Posterior-draining dural carotid cavernous fistulae: a possible cause of computed tomographic angiography negative isolated third nerve palsy

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Abstract

Computed tomographic angiography (CTA) is a well-established non-invasive investigation for this neurological presentation to exclude intracranial aneurysms. However, dural arteriovenous fistulae with anterograde venous drainage only can be missed by CTA. Here we reported two patients with painful complete third nerve palsy and dural carotid cavernous fistulae with anterograde venous drainage only missed by CTA. The natural history and management option are discussed. In patients with persistent symptoms or without vasculopathic risk factors, magnetic resonance angiography (MRA) or digital subtraction angiography (DSA) should be considered to exclude the diagnosis.

Case report

Computed tomographic angiography (CTA) is a non-invasive mean of investigating isolated third nerve palsy to exclude intracranial aneurysm.[1] However, third nerve palsy can be also associated with dural carotid cavernous fistulae (CCF) with anterograde inferior petrosal sinus drainage, which may occur without CTA features of superior ophthalmic venous dilatation and orbito-ocular congestion.2[3] Here, we present two cases missed by CTA. A 68-year-old woman with a history of hypercholesterolemia and on statin therapy presented with progressive ptosis and diplopia over five days. Physical examination showed left painful complete third nerve palsy without orbito-ocular congestive signs. CTA showed a 2.5 mm left internal carotid artery (communicating segment) outpouch but did not show any other vascular pathology. Magnetic resonance imaging (MRI) did not show any recent brainstem infarction. Digital subtraction angiography (DSA) confirmed the above finding as a left internal carotid artery infundibulum and also showed left dural carotid cavernous fistulae with drainage into the right inferior petrosal sinus. The symptoms and signs showed complete resolution at four-month follow-up. Follow-up magnetic resonance angiography (MRA) at 5 months showed persistent carotid-cavernous fistulae. Similarly, 63-year-old woman with no medical comorbidity presented with ptosis and diplopia over five days. Physical examination showed right painful partial third nerve palsy with mydriasis and without orbito-ocular congestive signs. Fasting glucose was normal and diabetes was excluded. CTA again did not demonstrate any vascular pathology. DSA was carried out and found right dural CCF (Figure 1A-D). The symptoms and signs showed complete resolution at three month. Follow-up MRA at six months showed no carotid-cavernous fistulae. Common causes of isolated third nerve palsies include diabetes mellitus and communicating segment internal carotid artery aneurysm. Other causes such as carotid cavernous fistulae are uncommon. The above two cases illustrate that CTA may not detect posterior-draining dural carotid cavernous fistulae when radiological signs of grossly engorged anterior cavernous sinus and a dilated superior ophthalmic vein are absent. In future, MRA may act as a noninvasive diagnostic tool for these CTA-negative posterior-draining dural carotid cavernous fistulae as illustrated by the first patient. The natural history of posterior-draining CCF was thought to be benign.[2-4] Embolization can also result in rapid and complete resolution of third nerve palsy in 88% of affected patients.

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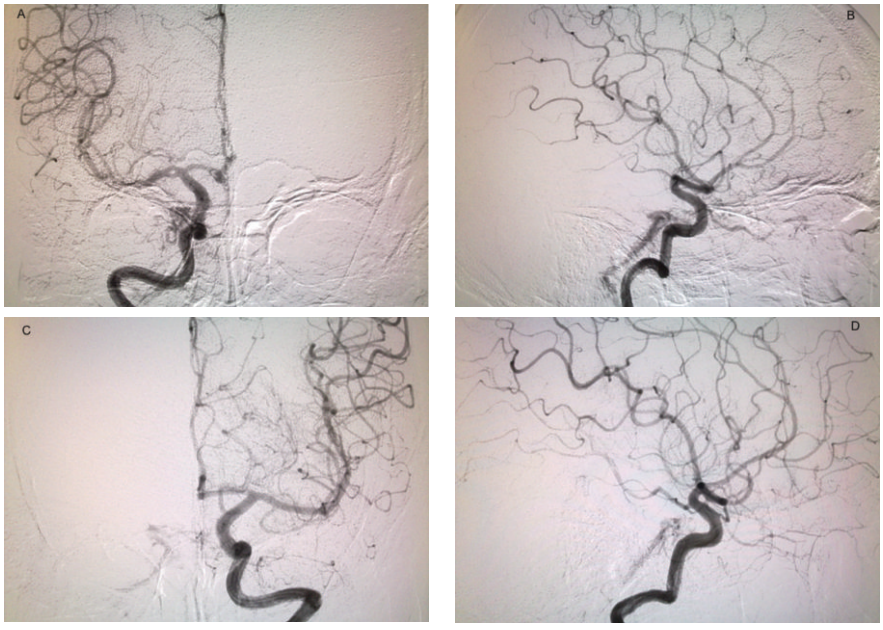


Figure 1. Digital subtraction angiography found right dural carotid cavernous fistulae fed by dural branches of bilateral internal carotid artery (ICA) and drained through right inferior petrosal sinus. (A) Right ICA injection, AP projection; (B) Right ICA injection, lateral projection; (C) Left ICA injection, AP projection; (D) Left ICA injection, lateral projection.