

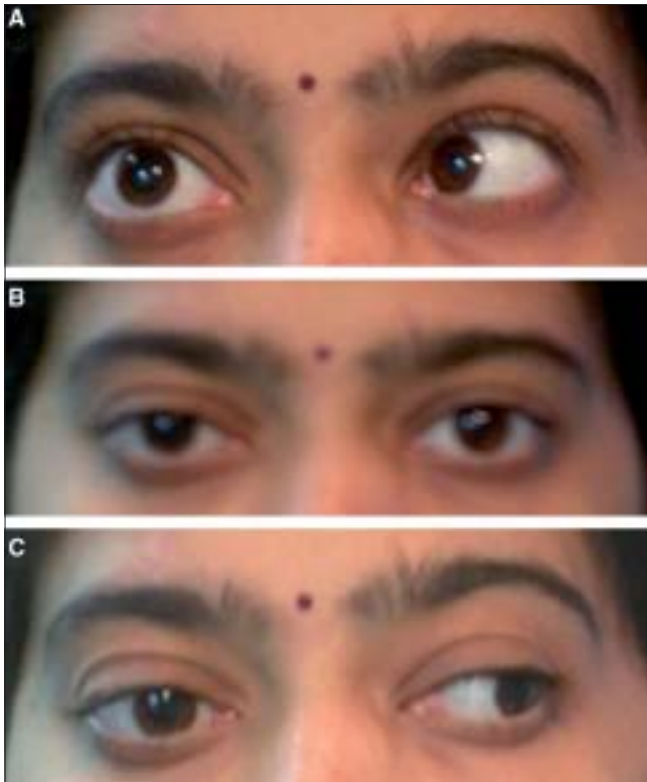
## **Right traumatic carotico-cavernous fistula with bilateral eye signs and post-treatment right pseudo Argyll Robertson pupil**

Dear Editor,

Carotico-cavernous fistula (CCF) is an abnormal communication between carotid artery and cavernous sinus (CS). Barrow *et al.* classified CCF angiographically as direct or indirect.<sup>1</sup> Seventy-five percent of CCF are direct due to head injury following road traffic accidents (RTA) or fall.<sup>2</sup> Traumatic CCFs are almost always direct and caused by laceration of internal carotid artery (ICA) within the CS. Cavernous ICA is fixed to the dura mater, thus limiting its mobility and pre-disposing to injury. Arteriovenous shunting leads to eye manifestations. Indirect shunts occur between CS and one or more branches of ICA (type B), external carotid artery (type C) or both (type D).



**Figure 1:** Pre-procedure clinical photograph showing bilateral proptosis and periorbital edema with right eye ptosis

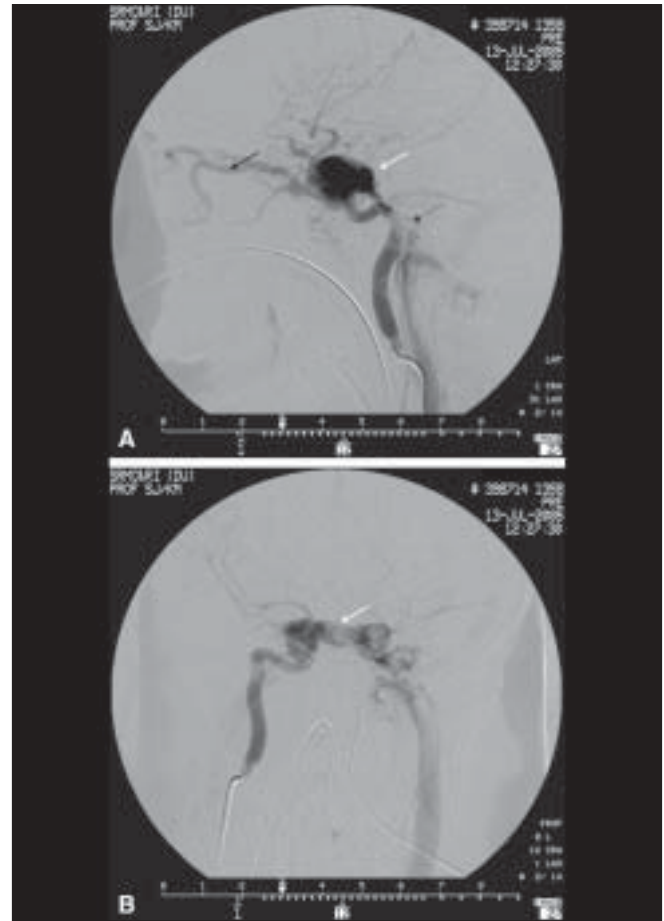


**Figure 2:** One-month post-procedure clinical photograph with failure of abduction and slight restriction of adduction in right eye

We report a case of 23-year-old female referred for evaluation following RTA sustained a month prior.

Her visual acuity was 20/20 and N6 in both eyes with periorbital edema and pulsatile proptosis of 4 mm in the right eye (RE) and 3 mm in the left eye (LE) [Fig. 1]. RE showed complete ptosis with total ophthalmoplegia including dilated fixed pupil [Fig 2A,B,C]. In LE, ocular movements were full, pupil was 3 mm. Intraocular pressure was 16 mmHg bilaterally. Both fundi showed blurred disc margins and dilated veins.

Four-vessel digital subtraction angiogram (DSA) revealed direct CCF at C3-C4 junction of the right intracavernous ICA, draining into inferior petrosal sinus with intercavernous communications and dilated superior ophthalmic veins (SOV) [Fig. 3A and B]. Successful occlusion of the fistula was obtained by embolization using detachable balloons (BALT 2 X-Ray balloon) through femoral arterial route [Fig. 4].

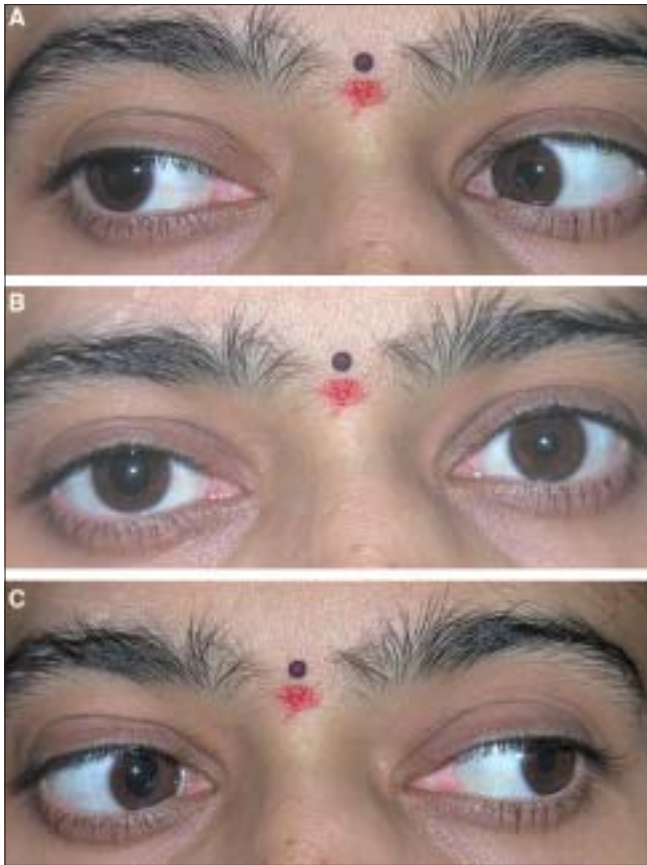


**Figure 3:** (A) Internal carotid angiogram lateral view revealing: (1) Type A CCF with filling of cavernous sinus from C3-C4 junction (white arrow); (2) Anterior drainage to superior ophthalmic vein (black arrow); (3) Posterior drainage to inferior petrosal sinus (dotted arrow) is seen. (B) Internal carotid angiogram AP view shows filling of right and left cavernous sinuses through intercavernous communication (white arrow)



**Figure 4:** Post-treatment angiogram showing no residual fistula

Six months post-procedure, ptosis disappeared, ocular movements were normal [Fig.5A,B,C]. RE pupil (6 mm) showed segmental contraction only on adduction (Pseudo Argyll Robertson pupil), unfortunately it could not be photographed.



**Figure 5:** Six-month post-embolization photograph with right eye dilated pupil with full abduction and adduction

Traumatic CCF is usually associated with ipsilateral eye signs. Due to intercavernous communication and variations in drainage pattern, contralateral eye signs could be present.<sup>3</sup>

Engorged SOV presents with a characteristic "hockey stick sign" on orbital imaging.<sup>2</sup> DSA is invaluable for the guidance of catheter placement and delivery of the embolic materials.

Spontaneous closure of symptomatic direct CCF is uncommon. The aim of treatment is to close the fistula with maintenance of ICA patency and was achieved by embolization using detachable balloons via ICA through the fistula into the CS.

Misdirection of regenerating nerve fibers occur in peripheral nerves that innervate more than one muscle.<sup>4</sup> Although here external ophthalmoplegia resolved following treatment, failure of recovery of pupillary signs in this case was due to misdirection of regenerating sprouts from axons that previously innervated medial rectus to the pupil.

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## References

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