

Case Report / Olgu Sunumu

Hybrid approach in tandem high-grade carotid stenoses: A case report

Tandem yüksek gradlı karotis stenozlarda hibrid yaklaşım: Olgu sunumu

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ABSTRACT

A 79-year-old male patient who presented with dizziness and several syncopal episodes was admitted to our clinic. Medical history of the patient revealed arterial hypertension and multifocal atherosclerosis with a history of two ischemic left middle cerebral artery strokes within the last year, without residual deficits, two coronary artery bypass grafts 22 years ago, and Stage IIB peripheral artery disease. The imaging studies revealed severe stenosis of the left internal carotid artery and high-grade ostial stenosis of the left common carotid artery. After clamping of the internal carotid artery and endarterectomy with patch angioplasty, before the patch was completely sutured, a sheath was placed through it and dilation and retrograde stenting of the proximal segment of the left common carotid artery were performed. The neurological symptoms of the patient disappeared and on postoperative computed tomography angiography, there was no residual carotid stenosis.

Keywords: Carotid artery, endovascular, hybrid, tandem stenosis, thromboendarterectomy.

Carotid endarterectomy is the gold standard for treating high-grade carotid stenoses. According to our experience, endovascular procedures are associated with comparable results. By severe tandem ostial stenoses of the internal carotid artery (ICA) and of the common carotid artery (CCA), hybrid procedure can be the preferred therapeutic approach.

In this article, we present a case of successful hybrid procedure by severe tandem stenoses of the ICA and CCA.

ÖZ

Yetmiş dokuz yaşında erkek hasta, baş dönmesi ve çok sayıda senkop atakları ile kliniğimize başvurdu. Hastanın tıbbi öyküsünde arteriyel hipertansiyon, multifokal ateroskleroz ve geçtiğimiz yıl rezidüel defisit olmaksızın iki iskemik sol orta serebral arter inme öyküsü, 22 yıl önce iki koroner arter baypas greftleme ve Evre IIB perifer arter hastalığı mevcuttu. Görüntüleme çalışmalarında sol internal karotis arterde şiddetli stenoz ve sol ana karotis arterde yüksek gradlı ostial stenoz izlendi. İnternal karotis arterin klemplenmesi ve yama anjiyoplasti ile endarterektomi sonrasında, yama tamamen sütürlenmeden önce, arasından bir kılıf geçirildi ve dilatasyon ve sol ana karotis arterin proksimal segmentine retrograd stentleme yapıldı. Hastanın nörolojik semptomları ortadan kalktı ve ameliyat sonrası bilgisayarlı tomografi anjiyografide rezidüel karotis stenozu izlenmedi.

Anahtar sözcükler: Karotis arter, endovasküler, hibrid, tandem stenoz, tromboendarterektomi.

CASE REPORT

A 79-year-old patient presented with symptoms of dizziness for a few months and several consecutive syncopal episodes in the course of the last month. His medical history revealed arterial hypertension and multifocal atherosclerosis with a history of two ischemic left middle cerebral artery strokes within the last year, without residual deficits, two coronary artery bypass grafts 22 years ago, and current peripheral artery disease Stage IIB

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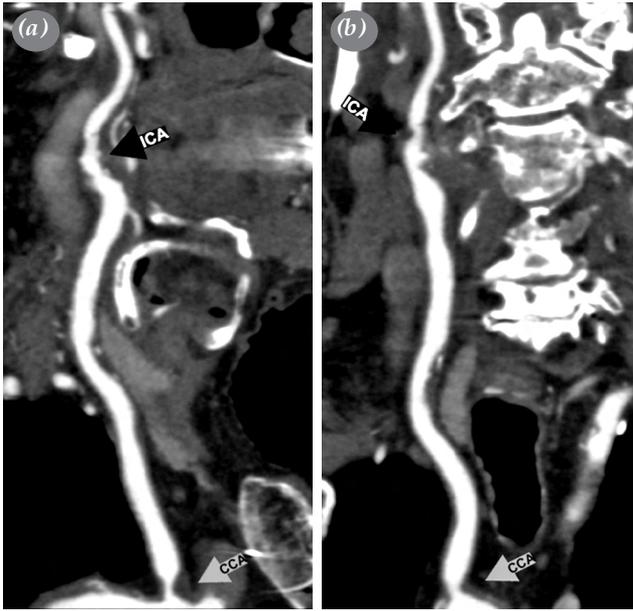


Figure 1. (a) A preoperative CT-angiography demonstrating the high-grade ostial stenoses of left CCA (lower arrow) and of left ICA (upper arrow). Non-significant (25%) stenosis in the middle third of left CCA is also visible. (b) A CT angiography reconstruction showing the high-grade ostial stenoses of left CCA (lower arrow) and of left ICA (upper arrow).

CT: Computed tomography; CCA: Common carotid artery; ICA: Internal carotid artery.

according to the Fontaine classification. The patient was still on combined antithrombotic therapy with anticoagulant and antiplatelet agents. The

hematological and the biochemical parameters were normal with the exception of mild reduction of the renal function (estimated glomerular filtration rate [eGFR] 50 mL/min/1.73 m²). The cardiology consultation revealed septoapical hypokinesia with mural thrombosis in the left ventricle and reduced ejection fraction (32%) and significant stenosis of the right coronary artery requiring bypass surgery. On carotid Doppler ultrasonography (DUS), type 2 plaque (according to the Gray-Weale classification) of the left ICA was detected with a peak systolic velocity of 250 cm/sec, corresponding to >70% stenosis.^[1] The computed tomography (CT) angiography showed two tandem ostial stenoses of the left ICA (70%) and of the left CCA (80 to 90%) (Figure 1). Since the patient had multifocal atherosclerosis, the carotid stenoses needed to be addressed first and the coronary stenosis at the next stage. After discussing the various therapeutic options, a decision was made to perform one-stage hybrid procedure. A written informed consent was obtained from the patient.

Through a typical longitudinal incision along the anterior border of the left sternocleidomastoid muscle, the left-sided CCA and its bifurcation were exposed. The ICA was followed maximally in a cranial direction. After heparinization with 5,000 UI unfractionated heparin (UFH) and by medically controlled hypertension, the ICA was clamped as cranially as possible followed by the clamping of CCA and external carotid artery (ECA).

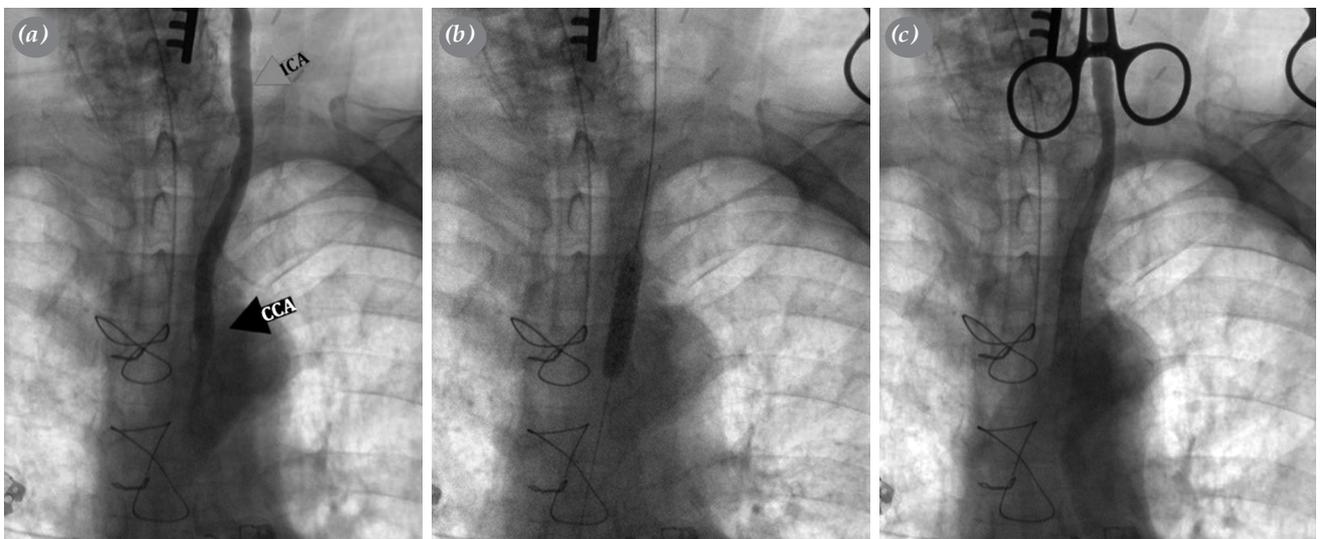


Figure 2. (a) An intraoperative angiography demonstrating high-grade ostial stenosis of the left CCA. (b) One-staged balloon dilation and stenting with an 8x29-mm balloon-expandable stent. (c) The final angiography showing good position of stent without residual stenosis.

CCA: Common coronary artery.

After longitudinal arteriotomy along the course of the left CCA and ICA, thromboendarterectomy (TEA) without fixation of the intima was performed. A synthetic vascular patch (1/7 cm) was implanted from the CCA to ICA on the left side. Before the patch was completely sutured, a 7Fr vascular sheath size was inserted through it. At this time, the CCA was fixed with rubber holders. Intraoperative angiography was performed to precisely define the location of the high-grade ostial stenosis of the left CCA (Figure 2a). Using a 0.035-inch guidewire, a 8×29-mm balloon-expandable stent (Isthmus Logic[®], Alvimedica Medical Technologies Inc., Istanbul, Turkey) was inserted and the lesion was stented (Figure 2b). The control angiography showed restoration of the blood flow without residual stenosis (Figure 2c). After removal of the sheath, by the clamped ICA, the antegrade flow in the CCA was released, followed by the release of the retrograde flow in the ICA, and multiple flushes were performed in the region of the vascular patch which was, then, completely sutured. The next step was



Figure 3. A CT angiography one month after the procedure showing two reconstructions with a patent vascular patch without migration of stent.

ICA: Internal carotid artery; CCA: Common carotid artery; CT: Computed tomography.

staged de-clamping of the CCA and ECA followed by de-clamping of the ICA (total clamping time: 30 min). During the entire period of the procedure, near-infrared spectroscopy (NIRS) monitoring was used to measure cerebral oxygenation. As the cerebral perfusion remained normal, shunting was not necessary.

In the early postoperative period, the patient had no neurological symptoms. He was discharged with dual antithrombotic therapy with anticoagulant and antiplatelet agents. The control CT arteriography one month after the operation showed a patent left CCA without migration of the stent and well-functioning vascular reconstruction of the left ICA (Figure 3). At 1, 6 and 12 months of follow-up, the patient was symptom-free. In addition, DUS showed well-functioning vascular reconstruction without acceleration of the blood flow velocity.

DISCUSSION

Doppler ultrasonography is the first-line imaging modality for the diagnosis of carotid stenosis. In patients with abnormal results, we routinely perform additional CT angiography to define in detail the anatomy of the lesions from the aortic arch to the intracranial vessels and as a precise screening test for kinking. About 10 to 25% of the general population have some forms of elongation or kinking of the carotid arteries.^[2] For the treatment of these anomalies, endovascular procedures with stenting are not feasible.

Carotid artery stenting (CAS) has developed rapidly over the last three decades and has become an attractive option, as it is less invasive than TEA and is associated with a lower risk for surgical complications.^[3,4] However, taking into consideration the tandem carotid stenoses in our case, an endovascular procedure would be associated with a twice as high risk for embolization. As the patient had concomitant cardiac disease and impaired renal functions, we decided that a hybrid procedure would be the most optimal option for him.

The one-stage intervention with access through the vascular patch has several advantages: the target lesion is much closer than with other accesses which facilitates catheter manipulation and lowers the risk for traumatic complications; less amount of contrast agents is needed which is very important to avoid nephrotoxicity; the controlled release of the antegrade and retrograde blood flow with clamping of the ICA during the entire procedure, it minimizes the risk for embolization. The excellent early result in our case confirms the right therapeutic choice.

In conclusion, the presented case demonstrates that a hybrid procedure with retrograde carotid stenting can be a safe and effective therapeutic option by double high-grade ostial carotid stenoses, even in patients with cardiac comorbidities. It allows solving of two hemodynamic problems in one segment with a single access, having an important advantage of direct surgical control by possible embolization.

Declaration of conflicting interests

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