

Retinal Vein Occlusion

Retinal vein occlusion [[central \(CRVO\)](#), [branch \(BRVO\)](#)] Vascular occlusion of either the branch or central retinal vein resulting in potential vision changes and long term sequelae.

Etiology

Both [CRVO](#) and [BRVO](#) are both related to occlusion of the retinal vein, however the cause of the occlusion differs based on location.

- Central Retinal Vein Occlusion ([CRVO](#)) occurs with a thrombus occludes the central retinal vein near lamina cribosa (Green, 1981)^[1]
- Branch Retinal Vein Occlusion ([BRVO](#)) occurs when a thrombus occurs at arteriovenous crossing point secondary to atherosclerosis of the retinal artery causing compression and occlusion of the retinal vein. (Frangieh, 1982)^[2]

Risk Factors

Despite similarities, the risk factors differ between [CRVO](#) and [BRVO](#).

CRVO

- Hypertension
- Open angle glaucoma
- Diabetes mellitus
- (The Eye Disease Case-Control Study Group, 1996)^[3]

BRVO

- Hypertension
- Cardiovascular disease
- Open angle glaucoma
- High body mass index (not diabetes mellitus)
- (The Eye Disease Case-Control Study Group, 1993)^[4]

General Pathology

Please see the specific EyeWiki Articles for [[central \(CRVO\)](#), [branch \(BRVO\)](#)] for more details.

- [CRVO](#) – A thrombus forms at the central retinal vein near the lamina cribosa (Green, 1981)^[1]
- [BRVO](#) – Arterial compression onto veins causes turbulence which may lead to endothelial cell damage and thrombus formation (Frangieh, 1982)^[2]

Pathophysiology

Retinal vein occlusions can cause retinal ischemia, neovascular complications such as glaucoma, vitreous hemorrhage and retinal traction, and macular edema.

Primary prevention

Maximal management of associated risk factors.

Diagnosis

Diagnosis is based upon the retinal examination findings of intraretinal hemorrhages, dilated veins, and often cotton wool spots often described as a "blood and thunder appearance" for CRVO. There may be macular edema also present.

History

Patients often present with acute visual acuity loss. They may report a history of cardiovascular risk factors including a history of diabetes mellitus and hypertension. They should be asked about a history of diabetes mellitus, hypertension and cardiovascular disease.

Physical examination

To diagnose and monitor for associated sequelae, clinicians must perform a thorough undilated slit lamp anterior segment examination with gonioscopy and dilated fundus examination with ophthalmoscopy. In addition, fluorescein angiography and optical coherence tomography may supplement clinical decision making. Fluorescein angiography is useful for determining the degree of ischemia present. OCT is useful for monitoring macular edema.

Signs

Retinal vein occlusions demonstrate variable degrees of intraretinal hemorrhage, cotton wool spots, macular edema, subretinal fluid, collateral vessels (chronic), iris and retinal neovascularization, dilated and tortuous veins, and vascular whitening with atrophy when chronic.

Symptoms

Common: Central or peripheral monocular vision loss
Less common: Transient visual obscurations or asymptomatic

Clinical diagnosis

Since the differential diagnosis is limited, retinal vein occlusions are often diagnosed with history and physical examination alone.

Diagnostic procedures

Fluorescein angiography may be used to determine the degree of retinal ischemia and diagnose macular edema. This may be important for prognostic reasons and to predict the development of sequelae. Optical coherence tomography may be used to diagnose macular edema and gauge response to treatment.

Laboratory test

In older patients with cardiovascular risk factors, no laboratory tests are needed. In atypical cases such as younger patients and bilateral or recurrent retinal vein occlusions, laboratory tests such as a complete blood count, fasting serum glucose, serum protein electrophoresis, homocystein, serum viscosity, and thrombophilic screening (factor V Leiden mutation, protein C or S deficiency, antithrombin III deficiency, antiphospholipid antibodies) may be considered.

Differential diagnosis

Ocular ischemic syndrome, diabetic retinopathy, human immunodeficiency virus (HIV) retinopathy, hypertensive retinopathy, retinopathy related to blood dyscrasias

Management

General treatment

No treatment is available to reverse retinal vein occlusions. However, the iris or retinal neovascularization or macular edema may be managed with anti-VEGF or steroid injections. Macular edema in [BRVO](#) may be managed with laser intervention. Please refer to the EyeWiki [BRVO](#) and [CRVO](#) pages for detailed discussions of treatment options.

Medical therapy

Medical therapy can limit complications from retinal vein occlusions. Anti-VEGF intraocular injections can cause regression of iris neovascularization (Ciftci, 2009)^[5] and macular edema (Spaide, 2009; Kondo, 2009)^{[6][7]}. In addition, the SCORE study demonstrated the benefit of triamcinolone acetonide for macular edema secondary to central retinal vein occlusions (vs. sham) (Ip, 2009)^[8] but did not demonstrate benefit for branch retinal vein occlusions (vs. focal laser) (Scott, 2009)^[9].

The mainstay of therapy is currently anti-VEGF therapy for macular edema with either [CRVO](#) or [BRVO](#). Both ranibizumab (BRAVO and CRUISE)^{[10][11][12][13]} and aflibercept (GALILEO/COPERNICUS; VIBRANT) ^{[14][15][16]} have been shown to be efficacious in the treatment of macular edema. Significant gains in visual acuity results and the retinal edema subsides with therapy. Both drugs are recommended to be used monthly for the 6 treatments and then as needed. Bevacizumab is also used off-label to treat macular edema.

Steroid implants, such as the dexamethasone (OZURDEX plant) implant ^[17] can also treat the macular edema and are best reserved as a second therapy or for eyes with chronic edema.

The SCORE2 Study compared aflibercept with bevacizumab for macular edema due to CRVO using a non-inferiority trial design. The primary endpoint was a 6 months. Bevacizumab was non-inferior to aflibercept with respect to visual acuity and OCT thickness. [18] After 6 months, good responders were divided into monthly and treat and extend (TAE) regimens using the original assigned drugs. No significant difference was seen between monthly and TAE for each drug. There were fewer treatments given for the TAE arms as compared to monthly. [19] Poor responders at 6 months were assigned a different treatment: aflibercept eyes were assigned to dexamethasone implant and bevacizumab eyes were assigned to aflibercept. The numbers of poor responders were small in both groups to make a definitive recommendation. However, visual acuity was improved in both groups.

Medical follow up

Ischemic retinal vein occlusions can cause iris or retinal neovascularization in addition to macular edema and should be observed with an undilated iris and angle examination followed by a dilated fundus examination on a period basis. CRVO eyes should be examined monthly for 6 months. The risk is highest for development of rubeosis within the first 90 days and decreases through 6 months. In general, fluorescein angiography should be delayed until retinal hemorrhages clear to allow for good visualization of the choriocapillaris.

Laser Surgery

The Central Retinal Vein Occlusion Study supported panretinal photocoagulation for iris neovascularization after it occurs. (CVO Study Group N Report, 1995)[20] It did not support grid photocoagulation for macular edema. (CVO Study Group M Report, 1995)[21] The Branch Vein Occlusion Study supported the use of grid laser photocoagulation of edematous area. (BVO Study Group, 1984)[22] In addition, The BVO Study Group recommended sectoral panretinal photocoagulation for the development of retinal neovascularization. (BVO Study Group, 1986)[23]

Surgical follow up

Complications

Complications associated with intravitreal injections include infection, bleeding, retinal detachment, cataract, and both infectious and sterile uveitis; however, these complications remain relatively rare. Triamcinolone acetonide can also cause a steroid-induced glaucoma.

Prognosis

The prognosis is highly variable depending on the location of the retinal vein occlusion, degree of ischemia, and development of sequelae. Please see EyeWiki BRVO and CRVO pages for more in depth information.

Additional Resources

- Boyd K, Janigian RH. Central Retinal Vein Occlusion. American Academy of Ophthalmology. EyeSmart® Eye health. <https://www.aao.org/eye-health/diseases/central-retinal-vein-occlusion-list>. Accessed April 04, 2019.
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Sourced from: https://eyewiki.org/Retinal_Vein_Occlusion