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Postangiographic 3D CT Findings of a Thrombosed Dissecting Aneurysm of the Posterior Inferior Cerebellar Artery

Takatoshi Sorimachi, Yukihiko Fujii, Takeo Nashimoto, Atsuko Harada, Yasushi Ito, and Shigekazu Takeuchi

Summary: We report a case of a thrombosed dissecting aneurysm of the posterior inferior cerebellar artery with subarachnoid hemorrhage. Although the aneurysmal sac was not shown on an angiogram on the day of the onset, 3D CT performed immediately after angiography revealed the aneurysm. The patient was successfully treated by endovascular occlusion.

Intra-aneurysmal thrombosis is one of the possible causes for false-negative angiographic findings in subarachnoid hemorrhage (SAH) (1). In dissecting aneurysms in the descending aorta, late enhancement of the thrombosed false lumen with the use of postcontrast CT has been reported (2). We report that an aneurysmal sac of a thrombosed dissecting aneurysm in the posterior inferior cerebellar artery (PICA), which was not shown on angiograms, was revealed on a postangiographic 3D CT scan owing to the late-enhancement effect.

Case Report

A 42-year-old male patient presented to the emergency department 1 hour after the acute onset of severe headache, nausea, and vomiting. A CT scan revealed an SAH with a preponderance of blood in the posterior fossa, including the cisterna magna, the fourth ventricle, and the prepontine cistern. On admission, a World Federation of Neurosurgical Societies grade II SAH was diagnosed.

A six-vessel cerebral angiogram, obtained 2 hours after the onset, showed segmental stenosis of the anterior medullary segment of the right PICA, although no aneurysmal sac was demonstrated (Fig 1). A dissecting aneurysm was suspected to exist around the stenotic lesion. The total dose of contrast medium (ioxaglic acid) administered during the 2-hour angiography study was approximately 170 mL (10 doses of contrast medium injections [5 mL of one-time dose] into the right vertebral artery [VA], six doses [5 mL of one-time dose] into the left VA, 12 doses [6 mL of one-time dose] into the bilateral internal carotid arteries, and four doses [4 mL of one-time dose] into the bilateral external carotid arteries).

A 3D helical CT scan, obtained immediately after angiography was performed, revealed a fusiform aneurysm with 5 mm of maximum diameter in the anterior medullary segment of the right PICA (Fig 2). To obtain the 3D CT scan, we used the HiSpeed Dx/i (GE Yokogawa Medical Systems, Tokyo) for the rapid sequential scanning (section thickness, 1 mm; section overlap, 0.5 mm), which was performed by using the following parameters: 140 kV; 160 mA; matrix, 512 × 512; and field of view, 20 cm. 3D CT reformations were obtained by using the surface-rendering method on the computer-analyzing system for digital images.

Neither MR images, including T2-weighted images, nor contrast-enhanced MR angiograms obtained with intravenous contrast medium (gadodiamide hydrate) the next day demonstrated the aneurysm of the PICA. SAH from the dissecting aneurysm of the PICA with thrombosed pseudolumen was diagnosed on the basis of the 3D CT findings, and the clot distribution was disclosed on the initial CT scan.

A balloon occlusion test was performed the day after onset to assess the feasibility of internal trapping by inflating a balloon catheter that had been transported to the right VA at the PICA origin. The aneurysm was not demonstrated angiographically at that time. General anesthesia was employed during the balloon occlusion test to reduce the possibility of rerupture induced by stimulation of the test occlusion. During balloon occlusion of the PICA and the VA, we observed on an angiogram that collateral flow from the other arteries seldom supplied the territory of the PICA. Therefore, the patient underwent conservative treatment in the acute stage.

A fusiform aneurysm in the PICA appeared on an angiogram 16 days after the onset of symptoms obtained at the same site as that on the 3D CT scan (Fig 3). The patient tolerated a 20-minute balloon test occlusion of the right VA at the PICA origin under local anesthesia without neurologic manifestation, although an angiogram demonstrated little filling of the PICA territory from collateral routes. Subsequently, the PICA and the aneurysm were occluded with Guglielmi detachable coils under general anesthesia. His postoperative course was uneventful. One month after onset, the patient was discharged free of any neurologic deficits and returned to work.

Discussion

To our knowledge, this is the first report of postangiographic 3D CT revealing a thrombosed aneurysmal sac that was not shown on conventional and contrast-enhanced MR angiograms. The causes of falsely negative angiographic findings of SAH include intra-aneurysmal thrombosis and intra-aneurysmal blood stagnation (1). Several cases of dissecting aneurysms have been reported in which initial angiograms failed to demonstrate the thrombosed pseudolumen of the aneurysms (3–5). Hayashi et al (2) studied a late-enhancement effect of a false

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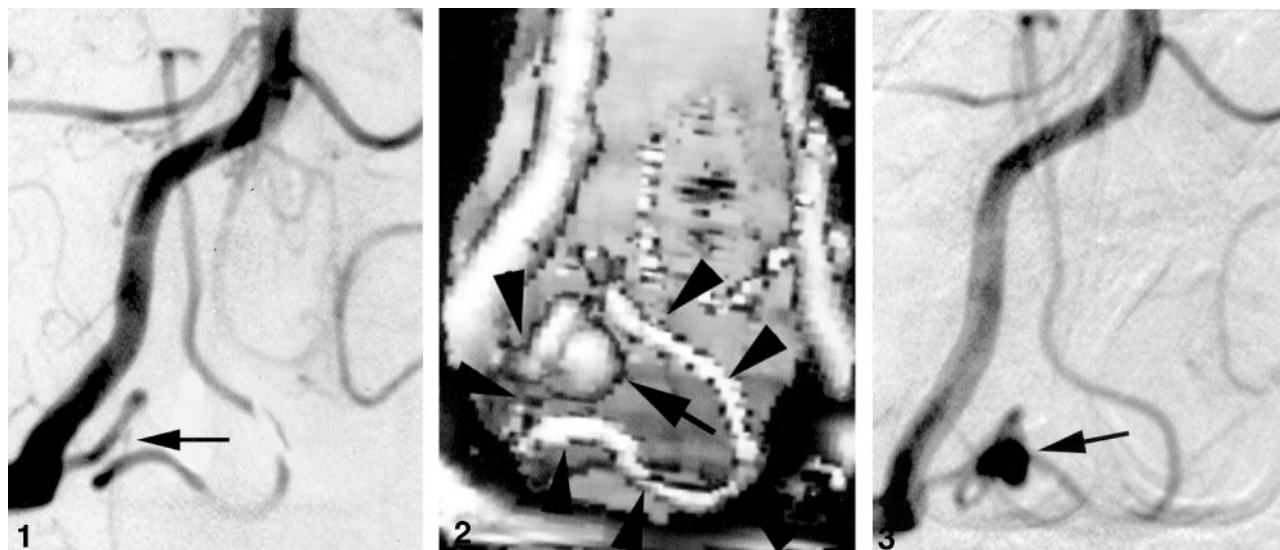


FIG 1. A right vertebral angiogram (anteroposterior [AP] view) obtained the day of the onset shows segmental stenosis (arrow) in the anterior medullary segment of the right posterior inferior cerebellar artery (PICA).

FIG 2. 3D CT scan (AP view) obtained immediately after angiography. A fusiform aneurysm (arrow) is revealed in the anterior medullary segment of the right PICA (arrowheads).

FIG 3. A right vertebral angiogram (AP view) obtained 16 days after onset. A fusiform aneurysm (arrow) is depicted in the anterior medullary segment of the right PICA.

lumen in five patients with dissecting thrombosed aneurysms in the descending aorta. In all of the five patients, the thrombosed false lumens, which did not enhance at CT performed immediately after contrast material injection, were enhanced on late-phase contrast-enhanced CT scans (2). This late enhancement of the thrombosed false lumens was observed from the day of onset to 28 days after onset. The mechanism of the late enhancement on CT scans may be explained by the spread of contrast medium in the arterial lumen into the unorganized thrombus in the false lumen by diffusion through the endothelial defect of the arterial wall (2). Contrast-enhanced MR angiography has been reported to demonstrate an aneurysm with stagnant intra-aneurysmal blood that was not shown on angiograms (6). If blood does not flow into a thrombosed aneurysm at all, however, theoretically neither conventional 3D CT angiography nor contrast-enhanced MR angiography, performed during intravenous administration of contrast medium, shows the aneurysm (2). In selective angiography for evaluation of SAH without an angiographically apparent aneurysmal sac, a large quantity of contrast medium tends to be administered into the suspected arteries. The angiographically occult thrombosed aneurysmal sac might be revealed on 3D CT scans obtained immediately after cerebral angiography, because the large volume of contrast medium induces the late enhancement of the thrombosed aneurysm.

Conclusion

We report a case of a thrombosed dissecting aneurysm of the PICA in which the aneurysmal sac was not shown on angiograms in the acute stage. The thrombosed pseudolumen of the aneurysm was revealed on a postangiography 3D CT scan by the late-enhancement effect. Postangiographic 3D CT scanning might be an effective option for evaluation of cause in patients with SAH in whom angiography fails to show the causative lesion.

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