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**Received,** 23 March, 2014

**Accepted,** 7 April, 2014

## Internal Carotid Artery Dorsal Wall Aneurysm: A Rare Neurosurgical Entity

Saccular aneurysms arising from the dorsal wall of the internal carotid artery are extremely rare. It is still a surgical challenge to achieve safe and successful clipping due to their unusual projection and fragile nature. A 32 years old gentleman presented with severe headache and high blood pressure. CT head showed SAH in basal cistern. CT angiogram demonstrated left dorsal ICA aneurysm rupture. The aneurysm was successfully clipped parallel to ICA without intraoperative and postoperative rupture. Post-operatively, he has no neurological deficits and leading his normal life.

**Key Words:** clipping, dorsal ICA aneurysm, pterional approach, subarachnoid hemorrhage

**A**neurysm arising from the dorsal wall of internal carotid artery (ICA) is a rare entity. It is still a surgical challenge to achieve safe and successful clipping due to their unusual projection and fragile nature. Here we discuss the technical consideration of successful clipping of such a case of rare aneurysm.

### Case report

A 32-year-old gentleman came to the emergency room of a general hospital with complaint of severe headache. On examination his blood pressure was 180/120 mm Hg. Other parameters were normal. Patient was admitted under the care of general physician and was being treated for hypertension urgency. His headache was worsening and incessant despite high doses of opiates and antihypertension measures for 2 days. Neurosurgical consultation was done. A high index of clinical suspicion warranted diagnostic imaging. Computed tomography (CT) head plain was done on the 3rd day of admission. CT head revealed hyperdense areas involving the peripontine cistern, bilateral Sylvian fissure, and anterior interhemispheric fissure which was suggestive of subarachnoid hemorrhage (SAH) possibly due to aneurysmal rupture (**Figure 1**). Pre-imaging Hunt and Hess grading was 2. Fischer grading was 2. Patient

was transferred to Norvic International Hospital where he underwent CT angiogram. It revealed left saccular dorsal ICA aneurysm 4mm in size (**Figure 2**).

Patient was conservatively managed with intravenous crystalloids, ICP lowering agents, vaso-protective agents and opiates. Mean arterial pressure (MAP) was maintained within 90-120 mm of Hg. He underwent surgery on the 5<sup>th</sup> day after the initial insult. The aneurysm was accessed via left Pterional approach through the trans-sylvian route. A saccular aneurysm 4mm in size arose from the dorsal wall of the left ICA just proximal to the origin of posterior communicating artery. Its dome projected supero-dorsolaterally. Anterior clinoid process was drilled out epidurally before opening dura for ease of access and manipulation. Aneurysm neck was clipped parallel to the ICA. Cut section of the clipped aneurysm fundus revealed thrombosed vessel.

There was no intraoperative or postoperative complications. There was no sign of vasospasm. Post operative CT showed intact clip and no bleeding at site of aneurysm and clip clearing up of the previous SAH (**Figure 3**). Patient was discharged on the 8th post operative day. Upon discharge, he had no major complaints and neurological deficits as a consequence of aneurysm

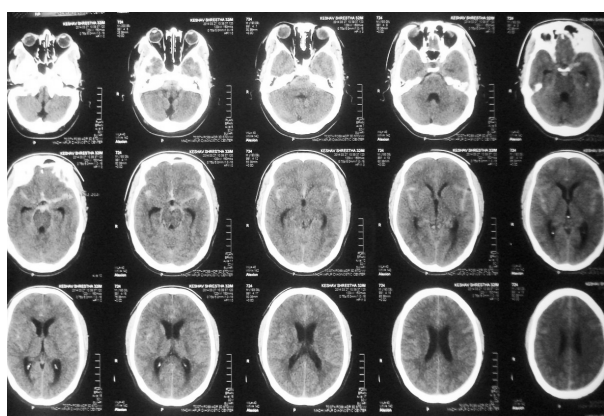


Figure 1: CT head showing diffuse SAH

rupture or the surgical intervention. He is in regular follow up and back to his normal routine.

### Discussion

The majority of saccular cerebral aneurysms arise at arterial branchings. Among the rare breed of aneurysms that do not arise at arterial branchings, the most commonest site is the ICA (45%), followed by the middle cerebral artery (MCA) (28%), the vertebrobasilar arteries (17%), and the

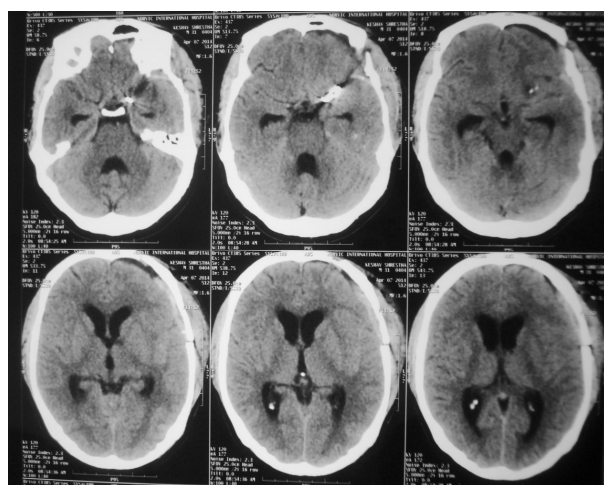


Figure 3: Post operative CT showing intact clip in situ. Preoperative SAH has cleared up

anterior cerebral artery (ACA) (10%).<sup>9</sup> Dorsal ICA is a rare location for aneurysm and still offers a considerable surgical challenge to achieve successful clipping due to their unusual projection.<sup>2</sup> Yasargil et al reported 3 cases of rare dorsal wall of distal ICA aneurysm among 319 cases of ICA aneurysm.<sup>8</sup> Similarly, Lee et al reported 8 cases of dorsal ICA aneurysm among 447 intracranial aneurysm cases.<sup>4</sup> This is our first experience of having ICA dorsal aneurysm.

The exact etiology of this aneurysm is still controversial. Authors have proposed multifactorial

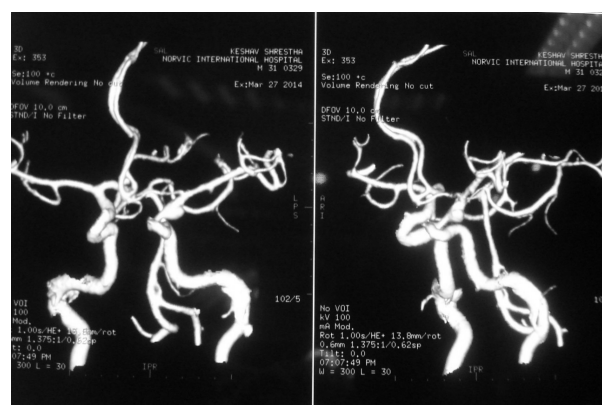


Figure 2: CT angiogram showing saccular left dorsal ICA aneurysm

etiologies including congenital defect in arterial wall, acquired arteriosclerotic changes in the arterial wall, carotid siphon, and local haemodynamic forces as important factors in the development of this type of aneurysm.<sup>9,5</sup>

Usually, this type of aneurysm presents with SAH in CT scan. Very rarely, it can even present with acute subdural hematoma with intracerebral hemorrhage without SAH.<sup>6</sup>

Surgical management of these rare aneurysms need a completely different clinical approach and special care because of the vulnerability of the arteriosclerotic parent arteries and higher than usual possibility of rupture when the blades of a clip are applied from a direction oblique or perpendicular to the carotid axis. Many authors have advocated for parallel clipping for this rare type of aneurysm.<sup>1,5</sup> These aneurysms are vulnerable to post-operative rupture in equal measures. Shigeta et al. encountered 5 intraoperative and 2 postoperative rupture amongst a series of 20 surgically treated dorsal ICA aneurysm.<sup>7</sup> Some authors suggest complete wrapping with fascia or Bemsheet (cellulose fabric) which they argue may be effective in preventing slippage of the clip and reinforcing a vulnerable arterial wall.<sup>5</sup> Ebina et al. preferred bemsheet over muscles, fascia or dura wrapping which begin to show necrotic and absorbable changes within 1-2 months post surgery.<sup>3</sup>

In our case, a 4 mm saccular thin walled aneurysm in the left dorsal ICA with a wide neck was clipped parallel to the parent artery without applying temporary clip. Wrapping of the clipped artery was not done. No intraoperative or immediate post-operative rupture was evident.

### Conclusion

Dorsal ICA aneurysm is a challenging entity for neurovascular surgeon because of its peculiar location, projection and fragility of the aneurysmal wall as well as the parent vessel. Despite advances in our understanding

of the pathogenesis and available surgical logistics, many cases of intra and postoperative rupture have been reported in the literature. Because of the peculiarity and complexity of this rare breed of aneurysm, meticulous preparation, vigil and caution on the operating surgeon's part is as important as his inherent technique and available technology.

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