Aorta-LITA Bypass Grafting with Saphenous Vein in a Patient Undergoing Coronary Artery Surgery with Subclavian Artery Stenosis

Koroner Arter Cerrahisi Yapılan Subklavyen Arter Stenozlu Bir Hastada Safen Ven Grefti İle Aorta-LİTA Baypası

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ABSTRACT
The internal thoracic artery (ITA) is the primary graft for coronary artery bypass grafting and cannot be used if there is subclavian artery stenosis (SAS). Aorto-axillary, carotid-subclavian bypass and also angioplasty with stenting or other interventional treatments are acceptable procedures for SAS treatment. Aorta-ITA bypass with saphenous vein can be alternative and simple technique for SAS to save Winslow pathway for patients with peripheral artery disease.
Key Words: Subclavian artery stenosis, coronary artery bypass, peripheral artery diseases.

ÖZET
İnternal torasik arter (İTA) koroner arter baypas greftlemede öncelikli tercih edilen grefttir ve subklavyen arter stenozunun (SAS) olduğu durumlarda kullanılamaz. Aorto-aksiller, karotid-subklavyen baypas ve anjioplasti ile stentleme veya diğer girişimsel tedaviler SAS'da kullanılan tedavi yöntemleridir. Safen veni ile yapılacak Aorta-ITA baypası SAS'da periferik damar hastalığı olan hastalarda Winslow yolunu koruyan alternatif ve kolay bir yol olabilir.
Anahtar Kelimeler: Subklavyen arter darlığı, koroner arter baypas, periferik vasküler hastalıklar.

INTRODUCTION

The internal thoracic artery (ITA) is the primary graft of choice for coronary artery bypass grafting (CABG), especially for left anterior descending coronary artery. It has a highest patency rate and is associated with longer survival and less complications when compared to other conduits. The internal thoracic artery cannot be used as a graft for coronary arteries when subclavian artery (SA) has stenotic disease proximal to the origin of ITA. It is important to identify this lesion before CABG to avoid 'coronary-subclavian steal' leading to myocardial ischemia. Aorto-axillary or carotid-subclavian bypass and angioplasty with stenting are accepted interventions to treat SA stenosis.

In this report we describe a case of a patient with significant proximal left-sided SA stenosis and bilateral lower-extremity peripheral artery disease, in whom aorta-Left ITA bypass with saphenous vein graft was performed during CABG to treat the left-sided upper and lower extremity claudication.

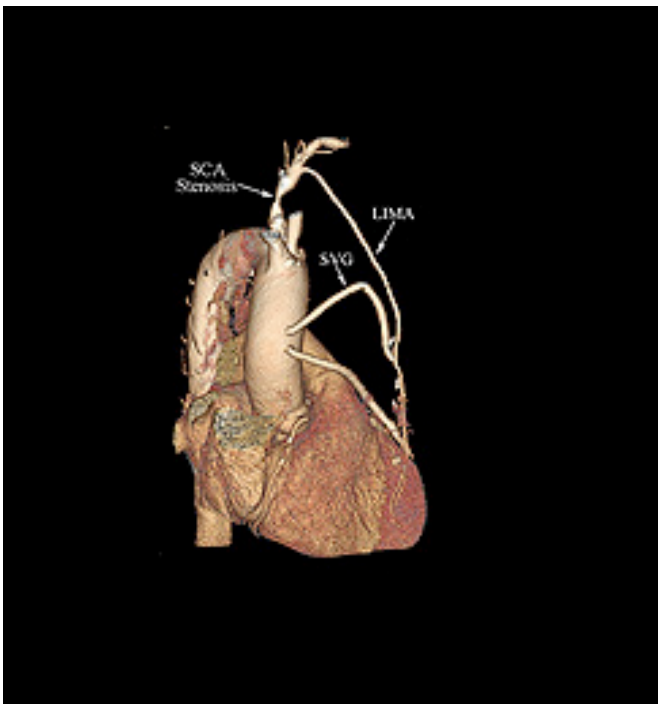
CASE

A 60-years-old male patient was admitted to our hospital with the complaint of chest pain

on minimal exertion, claudication on the left upper and bilateral lower extremities, vertigo and presyncope. The patient's past medical history was remarkable for hypertension, smoking, and severe chronic obstructive pulmonary disease. Oral antianginal medications had been prescribed one month ago at another institution. On admission, his blood pressure was 130/90mmHg on the right arm, 95/60mmHg on the left arm, and heart rate was 78 beats/min. Cardiac auscultation revealed normal heart sounds and vascular examination revealed diminished left radial and left femoral artery pulses and no pulse on right femoral artery with palpation. Electrocardiography showed previous inferior myocardial infarction and left ventricular hypertrophy and chest X-ray revealed mild dilatation of the ascending aorta. Doppler ultrasound examination showed low amplitude monophasic wave pattern in left axillary and brachial arteries, right common iliac artery occlusion and collateral refilling at the level of right common femoral artery and significant flow velocity increase at the level of left common iliac and femoral arteries. Selective coronary angiography and digital subtraction angiography (DSA) of left upper and bilateral lower extremities were performed. Coronary angiography showed 90% stenosis of the proximal left anterior descending artery (LAD) and DSA showed 90% stenosis of the left SA, 50% stenosis of the left common iliac artery, 80% stenosis of the left superficial femoral artery and total occlusion of the right common iliac artery. Left ventricular ejection fraction was found to be 45% on transthoracic echocardiography. Since the patient was still symptomatic despite antianginal treatment, he was scheduled for CABG after obtaining an informed consent for operation.

We decided to perform an off-pump surgery due to the presence of chronic obstructive pulmonary disease and single LAD disease. After standard anesthesia and median sternotomy, saphenous vein grafts were prepared. Since the patient has severe symptomatic left SA stenosis and bilateral iliac arterial disease, it was decided not to use left internal thoracic artery (LITA) as a bypass conduit but to perform an aorta to LITA bypass with saphenous vein graft both to perfuse the SA territory in a retrograde fashion and to protect the LITA to iliac artery connection. After performing an aorta-LAD anastomosis with saphenous vein graft, left side of hemisternum was retracted upward and laterally. The LITA was harvested with semiskeletonized technique between the second and fourth costal levels without opening the left pleural space. The proximal and distal sides of harvested LITA were clamped with plastic bulldog clamps and an end-to-side anastomosis of a saphenous vein graft to LITA by using 7/0 polypropylen sutures was performed. Proximal side of saphenous vein graft was anastomosed to the ascending aorta by using 6/0 polypropylen sutures. Finally, the saphenous vein graft between the aorta and the LITA was given a U-shape in order to prevent kinking of the graft. The patient had an uneventful postoperative course without any signs of myocardial or peripheral ischemia and was discharged from the hospital on the fifth postoperative day. At follow-up after 3 months, signs and symptoms of vertebrobasillary insufficiency, left upper and left lower extremity claudication were found to be improved. To evaluate the patency of the grafts, a 64-slices computerised tomographic angiography was performed and all anastomoses were found to be patent (Figure 1).

Figure 1: *Computerized tomography angiography showed patent aorta-LIMA bypass with saphenous vein graft.*



DISCUSSION

The reported prevalence of SA stenosis in patients referred for CABG is between 0.5%-6.8% (1,2). Clinical characteristics associated with the presence of SA stenosis include advanced age, hypertension, current or past smoking, and decreased high-density lipoprotein levels (3). Patients with clinical evidence of peripheral arterial disease (PAD) have also significantly higher rates of SA stenosis, ranging from 11.8% to 18.7% (2,4). The presence of a >20mmHg bilateral arm blood pressure difference suggests SA stenosis, but it is not a sensitive diagnostic tool (2). Proximal aortic arch arteriography is the gold standard for diagnosing the subclavian artery stenosis or occlusion. Alternative diagnostic procedures are doppler ultrasonography, multidetector CT angiography or magnetic resonance angiography.

In patients undergoing CABG, preoperative recognition of SA stenosis is very important to prevent the coronary–subclavian steal syndrome. Coronary-subclavian steal syndrome results from atherosclerotic stenosis of the subclavian

artery proximal to the origin of the in situ LITA graft causing reversal of flow in an internal thoracic artery used as conduit for coronary artery bypass grafting (1). If subclavian artery stenosis is identified in the preoperative evaluation, coronary surgery can be combined with a direct subclavian artery bypass. Although carotid subclavian artery bypass is considered as the standard surgical treatment method for symptomatic occlusion of proximal subclavian artery, aorto-axillary bypass or carotid-axillary bypass are the feasible alternatives when the traditional procedures are technically difficult (5). Percutaneous transluminal angioplasty with stenting is preferable in elderly patients with various risk factors with non-occluded stenotic of the SA lesions or in patients with SA stenosis diagnosed or developed after the CABG (6). In the present case, we performed a simple anastomosis between the aorta and LITA during off-pump CABG. This procedure requires no additional incision and avoids preparation of an atherosclerotic subclavian artery, which has close proximity to important lymphatic channels and nerves.

In the present case, another reason for not to use LITA as a coronary bypass conduit is to prevent lower limb ischemia. In patients with aortoiliac disease, the ITA may become a major collateral route to the lower extremities. The ITA is continuous with the ipsilateral superior epigastric artery, which in turn connects with the ipsilateral inferior epigastric artery. A branch of the external iliac artery (the inferior epigastric artery), completes the ITA to iliac connection. The collateral perfusion of the lower extremity by the route of ITA has been reported as case reports in Leriche syndrome and in patients with peripheral vascular disease. Using ITA for CABG in a patient with occlusion of other collateral pathways that developed in response to an aortoiliac disease may lead to serious complications including critical leg ischemia (7). Therefore, selective angiographic visualization of the ITA is suggested as an essential part of the preoperative evaluation in patients with severe peripheral vascular disease undergoing CABG. Therefore, we did not use LITA as a coronary graft and we aimed to increase LITA perfusion by the route of aorta-LITA anastomosis.

In conclusion, aorta-LITA bypass with saphenous vein graft can be performed easily during off-pump CABG for the treatment of SA stenosis. In the presence of aortailiac disease, it may also increases the perfusion of collaterals from LITA to the iliac artery.

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