Interdural origin of the ophthalmic artery at the dural ring of the internal carotid artery

Report of two cases

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The authors report two cases in which the ophthalmic artery (OA) originated from the interdural portion of the internal carotid artery at the carotid dural ring and coursed within the dura. This configuration was observed during surgeries performed in 82 cases of juxta–dural ring aneurysms.

In surgery for such an aneurysm, if the OA is not seen intradurally, an attempt should be made to find this kind of variation by using a Doppler flowmeter before sectioning the dural ring.

KEY WORDS • ophthalmic artery • surgical anatomy • aneurysm surgery • carotid dural ring • juxta–dural ring aneurysm

Illustrative Case

Examination. This 39-year-old woman harbored an incidental aneurysm. Preoperative angiograms revealed that the aneurysm and the OA originated from the C3 portion of the ICA (Fig. 1).

Operation. After removal of the anterior clinoid process, unroofing of the optic canal, and exposure of the infraciliary segment of the ICA, the OA could not be found either in the intradural or the extradural portion of the ICA. Flow of the OA was detected within the dura itself by using a Doppler flowmeter, and the artery was partially exposed for confirmation. The OA was observed to originate from the interdural portion of the ICA at the dural ring and it coursed within the dura (Fig. 2). The aneurysm, which was located in the carotid cave with its dome projecting both proximally and distally, was clipped with two Sugita ring clips (Fig. 2).

Abbreviations used in this paper: ICA = internal carotid artery; OA = ophthalmic artery.
Discussion

The OA has been reported to originate from the intradural portion of the ICA in 89 to 98% of cases and from the extradural portion in 2 to 8% of cases. However, there has been no case reported in which the OA originated from the interdural (either intradural or extradural) portion of the ICA at the carotid dural ring. Hayreh recorded that in 2% of 168 cadaveric specimens, the OA arose just at the point where the ICA penetrated the dura; the artery was partly extradural and partly subdural. However, it is not clear from this description whether the OAs originated from the interdural portion as in our cases.

We found two cases (2.4%) in which the OA originated from the interdural portion of the ICA at the dural ring during a surgical procedure for juxta–dural ring aneurysms, in which the OA was identified in the operating field.

In a cadaveric study of the surgical anatomy of the OA, this kind of variation would be very difficult to recognize using morphological observation alone; therefore, such a cadaver might be considered to be lacking the OA because it is located in the dura itself and cannot be confirmed without meticulous dissection of the dural ring. However, this can be revealed during surgery with the aid of non-invasive ultrasound devices and surgical exposure of the OA itself.

In clipping juxta–dural ring aneurysms, use of the untethering exposure method—that is, extensive removal of the anterior clinoid process, unroofing of the optic canal, mobilization of the OA, circumferential sectioning of the dural ring, and exposure of the infracranial portion of the ICA—is basically necessary to secure the proximal parent artery and the aneurysm neck before placing clips. When sectioning the dural ring on the medial side, therefore, the surgeon should be reminded of the possible existence of this kind of variation. An attempt should be made to find the flow of the OA within the dura by using a Doppler flowmeter, if the OA is not seen intradurally or extradurally, because it is difficult to predict the exact point of origin of the OA from the ICA by using any kind of preoperative imaging modality.

References


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