Coronary-subclavian steal syndrome in a hemodialysis patient with ipsilateral subclavian artery occlusion and contralateral vertebral artery stenosis "Case Report"

Saim Sağ, Ömer Fatih Nas*, Ömer Bedir, İbrahim Baran, Sümeyye Güllülü, Bahattin Hakyemez*
Departments of Cardiology and *Radiology, Faculty of Medicine, Uludağ University; Bursa-*Turkey*

Introduction

Subclavian artery (SCA) stenosis proximal to the internal mammary artery (IMA) may result in a condition termed as "coronary-subclavian steal syndrome," in which the left IMA (LIMA) bypasses the left anterior descending artery (LAD) (1). We present the case of a patient having end-stage renal failure (ESRF), with a history of coronary artery bypass graft (CABG) surgery, who developed angina during hemodialysis because of an arteriovenous fistula (AVF) in his left forearm. Clinical signs, physical examination findings, and recovery of symptoms after intervention are described.

Case Report

A 62-year-old man with ESRF, with a history of CABG surgery of a LIMA–LAD bypass, was referred to our cardiology department with the complaint of retrosternal angina happening in the course of each hemodialysis session for last 2 months. The patient had undergone bioprosthetic aortic valve replacement for severe degenerative aortic stenosis and single-vessel CABG surgery with a LIMA graft to LAD for 70% stenosis at the ostium of LAD 4 years ago. On physical examination, a low-flow thrill was palpated on his left forearm as a sign of AVF, and a difference of at least 70 mm Hg between systolic blood pressures of

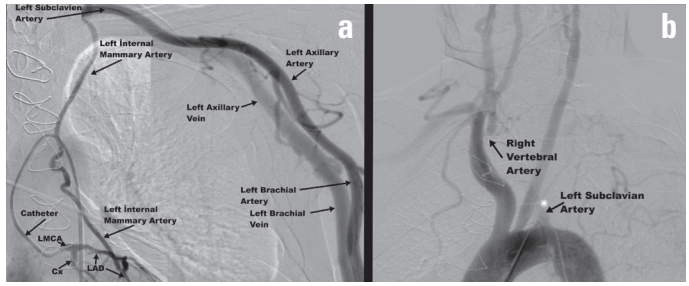

Figure 1. Left coronary angiography revealed the flow in the left brachial and subclavian vein via arteriovenous fistula in the forearm from the LIMA reversed flow (a). An aortography revealed a total occlusion in the left subclavian artery (asterisk) and severe stenosis on the ostium of the right vertebral artery (b)

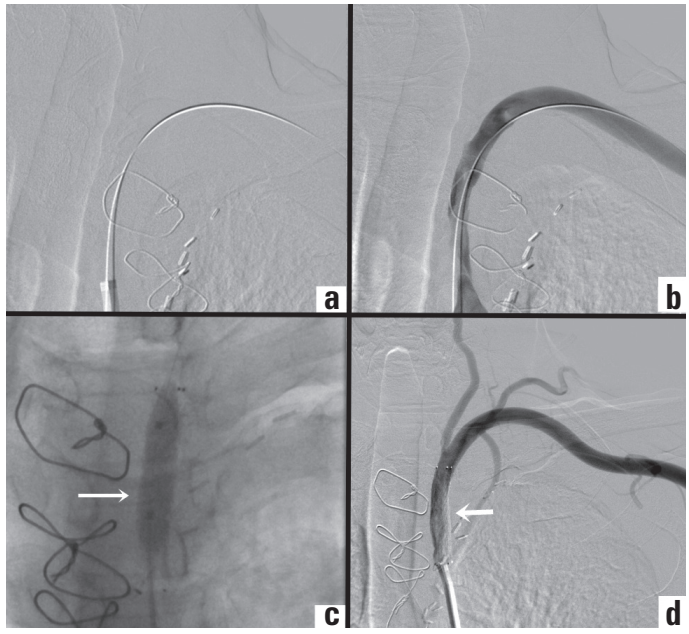

Figure 2. Totally occluded segment of the left subclavian artery was passed with the help of a guide-wire (a), and percutaneous treatment was performed (b, c). Angiography of SCA showed antegrade flow in LİMA after successful subclavian artery stenting (d)

the right and left upper extremities was observed (154/78 mm Hg and 84/55 mm Hg, respectively). Coronary angiography revealed moderate stenosis of LAD and no significant stenosis of the left circumflex or right coronary arteries. Left coronary angiography revealed a reverse flow in LIMA and a flow in the left SCA and brachial artery from LIMA (Fig. 1a). Aortography showed total occlusion in the left SCA and severe stenosis of the ostium of the right vertebral artery (VA) (Fig. 1b). For this reason, the patient underwent right VA and left SCA revascularization. The lesion at the ostium of the right VA was passed with a guide-wire (Guidewire®; Montmorency, France), and a 5x15 mm Powerflex balloon (PTA Dilatation Catheter®; Cordis Corporation, California, US) was used to dilate the stenotic segment before stent placement. Then a 5x15 mm Herculink stent (Vascular Stent®; Abbott Vascular, Diegem, Belgium) was placed, and reconstruction of VA was provided. Totally occluded segment of the left SCA was passed with a guide-wire and predilated with the help of a 7x20 mm

Powerflex pro-balloon catheter. Then a 10x40 mm, self-expanding nitinol stent (Misago Vascular Stent®; Terumo Corp, Tokyo, Japan) was placed. Post-dilation was performed using an 8x20 mm diameter angioplasty balloon catheter. Angiography of SCA showed antegrade flow in LİMA to LAD after subclavian artery stenting (Video 1). Endovascular treatment of the right VA and left SCA was successfully performed (Fig. 2). The patient was asymptomatic after the procedure and at 6-month follow-up.

Discussion

Using LIMA to bypass LAD has been the mostly preferred treatment of choice due to its unrivaled graft patency compared with that of venous ones (2, 3). Despite its excellent graft patency in patients who have previously undergone CABG surgery, cardiac events occur owing to ipsilateral SCA stenosis (coronary–subclavian steal phenomenon) (4, 5). Feldman et al.(6) reported in their retrospective study that patients having IMA as CABG and ipsilateral upper extremity AVF are at increased risk of cardiac events. However, another report suggested that LIMA should be used whenever possible to avoid coronary–steal phenomenon during hemodialysis (7). The prevalence of subclavian artery stenosis in hemodialysis patients is considered to be higher than that in other patients because of an increased incidence of peripheral artery disease in these patients (8). Our patient had left forearm AVF and CABG surgery history of LIMA to LAD graft. He described angina during each hemodialysis session, and coronary angiography was performed. Significant blood pressure difference between his right and left upper extremities was noticed, and aortography was performed. It revealed total occlusion in the left SCA. Digital subtraction angiography verified left SCA stenosis and also detected significant stenosis at the ostium of the right VA. Endovascular treatment was successfully performed. Therefore, patients describing symptoms suggestive of coronary subclavian steal phenomenon and a significant blood pressure difference between the two upper extremities should undergo a subclavian angiography, concurrently with coronary angiography, to exclude significant subclavian stenosis.

Conclusion

It is important to assess the subclavian artery using imaging modalities in hemodialysis patients who are referred for CABG surgery or in patients with a history of CABG surgery who are planning hemodialysis access.

Video 1. Endovascular treatment of the left subclavian artery (SCA) occlusion was showed. Totally occluded segment of the left SCA was passed with a guide-wire, and 10x40 mm self-expanding nitinol stent was placed. Angiography of SCA showed antegrade flow in LİMA to LAD after subclavian artery stenting.

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Address for Correspondence: Dr. Saim Sağ
Uludağ Üniversitesi Tıp Fakültesi,
Kardiyoloji Bölümü, 16059, Bursa-*Türkiye*
Phone +90 224 295 16 40 Fax: +90 224 295 16 28
E-mail: saimsag@gmail.com

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