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Case Report

Stenting for Severe Vertebral Artery Orifice Stenosis in A Case of Three Cerebral Artery Occlusion

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Abstract

A 51-year-old male presented with dysarthria and weakness on his left side. In his history, he had an operation due to aortic coarctation 13 years ago, and 5 years ago, he had a transient ischemic attack along with difficulty in speaking. During his neurological examination, he was conscious, cooperative, and oriented. Mild dysarthria and left hemiparesis were seen (4/5, 4/5). He smoked at least one cigarette packet per day for 30 years. Vascularization was performed only by narrowed right vertebral artery on cranial and cervical magnetic resonance angiography. He had a mild increase in his left hemiparesis during his stay in the hospital (2/5, 4/5). A stent had been inserted into his right vertebral artery during digital subtraction angiography. In his last neurological examination, he was conscious, cooperative, and oriented. We started prasugrel (10 mg/day) and acetylsalicylic acid (300 mg/day) for his mild dysarthria and mild hemiparesis. In this case, we explain that although there was three-vessel occlusion and narrowing in the right vertebral artery, the patient's neurologic status was not too bad due to collateral circulation around the cerebral arteries. This showed us the importance of collateral circulation between cerebral arteries.

Keywords: Vertebral arter, stenoz, girişimsel radyoloji

Introduction

The vertebrobasilar system (VBS) is responsible for causing 25% of ischemic strokes (1, 2). Approximately one-fifth of the posterior system strokes are caused due to the stenosis developing at the exit site of the extracranial vertebral artery (VA) from the subclavian artery (3). VA orifice stenoses are among the correctable causes of posterior system strokes that can be treated using developed imaging and treatment modalities.

Case Report

A 51-year-old male patient visited our clinic with a complaint of speech impairment and weakness on the left side. He had undergone a surgery for aortic coarctation 13 years ago and for transient ischemic episodes progressing along with speech impairment 5 years ago. Regarding his habits, he had a history of smoking a pack of cigarettes a day for 30 years. Neurological examination showed that he was conscious and cooperative and his orientation was complete. His speech was dysarthric. Left hemiparesis (4/5, 4/5) was detected on the motor examination. Magnetic resonance imaging revealed right hemisphere caudate nucleus and frontoparietal fragmented acute infarct (Figure 1). Acetylsalicylic acid (ASA) 100 mg and enoxaparin 0.6 mL 2 × 1 were started subcutaneously as treatment. Vasculitis examinations did not show any characteristics. The ejection fraction (EF) was 60%, and the left ventricular systolic functions were normal in transesophageal echocardiography (TEE). The right VA had a dolichoectasia appearance in color Doppler ultrasonography (CDU). The total VA current was 267 mL/min. Cranial and cervical magnetic resonance angiography (MRA) showed that cerebral blood flow was provided only by the narrow right VA (Figure 2). There was a slight deterioration in the left hemiparesis (2/5, 4/5) during the hospitalization. During cerebral digital subtraction angiography (DSA) performed by the neuroradiology team, a guiding catheter was inserted in the right VA because of the advanced occlusion in both ICAs (internal carotid arteries) and in the left VA outflow tract and 80% stenosis in the right VA orifice. The stenosis level was passed using a 0.14 guidewire through the guiding catheter, and a 6 × 12 mm balloon expandable stent was brought to the place of stenosis through the guidewire and opened. The procedure was terminated after the stent lumen was monitored open in the control images (Figure 3). Dysarthria and left hemiparesis (3/5,-5/5) were detected on the final neurological examination of the patient. Prasugrel 10 mg/day and ASA 300 mg/day were started as medical treatment due to clopidogrel resistance (92 U, sensitivity 24 U), and then the patient was discharged. At the first- and fifth-month

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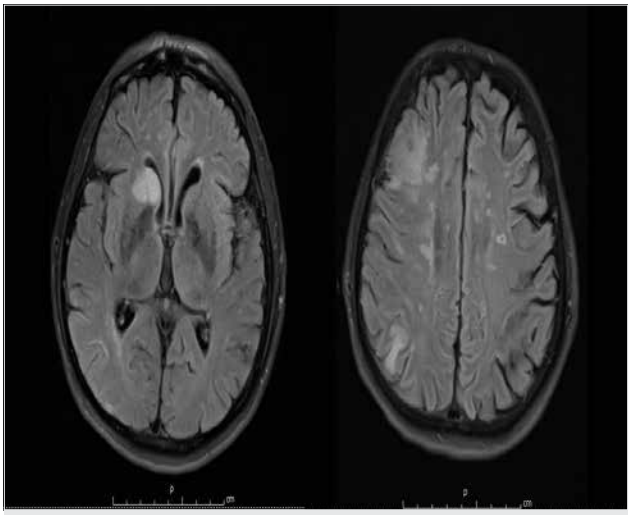

Figure 1. Right hemisphere caudate nucleus and frontoparietal fragmented acute infarct in diffusion magnetic resonance imaging

Figure 2. Stenosis in the right vertebral artery orifice (MR angiography before and after stenting)

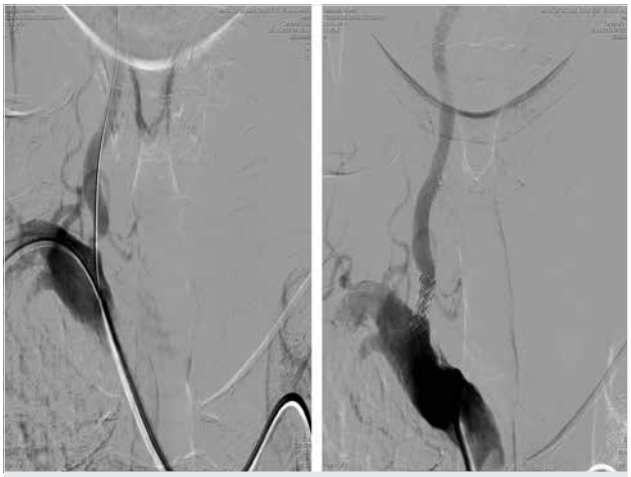

Figure 3. Balloon expandable stent placement in the right vertebral artery orifice

follow-ups of the patient, left frust hemiparesis (+4/5,-5/5) was found in the motor examination. MRS was 2, and the Barthel index was 90.

Discussion

Vertebral artery stenosis is one of the most important causes of posterior system ischemic symptoms. Medical, surgical, and endovascular methods are used in the treatment of VA stenoses (4, 5).

Endovascular treatment should be considered as a first-line option for patients with posterior system strokes that develop despite appropriate medical treatment or for patients who have asymptomatic bilateral carotid occlusion and in whom collateral circulation is provided only through VA (6, 7).

The extent of the ischemic area that can develop after cerebral artery occlusion depends on the adequate degree of cerebral collateral circulation that can compensate for decreased blood flow. Cerebral primer collateral pathways are intracranial anastomoses (Willis polygon, leptomeningeal, parenchymal anastomoses) (8, 9). Of the collateral systems, the most important is the Willis polygon that provides an even and balanced distribution of intracranial blood flow, which is critical for carotid artery and VA occlusion (10). In long or chronic stenotic processes, cerebral circulation assumes the function (11, 12). In our case, despite the presence of three vessel occlusions, cerebral blood flow was similarly provided through only VA that was narrow but open and through Willis polygonal anastomoses. Such a situation as in our case has been extremely rarely described in the literature.

Vertebral artery orifice stenosis is one of the correctable causes of posterior system strokes and is now being diagnosed more frequently using modern imaging modalities such as computerized tomography (CT), MR angiography, and DSA.

The elimination of VA orifice stenoses by balloon angioplasty or stenting is a successful treatment method under appropriate anticoagulant–antithrombotic therapy. VA angioplasty was first performed in 1980 by Sundt et al. Numerous clinical studies conducted since then have indicated the importance of angioplasty and stenting in the treatment of vertebrobasilar atherosclerotic disease (13-17). Technical success depends on the development of materials used in endovascular treatment, the degree of stenosis, the vascular tortuosity, and the experience of the neuroradiologist who performs the procedure. The technical success rate was found to be 100% in primary stenting studies of Kızılkılıç et al on 14 cases with severe VA orifice lesions (18). In the treatment of VA orifice stenoses, precise positioning is of great importance since a portion of the stent will have to extend to the subclavian artery. Previously, stents cut from a tube were used to prevent breakage in the orifice lesions due to the angulation of VA with subclavian artery, while balloon expandable stents are used today. Drug-releasing stents may also reduce restenosis in this region where restenosis is more prominent (5, 14, 19). VA balloon angioplasty and anticoagulant and antithrombotic treatment protocols as a medical therapy after stenting are the standard applications indicated in the literature (20, 21).

Conclusion

Vertebral artery orifice stenosis is one of the correctable causes of VBS strokes. Today, it is diagnosed more frequently using modern imaging methods. Balloon angioplasty and/or endovascular treat-

ment applied with stents due to the accompanying cerebral vascular pathologies are effective methods with low morbidity and mortality.

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