

Case Report

Glue Embolization of Ruptured Anterior Thalamoperforating Artery Aneurysm in Patient with Both Internal Carotid Arteries Occlusion

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Thalamoperforating artery aneurysms are rarely reported in the literature. We report an extremely rare case of ruptured distal anterior thalamoperforating artery aneurysm which was treated by endovascular obliteration in a patient with occlusion of both the internal carotid arteries (ICAs) : A 72-year-old woman presented with severe headache and loss of consciousness. Initial level of consciousness at the time of admission was drowsy and the Glasgow Coma Scale score was 14. Brain computed tomography (CT) scan was performed which revealed intracerebral hemorrhage in right basal ganglia, subarachnoid hemorrhage, and intraventricular hemorrhage. The location of the aneurysm was identified as within the globus pallidus on CT angiogram. Conventional cerebral angiogram demonstrated occlusion of both the ICAs just distal to the fetal type of posterior communicating artery and the aneurysm was arising from right anterior thalamoperforating artery (ATPA). A microcatheter was navigated into ATPA and the ATPA proximal to aneurysm was embolized with 20% glue. Post-procedural ICA angiogram demonstrated no contrast filling of the aneurysm sac. The patient was discharged without any neurologic deficit. Endovascular treatment of ATPA aneurysm is probably a more feasible and safe treatment modality than surgical clipping because of the deep seated location of aneurysm and the possibility of brain retraction injury during surgical operation.

Key Words : Anterior thalamoperforating artery · Aneurysm · Glue embolization.

INTRODUCTION

Anterior thalamoperforating artery (ATPA) aneurysm is extremely rare. To our knowledge, there are only three previously reported cases of ruptured APTA aneurysm available in the literature⁷⁻¹⁰. We are hereby reporting case history of a patient with a saccular aneurysm arising from distal ATPA which was treated by endovascular embolization. To our knowledge, this is the first report of an ATPA aneurysm treated with glue embolization in patient with both occluded internal carotid arteries (ICAs).

CASE REPORT

A 72-year-old woman was reported to us for transfer from local hospital after the sudden onset of headache and loss of consciousness. At the time of first examination on the local hospital, the patient was stupor and computed tomography (CT) scan

of brain demonstrated intracerebral hemorrhage (ICH) in right basal ganglia, subarachnoid hemorrhage (SAH) and intraventricular hemorrhage (IVH). Patient's blood pressure was 220/150 mmHg, and pulse rate was 92 beats per minute. The patient was transferred to our institution after becoming stabilized.

At the time of admission, patient seemed to be lethargic but could open eyes to voice and answer questions appropriately except to the time and place. Initial Glasgow Coma Scale (GCS) score was 14 and no other neurological deficits were observed. The patient's pupils were isometric and briskly reactive. Patient had no significant past medical history or history of consumption of medications. The brain CT scan revealed a large IVH which was prominent in the right lateral ventricle and fourth ventricle, ICH on right basal ganglia and SAH on basal cistern and right sylvian fissure (Fig. 1A). The CT angiogram demonstrating a saccular enhancing lesion within the ICH (Fig. 1B).

Intervention

A cerebral angiogram was performed which revealed complete occlusion of both the ICAs distal to fetal type posterior communicating artery (PCoA). The collateral flow for both the ICAs was from posterior cerebral leptomenigeal arteries and numerous perforators of posterior cerebral artery. Right inter-

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nal carotid arteries (ICA) angiogram revealed a saccular aneurysm at the distal portion of the ATPA, which was arising from the PCoA (Fig. 2A). Right vertebral artery angiogram demonstrated no filling of aneurysm while the right external carotid artery angiogram showed collateral flow to ipsilateral frontal lobe through branches of middle meningeal artery.

On the same day, the endovascular treatment of an ATPA aneurysm was performed. The procedure was performed under local anesthesia for neurologic examination during temporary occlusion test of an ATPA. Electrocardiography, arterial oxygen saturation, and blood pressure monitoring were monitored ac-

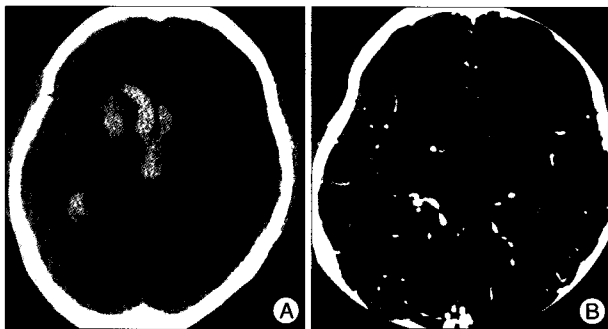


Fig. 1. Pretreatment computed tomographic (CT) and CT angiogram images. Non contrast-enhanced CT image (A) revealing the presence of ICH in right basal ganglia and IVH. The CT angiogram (B) demonstrating saccular enhancing lesion within the ICH. ICH : intracerebral hemorrhage, IVH : intraventricular hemorrhage.

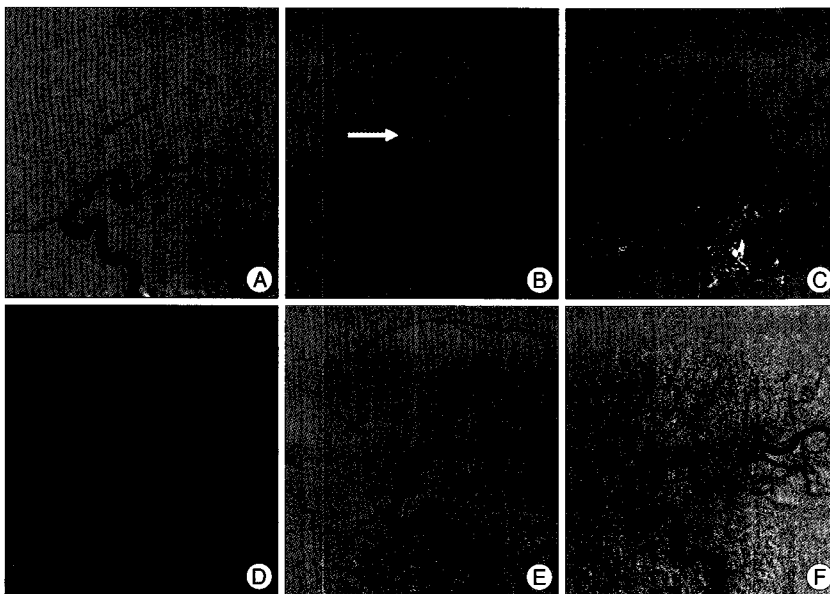


Fig. 2. Lateral (A) angiographic images of the right internal carotid artery (ICA) demonstrating complete occlusion of ICA distal to fetal type posterior communicating artery (PCoA) and a saccular aneurysm (black arrow) at the distal portion of the anterior thalamoperforating artery (ATPA) which arose from the PCoA. Microcatheter angiographic image (B) demonstrated a 4.8 mm sized saccular aneurysm (black arrow) and retrograde flow from the aneurysm to lateral lenticulostriatal artery (white arrow). Lateral angiography (C) showing the temporary occlusion test of ATPA with detachable coil (black arrow). ICA angiogram during temporally occlusion revealed no antegrade flow from lateral lenticulostriatal artery to aneurysm. Radiographic image (D) of 20% diluted glue applied to distal portion of the ATPA. Immediate (E) and 14th days post-procedural (F) angiograms demonstrating complete occlusion of the aneurysm and ATPA.

ordingly. The right femoral artery was accessed with a 6-French, 80 cm-lengthed Shuttle sheath (Cook, Bloomington, IN, USA). We placed a 6-French guiding catheter (Envoy, Cordis, Miami Lakes, FL, USA) in right distal cervical segment of ICA. A 165 cm long flow directed microcatheter (Marathon, Ev3, Irvine, CA, USA) with 200 cm long 0.008-inch microwire (Mirage, Ev3, Irvine, CA, USA) was navigated into the ATPA. Microcatheter injection demonstrated a 4.8 mm sized saccular aneurysm and retrograde flow from the aneurysm to lateral lenticulostriatal artery (Fig. 2B). We could not identify the antegrade flow of lateral lenticulostriatal artery to aneurysm because of right distal ICA occlusion, it was then decided to perform temporary occlusion test of ATPA with detachable coil. The ATPA was temporarily occluded with detachable coil (GDC, Boston scientific, Fremont, CA, USA) and ICA angiogram revealed no antegrade flow from lateral lenticulostriatal artery to the aneurysm (Fig. 2C). The patient did not develop any neurologic deterioration and tolerated the occlusion test. Thus, we decided to occlude the parent artery of aneurysm.

After removal of detachable coil and advancement of microcatheter to distal portion of ATPA, 20% diluted glue (Histoacryl, B.BRAUN, Swiss) was applied to distal portion of the ATPA (Fig. 2D). No glue reflux was observed into the parent vessel during embolization of the feeding artery. Post procedural right ICA angiogram demonstrated no filling of aneurysm and no antegrade flow to lateral lenticulostriatal artery (Fig. 2E).

The patient recovered without any neurological deficits. Follow-up right ICA angiogram two weeks later demonstrated complete occlusion of the aneurysm and ATPA (Fig. 2F).

DISCUSSION

ATPA aneurysm is an extremely rare condition. Aneurysms distal to the Circle of Willis are seen in conditions such as secondary to infection, tumor embolus, moyamoya disease, trauma, or arteriovenous malformation^{2,12}. The patient's angiogram in this report demonstrated a saccular aneurysm located at a distal branch of an ATPA with occlusion of both the ICAs distal to PCoAs. It has been observed that, patients with absence or hypoplasia of the carotid artery, and those with stenosis and occlusion of the carotid artery may have an increased tendency of developing intracranial aneurysm. Some reports have demonstrated that change in arterial blood flow and hemodynamic stress could also facilitate formation of

aneurysms^{1-7,9,13,14}). In addition, saccular aneurysms not related to the bifurcation of cerebral arteries are always associated with hypertension¹¹). We thought that the unusual saccular aneurysm demonstrated in this case was probably result from hemodynamic stress on the ATPA after occlusion of the both ICAs just distal to the PCoA.

In the literature⁷⁻¹⁰), only three cases of ATPA aneurysm rupture have been reported previously. In the report of Kumar et al.¹⁰) they demonstrated a ruptured aneurysm of ATPA, but were not able to treat the aneurysm because of its disappearance at follow up angiogram. In 1998, Joanna et al.⁹) also described a patient with subependymal thalamic hemorrhage due to a thalamoperforating artery aneurysm rupture. However, there was no treatment available and the precise etiology of the aneurysm was not approved. In 1999, Kim et al.⁸) described an ATPA aneurysm associated with internal carotid artery occlusion. They used subtemporal transventricular approach to clip the deep seated intraparenchymal aneurysm and the patient had an uneventful postoperative course.

Definitive treatment of ATPA aneurysms are by surgical clipping or endovascular methods. Surgical approaches are difficult because of the deep location in and around the basal ganglia. The conventional endovascular treatment options of ATPA aneurysms are by embolization using liquid embolic material or by coil embolization of feeding artery or aneurysm. With the advance in endovascular technique and material, surgical clipping of the deep seated ATPA aneurysm in poor Hunt-Hess grade patient is controversial. The endovascular catheterization and treatment are often difficult because of the small caliber of the involved vessels and the acute angle of origin from the posterior cerebral artery trunk. In our case, it was very difficult to select the distally located aneurysm with microcatheter because of tortuosity and small caliber of the ATPA. So we have decided to obliterate a parent vessel of the aneurysm with diluted glue. Occasionally, it is difficult or impossible to embolize feeding vessel with glue if the aneurysm is located proximally because of the short segment of artery available for catheterization and due to a risk of potential glue reflux into the parent artery. In our case, despite of the acute angle of ATPA, we could navigate a flexible flow directed microcatheter into ATPA and embolize the feeding vessel of the aneurysm with diluted glue.

CONCLUSION

ATPA aneurysm is extremely rare and its rupture can cause

ICH and SAH. Treatment of ATPA aneurysms by endovascular treatment is probably more beneficial than surgical clipping because of its deep seated location and possibility of brain retraction injury during surgical operation. However, small caliber of the involved vessels and often the acute angle of origin from the posterior cerebral artery trunk could make endovascular treatment difficult.

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