

Occluded mammary graft post-coronary bypass surgery: do we need to look for the second one?

A case report

Sergey Yalonetsky *, Ariel Roguin, Gil Gross, and Rafael Beyar

Interventional Cardiology Unit, Rambam Healthcare Campus, Ha-Alia, Street, Haifa 3109601, Israel

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Background

Anatomic variations of the left internal mammary artery (LIMA) can influence coronary artery bypass surgical technique as well as posing definite difficulties in the interpretation of angiographic findings. We present an unusual anatomic variant of two LIMAs originating from the left subclavian artery discovered post-coronary artery bypass grafting surgery.

Case summary

A 60-year-old man post-LIMA grafting of the left anterior descending (LAD) coronary artery underwent diagnostic cardiac catheterization. Selective angiography revealed occluded LIMA; therefore, it was decided to proceed with percutaneous coronary intervention (PCI) to the occluded native LAD. Once antegrade flow in the LAD was restored, retrograde filling of a vessel corresponding to the previously grafted LIMA was also detected. Additional contrast injection in the left subclavian artery (LSCA) showed a second patent LIMA originating from the distal segment of the LSCA.

Discussion

This patient has an unusual anatomic variant of two LIMAs originating from the LSCA. The proximal rudimentary LIMA was misinterpreted as an occluded arterial graft while the second, well-developed LIMA connected to the LAD had an unusually distal origin and had therefore been overlooked. This anatomical variant should be kept in mind when the internal mammary graft seems to be occluded.

Keywords

Case report • Aberrant LIMA • Occluded LIMA graft • Coronary angioplasty post-CABG

Learning points

- This is the first report describing two internal mammary arteries (IMA) arising from the left subclavian artery.
- This anatomical variant should be kept in mind when IMA graft seems to be occluded.
- Careful angiographic evaluation including haemostatic clips along left internal mammary artery course as well as surgical report review and prior use of computed tomography scan may be warranted for correct delineation of the coronary anatomy post-coronary artery bypass grafting surgery.

Introduction

The internal mammary arteries (IMA) are considered to be the superior conduit in coronary artery bypass grafting (CABG). Anomalies

of an IMA can influence the surgical technique as well as provide definite difficulties in the interpretation of angiographic findings. We present the case of double left internal mammary artery (LIMA) revealed post-CABG surgery.

* Corresponding author: Tel: +972-502062445, Fax: + 972-47774960, Email: s.yalonetsky@rambam.health.gov.il

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Timeline

- 2003 Coronary artery bypass grafting surgery including left internal mammary artery (LIMA) graft to the left anterior descending (LAD) coronary artery.
- 2015 Coronary angiography showed rudimentary LIMA which was misinterpreted as an occluded LIMA graft. After successful percutaneous coronary intervention to the LAD, retrograde filling of the LIMA graft was detected. Repeated angiography showed two LIMAs—the rudimentary one originating from the proximal left subclavian artery segment, and the normal one having an unusually distal origin.
- 2016 Coronary angiography showed occluded native LAD, probably due to competitive flow, and patent LIMA.

Case presentation

A 60-year-old man was referred for elective coronary angiography. His past medical history was remarkable for coronary artery disease. At the age of 53, he was admitted for typical angina and underwent coronary angiography which revealed >90% narrowing in the proximal left anterior descending (LAD) coronary artery segment. No significant narrowing was detected in the other coronary vessels. Following diagnostic coronary angiography surgical LIMA grafting to the LAD was successfully performed. Surgical report described no technical difficulties in the harvesting or anastomosis creation. In 2015, the patient reported recurrent angina. His treadmill exercise test was interpreted as positive in view of exercise related chest pain and 2 mm horizontal ST depression in the left precordial leads. No additional testing for ischaemia or computed tomography (CT) angiography was performed prior to catheterization. The patient underwent diagnostic catheterization via left radial artery. Selective angiography revealed a blind vessel thought to be an occluded LIMA (Figure 1A, [Supplementary material online, Video S1](#)); Native coronary angiography showed total LAD occlusion (Figure 1B) as well as patent

left circumflex and right coronary arteries. Since the LIMA graft was thought to be occluded, percutaneous coronary intervention (PCI) was undertaken to address the occluded native LAD. Once antegrade flow in the LAD was restored, retrograde filling of a vessel corresponding to the previously grafted LIMA was also detected (Figure 1C and [Supplementary material online, Video S2](#)). Additional angiography showed a patent LIMA originating from the distal segment of the LSCA, corresponding to the vessel in which retrograde filling was seen (Figure 1D, [Supplementary material online, Video S3](#)). Finally, non-selective LSCA angiography showed two LIMAs—the rudimentary one originating from the proximal LSCA segment and the normal one having an unusually distal origin ([Supplementary material online, Video S4](#)). On subsequent review, it has been noted that selective angiography of the proximal ('occluded') LIMA also shows non-selective opacification of the second LIMA, originating from the distal LSCA segment and directed towards the heart with metallic clips along its course. The appearance of the first LIMA was not consistent with an atrophied bypass conduit and no haemostatic clips were appreciated along its course ([Supplementary material online, Video S1](#)). A 2-year course of double antiplatelet treatment was recommended on discharge in view of competitive flow which may jeopardize the LIMA graft. We also recommended performing an isotopic scan or dobutamine stress echocardiography to exclude anterior wall ischaemia approximately 6 months after the procedure.

Discussion

This patient has an unusual anatomic variant of two LIMAs originating from the left subclavian artery. The proximal rudimentary LIMA was misinterpreted as an occluded arterial graft while the second, well-developed LIMA connected to the LAD had an unusually distal origin and had therefore been overlooked.

Laterally arising internal thoracic artery is a relatively uncommon finding. It was revealed angiographically by Baurer et al. in just 4 of 262 patients (1.5%) undergoing bypass surgery.¹ In an anatomical study by Henriquez-Pino et al.,² the LIMA arose from the lateral (extrascapular) part of the LSCA in 1% of cases.

Aberrant LIMA origin from the aortic arch³ or from the vertebral artery⁴ has been described. However, we are unaware of any previous

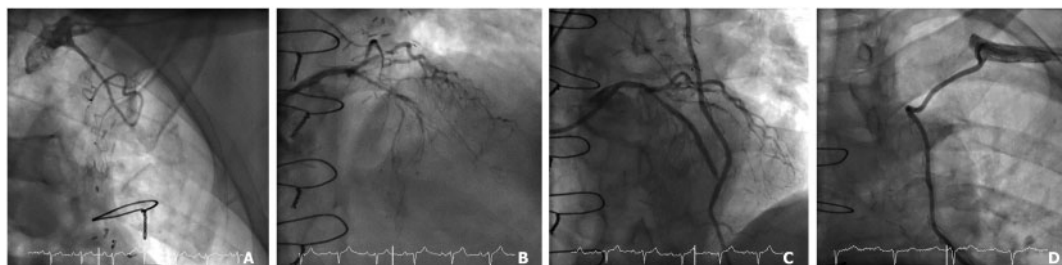


Figure 1 (A) Selective left internal mammary artery angiography, showing rudimentary left internal mammary artery misinterpreted as occluded artery. (B) Selective left coronary artery angiography showing total left anterior descending occlusion. (C) Coronary angiography post-successful percutaneous coronary intervention to left anterior descending, showing normal left anterior descending flow with retrograde filling of the left internal mammary artery. (D) Selective angiography showing second normal left internal mammary artery, originating from the lateral left subclavian artery segment.

report documenting two LIMAs arising from the LSCA. This anatomical variant should be kept in mind when a LIMA graft seems to be occluded. The use of radiological signs for the LIMA course (haemostatic clips), careful operation report review, and CT angiography prior to the coronary angiography may help in correct anatomical delineation post-CABG surgery. In our case, detection of the patent LIMA might have prevented unnecessary PCI to the native LAD.

Conclusion

Additional aberrant LIMA should be excluded by careful review of the radiological findings, surgical report, and cardiac CT scan, in case a normally originating LIMA seems to be occluded.

Lead author biography



Sergey Yalonetsky is a Senior Interventional Cardiologist, the Head of the Grown-up Congenital Heart service, Cardiology Division, Rambam Healthcare Campus, Haifa, Israel. Assistant Clinical Professor, Faculty of Medicine, Technion. A graduate of the Internal Medicine and Cardiology Residency Program at

Rambam Healthcare Campus and the Interventional Cardiology Fellowship at the Sunnybrook Hospital, Toronto, Canada.

Supplementary material

Supplementary material is available at *European Heart Journal - Case Reports* online.

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as [Supplementary data](#).

Conflict of interest: none declared.

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