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Percutaneous Intervention for Left Internal Mammary Artery Side Branch, Subclavian, and Coronary Artery Stenosis in Chronic Coronary Syndrome

Kronik Koroner Sendromda Sol İnternal Mammarian Arter Yan Dalı ile Subklavyen ve Koroner Arter Darlıklarına Yönelik Perkütan Girişim

CASE IMAGE
OLGU GÖRÜNTÜSÜ

A 55-year-old male with hypertension and coronary artery disease (CAD) presented with effort-induced Canadian Cardiovascular Society (CCS) class III angina and severe left arm pain occurring even at rest, without movement. His medical history included coronary artery bypass grafting (CABG) 10 years prior, with aorta-saphenous (Ao-S) grafts to the obtuse marginal (OM) branch, right coronary artery (RCA), and left anterior descending artery (LAD), as well as a left internal mammary artery (LIMA) graft to the intermediate artery (IM). Blood pressure measured 115/65 mmHg in the left arm and 140/70 mmHg in the right arm. Physical examination was unremarkable except for surgical scars on the legs and chest wall. Laboratory findings were within normal limits, except for a low-density lipoprotein (LDL) level of 122 mg/dL. The electrocardiogram (ECG) showed normal sinus rhythm with a left anterior hemiblock. Transthoracic echocardiography revealed a left ventricular ejection fraction of 52%, with hypokinesia of the lateral and inferior walls, and no significant valvular disease. Due to the patient's severe left arm pain, bilateral upper extremity Doppler ultrasonography was performed, revealing significant stenosis in the left subclavian artery with a retrograde flow pattern. Additionally, during exercise provocation testing, a marked drop in blood pressure and worsening pain in the left arm were observed.

The patient's prior medical therapy included acetylsalicylic acid 100 mg/day, metoprolol 50 mg/day, ramipril 5 mg/day, atorvastatin 20 mg/day, trimetazidine 35 mg twice daily, and ranolazine 500 mg twice daily. Despite this comprehensive anti-ischemic regimen, the patient continued to experience anginal symptoms. Coronary and peripheral angiography revealed an occluded RCA and circumflex artery, with 70% stenosis at the Ao-S-OM anastomosis (Figure 1A), multiple lesions in the LAD, and an occluded Ao-S-LAD graft. The LIMA-IM graft showed no stenosis. However, a well-developed side branch of the LIMA (Figure 1B) was causing a significant reduction in coronary flow due to the coronary steal phenomenon (Figure 1C). Subclavian artery angiography also demonstrated severe proximal stenosis (Figure 1D).

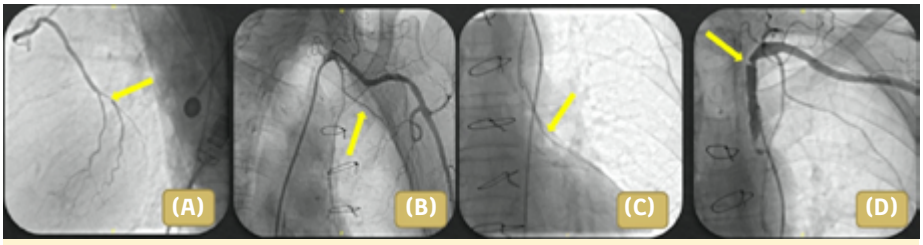

Figure 1. (A) Severe stenosis in the aorta-saphenous (Ao-S) to obtuse marginal (OM) graft. This in-graft narrowing reduces coronary perfusion and contributes to anginal symptoms. (B) Well-developed side branch of the left internal mammary artery (LIMA). This abnormal branch causes myocardial ischemia by diverting blood from the main coronary flow (coronary steal). (C) Coronary steal syndrome caused by the LIMA side branch. The image shows how the side branch from the LIMA diverts graft flow. (D) Severe stenosis in the proximal left subclavian artery. This narrowing reduces total blood flow to the LIMA.

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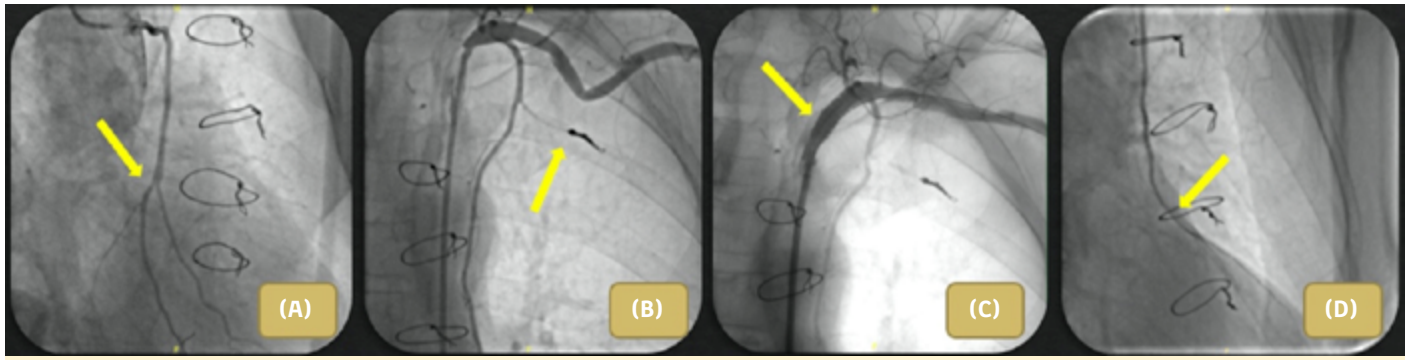

Figure 2. (A) Drug-eluting stent implantation for severe stenosis in the aorta-saphenous (Ao-S) to obtuse marginal (OM) graft. (B) Complete occlusion of the left internal mammary artery (LIMA) side branch following coil embolization. Blood flow through the side branch is fully eliminated after embolization. (C) Peripheral stent implantation in the proximal left subclavian artery. (D) Improved flow through the internal mammary artery (IMA) after subclavian artery stent implantation and LIMA side branch coil embolization. Coronary perfusion is significantly improved following the intervention.

The LIMA side branch was diverting a substantial portion of blood flow (steal phenomenon), thereby reducing blood flow to the LIMA-IM graft and contributing to myocardial ischemia. Additionally, the severe stenosis in the subclavian artery further limited total blood flow to the entire LIMA, exacerbating graft dysfunction. These two pathologies (the LIMA side branch and subclavian stenosis) acted synergistically to worsen coronary steal syndrome. Embolization of the LIMA side branch was planned to eliminate the steal phenomenon and improve coronary perfusion.

Revascularization was planned due to the patient's prior cardiac surgery and unsuitable coronary anatomy for repeat CABG. A drug-eluting stent (2.25 × 9 mm) was implanted at the Ao-S-OM graft anastomosis (Figure 2A). Embolization of the LIMA side branch was performed using 4 mm × 8 cm and 3 mm × 8 cm coils, resulting in complete occlusion (Figure 2B). A peripheral stent (8 × 18 mm) was placed in the subclavian artery (Figure 2C), which improved flow through the LIMA-IM graft (Figure 2D). The patient was discharged without complications and remained asymptomatic at the three-month follow-up.

Well-developed LIMA side branches can cause coronary steal. Subclavian artery atherosclerosis is common in patients with CAD, underscoring the importance of ruling out subclavian stenosis before CABG. Advances in percutaneous interventions provide effective treatment options for such patients, avoiding the challenges associated with repeat surgery.

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Informed Consent: Written and verbal consent was obtained from the patient for the publication of this case image.

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