

## Rescue vitrectomy with blocked artery massage and bloodletting for branch retinal artery occlusion

Chun-Ju Lin<sup>1,2</sup>, Cheng-Wen Su<sup>1</sup>, Huan-Sheng Chen<sup>3</sup>,  
Wen-Lu Chen<sup>1,4</sup>, Jane-Ming Lin<sup>1,4</sup>, Yi-Yu Tsai<sup>1,2</sup>

A 61-year-old male suffered from sudden blurred vision and superior visual field defect oculus dexter. His vision was counting fingers at 20 cm. Fundoscopy demonstrated inferior pale retina and a large embolus located at the proximal inferior retinal artery. Branch retinal artery occlusion (BRAO) was diagnosed. Initial paracentesis, topical brimonidine tartrate, oral pentoxifylline, and hyperbaric oxygen therapy were performed but showed limited improvement. Hence, he received 25-gauge vitrectomy, artificial posterior vitreous detachment, blocked retinal artery massage, and bloodletting 5 days after onset. After the surgery, his vision improved to 20/25. Fundoscopy showed reperfused retina, and optical coherence tomography revealed resolved retinal edema. RAO is an ophthalmological emergency; however, no standard guideline is available. Vitrectomy with blocked retinal artery massage and bloodletting showed favorable results in this case of BRAO with a large embolus. More prospective clinical trials are needed for setting up the standard treatment.

**Key words:** Blocked artery massage, bloodletting, branch retinal artery occlusion, vitrectomy

Retinal artery occlusion (RAO) occurs suddenly when the blood supply to the inner retina is blocked.<sup>[1]</sup> The resulting ischemia causes an immediate and severe visual loss. The artery may be blocked by an embolus or thrombus. Alternatively, there may be a sudden narrowing of the ophthalmic artery that supplies the central retinal artery or of the central retinal artery itself. The symptoms are usually more severe in embolism cases.

A branch RAO (BRAO) occurs when one of the branches of the retinal arterial supply becomes occluded. There is no generally agreed treatment regimen although a number of conservative interventions have been proposed, including

anticoagulation therapy, ocular massage, anterior chamber paracentesis, Valsalva maneuver, medication-induced reduction of intraocular pressure, and hyperbaric oxygen therapy.<sup>[1-5]</sup> Surgical embolectomy for RAO caused by a visible embolus has been reported and showed variable outcomes.<sup>[6-10]</sup> However, the embolus could not be removed owing to its large size in some cases.<sup>[6]</sup>

We report the favorable effects of the rescue surgery of vitrectomy, blocked retinal artery massage, and bloodletting in one case with BRAO induced by a large embolus 5 days after the onset.

### Case Report

A 61-year-old male with hypertension suffered from sudden onset of poor vision and superior visual field defect in the right eye within 1 day. His BCVA was counting fingers at 20 cm oculus dexter and 20/20 oculus sinister. Ophthalmologic examinations revealed quiet conjunctiva and clear cornea in both eyes. Fundoscopy showed pale whitish retina in the inferior quadrant with fovea involved [Fig. 1a]. A large embolus was found at the optic disc within the proximal inferior temporal artery. Hence, BRAO was diagnosed. Initially, anterior chamber paracentesis was performed in his right eye. Topical brimonidine tartrate 0.15%, oral pentoxifylline, and aspirin were given. Hyperbaric oxygen therapy was also performed but showed limited improvement after 3 days. Hence, surgery was suggested and he agreed after 2 days.

Therefore, 25-gauge pars plana vitrectomy, posterior hyaloid separation from the retina under active suction, blocked retinal artery massage with a 25-gauge soft tip backflush needle (Alcon Grieshaber-Switzerland/Alcon Labs, Inc., Fort Worth, TX, USA) [Fig. 1b], and bloodletting by 25-gauge end-grasping forceps (Alcon Grieshaber-Switzerland/Alcon Labs, Inc., Fort Worth, TX, USA) were undertaken 5 days after the onset. When bloodletting was induced, the intraocular pressure was increased to 60 mmHg for 2 min, and the 25-gauge soft-tip backflush needle was used to remove intravitreal blood [Video 1, Supplemental Digital Content]. Because the embolus was too large, we could not dislodge the embolus to the distal segment of retinal artery intraoperatively.

Fundoscopy showed reperfused retina with a smaller embolus postoperatively [Fig. 1c]. His BCVA improved to 20/200 1 month and 20/25 2 months postoperatively. The spectral-domain optical coherence tomography (Heidelberg Engineering, Heidelberg, Germany) showed hyperreflectivity of the inner retina with obvious optical shadowing effect preoperatively [Fig. 2a]; decreased hyperreflectivity, optical shadowing, intact ellipsoid zone, and external limiting membrane postoperatively [Fig. 2b]. However, visual field

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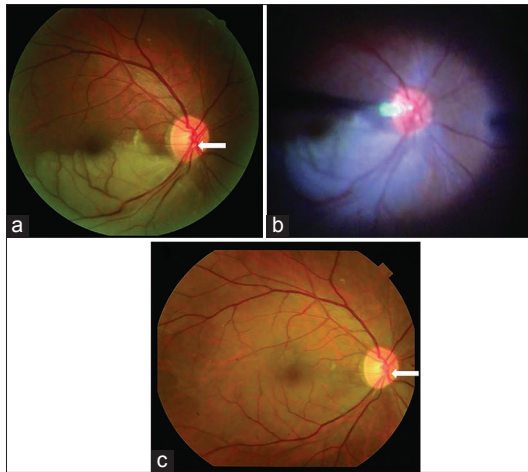
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<sup>1</sup>Department of Ophthalmology, China Medical University Hospital, China Medical University, <sup>2</sup>School of Medicine, College of Medicine, China Medical University, <sup>3</sup>An-Shin Dialysis Center, NephroCare Ltd., Fresenius Medical Care, <sup>4</sup>School of Chinese Medicine, College of Chinese Medicine, China Medical University, Taichung, Taiwan

**Correspondence to:** Dr. Chun-Ju Lin, Department of Ophthalmology, 2 Yuh-Der Road, Taichung 40447, Taiwan. E-mail: doctoraga@gmail.com

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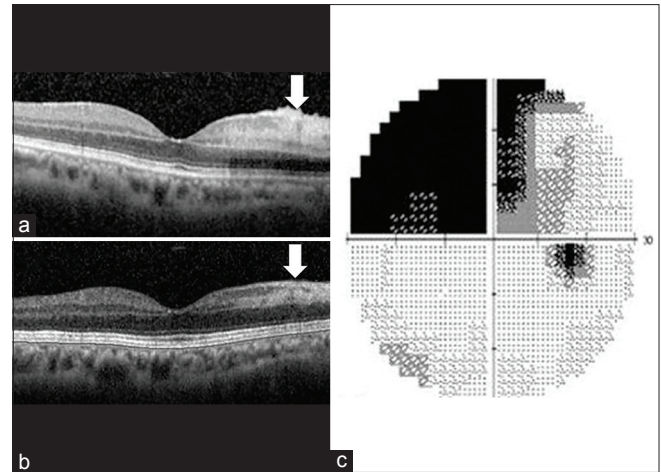
**Figure 1:** (a) Fundoscopy showed pale whitish retina in the inferior quadrant with fovea involved. A large embolus (arrow) was found at the optic disc within the proximal inferior temporal artery. (b) The intraoperative photo of 25-gauge pars plana vitrectomy and blocked retinal artery massage with a 25-gauge soft-tip backflush needle. (c) Fundoscopy showed reperused retina with a smaller embolus (arrow) postoperative 1 month

examination still revealed the corresponding defect at the right upper quadrant [Fig. 2c] and persisted in the every 6-month recheck. His central vision remained 20/25 28 months postoperatively. He refused our suggestion about fluorescein angiography because he was satisfied with the improvement of his vision.

## Discussion

RAO, characterized by painless unilateral visual impairment, is an acute vascular event. A thromboembolic event of the retinal artery is the primary cause in most cases of RAO.<sup>[1]</sup> Several conservative methods have been advocated for the treatment of RAO such as anticoagulation therapy, ocular massage, anterior chamber paracentesis, Valsalva maneuver, medication-induced reduction of intraocular pressure, and hyperbaric oxygen therapy.<sup>[1-5]</sup> A Cochrane review concluded that the currently available conservative therapies do not significantly alter the natural course of RAO.<sup>[1]</sup>

Transluminal neodymium-doped yttrium aluminum garnet (Nd:YAG) arteriotomy with embolectomy/embolysis might be beneficial in selected cases of RAO by enhancing the restoration of blood flow in the retinal arteries but could be complicated with persistent vitreous and subhyaloid hemorrhage. In this case of a large embolus, it might be difficult to perform the Nd:YAG embolectomy devoid of the complication of vitreous hemorrhage. Tissue plasminogen activator, either administered intravenously, intra-arterially, or intravitreally, has been reported as alternative invasive procedures to salvage RAO.<sup>[1,3-5]</sup> Thrombolytic therapy involves the use of clot-dissolving medication to lyse thrombi in the arterial vasculature. Careful inpatient monitoring of vital functions and coagulation factors is required during and after intravascular infusion. Although the complication rate of intravenous thrombolytic therapy for CRAO is not well known, cerebral hemorrhage and cardiovascular shock have been reported. Surgical embolectomy has been reported and



**Figure 2:** (a) The spectral-domain optical coherence tomography showed hyperreflectivity of the inner retina with obvious optical shadowing effect preoperatively (arrow). (b) Decreased hyperreflectivity, optical shadowing, intact ellipsoid zone, and external limiting membrane postoperatively (arrow). (c) Visual field examination revealed the corresponding defect at the right upper quadrant

showed variable results.<sup>[6-10]</sup> However, this surgery needs careful dissection of the blocked retinal artery and retrieval of the embolus. In some cases of a large embolus, it could not be removed successfully.<sup>[6]</sup>

The majority of conservative methods had been given in this case of BRAO caused by an embolus but showed limited improvement. Therefore, we decided to perform the 25-gauge vitrectomy for blocked retinal artery massage and bloodletting. Artificial posterior vitreous detachment was also done to release the possible strangulation of the proximal inferior temporal artery. Intraoperative bloodletting was induced by the manipulation of intraocular forceps. A break in the arterial wall was not only accomplished to allow reperfusion of blood flow but also let a part of embolus released. The results were favorable with good central vision improvement.

The restoration of retinal blood flow is vital for the preservation of retinal function. This report introduced the relatively easier surgical management in rescuing patients' vision when BRAO caused by a large embolus was observed. The initial conservative methods advocated for the treatment of RAO such as anticoagulation therapy, ocular massage, anterior chamber paracentesis, medication-induced reduction of intraocular pressure, and hyperbaric oxygen therapy might prevent further inner retinal ischemia. The sooner resolution of inner retina edema and intact ellipsoid zone contributed to the central vision improvement. A reperused cilioretinal artery after the rescue surgery could also be an explanation about his visual gain.

RAO is an ophthalmological emergency; however, no standard guideline has been established. Randomized trials with proven benefits are lacking. A 25-gauge vitrectomy for blocked retinal artery massage and bloodletting are relatively easier surgical management, and intraoperative vitreous hemorrhage can be handled uneventfully. His vision improved after the rescue surgery. Nevertheless, more prospective clinical trials are needed for setting up the standard treatment of BRAO.

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### Conflicts of interest

There are no conflicts of interest.

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