Distal Anterior Cerebral Artery Aneurysm: an Infrequent Cause of Transient Ischemic Attack Followed by Diffuse Subarachnoid Hemorrhage: Report of a Case

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We report a 54-year-old female who presented with a wide-based saccular aneurysm distal to the junction of the right pericallosal and callosomarginal arteries, showing acute onset of transient ischemic stroke initially, followed by diffuse spontaneous subarachnoid hemorrhage and supracallosal, intraventricular hemorrhage. Rotational 3-dimensional digital subtraction angiography clearly indicated the aneurysm location and shape. Pre-operatively, her Hunt and Hess grading was IV. Craniotomy with aneurysm trapping was performed in the acute stage. Post-operatively, her consciousness gradually improved but left hemiparesis remained. This clinical presentation, to our knowledge, has not been previously reported. We would like to emphasize that in patients with transient ischemic attacks presenting with hemiparesis, the possibility of a distal cerebral arterial aneurysm should be taken into consideration for prompt and appropriate management.

Key words: ischemic stroke, diffuse subarachnoid hemorrhage, cerebral aneurysm

Distal anterior cerebral artery (DACA) aneurysms are rare. They are most frequently located at the division of the anterior cerebral artery into the pericallosal and the callosomarginal arteries, distal to the genu of the corpus callosum.1-2 Most patients present with classical spontaneous subarachnoid hemorrhage symptoms,1 but it is unusual to see case with an acute transient ischemia attack as its initial manifestation, followed by diffuse spontaneous subarachnoid hemorrhage and intracerebral hemorrhage. In this communication such a case will be reported.

Case Report

A 54-year-old woman was brought to our emergency room (ER) because of acute onset of right hemiparesis. Her medical record included (1) head trauma 1 year earlier after falling a distance of two stories, and (2) hypertension for more than 10 years, without regular control. Upon arrival at the ER, her initial physical examination showed blood pressure of 182/98 mmHg, regular pulse of 74 beats/minute, and body temperature of 37.2°C. A neurological examination showed clear consciousness and isocoric pupils with a prompt light reflex. A cranial nerve examination was within normal limits. The patient’s right extremities were weak, with muscle power of grade 4 and grade 2 in the upper and lower limbs, respectively. She also had hypesthesia of the right limbs. Electrocardiography revealed normal sinus rhythm without arrhythmia. The carotid duplex sonography of the neck disclosed mild atherosclerotic changes in both...
carotid bifurcations, with no significant hemodynamic changes. Laboratory tests revealed normal values.

Under the impression of a transient ischemic attack (TIA), the patient received one 5000-unit dose of Fragmin by subcutaneous injection. Her neurological deficits showed near total recovery soon thereafter. She was admitted to the neurological ward.

Twenty-three hours after admission, her consciousness level deteriorated to a deep coma (Glasgow coma scale score, 3). Brain CT showed diffuse subarachnoid hemorrhage (Fig 3), mainly interhemispheric and supracallosal in location (5 cm in diameter), especially in the left frontal lobe. A four-vessel study including rotational, three-dimensional (3D) digital subtraction angiography demonstrated a wide-neck saccular aneurysm in the proximal right pericallosal artery, facing medially, with an irregular surface near the dome and a daughter nodule at its neck (Fig 4).

The patient underwent spinal drainage first, then a bifrontal craniotomy via a right interhemispheric approach, with a bicoronal skin incision. The intraoperative findings consisted of an aneurysm located distal to the junction of the pericallosal and callosomarginal arteries, and the distal run-off of the aneurysm showed ischemic changes, with vascular wall ecchymosis and a thrombus in the aneurysm. Trapping of the aneurysm was performed in the pericallosal artery because the neck of the aneurysm was torn.

Postoperatively, the patient’s Glasgow coma scale score progressively improved to 7 (E3VTM3), but profound left hemiplegia remained. A tracheostomy was performed on day 15 after admission because of her poor cough function and delayed ventilator weaning. The patient was transferred to an ordinary ward on day 18 after admission. She was discharged with clear consciousness and moderate left hemiparesis on day 30 after admission.

**Discussion**

DACA aneurysms are classified as congenital, hypertensive, traumatic, or mycotic. The overwhelming majority are congenital. The DACA is also a well-known location for traumatic aneurysms. The possible mechanism for these aneurysms is that the pericallosal artery is located laterally adjacent to the free edge of the falx cerebri. Thus, if shearing forces develop between the pericallosal artery, the falx and the brain, this could result in a vascular lesion. In our patient, the etiology of aneurysm formation in this unusual location may be multifactorial. We strongly suspected a traumatic origin for the aneurysm because of its unique location away from any branching point and adjacent to the falx edge. We believe that the probable explanation is that the patient had a severe head injury 1 year earlier that could
have resulted in vascular damage initially, and then subsequent long-term hypertension promoted aneurysm formation.

Most patients with DACA aneurysms present with classical spontaneous subarachnoid hemorrhage symptoms. In our literature review, ischemic symptomatology related to the presence of saccular aneurysms has been reported, but never in the DACA location. In our patient, a systemic evaluation showed little risk of embolism, while diffusion weighted MRI showed acute infarction in the right callosal region, which is compatible with ischemia distal to the aneurysm (Fig 2). We believe that the initial symptom of TIA was produced by distal embolization of the DACA aneurysm. We also hypothesize that TIA with hemiparesis may be a warning sign for DACA aneurysm rupture. However, we cannot completely rule out the possibility that the TIA and aneurysm rupture were coincidental.

Patients with ICHs over 3 cm in diameter after aneurysm rupture, in addition to poor preoperative grade, are likely to have a poor outcome. In our patient, the ICH was 5 cm in diameter and her preoperative Hunt and Hess grading was IV. This suggested to us that the prognosis of our patient would be poor. Furthermore, it suggests that if we had been able to detect the presence of an aneurysm earlier, when the patient initially presented with symptoms of a TIA, it would have been possible to prevent aneurysm rupture, thus producing a better outcome for the patient. We therefore recommend routine evaluation of stroke patients using 3D digital subtraction angiography to help identify aneurysms early to prevent poor outcomes.

We believe that this case shows an association between distal anterior cerebral artery aneurysm and transient ischemic stroke. This initial clinical presentation, to our knowledge, has not been previously reported. We emphasize that among patients with transient ischemic attacks presenting with hemiparesis, the possibility of a distal cerebral arterial aneurysm must be considered in the differential diagnosis so that prompt and appropriate therapy can be given.
References

遠端前大腦動脈動脈瘤：先以短暫性腦缺血表現後
繼發瀰漫性蜘蛛網膜下腔出血：病例報告

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我們報告一位54歲女性病人先以短暫性腦缺血發
作後繼發自發性瀰漫性蜘蛛網膜下出血擴張腦底
腦室出血，而3D數位減影血管攝影檢查顯示一個腦
底腦室擴張及脳底脈勻動脈交界處遠端的寬底囊
狀動脈瘤。手術前病人的情況為Hunt and Hess grade
IV。我們在急性期為病人施行開顱手術與動脈瘤
Trapping。手術後病人的意識狀態漸漸進步，但左側
肢體感覺異常。我們提出此一少見臨床病例要強調的
是當病人以短暫性腦缺血發作表現並半身輕癱時，遠
端大腦動脈的動脈瘤破裂必須列入可能的原因之一並
給予盡早適當的評估與治療。