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CENTRAL RETINAL ARTERY OCCLUSION DIAGNOSED BY COLOR DOPPLER ULTRASONOGRAPHY: A CASE REPORT

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Abstract: Central retinal artery occlusion (CRAO) is a form of ischemic stroke (CVA), with similar etiologies, but with a variable range of clinical entities in terms of pathophysiology, clinical features, diagnosis and management. Orbital Color Doppler Ultrasound (COUSD) is a useful non-invasive tool for the diagnosis of OACR and other pathologies of the orbit. This report describes the case of a patient diagnosed with CROCA through USDCO, with other exams normal, except for fundoscopy with cherry-red spots. USDCO is an important instrument for the clinical diagnosis and, in some cases, the etiology of sudden monocular visual loss, especially in cases with difficult or ambiguous clinical examination. The typical finding is the absence of flow in the central retinal artery (RCA), although there may be demonstrable flow. As CRCAO is a medical emergency, the USDCO can help in the rapid diagnosis, which is essential to establish the acute treatment and to define the secondary prophylaxis.
Keywords: Central retinal artery occlusion, color Doppler ultrasound, ischemic stroke, cherry-red spots, sudden monocular visual loss, atherosclerosis, embolism, carotid stenosis.

INTRODUCTION

Central retinal artery occlusion (CRAO) causes an interruption of blood flow to the retina, resulting in the acute onset of retinal tissue dysfunction. CRCAO (along with branch retinal artery occlusion and ophthalmic artery occlusion) is a form of ischemic stroke (ISC) (1). Like stroke, it can occur due to atherosclerosis of large arteries, embolism (of the heart, aorta or large vessels), inflammatory vascular disease or hypercoagulability (2). Although many patients show some improvement in vision, only about 17% recover functional visual acuity (3) and in 50% of affected people the only remaining visual field is a small peripheral island (4). OACR affects men and women equally (2 cases per 100,000 person years) and the incidence increases with age (5,6).

Vascular eye disease is diagnosed through a careful eye examination; for example, in 90% of RCAOs, a cherry red spot can be easily observed by indirect ophthalmology in the acute phase (7). However, funduscopic examinations do not differentiate the cause of the lesion. Orbital Color Doppler Ultrasound (COUSD) is a useful imaging tool to assess various orbital pathological conditions (8). The grayscale ultrasound image allows the study of the anatomy of the orbit, while the color Doppler image provides additional information about its vasculature (9). This method can provide quantitative measurements of vascular flow and opens up a whole new range of diagnostic possibilities. USDCO is a non-invasive, inexpensive and well-tolerated tool widely used by radiologists and ophthalmologists (10), although it is not commonly used in neurological practice.

PRESENTATION OF THE CASE

We report a case of a 70-year-old female patient, previously with pre-diabetes, arterial hypertension and hypothyroidism. She had sudden loss of visual acuity in the right eye, being evaluated by an ophthalmologist who diagnosed retinal detachment. The following day, she was referred to our service, a tertiary Neurology center. At her initial evaluation, she had no changes in the summary neurological examination and a National Institutes of Health Stroke Scale (NIHSS) of 0. Indirect ophthalmoscopy showed cherry-red spots and applied retina. Then, COUSD was performed bilaterally, with difficult visualization of the central retinal artery (RCA) on the right, with a residual pattern, only isolated systolic peaks were detected,

findings compatible with CROA. Secondary prophylaxis was started with AAS 100mg/day and simvastatin 40mg/day. Examinations were performed to investigate the ischemic stroke and angiotomography of the skull and carotid arteries showed atheromatosis in the carotid bulbs bilaterally, with stenosis of approximately 50%, being a probable atherothrombotic etiology (11).

DISCUSSION

CRCAO (along with branch retinal artery occlusion and ophthalmic artery occlusion) is a form of stroke (1), ie, a medical emergency. CRCAO causes sudden, painless visual loss. Occasionally, CRAO is preceded by transient monocular blindness or there is a course of blindness or fluctuation (12). Therefore, rapid assessment in a stroke center with rapid access is recommended to perform the additional basic tests that include routine blood, cardiology and vascular tests (13) and USDCO must be included during vascular and transcranial evaluation (8).

Advances in ultrasound equipment allowed orbital evaluations with a 7.5 MHz transducer (the same used for carotid arteries), achieving much better image resolution (8). Given that color Doppler image quality of the eye and orbit has proved useful for measuring blood flow, several publications have considered the application of color Doppler in small series or isolated cases of diabetic retinopathy, psoriasis, (10) thyroid ocular disease, and severe obstructive sleep apnea syndrome. Several series have reported abnormal blood flow in orbital vessels, measured by ultrasound (14), which improved after carotid endarterectomy (15).

Many conditions can produce visual symptoms and CRCAO is a rare event with an incidence of approximately 1 to 10 in 100,000 (5,16), thus making clinical diagnosis difficult. Clinical history and clinical examination help in the diagnosis of RCAO in the vast majority of cases, but funduscopic examination reveals a lack of perfusion of the retinal arteries, but direct evidence of retrobulbar occlusion of RCA is scarce (17). Transbulbar ultrasonography is reliable for detecting CRCAO (18). USDCO may be useful in cases of medial opacity or when the clinical appearance of the ACR occlusion is atypical. It may show a hyperechoic clot, but usually the diagnosis is based on spectral tracking changes (19).

We show our experience of how the USDCO can confirm the diagnostic hypothesis raised by the clinic or, in some cases, help to clarify the etiology (18). However, color Doppler imaging can be helpful when clinical examination is difficult (eg, due to lens opacity) or when clinical examination results are equivocal. In the reported cases, CRA reperfusion occurred within 1 week of occlusion (9), a situation that emphasizes the importance of having a flow velocity cutoff to determine the diagnosis of CRAO (even when the artery is in the recanalization phase).), using a non-invasive diagnostic tool that provides complementary information to intravenous fluorescein assessment (8).

CONCLUSION

Orbital ultrasonography is an important diagnostic method in cases of suspected OACR, which may have normal findings on initial ophthalmological examination and angiotomography. According to this case report and studies consulted, the use of USDCO to evaluate the orbital arteries can be a useful tool in determining the vascular cause and identifying the etiology of ischemic monocular visual loss. This is particularly relevant for patients with persistent vision loss, who are more likely to have ocular vessel disorders. The consulted studies suggest that USDCO may be especially effective in the diagnosis

of ocular ischemia, especially in the case of OACR. USDCO is valuable for the initial diagnosis, etiologic assessment, and prognostic evaluation of CRCAO. And ultrasound can help identify patients who are more likely to benefit from thrombolytic treatment (18). Furthermore, the diagnosis of CRCAO is fundamental to establish the acute treatment and to define the secondary prophylaxis. The USDCO was incorporated into our service and enabled the creation of a specific protocol for better management of CRAO cases.

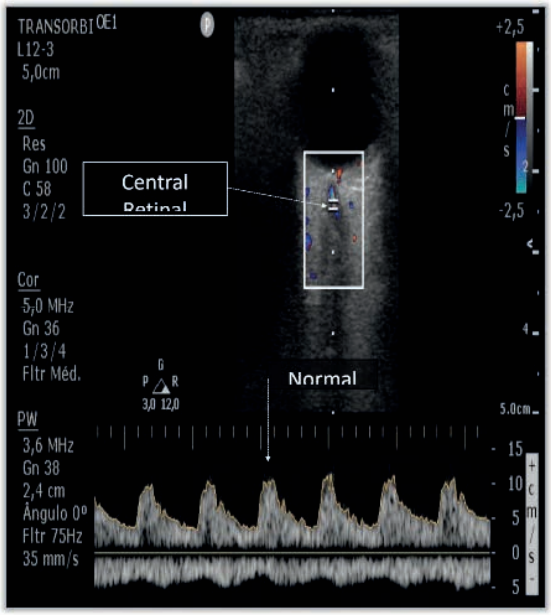

Fig 1: Normal Flow in the Central Retinal Artery of the contralateral eye.

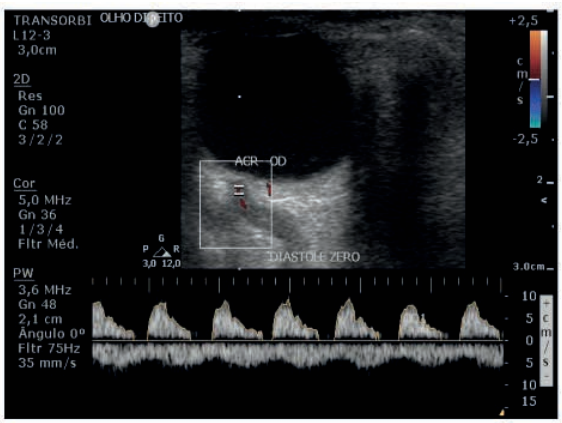

Fig 2: Zero Diastole in the Right Central Retinal Artery.

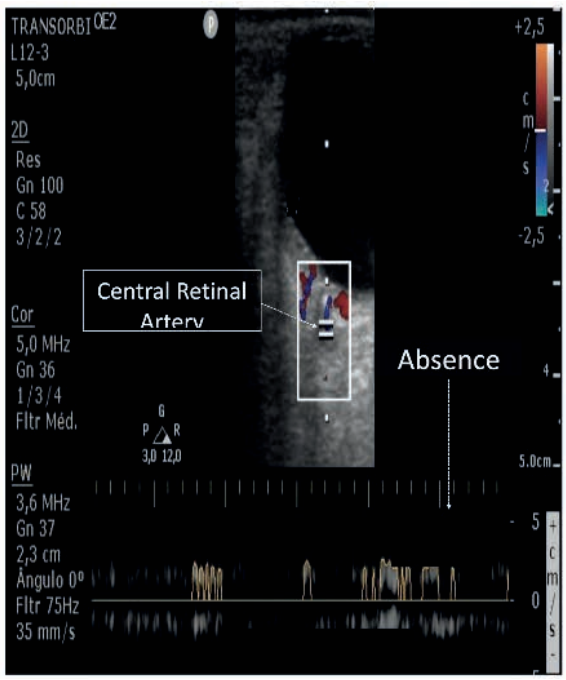

Fig 3: Absence of Flow in the Right Central Retinal Artery more distally.

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