

# Multiple intracranial aneurysms and abdominal aortic occlusion in a young woman

## A case report

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### Abstract

**Rationale:** Multiple intracranial aneurysms occur in 10% to 30% patients with cerebral aneurysms.

**Patient concerns:** We reported a case of multiple intracranial aneurysms concurrent with abdominal aortic occlusion (AAO) in a 29-year-old woman who was admitted because of abrupt onset of severe headache, vomiting, and dizziness for 26 hours. She complained sudden onset of severe headache, vomiting, and dizziness.

**Diagnoses:** Head computed tomography (CT) angiogram revealed 2 aneurysms of the anterior communicating artery (ACA) and a third aneurysm at the right middle cerebral artery (MCA). A diagnosis of multiple intracranial aneurysms concurrent with abdominal aortic occlusion (AAO) was made.

**Interventions:** We clipped the 2 aneurysms at the ACA via a right pterional approach. The transfemoral approach failed because of an unsuspected AAO. A right carotid artery approach was then employed to embolize the aneurysm at the right MCA with three coils.

**Outcomes:** Magnetic resonance angiography (MRA) at 7 days after the embolization demonstrated complete disappearance of all the intracranial aneurysms, but AAO was still present. The patient remained asymptomatic during 5-years of follow-up.

**Lessons:** The case highlights the importance of a thorough physical examination, and in rare cases, AAO or other abdominal aortic abnormalities should be considered in young nonsmoking females. Successful treatment can be achieved by aneurysm clipping and embolization.

**Abbreviations:** AAO = abdominal aortic occlusion, ACA = anterior communicating artery, CI = confidence interval, CT = computed tomography, DSA = digital subtraction angiography, MCA = middle cerebral artery, MRA = magnetic resonance angiography, OR = odds ratio.

**Keywords:** abdominal aortic artery occlusion, etiology, multiple intracranial aneurysms, treatment

## 1. Introduction

Intracranial aneurysms are abnormal focal outpouchings of cerebral arteries. Radiographic and autopsy studies revealed a prevalence of intracranial saccular aneurysms of 3.2% in the general population.<sup>[1]</sup> Ten to 30 percent of patients with cerebral aneurysms have multiple aneurysms.<sup>[2]</sup> Hypertension, cigarette smoking, and connective tissue disease probably play a contributory, rather than a causal role in the process of aneurysm formation. Single and multiple intracranial aneurysms may have similar risk factors. Here, we reported a case of multiple

intracranial aneurysms concurrent with abdominal aortic occlusion (AAO).

## 2. Case report

A 29-year-old woman presented to the emergency room of our hospital on May 2, 2015, because of sudden onset of severe headache, vomiting, and dizziness for 26 hours. The patient had a 2-year history of hypertension but did not take any antihypertensive medication. The patient had no history of seizure, trauma, or major surgery. She denied the use of tobacco, alcohol, and drugs. Her family history was unremarkable.

On admission examination, the patient was awake and mentally alert. Her blood pressure was 180/120 mm Hg. Nuchal rigidity and the Kernig and Brudzinski signs were positive. Her laboratory findings were unremarkable. Head computed tomography (CT) scan revealed hyperdense areas in the bilateral sylvian fissures and brain sulci (Fig. 1A, B). A cerebral CT angiogram showed 2 aneurysms at the anterior communicating artery and a third aneurysm at the right middle cerebral artery (Fig. 1C).

After written informed consent was obtained from the patient, we clipped the 2 aneurysms at the anterior communicating artery via a right pterional approach. Digital subtraction angiography (DSA) was performed via a transfemoral approach to embolize the aneurysm at the right middle cerebral artery. However, we failed to advance the guidewire through the abdominal aorta. A manual injection of contrast agent revealed the presence of an

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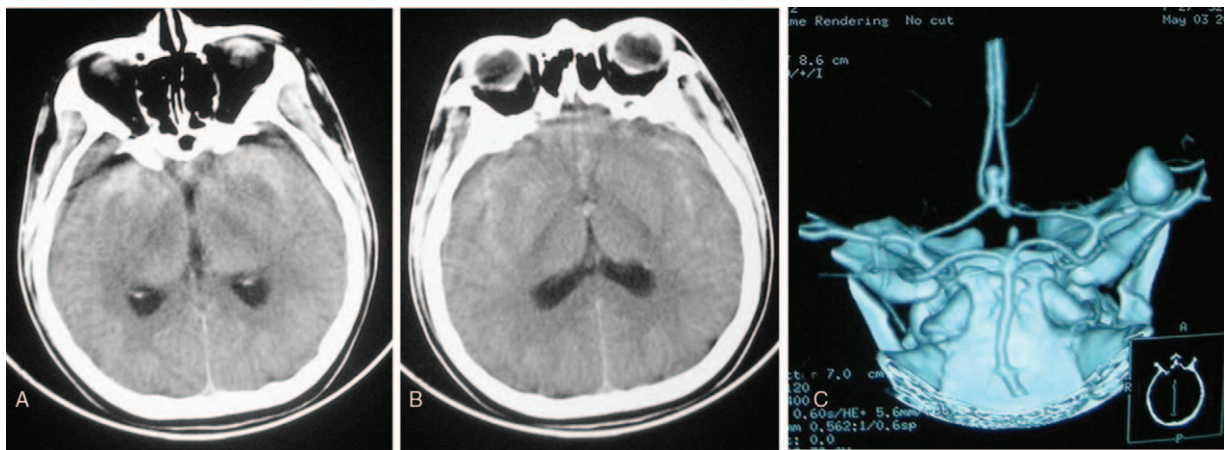
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**Figure 1.** Subarachnoid hemorrhage is detected on CT in a 29-year old female with abrupt onset of severe headache, vomiting, and dizziness (A and B). (C) CT angiogram shows 3 aneurysms located at the right middle cerebral artery and the anterior communicating artery.

AAO (Fig. 2). Consequently, we employed a right carotid artery approach to embolize the aneurysm at the right middle cerebral artery with 3 coils (Fig. 3). Magnetic resonance angiography (MRA) at 7 days after the embolization demonstrated complete disappearance of all the intracranial aneurysms, but AAO was still present (Fig. 4).

The patient was discharged 1 week after the operation without any neurological deficits and returned to work. The patient was followed up for 5 years and remained asymptomatic; she refused to undergo a DSA examination. Blood pressure was controlled to 150/90 mm Hg with regular nifedipine controlled-release tablets.

The patient has provided informed consent for the publication of the case. Patient data were anonymized in this report.

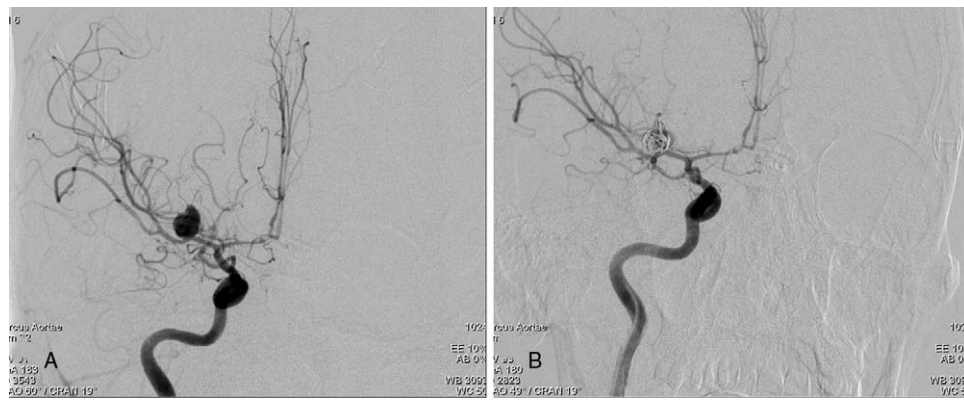
### 3. Discussion

In this report, we described the successful management of a case of multiple intracranial aneurysms concurrent with AAO in a 29-year-old hypertensive woman. The 3 intracranial aneurysms disappeared completely with vascular clipping and embolization while AAO was not treated.

Cerebral aneurysms are considered to be sporadically acquired lesions of nongenetic origin. Hypertension is thought to play a major role in the formation of intracranial aneurysms.<sup>[3]</sup> The current case had a 2-year history of hypertension and did not receive antihypertensive medication. Concurrent occurrence of nontraumatic multiple intracranial aneurysms and AAO suggests the presence of underlying pathogenesis that is common to both conditions. However, the patient denied a history of or was not found to have autosomal dominant polycystic kidney disease, fibromuscular dysplasia, Marfan syndrome, or Ehlers–Danlos syndrome type IV; these inherited diseases, on rare conditions, are associated with an increased risk of cerebral aneurysms or AAO.<sup>[4]</sup> Miyazawa et al reported an incidence rate of 7.2% for abdominal aortic aneurysm in patients with intracranial aneurysms and their multiple logistic analysis revealed that age [odds ratio (OR) 1.27, 95% confidence interval (95% CI) 1.08–1.48,  $P < .01$ ], multiplicity (OR 22.1, 95% CI 1.83–266.3,  $P = .01$ ), size of intracranial aneurysms (OR 1.30, 95% CI 1.10–0.54,  $P < .01$ ), and current smoking (OR 33.3, 95% CI 2.43–456.7,  $P = .01$ ) were independent risk factors for the association of aortic aneurysm with intracranial aneurysms.<sup>[5]</sup> Our current



**Figure 2.** Digital subtraction angiography (DSA) shows an abdominal aortic occlusion (AAO). The abdominal aorta is occluded before the origin of the renal artery.



**Figure 3.** (A) The right middle cerebral artery aneurysm before embolization. (B) The right middle cerebral artery aneurysm after embolization.

case is a young nonsmoking female and the only risk she had was multiplicity of intracranial aneurysms.

Intracranial aneurysms<sup>16,71</sup> are neurological conditions that are most commonly located at the branching points of the major

arteries that course through the subarachnoid space at the base of the brain. They are often asymptomatic until the time of rupture. Subarachnoid hemorrhage due to the rupture of an intracranial aneurysm is a devastating event associated with high rates of



**Figure 4.** Magnetic resonance angiography shows an AAO. Magnetic resonance angiography shows that the abdominal aorta is occluded before the origin of the renal artery.

morbidity and mortality. Little is known about the cause of intracranial aneurysms or the process by which they form, grow, and rupture, though hypertension and smoking-induced vascular changes are thought to play a major role. It also remains a possibility that hypertension in our patient was due to AAO and uncontrolled hypertension at least partially contributed to the rupture of multiple intracranial aneurysms.

Hypertension without a positive family history and multiple intracranial aneurysms seldom occur in young women, and there is also no report on the concurrent presence of multiple intracranial aneurysms and AAO. The case highlights the importance of a thorough physical examination. We initially overlooked the possible presence of an AAO in the present case. If we had conducted the DSA or MRA before commencing aneurysm clipping, embolization of intracranial aneurysm via the transfemoral approach could have been avoided.

In conclusion, in rare cases, AAO or other abdominal aortic abnormalities should be considered in young nonsmoking females. Successful treatment can be achieved by aneurysm clipping and embolization.

### Author contributions

**Conceptualization:** Ning Xu.

**Data curation:** Yubo Wang.

**Formal analysis:** Yubo Wang.

**Methodology:** Honglei Wang.

**Writing – original draft:** Honglei Wang.

**Writing – review & editing:** Ning Xu.

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