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양측성 천막상부 뇌동맥류에 대한 일측성 일회접근 결찰술 : 증례보고

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One Stage Clipping Through Unilateral Approach for Bilateral Supratentorial Aneurysms: A Case Report

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---- Abstract

Patients harboring bilateral supratentorial aneurysms can be approached via the contralateral pterional approach in selected cases. A 48-year-old woman was found to have two aneurysms at the left middle cerebral artery and the right anterior choroidal artery. The main direction of the anterior choroidal artery aneurysm was posterior. A direct clipping was performed via the left pterional approach. After the left middle cerebral artery aneurysm was clipped, the contralateral anterior choroidal artery aneurysm was further exposed and successfully clipped through the contralateral carotico-optic space. The author reports a case of bilateral supratentoral aneurysms that was successfully clipped via unilateral pterional approach, thus avoiding a second craniotomy.

Key words : cerebral aneurysm, bilateral suptratentorial aneurysms, unilateral approach

Introduction

Among patients diagnosed with cerebral aneurysms, the reported incidence of multiple intracranial aneurysms is between 14% and 34%.¹⁻⁸⁾ In 20 to 40% of these patients, the aneurysms are bilateral.¹⁻⁸⁾ Given the actuarial risk of rupture, the surgical goal in patients with bilateral aneurysms is clipping of all lesions. The first craniotomy should be performed on the side of the ruptured aneurysm. The second craniotomy, to be done some time later, should be performed in order to exclude the incidental aneurysm from the circulation. In patients with bilateral aneurysms, surgical clipping of all aneurysms via a unilateral approach would obviate the need for a second

operation. Patients harboring bilateral supratentorial aneurysms can be approached via the contralateral pterional approach in selected cases.

Case

A 48-year-old woman presented with a complaint about loss of consciousness for 1 minute. Hunt and Hess grade was 0 and Fischer grade was I. Neurological examinations diclosed no abnormlity. She was found to have two unruptured aneurysms at the left middle cerebral artery bifurcation and the right anterior choroidal artery by a three-dimensional computed tomographic angiogram. Preoperative cerebral angiogram showed that the main direction of the middle cerebral artery bifurcation aneurysm was lateral(Fig 1A). The size of that was as following: neck * height * width * length = $2.3 \times 1.4 \times 2.0 \times 3.3$ mm. The main direction of the anterior choroidal

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artery aneurysm was posterior(Fig. 1B). The size was 1.9 * 1.7 * 2.0 * 2.2 mm. Both of the aneurysms are not feasibe for coil embolization, so direct clipping was scheduled.



Fig. 1. Preoperative cerebral angiogram shows the left middle cerebral artery aneurysm at bifurcation site (A) and the right anterior choroidal artery aneurysm (B).

With the patient supine, a left frontotemporal craniotomy was performed. The parachiasmatic cistern was first approached and cut to evacuate the cerebrospinal fluid. The left sylvian dissection was performed, and the left middle cerebral artery birfurcation aneurysm was exposed(Fig. 2A). Small daughter sac was seen at the dome of aneurysm. Clipping of the left middle cerebral artery bifurcation aneurysm was successfully done. The prechiasmatic cistern was further dissected to the right side to expose the right optic nerve. The medial surface of the contralateral distal carotid artery was explored superior and lateral to the optic chiasm. The contralateral carotid artery segment lateral to the chiasm was identified and the dissection carried distally. The contaralateral anterior choroidal artery aneurysm could be easily indentified without retracting the optic nerve(Fig. 2B,). The contralateral anterior choroidal artery aneurysm was further exposed and successfully clipped through the contralateral carotico-optic space(Fig. 3). The wound was closed as usual. The whole procedure took 3 hours, and the patient experienced minimal blood loss.





Fig. 2. Intraoperative microscopic views show the aneurysm of left middle cerebral artery at bifurcation (A) and the right anterior choroidal artery (B).



Fig. 3. Postoperative skull X-ray shows blilateral clipping and left frontotemporal craniotomy.

The postoperative course was good and the patient was discharged 7 days after surgery. She displayed no neurological deficit. Postoperative cerebral angiography was done and showed that aneurysm was disappeared(Fig. 4A and 4B).



Fig. 4. Postoperative cerebral angiograms show complete obliteration of aneurysms at bifurcation of the left middle cerebral artery (A) and the right anterior choroidal artery aneurysm (B).

Discussion

Since Yasargil et al⁹⁾ first reported a case of an internal carotid-ophthalmic artery aneurysm clipped contralaterally, several authors¹⁰⁻¹⁵⁾ have used this approach in selected patients with bilateral suptratentorial aneurysms. The contralateral approach to ophthalmic segment aneurysms is very well described, even to the point that it is included in standard neurosurgical textbook.¹¹⁾

The openings of the ipsilateral sylvian and carotid cisterns, of the chiasmatic and lamina terminalis, and of the contralateral carotid and the sylvian vallecula cisterns create a tunnel-like space that allows full exposure of the contralateral anterior perforated substance and of the vascular structures related to it. The microscope rotates laterally to follow the axis of the tunnel as the cisternal opening proceeds to the opposite side. The opening of the contralateral sylvian vallecula cistern completes the exposure.¹⁶

In order to address the amenability for contralateral clipping the size, shape, and projection of the aneurysm and its relationships with the surrounding brain should be taken into consideration. The contralateral clipping of anterior circulation aneurysms should only be performed when brain conditions are ideal. Acute stage surgery for contralateral aneurysms should be avoided as brain conditions can make the surgery very difficult. During the acute stage the brain is frequently swollen and dissection of the cisterns is often very difficult. In such conditions the necessity for excessive brain retraction seems to be the rule and marked injury to the frontal lobes is to be expected. Acute stage surgery should thus be reserved to the aneurysm that has ruptured and eventually to the remainder aneurysms if brain conditions are favorable. ^{1, 16-21)}

The triangle defined by the lateral border of the contralateral optic nerve (chiasm and tract), the inferior aspect of the A1 segment of the contralateral anterior cerebral artery, and the medial aspect of the distal contralateral carotid artery define the contralateral opticocarotid space. Lateral displacement of the carotid artery through this triangle located superior to the optic apparatus allows exploration of the medial aspect of the contralateral carotid. This corridor affords the best opportunity to acess the contralateral anterior choroidal origin. In the setting of a long supraclinoid carotid or prefixed chiasm, the origin of the posterior communicating artery also can be accessed through this trianle.¹⁸⁻¹⁹⁾

Posterior communicating and choroidal segments aneurysms usually project posterior and laterally. Identification of the aneurysm neck and of the origins of the posterior communicating and anterior chodoidal arteries is usually difficult as they are partially hidden by the carotid artery and by the optic nerve. The optic nerve and chiasm usually project over the aneurysm. Pre-fixed chiasms can make the exposure either very difficult or even impossible. Clipping of aneurysms that project posteriorly will depend fundamentally on the position of the optic chiasm. When clipping is feasible it can be done either above or below the chiasm.¹⁶⁻¹⁸⁾

One of the complications of this technique is the lesion of the olfactory tract. In such cases, it is very important to be careful during the dissection and try not to use brain retractors so as to preserve olfaction. It is also very relevant to stress that sometimes it is very risky to perform an extensive dissection after subarachnoid hemorrhage mainly between the fourth and the ninth day as the brain could be rather fragile and edematous. It is also important to mention that the unilateral approach to bilateral aneurysms should be reserved for very experienced vascular neurosurgeons.²⁰⁻²¹⁾

Surgery is not indicated in cases of large or giant contralateral aneurysms because the approach - narrow and deep - does not only impair dissection of the aneurysm but also prevents the use of multiple clips. de Sousa AA commented that surgery was not indicated for contralateral MCA aneurysms with a diameter larger than 10mm.^{1, 19)}

Conclusion

The author reports a case of bilateral supratentoral aneurysms that was successfully clipped via unilateral pterional approach, thus avoiding a second craniotomy.

국문초록

양측성으로 천막상부의 뇌동맥류가 발견된 경우, 제한 된 경우에 한해서, 일측성 테리온 접근법으로 일회 수술 로 뇌동맥류 결찰술을 시행할 수가 있다. 48세 여성에서 좌측 중뇌동맥과 우측 전맥락동맥에 두 개의 뇌동맥류가 발견되었다. 우측 전맥락동맥류는 뒤쪽 방향을 향하는 양상이었다. 좌측 테리온 접근법으로 뇌동맥류 결찰술을 시행하였다. 좌측 중뇌동맥에 위치한 뇌동맥류를 결찰한 다음에, 우측 전맥락동맥에 위치한 뇌동맥류를 좌측 테 리온 접근법으로 반대쪽 경동맥·시신경 지주막하 공간을 통하여 성공적으로 뇌동맥류 결찰술을 시행하였다. 저자 는 양측성으로 천막상부의 뇌동맥류가 있는 경우에 편측 테리온 접근법으로 양쪽 뇌동맥류를 성공적으로 결찰하 여, 2차 수술이 필요없게 된 증례를 보고하면서 문헌을 고찰하였다.

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