

A rare reason of myocardial ischemia: left subclavian artery stenosis after coronary artery bypass grafting

Miyokardiyal iskeminin nadir bir nedeni: Koroner arter baypas greft ameliyatı sonrası sol subklaviyan arter stenozu

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A 57-year-old male was admitted with the complaint of prolonged resting angina. His medical history revealed coronary artery bypass grafting (CABG) two years ago. Electrocardiography showed sinus rhythm with a complete left bundle branch block without ST-depression or elevation. Subsequent exercise treadmill testing revealed a significant ST depression in V4-V6 leads. Coronary angiography showed patent bypass grafts, but a critical stenosis of the left subclavian artery just proximal to the origin of the left internal mammary artery. A stent was successfully implanted into the left subclavian artery. It should be considered that subclavian artery stenosis may cause coronary-subclavian steal, leading to myocardial ischemia in patients with a history of coronary artery bypass grafting utilizing a left internal mammary artery.

Key words: Coronary artery bypass grafting; left subclavian artery stenosis; myocardial ischemia.

Coronary artery bypass grafting (CABG) is the most common procedure performed in adult cardiovascular surgery today. The left internal mammary artery (LIMA) graft is the first choice for CABG surgery because of enhanced long-term survival with a well-documented, superior long-term patency rate.^[1] The use of the LIMA as a conduit to the left anterior descending artery (LAD) is recommended by the American College of Cardiology/American Heart Association (ACC/AHA) as a coronary bypass graft.^[2,3]

Elli yedi yaşında erkek hasta istirahatte uzamış anjina yakınması ile başvurdu. Hastanın tıbbi öyküsünde iki yıl önce koroner arter baypas greft (KABG) ameliyatı geçirilmiş olduğu belirlendi. Elektrokardiyografi sinüs ritminde olup, ST çökmesi veya elevasyonu yoktu, ancak sol dal blok'u vardı. Müteakip efor testinde V4-V6 derivasyonlarında belirgin ST çökmesi izlendi. Koroner anjiyografide koroner arter baypas greftleri açık olarak izlendi; ancak sol iç meme arterinin kökenine yakın sol subklaviyan arterde önemli bir darlık vardı. Sol subklaviyan arterde başarılı şekilde bir stent yerleştirildi. Sol iç meme arteri kullanılarak koroner baypas yapılan hastalarda subklaviyan arter darlığının miyokardiyal iskemiye yol açan koroner-subklaviyan çalmaya neden olabileceği göz önünde bulundurulmalıdır.

Anahtar sözcükler: Koroner arter baypas greftleme; sol subklaviyan arter darlığı; miyokardiyal iskemi.

Proximal subclavian artery stenosis may result in cardiac ischemia in CABG patients with internal mammary grafts.^[4] There is a risk of ischemia of the myocardium supplied by the LIMA, if hemodynamically critical stenosis of the left subclavian artery exists, which causes a reversal of blood flow through the LIMA. This phenomenon is clinically known as the coronary-subclavian steal syndrome (CSSS).^[3]

We report the case of one such patient who presented with prolonged resting angina due to left subclavian



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artery stenosis after CABG. Emergency proximal left subclavian artery stenting resulted in a resolution of the chest pain and electrocardiographic changes.

CASE REPORT

A 57-year-old male was admitted to our hospital with prolonged resting angina. He had undergone triple CABG surgery two years earlier (LIMA to LAD and two saphenous vein grafts to the obtuse marginal and posterolateral branches of the circumflex artery). On physical examination, the systolic blood pressure was characterized by a significant difference between the arms (right arm 130/80 mmHg and left arm 90/60 mmHg). The electrocardiogram showed a sinus rhythm with a complete left bundle branch block, and there was no clear evidence for acute ischemia. The serial cardiac enzyme and troponin measurements were normal. Therefore, the Bruce treadmill test protocol was performed, and significant ST depression in the precordial leads (V4-V6) was seen within the first minute of the test. At the second minute, the test was stopped because of the progression of ST depression to about 3 mm, and the patient was then referred for coronary angiography. Selective coronary angiography was performed via the right femoral approach using the Seldinger technique, and this showed that all of the bypass grafts were patent. The angiography also revealed a critical stenosis in the proximal part of the left subclavian artery (Figure 1). A percutaneous left subclavian artery intervention session was planned using a direct stenting technique over a 0.035 inch stiff wire



Figure 1. Angiography revealed a critical stenosis in the proximal part of the left subclavian artery.

without the use of a guiding catheter via left axillary artery access. The final result was angiographically perfect, and the patient was free of angina or other complications afterwards (Figure 2). The patient recovered well after an uneventful postoperative course. At the follow-up visit one month later, the results of an exercise treadmill test were normal. The patient remained free of symptoms at the 12-month follow-up with no divergence between the blood pressure measurements in the two arms.

DISCUSSION

Atherosclerotic occlusive disease of the aortic arch after CABG, especially occlusion or severe stenosis of the left subclavian artery proximal to the origin of the LIMA, may lead to myocardial ischemia due to reduced or reversed blood flow through a LIMA bypass graft to the coronary artery. Subclavian artery stenosis was first described in 1975.^[5] Since then, usage of the LIMA in CABG has become increasingly more important for the diagnosis and treatment of this clinical entity.

Myocardial ischemia due to subclavian artery stenosis after CABG is a rare phenomenon, and it has been observed at a rate of 0.5% to 1.1% in patients prior to CABG.^[6] However, the number of patients with myocardial infarction or ischemia because of occlusion of the subclavian artery in a graft-dependent coronary circulation has been on the rise.

Diagnostic modalities that have been used to detect subclavian arterial disease prior to the placement



Figure 2. Angiography revealed a successful endovascular intervention using the direct stenting technique for the left subclavian artery stenosis.

of a LIMA graft include arteriography, computed tomography angiography, and the combination of magnetic resonance imaging, magnetic resonance angiography, and Doppler ultrasonography.^[7]

In treatment, the methods that have been used to treat myocardial ischemia due to subclavian stenosis or occlusion include an aorto-subclavian bypass, a carotid-subclavian bypass, transposition of the LIMA, a directional atherectomy, a subclavian endarterectomy, and angioplasty, either with or without stenting, of the subclavian artery.^[6] Currently, stenting for subclavian artery stenosis or occlusion is more popular than the other methods, and this technique is associated with low morbidity, short hospitalization, and a high rate of success.^[4,7]

In conclusion, severe stenosis or total occlusion of the left subclavian artery may lead to myocardial ischemia due to reduced or reversed blood flow through a LIMA bypass graft to the coronary artery. We emphasize that the recognition and identification of this rare phenomenon is of clinical importance. Among patients with a medical history of CABG and chest pain with a positive stress test, severe stenosis or total occlusion should be considered, and an angiographic study should be performed.

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