Angina Post Coronary Artery Bypass Graft: A Case of LIMA Steal Syndrome

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Abstract

Evaluation and management of angina pectoris can be challenging in patients with previous coronary artery bypass surgery. The underlying causative agents could vary from progressive native disease, graft failure, incomplete vascularization, to patent proximal side branch of left internal mammary artery (LIMA) graft. The LIMA side branches to pectoralis major are common, and interrupted as the LIMA is harvested. Un-ligated LIMA side branches can result in diversion of blood from the myocardium and have been associated with coronary LIMA steal syndrome. The exact mechanism of this LIMA steal syndrome is still not fully understood as many patients remain asymptomatic with large un-ligated side branches. In this case report, LIMA side branch embolization alleviated patient's symptoms along with resolution in regional wall motion abnormality in the LIMA territory suggesting improvement in coronary flow.

Keywords: LIMA Steal Syndrome; Angina Post-CABG; LIMA Branch Interruption; LIMA Branch Embolization

Abbreviations

LIMA: Left Internal Mammary Artery; LAD: Left Anterior Descending Artery; SVG: Saphenous Venous Graft; RCA: Right Coronary Artery; CABG: Coronary Artery Bypass Graft

Introduction

Post-CABG, a substantial run off in large LIMA side branch can compromise flow to the distal internal mammary artery. Such patients should undergo functional studies to determine if LIMA-LAD territory is ischemic.

Case Report

We report this case of a 67 year old gentleman who previously underwent CABG in 2010 which included LIMA to LAD, and SVG to RCA. He presented with exertional angina pectoris progressively worsening despite maximal medical therapy. His stress echocardiogram was positive for inducible ischemia in the anterior wall distribution after 4 minutes and 59 seconds on Bruce protocol, with a peak heart rate of 136 per minute, and peak blood pressure of 190/83 mm of Hg. Subsequently, he underwent cardiac catheterization that showed patent LIMA and SVG grafts, and no native coronary disease progression compared with previous angiogram. A large proximal branch was arising from the LIMA graft supplying the anterior territory. He underwent a successful LIMA branch embolization following which there was no inducible ischemia on stress echocardiogram after 5 minutes of Bruce protocol with peak heart rate of 147 per minute, and peak blood pressure of 212/86 mm of Hg. He has remained asymptomatic in his follow-up with Cardiology team since.

Discussion

The established long-term patency survival rates make LIMA the most preferred for myocardial revascularization [1]. The anomalous or large LIMA side branch has been reported in 10-25% of general population [2], potentially causing steal phenomena if not ligated [3]. Controversy still surrounds the exact mechanism of steal phenomena due to systolic predominant flow pattern of LIMA side branches as apposing to diastolic-to-systolic flow pattern in grafted LIMA (mimicking coronary arterial flow) [4,11] and many patients remain asymptomatic with large un-ligated side branches [12,13]. However, there have been case reports that established improvement in coronary

flow reserve, ejection fraction and improvement in ischemic changes on stress test and radio nucleoside study after coil embolization of the side LIMA branch [5-10,14]. Our case demonstrated angina symptoms with impaired anterior wall motion abnormality in the setting of a patent LIMA-LAD and an anomalous LIMA side branch. Following coil embolization, the symptoms and motion abnormality settled and patient’s functional capacity improved on one and three month follow-ups. These findings support the hypothesis that the LIMA side branches can compromise myocardial perfusion and their interruption can improve perfusion and alleviate symptoms. Coil embolization remains the most popular method [16].

Conclusion
LIMA side branch ligation should be considered as a mean to alleviate symptoms in symptomatic patients post-CABG once other causes have been excluded after. Whether it improves coronary flow remains controversial and needs further elucidated.

Conflict of Interest
No Financial or any conflict of interest exists.

Bibliography


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