

## Exophthalmos Revealing a Post Traumatic Carotid-Cavernous Fistula: A Case Report

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### Abstract

### Case Report

Carotid-cavernous fistula is an abnormal communication between the carotid arterial system and the cavernous sinus. The most frequent origin is congenital, due to arteriovenous malformations, but it can also be post-traumatic. This is a rare condition, which can be life-threatening and visually disabling. We report here the case of a young female patient, aged 30, who was the victim of a violent craniofacial point-of-impact trauma and immediately presented with rapidly evolving left exophthalmos with no other associated signs, revealing a left carotid-cavernous fistula.

**Keywords:** Carotid-Cavernous Fistula, Internal Carotid Artery, Cavernous Sinus, About a Case Report.

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## INTRODUCTION

Carotid-cavernous fistula (CCF) is a direct, high-flow fistula caused by a breach of the internal carotid artery into the cavernous sinus. It is a rare but not exceptional complication of severe craniofacial trauma. Diagnosis is suspected clinically, confirmed by computed tomography (CT) or magnetic resonance imaging (MRI) and arteriography.

Therapeutic management has progressed considerably with the advent of interventional neuroradiology. Surgery is indicated when endovascular treatment fails. Symptoms generally improve dramatically after treatment.

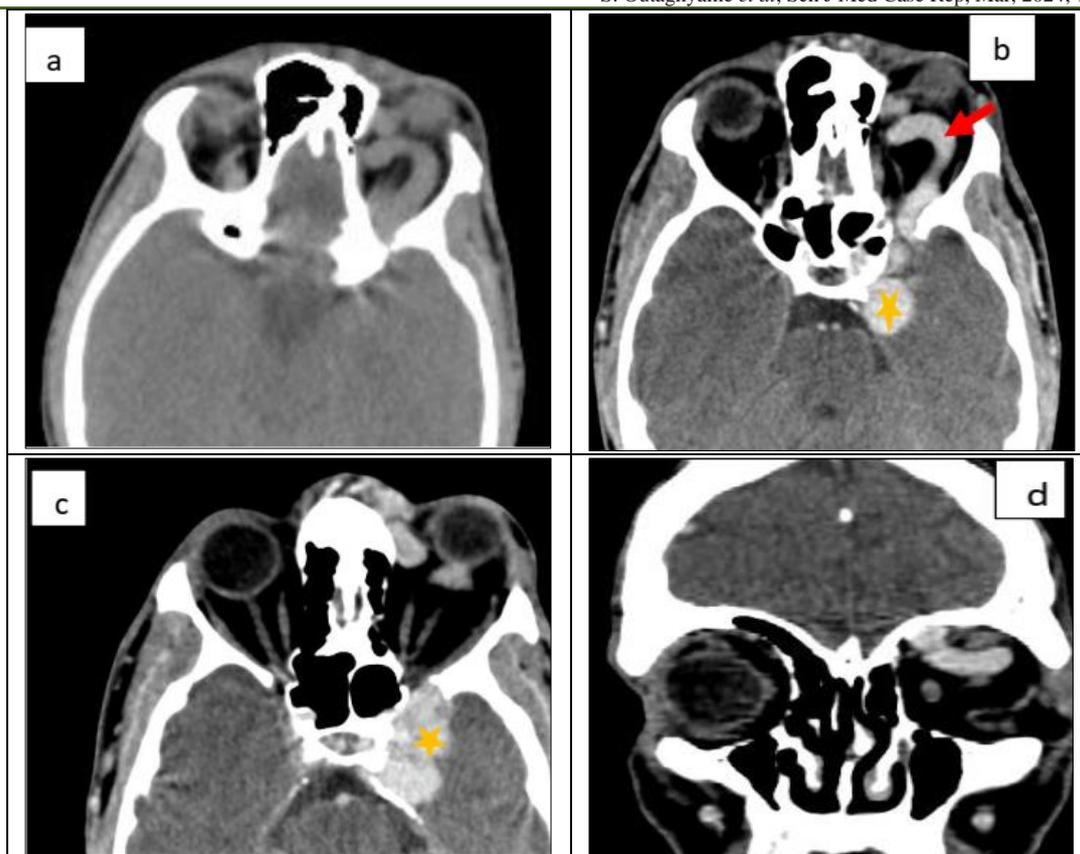
We report here the case of a young patient aged 30, who presented with a left carotid-cavernous fistula revealed by sudden onset exophthalmos after craniofacial trauma.

## OBSERVATION

A 30-year-old female patient presented to the emergency department following a violent craniofacial trauma with exophthalmos of the left eye.

Ophthalmological examination revealed: right eye: visual acuity 10/10, no adnexal abnormalities, ocular motility preserved, anterior segment: clear cornea, good anterior chamber, good direct and consensual photomotor reflex, clear lens and good ocular tone. Fundus: normal papilla with good macular reflex. Left eye: visual acuity 7/10. Adnexa: slight ptosis, nonreducible, painless, pulsatile axial exophthalmos, with preserved ocular motility without paralysis. Anterior segment: clear cornea, good anterior chamber, good direct and consensual photomotor reflex, clear lens and high ocular tone at 34mmhg. Fundus: 4/10 papillary excavation with tortuous venous axes. Macular reflex was without abnormalities.

A cerebral CT scan without and with PDC injection, requested urgently in view of the traumatic context, revealed stage I exophthalmos with enlargement of the cavernous cavity and its opacification at arterial time after injection of the contrast medium, and dilatation of the homolateral superior ophthalmic vein, an aspect in favour of a left carotid-cavernous fistula (Figure 1: a ,b,c,d).



**Figure 1: Cerebral CT scan without (a) and with PDC injection (b, c, d):**

- Grade 1 exophthalmos, with indirect signs of left carotid-cavernous fistula:
  - Cavernous sinus dilated and enhanced in arterial time (star)
  - Dilatation of superior ophthalmic vein (red arrow)

## DISCUSSION

Carotid-cavernous fistula is a rare but not exceptional pathology, with traumatic etiology found in almost 75% of cases [1]. Anatomically, the intracavernous portion of the internal carotid artery is the only arterial system in the body that crosses a large venous plexus. Direct or indirect trauma to the craniofacial region can result in weakness of the muscular wall of the internal carotid artery, or in a true laceration producing a vascular shunt from a high-flow artery into a low-flow venous sinus, leading to fistula [2].

Clinically, symptoms may appear within hours of the trauma, as in our patient's case, or be delayed for several months. They are dominated by ophthalmological signs, notably ptosis, unilateral, pulsatile exophthalmos with a systolodiastolic murmur on auscultation of the periorbital and temporal region, which disappears on manual compression of the homolateral carotid artery at the level of the neck, diplopia, ophthalmoplegia, reduced visual acuity and ocular hypertonia. Headaches and ringing in the ears may also be present.

Neuroimaging is essential for the diagnosis and treatment of post-traumatic carotid-cavernous fistulas. CT quantifies exophthalmos by measuring the oculo-

orbital index, looks for dilatation of the superior ophthalmic vein and for bulging of the cavernous sinus, all of which are indirect signs of fistula [3, 4]. It can also be used to complete the post-traumatic lesion assessment, in particular by looking for an associated fracture. Magnetic resonance imaging is of little interest, as it provides the same information as computed tomography [5].

The classification system universally adopted in the literature for carotid-cavernous fistulas is the scheme developed by Barrow and colleagues [6], type A: direct communication between the internal carotid artery and the cavernous sinus. Type B: dural fistula between the meningeal branch of the internal carotid artery and the cavernous sinus. Type C: dural fistula between the meningeal branch of the external carotid artery and the cavernous sinus. Type D: type B+ type C. It should be noted that direct carotid-cavernous fistulas, classified as Barrow type A, are high-flow shunts, and occur three times more frequently than indirect types [7]. The advent of interventional neuroradiology has revolutionized the management of this type of fistula. If left untreated, fistulas can be life-threatening (cerebral or subarachnoid haemorrhage, epistaxis) and functionally dangerous (ocular hypertonia, optic atrophy, reduced visual acuity) [8, 9]. Treatment consisted of selective cerebral arterial

embolization to close the fistula using an internal balloon delivered via the arterial route, while preserving the internal carotid axis.

## CONCLUSION

Post-traumatic carotid-cavernous fistula can manifest as pulsatile exophthalmos several months to several years after the trauma. For this reason, this diagnosis must be evoked and a neuroradiological work-up must be performed regardless of the delay in relation to the trauma.

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