

A Case of Acute Isolated Posterior Cerebral Artery Occlusion Successfully Treated with Endovascular Clot Aspiration

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Posterior cerebral artery (PCA) strokes produce various symptoms. Therefore, the diagnosis is often delayed and patients arrive late for thrombolytic therapy. We report a case of acute isolated PCA occlusion that was successfully treated with endovascular clot aspiration. A 63-year-old man presented with right complete homonymous hemianopia. Diffusion-weighted image (DWI) showed a high-intensity area (HIA) in the occipital lobe, and magnetic resonance angiography (MRA) showed PCA occlusion. Emergency endovascular clot aspiration was performed immediately after the diagnosis. Blood flow in PCA completely recovered 210 min after symptom onset. DWI after surgery showed partial disappearance of HIA, and the patient recovered from the symptom of right complete homonymous hemianopia. Endovascular recanalization is useful for acute PCA occlusion. This is the first reported case of acute isolated PCA occlusion successfully treated with endovascular clot aspiration. Prompt reperfusion results in a good clinical course in patients with PCA stroke. In this case, endovascular clot aspiration resulted in prompt recanalization in a patient with acute isolated PCA occlusion.

Keywords: posterior cerebral artery, stroke, brain infarction

Introduction

Brain infarctions in the area of the posterior cerebral artery (PCA) are not uncommon. Many patients with PCA stroke cannot properly describe their symptoms, because PCA strokes produce various symptoms. Therefore, the diagnosis is often delayed and patients arrive late for thrombolytic therapy. There are many case reports on endovascular recanalization for acute occlusion of the posterior circulation, but there are few reports on endovascular recanalization for acute isolated PCA occlusion. We report a case of acute isolated PCA occlusion that was successfully treated with endovascular clot aspiration.

Case Report

A 63-year-old man visited our emergency department and complained of visual field disorder. On admission, neurological

examination revealed right complete homonymous hemianopia. His National Institute of Health Stroke Scale (NIHSS) score was 2.¹⁾ Emergency diffusion-weighted image (DWI) showed a high-intensity area (HIA) in a wide area of the left occipital lobe (Fig. 1A), and fluid attenuated inversion recovery (FLAIR) did not show HIA. Magnetic resonance angiography (MRA) showed disappearance of left PCA (Fig. 1B). Cerebral angiograms showed occlusion of the P2 segment of left PCA. There was no stenosis of the left vertebral artery, basilar artery, or origin of PCA (Fig. 2). Hence, we suspected cardioembolism.

Emergency endovascular clot removal was performed immediately after the diagnosis. Heparin (5000 IU) was administered, and edalabon (30 mg) was infused intravenously. Emergency clot removal was performed by the transfemoral approach using 6 Fr. Roadmaster 90 cm (Goodman, Aichi, Japan) as the guiding catheter. Clot removal was performed using Penumbra 3MAX (Medicos-Hirata, Osaka, Japan) as the microcatheter and a penumbra aspiration-pump (Medicos-Hirata, Osaka, Japan). A microguidewire (Tenrou; Kaneka Medical Products, Osaka, Japan) was used to cross the lesion in the P2 segment of PCA. The 3MAX catheter was then slowly withdrawn while maintaining aspiration. The first aspiration resulted in the recanalization of left PCA 210 min after symptom onset, with a Thrombolysis in Cerebral Infarction (TICI) score of 3 (Fig. 3).²⁾ DWI on postoperative day 1 showed that HIA had partially disappeared (Fig. 4A), and MRA confirmed the recovery of PCA flow (Fig. 4B). Edalabon (60 mg/day) and heparin (12,000 IU) were intravenously administered for 7 days. Following this, the patient was diagnosed with paroxysmal atrial fibrillation by Holter electrocardiogram and was administered apixaban (10 mg/day). The patient had no complications and was discharged with right quadrantic hemianopia.

Discussion

Recently, remarkable progress has been made in endovascular treatment (EVT), and EVT for acute ischemic stroke due to large vessel occlusion has been an effective therapeutic option. Between 5% and 10% of all acute ischemic strokes occur in the area of PCA. Lacunar infarction is the most frequent stroke subtype, followed by atherothrombotic and cardioembolic infarctions.^{3,4)} PCA strokes produce various symptoms, which are sometimes not properly described by the patient. Patients are frequently not aware of their symptoms, or symptom recognition

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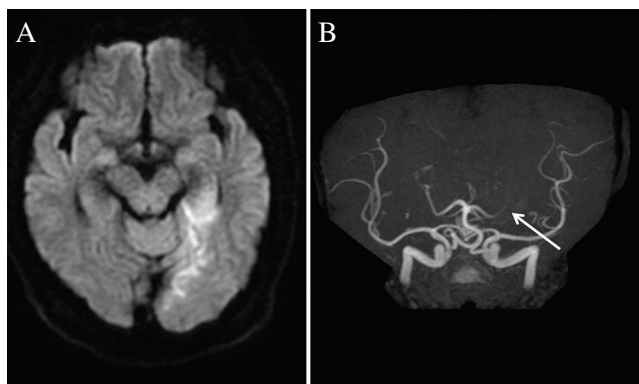


Fig. 1 Diffusion-weighted magnetic resonance images (A) on admission demonstrating a high-intensity area in the occipital lobe, and magnetic resonance angiography (B) showing disappearance of the P2 segment of the left posterior cerebral artery (arrow).

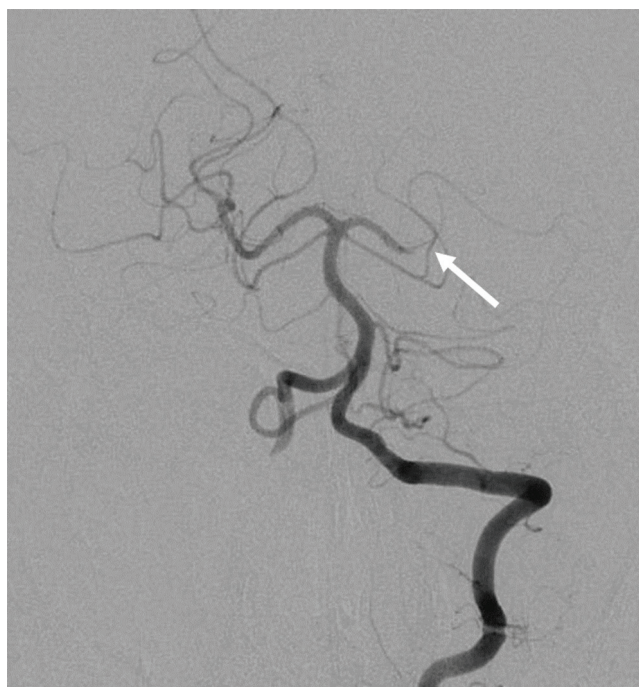


Fig. 2 Left vertebral angiograms demonstrating occlusion of the second segment of the left posterior cerebral artery (arrow).

is delayed. Therefore, the diagnosis is often delayed and patients arrive late for thrombolytic therapy. Many patients with PCA stroke have lower NIHSS scores than those with middle cerebral artery (MCA) or internal carotid artery (ICA) stroke. For example, complete homonymous hemianopia accounts for only two NIHSS points but severely affects the quality of life (QOL). Therefore, tissue plasminogen activator (t-PA) and EVT are often not initiated.

EVT for small vessel like PCA or distal MCA is still controversial regarding efficacy and safety. Indication of clots removal in PCA is unclear, because there are few reports on EVT for isolated PCA occlusion.^{5,6)} In addition,

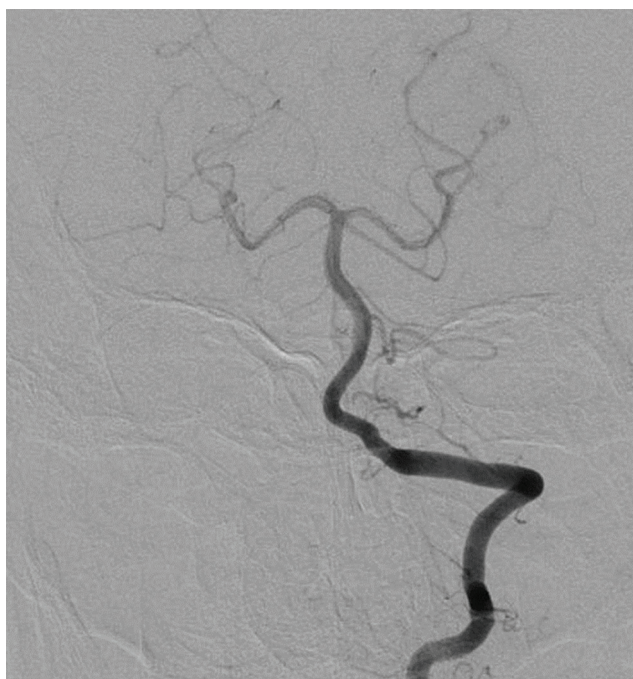


Fig. 3 Postoperative left vertebral angiograms demonstrating complete recanalization of the left posterior cerebral artery.

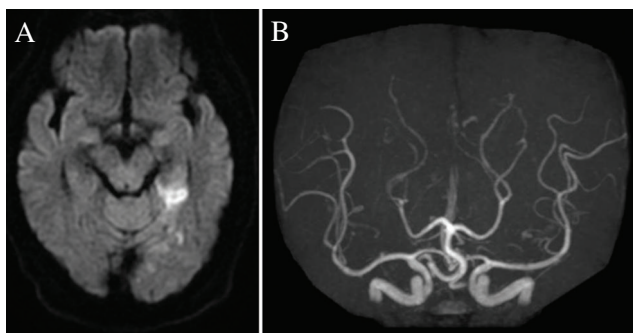


Fig. 4 Diffusion-weighted magnetic resonance images on postoperative day 1 (A) showing partial disappearance of the high-intensity area in the occipital lobe compared with that on admission. Magnetic resonance angiography on postoperative day 1 (B) demonstrating recovery of flow of the left posterior cerebral artery.

the removal of clots by aspiration for acute isolated PCA occlusion has not been reported. However, there are some literatures that EVT for posterior major artery occlusion like vertebral artery (VA) or basilar artery (BA) achieved a high rate of recanalization and a low rate of complication.⁵⁻¹⁰⁾ Amrou et al.¹¹⁾ reported that EVT for acute isolated the M2 segment of MCA occlusion was safe and effective relative to best medical treatment. The rate of recanalization was higher EVT than medical treatment, and the rate of complication was no differences. EVT always has risk, for example dissection and hemorrhage. However, the rate of complication of EVT was not high compared with medication.⁵⁻¹¹⁾

In the present case, we chose the Penumbra system rather than the stent retriever because we did not use a

balloon-guiding catheter. Clot removal was performed using a direct aspiration first pass technique (ADAPT) and was achieved without distal embolization. ADAPT was reported as a technique to remove a clot in a mass, and it may be effective to prevent distal embolization.¹²⁾ The removal of clots for acute anterior circulation occlusion is performed with balloon-guiding catheter. It prevents distal embolization and embolization of new territory (ENT). Commonly, VA is smaller than ICA. Therefore, the removal of clots is performed by narrow guiding catheter which has no balloon. Complete occlusion and aspiration during retrieval could not be performed with this approach. We thought that the use of a stent retriever without a proximal balloon-guiding catheter may result in distal embolization and ENT. On the other hand, there is a report of EVT for acute vertebral-basilar occlusion with stent retrievers and 8Fr. Balloon-guiding catheters. They achieved good outcome and discussed that flow control by balloon guiding catheter might prevent distal embolization and ENT.⁸⁾

One study reported that the outcome after intra-arterial thrombolysis with urokinase for acute PCA occlusion was favorable in most patients and that endovascular recanalization for PCA occlusion was useful and safe.⁵⁾ However, urokinase infusion requires several tens of minutes; the median infusion time was 50 min. Prompt reperfusion for acute ischemic stroke results in a good clinical outcome, thereby benefiting patients.¹³⁾ Delay in treatment results in worsened prognosis. In the present case, the time from puncture to recanalization was 25 min. The recanalization of the vessel can be performed more quickly with clot aspiration than with intra-arterial urokinase. Sun et al.¹⁴⁾ reported that every 10-min delay in the picture-to-puncture (P2P) time decreases the probability of achieving a good outcome by 6%. They proposed using P2P time as a metric for determining the efficiency of work-flow processes in interhospital transfers for strokes, with a target time of 90 min. In our case, the door-to-picture time was 30 min and the P2P time was 72 min. Prompt reperfusion improved not only the symptoms of the patient but also the HIA of DWI in the occipital lobe.

After EVT, HIA partially disappeared on DWI, and the patient's homonymous hemianopia improved. This result suggests that the ischemic penumbra includes not only the region of DWI mismatch but also portions of the area of initial diffusion abnormality. The area can be rescued by prompt recanalization. Labeyrie et al. reported the existence and clinical correlates of the reversible acute DWI lesion phenomenon in patients treated within 4.5 hours from stroke onset.^{15,16)} Another study reported that the reversal of HIA by DWI mostly occurred in patients with embolic stroke.¹⁷⁾

In this case, we did not use t-PA because the patient's NIHSS score was very low. However, Breuer et al. reported the efficacy of intravenous thrombolysis for PCA stroke.³⁾ Their data on safety and efficacy support the present common thrombolysis practice in patients with supratentorial PCA infarct, although an indication for intravenous thrombolysis should be based on the existence of a functionally

disabling deficit than merely on the NIHSS score. Therefore, if the patients with PCA stroke who have no contraindication can be treated within 4.5 hours from symptoms onset, they should be treated with t-PA. EVT was effective for patients who cannot be treated with t-PA because of contraindication or who cannot get recanalization with t-PA. It seemed that we should have used t-PA, while we prepared for endovascular treatment.

Conclusion

To the best of our knowledge, this is the first reported case of acute isolated PCA occlusion successfully treated with endovascular clot aspiration. PCA stroke severely affects QOL. Therefore, the decision on treatment should be based on a general view of the patient as well as NIHSS. Prompt reperfusion leads to a good clinical course. In the present case, endovascular clot aspiration led to prompt recanalization in a patient with acute isolated PCA occlusion. Examination of more such cases will be necessary in the future.

Conflicts of Interest Disclosure

The authors declare that there is no conflict of interest. All authors who are members of the Japan Neurosurgical Society (JNS) have registered online Self-reported COI Disclosure Statement Forms through the website for JNS members.

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