Central Retinal Artery and Vein Occlusion: Sudden threats to vision.

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Introduction

Central retinal artery occlusion (CRAO) and central retinal vein occlusion (CRVO) are serious ophthalmic emergencies that can result in sudden, often irreversible vision loss. These conditions affect the main blood vessels supplying and draining the retina, the light-sensitive tissue at the back of the eye responsible for visual perception. While both CRAO and CRVO share similar risk factors and present with acute visual symptoms, they differ in their pathophysiology, clinical presentation, and management [1, 2].

Central retinal artery occlusion is caused by a sudden blockage of the central retinal artery, which provides oxygenated blood to the inner layers of the retina. This blockage is most commonly due to an embolus (such as cholesterol or calcific plaque from the carotid artery or heart) or a thrombus forming within the artery. CRAO typically presents as a sudden, painless, and profound loss of vision in one eye. On examination, the retina appears pale and swollen, with a characteristic cherry-red spot at the macula, where the thinner foveal tissue allows the underlying choroidal blood supply to remain visible. Because the retina is extremely sensitive to ischemia, irreversible damage can occur within 90 minutes of occlusion, making CRAO a true ocular emergency [3, 4].

In contrast, central retinal vein occlusion occurs when there is a blockage in the central retinal vein, which is responsible for draining deoxygenated blood from the retina. This leads to increased venous pressure, retinal haemorrhage's, and leakage of fluid. CRVO also presents as sudden, painless vision loss, but the severity may vary depending on whether the occlusion is ischemic or non-ischemic. Ischemic CRVO tends to result in more profound vision loss and has a higher risk of complications. The retina in CRVO appears "blood and thunder"-like, with widespread haemorrhage's, dilated tortuous veins, and optic disc swelling [5, 6].

Both CRAO and CRVO are strongly associated with systemic vascular conditions such as hypertension, diabetes mellitus, hyperlipidaemia, and cardiovascular disease. CRAO, in particular, is considered equivalent to a stroke of the eye and warrants urgent evaluation for underlying embolic sources, including carotid artery disease and cardiac arrhythmias like atrial fibrillation. Similarly, CRVO has been linked to hypercoagulable states, especially in younger patients, and may be associated with systemic inflammatory or hematologic disorders.Diagnosis of these conditions is primarily clinical, supported by fundus examination and imaging studies. Fluorescein angiography can help assess blood flow in the retina and confirm the type of occlusion. Optical coherence tomography (OCT) provides detailed cross-sectional images of the retina and can help evaluate macular edema, which is common in CRVO [7, 8].

Treatment options for CRAO are limited and often ineffective due to the rapid and permanent damage caused by arterial occlusion. Attempts to dislodge the embolus or improve retinal perfusion through methods such as ocular massage, anterior chamber paracentesis, hyperbaric oxygen therapy, or lowering intraocular pressure have shown inconsistent success. Because CRAO may be a warning sign of systemic vascular disease, immediate referral to a stroke centre is essential for further evaluation and secondary prevention [9, 10].

Conclusion

Central retinal artery and vein occlusions represent urgent, vision-threatening vascular events of the eye. While CRAO typically leads to profound and permanent vision loss, CRVO can range in severity and may be treatable, especially if complications are managed early. These conditions not only demand prompt ophthalmologic attention but also serve as critical indicators of systemic vascular health. A patient presenting with retinal vascular occlusion must undergo comprehensive medical evaluation to address modifiable risk factors and prevent future ocular or systemic events. Ultimately, preserving vision in these patients hinges as much on managing the underlying vascular disease as it does on treating the eye itself.

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***Received:** 02-Jun-2025, Manuscript No. OER-25-166238; **Editor assigned:** 04-Jun-2025, Pre QC No. OER-25-166238 (PQ); **Reviewed:** 18-Jun-2025, QC No. OER-25-166238; **Revised:** 25-Jun-2025, Manuscript No. OER-25-166238 (R); **Published:** 30-Jun-2025, DOI: 10.35841/oer-9.3.276*

***Citation:** Bison T. Hypertensive Retinopathy: The Eye's Window into Vascular Health. Ophthalmol Case Rep. 2025;9(3):276*

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Citation: *Bison T. Hypertensive Retinopathy: The Eye's Window into Vascular Health. Ophthalmol Case Rep. 2025;9(3):276*