Ophthalmic artery aneurysm contralateral approach

Its not technical difficult and is not uncommon because ophthalmic artery aneurysm are often multiple.

Disadvantages of a contralateral approach (CA) are deep and narrow surgical corridors and inconsistent ability to achieve proximal control of the supraclinoid internal carotid artery (ICA). However, a CA remains as microsurgical option for selected internal carotid artery-ophthalmic segment (ICA-opht) aneurysms.

The supraclinoid segments of the internal carotid artery (ICA) and their surrounding structures were examined under magnification in 25 adult cadavers. Attention was paid to anatomical variations and relationships concerning ipsilateral and contralateral pterional microsurgical approaches to these regions, especially to the origin of the ophthalmic artery. Eighty-four percent of the ophthalmic arteries arose from the supraclinoid segment of the ICA. In the ipsilateral pterional approach, mobilization of the ipsilateral optic nerve was required to see the origin of the ipsilateral ophthalmic artery and the medial aspect of the proximal portion of the supraclinoid segment of the ICA. In the contralateral pterional approach, on the other hand, these areas on the contralateral side could be identified under the optic nerve with minimal or without retraction of the contralateral optic nerve. This was because 71% of the ophthalmic arteries arose from the supero-medial aspect of the ICA, and because there was nothing to intercept the view of the medial aspect of the ICA under the optic nerve. This study supports the usefulness of the contralateral pterional approach to the origin of the ophthalmic artery and the medial aspect of the supraclinoid segment of the ICA. This approach could be useful in certain cases of carotid-ophthalmic aneurysm. The authors' experience with the contralateral pterional approach to carotid-ophthalmic aneurysms is also described [1].

Its feasibility depends on specific anatomic parameters related to the aneurysm itself and to the prechiasmatic distance, interoptic distance, and relationship of the ICA with the anterior clinoid process [2].

In selected patients, transient cardiac arrest induced by adenosine during a contralateral approach allows a brief flow arrest and softening of the aneurysm for a safer exposure and clipping [3].

Case series

2000

Between 1995 and 1999, 46 patients with ophthalmic segment aneurysms of the ICA were surgically treated in our institution. Eleven of the 46 aneurysms were operated using the contralateral pterional approach. All aneurysms were successfully clipped without complications; three patients required bone resection around the aneurysm neck. We studied the 11 patients who were treated with the

contralateral approach by defining six parameters to assess the feasibility of the approach and to predict the necessity for bone resection: 1) Parameter A, the distance between the anterior aspect of the optic chiasm and the limbus sphenoidale; 2) Parameter B, the distance between the bilateral optic nerves at the entrance to the optic canal; 3) Parameter C, the interrelation of the optic nerve and the ICA, expressed as a/b in which a is the length from the midline to the optic nerve and b is the length from the midline to the ICA; 4) Parameter D, the size of the aneurysm neck; 5) Parameter E, the direction of the aneurysm from the ICA wall on the anteroposterior angiogram; and 6) Parameter F, the distance from the medial side of the estimated distal dural ring to the proximal aneurysm neck on the lateral angiogram.

Parameters A to F were 8.8 mm (range, 5.4-11.1 mm), 14.5 mm (range, 10.4-22.2 mm), 0.9 mm (range, 0.6-1.3 mm), and 3.0 mm (range, 2.3-4.7 mm), 5 to 160 degrees, and 1.3 mm (range, 0.3-2.4 mm), respectively. All patients had excellent operative outcomes without visual dysfunction. Three patients required drilling of the bone around the optic canal on the craniotomy side; bone drilling was not required when Parameter E was between 30 and 160 degrees and Parameter F was more than 1 mm.

Parameters A to D are important for assessing the feasibility of the contralateral approach to ICA-ophthalmic segment aneurysms, and Parameters E and F are most useful for calculating the difficulty of this approach [4].

1997

In a series of 51 patients with 58 aneurysms of the ophthalmic segment of the internal carotid artery, nine patients with 10 aneurysms (4 large aneurysms, 6 small aneurysms) were treated via a contralateral microsurgical approach after careful preoperative planning. Preoperative planning was based on the analysis of clinical and radiographic data, including cranial computed tomography, magnetic resonance imaging, magnetic resonance angiography, and conventional cerebral angiography.

The postoperative results were good in 38 (75%) of the patients, fair in 2 (4%), and poor in 3 (6%); 8 (15%) of the patients died after surgery. The postoperative follow-up was 4 months to 10 years. Postoperatively, 15 of 19 patients with uni- or bilateral visual deficits or visual field defects improved, 3 of the 19 patients experienced postoperative impairment of visual function, and 1 of the 19 patients had an unchanged visual field deficit. Visual impairment or unchanged visual function was observed in patients who underwent ipsilateral approaches, which was possibly caused by inappropriate intraoperative retraction of the optic nerve or chiasm. In all patients presenting with preoperative visual deficits who were treated via contralateral approaches, visual function improved in the postoperative course.

Giant carotid-ophthalmic aneurysms that are eligible for surgical treatment as well as small and large aneurysms dislocating the optic nerve or the chiasm superomedially or medially should be approached via ipsilateral craniotomies. It is recommended that small and large aneurysms of the carotid-ophthalmic segment originating medially, superomedially, or superiorly, displacing the optic nerve or the chiasm superiorly, superolaterally, or laterally, be approached via contralateral craniotomies [5].

1988

Vajda et al. used this contralateral approach successfully with single ophthalmic and proximal carotid aneurysms that pointed medially [6].

1984

Four carotid-ophthalmic aneurysms were treated through a contralateral pterional approach. Three of these aneurysms were clipped successfully. Because awareness of the size and shape of the optic chiasm is crucial for the success of this approach, we used metrizamide or blood cisternography with a high resolution computed tomographic scanner. With this technique, the shape of the optic chiasm was delineated before operation to make certain that the prechiasmatic space was large enough for the aneurysm to be approached [7].

Case reports

2011

A 37-year-old female presented with progressive right retro-orbital headaches. MRI/A revealed a right carotid-ophthalmic aneurysm as well as a small aneurysm on the left carotid-ophthalmic segment. Given the young age and medial orientation of the right aneurysm, direct surgical clipping was planned. It was our thought that a contralateral approach would afford us the best chance to clip the right medially pointing aneurysm fully without optic nerve retraction while having proximal control via exposure of contralateral cervical ICA.

After gaining proximal ICA control from right neck dissection, the Sugita frame was rotated to allow for a left pterional craniotomy. The right medially pointing ophthalmic aneurysm was clipped without optic nerve retraction. After dissection of the distal dural ring and gaining proximal control, the left aneurysm was clipped. Postoperatively, the patient remained intact without any visual complaints, and both aneurysms were obliterated on angiography.

The case illustrates safety and control while clipping bilateral ophthalmic artery aneurysms via a unilateral mini-pterional approach and utility of the Sugita head frame [8].

2001

A 69-year-old woman was found to have two aneurysms: a small aneurysm at the left internal carotid-posterior communicating artery and a giant aneurysm at the right internal carotid-ophthalmic artery.

A direct clipping operation was performed via the left pterional approach. After the small left internal carotid artery aneurysm was clipped, the contralateral giant aneurysm was further exposed and successfully clipped by use of the same approach via the prechiasmatic space.

The contralateral pterional approach can be applied even for a giant aneurysm of the carotid-ophthalmic artery aneurysm when the neck of the aneurysm is small and when there is a space between the anterior wall of the aneurysm and the tuberculum sellae. Furthermore, such a giant

aneurysm can be clipped more easily and safely via the contralateral approach without compromising visual functions. To our knowledge, this is the first reported case of a giant internal carotid-ophthalmic artery aneurysm approached contralaterally. The feasibility of this approach can be assessed preoperatively by three-dimensional computed tomographic angiography as well as by conventional cerebral angiography [9].

1982

Milenković Z, Gopić H, Antović P, Jovicić V, Petrović B. Contralateral pterional approach to a carotid-ophthalmic aneurysm ruptured at surgery. Case report. J Neurosurg. 1982 Dec;57(6):823-5. PubMed PMID: 7143066 [10].

1981

Two cases of carotid-ophthalmic aneurysm are reported in which the neck was successfully clipped by way of a contralateral pterional approach. The authors emphasize that in some cases this is the preferred approach; the aneurysm neck can be clipped without damage to important surrounding structures [11].

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