

Multiple Aneurysms on the Supraclinoid Segment of the Internal Carotid Artery

İnternal Karotid Arterin Supraklinoid Bölümü Üzerinde Çoklu Anevrizma

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Abstract: A rare case with multiple aneurysms located on a single segment of the internal carotid artery is presented. A 43 year-old woman with subarachnoid hemorrhage was referred to our department. Digital subtraction angiography was performed, and two saccular aneurysms on the supraclinoid portion of the left internal carotid artery were detected. Both of the aneurysms were clipped successfully through a pterional approach. This very rare occurrence of two consecutive aneurysms on one artery and surgical treatment options are discussed.

Key Words: Internal carotid artery, intracranial aneurysm, surgery

Özet: İnternal karotid arterin bir segmenti üzerinde yerleşmiş birden fazla anevrizması olan nadir bir olgu sunuldu. Subaraknoid kanama nedeniyle başvuran hastanın anjiyografisinde sol internal karotid arterin supraklinoid segmenti üzerinde iki ayrı anevrizma saptandı. Anevrizmalar pteriyonal girişimle kliplendi. Tek bir arter üzerinde yerleşmiş anevrizmaları olan bu nadir olgu sunularak cerrahi tedavi seçenekleri tartışıldı.

Anahtar Sözcükler: Cerrahi, internal karotid arter, kafa içi anevrizma

INTRODUCTION

The best way of treating multiple intracranial aneurysms (MIA) is still debated (7,8,20,21,22,23), but most neurosurgeons endorse clipping of all aneurysms during a one-stage operation, beginning with the one that has bled (13). The management of MIA become more difficult when they are located close to each other. We present our approach in such a patient who had tandem aneurysms on the left supraclinoid internal carotid artery.

CASE REPORT

A 43 year-old woman was admitted to a local hospital with a sudden and severe headache, she was

suspected of having subarachnoid hemorrhage (SAH). Since her computerized tomography (CT) was negative for blood, lumbar puncture was performed which established the diagnosis. She was then referred to our hospital for further investigation and treatment.

On admission to our hospital she was grade 1 according to World Federation of Neurosurgical Societies (WFNS) Scale (3), was neurologically intact but had neck stiffness. She had no family history or other risk factors for SAH. Her CT scan was Fisher grade 1 (4). An digital subtraction angiography (DSA) was performed and two saccular aneurysms on the C7 segment (2) of the left internal carotid artery (ICA) were detected (Figure 1). One week



Figure 1: Preoperative left carotid angiogram, oblique view. It was possible to visualize the two separate aneurysms on the supraclinoid segment of the left ICA.

later, surgery was performed. Initially, the cervical portion of the left ICA was prepared to control the bleeding that might occur from a premature rupture during surgery. Pterional craniotomy was performed, subarachnoid dissection revealed a saccular aneurysm (0.3x0.2 cm) originating from the

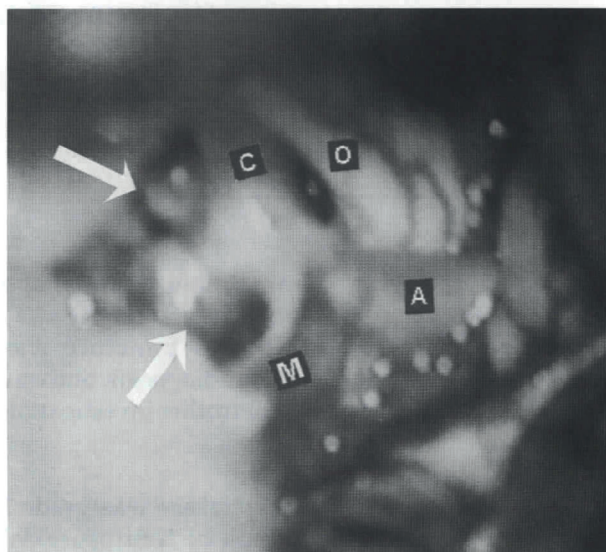


Figure 2: The aneurysms were dissected via a left pterional craniotomy. The proximal one was projecting inferolaterally. The distal and larger one was lying posteroinferolaterally and there was 2 mm of intact wall of ICA between them. (A: anterior cerebral artery, C: internal carotid artery, M: middle cerebral artery, O: optic nerve, arrows: aneurysms)

body of the ICA lying inferolaterally, and a second larger aneurysm (0.9x0.5 cm) lying posteroinferolaterally 2 mm beyond the first one (Figure 2). The posterolateral wall of the second aneurysmal sac was the site of rupture. Neither of these aneurysms were located at a junction between the ICA and one of its branches. The left posterior communicating artery (PCoA) was aplasic and the left anterior choroidal artery originated distal to the second aneurysm. The ICA bifurcation, A1, and M1 segments were dissected for distal control. After the necks of the aneurysms were prepared, the larger ruptured one was clipped. Since the two aneurysms lay very close to each other, the direction of application of the first clip was very important. We tried to put the clip via a more medial and posterior direction, so that it did not obscure the neck of the second aneurysm. Then, we easily placed the second on the neck of the proximal aneurysm (Figure 3). Both aneurysms were punctured to be sure that they had been ligated completely. After the administration of cisternal papaverin, the dura was sutured in a water-tight fashion. The operation was finished with the subsequent closure of the bone and skin flaps.

The postoperative period was uneventful. The DSA on the seventh postoperative day revealed no aneurysmal filling and/or vasospasm. The patient

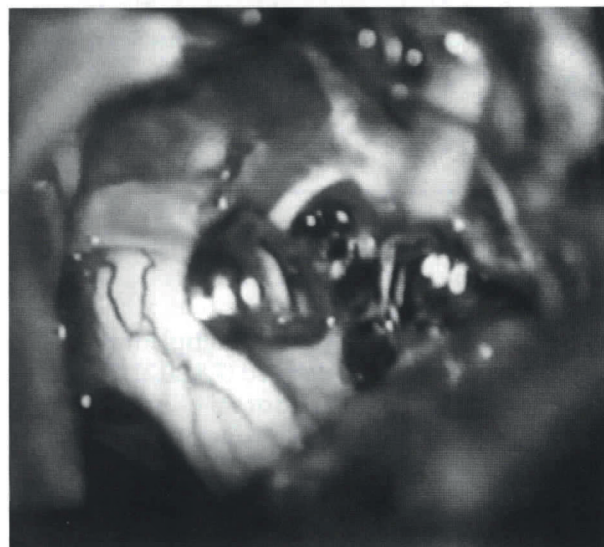


Figure 3: Operative view after the sequential clipping of the aneurysms. The distal one was initially clipped via a more medial and posterior approach not to complicate the clipping of the proximal aneurysm.

was discharged with a Glasgow Outcome Score (12) of 5 on the ninth day of the surgery and had no complaints in the next six months during her follow-up.

DISCUSSION

Intracranial aneurysms are multiple in 15-34% of cases (5,6,7,17,18). There is a female predominance and hypertension is present in most patients (1,14,15). The reason for the formation of intracranial aneurysms is a combination of an inherent weakness of the vessel wall with hemodynamic and other contributing factors, such as arteriosclerosis (10,11,19). The weak sites are usually scattered on the bifurcation points where there is a division or splitting of the internal elastic lamina. As the resistance of the arterial wall in the intracranial compartment essentially depends on the internal elastic layer, aneurysms tend to develop at the bifurcation points of the arteries. When the number of weak sites on the vessels are more than one, the risk of development of MIA increases. Since all aneurysms do not grow at the same pace, they may differ in size when detected (16). Carotid and pericallosal artery aneurysms are especially frequent in cases with MIA (7,9,14).

The rate of MIA in our series is 15 % but this number increases to 22 % in the presence of an ICA aneurysm which is in accordance with the literature. Among our 103 patients with ICA aneurysms, 34 had aneurysms at the posterior communicating artery origin of ICA. We presented this unique case since such association of two close and discrete aneurysms was an exception in our SAH patients.

In our presented case the two aneurysms were entirely located on the body of the ICA and there was no relation with any branch of the ICA. Thus, there was a healthy wall of 2 mm in length between them. The distal one was larger and this might be due to a more prominent and larger defect in the vessel wall rather than the hemodynamic effects. The aplasia of the left PCoA may indicate a more complex congenital abnormality leading to multiple aneurysm formation at this part of the artery. We could not find any reported case with multiple aneurysms located on the same segment of a major cerebral artery as in our case.

Such proximity of the two aneurysms could create further difficulty during clip application since one of them may rupture while clipping the other.

Therefore, we should initially prepare the proximal supraclinoid ICA, A1 and M1 segments for possible temporary clip application. In addition, we dissected the cervical portion of the left ICA as an alternative proximal control in case of a short supraclinoid ICA segment that could have been already occupied by the two aneurysms. In this manner, the first clip might obscure the neck of the other aneurysm. As the aim should be treating the ruptured aneurysm first (13), we clipped the distal one first which had bled. During this maneuver, we avoided any traction on the second aneurysm and put the clip via a more medial and posterior direction in order to have a free place for clipping of the second one. Fortunately, we were able to treat these two aneurysms without any intraoperative complication.

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