

## DO Patients with Retinal Vascular Occlusive Disease Require a Multidisciplinary Approach?

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### Abstract

Retinal vascular occlusive disease, specifically retinal venous occlusion, represents a common visually disabling disease, second in frequency after diabetic retinopathy. Prevalence of the occlusion of the central retinal vein and its branches increases due to the aging population and may represent a public health concern. Likewise, management of this condition poses a challenge despite a continuously developing of scientific understanding of occlusion, taken into account the complicated multifactorial etiopathogenesis of the venous occlusive disease. A global effort to solve this not only medical, but at the same time the social problem must be based on the systematic eye screening and preventive treatment. Currently available findings obviate the need to raise awareness of general practitioners, cardiologists and ophthalmologists about valuable diagnostic potential of non-invasive, time-saving, cost-effective retinal examination allowing optimal patient management. Our patients await from the medical professionals a tight interprovider communication intended to increase access to health care and achieve the best currently available care.

**Keywords:** *Systemic vascular disease; Retinal vasoocclusion; Interprovider communication*

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Majority of the contemporary patients suffer by more than one disease [1]. The patients with the occlusive disease of the reinal vein do not represent an acception [2], likewise underscoring accompanied systemic comorbidity.

Retinal vascular occlusive disease, specifically retinal venous occlusion (RVO), represents a common visually disabling disease, second in frequency after diabetic retinopathy [3,4], in which arterial risk factors are much more relevant than venous factors [5]. In a recent analysis of pooled data from population studies worldwide, the overall RVO prevalence was 0.52% (0.44% branch retinal vein occlusion (BRVO), 0.08% central retinal vein occlusion (CRVO), translating to approximately 16 million individuals worldwide affected by RVO [6].

Vasocclusive disorder of the retinal vein has the potential for significant vision-related morbidity. Prevalence of the occlusion of the central retinal vein and its branches increases due to the aging population.

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The first case of central retinal vein occlusion was reported by Richard Liebreich in 1855 [7]. The first case of branch retinal vein occlusion was reported by Theodor Leber in 1877 [8]. Despite being recognized in the 19<sup>th</sup> century there are still gaps in understanding the etiology and pathogenesis of vasooclusive disorders of the central retinal vein and its branches. Likewise, management of this condition poses a challenge despite a continuously developing of scientific understanding of occlusion, taken into account the complicated multifactorial etiopathogenesis of the venous occlusive disease. Although it is more common in the middle-aged and elderly population, no age group is immune to it.

In central retinal vein occlusion the obstruction is located in the central vein, at the level of the optic nerve, so most of the retina is affected. Anatomic features make the central retinal vein vulnerable to occlusion at this location. As the optic nerve and the accompanying central retinal artery and vein pass through the sieve-like connective tissue of the lamina cribrosa, the central retinal vein normally narrows, and the dense connective tissue of the lamina cribrosa limits any expansion of the traversing optic nerve and vessels within. Any thickening of the central retinal artery, which shares a common fibrous tissue sheath with the vein, might easily compress the lumen of the adjacent central retinal vein and start in motion the sequence of events that lead to thrombus formation.

In branch retinal vein occlusion, the obstruction is located in one of the branches of the central vein, affecting only part of the posterior pole and the portion of the peripheral retina drained by occluded branch. Sclerosis of the retinal artery which is associated with systemic hypertension or arteriosclerosis may result in further compression of the vein, when the increased rigidity of arterial wall and contraction of the adventitial sheath shared by artery and vein occur. Mechanical obstruction of the vein through the rigid artery in the artery/vein (A/V) crossing may result in turbulent blood flow producing damage to venous endothelium and intima media and the sequence of events leading to occlusion of the vein.

Despite improved treatment with intraocular injections of vascular endothelial growth factor inhibitors, RVO is still associated with non-responders, taxyphylaxis, high re-injections rate, which may represent also a rising economic burden. These findings underscore the importance of addressing new approaches to formulate avenues of intervention and preventive strategies. One of the promising therapeutic approach still under evaluation is rho-associated kinase inhibitors [9].

A global effort to solve this not only medical, but at the same time the social problem must be based on the systematic eye screening and preventive treatment.

The retina offers a potential non-invasive window into vascular changes in alive human organism. Recently a close attention was paid on the retinal microvasculature and its visualization in patients with cardiovascular diseases [10]. Almost uniformly, case-control studies evaluating a risk factors for Central retinal vein occlusion (CRVO) and Branch retinal vein occlusion (BRVO) reveal that systemic vascular disease, hypertension, diabetes mellitus, hyperlipidemia are the strong risk factors [2,5,11-13] followed by blood hyperviscosity, and thrombophilia [14], and commonly, the patients are monitored by general practioners.

The first step in the systemic vascular disease management alorhytm is a systematic eye screening, which should be easily accessible for a patient and affordable, and at the same time non-causative for economic burden. These goals are achievable using technological developments in retinal imaging; automatic analysis of retinal photographs by Software and telehealth approach for remote management of cases.

Workflow and screening will be concentrated at the primary health care provider's office, where nonphysician could take a photo of the patient's back of the eye, specifically the retina, by: Portable Eye and Retinal Imaging System - Fundus Smartphone Adapter easily attached to an Apple or Samsung smartphone, creating ophthalmic camera for vision care screening and evaluation [15]; or portable ophthalmic diagnostic equipment as a pocket-sized, solar-powered ophthalmoscope [16]. A photo taken by technical worker will be

sent on-line to an ophthalmologist, who is able to conclude on status of retinal microvasculature, sending his conclusion back to the general practitioner, who may necessitate precautions in patients. As was mentioned above in RVO arterial risk factors are much more relevant than venous factors [5], furthermore underscoring significance of timely discoverability of abnormal retinal arteriolar findings, such as narrowing, copper- or silver-wire symptoms, the artery/vein (A/V) crossing, for initiation of occlusion-preventive measures starting from manageable risk factors: blood pressure control, blood lipids control, blood sugar control and vasodilating (papaverine hydrochloride or nicergoline) therapy with daily 80 mg aspirin intake. Thus, modern non-invasive, time-saving, cost-effective retinal exam could be incorporated in the diagnostic protocols of patients suffered by systemic vascular disease intended to prevent retinal venous occlusion.

Currently findings obviate the need to raise awareness of general practitioner, cardiologists and ophthalmologists about valuable diagnostic potential of non-invasive, time-saving, cost-effective retinal examination, easily incorporated into routine practice, with a cutting-edge advances, creating an ophthalmic camera for immediate vision care, screening, including remote- by telehealth, photo documentation and evaluation, allowing optimal patient management.

Our patients await from the medical professionals a tight interprovider communication intended to increase access to health care and achieve the best currently available care.

### Conflict of interest

The author declares there exists no financial interest or any conflict of interest.

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