Superior hypophyseal artery aneurysm

Report of two cases

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Two cases of saccular intracranial aneurysms arising from the superior hypophyseal artery take-off from the internal carotid artery are presented. The angiographic findings and technical details of the operative approach are discussed. Particular attention is focused on the use of fenestrated angled clips.

KEY WORDS: aneurysm • superior hypophyseal artery • internal carotid artery • clip

Saccular intracranial aneurysms almost always arise at arterial bifurcations, however, paraclinoid aneurysms may have no obvious arterial branches at their origin. Since the tiny superior hypophyseal artery arises from the supraclinoid segment of the internal carotid artery (ICA), it may be anticipated that some paraclinoid ICA aneurysms arise at the superior hypophyseal artery take-off. We have documented intraoperatively two such aneurysms, both of which were managed successfully with angled fenestrated clips.

Case Reports

Case 1

This 52-year-old right-handed woman developed the sudden onset of a severe bilateral convexity headache while driving her automobile. Thereafter she experienced blurring of vision, numbness of her left middle and index fingers, nausea, and several episodes of vomiting. A viral syndrome was diagnosed. The numbness of the left hand persisted and, 1 month later, a computerized tomography (CT) scan of the head revealed a large area of lucency in the right frontal lobe with peripheral enhancement. Angiography disclosed an arteriovenous malformation (AVM) of the right frontal lobe. The patient underwent a craniotomy and right frontal lobectomy with total excision of the AVM. Findings at surgery were consistent with a previous hemorrhage in the area of the AVM. The patient recovered without a neurological deficit. Angiography following this procedure showed obliteration of the AVM, but an aneurysm was demonstrated on the left supraclinoid ICA (Fig. 1 upper pair).

Three months later, a left frontotemporal craniotomy was performed. At surgery, the aneurysm was exposed by removing the left anterior clinoid process. The aneurysm was found to originate from the take-off of the


Fig. 1. Left carotid angiograms, anteroposterior (left) and lateral (right) views. Upper Pair: Preoperative studies showing a paraclinoid internal carotid aneurysm projecting inferiorly and medially (arrows). Lower Pair: Postoperative studies confirm obliteration of the aneurysm by a fenestrated angled Sugita clip with patency of internal carotid artery.
left superior hypophyseal artery which was draped over it medially. A fenestrated angled Sugita clip was used to clip the aneurysm with sparing of the superior hypophyseal artery (Fig. 2). Postoperative angiography revealed no aneurysm remaining (Fig. 1 lower pair), and the patient was discharged without neurological deficit.

Case 2

This 50-year-old right-handed man experienced the sudden occurrence of a severe headache while dressing. Paralysis of his right arm and leg was present from the onset, but resolved completely over several weeks. A CT scan of the head was suggestive of subarachnoid blood, and angiography disclosed an aneurysm of the left ICA (Fig. 3 upper pair), thought to be an aneurysm of the left posterior communicating artery. The patient underwent a craniotomy with clipping of the aneurysm, but postoperative angiography detected partial filling of the aneurysmal neck (Fig. 3 center pair) and he was referred to our institution for reexploration. On examination, the patient was neurologically intact, but complained of mild forgetfulness since his first operation.

At surgery, a McFadden aneurysm clip was found lying across the aneurysm dome with the medial aneurysmal wall excluded from the blades of the clip. Further dissection was carried out to mobilize the ICA and, after removal of the McFadden clip, the superior hypophyseal artery was found arising from the ICA at the neck of the aneurysm. A fenestrated angled Sugita clip was applied to the aneurysm, completely obliterating the neck. Postoperative angiography revealed no residual aneurysm (Fig. 3 lower pair).

Discussion

Saccular intracranial aneurysms arise at bifurcations where there is a weakened cushion zone lacking internal elastic lamina. Among the common paraclinoid ICA aneurysms, some are clearly related to the take-off of the ophthalmic, posterior communicating, or anterior choroidal artery, but many have no obvious relation-
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ship to a branch artery. The superior hypophyseal artery is a well-described branch of the paraclinoid ICA. This small branch arises distal to the ophthalmic artery origin and passes ventrally and medially beneath the optic nerve to irrigate the optic nerve, pituitary stalk, and the hypophysis. It is reasonable to expect that some paraclinoid aneurysms, especially those pointing ventromedially, may be related to the superior hypophyseal artery, which can easily be overlooked if the surgeon does not seek this small vessel medial to the ICA.

Such aneurysms may be asymptomatic, as in Case 1, or may be associated with subarachnoid hemorrhage, as in Case 2. Visual disturbance due to compression of the optic nerve may also occur; thus, visual-field examination is recommended. When the lesion is large (≥ 1 cm), it can be visualized on CT scans or magnetic resonance images. Origin at the superior hypophyseal artery take-off is especially suggested when the lesion lies medial to the paraclinoid ICA. Angiography can suggest the diagnosis when the aneurysm is just beyond the ophthalmic artery and points posteriorly and medially (Figs. 1 and 3). Although the lateral projection may suggest a posterior communicating ICA lesion, the anteroposterior views show medial deflection which is characteristic of these aneurysms.

As in the case of other paraclinoid aneurysms, direct surgical obliteration is the treatment of choice for symptomatic aneurysms, if it can be performed safely. When the angiogram suggests a reasonable chance for clipping, exploration is recommended. The anterior aspect of the patient’s neck is draped into the field to permit control of the ICA, should this be needed. The head is turned about 30° to permit optimal inspection of the neck profile, as far as possible. Usually the anterior clinoid process must be removed with a high-speed drill to provide intracranial proximal control of the ICA. A combined epidural and subdural approach can also be carried out to remove the anterior clinoid. The ophthalmic, posterior communicating, and anterior choroidal arteries are identified and spared. By gently deflecting the ICA laterally or the optic nerve medially (or both), the neck of the aneurysm may be identified, including its relation to the superior hypophyseal artery which is gently freed up (Fig. 2). For final preparation and clipping of the aneurysmal neck, temporary ICA occlusion (either intracranially or cervically) may slacken the aneurysm and avert rupture. An attempt to obliterate the aneurysm with a clip placed laterally may not occlude the mesial portion of the lesion, as occurred in Case 2.

A key technical advance which permits safe clipping of these lesions is the development of fenestrated angled clips by Sugita. The window surrounds the ICA and the angled blades occlude the aneurysmal neck with minimal manipulation of the ICA and optic nerve. The superior hypophyseal artery may sometimes be preserved, although no deficit from its occlusion has been established. A modification of this clip by Fujita, with blades arising 135° around the fenestration from the hub, may facilitate more mesial jaw closure despite a lateral angle of application.

References


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