Case study

Spontaneous Recanalization of an Occluded Left Internal Mammary Graft After Documented Atresia

Abstract

An internal mammary graft atresia after CABG surgery is a well-known complication which could be related to competitive flow in the grafted artery. Spontaneous recanalization of a previously occluded LIMA graft is an extremely rare phenomenon. We describe a patient in whom the LIMA was occluded 2.5 years after CABG surgery, but was found to be completely patent 10 years later, probably due disease progression in the native grafted vessel.

Keywords: internal mammary graft, coronary bypass graft occlusion, coronary bypass graft recanalization

Learning Objective

Spontaneous recanalization of an atretic mammary graft may be observed as long as 10 years after its documented occlusion. While graft degeneration is usually related to competitive flow, its spontaneous return may be explained by disease progression in the grafted vessel.

Introduction

Internal mammary arteries (IMA) are the grafts of choice for coronary artery bypass (CABG) because they are generally free of atherosclerosis and they have high patency rates compared with venous grafts [1]. While IMA atresia is a well-known complication post CABG surgery [2,3], spontaneous patency restoration of an occluded IMA graft is an extremely rare phenomenon. We report a patient in whom the left internal mammary graft (LIMA) was occluded 2.5 years after CABG surgery, but was found to be completely patent 10 years later.

Case Report

A 70-year-old woman with a known atherosclerotic cardiovascular disease, hypertension and dibetes melitus was admitted for elective cardiac catheterization as a part of investigation for suspected diastolic heart failure.

Ischemic heart disease was diagnosed 12 years earlier when she was first admitted for unstable angina pectoris. Coronary at angiography (CA) at that time revealed 70% narrowing of the ostial left main coronary artery (LMCA) and a 50-75% narrowing in the mid left anterior descending coronary artery (LAD) segment. In the light of these findings the patient underwent CABG surgery which included a LIMA graft to the

LAD and a free right internal mammary artery (RIMA) graft to the obtuse marginal artery (OM). Sixteen months following the surgery the patient started to experience recurrent angina and therefore underwent another cardiac catheterization. It revealed 75-90% narrowing of the distial LMCA, a patent LIMA graft to LAD and an occluded RIMA graft to OM. Percutaneous coronary intervention (PCI) to the LMCA with a bare-metal stent (BMS) (Driver 4.0/9) was completed successfully aiming to augment the blood flow into the LCX artery.

Fourteen months later the patient underwent repeat coronary angiography for exertional dyspnea which was considered to be anginal equivalent. Total LIMA graft obliteration ("string phenomenon") was demonstrated (Fig. 1), and no additional flow limiting lesions were detected.

Repeat coronary angiography in 2014 revealed similar findings.

Current elective admission in April 2021 for diagnostic cardiac catheterization was related to ongoing effort dyspnea and left ventricular diastolic dysfunction revealed by echocardiography. Her ongoing medication included antiplatelets (clopidogrel), statins and beta blocker, angiotensin receptor antagonist and insulin. The hemodynamic measurements demonstrated moderate pulmonary hypertension (mean arterial pressure of 38 mm Hg) with normal pulmonary vascular resistance and elevated left ventricular end diastolic pressure, consistent with diastolic heart failure, probably attributed to age related myocardial compliance reduction as well as chronic hypertension and ischemic heart disease. Coronary angiography demonstrated a 75-90% mid LAD narrowing while the LIMA graft which was previously shown to be occluded was now patent (Fig. 2).

Discussion

We describe a case of spontaneous recanalization of a LIMA graft 10 years after it was shown to be occluded. Postoperative degeneration of a LIMA graft after CABG surgery is a well-known complication which could be related to competitive flow in the grafted artery [2,3] as well as to an on-going atherosclerotic disease in the native vessel, which has extended to the anastomotic area, or other mechanisms [4] . However only a few reports describe the recanalization of a previously occluded LIMA graft [5-8].

In the presented case the LMCA stenting was performed to improve LCX blood flow since the free RIMA graft to OM had been shown to be occluded; this probably also enhanced the blood flow into the LAD causing competitive haemodynamics with subsequent LIMA degeneration. The recanalization of the LIMA graft which was later observed could probably can be explained by the progressive mid LAD narrowing over the time.

Felot et al described an early postoperative LIMA to LAD occlusion (3 months after surgery) related to progressive narrowing of the LAD segment located distal to the anastomosis which was successfully stented. Repeat angiography performed 4 months later revealed patent a LIMA graft along with proximal LAD narrowing progression and widely patent distal angioplasty site [5].

In the report of Nawaz et al the LIMA graft was shown to be occluded 2 years after CABG surgery, but was found completely patent 5 years later, as a result of worsening native LAD disease [6].

A similar case had been described by Khalid et al showing LIMA graft "return" 9 years after its documented occlusion [7].

Meredith et al described a patient who underwent bypass surgery with a LIMA to LAD graft for an anomalous LMCA originating from the right coronary cusp with retro-pulmonary interarterial course. The LIMA graft was found to be atretic 3 months after surgery. Repeat coronary imaging 7 years later showed recanalization of the previously atretic LIMA probably explained by atherosclerotic plaque progression in the distal LMCA [8].

Similarly to the previously published reports, in the case presented here, LIMA recanalization was related to the progression of native LAD disease; however, the ten-years time interval between the documented occlusion and recanalization is longer compared to the previously published cases.

Conclusion

The case presented here demonstrates that LIMA graft atresia caused by competitive flow can be reversible, while the restoration of its patency is probably related to disease progression in the native grafted vessel.

Ethical Issues Declaration

The authors declare that:

1) the paper is not under consideration elsewhere;
2) none of the paper's contents have been previously published;
3) all authors have read and approved the manuscript;
4) the authors do not have any relationship with industry or other conflict of interest.

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Figure Legends

Fig. 1: Coronary angiography from 2011 showing atretic LIMA graft ("string phenomenon").

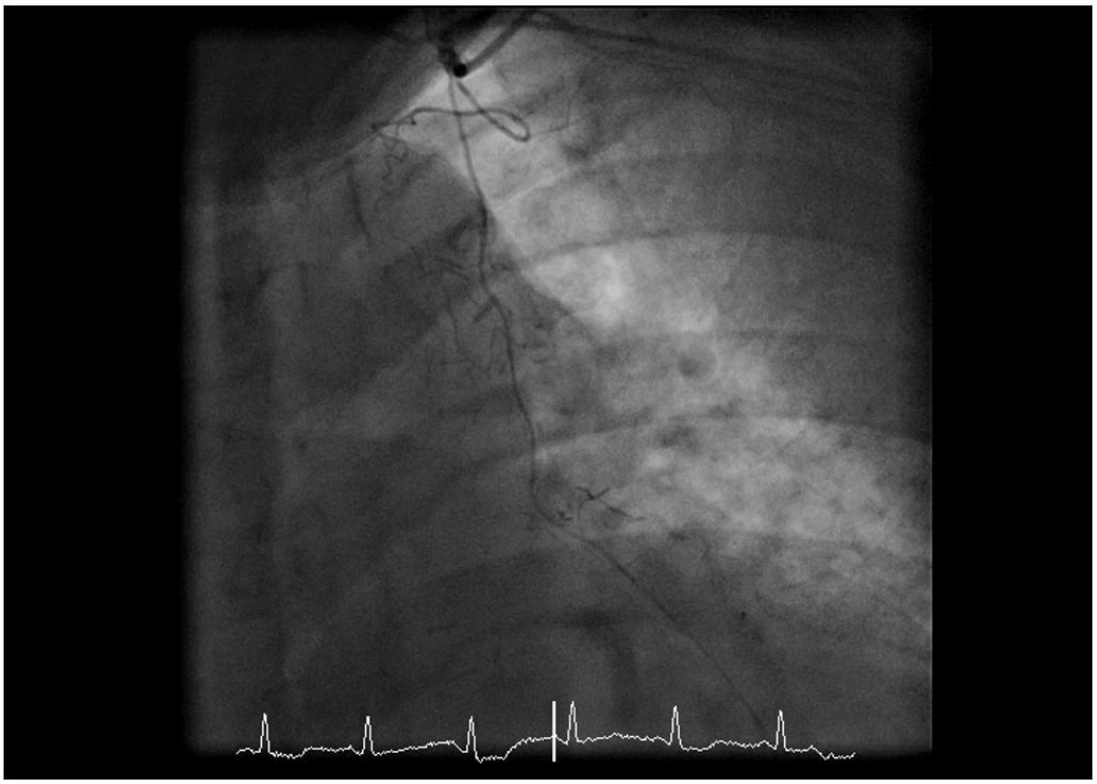

Fig. 2. Coronary angiography from 2021 showing patent LIMA.