

## Severe Aneurysmal Subarachnoid Hemorrhage after Warning Headache during Pregnancy: A Case Report

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**Background:** Aneurysmal subarachnoid hemorrhage is a rare but important cause of maternal death during pregnancy.

**Case Description:** A 34-year-old primigravida (31 weeks of pregnancy) with acute headache but no neurological deficits or neck stiffness was prescribed medication and returned home. Four weeks later she presented with severe headache and consciousness disturbance. She was admitted to our hospital, where she fell into a deep coma. Brain CT and three-dimensional CT angiography showed subarachnoid hemorrhage and a 5-mm right internal carotid-posterior communicating artery aneurysm. Fetal heart rate was 60 beats per minute. Emergent cesarean section and surgical clipping were performed. Intraoperative examination revealed that the aneurysm originated at the right posterior communicating artery. There were no postoperative neurological focal deficits. On postoperative day 13 she developed delayed cerebral ischemia of the right temporo-parieto-occipital lobe. She was discharged home 36 days after surgery with left hemianopsia. The infant was free of complications and was discharged at age 17 days.

**Conclusions:** A pregnant woman with severe headache should undergo brain CT or magnetic resonance imaging to rule out subarachnoid hemorrhage. (J Nippon Med Sch 2020; 87: 162–165)

**Key words:** warning headache, subarachnoid hemorrhage, pregnancy, cesarean section

### Introduction

Although the incidence of aneurysmal subarachnoid hemorrhage (aSAH) in pregnancy is low<sup>1</sup>, intracranial hemorrhage is the second leading cause of maternal death in Japan<sup>2,3</sup>. We discuss a pregnant woman with a warning headache at 31 weeks of pregnancy that was overlooked. She developed severe aSAH at week 35 of pregnancy.

### Case Report

A 34-year-old primigravida in week 31 of pregnancy presented to the emergency room of another hospital with acute headache. In the absence of neurological deficits she was prescribed medication and went home. Four weeks later she again developed severe headache and

was transported by ambulance to our hospital. In the ambulance she fell into a deep coma and stopped breathing 1 minute before her arrival. At admission her blood pressure was 212/120 mm Hg and her heart rate was 40 beats per minute (bpm); peripheral oxygen saturation was 50% under bag-valve mask ventilation. She restarted spontaneous breathing immediately after intubation. Brain CT scans and three-dimensional CT angiography showed subarachnoid hemorrhage and a 5-mm right internal carotid-posterior communicating artery aneurysm (**Fig. 1**). After artificial ventilation, her blood oxygen level immediately normalized; however, the fetal heart rate was 60 bpm. The obstetrician and neonatologist decided to deliver the baby immediately to save the baby's life. Emergent cesarean section was performed under intrave-

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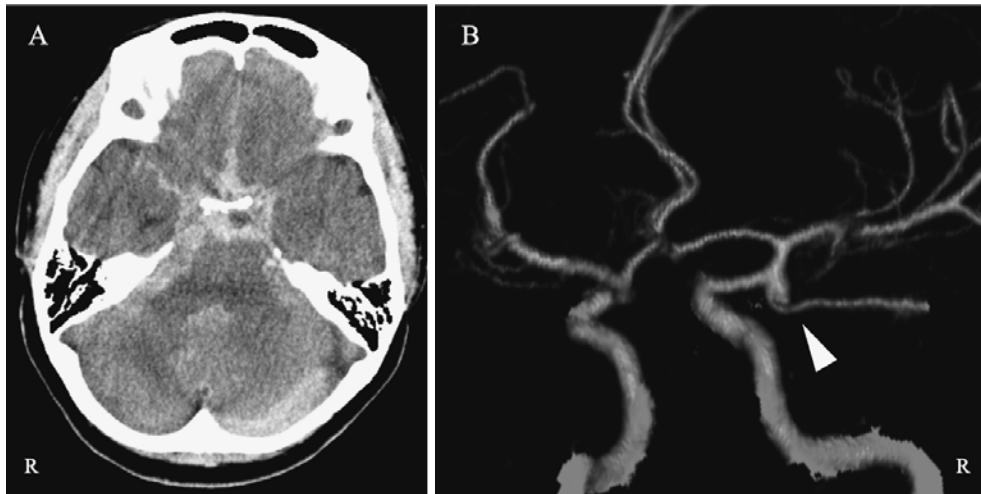


Fig. 1 (A) A brain computed tomography (CT) scan acquired on arrival at our hospital shows diffuse subarachnoid hemorrhage (R, right side). (B) Three-dimensional CT angiography showing a right internal carotid-posterior communicating artery aneurysm (arrowhead).

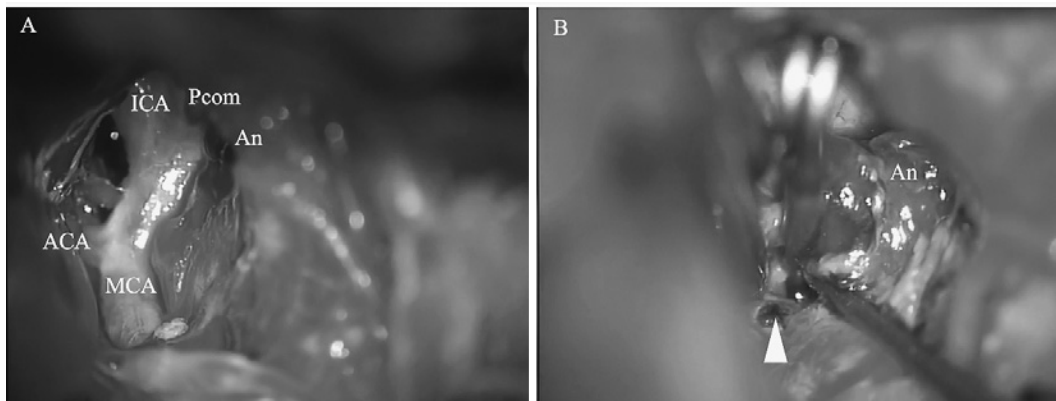


Fig. 2 Intraoperative photographs of (A) before and (B) after clipping of the aneurysm. The arrowhead shows anterior thalamoperforating artery. The aneurysm neck arises distal to the origin of the posterior communicating artery. ICA, internal carotid artery; ACA, anterior cerebral artery; MCA, middle cerebral artery, Pcom, posterior communicating artery; and An, aneurysm.

nous general anesthesia. One-minute and 5-minute Apgar scores of the baby were 3 and 8, respectively. After delivery, intubation and mechanical ventilation of the mother were continued.

She underwent surgical clipping under intravenous general anesthesia on the following day. Although surgery was started within 24 hours of admission, adhesion between the frontal and temporal lobes was so strong that sylvian fissure dissection was difficult. Intraoperative examination revealed that the aneurysm originated at the right posterior communicating artery (Fig. 2). On the day after surgical clipping, she regained consciousness and was extubated. Diffusion-weighted magnetic resonance imaging (DW-MRI) scans acquired on the day

after surgical clipping showed no ischemic lesions (data not shown). Postoperatively she had no neurological focal deficits. We administered fasudil hydrochloride, nicardipine, and cilostazol to prevent cerebral vasospasm and ischemic sequelae. However, 13 days after surgical clipping she developed confusion and weakness on the left side. DW-MRI showed delayed cerebral ischemia in the right temporo-parieto-occipital lobe (Fig. 3), and cerebral digital subtraction angiography revealed bilateral internal carotid artery vasospasm. We performed percutaneous transluminal angioplasty (PTA) with a Gateway PTA balloon catheter (Stryker, Fremont, CA, USA). The PTA balloon (2.5 mm) was inflated to a lower (4 atm) than nominal pressure for 10 seconds, to prevent arterial

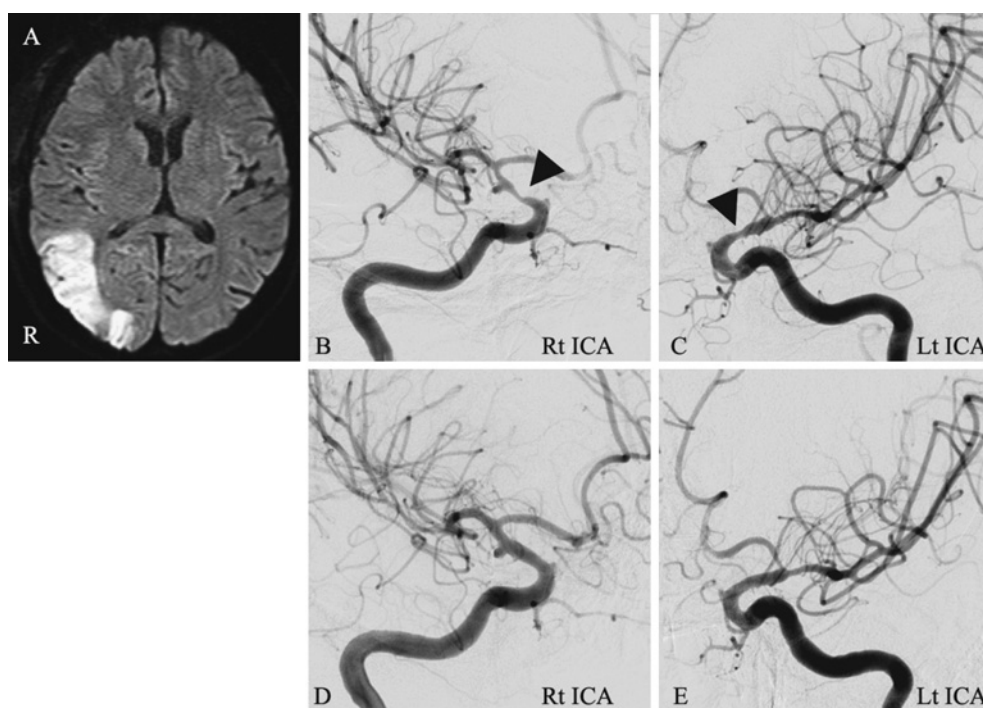


Fig. 3 (A) Diffusion-weighted magnetic resonance imaging scans acquired 13 days after surgical clipping showing delayed cerebral ischemia in the right temporo-parieto-occipital lobe (R, right side of brain). (B, C) Cerebral digital subtraction angiograms showing bilateral internal carotid artery vasospasm (arrowheads). (D, E) Percutaneous transluminal angioplasty resulted in expansion of arteries. Rt, right; Lt, left; and ICA, internal carotid artery.

dissection. She became alert and the left-side weakness disappeared. She was discharged 36 days after surgical clipping, with left hemianopsia. The infant was free of complications and was discharged at age 17 days.

### Discussion

The incidence of aSAH during pregnancy is estimated to be 3 to 10 per 100,000 pregnancies<sup>1</sup>. Although Kim et al.<sup>4</sup> reported that aSAH risk was not elevated during pregnancy and delivery, in Japan, intracranial hemorrhage is the second leading factor in maternal mortality during pregnancy<sup>3</sup>. Among pregnant women with aSAH, maternal mortality was 13% to 35%, and fetal mortality ranged from 7% to 25%<sup>5</sup>. Therefore, aSAH should be ruled out when a pregnant woman presents with severe headache.

In the present case, adhesion between the frontal and temporal lobes was very strong, although we started surgical clipping within 24 hours of admission. This suggests that minor aneurysm leaks had occurred previously. The reported incidence of warning leaks a few weeks before aSAH ranges from 13.5% to 60%, and prognosis is worse for patients with warning leaks<sup>6</sup>. We believe that our patient had a warning leak when she consulted the first hospital, although no brain imaging stud-

ies were performed.

Radiation exposure from medical imaging must be considered, and its risks and benefits, especially in pregnant women, must be evaluated. Because of potential risks to the fetus, pregnant women often do not undergo CT studies. However, the International Commission on Radiological Protection recommends that fetal doses of less than 100 mGy should not be regarded a reason for terminating a pregnancy<sup>7</sup>. Moreover, radiation doses absorbed by fetuses of women undergoing head CT scans are essentially negligible because CT radiation is highly collimated<sup>8</sup>. Therefore, we believe that brain CT scans should not be withheld for pregnant women with acute neurological symptoms.

Iodinated contrast medium, essential in cerebral angiography, crosses the placenta into fetal circulation and is excreted by the kidneys into amniotic fluid<sup>8</sup>. No evidence indicates that iodinated contrast media have mutagenic or teratogenic effects on the fetus; thus, these agents are not contraindicated for use, when necessary, for diagnosis in pregnant women<sup>9</sup>.

MRI during pregnancy is generally thought to be safe for the fetus, especially in the 2nd or 3rd trimester<sup>10</sup>. According to Ray et al.<sup>11</sup>, MRI performed during the 1st tri-

mester was not associated with increased risk to the fetus or young children. Consequently, the American College of Radiology concluded that MRI should not be ruled out at any stage of pregnancy when such studies are diagnostically necessary<sup>9,12</sup>.

There are no guidelines for optimal management of pregnant women with aSAH. The predicted survival of preterm infants improves after 28 weeks of gestation<sup>13</sup>. Acciarresi et al.<sup>14</sup> recommended surgical intervention for women with intracranial hemorrhage, unruptured aneurysms, or arteriovenous malformations when the duration of pregnancy was shorter than 24 weeks, a time at which intact survival of the fetus is uncertain. Because anticoagulation and antiplatelet drugs necessary for endovascular coiling increase the risk of postpartum hemorrhage after cesarean section, we performed surgical clipping after emergent cesarean section for a 35-week fetus with severe bradycardia.

### Conclusion

Although aSAH in pregnancy is rare, the mortality rate is not low. Therefore, we recommend that, when diagnostically necessary, brain CT and MRI should not be withheld in pregnant women.

**Conflict of Interest:** The authors have no reportable conflicts of interest.

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