Hemorrhagic Transformation of Stroke Secondary to Spontaneous Internal Carotid Artery Dissection

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The clinical course of patients with hemorrhagic transformation in stroke secondary to spontaneous cervical internal carotid artery dissection (ICAD) has not been elucidated. We report a 36-year-old man with presentation of headache and subsequent left hemiparesis. Magnetic resonance imaging disclosed right ICAD with nearly complete occlusion of the right distal internal carotid artery and infarction over the right basal ganglion with hemorrhagic transformation in its central area. Hemorrhagic transformation can develop early in ICAD patients without preceding treatment with antithrombotic agents. Clinicians are urged to use antithrombotic agents with caution in patients with spontaneous ICAD with ischemic stroke because early hemorrhagic transformation may also be present. Possible pathomechanisms and treatment strategies are also discussed. [J Chin Med Assoc 2006;69(12):585–588]

Key Words: hemorrhagic transformation, internal carotid artery dissection

Introduction

Recent studies investigating the effects of administering antithrombotic agents in internal carotid artery dissection (ICAD) to prevent thromboembolic events and to improve prognosis have found that not all ICAD patients are suited to receive antithrombotic agents.1,2 Antithrombotic agents can be detrimental if the ICAD-induced stroke is accompanied by hemorrhagic transformation. This suggests that the influence of hemorrhagic transformation should be considered in the management of ICAD with ischemic stroke. If they are misadministered because hemorrhagic transformation was not discovered earlier, antithrombotic agents may cause adverse consequences. The clinical course of hemorrhagic transformation has not been comprehensively described, imaging studies of ICAD in patients with hemorrhagic transformation have not been reported, and the treatment and prognosis of ICAD have not been amply discussed.1–4 Hence, to promote further discussion of ICAD treatment and prognosis, we report this case.

Case Report

A 36-year-old man suffered from sudden onset of a throbbing headache over his right parietal region while walking on December 25, 2004. The man presented to the emergency department (ED) within 1 hour. Initial neurologic examination did not reveal any abnormality. The patient was admitted to the ED observation room with the tentative diagnosis of primary headache. No medications except pain killers were prescribed at that time. Ten hours later, the patient suffered from transient left hemiparesis and hemihypesthesia. Computed tomography (CT) of the brain was performed within 30 minutes, and did not disclose any intracranial lesion. His hemiparesis and hemihypesthesia relapsed on the following morning. Early stroke was suspected and...
magnetic resonance imaging (MRI) was arranged. The symptoms presented with undiminished sensation over the right parietal and right retro-orbital areas. MRI disclosed nearly complete occlusion of the right distal internal carotid artery, with soft tissue signal around the region of stagnant flow (Figure 1) and infarction over the right basal ganglion with hemorrhagic transformation in its central area (Figure 2).

Conventional angiography showed a long segmental narrowing over the distal cervical and petrous portions of the right internal carotid artery (Figure 3). Hemorrhagic transformation of ICAD-induced stroke was diagnosed. Upon providing informed consent, the patient was enrolled as a case in our study. He was then admitted to the neurologic ward for further evaluation and intervention.

The patient denied having a history of head or neck trauma, cervical manipulation, chronic migraine, illicit drug use, or any other known systemic disease. On admission, neurologic examination showed clear consciousness, isocoric pupils with partially limited eye movement, left hemiparesis and hemihypesthesia, increased tendon reflex, and positive Babinski response on the left. The National Institutes of Health Stroke Scale (NIHSS) score was 13. Laboratory studies, including hemogram, biochemistry, α1-antitrypsin, VDRL (venereal disease research laboratory slide test), coagulation, autoimmune and inflammation profiles, were all within normal limits. Electrocardiogram and transthoracic echocardiography were normal. During the admission period, the patient experienced progressive hemiplegia and headache in the first 2 days. Follow-up brain CT showed enlarged hematoma without midline deviation. Symptomatic hemorrhagic transformation was impressed. Without significant sign of increased intracranial pressure, the patient received only conservative management such as maintaining adequate vital signs and use of nonsteroidal anti-inflammatory drugs for pain relief. After that, no other adverse event
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occurred during the admission period. He was discharged 1 month later in a stable condition with satisfying neurologic recovery. His NIHSS score was 7 on discharge.

Follow-up brain magnetic resonance angiography (MRA) 4 months later showed no flow in the distal cervical carotid artery but relatively normal blood flow in the intracranial carotid artery (Figure 4). The patient’s neurologic deficits improved gradually despite the unresolved internal carotid artery occlusion. He did not receive any antithrombotic agent during the admission period. His NIHSS score was 2 and modified Rankin Scale score was 1 (minor sequelae) 1 year later, representing a satisfactory neurologic outcome.

Discussion

Hemorrhagic transformation develops in about 1-third of all stroke patients within the first week of symptom onset, but its incidence is much lower in patients with stroke secondary to cervical ICAD. This difference may be due to younger age at onset and fewer predisposing factors of intracranial hemorrhage (such as hypertension, diabetes, and atherosclerotic vessels) in patients with cervical ICAD. In ICAD patients with or without cerebral ischemic events, the long-term neurologic prognosis is good. MRI techniques are replacing conventional angiography as the best imaging modality for diagnosing ICAD. MRI can also identify patients who are at increased risk of secondary hemorrhagic transformation following acute ischemic stroke. To find the best treatment plan in a timely fashion, we recommend that MRI be arranged as soon as possible to diagnose carotid artery dissection in all young stroke patients and patients with migraine-like unusual headache with aura, and that before administering antithrombotic agents, the treating physician should carefully look for signs of hemorrhagic transformation. Once the signs of hemorrhagic transformation arise, immediate brain CT is needed. Our patient’s condition improved gradually during his month-long admission and the ensuing 1 year. The neurologic outcome indicated that the brain tissue supplied by the occluded internal carotid artery

Figure 4. Brain magnetic resonance angiography shows no flow in the distal cervical carotid artery (long arrow) and normal flow in the intracranial carotid artery (short arrow).
remained viable. Most authors believe that the ischemic territory is rescued by collateralization from the part of the Circle of Willis, and the follow-up MRA (Figure 4) in our patient showing the normal flow of the right intracranial internal carotid artery supports this belief. These results challenge the need for surgical or catheter revascularization in ICAD patients with persistent deficits. However, studies comparing the outcomes of different management strategies might be useful.

In conclusion, hemorrhagic transformation can occur in young stroke patients secondary to spontaneous cervical ICAD even in the early stage before administration of antithrombotic agents. Physicians should be more cautious in the routine use of anticoagulants in patients with ICAD. Early MRI study facilitates early diagnosis of spontaneous ICAD, and follow-up brain CT in patients with clinical suspicion of hemorrhagic transformation can help in its early recognition. Conservative management may be an alternative approach for ICAD patients with proven stroke with hemorrhagic transformation.

References