Surgical Technique

Surgical mobilization of an arterial embolus in cilioretinal artery occlusion

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We describe an effective surgical approach for the management of cilioretinal artery occlusion. A 23-G pars plana vitrectomy assisted with two soft tip cannulas was performed. One cannula pressed the cilioretinal artery branch directed toward the macula, distal to the location of the embolus, whereas the other cannula was used to gently swipe over the cilioretinal artery proximal to the occlusion. Anatomical and functional outcomes were evaluated by fundus examination, fluorescein angiography, Goldmann visual field, and best-corrected visual acuity (BCVA). It was possible to mobilize the embolus by mechanical displacement with 23-G soft-tip cannulas and disintegrate it, preventing the passage toward the branch directed to the macula. Restoration of retinal circulation was confirmed by fluorescein angiogram. The patient recovered his previous documented BCVA and visual field. The described technique can be considered as a new possibility for achieving a solution to cilioretinal artery occlusion or any other retinal artery occlusion.

Key words: Cilioretinal artery occlusion, embolus, pars plana vitrectomy, retinal artery occlusion

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Cilioretinal artery occlusion has been found to comprise approximately 5% of retinal arterial occlusions. Isolated cilioretinal artery occlusion is very unlikely, but it produces significant central vision impairment and central visual field loss with good peripheral vision.[1]

Therapeutic options for these patients are scarce. The most common therapeutic attitude is observation.[1] Based on the previous experience with surgical mobilization of an arterial embolus with intrasurgical control of ocular hypotony,[1,2] we describe step by step an effective technique to perform surgical direct mechanical mobilization of an arterial embolus on a cilioretinal artery occlusion without inducing intraocular hypotony.

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We present the case of an 80-year-old male who was referred to our retina department three hours after a sudden vision loss in his left eye (LE). As medical history, he presented dyslipidemia, atherosclerosis, and cardiac arrhythmia. His previous best-corrected visual acuity (BCVA) was 20/30 for the right eye (RE) and 20/35 for the LE.

Ophthalmological examination revealed a BCVA of 20/30 in the RE and 20/60 in the LE. LE fundus exam showed a well-limited white-colored area surrounding the cilioretinal artery in the papillomacular bundle corresponding to nerve fiber layer infarction [Fig. 1]. Goldmann visual field examination revealed a paracentral scotoma in the LE. Fluorescein angiography (FA) demonstrated a blockage defect over the edematous area in the papillomacular bundle surrounding the cilioretinal artery with a slow filling. Subsequently, an embolus was identified by a characteristic hyperfluorescent staining pattern in a bifurcation of the cilioretinal artery, near the optic nerve head [Fig. 2]. Optical coherence tomography angiography (OCT-A) revealed a nonperfusion area coincident with previous observations [Fig. 3].

Based on previous experience[1,2] with central artery occlusion and emboli surgical mobilization with intrasurgical control of ocular hypotony, it was decided to perform 23-G pars plana vitrectomy (PPV) followed by direct surgical mobilization of the arterial embolus. The surgery was started five hours after the onset of symptoms and was performed under peribulbar anesthesia.

After completing the PPV, two 23-G soft-tip cannulas were used helped by Chandelier endoillumination, one of them pressing over the branch of the cilioretinal artery directed toward the macular area, just distal to the embolus location, whereas the other cannula was used to swipe over the cilioretinal artery proximal to the occlusion. After three attempts, it was possible to displace the embolus through the upper branch, where it disintegrated and disappeared [Video 1].

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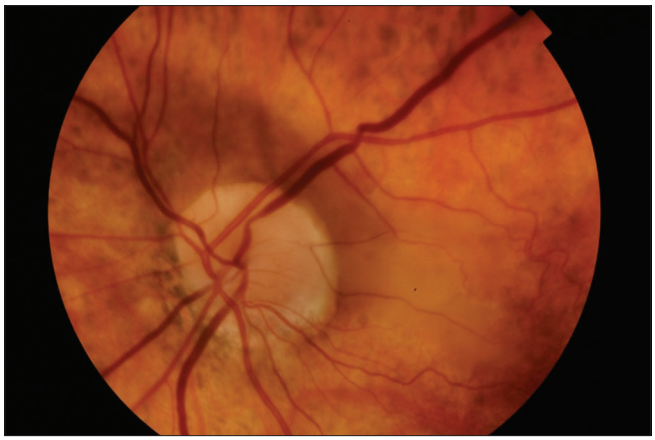

Figure 1: Color fundus photograph revealing abnormalities on arterial and venous walls, some areas of venous thinning, and an almost absence of arterial lumen on cilioretinal artery proximal to an area of retinal tissue whitening

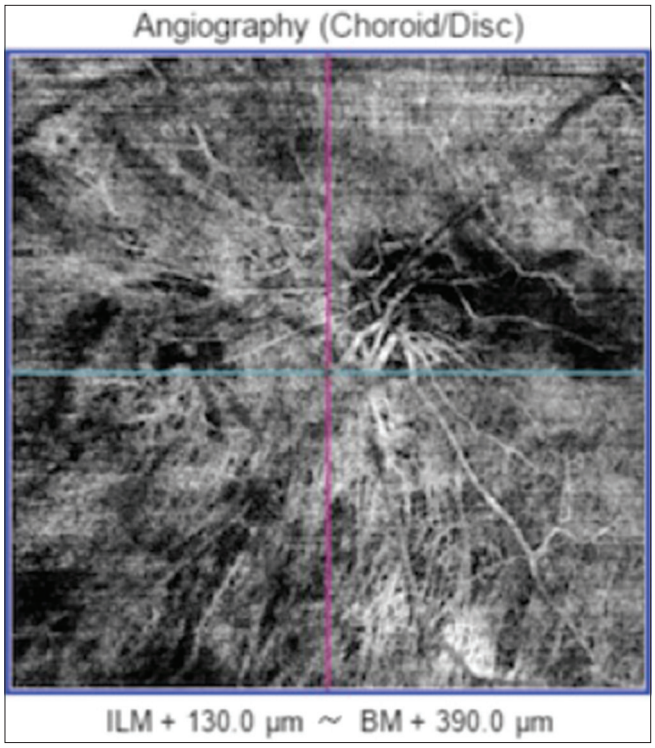

Figure 3: Optical coherence tomography angiography of the superficial vessels demonstrating a non-perfusion area in the papillomacular bundle

The surgical maneuver was performed without the need to resort to intraocular hypotony due to the small caliber of the cilioretinal artery, and the ease of mobilization of the embolus, which caused its disintegration by mechanical displacement with 23-G soft tip cannulas.

During the surgical procedure, it was possible to observe restoration of retinal circulation, confirmed by a postoperative fluorescein angiography. One week after the surgery, the patient recovered his previous BCVA (20/35) and FA showed no signs of vascular occlusion [Fig. 4], with normal visual field exam.

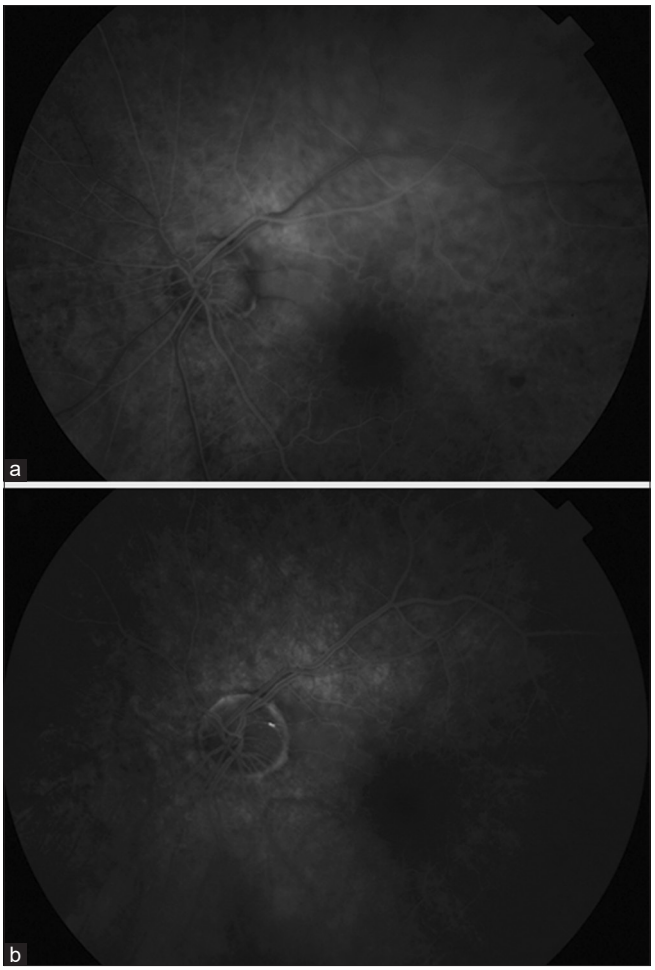

Figure 2: Fluorescein angiography (a) 0:31 min/(b) 1:06 min) revealing an hypofluorescent area due to vascular filling defect distal to a hyperfluorescent arterial embolus

Discussion

Fluorescein angiography in the acute phase is useful to visualize the embolus, if not observed in the fundus exam, and plays an important role in analyzing blood-retinal flow abnormalities and ischemic areas, as well as a retrograde filling of occluded vessels, which could give more information regarding retinal circulation.[3,4] Nevertheless, therapeutic effort should not be delayed in order to perform any diagnostic test if clinical suspicion is high enough.

The most important prognostic factor to determine visual prognosis in patients with arterial occlusion is the time of ischemia, clinically determined by the time since the onset of symptoms. Experimental models of central retinal artery occlusion showed that 240 minutes could be enough to cause irreparable damage to retinal tissue.[2] However, unlike animal models, humans rarely have a complete occlusion of the artery, and there is always a remaining flow, which increases retinal viability.

Another determinant factor is the nature of the embolus itself. There are mainly three types of arterial embolus:[2] 1) Cholesterol emboli, originated in atheromatous plaques on the ipsilateral carotid artery, aorta, or cardiac valves; 2) Fibrin

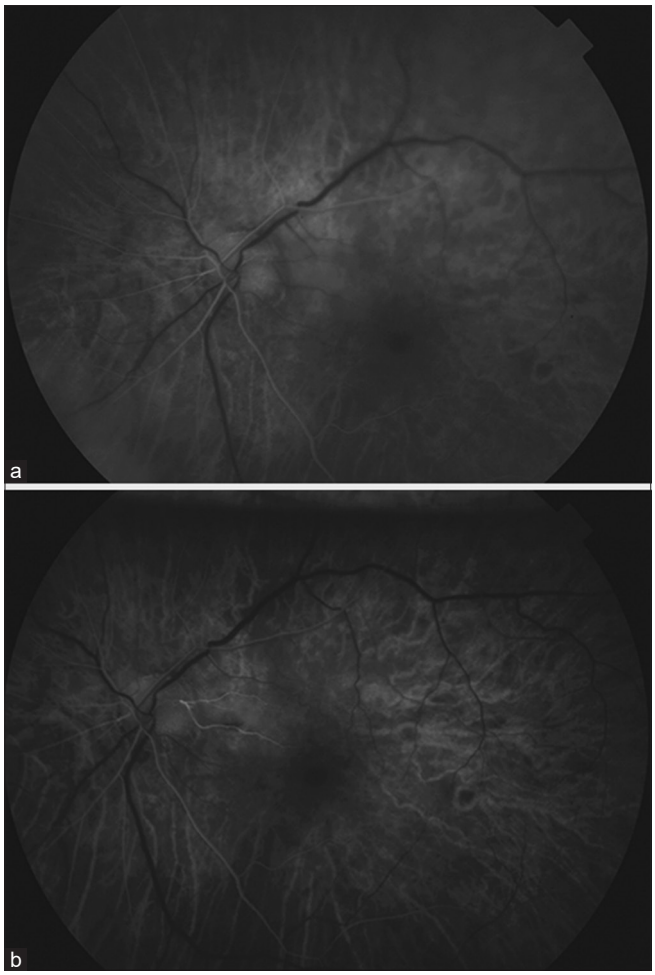

Figure 4: Arterial phase of fluorescein angiography (a) 0:14 min/ (b) 0:23 min) showing a normal dye circulation of the previously occluded cilioretinal artery

platelet emboli, associated with cardiac or carotidal thrombosis; 3) Calcific emboli, in relation to calcified cardiac valves or aortic calcification. This surgical procedure has shown to be effective in fibrin platelet emboli, which can be deformed, and probably with cholesterol emboli. However, it seems less able to mobilize calcific emboli, which are often impacted in the lumen of the artery.

To perform the present technique, it is essential to visualize the embolus. During surgery, restoration of retinal circulation can be seen, but a postoperative FA is recommended for confirmation.

Because the degree of damage is a time-dependent characteristic of this condition, it is strongly recommended not to delay the surgical treatment to perform complementary tests if clinical suspicion is strong. Our recommendation is to perform this surgical approach within the first 12 hours since the onset of symptoms.

In regard to potential complications, the ones related to the surgical technique are very unlikely to appear as the cannulas used are soft. However, if the technique is not performed with caution, a retinal hemorrhage or a retinal tear could be caused. Nevertheless, as a pars plana vitrectomy is also performed, complications related to this procedure can also appear, such as cataract, vitreous hemorrhage, retinal detachment, infection, or intraocular pressure changes.

Conclusion

Pars plana vitrectomy followed by direct vascular manipulation could lead to embolus mobilization after several attempts. The present surgical technique should be considered as a new possibility of achieving a permanent solution in the occlusion of cilioretinal artery or any other retinal arterial occlusion.

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Conflicts of interest

There are no conflicts of interest.

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