

Congenital Fistula between the Left Internal Mammary Artery (LIMA) and the Pulmonary Artery: Cause of LIMA Bypass Occlusion?

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ABSTRACT

Congenital fistulas from the left internal mammary artery to the pulmonary artery are rare. We describe a 49-year-old patient with severe aortic valve regurgitation and coronary artery disease. Percutaneous transluminal coronary angioplasty and left anterior descending artery (LAD) stenting had been performed because of a significant proximal LAD lesion. Repeated coronary angiogram 3 months later revealed a patent stent but severe sclerosis up to a 40% stenosis of the LAD after the area of stenting. An aortic valve replacement and a left internal mammary artery (LIMA) bypass to LAD were performed during standard cardiopulmonary bypass (CPB). Because of patient chest pain, a control angiogram was carried out 2 years after surgery and revealed a LIMA-bypass occlusion and a large fistula deriving from the proximal part of the LIMA to the pulmonary artery. The fistula was occluded by coils during an interventional cardiological procedure. Diminished flow in the LIMA bypass due to the fistula in combination with a nonsignificant proximal LAD stenosis are possible reasons for IMA-bypass occlusion. From this case we conclude that angiography of the IMA to detect malformations preoperatively should be mandatory in all cases of arterial coronary revascularization using IMA bypasses.

INTRODUCTION

Angiography of the internal mammary arteries (IMA) prior to coronary artery bypass grafting (CABG) in order to assess suitability of the vessel as a graft is not a standard procedure during diagnostic heart catheterization. Congenital fistulas from the left IMA (LIMA) to the pulmonary artery are rare [Misumi 1998, Ferreira 2002]. If those LIMA are

used for coronary artery bypass, coronary steal may occur and potentially result in bypass occlusion. We describe a patient who developed occlusion of LIMA-to-left anterior descending (LAD) bypass after CABG and aortic valve replacement. A postoperative angiogram revealed a large congenital LIMA-to-pulmonary artery fistula, which was considered a potential reason for the occlusion.

CASE REPORT

We report the case of a 49-year-old male patient with severe aortic valve regurgitation and coronary artery disease. Percutaneous transluminal coronary angioplasty and LAD stenting had been performed because of a significant proximal LAD lesion. Repeated coronary angiogram 3 months later revealed a patent stent but after the area of stenting there was coronary sclerosis with up to a 40% stenosis of the LAD. The patient underwent surgery in normothermia with standard cardiopulmonary bypass (CPB) using a membrane oxygenator and crystalloid cardioplegia. A mechanical aortic valve (Medtronic Hall; Medtronic, Minneapolis, MN, USA) was implanted. Despite nonsignificant stenosis visible in the coronary angiogram, bypass of the LAD with a LIMA graft was planned for prophylactic reasons. After incision, the 2-mm-sized LAD was examined. A 1-mm probe could not be passed through the area of stenosis, and the LAD was bypassed using the LIMA. The operation was carried out without complication during a total CPB time of 75 minutes and aortic cross-clamp time of 66 minutes. Postoperative course was uneventful, and the patient was discharged from the hospital 9 days after surgery. Stress electrocardiogram (ECG) 2 months after surgery showed no signs of myocardial ischemia during 2 minutes of stress up to 100 W. Two years after surgery a control angiogram was performed because the patient suffered from chest pain. It revealed a LIMA bypass occlusion and a large congenital fistula deriving from a proximal side branch of the LIMA running into the pulmonary artery (Figure 1). Diminished flow in the LIMA bypass due to the fistula in combination with a nonsignificant proximal LAD stenosis were possible reasons for early LIMA bypass occlusion. The proximal LIMA was occluded using an 8 F catheter and 2 platine coils (5 mm and 6 mm). Angiography demonstrated a complete proximal LIMA occlusion (Figure 2).

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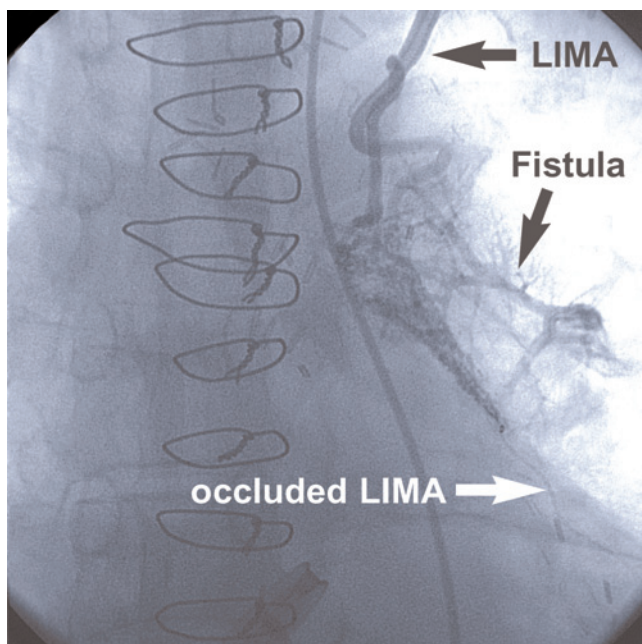


Figure 1. Control angiogram 2 years after surgery showing a left internal mammary artery (LIMA) bypass occlusion and a large fistula deriving from a proximal side branch of the LIMA leading into the pulmonary artery.

DISCUSSION

Congenital fistulas from the LIMA to the pulmonary artery are rare. Only a few cases have been described [Misumi 1998, Musleh 2001, Ferreira 2002]. If LIMA that are affected by congenital fistulas are used for coronary artery bypass, a coronary steal phenomenon may result in bypass occlusion.

There are anecdotal reports of LIMA-to-pulmonary artery fistulas after minimally invasive coronary bypass surgery [Maiello 2002]. However, in our case localization of the fistula was at the very proximal part of the LIMA, which was not dissected during the coronary artery bypass operation. Thus, this fistula appears to be a congenital one.

Fistulas from a LIMA bypass to the pulmonary artery may be the reason for angina due to a coronary steal phenomenon [Madu 2001, Michael 2001, Ferreira 2002]. In our patient no angina was reported during the early postoperative course, and the stress ECG 2 months postoperatively did not demonstrate ischemia. Thus the presence of early LIMA graft occlusion appeared probable.

In our case we planned to bypass the LAD, which appeared insignificantly (40%) stenosed on angiogram, because stenting was performed only 4 months prior to operation, and the rate of restenosis in noncoated stents is reported to be greater than 20% [Walters 2002]. After incision the 2-mm LAD was examined. A 1-mm probe could not be passed through the area of stenosis, indicating a significant stenosis, so the LAD was bypassed using the LIMA.

Different approaches have been described to occlude coronary artery fistulas. Successful repair of a coronary artery-to-pulmonary artery fistula with saccular artery aneurysma and critical stenosis of the LAD coronary artery

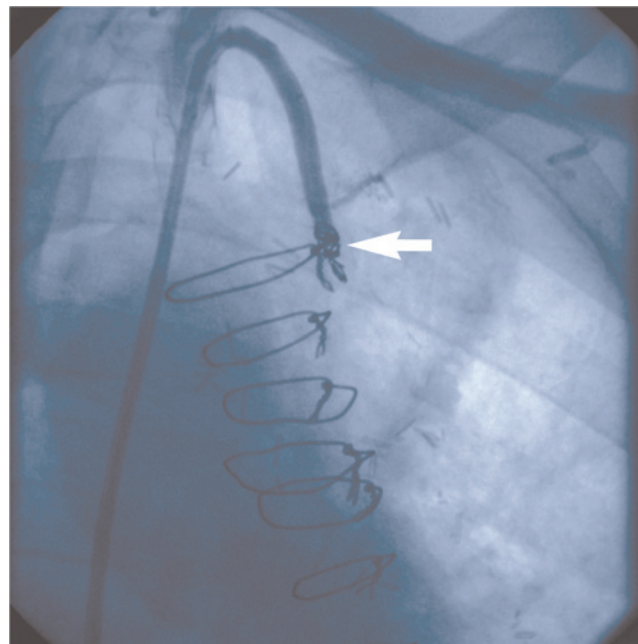


Figure 2. Interventional occlusion of the fistula by coils (arrow).

has been described [Gelsomino 2003]. An elegant method to treat pulmonary steal from the IMA bypass is a transcatheter embolization, which was used in our case [Ishizaka 1995, Eisenhauer 1998, Michael 2001].

We conclude that a fistula between the LIMA and the pulmonary artery is a rare congenital defect that may cause a LIMA bypass occlusion. Therefore, to detect malformations preoperatively, angiography of the IMAs should be mandatory in all cases of coronary revascularization using IMA bypasses.

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