remained attached to the pulmonary trunk at the time of their separation[5]. On the other hand, coronary artery fistula may occur as an extremely rare acquired form, such as external thoracic trauma[6], myocardial infarction and iatrogenic trauma[7,8].

The majority of coronary artery fistula were related to the right coronary artery, and most of the fistula communicated with a right cardiac chamber. Drainage to the pulmonary artery is a relatively unusual variant accounting for 17% of the total in a review of 363 cases[9].

Coronary angiography has traditionally been used to diagnose coronary artery fistula. With the advent of high-resolution two-dimensional and colour Doppler echocardiography, the accurate detection of coronary artery fistula has increased[10], but remains a rare diagnosis. The transthoracic acoustic window in adults is occasionally too poor to allow precise determination. Thus, as it was in the case of our patient, there may be little use in establishing the origin and the course of coronary artery fistula if there is no dilation in the proximal coronary artery. Transoesophageal echocardiography is capable of more reliably assessing the anomaly of coronary artery fistula than transthoracic echocardiography. Coronary artery–pulmonary fistula usually causes continuous turbulent flow in the pulmonary artery, which can be nicely imaged during diastole. It is more difficult to identify the origin of the turbulent flow. The decision criterion for the identification of the origin is proof of diastolic flow by Doppler, since systolic flow is superimposed by right ventricular ejection. When a haemodynamically important coronary artery fistula is demonstrated, embolization with detachable balloon or coil should be considered the method of choice.

In conclusion, multiplane transoesophageal echocardiography is superior to transthoracic echocardiography in detection of coronary artery fistula and mandatory for an accurate differential diagnosis. It can be considered a first-line diagnostic tool for detecting coronary artery fistula.
References


