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Giant Distal Superior Cerebellar Artery Aneurysm: Case Report and Review of the Literature

Dev Distal Yerleşimli Superior Serebellar Arter Anevrizması: Olgu Sunumu ve Literatürün Gözden Geçirilmesi

M. Engin ŞENVELİ[1]
Ahmet ACIDUMAN[2]
Deniz BELEN[3]

[1,3] S.B. Dışkapı Yıldırım Beyazıt Eğitim ve Araştırma Hastanesi II. Nöroşirürji Kliniği, Ankara-Turkey
[2] S.B. Etlik İhtisas Hastanesi Nöroşirürji Kliniği, Ankara-Turkey

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ABSTRACT

Aneurysms arising from the distal portion of superior cerebellar artery are infrequently seen. They are usually assumed to result from local arterial wall disruption like proximal supratentorial artery aneurysms. Depending on institutional facilities, these particular aneurysms can be treated either by a microsurgical procedure or interventional radiological technique. In general, surgical clipping has been recommended for these lesions. In this report we describe a 44-year old man who presented with a subarachnoid hemorrhage in the right cerebellopontine angle and was diagnosed with a giant aneurysm arising from the cisternal portion of the right superior cerebellar artery. The patient underwent surgery; microsurgical clipping of the aneurysm through subtemporal craniotomy was performed with no difficulty. We conclude that surgical therapy is suitable for the majority of aneurysms arising from the distal portion of the superior cerebellar artery.

KEY WORDS: Giant aneurysm, Superior cerebellar artery aneurysm, Surgery

ÖZ

Distal yerleşimli superior serebellar arter anevrizmaları nadir görülürler. Bu anevrizmaların, supratentorial yerleşimli anevrizmalarda görüldüğü gibi damar duvarı zayıflığı sonucu oluştukları düşünülmektedir. Bu tür anevrizmaların tedavisinde çalışılan kurumun olanaklarına bağlı olarak mikrocerrahi yöntem ya da girişimsel radyolojik işlem tercih edilebilir. Tedavilerinde genellikle cerrahi girişim önerilmektedir. Bu çalışmada, sağ serebellopontin köşede subaraknoid kanama ile başvuran ve dev distal superior serebellar arter anevrizması tanısı konulan 44 yaşında bir erkek hasta literatür bilgileri gözden geçirilerek sunuldu. Anevrizma, subtemporal kraniyotomi yolu ve mikrocerrahi yöntem kullanılarak bir zorlukla karşılaşılmadan kliplendi. Bu yerleşimdeki anevrizmaların çoğunluğunun cerrahi yöntemle tedavi edilebileceğini düşünüyoruz.

ANAHTAR SÖZCÜKLER: Cerrahi tedavi, Dev anevrizma, Superior serebellar arter anevrizması

Correspondence address:
Deniz BELEN
Address: 60. Sokak 16-2,
Emek, 06510 Ankara
Phone: +90.312. 223 69 75
E-mail: denizbelen@hotmail.com

INTRODUCTION

Superior cerebellar artery (SCA) aneurysms are rare vascular lesions accounting for as low as 0.2% of all intracranial aneurysms (17). They are usually encountered in two anatomic locations; the majority of them originate from the portion close to the basilar artery (BA)-SCA junction followed by more distal locations (6). Distal aneurysms arising from cortical segment of SCA are extremely rare and only few cases have been reported in the literature (19). Owing to proximity of particularly cisternal giant SCA aneurysms to the vital structures, the management of these lesions is sometimes challenging. Currently, surgery is the preferred treatment for the majority of these lesions. Although trapping the lesion via occlusion of the parent vessel has been adopted in most reported cases, surgical strategies differ according to the affected vessel segment (3). In this report we present a case that harbored a giant distal SCA aneurysm with problematic clinical course treated by microsurgical clipping.

CASE REPORT

A 44-year-old man was admitted to the hospital after losing his consciousness. Before admission, he had suffered from headache, nausea, and vomiting for 2 weeks. On neurological examination right third and fourth cranial nerve palsies, and left hemiparesis were found besides the unconsciousness. Nuchal rigidity was positive. His vital functions were all normal. Cranial computed tomography (CT) showed a right Fisher grade 3 cerebellopontine angle (CPA) hemorrhage (Figure 1). His medical history obtained from a local hospital revealed that he had had 2 additional subarachnoid hemorrhage attacks without neurological deficit within the last three years and that he had refused further investigations. The patient's clinical presentation was classified as WFNS 4 subarachnoid hemorrhage (SAH) score. No angiography was planned for the patient as a digital angiography system was not accessible in the hospital in that time. The patient became conscious and neurologically normal in two weeks with conservative treatment. The patient could not be transferred to an advanced radiology department because of social security reasons and a conventional angiography through the femoral artery route was performed on the 25th day of SAH. Angiograms of the anterior cerebral circulation and the left vertebral artery did not show any vascular abnormality. A large irregular shaped right superior cerebellar artery aneurysm was detected on the right vertebral angiogram (Figure 2). The fundus of the aneurysm and the surrounding vessels were not clearly defined because of ongoing radiological vasospasm. On the second day following the angiography, a new SAH developed in the patient compelling him to the same neurological status that was noticed on admission. The patient recovered from this condition for a second time except for slight left hemiparesis. On the 15th day of ensuing SAH, the patient underwent surgery under lumbar drainage. The tentorial edge was explored through a right subtemporal approach and cut carefully after freeing the trochlear nerve. A partially thrombosed aneurysm was seen when the tentorial edges were hanged. The aneurysm was located on the SCA, 20mm distal to the BA-SCA junction and just behind the brainstem perforating arteries, and was 36mm in length and 15mm at the neck (Figure 3A). The aneurysm's fundus was directed infero-laterally toward fifth cranial nerve. After dissecting the aneurysm from surrounding tissues, a curved aneurysm clip was applied to the neck in parallel to the SCA main trunk. However, the clip slipped away immediately following placement, indicating

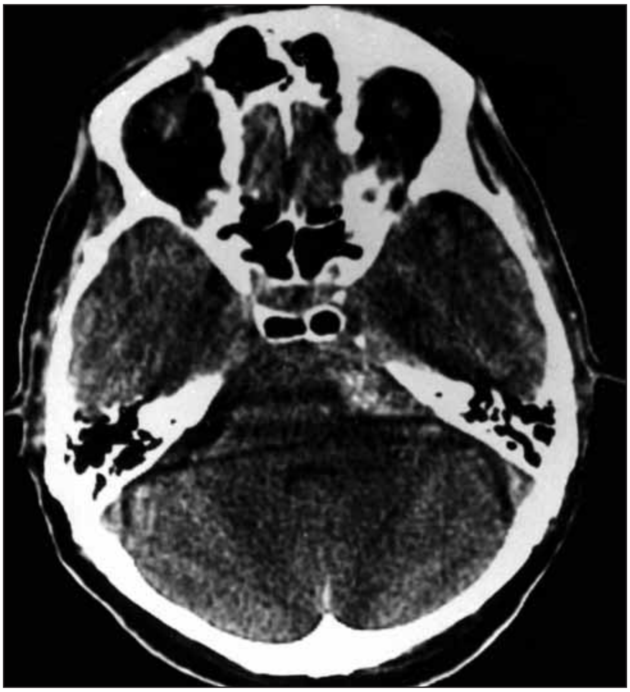


Figure 1: *Figure 1. Cranial CT of the patient obtained on admission revealing a right PCA hemorrhage (Fisher grade 3).*

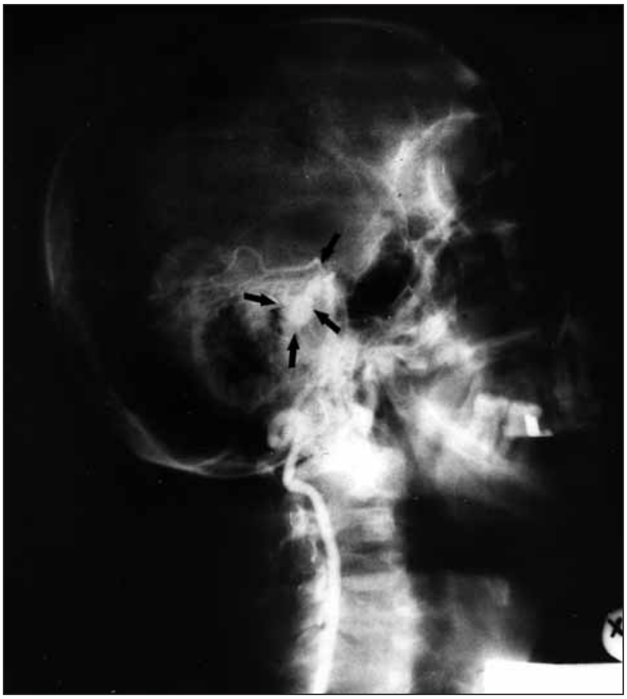
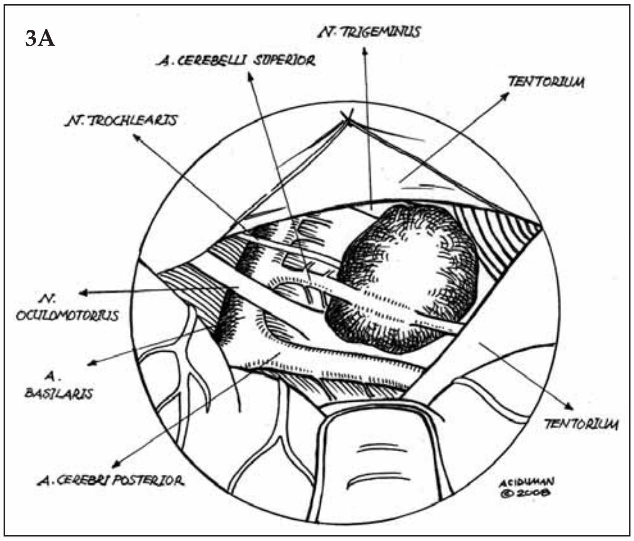


Figure 2: *Conventionally performed selective right lateral vertebral angiogram showing irregular shaped large SCA aneurysm (lower arrows). The upper arrow indicates the right posterior cerebral artery. Note that the distal SCA could only be vaguely defined due to vasospasm.*



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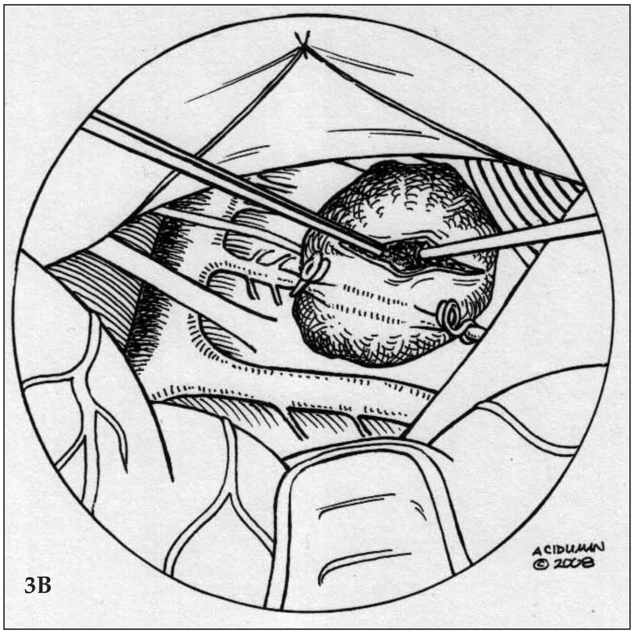

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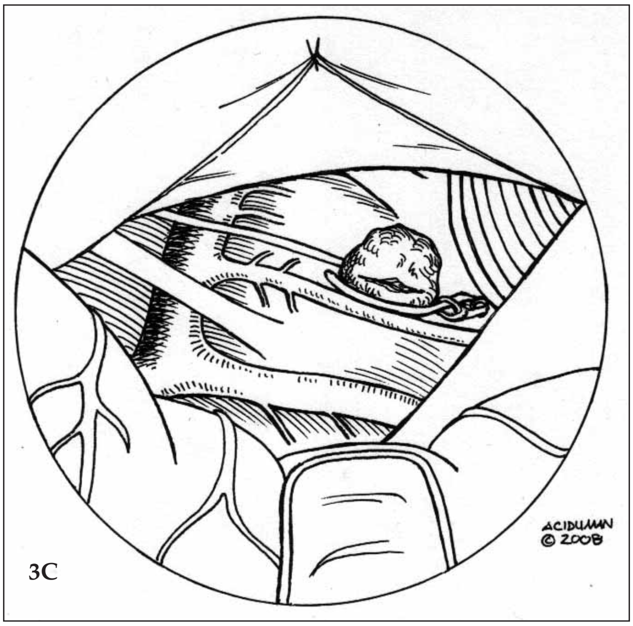

3C

Figure 3: *Schematic drawings show the intra-operative surgical field:* ***A****) following right temporal lobe retraction and cutting the tentorial edge infero-laterally, the giant distal SCA aneurysm was exposed (tentorial cut ends were hanged),* ***B****) the fundus of aneurysm was opened with proximal and distal controlling of the main arterial trunk and the thrombus removed completely together with the atherosclerotic plaques,* ***C****) the aneurysm fundus was mobilized carefully from the brainstem towards the superior aspect of the SCA and a permanent clip was applied to the neck with no difficulty.*

existence of organized thrombus formation and an atherosclerotic plaque inside the neck. Two temporary clips were applied for 9 minutes proximally and distally to the neck and the fundus of the aneurysm was opened. Once the thrombus formation and plaques were removed completely, a permanent aneurysm clip was applied to the neck with no difficulty (Figure 3 B and C). Blood flow in the SCA was controlled by observation after temporary clips removal. The patient awakened from general anesthesia without any problem. The early postoperative period was uneventful and no additional deficit was noticed. The patient was discharged with mild left hemiparesis. Three weeks later the patient presented with confusion. A communicating hydrocephalus was seen on cranial CT and a ventriculo-peritoneal shunt operation was performed. The patient's symptom resolved subsequently and he was discharged from the hospital. He was followed-up more than 2 months and died of acute myocardial infarction by the end of the 3rd month. The intended postoperative control angiography could therefore not be obtained.

DISCUSSION

Aneurysms arising from SCA are frequently reported at the BA-SCA junction in the literature (6, 17). In reality, aneurysms originating from the SCA–basilar artery trunk junction are not uncommon and are erroneously named "SCA aneurysms" by some authors (3). Other authors call them by the distinctive term of "laterobasilar aneurysms," as they are not strictly aneurysms of the SCA itself (3). The SCA can be divided into two segments: the cisternal segment (from the anterior pontine segment to the quadrigeminal segment), and the cortical segment equivalent to the hemispheric, vermian, and marginal branches (19). Aneurysms arising from one of the SCA segments are quite rare, accounting for only 0.2% of all intracranial aneurysms (2, 3). Although many of these lesions are saccular, fusiform and dissecting aneurysms are not unusual (1, 5, 7, 9, 13, 16, 17). Some cases are associated with arteriovenous malformations and a history of trauma could be traced in other cases (4). The SCA may be particularly vulnerable to injury caused by stretching of the edge of the tentorium (18). Despite being a distal lesion, a mycotic origin has seldom been proven in SCA aneurysms (11, 17).

The relevant literature has revealed that in most cases (~ 90%) the aneurysms rupture, and patients present with an SAH (2, 12, 14). Rebleeding has frequently been reported (3). Although rare, peripheral SCA aneurysms may present with ischemia and this finding should be recognized to prevent SAH from an undiagnosed lesion (4). Distal posterior circulation aneurysms may have distinctive clinical features in accordance with their location. The trochlear nerve, located beneath the tentorium, is vulnerable to injuries related to aneurysms involving the nearby posterior cerebral artery (P2 and P3 segments) or to SCA (4, 6, 17). Third and fifth cranial nerve palsies have also been reported in SCA aneurysm cases as evident in the presented case (17). Loss of consciousness associated with left hemiparesis in this patient indicated a brainstem vascular event which may have been occurred most probably by vasospasm of related feeding vessels.

The diagnosis of ruptured peripheral aneurysm of the superior cerebellar artery should be considered when subarachnoid hemorrhage predominates in the perimesencephalic and superior cerebellar cisterns (3, 15). Careful angiographic evaluation is essential to distinguish peripheral aneurysms of the superior cerebellar artery from aneurysms of the posterior cerebral artery, because the former's infratentorial location requires a modification of the surgical approach. The need to demonstrate the presence or absence of a surgical neck and to ascertain the proximity of the aneurysm to major branches are also relevant concerns for surgical planning, as these features can often only be observed with the use of magnification views in various planes (3, 6, 20). At this point we were not able to obtain the ideal angiographic examination due to technical reasons. The possibility of an extra-axial cavernous malformation or hemangioma/ hemangiopericytoma of the fifth cranial nerve may be included in the differential diagnosis during the evaluation of patients with cranial CT or magnetic resonance image techniques indicating a restricted hematoma in the PCA (10).

Microsurgical neck clipping is the standard procedure for saccular aneurysms of the distal SCA (6, 20). Currently, the majority of patients are treated surgically. Treatment of thrombosed and fusiform aneurysms may sometime include trapping and proximal clipping (17). In any event, care should be taken to preserve ventral brainstem perforating branches, although there is generally a paucity of these vessels arising from the anterior pontine and lateromesencephalic portions of the superior cerebellar artery, which are well collateralized with the paramedian and short circumferential perforators from the basilar artery (10). However, anatomical variations should be considered on an individual basis. For instance, loss of consciousness and hemiparesis in the presented case may possibly point to involvement of the perforating arteries that originate from SCA. Endovascular embolization is useful for the treatment of patients in poor clinical grade, with concurrent medical conditions, or in senility, and in those cases who present with fusiform and dissecting aneurysms (8, 17). In some endovascular cases, the selected modality was permanent occlusion of the parent vessel, imitating the surgical experience, which occludes the aneurysm by surgical trapping (22). Recently, stenting procedures have been used especially for fusiform SCA aneurysms aiming to assure parent artery patency (21).

The surgical approach depends on the site of the aneurysm (6). Aneurysms of the cisternal segment may be treated by the pterional transsylvian, subtemporal transtentorial or occipital transtentorial approaches, whereas aneurysms of the cortical segment are usually clipped through the suboccipital approach for the marginal branch, infratentorial supracerebellar or occipital transtentorial approach for the hemispheric branch, and suboccipital, infratentorial supracerebellar, or occipital transtentorial approach for the vermian branch (19, 20). In our case, we preferred the subtemporal approach because angiographic findings suggested that the aneurysm was partially thrombosed indicating a larger lesion and it was located more proximally. The BA-SCA junction, third, fourth and fifth cranial nerves could be observed and protected with the wide surgical field obtained through the subtemporal approach. Proximal control of SCA is easier in this procedure when compared with the suboccipital approach, and the relationship between the brainstem and aneurysm can be considered without difficulty. More distal aneurysms can be approached through a suboccipital retromastoid craniotomy (20). Dissection is carried out over the cerebellar hemisphere. In some cases, the aneurysm wall may be firmly adherent to the edge of the tentorial hiatus and has to be mobilized carefully to some degree before a clip can be applied (20).

One concern in the management of SCA aneurysms is to provide parent artery patency. Although we were able to examine the flow in SCA only subjectively following neck clipping, it is important to assess the collateral reserve by the hemodynamic measurements, including the microvascular Doppler flowmeter or proximal endovascular trial balloon occlusion testing, when proximal occlusion of the SCA is needed (11).

Patients who present with cisternal-cortical junction or more proximal SCA aneurysms may have a poor prognosis as is the case with anterior circulation aneurysms (3, 17). The outcome for patients with aneurysms arising from the cortical segment of the SCA is mainly excellent or good (3, 19). In the previously reported cases almost all patients underwent delayed surgery due to brain swelling except for endovascular treatment. The unfortunate experiences with early surgery have suggested that delayed surgery is preferable; not only because dissection is easier but also the risk of rebleeding and vasospasm are lower (11). However, considering the risks of rebleeding and vasospasm, it has been recommend that surgery should be undertaken in the acute stage for distal aneurysms such as those arising from the cortical segment of the SCA. (19).

CONCLUSIONS

Aneurysms located in the SCA are rare but can develop in any segment of the artery. The risk for these lesions is related to the frequency of SAH and they should therefore be rapidly addressed. Many cases in the literature have been controlled by parent vessel occlusion; however, this approach should be avoided as often as possible. A surgical approach to the SCA is favorable in most cases without a significant risk of morbidity.

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