

# Late reperfusion with vision improvement in central retinal artery occlusion after surgical embolectomy — a case report

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## ABSTRACT

**BACKGROUND:** The objective was to report a case of central retinal artery occlusion (CRAO) with late gradual improvement of visual acuity after surgical embolectomy.

**CASE PRESENTATION:** A 65-year-old woman with central retinal artery occlusion in the left eye for two days and visual acuity counting fingers (20/2000, logMAR 2.0). Due to a significant decrease in visual acuity and the long-term course of the disease, it was decided to perform a vitrectomy. The technique was adjusted to the location of the embolic material and the extent of retinal ischemia. The aim of the vitrectomy was evacuation of the embolus and improvement in perfusion.

**RESULTS:** After treatment, visual acuity gradually improved. After 18 months of observation, the patient's visual acuity was 20/63 (LogMAR 0.5).

**CONCLUSION:** Despite the potential risk assessment, embolectomy could be considered as a treatment option in selected cases of central retinal artery occlusion.

**KEY WORDS:** central retinal artery occlusion; CRAO; surgical embolectomy; vitrectomy

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## INTRODUCTION

No consensus exists as to the best first-line therapy choice in central retinal artery occlusion (CRAO) or branch retinal artery occlusion (BRAO). The management is based on conservative and surgical methods [1]. Conservative methods include sublingual isorbide nitrite, rebreathing of expired carbon dioxide, hyperbaric oxygen treatment, ocular massage, or topical antiglaucoma drops. Among the surgical treatments should be mentioned anterior chamber paracentesis, vitrectomy with incision of the blocked arteriole, Nd:YAG laser therapy, or intraarterial thrombolysis [1–5].

It is essential to classify CRAO into its different types to make scientifically accurate observations about the visual outcome, same as the visual field defects. They can vary in the different types of diseases. Moreover, it has been revealed that visual acuity improvement can occur during the first 7 days, with minimal chance of any appreciable visual acuity improvement thereafter.

## CASE REPORT

A 65-year-old woman arrived at the ophthalmology department due to a significant painless dete-

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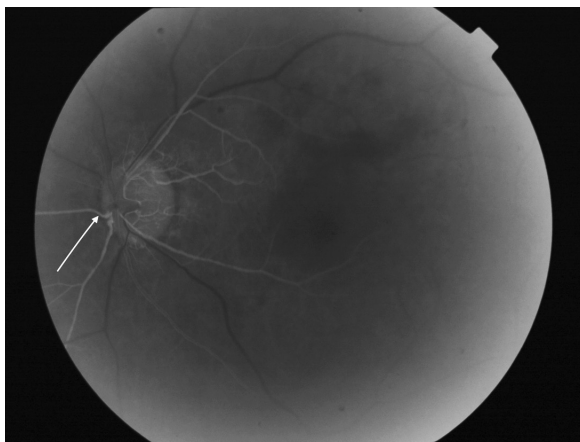
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rioration of vision in her left eye over the previous two days. There was no history of ophthalmic procedures or trauma, but the patient had been treated for hyperlipidemia and hypertension in the last 20 years. A few days before her arrival, she had recorded elevated blood pressure up to 200/80 mm Hg.

Full preoperative ophthalmic examination was performed. The visual acuity (VA) in the left eye at a distance of two feet was counting fingers (CF): 20/2000 (LogMAR 2.0), and in the right eye, it was 20/25 (LogMAR 0.1). Intraocular pressure (IOP) was within normal limits (9 mm Hg in the right eye and 11 mm Hg in the left eye). Slit lamp biomicroscopy was performed after dilating the pupils with a 1% Tropicamide solution. No abnormalities were found in the anterior segment of either eye or in the right eye fundus examination. The examination of the left eye fundus showed edema and macular whitening with a characteristic cherry-red spot. Embolic material was found on the optic nerve disc in the arterial vessel. Arteritic anterior ischemic optic neuropathy has been excluded.

An ocular massage with a Goldmann-type gonioscope was performed for 10 minutes. Then, the patient was given 2 tablets of 250 mg acetazolamide and IOP-lowering eye drops (ofotensin, dorzolamide). Anterior chamber paracentesis was performed. No improvement was achieved after this treatment — the embolic material was still present in the vessel, which was confirmed by fluorescein angiography (Fig. 1).

The next day, after obtaining written consent from the patient, a 3-port vitrectomy was carried out under peribulbar anesthesia in a 23-gauge sys-



**FIGURE 1.** Fluorescein angiography images showing central retinal artery occlusion (CRAO) with marked embolic material (arrow)

tem. After cortical vitrectomy, Membrane Blue Dual® (DORC, Rotterdam) was used for staining. The stain was rinsed out after one minute, and this was followed by induction of posterior vitreous detachment. The arterial vessel was incised longitudinally above the blockage material using vitrectomy vertical scissors. The embolus was evacuated. The vessel showed only small bleeding features despite very low intraocular pressure. Finally, fluid/air exchange was performed, maintaining the hypotonic state.

After three days, the patient was discharged from the ophthalmic clinic. Visual acuity (VA) did not improve and remained at counting fingers (CF) 20/2000 (LogMAR 2.0).

At the follow-up visit after 2 weeks, VA had improved to 20/320 (LogMAR 0.06). One month later, the patient returned. VA had fallen to hand motion, 20/20000 (LogMAR 3.0). Examination revealed vitreous hemorrhage with retinal attachment, confirmed in ultrasonography. This hemorrhage was spontaneously absorbed after one month. Eight months later, phacoemulsification with intraocular lens implantation was carried out.

Follow-up swept-source optical coherence tomography angiography (SS-OCTA) showed gradual improvement (Fig. 2 AB).

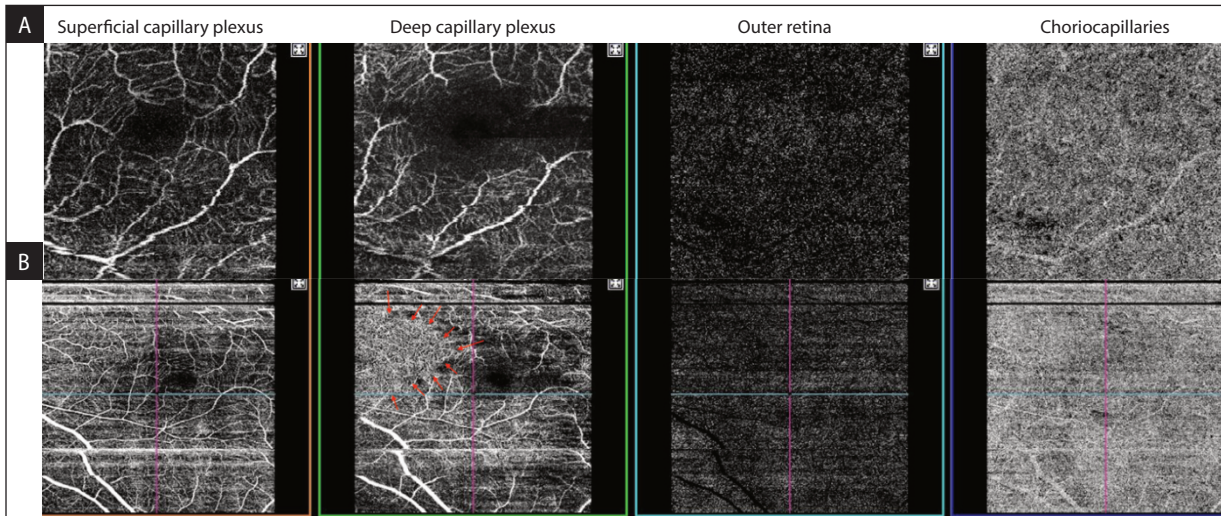
At the most recent follow-up visit, after 18 months, visual acuity was 20/63 (LogMAR 0.5).

The patient remains under our periodic control to prevent late CRAO complications. Figure 3 presents changes in VA during follow-up.

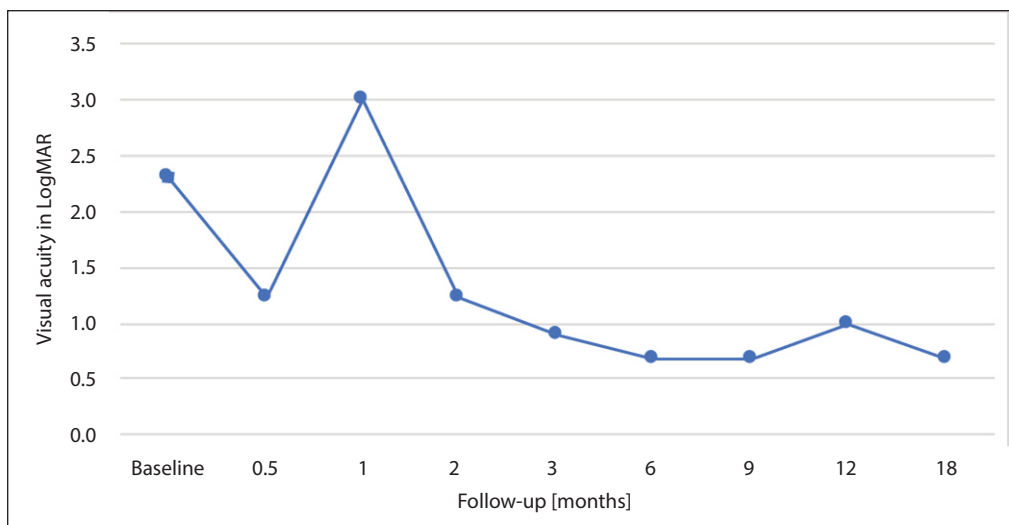
## DISCUSSION

Since the Albert von Graeffe description of 1859, no definitive treatment for CRAO has been proposed [6]. Although there are noninvasive (including pharmacological) and surgical procedures available, none of them is particularly effective. Undoubtedly, timing plays a crucial role in their application. According to the literature, intervention in the case of a CRAO is important up to 240 minutes after its occurrence. After this time, irreversible retinal damage is considered to occur [7].

In the described case, due to the extensive area of ischemia and the location of the embolism, the surgeon (SC) decided to perform a vitrectomy. The direct recanalization of the vessel provided the only possibility of unblocking it and also allowing a potential improvement of visual acuity. Moreover, a possible advantage of vitrectomy be-



**FIGURE 2.** Swept-source optical coherence tomography angiography (SS-OCTA) shows a gradual increase in vessel density in the deep retinal plexus during follow-up visits. **A.** 7 months postoperatively; **B.** 18 months postoperatively



**FIGURE 3.** Changes in visual acuity (VA) for 18 months

sides the removal of embolus is prolonged hypotony during this procedure, much longer than the effect of paracentesis itself.

The embolism must have had — as we suppose — a multiple character located at the level of the lamina cribrosa or deeper, which is difficult to visualize. Late reperfusion of the vessel was recorded 2 weeks after it was incised. We believe that leaving the retinal vessel open might assist in flushing out from the deep retinal layer [5].

SS-OCTA shows a normal layer of superficial vascular plexus and an unrecognizable layer of deep capillary plexus, which indicates hypoperfusion in this layer and corresponds to the confluence in

the inner nuclear layer. However, the reason why the deep vascular plexus layer is most sensitive to hypoperfusion is unknown [8].

In the follow-up period, we could observe near-normal fluorescein transit time. SS-OCTA scans revealed a gradual increased in vessel density in the deep retinal plexus.

## CONCLUSIONS

An interesting question that arises is why the VA continued to improve after such a prolonged time. In our opinion, surgical embolectomy should be considered as a treatment for retinal artery occlu-

sion. Additionally, the formation of vascular anastomoses in the deep vascular plexus can also play a role in the restoration of retinal blood flow and visual functions and can be observed in SS-OCTA.

The patient remains under our care to monitor for late effects of the CRAO, which, to date, have not occurred.

### **Conflict of interests**

No conflicting relationship exists for any author

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