A Rare Case of a Patient With Numbness in the Right Arm: Subclavian Steal Syndrome

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Introduction

Subclavian artery stenosis is a rare, generally asymptomatic syndrome, which can present with the findings of vertebrobasilar insufficiency because of decreased amount of blood to the brain. This syndrome is suspected when peripheral pulses cannot be captured in the side with stenosis or can be weakly captured compared to the other extremity, and there is a difference of >15–20 mmHg in the arterial blood pressure values measured from both arms. Since it is a rare syndrome, we aimed to present a case with subclavian steal syndrome in this study.

Case Report

A 45-year-old female patient was admitted with complaints of long-lasting numbness and occasional tingling and weakness in the right arm. She had no disease or familial history. She had no neurological signs related to vision and hearing except arm numbness.

In the physical examination, arterial blood pressure was 130/60 mmHg in the left arm and 100/50 mmHg in the right arm. While the right radial artery pulse was weak, left radial artery pulse and other peripheral pulses were full and regular. Cardiovascular, respiratory, and neurological examination results were normal.

No abnormality was detected in blood biochemistry, hemogram, and thyroid function tests.

The results of an electrocardiogram showed sinus rhythm, and a chest radiography was normal.

Transthoracic echocardiography (Toshiba, Aplio 500, Japan) revealed no abnormality in the structures and functions of the heart.

In the color Doppler examination of the carotid (Toshiba, Aplio 500, Japan), flows were found to be normal. The flow pattern was observed to be monophasic in the right subclavian artery, and the mean volume of the right vertebral artery was decreased in the arterial Doppler ultrasonography examination of the right upper extremity. Considering the right subclavian steal syndrome, the patient was taken into the Interventional Cardiology Laboratory (Siemens, Axiom Artis MP, Germany). After administering local anesthesia, the right main femoral artery was catheterized. When contrast media was injected into the right innominate artery, it was observed that the right carotid communis was filled, but the right subclavian artery was occluded from the ostium (Figure 1). Although very weak, the right radial pulse could be sensed. Because collateral flow was not observed, contrast media was injected into the left subclavian artery. It was observed...
that the left vertebral artery filled the right vertebral artery and then the right subclavian artery in retrograde manner (Figure 2, 3).

Informed consent was obtained from the patient in this study.

**Discussion**

Vertebral arteries are anatomically close to the beginning of the subclavian arteries. After leaving the subclavian artery, they direct to the base of the brain to form the vertebrobasilar system and then the Willis polygon. Normally, blood flow is toward the proximal region both in the systole and in the diastole in the vertebral arteries. In the presence of subclavian artery stenosis, the flow is reversed in the vertebral artery in the same side because of decreased intravenous pressure in the distal region of the artery. Ischemic symptoms occur in the same extremity due to insufficient blood flow (1). The syndrome was first defined by Contorni (2) in 1960. Reivich et al. (3) published two case reports in 1961.

The symptoms of patients with subclavian steal syndrome differ, but the findings of vertebrobasilar insufficiency are dominant. In the absence of sufficient collateral flow or in cases where blood need increases, such as exercise and arteriovenous fistula, patient becomes more symptomatic. Symptoms, such as dizziness, headache, visual problems, nausea, mono-hemiparesis or paralysis, numbness in the extremity or face, swallowing difficulty, speech disorder, and ataxia, which suggest vertebrobasilar system insufficiency, are observed. Cerebral symptoms are short term. Cyanosis can develop when the arm is elevated to the heart level. Some cases are asymptomatic. The condition can incidentally be noticed during an angiography, Doppler ultrasonography of the vertebral artery, or measurement of blood pressure (2, 3).

Although congenital anomalies can be seen among the causes of subclavian stenosis, the most common cause is atherosclerotic lesions in adults. Aneurysm or arthritis is the second most common cause of subclavian stenosis. Arteriosclerosis, traumatic dissection of aneurysm, embolism, tumor thrombosis, and nonspecific inflammatory arteritis can also be the main causes. In 75% of cases, the lesion is on the left side and patients are generally aged between 50 and 60 years. While the most common cause of the disease is atherosclerosis in men and age >50 years, Takayasu's arteritis should be suspected in women and those aged <30 years. The incidence of the disease has been reported as 1%-3% (4, 5). Today, the number of iatrogenic subclavian stenosis cases increases because of widespread aortic endovascular interventions.

While diagnosing subclavian artery stenosis, the diameter of the artery must be narrower than 50% in angiography. The number of asymptomatic patients increased with beginning the use of ultrasonography in the 1970s and magnetic resonance angiography in Figure 1. When contrast media was given into the right innominate artery, it was observed that the right carotid communis was filled, but the right subclavian artery was occluded from the ostium.

Figure 2. a, b. It is observed that the left vertebral artery fills the right vertebral artery and then the right subclavian artery in a retrograde manner.
1991 used for diagnoses (6, 7). In addition to magnetic resonance angiography, color Doppler ultrasonography of the vertebral artery is very important for diagnosis since it shows reverse flows in the vertebral arteries (8). Moreover, conventional and digital subtraction angiography (DSA) are among the preferred techniques because they allow the determination of stenotic segment length and the degree of stenosis and also permit invasive radiological procedures (percutaneous transluminal angioplasty or stent implantation) when needed in the same session (7, 8).

In the presence of asymptomatic subclavian stenosis, the risk determining morbidity and mortality varies depending on the underlying atherosclerotic disease. An increase is seen in the total (hazard ratio, 1.4) and cardiovascular disease mortalities (hazard ratio, 1.57) with subclavian stenosis (9).

While planning treatment method, patient’s complaints and lesion are considered. Although the flow is demonstrated to be reverse in the presence of incidentally detected and asymptomatic subclavian stenosis, revascularization is rarely considered (10).

In symptomatic cases, surgery or percutaneous therapy can be successful. Surgery provides better outcomes in long or very distal occlusions. Surgical methods include carotid-subclavian bypass, carotid transposition, and axillo-axillary bypass. For all these techniques, the 5-year patency rate is above 70%. The first successful surgical intervention for subclavian stenosis was reported by De Bakey et al. (11) using a transthoracic approach in 1958.

In contrast, a 5-year patency rate of 85% can be obtained by percutaneous transluminal angioplasty or stent implantation with a technical success rate of >90% (12).

Antiplatelet therapy and general cardiovascular measures are recommended for patients who cannot be operated.

Our patient had no complaints that would suggest vertebrobasilar system insufficiency. She only had numbness and tingling increasing with arm movements. Therefore, surgery, percutaneous angioplasty, or stent placement were not recommended.

She was advised general medical measures (no smoking, optimal blood pressure control, and avoiding excessive abduction of the right arm).

Conclusion

Peripheral pulse examination and arterial blood pressure from both arms should be performed in patients having nonspecific signs, such as weakness and numbness in the upper extremity. In patients with findings of vertebrobasilar insufficiency, a color Doppler ultrasonography of the carotid and vertebral artery at the first step is a cost-effective and safe method. If there is an occlusion in the big vessels originating from the aortic arch according to the results of available noninvasive examinations, a DSA can guide in both diagnosis and treatment. Large randomized studies on angioplasty, stent, and surgical interventions have not been conducted to date, but percutaneous treatments seem to be advantageous currently in terms of comfort, cost, and duration of hospitalization.

Informed Consent: Informed consent was obtained from the patient who participated in this study.

Conflict of Interest: No conflict of interest was declared by the authors.

References
