

CASE REPORT

Percutaneous management of ostial stenosis of the left internal mammary artery graft

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Abstract

A 61-year-old man, who had undergone coronary artery bypass surgery 10 years earlier, presented with a non-ST segment elevation myocardial infarction. He was treated with medical therapy and taken to the Cardiac Catheterization Laboratory. A left heart catheterization demonstrated an ostial stenosis in the left internal mammary artery graft, which was felt to be the culprit lesion. This was successfully repaired with a drug eluting stent. This case is presented as an unusual location for a de novo coronary stenosis. The pathophysiology of these lesions is not well understood.

INTRODUCTION

When performing coronary artery bypass surgery, the left internal mammary artery (LIMA) remains the favored graft for anastomosis to the left anterior descending artery (LAD) [1]. Lower incidences of atherosclerotic disease as well as better long term patency rates of the left internal mammary artery compared with vein grafts make it the artery of choice [1]. Interestingly, in the rare case that arteriosclerosis develops in this conduit, it almost always occurs either in the body of the vessel or at the distal site of anastomosis. These lesions are commonly repaired percutaneously [2–4]. However, ostial lesions in the internal mammary artery are not well reported and the pathophysiology is not well known. Therefore, management becomes more challenging. It has been suggested that prior catheterization procedures may contribute to vascular trauma and subsequent predisposition to stenosis in this area [5]. While there are case reports of successful angioplasty and

stenting for right internal mammary artery and LIMA, it remains rare [3, 6, 7].

CASE REPORT

A 61-year-old male with a history of hypertension, hyperlipidemia, active smoking and coronary artery bypass grafting (CABG) 10 years prior was admitted to the hospital with substernal chest pain. In the past, his left heart catheterization had revealed multi-vessel coronary artery disease for which revascularization was accomplished via a left internal mammary graft to the LAD artery (LIMA to LAD), saphenous vein graft to the obtuse marginal (SVG to OM), and saphenous vein graft to the right coronary artery (SVG to RCA). He had not experienced angina since the CABG until now. Upon presentation for the current admission, his vital signs were significant for an elevated blood pressure to 203/91, but no signs of cardiac

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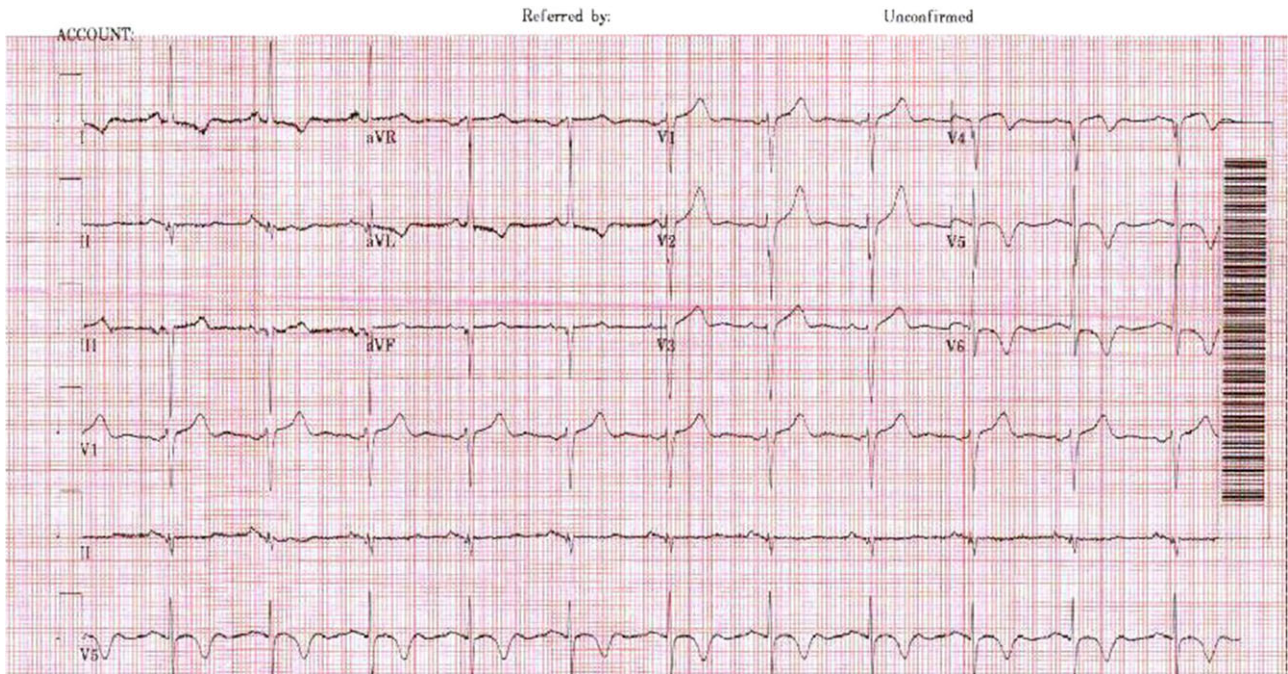


Figure 1: electrocardiogram demonstrating sinus rhythm with left ventricular hypertrophy and a marked repolarization abnormality

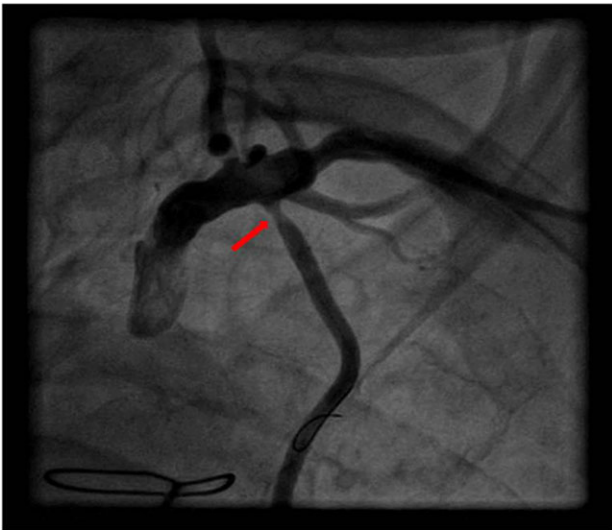


Figure 2: stenosis at the ostium of the left internal mammary artery (arrow)

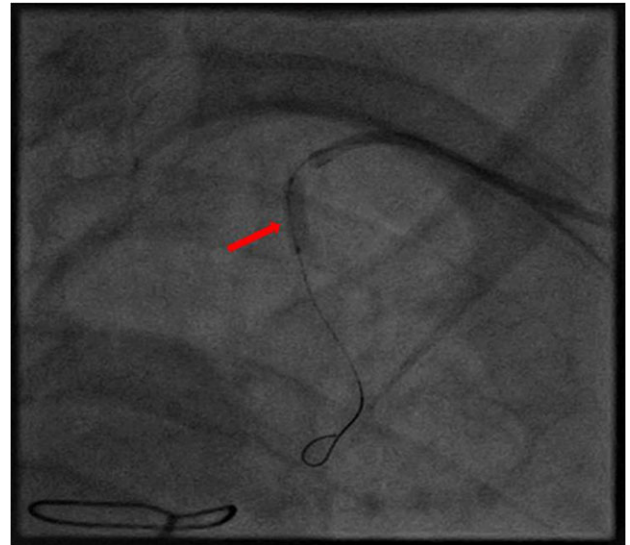


Figure 3: deployment of stent

decompensation. Laboratory findings were significant for a troponin I that peaked at 29.6 (NG/ML). His electrocardiogram demonstrated sinus rhythm with left ventricular hypertrophy and a marked repolarization abnormality (Fig. 1). Based on these findings, he was treated as a non-ST segment elevation myocardial infarction with Aspirin (325 mg), Lisinopril (10 mg), Carvedilol (6.25 mg twice a day), Simvastatin (80 mg), Clopidogrel (600 mg) and intravenous unfractionated Heparin. He was then taken to the catheterization lab the next morning. Coronary angiography revealed an ostial 70% stenosis in the LIMA and a chronic total occlusion of the LAD after the anastomosis which reconstituted via septal collaterals (Fig. 2). The rest of his native coronary arteries and grafts were reported as the following: the left main was occluded, the RCA was small caliber

with diffuse significant luminal narrowing, the SVG to Ramus and OM was patent, there was retrograde filling of distal LCx and the SVG to RCA was occluded. There was no deep engagement of the catheter during the index coronary angiography. Intravascular ultrasound (IVUS) exam of the ostium of LIMA revealed a bulky plaque in the ostium with minimal diameter of 1mm. A DES was then deployed in the ostium of LIMA (Fig. 3) and post-dilated successfully (Fig. 4). Final angiogram showed no edge dissection, distal embolization or perforation. The rest of his hospital course was uneventful and he was discharged without any complications. Upon follow up 4 months after discharge, the patient was reported to be free of angina and doing well from the cardiac standpoint.



Figure 4: widely patent lumen after stenting

DISCUSSION

Percutaneous repair at the origin of the LIMA remains rarely reported [3]. The LIMA's vessel anatomy makes it a good candidate for bypass grafting. Atheromatous lesions are unusual and when compared to saphenous vein grafts, patients who have undergone bypass with the LIMA have improved rates of patency as well as survival [8]. Patency rates of LIMA grafts are reported near 90–95% 10–15 years after CABG [9]. When reported the majority of cases have described lesions that have occurred at sites that are distal rather than proximal. Pathogenesis of lesions that develop at the takeoff of the LIMA as in our patient is unclear. Mechanical manipulation plays a role in more immediate cases of stenosis formation, however to what degree is not known [2, 10].

There is no data at this time to report the incidences of restenosis of this anatomical site, however ostial lesions are best managed percutaneously [10]. A DES strategy is often elected in the repair process. This is in part due to the concept of elastic recoil that occurs at ostial sites, including the LIMA. After balloon dilation, there is both immediate and delayed increased elastic recoil caused by the unique muscle layer distribution of vessel in ostial regions. Compared to non-ostial lesions, this increased recoil can increase the chance of a failed intervention with coronary restenosis. Stents are effective in mitigating this elastic vessel recoil and therefore the intervention of choice. The use of IVUS, as done in this case, is done primarily for optimization of the interventional technique (vessel sizing, stent sizing, diameter and length). IVUS can also influence post dilation strategy and post-stenting to determine adequacy of stent deployment which includes lesion coverage, stent expansion and apposition as well as any edge injury.

More research is required to investigate etiology and prevention of stenosis at ostial sites. Our case serves to highlight reporting of ostial stenosis of the LIMA as well as exemplify successful stenting of this rare anatomical site of occlusion.

CONFLICT OF INTEREST STATEMENT

No conflicts of interest.

FUNDING

No funding was required.

ETHICAL APPROVAL

No ethical approval was required.

CONSENT

We obtained patient informed consent for the presentation of this case.

GUARANTOR

Tanuka Datta is the guarantor of this article.

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