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Case Report

A case report of cerebral infarction after interventional embolization of basilar tip aneurysms

Xiaobo Dong[1*], Lei Wang[1*], Chongwen Song[2], Gesheng Wang[1], Yong Du[1], Guangrong Song[1], Xu Cai[1]

[1]The Third Department of Encephalopathy, Dongfang Hospital Afflilated to Beijing University of Chinese Medicine, Beijing, China; [2]Department of Pathology, Nanyuan Hospital, Beijing, China. [*]Equal contributors.

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Abstract: Introduction: Top of the basilar syndrome (TOBS) can lead to visual, oculomotor and behavioral abnormalities and is mainly caused by cerebral embolism, cerebral thrombosis or mycotic embolism. Presentation of case: A patient with ruptured wide-necked basilar tip aneurysms (BIAs) received double catheter technology and stent-assisted embolization therapy. Several neurological symptoms such as conscious disturbance, eye movement disorder and limb dysfunction were found 2.5 hours after embolization and the diagnosis was TOBS. Treatments of anticoagulation combining antiplatelet was given. At last, most symptoms disappeared except mild ataxia at the right limbs when discharged from hospital. Conclusion: TOBS is one of severe complications of stent-assisted embolization for ruptured BIAs. Early recognition and treatment could reduce the mortality and morbidity.

Keywords: Basilar artery, intracranial aneurysm, endovascular treatment, complications, brain infarction

Introduction

Endovascular treatment has become the recommended method for BIAs (basilar tip aneurysms). However, various new complications have also been identified after endovascular treatment. Here, we reported a patient with subarachnoid hemorrhage caused by ruptured BIAs at the Department of Neurosurgery, Beijing Nanyuan Hospital. After stent-assisted embolization, the patient suffered TOBS (top of the basilar syndrome) and then received the corresponding treatment.

Case report

A 61-year-old woman with intermittent dizziness, headache, nausea and vomiting for 11 days was admitted to our hospital on June 26, 2017. Physical examinations showed that her blood pressure was 132/96 mmHg and no obvious positive signs were found in the nervous system. Immediate brain CTA scan showed subarachnoid hemorrhage and basilar artery aneurysm. Cardiopulmonary function was normal and biochemical examination indicated diabetes mellitus.

After admission, the patient received oral aspirin and clopidogrel sulfate treatment. Then cerebral angiography and stent-assisted embolization were performed. A broad irregular aneurysm on the top of the basilar artery was found in the operation (**Figure 1**). The size of the aneurysm was about 7.2*13.1 mm. Bilateral posterior cerebral artery, bilateral superior cerebellar artery and the top of basilar artery together formed the bottom of the aneurysm. A daughter aneurysm with a size of about 5.3*4.3 mm could be seen at the top of the aneurysm.

Therapeutic procedure: The 6F guide tube was placed at the level of the 2nd vertebral body of the left vertebral artery. A Neuroform 3.5 mm/20 mm stent was inserted into the left posterior cerebral artery trunk along the X-Celerator 300 cm guide and released into the left posterior cerebral artery with the head in the posterior cerebral artery and the tail in the basilar artery. The head of an Echelon-10 catheter was placed at the lower half of the aneurysm, meanwhile a Prowler-10 catheter was placed at the top of aneurysm lumen. According to the measurement, 12 coils were settled to finish the embolization. The reexamination showed that the

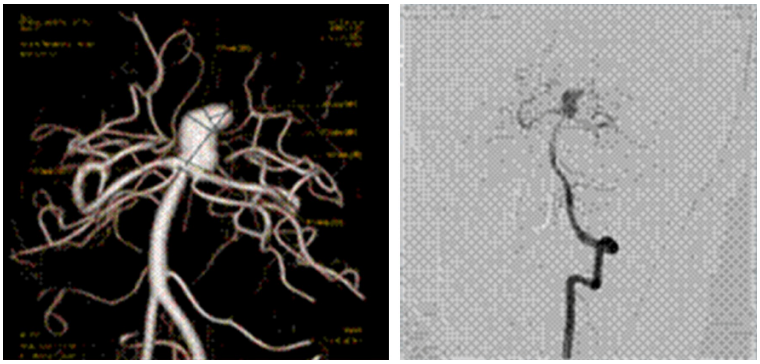

Figure 1. DSA Before embolization.

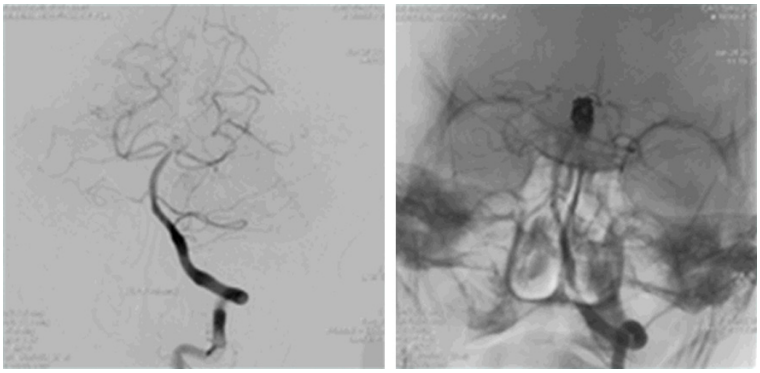

Figure 2. DSA Immediately after embolization.

blood flow of the basilar artery, bilateral posterior cerebral artery and bilateral superior cerebellar artery was smooth, the aneurysm was completely occluded and the distal branches were well filled (**Figure 2**). Intravenous Nitroglycerin was used to control blood pressure after operation.

Two and a half hours later, the patient showed lethargy and was unable to answer complex questions. Pupil dilation to light became obtuse and the eyeball movement was impaired. No intracranial hemorrhage or infarction was found on CT scan and our preliminary diagnosis was acute cerebral infarction caused by stent thrombosis. Antiplatelet aggregation therapy and other supportive treatments were used. The symptoms and signs did not aggravate significantly. On the 3rd day after the operation, brain CT scan showed symmetrical low density lesions in the anterior parathalamic median region and upper left cerebellar hemisphere (**Figure 3**). According to the patient's clinical symptoms and signs, combined with the CT finding, the diagnosis of BIA was concluded. On the 6th day after operation, brain CT scan showed no significant changes in the bilateral parathalamic median area and the upper left cerebellar hemisphere. Edema zone was seen around the lesion (**Figure 4**). On the 14th day after the operation, the patient recovered and was discharged from the hospital with mild ataxia of the right limb. The brain CT scan showed that the bilateral hypothalamus with low density lesions had disappeared and the low density lesions decreased significantly in the left upper cerebellum (**Figure 5**).

Discussion

Top of the basilar syndrome (TOBS) was first proposed by Caplan in 1980 [1]. The main symptoms were visual, oculomotor and behavioral abnormalities. TOBS was mainly due to the infarction of the rostral brainstem and cerebral hemispheral regions fed by the posterior cerebral artery or superior cerebellar artery [2]. Branch variations of the P1 segment of the posterior cerebral artery included three types (**Figure 6**) [3] and the occlusion of the artery would manifest a triple sign: vertical gaze paralysis, disturbance of consciousness and memory impairment [4, 5].

Most of the BIAs are cystic. Because of their deep location and important adjacent structures, endovascular treatment of basilar tip aneurysm may be the recommended method [6]. For wide carotid aneurysms at the top of the basilar artery, the alternative methods are stent-assisted embolization, double catheter technique, Y-shaped stent technique, horizontal stent placement and embolization [7]. The complications of embolization of BIAs included rupture and bleeding of aneurysms and thrombosis in the stent [8]. Moreover, impairment of the perforating artery can lead to cerebral ischemia and parent artery thrombosis [9]. It has been reported that BIAs embolization resulted in TOBS [6].

Based on the case, we analyzed the possible reasons. The bilateral posterior cerebral artery

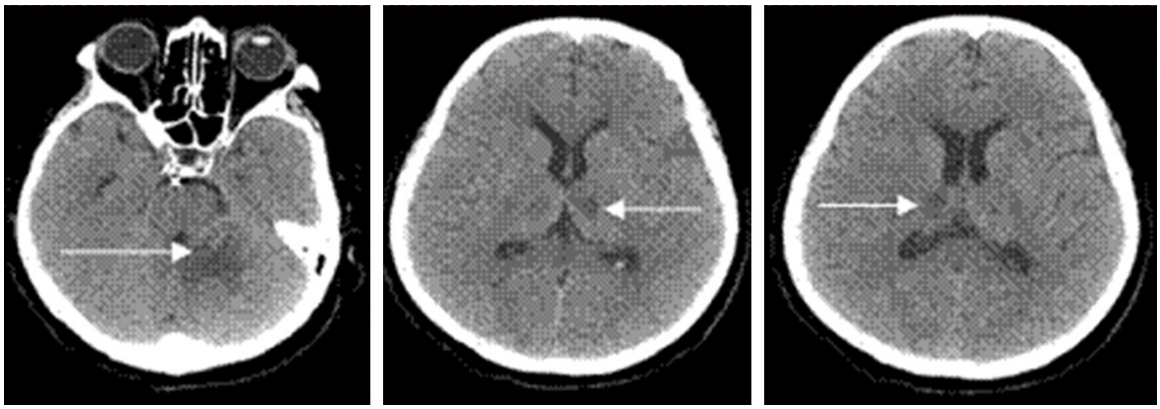

Figure 3. CT scan on the 3rd day after embolization.

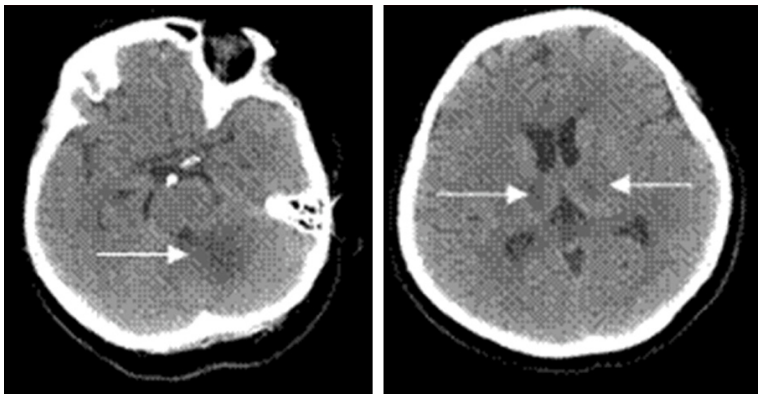

Figure 4. CT scan on the 6th day after embolization.

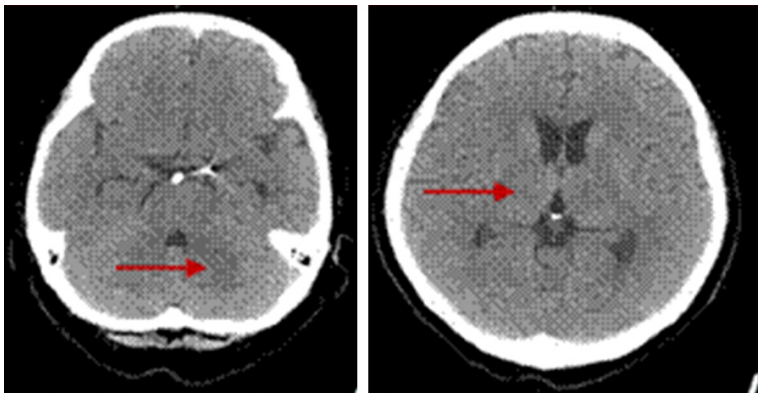

Figure 5. CT scan on the 14th day after embolization.

and bilateral superior cerebellar artery originated from the base of the dilated and enlarged aneurysms. We used stent-assisted embolization technology and double-catheter embolization technology and achieved complete embolization. However, the hemodynamics of the left superior cerebellar artery and left posterior cerebral artery P1 segment significantly changed due to the stenting in the left posterior cerebral artery. Thrombosis at the superior cerebellar artery resulted in low density lesions in its blood supply area on CT. Thrombosis at the left posterior cerebral artery affected the thalamic perforating artery of the left P1 segment and the symmetrical low density lesions in the bilateral parathalamic central area suggesting that the perforating thalamic artery in this patient might be B-type variant.

Acknowledgements

Informed consent was obtained from the individual participant included in the study.

Disclosure of conflict of interest

None.

Address correspondence to: Gesheng Wang, The Third Department of Encephalopathy, Dongfang Hospital Affiliated to Beijing University of Chinese Medicine, No. 6, Area 1, Fangxing Garden Fangzhuang, Fengtai District, Beijing 100078, China. Tel: +86-10-67689735; Fax: +86-10-67689735; E-mail: wanggesheng11@sina.com

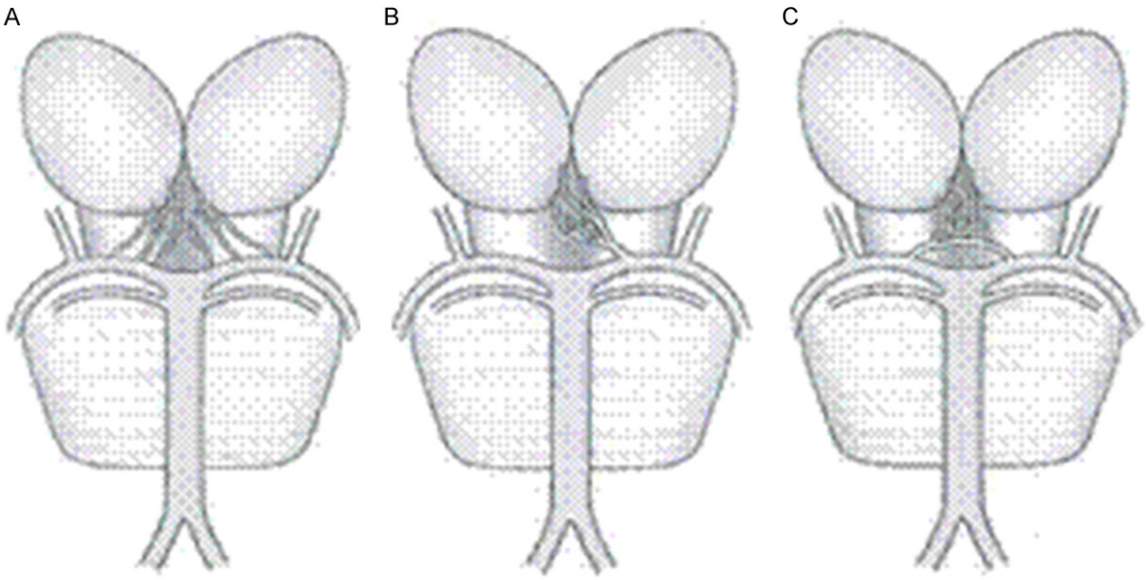

Figure 6. Variation of perforating vessels of the posterior cerebral artery. A. Multiple vessels originating from the P1 segment of the ipsilateral posterior cerebral artery supplying the ipsilateral parathalamic median nucleus group; B. A single trunk originates from the P1 segment of the posterior cerebral artery and branches to the bilateral parathalamic median nucleus group, which is called the Artery of Percheron (AOP); C. Vessel originates from the P1 segment of the bilateral posterior cerebral artery to form "bridging artery" and branches to supply the bilateral parathalamic median nucleus.

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