

Case Report

Cilio-retinal Artery Occlusion after Extrusion Onyx Embolization for Ethmoidal Dural Arteriovenous Fistula via the Ophthalmic Artery

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ABSTRACT

A 54-year-old man with an ethmoidal DAVF presented with acute ocular pain and visual loss in his right eye 10 hours after prophylactic embolization of ophthalmic artery to the fistula with extrusion Onyx injection with sparing perfusion of the central retinal artery. Ophthalmoscopy showed a cilio-retinal artery occlusion which was confirmed by fluorescein angiography. His visual acuity was 0.01 in the right eye, although he was treated with thrombolysis using uranase. Occlusion of cilio-retinal artery can be a complication of extrusion Onyx embolization of ophthalmic artery to an ethmoidal DAVF and lead to severe visual loss.

Keywords: Acute visual loss, Cilio-retinal artery, Embolization, Ethmoidal, Dural arteriovenous fistula

Introduction

Transarterial extrusion Onyx embolization of a feeder artery to dural arteriovenous fistula (DAVF) is a valuable procedure to cure [1-3]. However, an unintentional embolization of the cilio-retinal artery, although rare, has been documented as a cause of acute visual loss in embolization of feeding artery to a meningioma, carotid artery dissection or following cardiac catheterization [4-7]. This is the first report of a cilio-retinal artery occlusion caused by extrusion Onyx embolization of an ophthalmic artery to an ethmoidal DAVF.

Case Report

A 54-year-old man presented an incidental ethmoidal DAVF with normal ocular history. Cerebral angiograms showed a fistula fed by the right ethmoidal branches arising from the distal portion of the right ophthalmic artery (Figure 1) and drained by the frontal polar vein. He was diagnosed with an ethmoidal DAVF. Transarterial embolization of the feeding ophthalmic artery to the fistula with Onyx-18 (ev3, Medtronic, USA) was performed under general anesthesia. Anticoagulation was achieved with heparin (3000

IU initially followed by constant infusion of 1000 IU/h) during intervention. Extrusion Onyx injection without blood flow after a certain distance casting through the head end of the microcatheter was performed with a Marathon microcatheter (ev3, Medtronic, USA). The lesion was cured with sparing the persisting perfusion of the central retinal artery. He experienced ocular pain and acute visual loss 10 hours after embolization. His ophthalmologic examination showed no light perception of the right eye and 1.2 in the left. The right fundus showed milky-white edema in the region of the optic papilla. The edema appeared to be caused by a cilio-retinal artery occlusion, which was confirmed by fluorescein angiography. His visual acuity was 0.01 in the right eye at discharge, although he was treated with thrombolysis using 200,000 IU uranase. This patient was waiting for 6 months follow-up.

Discussion

This is a case of anterior skull base dural fistula treated by transarterial extrusion Onyx embolization through the ophthalmic artery. The patient presented with delayed loss of vision despite preservation of the central artery of the retina. The loss of vision was attributed

to a relatively frequent anatomical variant, namely the presence of a cilio-retinal artery which was a significant supply to the retina. Ethmoidal DAVFs are rare, but they have an unusually 62–91% incidence of hemorrhage in contrast to DAVFs at other locations [8-11]. Therefore, this case was prophylactic treated. It is especially important since the improvement of endovascular tools allows us to treat through the ophthalmic artery which was, until relatively recently, considered as an endovascular “no man’s land”. In our case, the loss of visual function is attributed to the occlusion of the cilio-retinal artery, which arising from the short posterior ciliary artery, because the central retinal artery was preserved and fluorescein angiography supported this result. The lateral and posterior ciliary arteries arise in close association with the central retinal artery, which is usually the first important intraorbital branch of the ophthalmic artery [12]. During the course of the larger medial division of the ophthalmic artery, the anterior and posterior ethmoidal branches are given off [1].

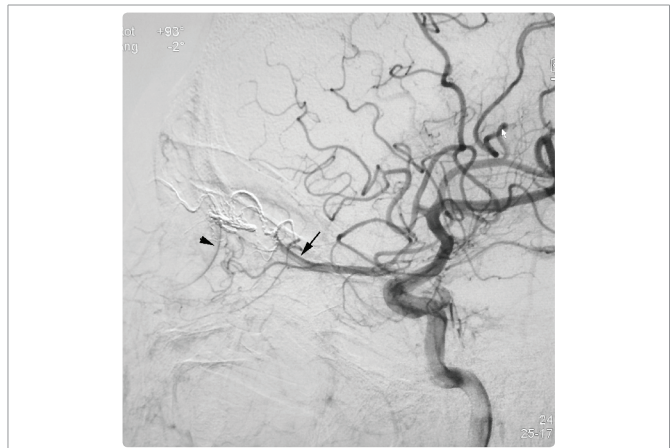


Figure 1c: Ophthalmic portion giving rise to the central retinal artery (arrow) and persistent choroidal perfusion (arrowhead) at the end of the embolization procedure.

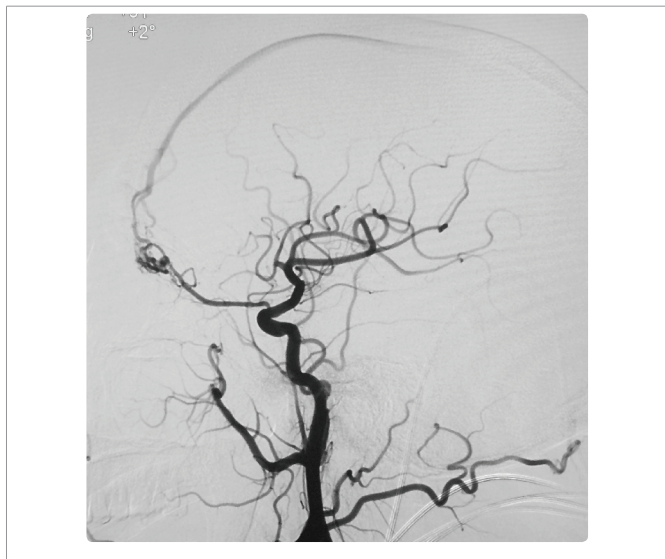


Figure 1a: The right carotid artery angiogram showing the ethmoidal DAVF.

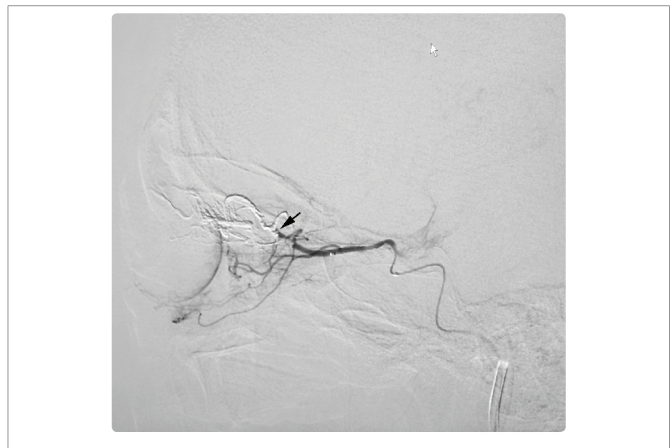


Figure 1d: Super selected angiogram of the ophthalmic artery during thrombolysis 10 hours after embolization procedure showing the occlusion of ophthalmic portion giving rise to the cilioretinal arteries (arrow).



Figure 1b: Microcatheter tip in the distal ophthalmic artery aiming at the ethmoidal branches (arrow).

Extrusion Onyx embolization was attempted directly via the ophthalmic artery, aimed at occlusion of the ethmoidal branches, which represented the main arterial feeders of the lesion [1-3]. Since the origin of the cilio-retinal artery is very near the one of the central artery of the retina, the position of the catheter was still adequate. Also, it is not clear that the occlusion of the cilio-retinal branch occurred during the embolization, especially since the loss of vision was delayed. It is thus possible that retrograde thrombosis occurred after because of the closure of the shunt, an event that should always be considered and may be prevented with anticoagulation. The other therapeutic strategies that could avoid catheterisation of the ophthalmic artery. A transvenous approach and surgery could be considered in such cases [2].

Occlusions of the cilio-retinal artery have been reported to be associated with systemic and ocular disorders, including central retinal artery or vein occlusions, carotid artery dissection, and coronary catheterization [4,6]. The cilio-retinal artery can lead to severe visual dysfunction [13,14]. However, central retinal artery occlusions with a patent cilio-retinal artery could result in good central visual acuity with peripheral visual field defects [15]. In

Chinese population, 35.0% persons have the cilio-retinal arteries and men and women have an equal distribution of cilio-retinal arteries [11]. The arteries occurred bilaterally in 6.9% and contributed to some portion of the temporal circulation in 78.3%, nasal circulation 14.8%, respectively. Therefore, not all patients have cilio-retinal arteries. Preoperative fluorescein angiography in ethmoidal DAVF patients for the cilio-retinal artery evaluation is necessary. This can reduce the possibility of visual loss caused by the cilio-retinal artery occlusion.

Conclusion

Occlusion of a cilio-retinal artery can be caused by extrusion Onyx embolization of an ethmoidal DAVF and lead to severe visual loss, although the central retinal artery was preserved.

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