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Letter to Editor

Infraoptic Course of Anterior Cerebral Artery Coexistence with Double Fenestration of Proximal A2 Segment of Anterior Cerebral Artery with Associated Dysplastic Anterior Communicating Artery Aneurysm Treated with Stent-Assisted Coiling

Sir,

A 62-year-old hypertensive male, known case of Parkinson's disease was found to have a suspicious aneurysm in the anterior communicating artery (AcoA) region on magnetic resonance imaging brain. We performed cerebral angiography using biplane fluoroscopic guidance (Axiom Artis Zee; Siemens, Erlangen, Germany) which revealed dysplastic aneurysm (6 mm × 5 mm × 4.8 mm) in the AcoA associated with double fenestration of proximal A2 segment of left ACA. In view of dysplastic broad neck aneurysm with multilobed morphology, we planned endovascular stent-assisted coiling. Distal landing zone of the Neuroform Atlas Stent (Stryker Neurovascular, Fremont, CA, USA) was in the A2 segment of left ACA distal to the fenestration. Stent was deployed through the medial limb of fenestration and proximal up to the A1 segment across the neck of the aneurysm. Stent placement through the medial-most limb of the fenestration was done to provide good apposition of the stent across the aneurysm neck. On final check angiography, there was near-complete occlusion of aneurysm with stasis of dye in the teat in late arterial phase [Figure 1a-d]. There was also associated infraoptic course of anterior cerebral artery (ACA). Left ACA (A1 segment) had a low origin below the ophthalmic artery with horizontal and medial course from the origin. Left ophthalmic artery was arising from the internal carotid artery (ICA) bifurcation [Figure 2a-d]. The patient was discharged without any neurological compromise and was advised 6 months follow-up check angiography. The uniqueness of our case is that it is the first case report of infraoptic course of ACA with its coexistence with extremely rare anomaly of double fenestration of dominant A2 segment of ACA with associated dysplastic aneurysm.

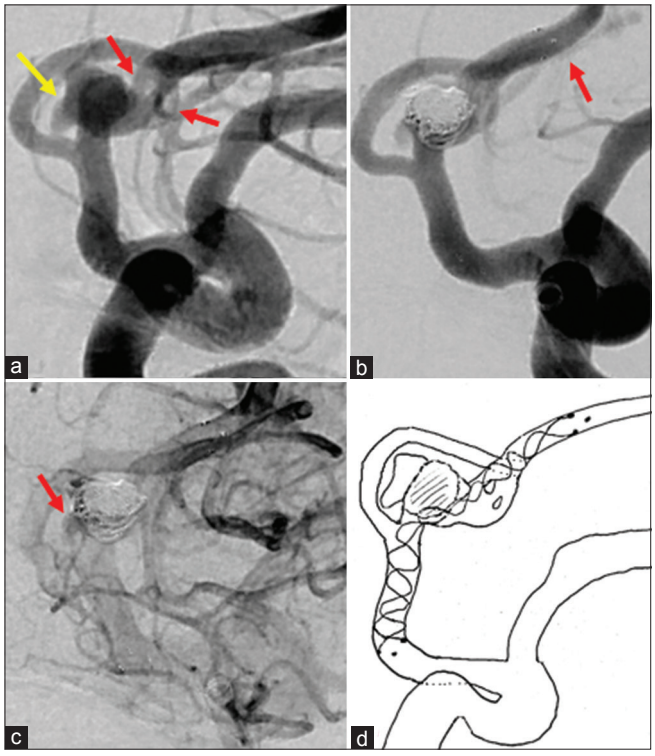

Figure 1: Left internal carotid artery injection showed dysplastic broad neck multilobed aneurysm (yellow arrow) with associated double fenestration (red arrow) of A2 segment of the left anterior cerebral artery (a). Stent-assisted coiling of aneurysm was done with stent markers *in situ* (arrow in b) and stasis of contrast in the lobule (red arrow in c). Line diagram showing stent deployment through the medial limb of fenestration and across the neck of the aneurysm (d)

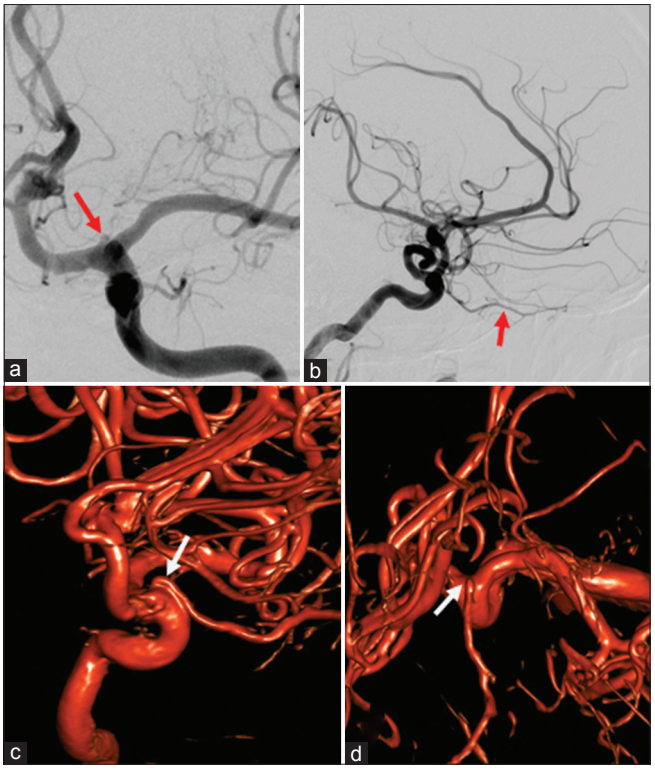

Figure 2: Left internal carotid artery injection showed low origin of left ACA below the ophthalmic artery with horizontal and medial course from the origin (a). Left ophthalmic artery was arising from the internal carotid artery bifurcation ophthalmic artery (arrow in b) arising from the internal carotid artery bifurcation (a and b). Three-dimensional angiography (lateral view and craniocaudal) showed origin of ophthalmic artery (white arrow) from the internal carotid artery bifurcation (c and d)

Infraoptic course of ACA is a rare arterial anomaly and is identified on angiography by its characteristic appearance on angiography: Low bifurcation of ICA at or just above the ophthalmic artery origin and characteristic horizontal-medial course as it runs under the optic nerve then turning superiorly to join the AcoA or the distal A1 segment of ACA. Our case has all the characteristic angiographic appearance, and infraoptic origin of the A1 segment is proximal to the origin of ophthalmic artery. The embryogenesis of this anomaly is unclear, and several hypotheses have been proposed including early bifurcation of ICA, prechiasmal anastomosis enlargement, persistent anastomotic loop between primitive dorsal and ventral ophthalmic arteries, and anastomotic loop between the branches of primitive olfactory and primitive maxillary arteries. Clinical importance of this anomaly is its association with the aneurysm prevalence, which is more common in ACA–AcoA complex.[1,2] Fenestration of the cerebral arteries is common in vertebrobasilar system.[3] Fenestrations of the ACA are uncommon, however, commonly seen in the distal A1 segment and the AcoA with the incidence of 5.3% and 0.058% on angiography. A2 segment (ACA) fenestration and their association with aneurysm has also been described in the literature by some authors.[3-7] Double fenestration of the A2 segment is an extremely rare anomaly. The only case of double fenestration of A2 segment of ACA has been reported in the literature by Namiki *et al*.[8] in which they have described double fenestration of proximal A2 segment of ACA as a subtype of duplication of AcoA artery rather than a true double fenestration of proximal dominant A2 segment of left ACA. These fenestrations do not have clinical significance; however, an aneurysm may develop in relation to fenestration, especially from the proximal part. The possible reason includes reduced smooth muscle and collagen, which is commonly seen at both proximal and distal portions of the duplicated segments. These are especially observed in severity at the medial and ventral walls of the proximal junction. Thus, all these reasons and also the increased hemodynamic stress and turbulence lead to aneurysm formation.[9,10] The exact cause of fenestration of A1 and A2 segment is not well understood. It has been proposed that fenestration of ACA is remnants of plexiform anastomosis between the primitive olfactory artery and ACA.[4] The association of infraoptic course of ACA and double fenestration of ACA (A2 segment) has not been clearly described in the literature, and in our case, both the anomalies have probably contributed to the development of aneurysm in AcoA region. It was important to recognize the double fenestration in the A2 segment while planning the endovascular management for dysplastic aneurysm proximal to it as this required precise stent placement, microcatheter, and microwire manipulation through the arterial channels of the double fenestration. In our case, stent was placed through the most medial arterial channel to tack the stent margin along the dysplastic base of aneurysm to avoid the coil herniation. Thus, detailed knowledge and angiographic identification of these anomalies are important in planning the intervention and surgical procedures.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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