



One-Stage Operation for Rare Multiple Mirror Intracranial Aneurysms: A Case Report and Literature Review

Nadir Çoklu Ayna İntrakraniyal Anevrizmalar İçin Tek Aşamalı Ameliyat: Bir Olgu Sunumu ve Literatürün Gözden Geçirilmesi

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ABSTRACT

Although intracranial multiple aneurysms are not uncommon, multiple mirror aneurysms are relatively rare. A few isolated cases have been described. However, to the best of our knowledge, 3 pairs of pure symmetrical mirror aneurysms in one patient have not been reported yet. We present a case of multiple mirror aneurysms involving the bilateral middle cerebral artery (MCA) bifurcations and posterior communicating arteries (P-com A) confirmation by one-stage operation. The possibility of one-stage treatment must be considered before surgery. Missed diagnosis and misdiagnosis must be avoided before one-stage operation for multiple mirror aneurysms.

KEYWORDS: Multiple intracranial aneurysm, Mirror aneurysms, Subarachnoid hemorrhage (SAH), Preoperative evaluation, One/multiple stage treatment

ÖZ

İntrakraniyal çoklu anevrizmalar nadir değildir, ama çoklu ayna anevrizmalar nispeten nadirdir. Birkaç ayrı olgu tanımlanmıştır. Ancak bildiğimiz kadarıyla tek bir hastada 3 çift saf simetrik ayna anevrizması daha önce bildirilmemiştir. Bilateral orta serebral arter bifurkasyonları ve posterior komünikan arter üzerinde çoklu ayna anevrizmalarının bulunduğu ve tek aşamalı ameliyatla doğrulandığı bir olgu sunuyoruz. Cerrahiden önce tek aşamalı tedavi olasılığı dikkate alınmalıdır. Çoklu ayna anevrizmalarının tek aşamalı ameliyatından önce tanının atlanması ve yanlış tanıdan kaçınılmalıdır.

ANAHTAR SÖZCÜKLER: Çoklu intrakraniyal anevrizma, Ayna anevrizmaları, Subaraknoid kanama (SAK), Preoperatif değerlendirme, Tek/çoklu aşama tedavisi

INTRODUCTION

The incidence of multiple aneurysms varies from 12.9% to 26.4%(15). Mirror-like or twin aneurysms constitute 9.4% of overall aneurysms patients in the series of Campos(2) and 36% of multiple aneurysm patients studied by Porter(15). Mirror aneurysms can be found in different vascular segments of the intracranial arterial system including anterior and posterior circulation, however, there was predominance in the middle cerebral artery (MCA) of internal carotid artery system, followed by the posterior communicating artery (P-com A)(14).

Computed tomographic angiography (CTA) and digital subtraction angiography (DSA) may be insufficient in diagnosing bilateral multiple intracranial aneurysms due to superimpositions and vision neglect(8). More detailed diagnostic images may therefore be obtained with three-dimensional (3D) technique and advanced magnetic images including 3D-CTA and 3D-DSA as well as susceptibility-weighted magnetic resonance imaging (SW-MRI).

Treatment of mirror cerebral aneurysms represents a major neurosurgical challenge. The best therapeutic option, that is whether to approach all aneurysms during one surgery through a single craniotomy or to perform two craniotomies is controversial. Bilateral aneurysms are usually clipped through 2 craniotomies, with the first one approaching the ruptured aneurysm and the second one approaching the unruptured contralateral aneurysm(9,18,19). According to some authors, bilateral aneurysms at certain locations can be clipped safely by unilateral craniotomy (5,7,10,12,16).

Although mirror aneurysm is not uncommon, 3 pairs of pure symmetrical mirror aneurysms in one patient have not been reported yet. We present a case of multiple mirror aneurysms involving the bilateral MCA bifurcations and P-com A confirmation by one-stage operation.

CASE REPORT

A 71-year-old woman was admitted in our department with severe headache and altered consciousness. She

had a hypertension history for 4 years. There was nothing significant in the personal and family history. Hunt-Hess grading was III. Emergency brain CT revealed left Sylvian fissure and suprasellar cistern subarachnoid hemorrhage (SAH) (Figure 1). Preoperative cerebral angiography disclosed in aneurysms located bilaterally at the P-com A, on the left MCA-M1 segment and on the right MCA bifurcation (Figure 2A-C). The aneurysm located on the left P-com A was thought to have ruptured because of the obvious hemorrhage in the left Sylvian fissure.

One-stage bilateral pterional approach craniotomy for bilateral cerebral aneurysms was performed within 72 hours after SAH due to patient's economic state and surgical preference for MCA aneurysms. During surgery, we found another 2 undetected micro-aneurysms. One was located on the left MCA bifurcation. The other one was on the right MCA-M2 bifurcation. All 6 aneurysms were clipped successfully. However, re-reviewing preoperative angiography, we could only find one aneurysm on left MCA bifurcation in CTA, but not in DSA. After surgery, vasospasm developed and aneurysms disappeared (Figure 3), but her clinical evolution was satisfactory with partial recovery of her neurological symptoms and signs. She recovered and was discharged 3 weeks after the clipping operation. One-year follow-up showed that the patient was doing well.

DISCUSSION

To date, Meissner performed the largest prospective study of patients with unruptured mirror aneurysms (14). However, their prevalence in the general population is still unclear due to sporadic, incomplete imaging and non-standardized radiological review. A congenital predisposition and the early embryological derangement of vascular wall formation have been suggested in their genesis (3), of course, hemodynamic forces might be responsible for triggering the development of the aneurysm.

It is necessary to evaluate the family history of SAH and variety of systemic disorders such as familial vasculopathies (Ehlers-Danlos, polycystic kidney disease, fibromuscular dysplasia, Marfan syndrome, Neurofibromatosis Type I), infectious and immune deficiencies (HIV) (1,13,17). Besides, whether clipping or coiling, preoperative evaluation of multiple aneurysms is important. DSA continues to play an important role in the radiological diagnosis of cerebral vascular pathologies. However, as above presented case, missed diagnosis was occurred by only DSA confirmation before operation. Therefore, 3D-CTA and 3D-DSA have started to replace DSA especially in the diagnosis of multiple mirror aneurysms. The advantages of 3D-CTA/DSA over DSA in multiple aneurysm diagnosis are obvious. It is possible to obtain multi-planar images and detailed information can be constructed on aneurysm morphology and vascular relations. This is especially useful when the aneurysm cannot be seen with DSA due to superimposition and can significantly decrease the rate of misdiagnosis and missed diagnosis. For 3D-CTA, it is a non-invasive technique not requiring artery puncture or catheterization and can easily be performed by administering intravenous contrast material. We also obtain very highly detailed images with postoperative 3D-CTA easily. SW-MRI, as a novel technique, has been applied in verification of the fact of hemorrhage due to multiple aneurysms in disputable cases (11).

Whether clipping or coiling should be chosen for multiple mirror aneurysms is still debated. The advantages of endovascular coiling therapy for mirror aneurysms are micro-invasion and fast recovery, but coiling is more expensive and causes more rebleeds of the treated aneurysm than clipping. Here we just discuss surgical treatment for multiple mirror aneurysms, one-stage or multi-stage operation. It is known that the ideal surgical treatment in patients with mirror aneurysms is clipping all aneurysms. However, there is controversy regarding the best surgical option, that is whether

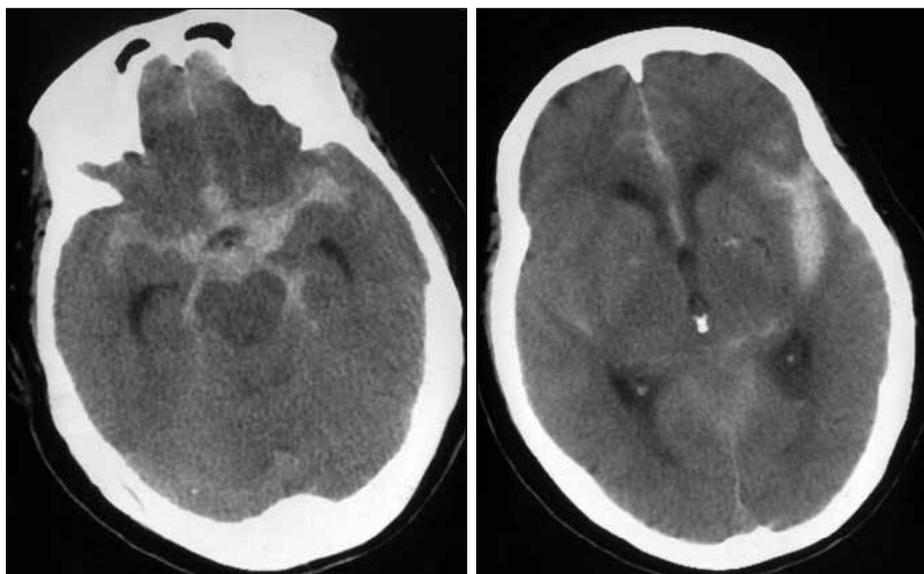


Figure 1: Preoperative cerebral CT scan shows SAH.

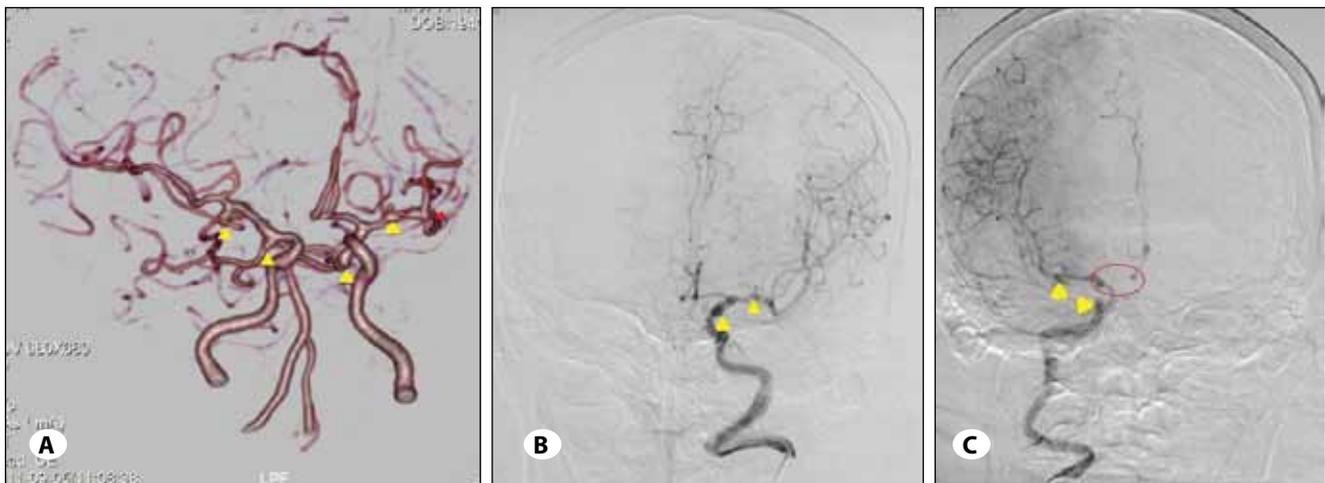


Figure 2: Preoperative cerebral angiography: **A)** shows 4 aneurysms located bilaterally at the P-com A, on the left MCA-M1 segment and on the right MCA bifurcation (yellow arrows). Red arrow shows one of the additive surgical findings, located on the left MCA bifurcation not on the right. **B)** and **C)** show 4 aneurysms and deficiency of right anterior cerebral artery (ACA) A1 segment before surgery in left and right internal carotid DSA of anterior-posterior position.

to approach all aneurysms during one surgery through a single craniotomy or to perform two craniotomies. Two-stage surgery at two different sessions has been recommended for multiple mirror aneurysms to reduce the mortality (6). It is stated that one-stage operation increases the time of surgical procedure, is more invasive for brain tissue and cerebral vessels due to longer retraction. It will increase the incidence of delayed neural function dysfunction. However, more investigators advocate one-stage operation (7,12,16,19). They propose some disadvantages of multi-stage treatment, increased time and cost in the hospital, possibility of unclipped aneurysm rupture and much more psychological pressure to the patient due to multiple operations. Wachter analyzed a database including 1016 patients with aneurysm. They concluded that clipping of more than 1 aneurysm in a 1-stage operation within 72 hours after SAH can be performed without increasing the risk of cerebral vasospasm and symptomatic vasospasm (19). As our experience, we believe one-stage operation should be recommended for general patients with multiple mirror aneurysms except those not suitable for surgery.

Another problem is whether to choose bilateral or unilateral craniotomy. Although some authors have published unilateral craniotomy to clip bilateral aneurysms (4,7,16), the decision to operate bilateral aneurysms still should be made for each individual on the basis of the age of the patient, the clinical condition, size, location and projection of the aneurysm, and the experience of the surgeon.

CONCLUSION

We describe a very rare case of multiple mirror intracranial aneurysms arising bilaterally from the MCA and both P-com A. The possibility of one-stage treatment must be considered before surgery by using 3D-CTA, 3D-DSA and SW-MRI, which determine aneurysmal number, size, projection, and

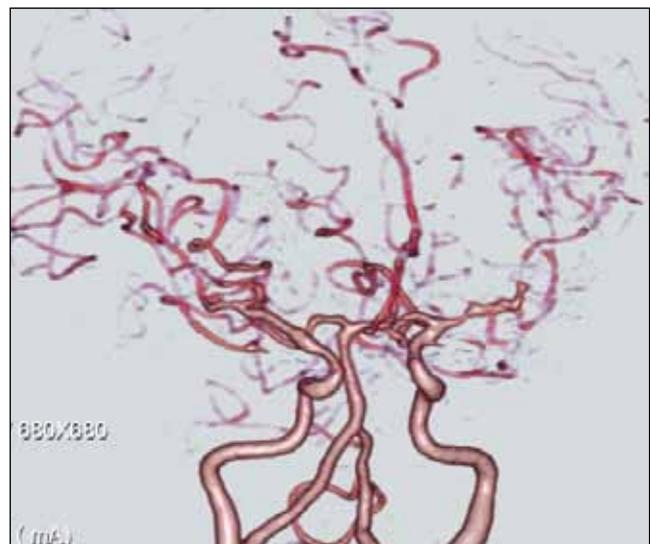


Figure 3: CTA of 10 days after operation shows vasospasm developed and aneurysms disappeared.

relationship to the parent vessel and contiguous branches. The ruptured aneurysm should be located and clipped first. Missed diagnosis and misdiagnosis must be avoided before one-stage operation for multiple mirror aneurysms.

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