Neurosonology: a potential diagnostic tool in central retinal vein occlusion

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Abstract

Introduction: Central retinal vein occlusion (CRVO) is a common vascular retinal pathology. It produces a subacute monocular severe visual loss, usually painless. Retinal and iris neovascularization can result in vitreous hemorrhages, neovascular glaucoma and tractional retinal detachment. The diagnosis is clinically-based, through funduscopic exam, and supported by fluorescein angiography, an invasive technique requiring intravenous contrast administration. The diagnosis becomes harder in the presence of local complications preventing ocular fundus observation, as hemovitreous, sometimes requiring clarifying surgical intervention. Neurosonology, a non-invasive and safe technique, has not yet been pointed out as a definite diagnostic tool in CRVO.

Case Report: An 82-years-old female with known and poorly controlled essential hypertension and type 2 diabetes mellitus, developed a subacute visual acuity impairment in her left eye, allowing solely hand movements visualization. Ophthalmoscopy revealed a total hemovitreous of the left eye. Ocular echography did not show any other lesions. Differential diagnosis stood between CRVO and ocular arterial ischemic syndrome. Transorbital colour coded Doppler identified a preserved left ophthalmic artery and a reverberant flow in the central retinal vein, suggesting CRVO. The patient underwent pars plana vitrectomy associated to endolaser as management of this secondary complication of CRVO.

Discussion: The present clinical case underlines a potential new neurosonologic application, as a diagnostic tool in CRVO, particularly useful when ocular fundus cannot be properly visualized.

Keywords: Neurosonology, Central retinal vein occlusion, Hemovitreous.
Introduction

Central retinal vein occlusion (CRVO), a potentially disabling disease, is the second most common retinal vascular disorder after diabetic retinopathy [1]. There is an association with older age, smoking history, hypertension, dyslipidemia and diabetes [2]. It has been suggested that venous occlusion leads to hypoxia and a subsequent ischemic state, originating macular edema and retinal neovascularization [3]. The latter may lead to vitreous hemorrhages, neovascular glaucoma and tractional retinal detachment [4]. Clinically, there is a subacute visual loss, progressive and usually painless. Diagnosis is based on clinical assessment, made by funduscopic examination and supported by fluorescein angiography, which is an invasive technique requiring intravenous contrast administration [5]. However, this diagnostic tool becomes useless in the presence of local complications preventing an accurate fundus visualization, as hemovitreous, sometimes requiring clarifying surgical intervention. Neurosonology, a non-invasive and safe technique, has not yet been established as a diagnostic tool in CRVO.

Case Report

We present a 82-year-old woman who developed subacute, painless visual acuity impairment of her left eye. She denied headaches, ocular or cranial trauma. Her medical history included type 2 diabetes mellitus with a poor metabolic control, and essential hypertension, poorly controlled although she had been taking an angiotensin-converting enzyme inhibitor. The patient had never smoked and had residual alcohol consumption.

Physical examination revealed high blood pressure (175/89 mmHg). Her body mass index was 32.1 kg/m². She had severe impairment of visual acuity in her left eye, allowing solely hand movements visualization. No other neurologic deficits were identified. Intraocular pressure values were within normal range. Basic laboratory testing was normal. Ophthalmoscopy showed a complete hemovitreous of the left eye and an otherwise normal disc, macula and fundus at her right eye. Differential diagnosis stood between neovascularization related to hemovitreous due to CRVO or ocular arterial ischemic syndrome. The patient was then presented for neurosonologic examination. Carotid and vertebral evaluation did not have hemodynamically significant arterial stenoses, bilaterally. There were also no hemodynamically significant stenoses in intracranial vessels. Transorbital B-mode (General Electrics Logiq 7 with a linear 11MHz probe) ultrasound confirmed the hemoviterous of the left eye without any further pathological changes. Transorbital colour coded Doppler (TCCD) identified a preserved flow in the right superior ophthalmic vein, right central retinal artery and in the right central retinal vein. Both left superior ophthalmic vein and left central retinal artery (Figure 1) also present-

![Figure 1. Left central retinal vein EcoDoppler: reverberant flow.](image-url)
ed with a normal flow. However, left central retinal vein presented with a reverberant flow (Figure 1). This finding allowed diagnosis of CRVO with an associated complication—hemovitreous. The patient underwent pars plana vitrectomy associated to endolaser as management of this secondary complication of CRVO.

**Discussion**

CRVO is a common retinal vascular pathology that can affect people of any age but is more common in the elderly. In the presence of local complications such as hemovitreous, which sometimes can totally prevent fundus visualization, the correct diagnosis and subsequent treatment may become compromised. Performing a TCCD may aid to accurately diagnose a CRVO: it usually reveals a low velocity, or even a reverberant flow at central retinal vein. Moreover, central retinal artery may also show a decreased blood velocity. However, our patient presented with normal central retinal artery flow velocity, which may be explained by blood bypassing the occluded central retinal vein through collateral venous channels—these are usually small in caliber, beyond the resolution of colour Doppler.

The present clinical case underlines a potential new neurosonologic application, as a diagnostic tool in CRVO, particularly useful when ocular fundus cannot be properly visualized.

**Abbreviations**

CRVO: Central retinal vein occlusion; TCCD: Transorbital colour coded Doppler (TCCD)

**Competing interests**

The authors declare no conflict of interest.

**References**