Case Report

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Secondary central retinal artery occlusion due to rhino-orbital-cerebral mucormycosis in a diabetic patient: a case report

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Introduction and importance: Acute sinusitis can cause intraorbital complications. Although subperiosteal abscesses generally do not cause severe vision loss, rare cases of decreased vision due to central artery or vein occlusion have been reported since 2003. Central retinal artery occlusion (CRAO) is an eye emergency that can cause sudden loss of vision. This condition is commonly found in elderly individuals with other metabolic diseases. The authors report a case of a type 2 diabetes mellitus (T2DM) patient with CRAO due to suspected rhino-orbital-cerebral mucormycosis (ROCM).

Case presentation: A 47-year-old man came with sudden blurred vision since the last week. Examination of the left eye revealed no light perception and vision, orthophoric eyeball position with restricted movement in all directions. Hypaesthesia was observed on the left side of the face. In the anterior segment, oedema of the eyelids, ptosis, conjunctival injection, ciliary injection and chemosis, clear cornea, deep anterior chamber with VH4, brown iris, crypts, no neovascularization of the iris, pupil round, mid-dilated with a diameter of 5 mm, no light reflex, relative afferent papillary defect, and NO2NC2 lens were observed. In the posterior segment, non-uniform fundal reflexes were found, as well as retinal oedema, round papillae, hyperaemic fovea reflex (cherry-red spot), and a cup-to-disc ratio that could not be evaluated. The patient was diagnosed with CRAO, orbital cellulitis, and uncontrolled T2DM. The patient was administered topical and oral antibiotics; however, there was no improvement in the left eye. ROCM was suspected.

Clinical discussion: CRAO is most often caused by embolization or thrombosis associated with atherosclerosis at the lamina cribrosa level. CRAO accompanied by ROCM infection is very rare; to establish the diagnosis, it is necessary to carry out further examinations so that administered therapy can definitely improve the patient's clinical condition. Due to resource limitation, biopsy and MRI were not performed. Surgical debridement was planned when the patient was stable, but the patient missed follow-up appointments.

Conclusion: Fungal aetiology should be considered especially in T2DM patient with CRAO that do not improve with antibiotics.

Keywords: central retinal artery occlusion, infection, rhino-orbital-cerebral mucormycosis, diabetes mellitus, case report

Introduction

Acute sinusitis can cause intraorbital issues, such as subperiosteal abscesses, periorbital cellulitis, and abscesses. These are rare in adults but are more common in children. The current incidence of complications from acute bacterial rhinosinusitis is three cases per 1 million people per year, with orbital infections being the most frequent (60–80%). Blindness due to rhinosinusitis complications is 5.5–10%, but the cause is still unknown[1,2].

HIGHLIGHTS

- Rare complication: A 47-year-old male presented with sudden blurred vision and central retinal artery occlusion (CRAO) after a severe infection, highlighting the uncommon link between acute sinusitis and intraorbital complications.
- Ophthalmic signs: The patient exhibited restricted eye movement, eyelid oedema, ptosis, and conjunctival and ciliary injection.
- Diagnostic challenges: CRAO diagnosis was complicated by orbital cellulitis and uncontrolled type 2 diabetes mellitus, underscoring the need for comprehensive assessments.
- Uncommon association: The case reveals the infrequent occurrence of CRAO with potential rhino-orbito-cerebral mucormycosis infection, emphasizing the importance of considering fungal etiologies when antibiotic therapy is ineffective.
- Treatment complexities: Given the lack of improvement with antibiotic therapy, prompt consideration of potential rhino-orbito-cerebral mucormycosis infection is crucial for guiding appropriate treatment approaches.

Retinal ischaemia due to central artery occlusion, first reported in 2003, causes visual impairment. Simultaneous occlusion of arteries and veins is rare. Central retinal artery occlusion (CRAO) is an ocular emergency that can cause sudden vision loss. Retinal artery occlusion is common in elderly individuals with hypertension,

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atherosclerosis, and other diseases. It is caused by an embolus blocking the central retinal artery, resulting in severe vision loss or blindness. In children, it is usually caused by subperiosteal orbital abscesses from acute sinusitis but is very rare[1,2].

Mucormycosis is a rare and serious infection caused by *Mucoraceae* fungi. It usually affects immunocompromised individuals, especially type 2 diabetes mellitus (T2DM) patients, organ transplant recipients, those on steroids or chemotherapy, and those with leukaemia or cancer. Symptoms include rhino-orbito-cerebral mucormycosis (ROCM), pulmonary, cutaneous, and gastrointestinal manifestations. ROCM is a severe form of mucormycosis in T2DM patients. It starts in the nasal/paranasal sinus mucosa after inhaling fungal spores, which can spread to the orbit and brain[3].

CRAO due to ROCM has been reported in 20% of cases. Angioinvasive fungus infiltrates the vessel causing necrotizing vasculitis which ultimately leads to thrombus formation and infarction. Immunocompromised patients with secondary CRAO due to infection that do not respond to antibiotics should be suspected of ROCM[4]. This case report highlights the suspicion of ROCM in T2DM patient with CRAO that do not improve with antibiotics.

This case report has been reported in line with the SCARE criteria[5].

Case presentation

A 47-year-old male presented to ophthalmology clinic of Prof. R. D. Kandou General Hospital with sudden blurred vision in the left eye. Two weeks prior, he was hospitalized due to redness, pain, tearing, eye movement difficulty, and swelling in the left eye. He also experienced nasal congestion, yellowish purulent discharge, and fever. An internal medicine specialist referred him with uncontrolled T2DM for 5 years, without any history of hypertension or eye surgery. During hospitalization, the patient was administered ofloxacin eye drops 4×/day, hydrocortisone and chloramphenicol eye ointment 3×/day in the left eye, and 500 mg metronidazole IV 3×/day for 5 days, followed by oral administration of the same dose.

Ophthalmology examination was performed. The right eye showed no abnormalities, but the left eye showed no light perception, 17.3 mmHg intraocular pressure, orthophoric position, and limited movement. Hypaesthesia was present on the left side of the face. Eyelid swelling, drooping, redness, ciliary injection, and chemosis were also observed in the front segment. The cornea was clear, the anterior chamber deep (VH4), the iris brown with intact crypts, and there was no neovascularization. The pupil was round, 5 mm in diameter, and had no light reflexes or relative afferent pupillary defect. Lens clarity was graded as NO2NC2 (Fig. 1).

On fundoscopy, the posterior segment showed a non-uniform fundus reflex. Retinal oedema, a round, pale optic disc with unclear borders, and a 2:3 arteriovenous ratio were observed (Fig. 2). The fovea was hyperaemic (cherry-red spot). These findings suggest severe abnormalities in the left eye.

Laboratory tests revealed leukocytosis (15 300/µl), high total cholesterol (226 mg/dl), low-density lipoprotein cholesterol (146 mg/dl), HbA1C (13.9%), low albumin (3.08 g/dl), and low total calcium (8.33 mg/dl).

Optical coherence tomography was conducted (Fig. 3). The right eye showed a normal foveal contour with no shadows in the intraretinal and subretinal layers. The left eye showed a foveal contour with a potential macular hole. A hypo-reflective shadow was observed in the subretinal space and the retina was elevated at the posterior pole. No hypo- or hyper-reflective shadows were present in the intraretinal layers, and the retinal layers were not visible. Computed tomography of the central head, with emphasis on the orbital regions, showed intact orbital cavities. Hyperdense shadows were observed in the left orbital cavity and both maxillary sinuses (Fig. 4).

The patient was diagnosed with emmetropia, CRAO, orbital cellulitis, bilateral rhinosinusitis, and T2DM. Treatment plan included levofloxacin eye drops, artificial tears, ciprofloxacin, ceftriaxone, metronidazole, citicoline, and ENT consultation. The patient missed follow-up appointments for therapy evaluation.

Discussion

CRAO causes sudden, painless vision loss in one eye, with visual acuity worse than 20/400. This can lead to total light perception loss due to occlusion of the ophthalmic artery (partial or total), ciliary artery, and central retinal artery. Non-human primate studies have shown that 90 min after total CRAO, the sensory retina is permanently damaged. Visual recovery can still occur, even with long-term obstruction. Vision loss without light perception is caused by total occlusion of the ophthalmic artery and papillary atrophy[6].

The examination revealed grey retinal discoloration and swelling, particularly at the posterior pole. The red reflex from the macula originates from the foveola's underlying choroidal blood vessels, surrounded by a grey, swollen retina. Optical coherence tomography revealed a normal macula with increased reflectivity and inner retinal layer loss. Fluorescein angiography indicated central retinal artery and ciliary artery occlusion, leading to ischaemia and choroid vertical perfusion. This resulted in sudden, painless, blurred vision in the patient's left eye[6].

CRAO is usually caused by embolization or thrombosis due to atherosclerosis of the lamina cribrosa. The less common causes include haemorrhage, trauma, spasms, and aneurysm dissection. Systemic conditions such as arrhythmias, pregnancy, coagulation disorders, trauma, inflammation, and infection can also cause CRAO. Inflammation and infection may originate from the maxillary sinus, causing symptoms similar to those of orbital cellulitis and abscesses[6]. In our case, the patient had previously been hospitalized 2 weeks prior with orbital cellulitis and rhinosinusitis. The history of the patient highlights the aetiology of CRAO due to infection.

In this case, uncontrolled T2DM, lack of response to antibiotics, and no sinus pus/fluid examination increased suspicion of fungal diagnosis, especially ROCM. Diabetes weakens the immune response to the fungus, while high glucose, acidosis, and free iron boost fungal growth. Fungi can harm blood vessel elasticity, leading to angioinvasion, thrombosis, and haemorrhagic necrosis[3]. ROCM often starts in the nasal and sinus areas and spreads to adjacent tissues. Symptoms include headache, fever, purulent or bloody nasal discharge, and ophthalmoplegia. Intracranial invasion can occur, leading to impaired consciousness, hemiparesis, or blindness. CRAO is a rare manifestation of ROCM, appearing in 16–20% of cases[7]. Similar cases have been reported previously, with contralateral endogenous fungal endophthalmitis causing sudden vision loss due to CRAO. This was caused by a fungus that directly infiltrated the central retinal

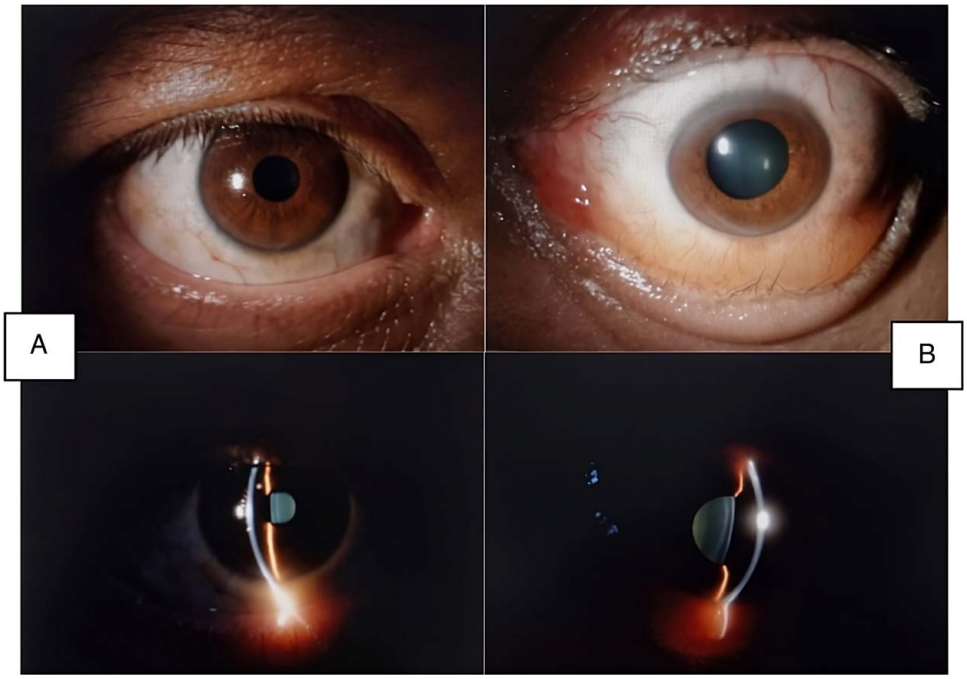

Figure 1. Anterior photo of the right eye (A) and left eye (B).

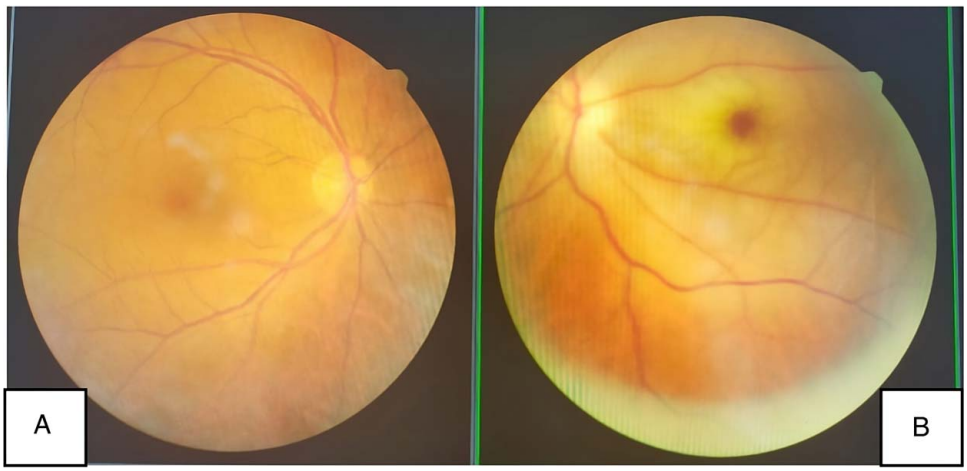

Figure 2. Fundus examination of the right (A) and left (B) eyes.

artery from the orbit. Other cases found that vision loss in ROCM is often linked to CRAO and cavernous sinus thrombosis[8].

Biopsy and MRI is required for diagnosis of ROCM. Once confirmed, patient should be treated aggressively with amphotericin B and extensive surgical debridement. Dead tissue and injured vessels are where the fungus grows; therefore, debridement is necessary. Amphotericin B is more effective, less toxic, and has good therapeutic effects. Infection control should be used with appropriate therapy, although the CRAO-affected eyes remain blind[7]. In our case, biopsy and MRI was not performed due to low-resource setting. Thus, we were unable to start administration of amphotericin B, as biopsy and MRI were not conducted, and extensive surgery was not performed because of the patient's poor condition. Debridement was planned by our ophthalmologist when the patient's health improved; however, the patient did not return for follow-up.

Here, we reported a rare case of patient with CRAO as a complication of suspected fungal aetiology, possibly ROCM. Our case highlights the importance of suspecting ROCM in T2DM patient with CRAO that do not respond to antibiotics. However, due to the low-resource setting, we were unable to conduct biopsy and MRI to confirm the diagnosis of ROCM. Nevertheless, fungal etiologies should be considered when antibiotic is ineffective. Treatment requires the collaboration of cross-specialties with ophthalmology and internal medicine to treat CRAO as a complication of ROCM and the underlying cause of immunodeficiency, T2DM.

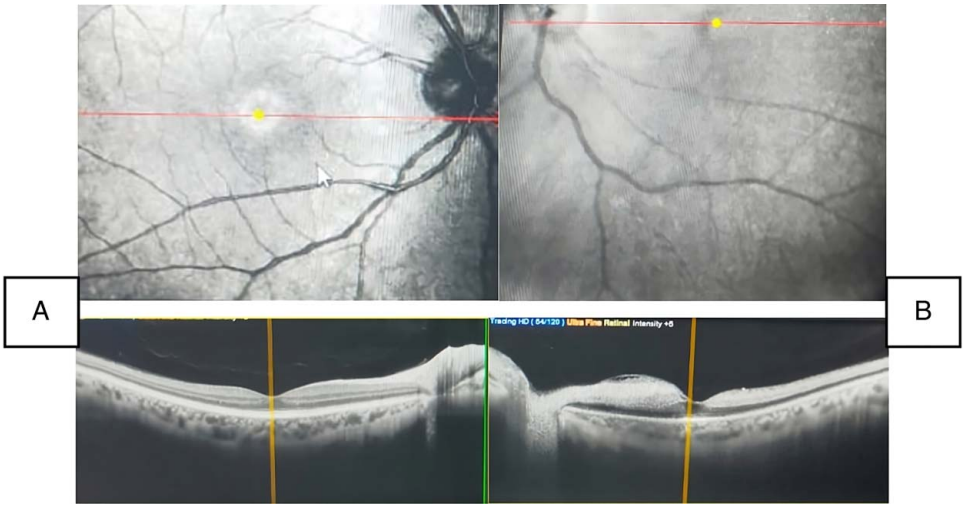

Figure 3. Optical coherence tomography of the right (A) and left (B) eyes.

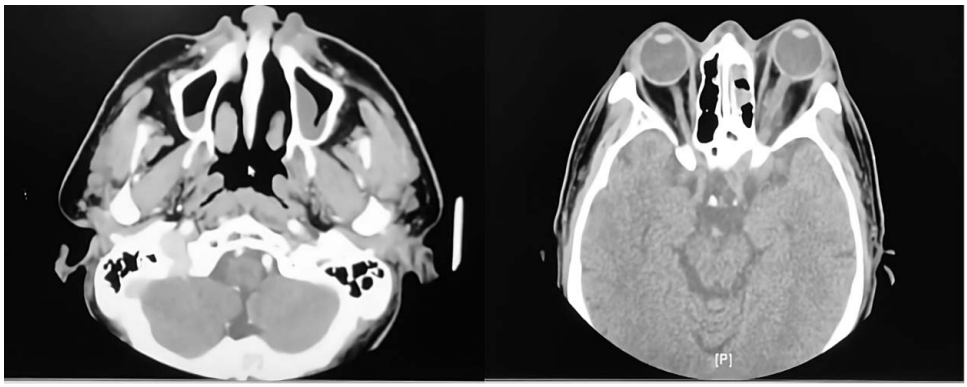

Figure 4. Contrast-enhanced computed tomography scan of the central head (A) with a focus on the orbital regions (B).

Conclusion

CRAO is usually caused by embolization or thrombosis due to atherosclerosis of the lamina cribrosa. Systemic conditions such as arrhythmias, mitral valve prolapse, oral contraceptives/pregnancy, coagulation disorders, trauma, inflammation, and infection can cause CRAO. CRAO in conjunction with ROCM infection is rare; therefore, further investigation is needed to diagnose and treat this patient.

Ethical approval

This study, being a case report, did not require formal ethical approval as per the policies of the Department of Ophthalmology, Prof. R. D. Kandou General Hospital-Faculty of Medicine, Sam Ratulangi University. Nevertheless, informed consent was obtained from the patient, and their confidentiality and privacy were strictly maintained throughout the study.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author Contribution

Conceptualization, V.S., A.L., R.L.S.; methodology, V.S., A.L.; validation, V.S., A.L., R.L.S.; formal analysis, V.S., A.L.; investigation, V.S., A.L.; resources, V.S., A.L.; data curation, V.S., A.L.; writing—original draft preparation, V.S., A.L.; writing—review and editing, V.S., R.L.S.; visualization, V.S., A.L.; supervision, V.S., R.L.S.; project administration, R.L.S. All authors attest that they meet the current ICMJE criteria for Authorship.

Conflicts of interest disclosure

There are no conflicts of interest.

Research registration unique identifying number (UIN)

NA. The study is not a 'First in Man' study.

Guarantor

Vera Sumual.

Data availability

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Provenance and peer review

Not commissioned, externally peer-reviewed.

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