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*Case Report*

# A case report of successful intravenous thrombolysis bridged with percutaneous endovascular stent angioplasty

Hui Wu*, Dan Wei*, Guo-Hua Chen, Yue-Gu Wang, Hui-Ying Zhu

*Department of Neurology, Wuhan No.1 Hospital of China Hubei Province, Wuhan 430022, China. *Co-first authors.*

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**Abstract:** The mortality and disability rate of acute vertebral basilar artery occlusion remains very high. The main clinical manifestations are dizziness, numbness of the limbs and disordered activities, and even coma in serious conditions. The patient of this case was admitted for the main cause of "a transient sense of consciousness combined with weakness in left side of the limb for two hours". Neurologic impairment score was 11 points at admission, in accordance with the scoring system of the National Institutes of Health (NIH) of the United States. Furthermore, mRS grading was five; and was diagnosed with acute cerebral infarction and occlusion of the main branch of the basilar artery. Alteplase was given for intravenous thrombolytic therapy. The patient's condition improved once, aggravated again, and fell into a light coma state; but bleeding was excluded. This was considered as a re-occurrence of vascular occlusion, and emergent right vertebral artery stenting was performed. The patient was treated with antiplatelet, and subsequently received anticoagulation therapy. Then, the patient recovered and was discharged. This case revealed that thrombolytic therapy bridged with stenting can improve the vascular recanalization rate, and early vascular recanalization is the key to improve the prognosis.

**Keywords:** Thrombolysis, percutaneous endovascular stent angioplasty, vertebral basilar artery occlusion

## Introduction

Vertebral basilar artery is the feeding artery for the brain stem, cerebellum, brain occipital lobe, thalamus and the capsula interna. Vertebral basilar artery thrombosis would cause the ischemia and necrosis of these important structures, and result in severe neurological impairments. The prognosis of patients with vertebroal basilar artery occlusion (VBAO) is very poor, and the mortality of VBAO can reach 80-95% without successful treatment [1-4]. Therefore, it is of great clinical significance to open the occluded vessels in the early stage. With the maturation of thrombolytic therapy and the development of endovascular treatment technology, especially with the clinical application of a stent embolectomy device, it is possible to open the vertebral basilar artery and other large vascular occlusions. The patient with acute vertebral basilar artery occlusion admitted in our department was recently treated with stent implantation after intravenous thrombolysis. The treatment process is reported as follows.

## Case report

The patient was 56 years old male, and admitted for the main cause of "a transient sense of consciousness combined with limb weakness on the left side for two hours". The families of the patient complained on behalf the patient that the patient fainted and fell to the ground on the way to work on 07:30 without apparent reason. Then, the patient waked up, accompanied by a sense of left-side weakness and dizziness. Furthermore, the left upper limb could not lift things, the left lower limb could not walk, no vomiting occurred, limbs twitched, and urinary and fecal incontinence were presented at that time. The patient was sent to the Emergency Department of our hospital, and the result of cerebral CT revealed that there were changes in the right temporal occipital lobe. Considering combined clinic and review in the short-term,

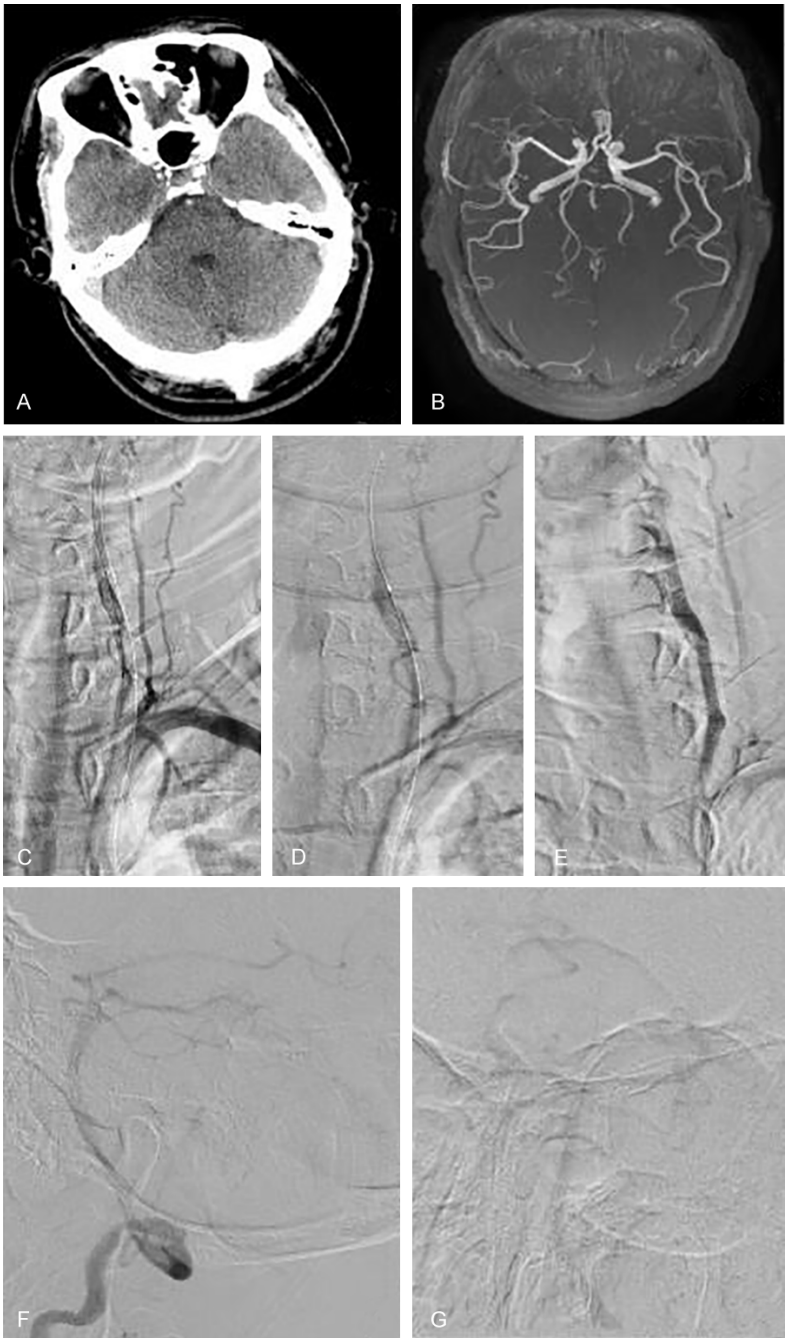


**Figure 1.** Angiography of basilar artery. A: Basilar artery dot sign was visible; B: Lower part of the lumen became occluded; C: Considering as re-occlusion, emergency cerebral angiography was immediately performed, intraoperative V1 segment opening was found in the left vertebral artery, ulcer plaque was found behind the segment, followed by thrombus. Furthermore, vertebral artery occlusion was subsequently found, basilar artery was not found in the angiography, the right vertebral artery was small and fine, and the opening segment had severe stenosis. The intracranial segment was not found in angiography; D: Balloon dilatation were performed twice at the left vertebral artery stenosis during the operation, and the vessel was not yet been fully recanalized; E: Balloon dilation was performed again and bridged it with stent angioplasty. The vessel became patency; F: Lateral view of basilar artery shows the vessel opening; G: Towne's view shows the vessel opening.

cerebral infarction was excluded; and basilar artery dot sign was visible (**Figure 1A**). Head magnetic resonance imaging (MRI) assay was performed promptly. (1) Multiple focal cerebral infarctions were found in the bilateral frontal lobe, left occipital lobe and left cerebellar hemisphere; and the left cerebellar hemisphere and left occipital lobe lesions revealed features that manifested during the acute period. (2) The upper part of the lumen of the arteria basilaris became finer and the lower part of the lumen became occluded (**Figure 1B**). Proposed to analyze combined with the clinical manifestations. (3) Perfusion-weighted imaging (PWI) results revealed that the local blood volume of the left occipital lobe was lower than the contralateral side, which was proposed to be considered combined with clinical manifestations. The patient has a history of hypertension for eight years, and highest systolic blood pressure was 180 mmHg. The patient has "schistosomiasis liver disease" history, as well as smoking and drinking habits. Physical examination: blood pressure (BP) was 135/70 mmHg, HR (heart rate) was 86 beat/min, temperature was 36.5°C. The patient had sleepiness, dysarthria, and had no neck resistance; and the bilateral pupils were equal at size and diameter, the reflex to light was sensitive, horizontal nystagmus was visible in left eye with an extended position, the right eye could not move horizontally and could move freely in the

other directions, the nasolabial was shallow on the right, dysarthria, tongue deflected left, the pharyngeal reflex on the right side was abated, and the patient could not cooperate with feeling and coordination inspections. The strength of the left upper limb was grade 0, the left lower extremity muscle strength was grade 2, muscle tension was low, tendon reflexes of left side was smaller than that of the right side, the muscle strength of right limbs were grade 5, bilateral pathologic reflexes were not detectable, and meningeal irritation sign was negative. Breath sounds of the double lungs were clear, and no obvious wet and dry rales were observed. Furthermore, heart rhythm was regular, without obvious murmur. NIH stroke scale (NIHSS) scoring was 11 points, and mRS grading was 5. According to medical history and clinical characteristics, combined with cerebral CT basilar artery dot sign, basilar artery occlusion was revealed in brain MRI. The patient was diagnosed with cerebral infarction, and it was vertebrobasilar artery occlusion. Alteplase was given immediately for intravenous thrombolysis therapy; in which 6.3 mg of alteplase was first injected according to body weight, and the left 56.7 mg was intravenously infused within one hour. The patient was consciousness after administration, and left upper and lower limb muscle strengths significantly improved. NIHSS scoring was 2 points, mRS scoring was 1. The patient went into a coma again 15 minutes later, revealed no response to calling, and had little response to painful stimuli. The patient was in tidal breathing, combined with mild limb clonus. Physical examination: BP was 136/78 mmHg, $SPO_2$ was 100%, HR was 80 BPM, and heart rhythm was regular. Furthermore, light coma and bilateral pupil sizes were not identical. Furthermore, left pupil diameter was 4.5 mm, right pupil diameter was 2 mm, reflex to light disappeared in the bilateral pupil, and no autonomic activities in the limbs were observed. In addition, muscle strength was grade 0, muscle tension of the limbs were low, and bilateral Babinski sign was positive. GCS scoring was 5 points. Considering as cerebral hemorrhage or re-occlusion, the patient was immediately evaluated; and no evidence of bleeding was found in cranial CT. Considering as re-occlusion, emergency cerebral angiography was immediately performed, intraoperative V1 segment opening was found in the left vertebral artery, ulcer plaque was found behind the segment, followed by thrombus. Furthermore, vertebral artery occlusion was subsequently found, basilar artery was not found in the angiography, the right vertebral artery was small and fine, and the opening had severe stenosis. The intracranial segment was not found in angiography (**Figure 1C**). A 4 × 30 mm balloon dilatation were performed twice at the left vertebral artery stenosis during the operation, and the vessel was not yet been fully recanalized, (**Figure 1D**). In addition, a 4 × 19 mm balloon dilation was performed again and bridged it with stent angioplasty. The vessel became patency, and there was still approximately 50% of the stenosis at vertebral artery opening; but the subsequent blood flow was unobstructed (**Figure 1E-G**). TICI grading: grade 3, the patient was irritable in the operation, midazolam was administrated, and a hibernation pump was given to calm the patient down. The patient was in a postoperative calm state, the locomotor activities of the limbs were visible, and the scattered pupil was recovered. The patient was sent to the ward after surgery, and ECG and blood pressure were monitored.

Rounds in the ward on the second day: the patient was conscious, spoke clearly, had no neck resistance, bilateral pupils were equal at size and diameter, reflex to light was sensitive, bilateral eye movements were free, nystagmus was visible when eyes moved horizontally, the right nasolabial was shallow, tongue lolled in the middle, limbs muscle strength were grade 5, muscle tension was normal, tendon reflection was symmetrical and bilateral Babinski syndrome was not elicited, meningeal irritation sign was negative, and finger to nose was exactly in the coordination test. Breathing sounds were thick in the lungs, no obvious wet and dry rales were found, heart rhythm was regular, the abdomen was soft, no tenderness and rebound tenderness were found, and lower limbs were not swelled. NIHSS scoring: 1 point. No obvious abnormal changes were found during the cerebral CT review. Anti-platelet accumulation and lipid regulation therapy were given to the patient.

## Discussion

VBAO accounts for approximately 1% of all ischemic strokes [5]. VBAO can lead to severe neurological deficits, and its mortality and disability rates are high [6, 7]. The basilar artery is the

main feeding-vessel for the pons. Once an occlusion occurs in the trunk, the nerve nuclei in the other parts of the brain stem would be prone to damage, and mortality and disability rate would increase in patients at the acute stage [8]. These neurological deficits were serious after VBAO, but its collateral vessels were more abundant than in the anterior circulation; which was more tolerated in ischemic stroke than other brain tissues. Therefore, it is argued that the thrombolysis time window can be appropriately prolonged [9]. However, in the time window, allowing occluded vessels to repass as soon as possible and restoring blood flow are the most reasonable methods of BAO(basilar artery occlusion) [10].

This patient had the risk factors of cerebral vascular disease such as hypertension, smoking, and drinking. The main symptoms of the onset in this time were: dizziness, limb weakness, and loss of consciousness. In addition, in the physical examination, one-and-a-half syndrome was found in the eye, left limbs had hemiplegic paralysis, and the basilar artery dot sign was visible in cerebral CT; all these were in accord with the diagnosis standard of basilar artery occlusion. Combined with the subsequent cerebral angiography, the diagnosis was confirmed further. Treatments were carried out according to the guidelines of AHA/ASA in 2013 for the early treatment of acute ischemic stroke [11]. The patient was admitted to the hospital within three hours after onset, rt-PA was given for intravenous thrombolytic therapy. The patient returned to normal after thrombolysis, but the patient went into comatose again 10 minutes later, and manifested with brain stem impairment. CT of head was immediately reviewed to eliminate cerebral hemorrhagic re-perfusion injury of post thrombolysis at the first time, and no cerebral hemorrhage was found. Therefore, the re-occurrence of vertebral basilar artery occlusion was considered, if not opened promptly, the patient would suffer from brainstem infarction, apallic syndrome and other disastrous consequences. The patient immediately underwent emergency cerebral angiography. During the operation, it was found that blood flow was patency in the anterior circulation, the posterior cerebral artery blood flow was compensated by the posterior communicating artery blood flow, the right vertebral artery was small and fine, plaque and stenosis were visible at the starting segment, and the blood supply could not reach the intracalvarium. The result of the left vertebral artery angiography was the same as described above. Thus, we can restore the truth for these cerebral vascular events: the starting end of the dominant side, which was the left vertebral artery, was atherosclerosis caused by cerebral vascular disease risk factors; which leads to ulcer plaque formation in the local blood vessel. Furthermore, thrombosis formed behind the plaque, leading to the left vertebral artery occlusion; and the right vertebral artery was congenital small and the ostium was stenosis. Hence, the right vertebral artery could not compensate the left vertebral artery to provide blood supply to the basilar artery. The anterior circulation would only compensate the posterior cerebral artery through the posterior communicating artery. Occlusion occurred in the lower part of the basilar artery. Therefore, disastrous symptoms and signs such as dizziness, loss of consciousness, pupil changes, and limb weakness appeared in the patient. Hence, if only balloon dilation angioplasty is performed, thrombosis and vascular occlusion would be formed once again, since the stenosis was not basically resolved, in fact. This condition really occurred during the process of treatment. Comprehensive considering, for patients with thrombosis after stenosis, stent angioplasty is a good choice.

Roth *et al.* [12] reported eight cases of acute basilar artery occlusion that were treated with the Solitaire thrombectomy device. The vessels of all patients with basilar artery occlusion underwent completely repatency, the blood flow was restored well, and defined TICI grading was >2. Furthermore, good functional recovery (mRs, 0-2) reached 50%, and death rate was 37.5%. Therefore, although repatency rate was very high, the clinical curative effect is limited.

The AHA/ASA in 2015 updated the guidelines in 2013, according to several randomized controlled clinical studies [13]; which mainly involved intravascular treatment. It was believed that for anterior circulating vascular lesions, it is appropriate to select appropriate patients for endovascular treatment post intravenous thrombolysis. However, for the treatment of the posterior circulating large vascular occlusion, there is a need for further exploration, as well

as randomized controlled clinical studies performed by the teams with more rigorous designing and skilled endovascular treatment techniques, in order to provide medical evidence and a method for the treatment of posterior circulating vascular occlusion.

## Disclosure of conflict of interest

None.

**Address correspondence to:** Guo-Hua Chen, Department of Neurology, Wuhan No.1 Hospital of China Hubei Province, Zhongshan Avenue 215, Qiaokou District, Wuhan 430022, China. Tel: +86 02785332099; Fax: +86 02785832563; E-mail: drguohuachen@163.com

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