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# Isolated bilateral abducent nerve palsy due to a spontaneous left-side dural carotid cavernous fistula Type Barrow C

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Sirs: Carotid cavernous fistulas (CCFs) are commonly associated with congestive orbito-ocular features – in most cases ipsilateral to the fistula side [1, 2]. As a rare entity, we describe a case of isolated bilateral abducent nerve palsy due to a spontaneous left-side CCF, whose presence was proven by magnetic resonance (MR) digital subtraction angiography (DSA).

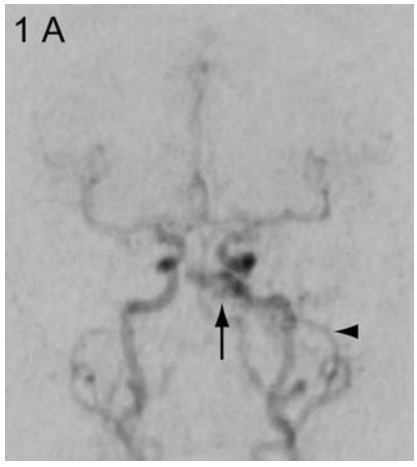
A 63-year old woman developed acute horizontal diplopia associated with nausea, without preceding trauma or illness. The symptoms disappeared within a few hours, reappeared again 10 days later and persisted thereafter. Her medical history included an essential arterial hypertension.

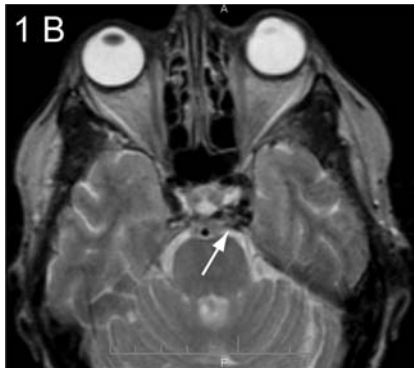
Physical examination showed a bilateral, left-dominant abducent nerve palsy and a pulsatile bruit over the left carotid arteries. On request the patient told us about an intermittent, pulsatile left-side tinnitus, which had started about 6 months prior to the occurrence of the diplopia. The funduscopic examination and the visual acuity were normal. Time-of-flight MR angiography of the cerebral vessels and color-coded Doppler sonography were normal. MR DSA [3] showed filling of the cavernous sinus during the early arterial phase (Fig. 1A), proving the presence of a CCF. A second more subtle finding – only detected after further analysis of the MR DSA images – was the presence of small flow voids adjacent to the cavernous segment of the internal carotid artery on T2-weighted MR images of the brain (Fig. 1B). On intra-arterial DSA the fistula was seen to be filled only by branches of the left maxillary artery (Fig. 1C). Cavernous outflow drained into the left superior ophthalmic vein, which showed a focal stenosis in its proximal segment, into the left middle cerebral vein and bilaterally into petrosal veins.

The embolization with microparticles of the major feeding branches arising from the maxillary and the middle meningeal arteries resulted in a marked reduction of the fistula flow. A few hours after embolization the pulsatile tinnitus disappeared and within about 10 weeks the bilateral abducent nerve palsy gradually regressed. MR DSA 6 weeks after embolization showed signs of a slight persistent fistula, and intra-arterial DSA 18 weeks after embolization disclosed a complete occlusion of the fistula.

Our patient presented an isolated left-dominant bilateral abducent nerve palsy due to a spontaneous left-side dural CCF Type Barrow C [4]. Apart from the diplopia the only other clinical symptom was a left-side pulsatile tinnitus, which is a well-known feature of dural arteriovenous fistulas (DAVFs).

Abducent nerve palsy is the most common cranial nerve palsy associated with CCF [2], but isolated bilateral abducent nerve palsy due to a unilateral CCF is a rare entity [5]. Isolated abducent nerve



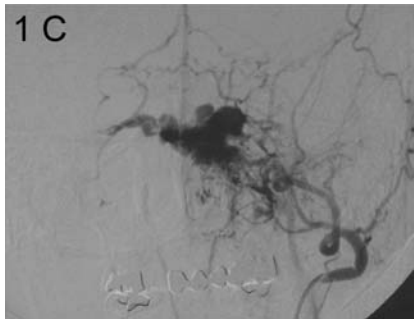




**Fig. 1** **A:** MR DSA image during the early arterial phase. Note the early flow into the cavernous sinus (arrow) from a prominent artery (arrowhead) on the left side. From the anatomical course the feeding vessel is probably the maxillary artery. However, because there is only one image plane (frontal view), leading to limited spatial resolution compared to conventional DSA, a detailed characterisation of the feeding vessels is not possible. **B:** T2-weighted image at the level of the cavernous sinus. Note the signal loss located medially to the internal carotid artery (arrow), representing flow-voids caused by fast flowing vessels of the fistula. **C:** Conventional DSA image (obtained in the arterial phase with the catheter positioned in the left maxillary artery) depicts multiple feeders of the CCF

palsy is thought to be less due to the mass effect of the distended sinuses, than to the venous hypertension with nerve ischemia associated with arteriovenous shunting [1, 6]. Interestingly orbito-ocular congestive features were not observed in our case, despite the antegrade drainage into the superior ophthalmic vein. The reason for this was most likely the segmental narrowing of the vein in its proximal course, leading also to retrograde cavernous outflow. This narrowing, which has already been described in cases with DAVFs [7], probably represents a postthrombotic state.

The exact anatomical depiction of the fistula was only possible with the high spatial and temporal resolution of intra-arterial DSA, which is without doubt the method of reference for imaging these pathologies. On the other hand, intra-arterial DSA is time-consuming, expensive, and bears a small risk of neurological complications [8]. We therefore advocate to incorporate into the imaging algorithm MR DSA, a two-dimensional, contrast-enhanced angiographic technique with a high temporal resolution which proved useful in our case not only for the detection but as well for the follow-up of the treated fistula.

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