

Simultaneous Occurrence of Subarachnoid Hemorrhage Due to Ruptured Aneurysm and Remote Brainstem Hematoma

—Case Report—

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Abstract

A 48-year-old woman presented with simultaneous aneurysmal subarachnoid hemorrhage (SAH) and remote intracerebral hemorrhage manifesting as sudden onset of severe headache, left hemiparesis, and diplopia. Emergent computed tomography revealed localized SAH in the interpeduncular cistern, and a remote brainstem hematoma in the right dorsolateral tegment. Neuroimaging found no signs of vascular anomaly in the brainstem. The aneurysm at the basilar artery and superior cerebellar artery bifurcation was successfully embolized using coils. Her postoperative neurological status was improved except for slight diplopia. The causes of this extremely rare case of simultaneous occurrence of aneurysmal SAH and remote brainstem hematoma in the dorsolateral tegment remain obscure.

Key words: subarachnoid hemorrhage, brainstem hematoma, hypertensive intracerebral hemorrhage, vascular anomaly

Introduction

Simultaneous occurrence of aneurysmal subarachnoid hemorrhage (SAH) and remote intracerebral hemorrhage (ICH) is very rare, with only three reported cases.^{8,17,19)} The mechanism is considered to be related to rapid increase of blood pressure. Hypertensive ICH tends to occur in well-known locations. Hematoma at the dorsolateral tegment of the brainstem is generally thought to be associated with various vascular anomalies^{10,16)} such as arteriovenous malformation, cavernoma, capillary telangiectasia, and developmental venous anomaly.^{1,3,4,6,11,13)} Some of these abnormalities are angiographically occult vascular malformations of the brainstem.^{1,2,5,9,14,15)}

We describe a case of simultaneous aneurysmal SAH in the interpeduncular cistern and remote ICH at the dorsolateral tegment of the brainstem.

Case Report

A 48-year-old woman suffered from sudden onset of

severe headache and was admitted to our hospital urgently. Her blood pressure was 120/70 mmHg. She had no history of hypertension or other systemic diseases. Computed tomography (CT) showed an aneurysm in the interpeduncular cistern (Fig. 1). However, no SAH was identified. Spinal tap was performed, but the cerebrospinal fluid was watery clear. Cytological examination and biochemical

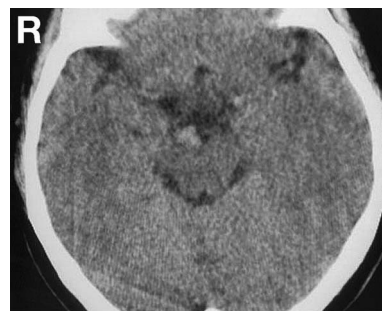


Fig. 1 Computed tomography scan on admission showing an aneurysm in the interpeduncular cistern without subarachnoid hemorrhage.

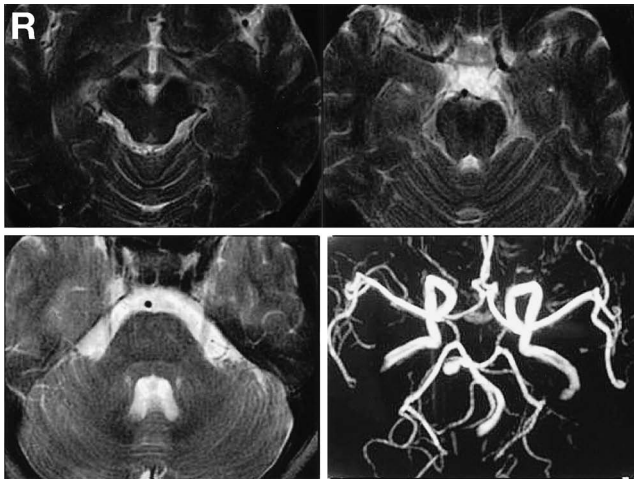


Fig. 2 T₂-weighted magnetic resonance images (upper row, lower left) showing no abnormal signal intensity area in the brainstem. Magnetic resonance angiogram (lower right) demonstrating a saccular aneurysm arising from the bifurcation of the basilar artery and right superior cerebellar artery.

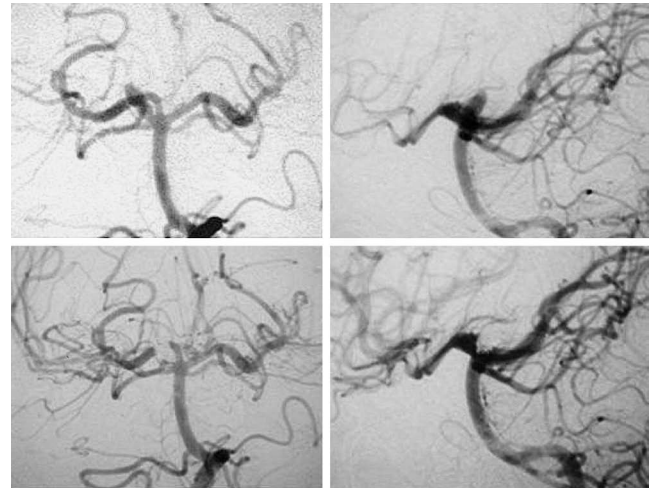


Fig. 4 Left vertebral angiograms, anteroposterior view (left column) and lateral view (right column), showing the saccular aneurysm at the basilar artery and right superior cerebellar artery bifurcation with superolateral projection (upper row), and successful embolization (lower row).



Fig. 3 Computed tomography scan showing subarachnoid hemorrhage in the interpeduncular cistern, and a brainstem hematoma in the right dorsolateral tegment.

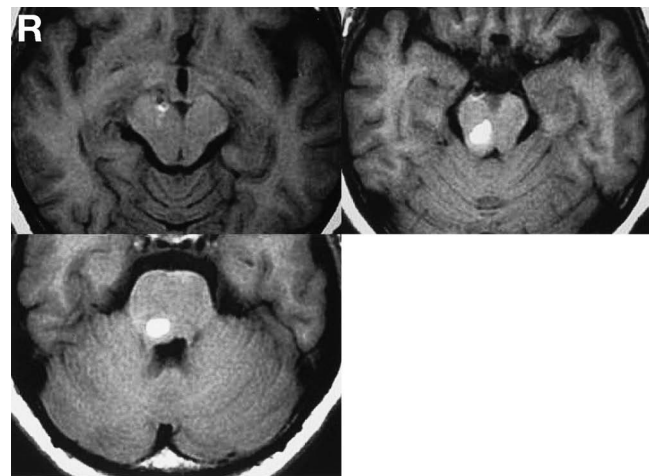


Fig. 5 T₁-weighted magnetic resonance images 11 days after admission revealing the hematoma in the dorsolateral tegment of the brainstem, and no sequelae to the aneurysm in the interpeduncular cistern.

studies detected no definite abnormalities. Magnetic resonance (MR) angiography on admission revealed a saccular aneurysm arising from the bifurcation of the basilar artery (BA) and right superior cerebellar artery (SCA) (Fig. 2 lower right). No abnormal signal intensity area was observed in the brainstem on T₁-weighted, T₂-weighted (Fig. 2 upper row, lower left), or fluid-attenuated inversion recovery MR imaging. We considered this severe headache to be a warning headache. We planned to perform coil embolization of the aneurysm in the acute stage. The patient was kept quiet in bed in a hospital room under monitoring.

On the following day, she suffered second sudden onset of headache followed by left hemiparesis and diplopia. Emergent CT revealed localized SAH in the interpeduncular cistern, and a remote brainstem hematoma in the right dorsolateral tegment (Fig. 3). Her blood pressure was 130/80 mmHg without anti-hypertensive medication. Coil embolization of the

ruptured BA-SCA aneurysm was performed (Fig. 4). Cerebral angiography showed no vascular abnormality in the brainstem. MR angiography 11 days after admission revealed the resolving hematoma in the dorsolateral tegment of the brainstem, and no sequelae to the aneurysm in the interpeduncular cistern (Fig. 5). Postoperative neurological status was improved except for slight diplopia, and she was discharged 3 weeks after the coil embolization.

Discussion

In the present case, SAH in the interpeduncular cistern was caused by rupture of BA-SCA aneurysm simultaneously with remote brainstem hematoma in the dorsolateral tegment. The occurrence of headache, left hemiparesis, and diplopia at the same time strongly indicated the simultaneous onset. CT and MR imaging showed no continuity between the hematoma of the brainstem and the SAH localized in the interpeduncular cistern. MR imaging also showed that the hematoma was completely surrounded by the parenchyma of the brainstem. The superolateral projection of the cerebral aneurysm also indicated independent origins for the two intracranial hemorrhages. Bleeding from the aneurysm almost certainly did not progress posteriorly like a jet, based on the stability of consciousness and vital signs of the patient as well as the neuroimaging findings.

The cause of brainstem hematoma in this case was unclear, but we suggest possible mechanisms as follows. The dorsolateral tegment is not a common location for hypertensive ICH, but any rapid increase in blood pressure might cause hematoma, or brainstem hematoma might be caused by hemorrhagic infarction. The blood flow in the area of the hematoma is supplied by a perforating artery of the SCA. The hematoma and the BA-SCA aneurysm were close and on the same side. Therefore, the initial headache attack might have been induced not by minor leak but by intraluminal thrombosis or intramural hemorrhage.^{7,12,14,18,20} The rapid growth of the aneurysm caused by intraluminal thrombosis and the rupture of aneurysm then resulted in the migration of thrombus to the peripheral SCA to cause hemorrhagic infarction.

Various occult vascular anomalies are associated with brainstem hematoma. Certainly no definite evidence of vascular malformation was detected by MR imaging on admission, enhanced MR imaging 1 year after headache onset (data not shown), and cerebral angiography at coil embolization. However, brainstem hematoma in the dorsolateral tegment strongly suggests the presence of some types of vascular anomalies.^{10,16}

Moreover, the patient's blood pressure was normal without antihypertensive medication, even at rupture of the cerebral aneurysm. The location of the hematoma was also quite different from that of hypertensive ICH. One possibility to account for the brainstem hematoma was that the ruptured aneurysm compressed the arachnoid membrane and the brainstem around the aneurysm, thus resulting in a fragile vascular anomaly. The rapid growth and rupture of the aneurysm might have resulted in changes in pressure and circulation in the brainstem.

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