Case Report

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A rare case of ruptured aneurysm of the paramedian artery of Percheron

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Abstract

Introduction: The artery of Percheron is a rare anatomic variant supplying bilateral medial thalamic nuclei and a variable portion of the rostral part of midbrain.

Case report: A 48-year-old female with massive subarachnoid hemorrhage due to a ruptured aneurysm of the paramedian artery of Percheron presented to the emergency room. Because of significant risk of recurrent intracranial hemorrhage, it was decided to proceed with endovascular embolization of the aneurysm. The patient was ultimately sent to a rehabilitation center and her presenting neurologic deficits showed significant improvements in the weeks following endovascular embolization treatment.

Discussion: The paramedian artery of Percheron is a rare anatomic variant and subarachnoid hemorrhage due to aneurysm of this artery is exceedingly rare. This case underlines the importance of a correct evaluation of cerebral arterial anatomy in order to choose the best endovascular therapeutic approach, reduce complications, and optimize patient outcome.

Keywords

Artery of percheron, ruptured cerebral aneurysm, subarachnoid hemorrhage

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Introduction

The artery of Percheron is a rare anatomic variant supplying blood to the thalamus and brainstem. In 1973, Gerard Percheron described in detail the vascular anatomy of the human thalamus, including several rare anatomic variants.[1] The antero-inferior aspect of the thalamus and the mesencephalon typically receive their arterial blood supply via the anterior thalamostriate perforators arising from the posterior communicating artery. The remaining portions of the thalamus are supplied by the posterior thalamostriate perforators arising from the posterior cerebral arteries. The branches arising from the P1 segment provide arterial supply to the posteromedial thalamic nuclei, and the perforators originating from P2 segment supply the posterolateral and superior nuclei.

The artery of Percheron is a common arterial trunk originating from one of the P1 segments of posterior cerebral arteries. When this rare anatomic variant is present, bilateral medial thalamo-perforator arteries arise from this single vessel, so that the common trunk of the artery of Percheron supplies both medial thalamic nuclei and variable portions of the rostral part of the midbrain.

In the setting of acute subarachnoid hemorrhage, familiarity with this anatomic variant is critical to promptly diagnose the exact site of a ruptured aneurysm, design the best treatment approach and, thus, reduce procedure-related complications. Herein, we report a case of a 48-year-old female with massive subarachnoid hemorrhage due to a ruptured aneurysm of the paramedian artery of Percheron.

Case report

A 48-year-old female with sudden onset of severe headache, confusion and decreased level of consciousness presented to the emergency room. No history of trauma was reported. A head computed tomography (CT) scan showed massive subarachnoid hemorrhage with intra-ventricular extension (Figure 1). A CT angiogram and, shortly thereafter, a conventional cerebral angiogram were performed. Both examinations showed an oblong, slightly irregular arterial structure arising from a vessel emanating from the P1 segment of

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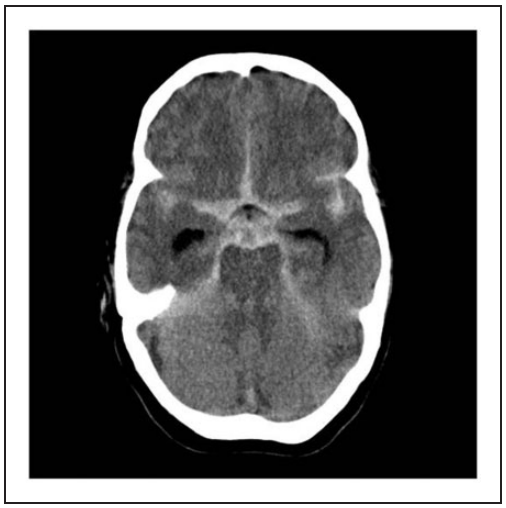

Figure 1. Head CT scan showed massive subarachnoid hemorrhage.

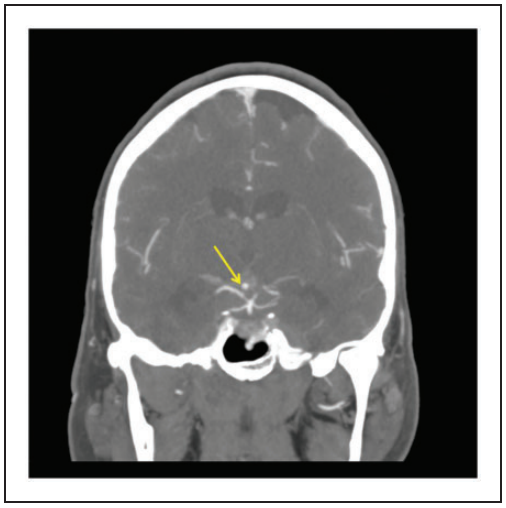

Figure 2. CT angiogram showed the aneurysm (arrow).

the right posterior cerebral artery (Figures 2 and 3). The appearance of the oblong arterial structure was compatible with a ruptured aneurysm and the artery involved was a right paramedian artery of Percheron. After multidiscliplinary discussion, it was felt that the aneurysm was responsible for the patient's subarachnoid hemorrhage and it posed significant risks for recurrent intracranial hemorrhage. Hence, it was decided to proceed with endovascular embolization of the aneurysm. Given the marked irregular morphology of the aneurysm and its location in posterior circulation, surgical treatment was not felt to be an option, and the complex, irregular morphology was felt to carry substantial risks for endovascular coiling. It was opted to treat the aneurysm with a flow diversion device, in order to alter the flow-related forces in the aneurysm sac to facilitate stasis and slowly allow for thrombosis of the aneurysm lumen. The procedure was performed by an interventional neuroradiologist with 10 years experience. The patient was placed under

Figure 3. Pre-procedural cerebral angiogram showed the aneurysm (arrow) arising from a vessel emanating from the P1 segment of the right posterior cerebral artery (dotted arrow).

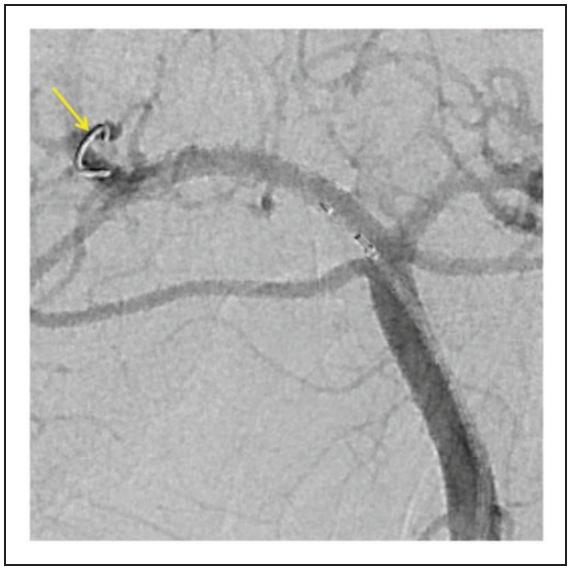

Figure 4. Cerebral angiogram showed aneurysmal occlusion with a pipeline embolization device (arrow).

general anesthesia and administered systemic heparinization. Access was obtained via a 6 French right common femoral artery sheath and diagnostic angiography was performed with the Navien 058 intermediate catheter and 6 French Envoy DA guiding catheter. A right vertebral artery injection demonstrated an irregular aneurysm arising from a vessel emanating from the P1 segment of the right posterior cerebral artery (Figure 3), consistent with an aneurysm of a right paramedian artery of Percheron. A Markman 0.27-inch microcatheter was navigated into the right P2 segment over a 0.014 microwire (Figure 4). The aneurysm was catheterized using a 2.5×10 mm pipeline

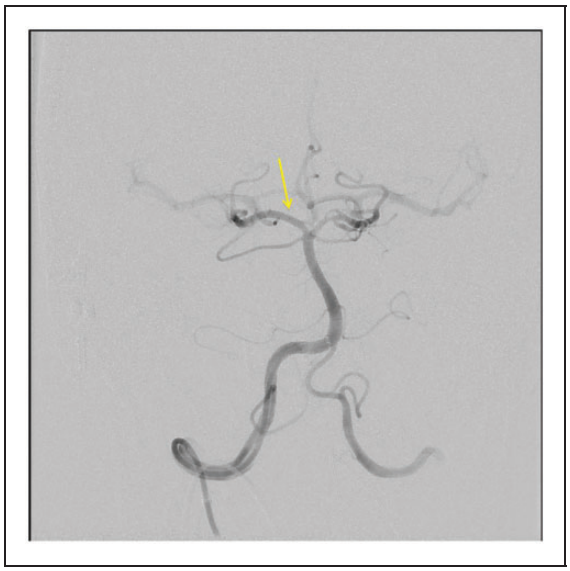

Figure 5. Post-procedural cerebral angiogram showed negligible opacification of the aneurysm (arrow).

Figure 6. Head CT obtained 4 weeks after pipeline embolization showed bilateral paramedian thalamic infarcts (arrows).

embolization device, which was deployed with the distal tip positioned at the right P2 segment and its proximal end terminating at the P1 segment, crossing the neck of the aneurysm of the artery of Percheron. Post-treatment cerebral angiography demonstrated normal appearance of the right P1 segment and negligible opacification of the artery of Percheron and of the aneurysm arising from such vessel, which suggested near complete occlusion of the ruptured aneurysm (Figure 5). During the post-procedural period, the patient's condition was complicated by hydrocephalus, which required ventriculostomy catheter placement. Following the acute stage of her illness, the patient underwent follow-up CT exam, which demonstrated bilateral paramedian thalamic infarcts, in keeping with occlusion of the paramedian artery of Percheron (Figure 6). The patient's mental status improved and she was sent to a rehabilitation center. The rehabilitation program lasted several weeks, and was effective in yielding substantial improvements in the patient's neurologic deficits. A follow-up CT obtained 6 weeks after discharge showed no recurrent hemorrhage or evidence of recurrent hydrocephalus.

Discussion

The paramedian artery of Percheron is a rare anatomic variant due to a common arterial trunk originating from one of the posterior cerebral arteries, supplying bilateral medial thalami and variable segments of the rostral midbrain. In 1973, the French neurologist Gerard Percheron described anatomic variations involving the paramedian thalamic-mesencephalic arterial supply.[1] The arterial supply to the thalami and midbrain is ordinarily provided by thalamostriate perforators arising from the posterior communicating artery and the P1 segment of the posterior cerebral artery. The thalamic arterial supply is classically divided into four distinct territories: anterior, paramedian, inferolateral, and posterior. The artery of Percheron is a common arterial trunk feeding the paramedian vascular territory of the thalami and the medial aspect of upper brainstem.[2–4] The paramedian artery of Percheron arises as an asymmetric involution of the primitive trigeminal arteries. The cephalad portion of the basilar artery is formed by the fusion of the ventral longitudinal neural arteries as primitive trigeminal arteries undergo involution. Normal embryonic development will induce symmetric regression of the primitive trigeminal arteries, leading to the formation of bilateral trunks of thalamic perforators, each arising from its ipsilateral P1 segment. In the rare occasion of asymmetric involution of the primitive trigeminal arteries, a single arterial trunk is formed, the paramedian artery of Percheron, supplying bilateral thalami.[2,3]

There are several articles and case reports describing acute infarcts in bilateral paramedian thalamic nuclei and mesencephalon caused by occlusion of the artery of Percheron.[4–6] Aneurysm of the paramedian artery of Percheron is extremely rare. Herein, we have reported the case of a patient presenting with massive subarachnoid hemorrhage due to rupture of an aneurysm of the artery of Percheron.

This case underlines the importance of a precise evaluation of cerebral arterial anatomy in order to establish the correct angiographic diagnosis and select the best treatment approach to safely achieve aneurysm occlusion and reduce potential complications.[7]

CT angiography, as demonstrated in this case, allowed accurate and noninvasive assessment of cerebral arterial anatomy and showed excellent correlation

with conventional angiography, avoiding the risks associated with an invasive procedure. When facing a patient with a subarachnoid hemorrhage due to a ruptured aneurysm, there are surgical and endovascular options that may be selected to avoid a recurrent aneurysm rupture. Typically, the location of the aneurysm will dictate the choice of the treating team because there are advantages and disadvantages for both surgical and endovascular approaches. Endovascular treatment is usually preferred whenever the location of the aneurysm is challenging for surgical exposure, as might be seen with basilar tip aneurysms. In such settings, anatomic exposure of the area of interest is quite limited and placement of an aneurysm clip might cause substantial injury to the nearby structures. Moreover, the long-term benefits of endovascular therapy compared to surgery have been demonstrated by the International Subarachnoid Aneurysm Trial (ISAT).[8] In our case, given the anatomic location of the aneurysm of the artery of Percheron, it was felt that treatment was best approached with endovascular techniques rather than surgical clipping. Given the high likelihood for recurrent rupture and the complex, irregular morphology of the aneurysm, it was elected to treat it urgently with a pipeline flow diversion device, chosen over endovascular coiling. Flow diversion achieved by a pipeline device induces a slow thrombosis of the aneurysm by altering the oscillatory and dynamic forces of flowing blood, promoting stasis, thrombosis and vascular remodeling.[9] This technique has become a viable option for endovascular treatment of highly complex aneurysms that are not surgically accessible and for which endovascular coiling is felt to be quite risky. Patients typically treated with flow diversion devices will require dual antiplatelet agents for 6 months, and one agent is usually continued indefinitely.

In our case, the patient was neurologically stable after endovascular treatment and was ultimately discharged to a rehabilitation center.

Declaration of conflicting interests

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