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CASE PRESENTATION AND ORIGINAL APPROACH

Modern approach in posttraumatic carotid-cavernous fistulas treatment

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ABSTRACT

The article presents the case of a posttraumatic carotid-cavernous sinus fistula, which required repeated examinations for diagnosis. After that, a modern and effective treatment was chosen, which led to remission of symptoms and recovery of the visual function.

KEYWORDS: exophtalmy, posttraumatic carotid-cavernous fistula, stent angioplasty

INTRODUCTION

The cavernous sinuses, with a venous structure, are paired, being located on each side of the sella turcica. The cavernous sinuses receive blood via the tributary veins of the superior and inferior ophthalmic veins, which drain into the superior and inferior petrosal sinus. The cavernous sinus contains the carotid artery with its sympathetic plexus and oculomotor nerves III, IV and VI. Moreover, the ophthalmic branch and, occasionally, the maxillary branch of the Vth pair of cranial nerves pass through the cavernous sinus. The nerves pass through the wall of the cavernous sinus, while the internal carotid artery right through the sinus[1].

Cavernous sinus syndrome is characterized by multiple clinical features, which make the diagnosis difficult. The neuro-ophthalmological examination reveals: ophthalmoplegia, chemosis, proptosis, Horner's syndrome, trigeminal sensory neuropathy, orbital congestion, optic neuropathy, papillary edema or retinal hemorrhage[2].

The carotid-cavernous fistulas can be whether direct or indirect.

According to Barrow et al, frequently used classification, there are four angiographic types of carotid-cavernous fistulas:

- A – direct fistula – shunt between the internal carotid artery and the cavernous sinus
- B, C, D – indirect fistulas – shunt between the cavernous sinus and the meningeal arteries (branches of the internal or external carotid artery, or both)

This classification according to the angiographic investigation appearance is also important in choosing the most effective treatment.

The etiology of the carotid-cavernous fistulas can be: infectious, non-infectious, inflammatory, vascular, traumatic, or due to some neoplastic lesions.

CASE PRESENTATION

A woman patient was hospitalized in Elias University Emergency Hospital on July 29th 2007, after suffering a cranial trauma due to human aggression. The case required an interdisciplinary evaluation: ophthalmology, ENT, neuro-ophthalmology.

When the patient was hospitalized, she complained of frontal headache, pain in the left laterocervical region and thighs, vomiting, thoraco-abdominal pain, due to human aggression. The patient claimed posttraumatic loss of consciousness.

Clinical examination reveals multiple bruises located on her left shoulder, right arm, left infraorbital and temporal regions, on her chest and both thighs.

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Figure 1 Left eye aspect – complete ptosis, superior and inferior orbital hematoma, eyelid bruising

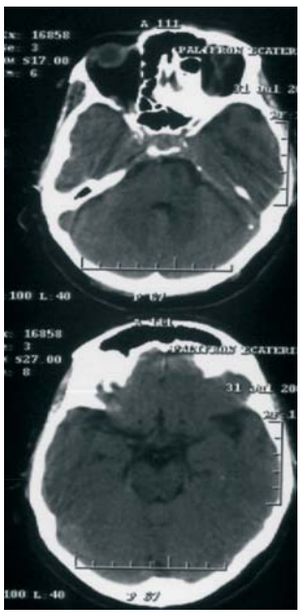

Figure 2 No cerebral posttraumatic lesions

Figure 3 Left eyelid edema

An interdisciplinary evaluation was required and it consisted of ophthalmologic, neurologic and ENT examinations.

The ophthalmologic assessment performed on July 31st 2007 revealed:

VOD = 1cc (+Dsf)

VOS = 1ccp (Cg) Cn+5Dsf and upper eyelid support

TOD = 15mmHg TOS =17mmHg

The biomicroscopy revealed a normal right eye according to age. The left eye presented complete ptosis, eyelid bruising with superior and inferior orbital hematoma, moderate chemosis, reduced ocular motility in all directions and external strabismus (Figure 1).

At the ophthalmoscopic examination the papilla proved to be flat, round shaped, of normal color and excavation, retinal vessels with type II/III angiosclerosis, diminished foveal reflex and macular chemosis.

We have followed the diagnosis protocol (for cranial traumas with loss of consciousness) and a brain CT scan was performed. No cerebral or orbital heterodense posttraumatic lesions were discovered (Figure 2, 3).

Figure 4 a. Left eye ptosis

Figure 4 b. Chemosis, Mydriasis

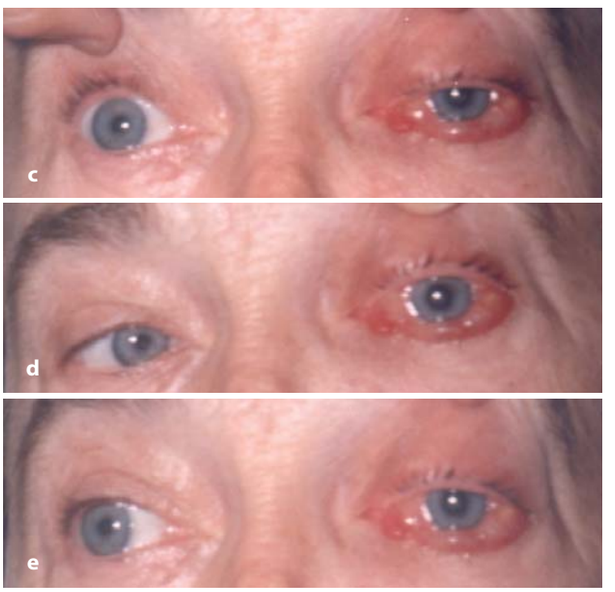

Figure 4 c.,d.,e. Eye immobility in all fields

The patient is discharged with the following diagnosis: grade I minor traumatic brain injury, left eyelid bruising, Glasgow Score of 15 points, thoraco-abdominal trauma. The patient remained under observation for intracranial hypertension. Aggression was confirmed.

Since the evolution of the orbital contusion does not improve in the coming weeks, our patient is hospitalized in the Neurosurgery Department, at "Sfantul Pantelimon" Emergency Hospital for an interdisciplinary examination. The clinical evaluation revealed left ptosis and eye protrusion, chemosis, left eye mydriasis, eye immobility and papillary edema at ophthalmoscopy (Figure 4).

The MRI examination shows a normal aspect of the brain, but with multiple inflammatory lesions in the left orbit (Figure 5 a, b, c).

CCF is suspected, but only the CT scan and the MRI cannot confirm. Therefore, a bilateral carotid angiogra-

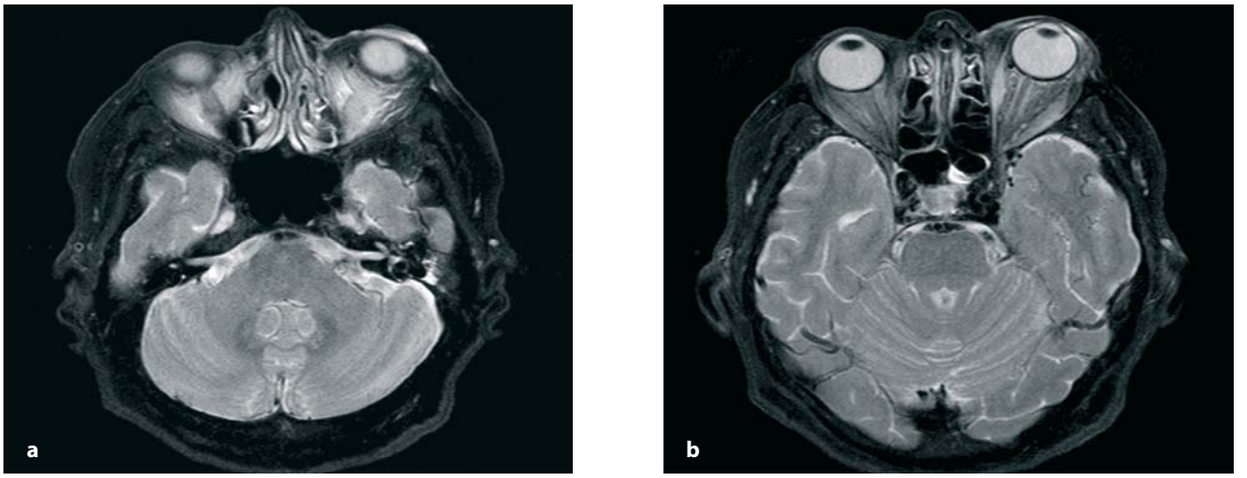

Figure 5 **a.** Posttraumatic inflammatory lesions in the left orbit
b. Left orbit – increased size of the right external and internal rectus muscles with edema-like signal, normal aspect of the eyeball and optic nerve

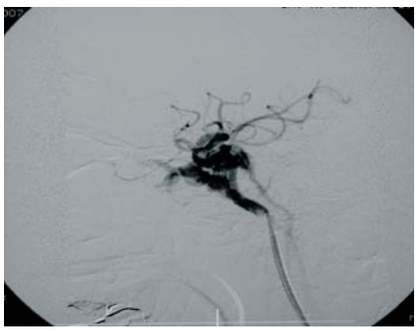

Figure 6 Left internal carotid angiography reveals, in the nervous system, a poor intracerebral shunt – carotid-cavernous fistula

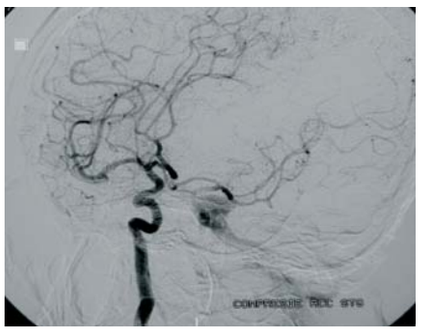

Figure 7 The selective injection of the right carotid artery with left internal carotid artery compression – retrograde shunt in the fistula through the anterior communicating artery

Figure 8 Stent-graft angioplasty

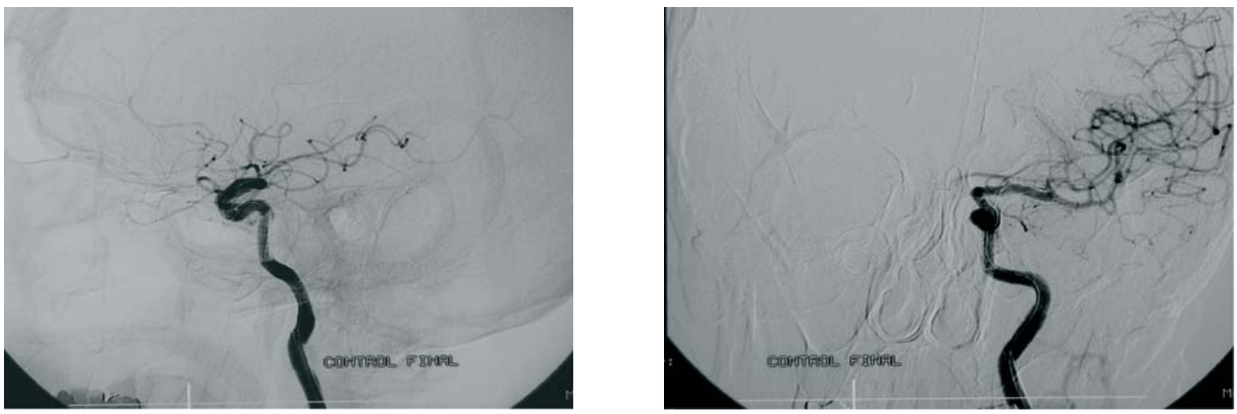

Figure 9 Follow-up angiography --> No carotid-cavernous fistula

phy is performed for elucidation. The selective injection of the left internal carotid artery shows a carotid-cavernous fistula (Figure 6). The selective injection of the right internal carotid artery with left internal carotid artery compression reveals a retrograde shunt in the fistula through the anterior communicating artery (Figure 7).

The treatment strategy consisted in neuro-radiologic management. A stent-graft angioplasty (3x16mm at 16 atm) with balloon post-dilation (4x12mm) was performed (Figure 8).

The postoperative medical treatment consisted of 0,4ml Clexan at 12 hours, for 24-48h, followed by

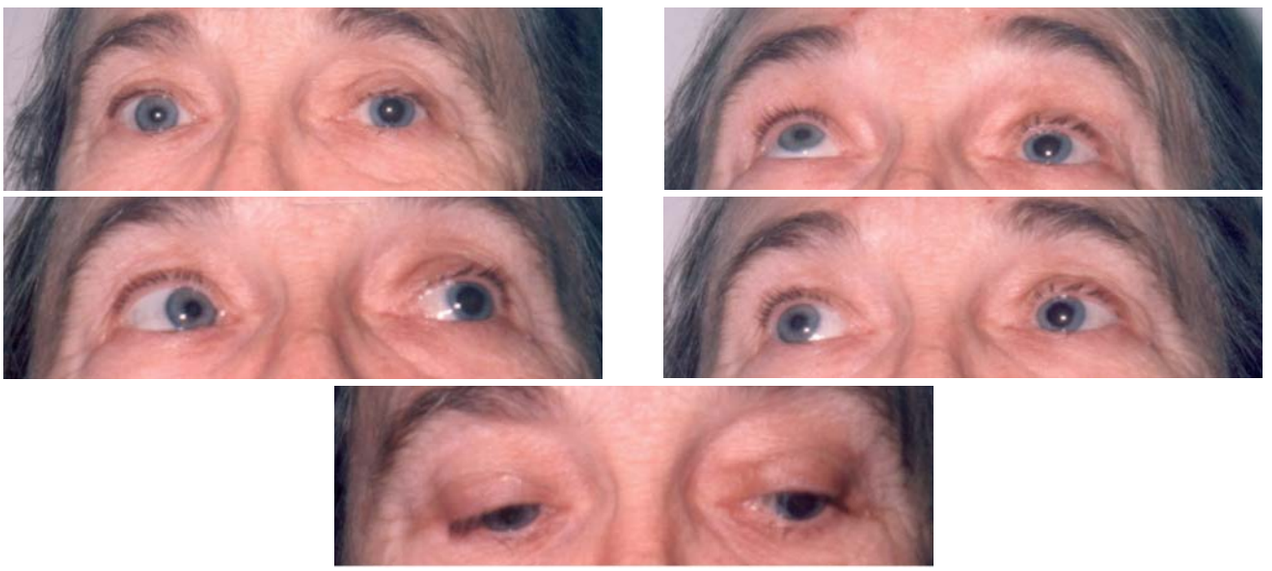

Figure 10 4 months follow-up: left eye mydriasis, photomotor reflex abolished

clopidogrel (Plavix) 75mg per day for at least 9 months and Aspenter 75mg per day without interruption.

The follow-up angiography revealed permeable stent, lack of loading in the venous system (closed fistula) and normal brain vascularization (Figure 9).

The evaluation made at 4 months after surgery reveals only a left eye mydriasis and photomotor reflex abolished (Figure 10).

DISCUSSIONS

The aim of the treatment of carotid-cavernous fistulas is to preserve the visual function and to avoid cerebral ischemic complications.

Over time different therapeutic strategies were used in order to relieve CCF symptoms[4,5,6,7]. Thus, intra/extracranial internal carotid artery ligation was tried, but with a high risk of stroke in case of a poor collateral circulation. There is also the possibility of endovascular obliteration of the direct fistula with coils or balloon.

In our case, a stent angioplasty was performed by the radiologists at the University Hospital and it managed to rescue the visual function and aesthetics, without cerebral ischemic complications. In case of intraocular hypertension, antiglaucoma agents are needed.

The brain and orbital CT scan, as well as the MRI examination, revealed no carotid-cavernous fistula; however, in order to explain the symptoms and to establish the treatment, investigations continued and bilateral carotid angiographies were performed.

CONCLUSIONS

The difficulty in establishing the CCF diagnosis required a multidisciplinary examination. Angiography is often needed for a correct diagnosis and a successful approach. Even if, in our case, the diagnosis was established by the neuro-ophthalmologist, the surgery was performed by the interventional radiologists.

Functional recovery is more rapid as both diagnosis and surgical operation are closer to the time of injury.

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