Competitive flow between a vein and an arterial graft at transit-time flow measurement

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Abstract

We report the intraoperative finding, at a transit-time flow measurement, of competitive flow between a venous and an arterial graft in a 72-year old woman who underwent uncomplicated coronary artery bypass grafting × 3. The blood flow in the left internal mammary artery (LIMA) improved only after temporary occlusion of the saphenous vein graft (SVG) anastomosed to the first diagonal (D1), demonstrating the presence of competitive flow from the SVG-D1 anastomosis into the LIMA–left anterior descending coronary artery (LAD) system. Interestingly the two target vessels suffered from separate critical lesions. The patient's haemodynamics remained stable throughout and no further action was taken. Her recovery was uneventful and the patient was discharged home on postoperative day 6. This case raised questions about the cost benefit of grafting a diagonal target even when it appeared to be disconnected from the LAD on a coronary angiogram.

Keywords: Coronary artery bypass grafts · Arterial graft · Venous graft · Coronary collateral blood flow

INTRODUCTION

In the setting of coronary artery bypass grafting (CABG), competitive flow from the native vessel or from another graft can jeopardize the left internal mammary artery (LIMA) graft flow and lead to early arterial graft failure [1]. The aim of this report is to describe the intraoperative phenomenon of competitive flow at transit-time flow measurement (TTFM) between two vascular grafts anastomosed to two different critical left-sided target vessels.

CASE REPORT

We present a 72-year-old woman who underwent uncomplicated CABG × 3. The conduits of choice were the LIMA anastomosed to the left anterior descending coronary artery (LAD) and a long saphenous vein graft (SVG) sequentially sewn to the posterior descending coronary artery (PDA) and the first diagonal (D1). After weaning from cardiopulmonary bypass and protamine administration, the TTFM showed an excellent flow in the sequential vein graft (Fig. 1A) but a poor flow in the LIMA with a dumped wave (Fig. 1B). Temporary occlusion of the distal part of the vein graft, i.e. between the D1 and PDA anastomosis, did not have any benefit on the LIMA flow pattern. The blood flow in the LIMA became excellent with a normal wave shape only after temporary occlusion of the proximal part of the SVG (Fig. 1C), demonstrating the presence of competitive flow from the SVG-D1 anastomosis into the LIMA-LAD system. Interestingly, the LAD and the D1 target suffered from two different critical lesions on a coronary angiogram.
angiogram (Fig. 2, white arrows) and the grafts were placed below them (Fig. 2, white circle). The patient’s haemodynamics remained stable throughout. After a discussion, we decided not to take any further action and the patient was transferred to the intensive care unit. Her recovery was uneventful and the patient was discharged home on postoperative day 6.

**DISCUSSION**

An intraoperative graft flow assessment after CABG with a TTFM has been recommended by the joint 2010 European Association for Cardio-Thoracic Surgery (EACTS) and European Society of Cardiology (ESC) guidelines on myocardial revascularization [2]. In our unit, we routinely assess the performance of grafts after CABG. In this particular case, we recorded the presence of competitive flow from a vein into the LIMA graft. Although the presence of competitive flow is not a sign of graft failure, it can jeopardize the long-term durability of the LIMA graft [1,3,4]. In fact, Kawamura et al. [3] showed that the long-term patency of the LIMA–LAD bypass can be impaired by the presence of competitive flow from a patent vein graft anastomosed to a left-side coronary artery. However, in their work, they reported a cumulative graft patency rate of the LIMA to LAD bypass of 98.6% at 5 years in patients who had a severe (> =76%) native coronary stenosis between the two anastomotic sites. The patency rate became worse, at 82.3%, only in patients without severe stenosis between the two left-sided anastomotic sites (P < 0.0001). Similarly Kolozsvari et al. [4], in a series of 105 patients who underwent CABG, studied the effect of competitive flow on diffuse involution of the LIMA graft (string sign). They concluded that the most common cause for the development of the string sign in the LIMA graft secondary to competitive flow was the over-assessment of the lesion of the LAD or of another target vessel. In our case, on the other hand, the two lesions on the native vessels (LAD and D1) were critical (>75%) on the coronary angiogram (Fig. 2). Nevertheless, we recorded significant competitive flow at a TTFM in the LIMA from the SVG on D1 (Fig. 1). This case raised questions about the cost benefit of grafting a diagonal target even when it appeared to be disconnected from the LAD on the coronary angiogram.

**REFERENCES**


