



Subclavian Steal Syndrome Treated by Endovascular Approach in the Interventional Neurology Clinic

Girişimsel Nöroloji Kliniğinde Endovasküler Yaklaşımla Tedavi Edilen Subklavian Çalma Sendromu

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Summary

Subclavian steal syndrome is a clinical feature displayed due to decrease or reverse of blood flow in the ipsilateral vertebral artery resulting from severe stenosis or occlusion of the proximal subclavian artery. Subclavian steal syndrome was first described and defined by angiography. The best treatment of subclavian steal syndrome is still controversial, although balloon angioplasty and/or stenting procedures have been generally accepted during the past decade. We report a case of subclavian steal syndrome successfully treated by stenting of the left subclavian artery in our interventional neurology clinic. (*Turkish Journal of Neurology* 2013; 19:66-8)

Key Words: Subclavian steal syndrome, endovascular treatment

Özet

Subklavian çalma sendromu proksimal subklavian arterin ileri derecede stenozu veya oklüzyonu sonucu ipsilateral vertebral arterde kan akımının azalması veya tersine dönmesi sonrası ortaya çıkan bir klinik tablodur. Subklavian çalma sendromunun ilk kez tanınması ve tanımlanması anjiyografi ile olmuştur. Subklavian çalma sendromunun en iyi tedavisinin halen tartışmalı olmasına rağmen, son on yıldır genel olarak balon anjiyoplasti ve/veya stent ile tedavi yaklaşımları kabul görmektedir. Burada girişimsel nöroloji kliniğinde sol subklavian artere stent uygulanarak başarıyla tedavi edilen bir olgu sunulmuştur. (*Türk Nöroloji Dergisi* 2013; 19:66-8)

Anahtar Kelimeler: Subklavian çalma sendromu, endovasküler tedavi

Introduction

Subclavian steal syndrome is a rare condition characterized by symptoms of vertebrobasilar system insufficiency resulting from arm movements, in particular. When there is an obstruction in the proximal subclavian artery at the origin of the vertebral artery (VA), blood flows backwards in the vertebral artery. This condition is called subclavian steal syndrome. Although it is not common, the syndrome is increasingly diagnosed due to the advances in diagnostic methods. The symptoms of left subclavian steal symptoms may be encountered in various ways, among which are symptoms suggesting vertebrobasilar system insufficiency including dizziness, ataxia, and loss of vision, or headache, lassitude, weakness, coldness and pain in the arm with exercise. It may even be asymptomatic (1). Following the unsuccessful attempts at percutaneous transluminal angioplasty (PTA) for the treatment of occlusive lesions of the subclavian and innominate arteries in the early 1990's, stent

implantation method was developed to treat complications. Stent implantation has numerous advantages such as increasing the success of recanalization of occlusion, long-term maintenance of the recanalization, preventing cerebral embolization by holding the atheromatous debris or thrombus that has dislodged during PTA between the vessel wall and stent net (2).

Case

Sixty-nine year-old femal patient presented at our clinic with complaints of dizziness, pain and numbness in her left arm when she walked and lifted her arm up and a droning murmur in her head. She had investigations done in various centers within and outside the country with similar complaints, and none of the recommended treatments had benefited her. Physical examination showed that blood pressure was 160/90 mmHg and 110/90 mmHg in her right and left arms, respectively; her right radial pulse was full, whereas her

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left radial pulse was weak. A murmur was detected by auscultation in her left supraclavicular region. Other neurological examination findings were normal. Following the observation of craniocaudal flow in the left vertebral artery on Doppler ultrasonogram, CT angiogram was taken for a differential diagnosis of subclavian steal syndrome and proximal stenosis was found in the left subclavian exit region. After obtaining informed consent from the patient, digital subtraction angiography (DSA) was performed in the Interventional Neurology clinic. Right vertebral arterial selective angiogram showed that the left subclavian artery was filling through the right vertebral artery – basilar artery – left vertebral artery (Image 1a) and there was a 95-99% stenosis at the origin of the left subclavian artery (Image 1b). There was no filling in the left VA and this picture was interpreted as subclavian steal syndrome, and endovascular treatment was planned. A 5 French (F) short sheath was inserted into the patient's right femoral artery, as well as a diagnostic 5F catheter in the proximal of the lesion. Following this, an extra-support micro-guide wire of 0.014" was extended to the distal of the subclavian stenosis. The 4F diagnostic catheter was advanced over this to the distal of the lesion. After a 0.035 guiding wire was passed through the diagnostic catheter the catheter and femoral sheath were taken out and a 7F flex guiding sheath was inserted and advanced to the proximal of the lesion in the arcus. A 7.0x20 mm balloon catheter was extended and the lesion dilated; later, a 8.0x37 millimeter cobalt-chrome "balloon expandable" stent was inserted starting from the distal of the lesion towards the arcus (Images 2a and 2b). The retrograde filling in the left VA was seen to disappear in the angiographic images taken after stent implantation (Image 2c). Following treatment, there was a clear improvement in the patient's symptoms including dizziness, pain and numbness in his left arm when walking and lifting his arm up, and especially in the droning murmur in his head. The patient has been in follow-up without any problems for almost seven months.



Image 1: a) Following injection into right vertebral artery (VA) retrograde filling is seen in left VA via right VA – basilar artery . **b)** 95-99% stenosis is seen in the origin of the left subclavian artery.

Discussion

The direction of blood flow in normal vertebral arteries is towards the cranium in both systole and diastole. When there is stenosis in the subclavian artery, the flow in the ipsilateral vertebral artery reverses due to the decrease of intraluminal pressure in the distal of the artery (3). As a result of the angiogram performed in our clinic we observed our patient's left vertebral artery to fill retrogradely via the right vertebral artery (Image 1). Subclavian steal syndrome is seen mostly around 60 year-old males (2). The left subclavian artery is affected 4-fold more than the right one (3). Our patient was a 69 year-old female patient and she had a stenosis in the left subclavian artery.

Clinical signs such as difference of blood pressure in the left and right arms, weak or non-existent upper extremity pulses on the same side suggest subclavian steal syndrome (1). Our patient had blood pressure of 160/90 mmHg in the right arm and 110/90 mmHg in the left arm; her right radial pulse was full, whereas her left radial pulse was weak. Moreover, there was a murmur heard with auscultation in the left supraclavicular region.

The treatment of subclavian steal syndrome includes surgical, percutaneous transluminal angioplasty (PTA) and stent methods (5) Invasive methods are not advised for patients with asymptomatic subclavian steal syndrome (6). Surgical options include transthoracic and extrathoracic revascularization in subclavian artery stenosis. Although these procedures are effective, the morbidity and mortality rates of 5-19% are limiting. Moreover, intrathoracic surgery approach has complications including thrombosis, chylothorax, and Horner's syndrome. PTA was first utilized in subclavian artery stenosis in 1980, but carries the risks of restenosis, thrombosis and stroke (7). Millaire et al. describe a complication rate of 10% in PTA treatment, as well as 14% of restenosis following 39 months of follow-up. They report complications in the axillary artery, brachial artery and aorta including thrombosis, ischemic stroke and thrombosis of the dilated region requiring surgical by-pass (8). AbuRahma AF et al. found the peri-operative complication risk in patients inserted a stent for subclavian stenosis to be 14.9%. They describe major complications including distal embolic event, brachial artery

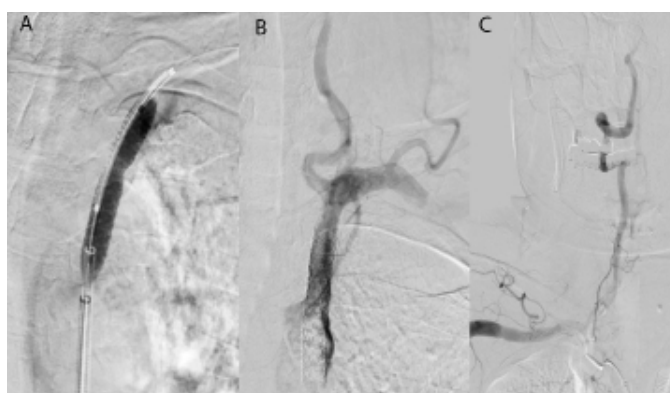


Image 2: a) Balloon angioplasty in the left subclavian artery. **b)** Left subclavian artery following stent implantation – filling is seen in the left vertebral artery. **c)** Following stent insertion, retrograde flow disappears in the left vertebral artery when right subclavian artery is injected

thrombosis, congestive heart failure, edema in the arm following reperfusion without compartment syndrome, pseudoaneurism, dissection and thrombosis resulting from the intervention, as well as minor complications such as hematoma in the femoral catheter region not requiring transfusion, headache improving in 24 hours, syncope, and superficial wound infection (9). Stent insertion combined with PTA results in a higher success rate and better long term results, compared with PTA treatment alone (10). Stent insertion following PTA treatment provides technical advantages including prevention of intimal tearing, prevention of sudden vessel occlusions, and fewer late stage restenoses (7). In the light of all this information, we saw it fit to perform endovascular treatment on our patient. We initially performed a balloon angioplasty with dilation and later stent implantation for left subclavian stenosis, and widened the stenosis successfully.

In conclusion, the utilization of interventional neuroangiographic methods in the treatment of cerebrovascular conditions has rapidly increased in recent years with the advance of materials technology. We hereby present a case diagnosed in our interventional neurology clinic with subclavian steal syndrome and treated with endovascular methods.

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