Ruptured Intracranial Aneurysm Presenting as a Significant Intracerebral Hematoma without Visible Subarachnoid Hemorrhage on Computed Tomography: a case report

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ABSTRACT

Although intracerebral hemorrhage (ICH) secondary to intracranial aneurysm rupture has been documented to occur in approximately 4% to 42.6% of patients, ICH without subarachnoid hemorrhage (SAH) is rare. The condition is mainly associated with rupture of a middle cerebral artery aneurysm. We report the case of a 57-year-old woman with significant intracerebral hematoma without visible SAH on computed tomography (CT). CT angiography (CTA) of the brain subsequently revealed an aneurysm arising from the supraclinoid portion of the left internal carotid artery near the origin of the left posterior communicating artery, which was considered to result in ICH. Aneurysm rupture should be included in the list of differential diagnoses when ICH is encountered at an atypical site of hypertensive hemorrhage, even in patients without SAH.

Rupture of an intracranial aneurysm typically results in subarachnoid hemorrhage (SAH). Although intracerebral hemorrhage (ICH) secondary to intracranial aneurysm rupture has been reported to occur in 4% to 42.6% of patients, ICH without SAH is rare. The condition is mainly associated with ruptured middle cerebral artery aneurysm. ICH without SAH resulting from internal carotid artery rupture is particularly rare.

CASE REPORT

An unconscious 57-year-old woman with diabetes mellitus was brought to the emergency department. According to her friend, the patient experienced an abrupt onset of headache and vomiting approximately 2 hours before admission. Physical examination showed altered mental status (Glasgow Coma Scale score 3). Blood pressure was 189/77 mm Hg. A noncontrast-enhanced cranial computed tomographic (CT) image displayed a large ICH in the left parietotemporal lobes without visible SAH. A mass effect on the left cerebrum with midline shift to the right side also was identified. Because of further deterioration in the patient's level of consciousness, emergent left frontotemporoparietal craniotomy was performed, and a 70-mL intracerebral hematoma was subsequently evacuated. After surgery, the patient remained comatose. CT angiography (CTA) of the brain was performed to evaluate the possibility of a vascular lesion. Results showed a 7- × 3-mm saccular outpouching arising from the supraclinoid portion of the left internal carotid artery near the origin of the left posterior communicating artery, which was considered to result in ICH. The patient was transferred to another hospital and coil embolization of the aneurysm was performed. The postembolization angiogram demonstrated near-total occlusion of the aneurysm sac. The patient regained consciousness but had hemiplegia on the right side and was transferred to a local hospital for additional rehabilitation.

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Figure 1. Noncontrast-enhanced cranial CT images with axial a, b, and c. and coronal views d. The CT images show large ICH in the left parietotemporal lobes. Mass effect on the left cerebrum is noted, with midline shift to the right side. No visible SAH is identified.
Ruptured intracranial aneurysm presenting

DISCUSSION

Rupture of an intracranial aneurysm typically presents with SAH. ICH has been less frequently identified with SAH, occurring in 4% to 42.6% of patients [1-5]. Such ICH originates from aneurysms located mainly in the middle cerebral artery (MCA) and anterior communicating artery (ACom), with incidence rates of 42% and 34%, respectively [1, 6]. The location of the hematoma has been related to the location of the ruptured aneurysm. For the MCA, the hematoma is most commonly located in the temporal lobe.

For the ACom, the hematoma is mainly located in the frontal lobe. An internal carotid aneurysm at the origin of the posterior communicating artery is usually ruptured into the temporal lobe [7]. The presence of ICH is reported to be an unfavorable prognostic factor of ruptured aneurysm [4, 5, 8], with a mortality rate ranging from 36% to 58% [1, 5].

Intracranial aneurysm rupture resulting in only ICH is rare. In previous studies, 7 of 618 cases (1.1%) and 1 of 492 cases (0.2%) of ruptured aneurysms presented with only ICH without SAH [2]. Hematoma originating from an internal carotid artery aneurysm is particularly rare [2].

Figure 2. CT angiograms showing a 7- × 3-mm saccular outpouching (arrows) arising from the supraclinoid portion of the left internal carotid artery near the origin of the left posterior communicating artery.
Several possible mechanisms have been proposed to explain the occurrence of ICH without SAH after aneurysm rupture. One theory suggests the presence of an aneurysm dome deeply buried in the cerebral parenchyma. Another proposes that adhesion of the ruptured point of an aneurysm into the adjacent neural tissue intercepts SAH. However, the precise mechanism is unknown [2].

In the present case, there is significant ICH without visible SAH on initial CT images. The hematoma is located in the left parietotemporal lobe, which is not a typical site of hypertensive ICH. It is important to differentiate hypertensive hemorrhage from that caused by an underlying structural vascular abnormality such as arteriovenous malformation and aneurysm so that appropriate treatment can be carried out to prevent rebleeding. The optimal diagnosis of aneurysm is particularly important because surgical clipping or embolization should be performed immediately to prevent repeat rupture. In a patient with spontaneous ICH, CT is the initial diagnostic modality. Hypertensive ICH can be assumed in patients with known arterial hypertension and ICH in a typical location such as the basal ganglia, thalamus, pons, or cerebellum. Diagnostic cerebral angiography should be considered subsequently for all patients with spontaneous ICH, except those older than 45 years with preexisting hypertension and typical location of hypertensive ICH [9]. Digital subtraction angiography (DSA) has been the gold standard diagnostic test in this setting and is the most sensitive tool for the detection of intracranial aneurysm [10]. Furthermore, rotational DSA detects considerably smaller aneurysms (less than 3 mm) with greater sensitivity than traditional DSA and is the new gold standard in the detection of additional intracranial aneurysms [11]. However, this procedure is invasive and reportedly confers a 1% risk for a disabling neurological deficit and 0.1% risk for mortality [12]. When compared with DSA, CTA is a noninvasive technique, can be performed faster, does not require sedation in most patients, and is suitable for emergency examinations of unstable patients. Although CTA has several advantages, it not as effective as DSA and has a lower sensitivity for the detection of dural arteriovenous fistulas [13]. Compared with those of DSA, the overall sensitivity, specificity, positive predictive value, negative predictive value, and accuracy of CTA are 89%, 92%, 91%, 91%, and 91%, respectively [13]. Magnetic resonance angiography (MRA) is another noninvasive imaging method that can be used to identify the underlying cause of ICH. The advantages of MRA include lack of exposure to ionizing radiation, no requirement for intravenous contrast medium, and large volume coverage. However, MRA is associated with a long examination time, difficulty in demonstrating vessels with low-flow conditions, and limited access in critically ill patients. To our knowledge, there are no data regarding the use of underlying vascular abnormalities in patients with spontaneous ICH [12].

In conclusion, when ICH is seen at atypical sites of hypertensive hemorrhage, aneurysm rupture should be included in the list of differential diagnoses, even for patients without SAH. Diagnostic angiography should be performed to find the causative vascular lesion and facilitate appropriate treatment.

REFERENCES