

## CASE REPORT

# Spontaneous closure of posttraumatic high-flow carotid-cavernous fistula following cerebral angiography

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## ABSTRACT

Traumatic carotid-cavernous fistula (TCCF) is a direct communication between cavernous portion of the internal carotid artery (ICA) and cavernous sinus due to tear in ICA. Most of the cases are treated by endovascular embolization. Spontaneous resolution of high-flow TCCFs is extremely rare. We report a case of posttraumatic, direct, high-flow carotid cavernous fistula (Barrow type A) that resolved spontaneously after cerebral angiography.

**Key words:** Barrow classification, embolization, spontaneous closure, traumatic carotid-cavernous fistula

## Introduction

Carotid-cavernous fistula (CCF) is an abnormal communication between the cavernous portion of internal carotid artery (ICA) or one of its branches or external carotid artery and the cavernous sinus. Etiologically classified into posttraumatic or spontaneous CCF. Posttraumatic cases account for about 75% of all CCFs and usually high-flow type. Common clinical manifestations are pulsatile proptosis, bruit, chemosis, and ophthalmoplegia.<sup>[1-3]</sup> Traumatic CCF (TCCF) may occasionally result in life-threatening epistaxis or intracranial hemorrhage.<sup>[4]</sup> Being a high-flow shunt, spontaneous resolution is extremely rare. We are presenting a case of Barrow type A CCF following head injury which closed spontaneously after diagnostic angiography.

## Case Report

A 60-year-old female presented with history of protrusion of right eye ball, redness and double vision for the last 2 months. Patient had suffered head injury due to road traffic

accident 3 months back for which she was admitted in local hospital and was managed conservatively. On examination, there was redness of right eye with significant proptosis. Movements of eyeball were painful and restricted in all directions. Visual acuity was 6/18 in the right eye and 6/6 in the left eye and fundus was normal. Bruit was audible in frontal and orbital region on the right side. Computed tomography scan orbit showed proptosis of right eyeball with dilated tortuous superior ophthalmic vein [Figure 1]. Four vessel cerebral angiography showed right side direct high-flow CCF (Barrow type A) with dilated tortuous superior ophthalmic vein and marked cortico-venous reflux [Figure 2]. Diagnosis of right side Barrow type A CCF was made on the basis of clinical history, examination and cerebral angiography. Endovascular embolization was planned using balloons but was delayed due to financial constraints. During this period, patient improved gradually as redness of eye and proptosis decreased. Eye movements became almost painless, bruit diminished in intensity and finally disappeared after 1 week of angiography. After 6 weeks, patient was posted for endovascular embolization during which angiogram showed complete resolution of CCF [Figure 3].

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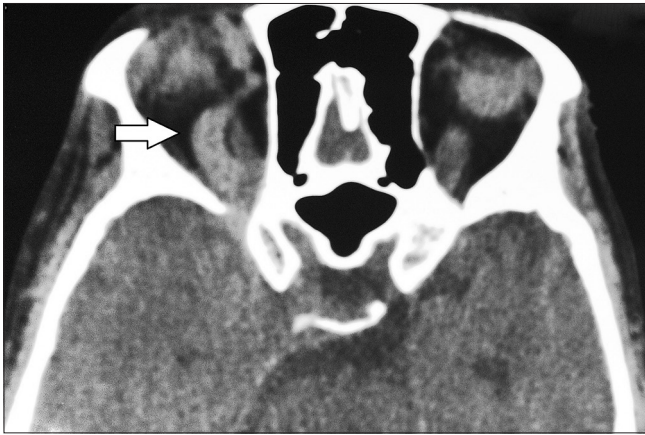
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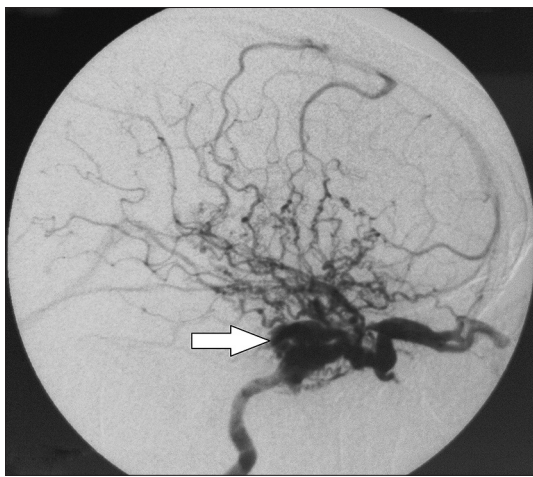
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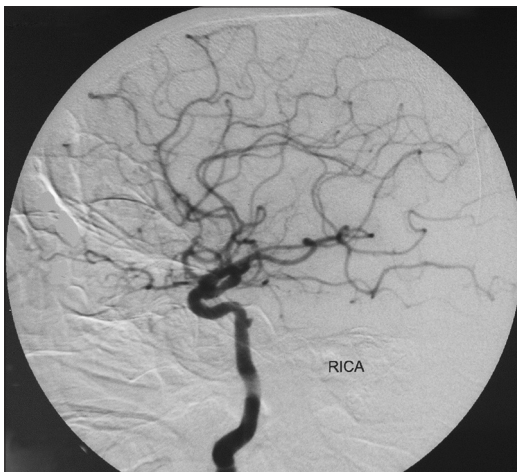
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**Figure 1:** Computed tomography scan orbit showing dilated right superior ophthalmic vein



**Figure 2:** Right carotid angiogram showing traumatic carotid-cavernous fistula with dilated superior ophthalmic vein



**Figure 3:** Carotid angiogram done after 6 weeks shows complete resolution of carotid cavernous fistula with preservation of internal carotid artery blood flow

## Discussion

Barrow *et al.*<sup>[5]</sup> classified CCF on the basis of angiography into four types: Type A is direct shunt between cavernous

portion of ICA and cavernous sinus, usually high-flow type and traumatic in origin, less commonly due to aneurysmal rupture. Type B, C, and D are indirect shunt between cavernous sinus and meningeal branch of ICA, external carotid artery or both, respectively.

Type A CCF is usually treated by endovascular embolization either using balloons or coils.<sup>[6]</sup> Coil embolization through trans-arterial route is usually preferred while transvenous route is used when trans-arterial approach fails.<sup>[7]</sup>

Spontaneous closure of type A fistula is a rare phenomenon. The mechanism of spontaneous closure is unknown. Cerebral angiography might play a role in spontaneous resolution of CCF as reported in few cases.<sup>[8,9]</sup> Mechanism thought to be responsible for spontaneous closure of direct CCF are slow flow due to ICA dissection leading to venous stasis and damage to vascular endothelium of cavernous sinus by venous hypertension.<sup>[8,10]</sup> Another possible mechanism is the use of iodinated contrast medium that exaggerates leukocytic accumulation, promotes red blood cell aggregation and direct effect on vascular endothelium leading to thrombosis.<sup>[8,10]</sup> The absence of posterior drainage of CCF through superior and inferior petrosal sinus may also play a role in spontaneous closure of CCF, which was the most probable mechanism of closure of fistula in our case. Nishijima *et al.* reported spontaneous occlusion of TCCF after orbital venography.<sup>[8]</sup> Castillo *et al.* reported spontaneous thrombosis of a direct CCF, which was confirmed by Gadolinium-diethylene triamine pentaacetic acid (GD-DTPA) enhanced magnetic resonance.<sup>[10]</sup>

## Conclusion

Direct high-flow CCF is a rare complication of head injury and usually requires endovascular intervention for treatment. Spontaneous occlusion after diagnostic cerebral angiography can also occur although it is a rare phenomenon.

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## Conflicts of interest

There are no conflicts of interest.

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