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## INTRODUCTION

Carotid artery dissection (CAD) is a rare condition in which there is a tear in the intimal layer of the carotid artery wall, leading to the formation of a hematoma between the arterial layers. This can cause a reduction in blood flow, formation of a thrombus, or embolization of clot to the brain, resulting in ischemic stroke or other neurological deficits.

Here, we describe a case of carotid artery dissection following a traumatic event that was initially managed conservatively but later complicated by the development of a cavernous sinus fistula.

## CLINICAL CASE PRESENTATION

A **44-year-old woman** was brought to the emergency department after being rear-ended by a bus while driving her car. The collision occurred at low speed, but the impact caused significant **whiplash** forces to the cervical region.

At primary survey, the patient was alert and hemodynamically stable. The physical examination revealed an open and displaced fracture of the left radius. Initial diagnostic imaging included a contrast-enhanced CT scan of the abdomen and chest, and basal CT scans of the head and cervical spine, all of which were negative for other significant injuries. The patient was therefore admitted to the orthopaedic ward for surgical treatment of the fracture.

On the first day of admission, the patient began to complain right-sided headache radiated to the neck and diplopia. Physical examination revealed: 1) **intermittent horizontal diplopia** in all directions of gaze, but no diplopia was present in monocular vision; 2) **anisocoria**, right pupil larger than the left, both reactive to light. No sensory deficits were present in the face or the four limbs. The finger-to-nose test was well-executed on the right side. No elevation differences were noted in the right upper limb or lower limbs (the left upper limb was in a cast). No Babinski sign was present and no signs of meningeal irritation.

The occurrence of new neurological symptoms prompted to repeat a basal CT scan of the head that did not show any acute findings. After neurology consultation, a CT angiography of the head and neck was performed, which documented the presence of **dissection flaps in both the internal carotid arteries at cervical level**, in particular the left carotid artery showed a reduction in caliber by approximately 45-50%. Subsequently, a brain contrast MRI confirmed the suspicion of carotid artery dissection, with no immediate ischemic damage.

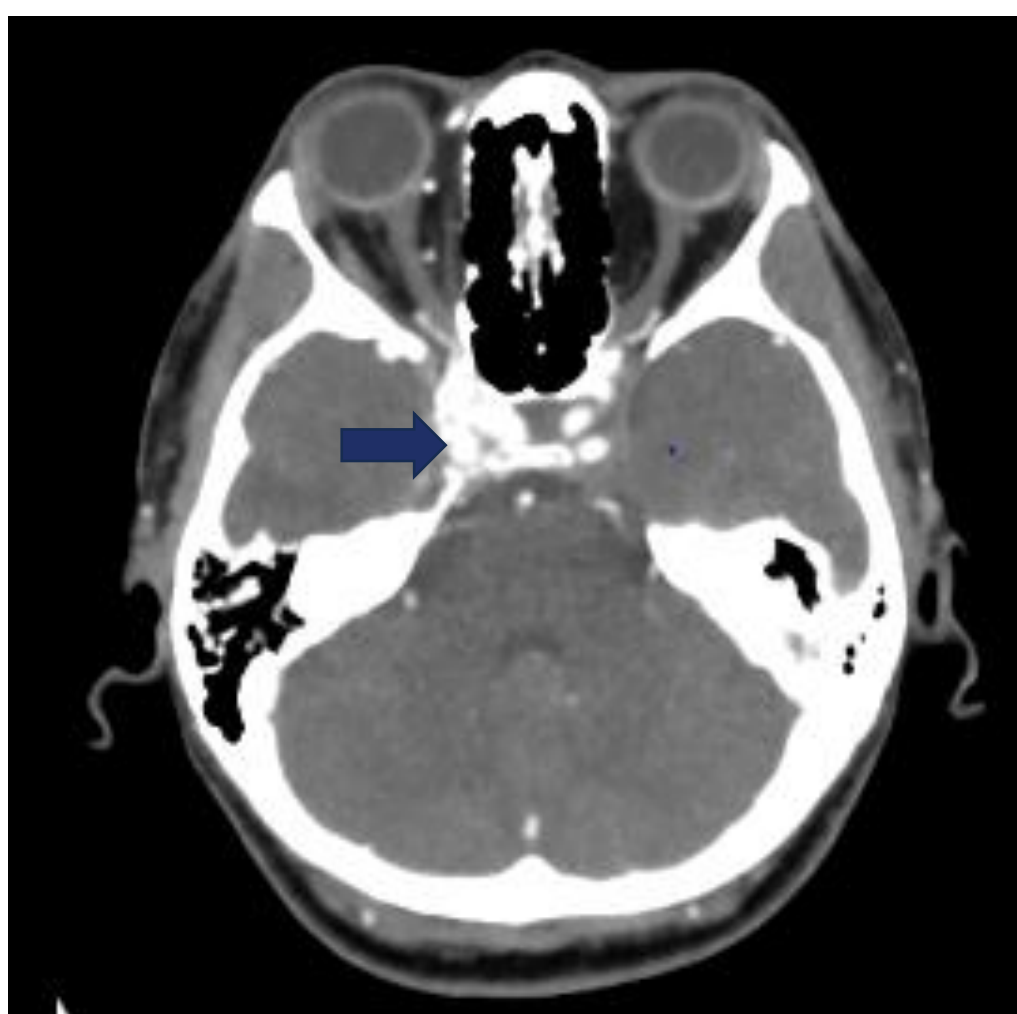
Given the findings of bilateral carotid artery dissection, anticoagulation therapy with Warfarin was initiated.

A follow-up angioCT of the head and neck showed the **development of pseudoaneurysms** in both carotid arteries, specifically a glove-shaped pseudoaneurysm at the right pre-petrous segment and a dilation on the left cervical segment without stenosis.

One month later, she returned to the ED with **worsening headache and recurrent diplopia**.

Examination found **enophthalmos** and **conjunctival chemosis** of the right eye but no new cranial nerve deficits. AngioCT revealed **cavernous sinus engorgement and superior ophthalmic vein dilation**, suggestive of a **cavernous sinus fistula (Fig.1)**.

Digital subtraction angiography confirmed a right-sided low-flow cavernous sinus fistula with venous drainage into the ophthalmic and facial veins. The patient was referred for multidisciplinary management and endovascular closure was planned to prevent further complications.



*Fig.1: AngioCT showing cavernous sinus engorgement and superior ophthalmic vein dilation, suggestive of a cavernous sinus fistula.*

## CONCLUSIONS

Cavernous sinus fistula, an abnormal connection between the carotid artery and cavernous sinus, can cause venous congestion and ocular symptoms. The pseudoaneurysm formation led to fistulization, resulting in increased intraocular pressure and progressive symptoms.

Management of CAD typically involves anticoagulation to prevent thromboembolism.

Despite an initially unremarkable presentation, progressive neurological symptoms necessitated further investigation, ultimately revealing CAD. The delayed onset of complications underscores the importance of long-term follow-up in trauma patients.

Trauma-induced cavernous sinus fistulas are rare, particularly in young women. This case emphasizes the need for thorough evaluation in trauma patients presenting with neurological symptoms like headache and diplopia. Early recognition of complications, including pseudoaneurysms and fistulas, is crucial for timely intervention. Multidisciplinary collaboration among neurology, neuroradiology, and interventional radiology is essential in optimizing outcomes for such complex cases.

## Affiliazioni

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## CASO CLINICO

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