

Iatrogenic Dissection of the Left Subclavian Artery Threatening Occlusion of LIMA to LAD. Two Case Reports and Literature Review

Chryssa Simopoulou¹, Anthos Koureas², Ioannis Zittis¹ and Christos Eftychiou^{1*}

¹Cardiology Department, Nicosia General Hospital, Nicosia, Cyprus

²Vascular Surgery Department, Nicosia General Hospital, Nicosia, Cyprus

***Corresponding Author:** Christos Eftychiou, Interventional Cardiologist, Cardiology Department, Nicosia General Hospital, Nicosia, Cyprus.

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Abstract

Dissection of the left subclavian artery during cardiac catheterization is not a frequently reported complication and it usually occurs while engaging the LIMA. In the majority of cases described, an invasive treatment was chosen with excellent outcomes. In this article, we report two cases of iatrogenic dissection of the left subclavian artery threatening occlusion of LIMA to LAD, which were treated with stenting of the artery and discuss its management.

Keywords: LIMA Dissection; Left Subclavian Dissection; Catheter Induced Dissection

Introduction

The need for repeat revascularization in patients with previous Coronary Artery Bypass Grafting (CABG) can sometimes lead to rare and potentially fatal complications, such as the iatrogenic dissection of the left subclavian artery implicating the Left internal mammary artery (LIMA). The available literature is limited, probably because of underreporting. We report two cases of iatrogenic dissection of the subclavian artery involving the LIMA to LAD, which were treated successfully, discuss the relevant implications and review the existing literature.

Case Report

Case 1

The first patient was a 71-year old woman, with a history of atrial fibrillation, non-insulin depended diabetes mellitus, dyslipidemia and heart failure, who underwent CABG (LIMA to LAD, saphenous vein graft to RCA) and mitral valve replacement with a mechanical prosthesis 8 years ago. She presented to our hospital with chest pain, ischemic ECG changes and troponin rise, suggesting a non-ST elevation myocardial infarction (Non-STEMI).

The first cardiac catheterization by right femoral approach revealed a significant stenosis of the Obtuse Marginal (OM) branch and a very proximal tight stenosis of the LIMA. The patient underwent PCI to the OM branch and 2 days later, she had a repeat angiogram by the right femoral artery to attempt a PCI to the ostium of the LIMA to LAD. Attempts to engage the LIMA resulted in a catheter induced dissection of the left subclavian artery with significant impairment of the flow (Figure 1). A hydrophilic 0.035" wire was used to cross the Subclavian and pre-dilatations were performed with an INVATEC balloon 6.0 x 40 mm. Two Biotronik self-expandable stents 8.0 x 40 mm were deployed overlapping and post-dilated with an INVATEC balloon 8.0 x 40 mm with a very good result. The LIMA was engaged with

an IMA catheter and wired with difficulty using a 0.014" Whisper ES hydrophilic guide wire and the help of a 90° angled microcatheter. Direct stenting with a Xience Pro 2.5 x 15 mm was followed by post-dilatation with a NC Mozec 2.5 x 8 mm and a very good overall result (Figure 2 and 3).



Figure 1: Case 1, catheter induced dissection of the left subclavian artery.



Figure 2: Case 1, stenting of the left subclavian and the LIMA.



Figure 3: Case 1, final result.

During her hospitalisation, the patient remained asymptomatic, with a gradual decrease of cardiac biomarkers and after 5 days, she was discharged from the hospital. At a 5-months follow-up as an outpatient, she was free of angina and with no signs of left upper limb ischemia

Case 2

A 71-years old male patient, with a history of coronary artery disease, dyslipidaemia and chronic kidney disease because of polycystic kidneys, who had undergone CABG with LIMA to LAD and SVG to LCx which was known to be occluded, presented to our hospital with palpitations. At the emergency department, episodes of Ventricular Tachycardia (VT) were detected and the patient was admitted at the Coronary Care Unit. During his hospitalisation, he presented multiple episodes of VT and thus, he was referred for left heart catheterisation.

The procedure was performed by the right femoral artery, showing the LIMA supplying well the native LAD, the RCA and the OM branch as well. A large catheter induced dissection of the subclavian artery, which extended to the LIMA and causing a severe narrowing of its ostium with a threatening occlusion was detected (Figure 4). Given the extent of the dissection, we took the decision to stent the left subclavian and the ostium of the LIMA. The LIMA was engaged with an IMA (6F) catheter and the LAD was wired with a BMW guide wire. Predilatations of the ostial LIMA were done with a NC Mozec 2.5 x 15 mm and a NC Mozec 3.5 x 15 mm. The left radial artery was also used to wire the left subclavian artery with a double length 0.035" guide wire and dilate it with an INVATEC balloon 7 mm x 4 cm, an INVATEC 9 mm x 4 cm and an INVATEC 10 mm x 4 cm. The access to LIMA was kept with the IMA catheter and a 0.014" BMW guide wire in the LAD through the right femoral artery while a Biotronik stent 10 mm x 8 cm was deployed in the left subclavian and across the LIMA. The jailed guide wire was removed, and the LIMA was re-engaged with the same IMA catheter from the left radial artery. The LIMA was rewired, and its ostium was predilated with a NC Mozec 3.5 x 15 mm while a Xience Pro 4.0 x 18 mm was deployed with minimal protrusion in the left subclavian. We finished with post-dilatations using a NC Sapphire 4.5 x 15 mm and a very good result (Figure 5).

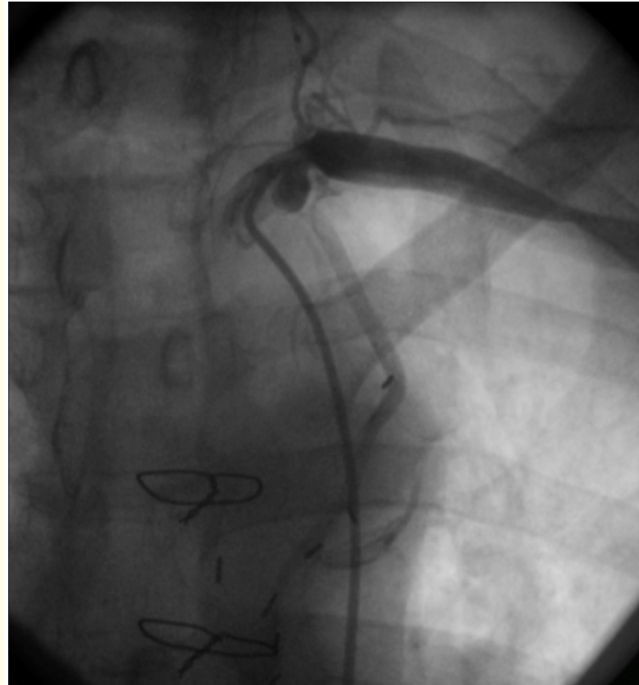


Figure 4: Case 2, catheter induced dissection of the left subclavian artery and the LIMA.



Figure 5: Case 2, final result.

The post-procedural course was uneventful. At 2-years follow-up, the patient remained asymptomatic with no episodes of chest pain and no signs of left upper limb ischemia.

Discussion

The LIMA can be a challenging artery to catheterize because of its anatomy [1]. This has led Kuntz and Baim to recommend a standard cannulation technique for the IMA arteries proposing the use of dedicated IMA catheters preferentially tapered and soft tipped [2]. Iatrogenic dissection of the subclavian artery during cardiac catheterization was first described in 1994 and it can be complicated by dissection of the vertebral artery and the ostial LIMA resulting not only to arm ischemia and neurological distress, but also to myocardial infarction. Obviously, both the extent and the urgency of this complication are associated with the degree of dependence of the coronary circulation on the grafted LIMA [3].

There are only 6 cases described in the existing literature reflecting not only its rarity, but also a possible reluctance to report iatrogenic complications. In 5 out of 6 cases [3-8], the dissection occurred during catheterization by the femoral artery leading Spies et al to suggest the left radial or brachial approach as a safer alternative. However, as described by López-Palop, *et al.* this approach does not eliminate the risk for subclavian artery dissection, but it can suggest one other option for treatment; this of conservative management, with good short to mid-term outcome, as the distal to proximal direction of the dissection can favour its spontaneous healing [7,8].

The use of an intra-aortic balloon pump, was also been suggested in cases of a large area of myocardium depended by the LIMA. However, its use remains questionable when there is fear of impaired flow down the LIMA.

Although catheterization of the LIMA via the femoral artery in patients in whom the vessel has been used as a graft is very common, when catheter-induced dissection of the left subclavian artery occurs, such as in our case, the change to the retrograde approach via the left radial artery should be taken into consideration, as it can ensure an easier access to the true lumen of the vessel, without provoking mechanical extension of the injury and thus, successful stenting of the artery [7].

In addition, as our second patient was treated, when the dissection extents to the ostium of the LIMA and its stenting is necessary, the stent of the LIMA should be protruding in the subclavian artery, as a more certain treatment of the injury at this anatomical site and less likelihood of leaving a part of the flap uncovered threatening the LIMA with occlusion.

Conclusion

The iatrogenic dissection of the subclavian artery during cardiac catheterization can be a very serious complication especially when a patent LIMA to LAD is present. Its treatment should be done invasively and quickly for good long-term outcomes. Both the femoral and radial access may be needed to secure the patency of the vessel while stenting of the ostium of the LIMA is usually needed.

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