

## CASE REPORT

# Pure posterior communicating artery occlusion treated with mechanical thrombectomy

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## SUMMARY

There has been no report of mechanical thrombectomy for a pure posterior communicating artery (PComA) occlusion. Here, we report the case of an 87-year-old woman with a disturbance of consciousness and left hemiparesis diagnosed with a right PComA occlusion. The patient was successfully treated using mechanical thrombectomy in combination with a stent retriever and the Penumbra system. A CT perfusion image showed cerebral blood flow reduction in the ipsilateral occipital lobe and thalamus. A CT angiography supported the diagnosis of an occlusion of fetal type PComA. The PComA could not be detected by internal carotid angiogram, but after deployment of stent retriever, the PComA was recanalised and distal embolus at the right posterior cerebral artery was visualised. The thrombus was then removed using the Penumbra system. Although the treatment for a PComA occlusion requires further investigation, the present case supports a thrombectomy as an effective rescue strategy for PComA occlusions.

## BACKGROUND

There has been no report of mechanical thrombectomy for a pure posterior communicating artery (PComA) occlusion. In total, 250 consecutive patients with acute ischaemic stroke have been treated with mechanical thrombectomy at our hospital; however, only one case involved a pure PComA occlusion.

The PComA connects the carotid and the posterior cerebral arteries. Owing to a low-pressure gradient between the two systems, pure PComA occlusion is rare.<sup>1</sup> Mechanical thrombectomy for pure PComA occlusion requires further discussion because of its rare frequency. Here, we report the case of pure PComA occlusion treated with mechanical thrombectomy.

## CASE PRESENTATION

An 87-year-old woman was admitted to an emergency room of our hospital owing to impaired consciousness (Glasgow Coma Scale 13) and left hemiparesis. A National Institute of Health Stroke Scale score of 13 recorded on admission. The patient had no medical or family history to be noted.

## INVESTIGATIONS

A CT scan showed no intracranial haemorrhage or early ischaemic signs. CT perfusion showed cerebral blood flow (CBF) reduction, mean transit time

(MTT) elongation at the right occipital lobe, mild CBF reduction and mild MTT elongation at the middle cerebral artery area (figure 1). However, a three-dimensional CT angiography (CTA) showed mild intracranial stenosis at the right internal carotid artery (ICA) without a deficit of the right posterior cerebral artery (PCA) (figure 2A, C). A CTA source image (CTA-SI) revealed an occlusion of the right fetal-type PComA (figure 2B, D).

## TREATMENT

After intravenous injection of recombinant tissue plasminogen activator, endovascular treatment was provided after obtaining informed consent of the family of the patient in conformance with the policy of the Ethical Review Board of our hospital. Left vertebral angiogram showed bilateral hypoplastic PCA (P1) (figure 3A). Although, the PCA was depicted as a peripheral artery on CT, the flow of the contrasting agent was delayed. Internal carotid (IC) angiogram of the right showed a 4 mm long mural thrombus at the IC-PComA bifurcation portion. (figure 3B). PComA and PCA were not delineated through IC angiography. Based on these findings and the CT perfusion data, we diagnosed the patient with an acute pure PComA occlusion on the right.

A stent retriever was applied to remove the mural thrombus because we could not identify the PComA after the angiogram. We deployed Solitaire FR (Medtronic, Minneapolis, Minnesota, USA) 6 mm/30 mm at the mural thrombus site. At 2.5 min after stent deployment, an IC angiogram revealed the PComA recanalisation and distal embolus at the right PCA (figure 3C and D), which was retrieved using two passes of 5MAX ACE (Penumbra, Alabama, California, USA) with A Direct Aspiration First Pass Technique (figure 3E). The distal PCA (P4) occlusion remained; therefore, the final recanalisation rate was equivalent to thrombolysis in cerebral infarction grade 2b. The time from onset to reperfusion was 319 min.

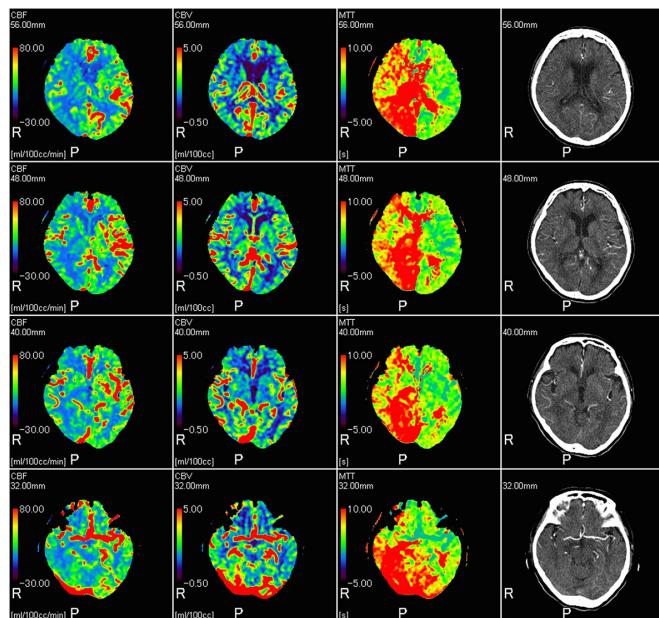
## OUTCOME AND FOLLOW-UP

The patient fully recovered from left hemiparesis and impaired consciousness within 24 hours after reperfusion therapy. Diffusion-weighted MRI revealed multifocal punctate infarction in the right thalamus and occipital lobe (figure 4). The modified Rankin Scale score of the patient at 90 days was 3 because of vascular dementia before admission.



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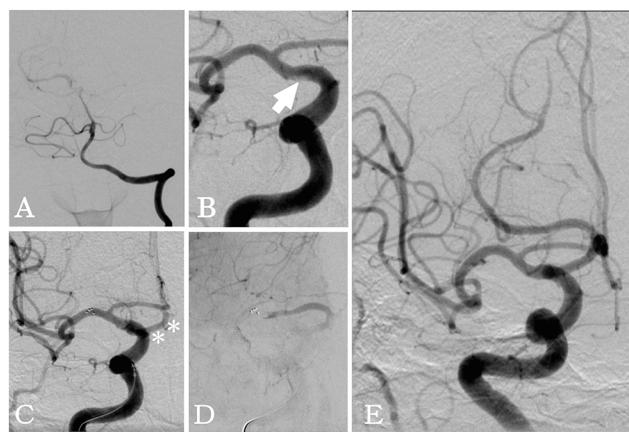
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**Figure 1** Four slices of a head CT perfusion image on admission are shown. Cerebral blood flow, cerebral blood volume and mean transit time are shown in order from the left. A CT angiography source image of the arterial phase is shown on the right side. On the thalamus and posterior cerebral artery region, a reduction of cerebral blood flow and an extension of the mean transit time are shown on the ipsilateral side. In contrast, the cerebral blood volume is reserved compared with the contralateral side. P, posterior side; R, right side.

## DISCUSSION

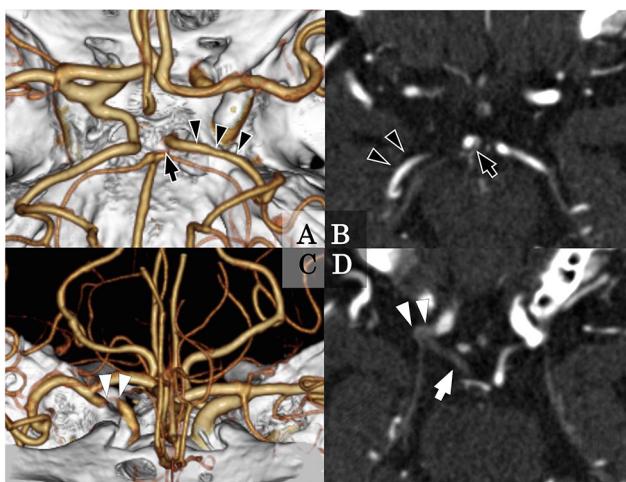
In the present case, although P1 was hypoplastic with fetal-type PComA (FTP), PCA was depicted through P1 owing to occlusion of PComA. Thus, the CTA findings of posterior circulation of the



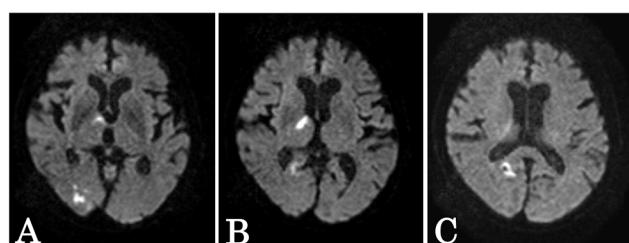
**Figure 3** Angiographic findings are shown that were observed during interventional radiology. (A) A left vertebral angiogram shows the right posterior cerebral artery (P2) through the hypoplastic posterior cerebral artery (P1); there was a delay in depicting P2. (B) The posterior communicating artery and posterior cerebral artery are not drawn in the right internal carotid angiogram. Mural thrombus of 4 mm in length is observed at the IC-PComA bifurcation (white arrow). (C) A rendering of the posterior communicating artery was obtained when the stent retriever was expanded (\*). (D) A migrated thrombus in late phase is shown via the posterior communicating artery. (E) After removal of the thrombus, the posterior communicating artery and the hypoplastic posterior cerebral artery were reperfused (thrombolysis in cerebral infarction grade 2b).

present case resembled that of a normal case; therefore, the diagnosis of a pure PComA occlusion was difficult. We could diagnose based on CT perfusion image with CBF decreased in the PCA territory, CTA findings of obviously hypoplastic P1 compared with periphery of PCA and CTA-SI with a contrast agent defect of on PComA.

Although the ischaemic area was detected in the right occipital lobe, the patient's symptoms were severe. We had no direct evidence that a pure PComA occlusion on the non-dominant hemisphere impaired consciousness and caused the left hemiparesis; however, we believe that the patient's symptoms were due to a PComA occlusion because of the sudden onset of symptoms, the clinical course, symptom improvement after recanalisation and no symptom recurrence during the observation period. An occlusion of the tuberothalamic artery (TTA) originates from the middle third of the PComA and causes acute severe perseverative behaviour that is apparent in cognition, speech and all memory-related and executive tasks, in combination with increased sensitivity to interference.<sup>2</sup> Similar to the present case, a previous study reported contralateral paresis in a patient with a TTA infarction



**Figure 2** A three-dimensional CT angiography shows the posterior communicating artery occlusion (A, C: reconstructed image; B, D: axial image). The right posterior cerebral artery (P2; black arrowhead) is well depicted through the low forming right posterior cerebral artery (P1; black arrow) (A, B). In the reconstructed image, the right posterior communicating artery is not drawn (A), and the stenosis is shown at the supraclinoid portion of internal carotid artery (C; white arrow head). A defect of the contrast agent is seen at the internal carotid artery through the full length of the posterior communicating artery (D; white arrow).



**Figure 4** Diffusion-weighted MRI of the patient after mechanical thrombectomy. A small infarction was observed in the right thalamus (A, B) and occipital lobe (C). No infarction appeared in the anterior circulation (A, B, C).

due to occlusion of the PComA after coil embolisation for an IC-PComA aneurysm.<sup>3,4</sup>

Mechanical thrombectomy has been shown to be effective for acute ischaemic stroke;<sup>5</sup> however, a thrombectomy for an acute occlusion of the PComA has not been established. The average diameter of the PComA is reported to be 1.3 mm (0.3–3.1 mm).<sup>6</sup> We use the Penumbra system in the present case. The diameter of the PComA in the present case was 2.00 mm and the Penumbra system (with a 0.060 inch (1.524 mm) calibre) could be easily applied, and fortunately after the reperfusion, consciousness improved and hemiparesis was alleviated. A previous study reported that for the anterior circulation, Penumbra and Stent treatment groups show no differences in efficacies and complications of mechanical thrombectomy.<sup>7</sup> Regarding the present case, we believe that the thrombus initially occluded the IC-PComA bifurcation and then migrated to the PComA, which had a relatively larger vessel diameter. We assumed that the mural thrombus of the ICA was proximal edge of thrombus of PComA, and the thrombus occluded ICA at IC-PComA bifurcation. Therefore, we attempted a recovery of flow of PComA using a

### Learning points

- We present the first case of pure posterior communicating artery (PComA) occlusion treated with mechanical thrombectomy.
- Cautious evaluation of the CT perfusion image, CT angiography and angiograms enables to diagnose the PComA occlusion.
- Mechanical thrombectomy with A Direct Aspiration First Pass Technique or stent retriever was feasible and effective to treat to PComA occlusion.

stent retriever by deploying Solitaire to ICA, because fortunately, we could identify the origin of PComA and made it possible to continue thrombectomy. Had we been unable to identify the origin of the PComA, further treatment would have been difficult.

Although further investigations on appropriate treatment strategies for PComA occlusion are required, the present case indicates the use of thrombectomy as an effective rescue strategy in the treatment of PComA occlusions in acute ischaemic stroke.

**Contributors** RO and KK: data gathering and manuscript preparation. KK and JU: review, editing and study design. HG: guarantor and overall review.

**Competing interests** None declared.

**Patient consent** Consent obtained from next of kin.

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