

Case Report

Mirror image of bilateral DACA aneurysm with its successful surgical management

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Abstract

Background: Among various locations of intracranial aneurysms reported in the literature, two different aneurysms situated symmetrically opposite on bilateral distal anterior cerebral arteries (DACA) are very rare.

Case Description: Here, we report a rare case of mirror image distal anterior cerebral aneurysm in a middle-aged male patient. The patient presented with severe headache and loss of consciousness. Angiography was done which suggested mirror imaging of two aneurysms located over both DACA. It was treated through microsurgical approach with a successful outcome.

Conclusion: Careful analysis of intracranial vasculature should be done using angiography, particularly in different views and stages to rule out multiple aneurysms at different locations in the same artery or at different arteries. Mirror images of bilateral DACA aneurysms are very rare. Fundamental surgical strategy of securing the parent artery and clipping the neck after meticulous dissection should be followed.

Key Words: Clipping, corpus callosum, DACA aneurysm, DSA, frontal craniotomy

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INTRODUCTION

Among various locations of intracranial aneurysms reported in the literature, two different aneurysms situated on both distal anterior cerebral arteries (DACA) are very rare.^[1,3,8,9,12,13] Due to difficult access to the region and more susceptibility to rupture during dissection, surgical management should be done very meticulously. Here, we report a case of ruptured bilateral DACA aneurysm and its underlying surgical management with relevant imaging features.

CASE REPORT

A 45-year-old male patient reported to the casualty with a history of sudden-onset severe headache with loss of

consciousness for 1 day. On examination, the patient was E1M5V1, vitals were stable, pupil was normal sized and reacting to light, and there were no focal deficits. Patient came with noncontrast computed tomography (NCCT) of the head [Figure 1a and b]. NCCT was suggestive of anterior interhemispheric bleed, corpus callosal

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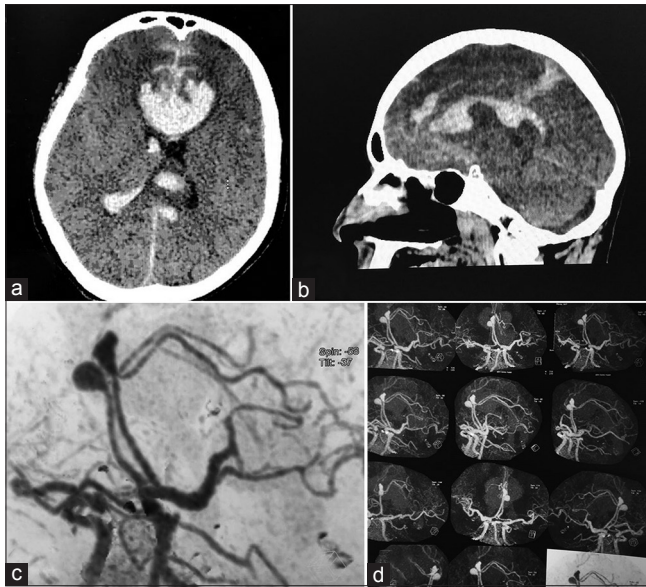


Figure 1: (a and b) NCCT of the head (axial and sagittal) suggestive of interhemispheric bleed and corpus callosal hematoma. (c) MR angiography brain suggestive of mirror image of bilateral DACA aneurysm. (d) MR angiography brain suggestive of mirror image of bilateral DACA aneurysm (TOF)

hematoma, and intraventricular blood. Magnetic resonance angiography (MRA) of the brain from outside was suggestive of aneurysm on both distal anterior cerebral artery (ACA) at the junction of pericallosal and callosomarginal arteries [Figure 1c and d]. Patient was intubated, kept on ventilator, and stabilized after admission. Digital subtraction angiography (DSA) was done which was suggestive of two different aneurysms over both DACA at the junction of pericallosal and callosomarginal arteries. Right side aneurysm was size 8.1×8.7 mm with a neck measuring 2.5 mm. Left-sided aneurysm measured size 9.2×6.5 mm with a neck of 3.5 mm with a daughter lobule and superiorly projecting rupture site. Both were directed anterosuperiorly. Both A1 ACAs were of the same size with good crossflow. Focal segmental areas of spasm were noted in both pericallosal arteries [Figure 2a-d].

The patient was operated; right frontal craniotomy was done. Interhemispheric approach was utilized. Ventricle was opened and intraventricular hematoma (IVH) was evacuated. Pericallosal and callosomarginal arteries of the left side was identified and traced proximally. Left DACA aneurysm arising from the junction of pericallosal and callosomarginal artery directing anterosuperiorly was visualized. Intraoperatively, aneurysmal ruptured site was projecting superiorly with overlying hematoma and adhesions. Moreover, majority of the hematomas were present over the left DACA aneurysm embedded in brain parenchyma. Neck dissected from the surrounding structures and both the arteries visualized with proximal ACA. Clip of size 5 mm was applied on the left side.

Right-sided DACA aneurysm was identified and clipped in a similar manner [Figure 2e]. While clipping the left-sided aneurysm, retraction was applied only on the left medial frontal lobe. Right-sided frontal lobe was left undisturbed to avoid the rupture of left DACA aneurysm and vice versa.

Intraoperatively, the procedure was uneventful. There was no aneurysm rupture. There was no episode of blood pressure fluctuation. Minimal brain retraction was done. Postoperatively, the patient was electively ventilated and hypertensive therapy was given. On the 4th postoperative day, patient hemiparesis worsens. CT of the head was done, which was suggestive of right posterior frontal venous infarct and bleed [Figure 2f]. Patient was managed conservatively. After 1 month of hospital care, patient became E4M6Vt with 80% recovery in left hemiparesis. NCCT head performed after 1 month was suggestive of resolving hematoma without any evidence of infarct [Figure 2g].

DISCUSSION

DACA aneurysms have a very low incidence, and represent 4.4% of all cases of intracranial aneurysms.^[14] Reported cases of bilateral distal ACA aneurysm are very few in the literature.^[1,3,8-13] A large series of intracranial aneurysm identified 0.2% of kissing aneurysms.^[15] Sindou reported bilateral aneurysms in 11% of the patients with distal ACA aneurysms.^[11] However, whether it is bilaterally symmetrical according to the location is not known. Patient presented with sudden severe headache with interhemispheric and corpus callosal hematoma which was in favor of DACA aneurysm.^[11] However, to rule out the presence of single or multiple aneurysms, angiographic imaging is more definite. Further, angiographic imaging is more useful in deciding suitable surgical approach. Our patient presented with sudden severe headache with loss of consciousness. His CT head was showing interhemispheric and corpus callosal hematoma, which was suggestive of DACA aneurysm ruptures. However, angiogram is necessary to know about the size, site, and number of aneurysms.

CT angiography, MRA, and DSA are more useful for the diagnosis of bilateral DACA aneurysms. Due to shorter acquisition time and low dose of contrast requirement compared to angiogram, CT angiogram is very useful in early planning of these types of aneurysms. CT angiogram also shows specific relation of aneurysm to bone window helping in rapid planning of craniotomy and clipping of aneurysms. MRA is also very sensitive and specific for distal aneurysm, especially measuring more than 3 mm. There is no radiation risk in MRA. Three-dimensional reconstructions are also available in this imaging.^[2] However, DSA provides complete study of intracranial vessels in real time. Vasospasm can also be diagnosed

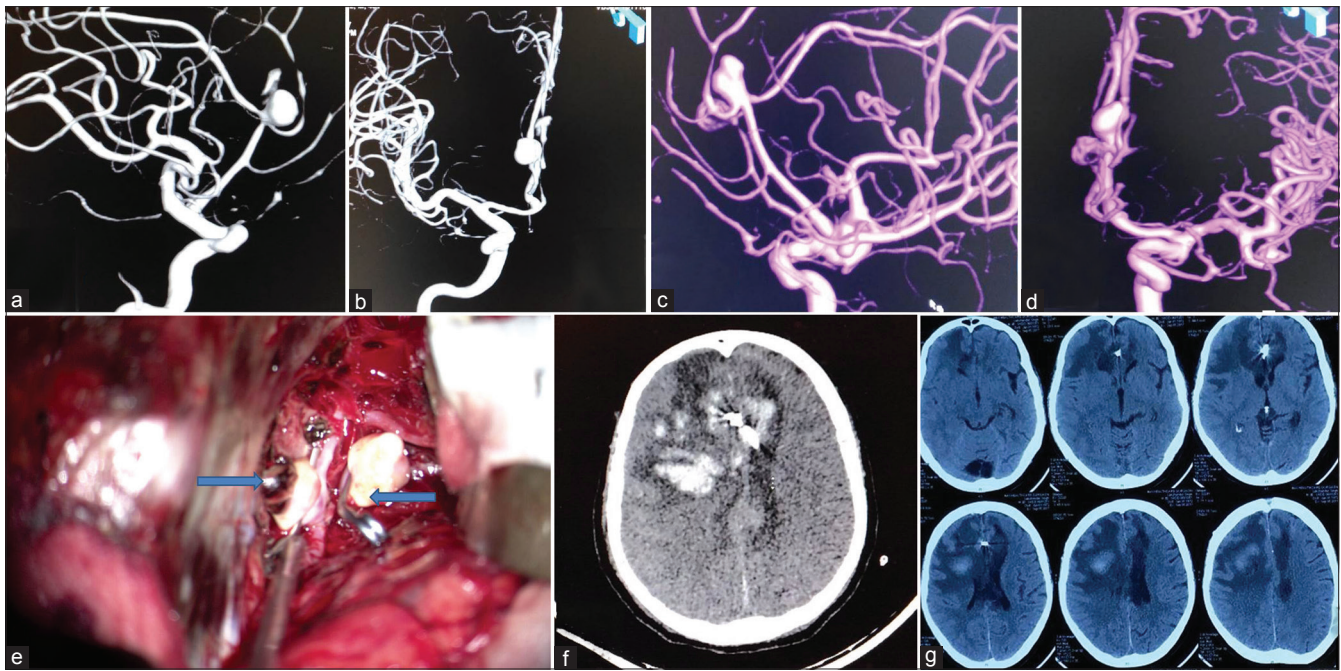


Figure 2: (a and b) DSA of the head showing right DACA aneurysm at the junction of right pericallosal and callosomarginal artery directing anterosuperiorly. (c and d) DSA of the head showing left ICA with left DACA aneurysm. (e) Intraoperative photograph showing clipped DACA aneurysms of both sides. (f) NCCT of the head on the 4th postoperative day showing right posterior frontal infarct. (g) NCCT head after 1 month showing resolving right posterior frontal infarct

during angiogram in early phases. Incidental aneurysms at distant sites can be visualized in angiograms. However, the procedure is cumbersome for patients and requires high dosage of the contrast agent. The above mentioned types of imaging procedures give suitable information to a surgeon regarding aneurysm location, shape, size of neck, branch vessel, and cross circulation. With this information, the surgeon can decide whether to go for clipping or coiling. Angiogram anteroposterior views or rotatory oblique view helps in visualizing two or multiple aneurysms from same or different vessels. However, the most important point for the diagnosis of bilateral distal anterior cerebral aneurysm is its awareness. MRA and DSA of this patient showed aneurysm at both DACA at the junction of pericallosal and callosomarginal origin.

Clipping the aneurysm is the most definite management at the bilateral DACA region. Aneurysms at this location usually present with hematoma.^[4,6] Rupture recurrence is also very high in DACA aneurysm. With craniotomy we can secure the aneurysm through an interhemispheric approach. Surgical intervention also provides an opportunity for hematoma evacuation, relieving the brain from its mass effect.^[4,6] Thorough washing of cranial cavity with normal saline during surgery also removes blood by products which decreases the intensity and duration of vasospasm. Aneurysm occlusion rate is very high with clipping. Rebleeding or recurrence is very rare after clipping. Hence, craniotomy and clipping of aneurysm is the best management for such patients. However, microsurgical approach has its own problems.

It needs to be done through a deep, narrow working space in interhemispheric fissure and callosal cistern.^[15,16] Lack of anatomical landmark, dense attachment, and embedded aneurysmal dome in the surrounding brain tissue always make the dissection uncomfortable. Dome of the aneurysm always point towards the surgeon, hence, the chance of rupture is very high.^[5,14] Edematous brain is more prone to injury during retraction due to the rupture of bridging veins.^[15,16] The patient was taken up for clipping after angiogram, which posed abovementioned difficulties. During the operative procedure, retraction was applied first on the left medial frontal lobe to identify left-sided parent artery and dome of aneurysm. Dome was followed inferiorly up to the neck and the clip was applied. After securing left-sided aneurysm completely, right-sided frontal lobe retraction was applied. Dome and neck of the right DACA aneurysm was then dissected and clip applied. With this maneuver, we avoided intraoperative rupture of both aneurysms. However, the patient developed venous infarct in the postoperative period, which recovered completely.

Our case was not suitable for endovascular coiling because there was diffuse vasospasm in distal arteries. As there were two separate aneurysms located at two different arteries (also distal location), both the internal carotid arteries needs to be cannulated separately for coiling. This maneuver was going to increase the chances of dissecting injuries to both internal carotid arteries. Due to the small caliber of the parent artery, it is challenging for many endovascular microcatheters to

navigate.^[9] In addition, small size and relatively wide-neck branches originating close to the base and distal location of the aneurysms limits the application of endovascular technique.^[7] Despite significant improvements in endovascular techniques, open microsurgery remains one of the best options for DACA aneurysms, especially in the case of multiple aneurysms.

CONCLUSION

Careful analysis of intracranial vasculature should be done in angiography, particularly in different views and stages to rule out multiple aneurysms at different locations in the same artery or at different arteries. Mirror images of bilateral DACA aneurysms are very rare. Fundamental surgical strategy of securing the parent artery and clipping the neck after meticulous dissection should be followed. There are high chances of rupture of other aneurysm while handling the first one as dense adhesions are present between them. Surgical maneuver should be modified in such aneurysms by careful analysis of angiography and targeting each aneurysm separately.

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Conflicts of interest

There are no conflicts of interest.

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