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Case Report

DACA Aneurysm Presenting as Ischemic Stroke

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Abstract

Aneurysms rarely present with features of ischemic stroke. The data on treatment of such strokes is limited. We present a case of multiple aneurysms and an ischemic stroke caused by distal anterior cerebral artery (DACA) aneurysm treated with flow diverter placement, the first case of endovascular treatment of DACA aneurysmal ischemic stroke reported to our knowledge.

Keywords

- DACA
- aneurysm
- stroke
- thrombectomy

Introduction

An 80-year-old female, with chronic hypertension, compliant to medications, came with left hemiparesis in the hospital casualty. Her vitals were found to be within the normal range. After thorough examination of the patient, National Institute of Health Stroke Scale (NIHSS) score was found to be 9 and an emergency magnetic resonance imaging (MRI) was performed that revealed hyper acute subcortical infarct at right parasagittal high frontal region of anterior cerebral artery (ACA) territory (►**Fig. 1A**). The patient was out of window for thrombolysis, and clinical–diffusion mismatch and diffusion–perfusion mismatch were seen. Digital subtraction angiography/cerebral angiogram was performed that showed distal ACA (DACA) thrombosis (►**Fig. 1B**). Mechanical thrombectomy was performed with Trevo 4×30 mm for DACA thrombosis. However, a small DACA aneurysm (1.7×2mm) was noted at the site of thrombosis post-thrombectomy (►**Fig. 2**). On exploration, another small aneurysm at proximal pericallosal ACA segment and a left posterior inferior cerebellar artery (PICA) aneurysm were noted (►**Fig. 3**). Twenty-four hours follow-up MRI with perfusion imaging showed reversal of hypoperfusion in the right parasagittal high frontal cortex (►**Fig. 4**). We decided to treat the patient with placement of flow diverter stents in ACA and WEB in the aneurysm sac at left PICA (►**Fig. 5A** and **B**).

A neuron max was placed into the right internal carotid artery (ICA) through which a 6F neuron guiding catheter was introduced in the distal cervical ICA. A headway 21 microcatheter navigated over hybrid microwire into right A3 segment across distal pericallosal aneurysm. This was followed by deployment of Flow Redirectional Endoluminal Device (FRED) JR $2.5 \times 13 \times 8$ mm across the neck of aneurysm and another FRED JR $3 \times 13 \times 9$ mm across proximal pericallosal artery aneurysm.

The final ICA angiogram post-procedure showed good blood flow across the diverter stents and stasis in both aneurysms.

At the same setting, a neuron max was placed into the left subclavian artery, and a 6F neuron guiding was navigated into distal V2 segment of left vertebral artery. VIA 17 microcatheter was navigated over hybrid microwire into

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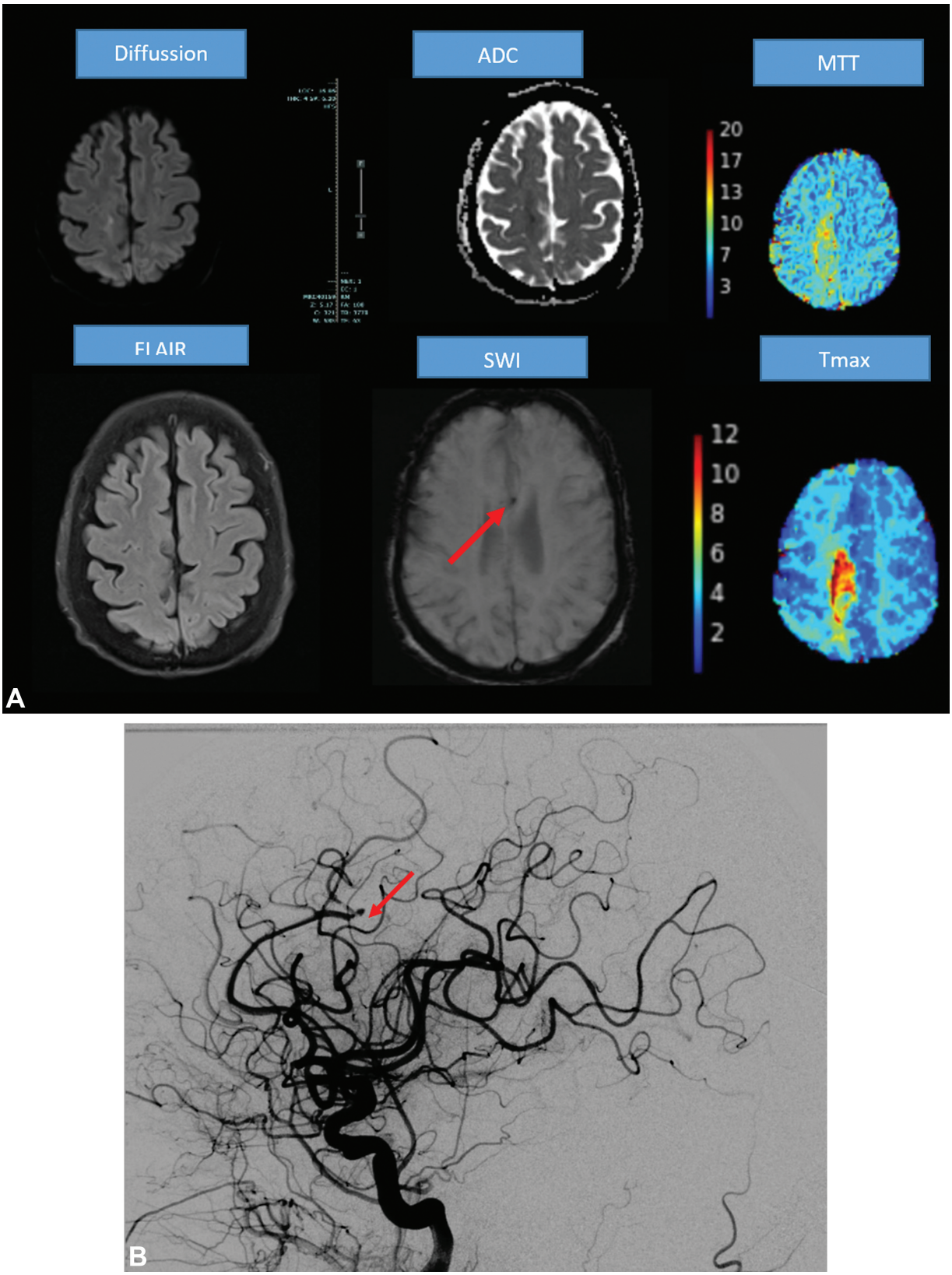

Fig. 1 Anterior cerebral artery (ACA) aneurysm thrombotic stroke. (**A**) Magnetic resonance imaging of brain showing hyperacute subcortical infarct at right parasagittal high frontal region of ACA territory with hypoperfused area on perfusion images adjacent to it. On susceptibility-weighted imaging (SWI), arrow points toward distal ACA thrombus. (**B**) Lateral right internal carotid artery angiogram showing thrombotic occlusion of right distal ACA (A3 segment)/pericallosal artery (red arrow). ADC, apparent diffusion coefficient; FLAIR, fluid-attenuated inversion recovery; MTT, mean transit time.

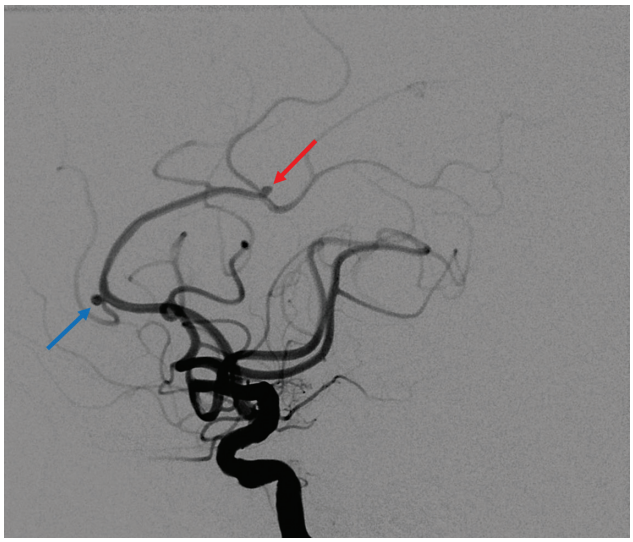

Fig. 2 Post-mechanical thrombectomy, saccular wide neck aneurysm is seen at the bifurcation exactly at the location of thrombotic occlusion of distal A3/pericallosal artery (red arrow) with mTICI III recanalization and another small saccular aneurysm is also seen at the bifurcation at proximal pericallosal artery (blue arrow).

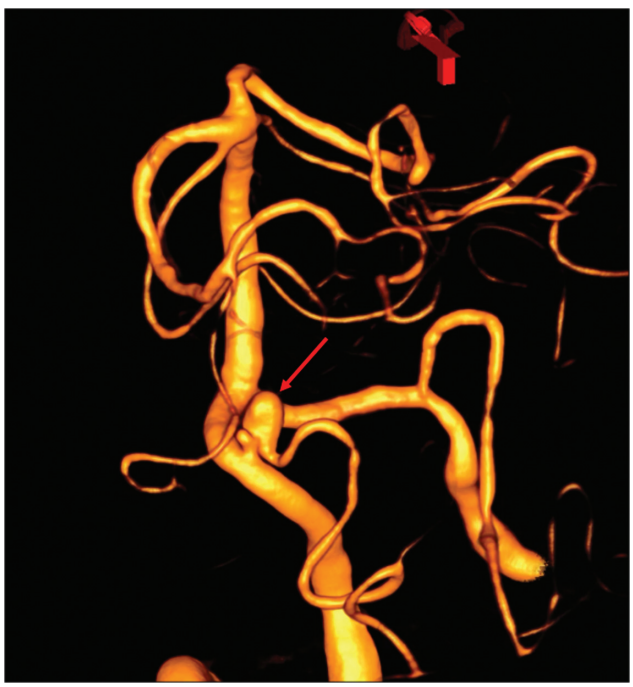

Fig. 3 Three-dimensional rotational angiogram showing left posterior inferior cerebellar artery aneurysm with small daughter sac adjacent to it.

the left PICA aneurysm that was followed by deployment of WEB SL 5 × 3 mm into aneurysm sac and a post-procedural angiogram showed a well-positioned web with significant intra-aneurysmal stasis and good flow into distal PICA. The position was confirmed and no bleeding was noted in Dyna computed tomography performed post-procedure. The patient was discharged with no post-procedure complications.

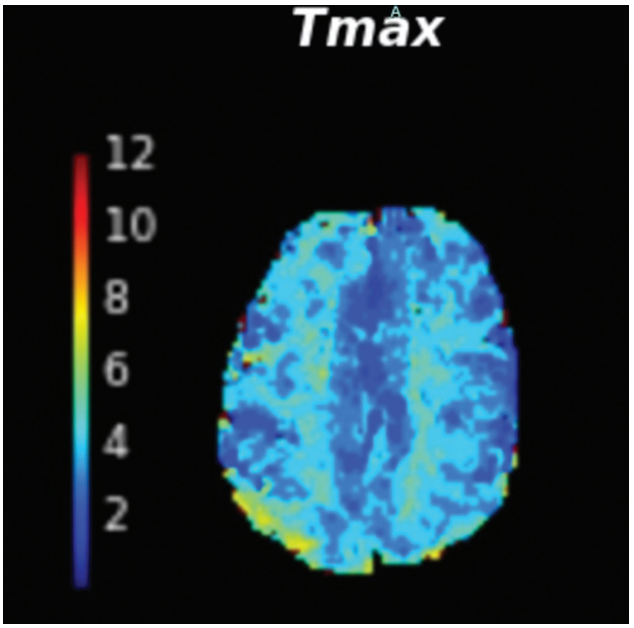

Fig. 4 Magnetic resonance imaging perfusion done after 24 hours showed reversal of hypoperfusion in the right parasagittal high frontal cortex.

Follow-Up

On one year follow up patient had complete recovery and exclusion of all three aneurysms with no residual paresis. (►**Fig. 6A** and **B**).

Discussion

An aneurysm is a ballooning arising from a weakened blood vessel wall. Saccular or berry aneurysms represent 90% of all the cerebral aneurysms, while there are various genetic factors such as connective tissue disorders, polycystic kidney disease, and arteriovenous malformations that can cause such aneurysms; however, arterial aneurysms in cerebral circulation are common in patients with chronic hypertension.[1,2] While cerebral aneurysms are likely to be seen in ACA/ACoA complex, supraclinoid ICA and ICA PcomA junction at the level of M1 and M2 bifurcation of middle cerebral artery in anterior circulation and basilar tip, superior cerebral artery, or PICA of posterior circulation, aneurysms in DACA are uncommon and represent only 6% of intracerebral aneurysm.[3] Most of these patients remain asymptomatic, while those who remain symptomatic usually come with intracranial subarachnoid hemorrhage; thrombosis is usually seen in cases of larger aneurysms or in small arteries in the pediatric population.[4] However, our case presented with a thrombus lodging within a DACA aneurysm causing hemiparesis.

A study by de Sousa et al states that DACA aneurysms are associated with aneurysms in other locations, which were also seen in the patient, as another proximal aneurysm in ACA and one of relatively larger size in PICA were noted in our case.[5] Prompt treatment of aneurysm is necessary as rupture may lead to life-threatening intracranial bleeding and increased risk of morbidities.[6,7] Depending on the size of aneurysms, they are treated with either surgical measures

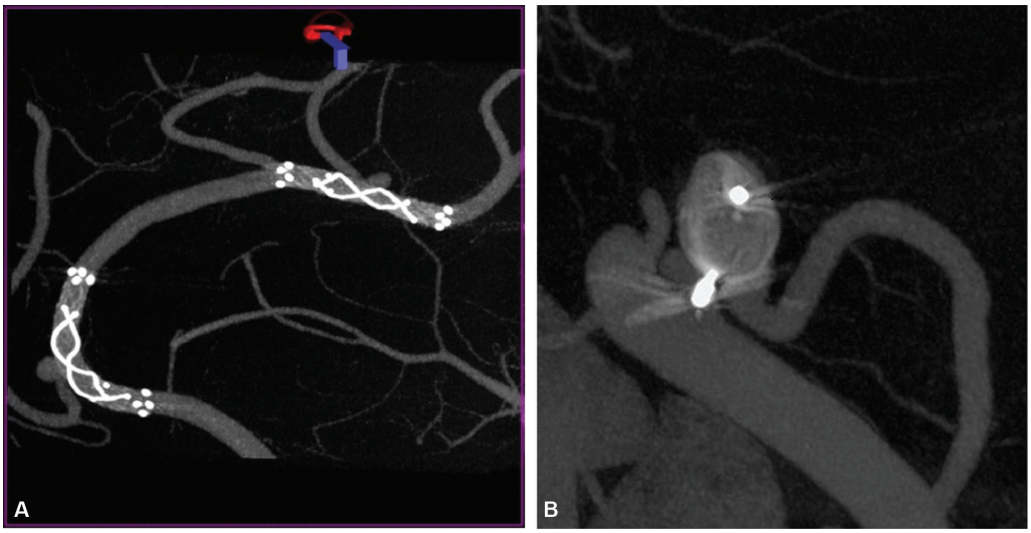

Fig. 5 (A) Dyna computed tomographic images showing flow diverter placement across both the distal anterior cerebral artery aneurysms. (B) WEB device within left posterior inferior cerebellar artery aneurysm.

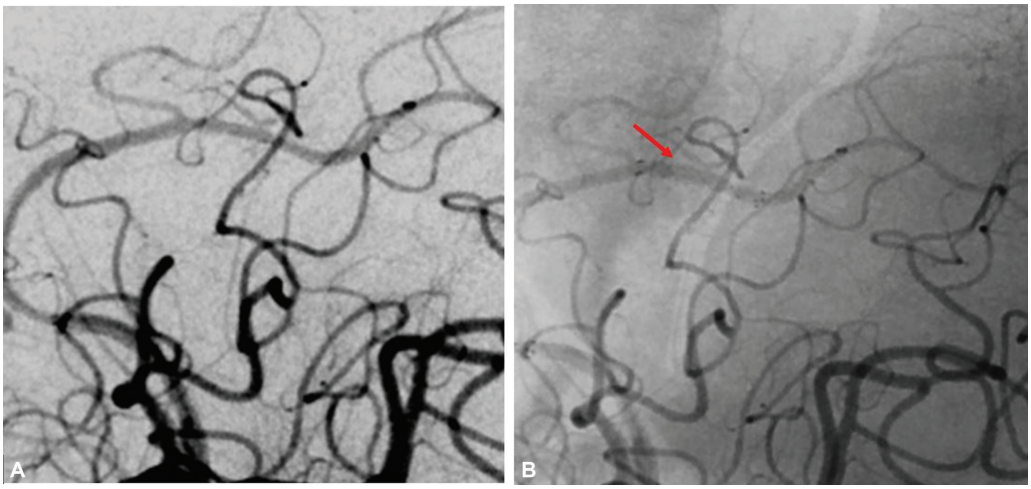

Fig. 6 (A) 1.5-year follow-up digital subtraction angiography image showing complete exclusion of distal anterior cerebral artery aneurysm. (B) Unsubtracted image showing corresponding location of previously placed flow diverter (red arrow).

that involve clipping or endovascular procedures involving placement of coils, flow diverters, and WEB placement.[8] Symptomatic aneurysms, whether thrombotic or hemorrhagic, should be treated with surgical or endovascular approach irrespective of their size; in our case since the cause of stroke was the aneurysm, we decided to treat the aneurysm directly[9] With advent of highly effective medical devices such as flow divertors and given an ideally skilled hands treating the patient, we advise active intervention in such cases. Endovascular approach to treatment of aneurysms has shown better prognosis in patients. Data portrays the use of flow diverters and WEBs as effective and safer treatment for small and wide neck aneurysms, respectively,[10,11] hence these two devices were used for the treatment of the patient. Similarly, in all cases of thrombotic occlusion at our institution, a blunt ended J tip/loop of the wire is used to cross the occluded segment to prevent perforation of the vessel wall.

On literature search, very limited data are available on treatment of thrombotic DACA aneurysms. This is the first case we have discovered where one of the DACA aneurysms camouflaged as a thrombotic stroke that was treated with endovascular approach. It is thus important to also consider DACA aneurysmal thrombosis as a differential while assessing any patient with chronic hypertension and other comorbidities presenting with ACA stroke.

Conflict of Interest

None declared.

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