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Treatment of acute thrombosis during stent-assisted coil embolization of ruptured proximal posterior inferior cerebellar artery aneurysm

Guangwen Li, Tonghui Liu, Naidong Wang, Yong Zhang

Abstract:

Aneurysms located in the posterior inferior cerebellar artery (PICA) are not a majority of the intracranial aneurysms cases. Many challenges were addressed in the endovascular procedure to treat the disease. The authors have successfully diagnosed and treated a ruptured proximal PICA aneurysm. However, digital subtraction angiography showed acute thrombosis in the vertebral artery in the procedure, which probably could be an acute in-stent thrombosis. The tirofiban hydrochloride injection was subjected through a microcatheter, and then, the second Neuroform EZ stent was planted. In the 6-month follow-up, no recurrence of the aneurysm and complete patency of the right PICA at the site of aneurysm formation were found. We believe that the treatment of PICA aneurysms with Neuroform EZ stents could get a favorable result. Combination of tirofiban hydrochloride and Neuroform EZ stent could be an effective approach in treating acute thrombotic complications.

Keywords:

Aneurysms, Neuroform, posterior inferior cerebellar artery, stents

Introduction

Aneurysms of the posterior inferior cerebellar artery (PICA) accounts for 0.5%–3.0% of all intracranial aneurysms.[1] Most of the PICA aneurysms originate from the vertebral artery (VA)-PICA junction.[2] Direct surgical therapy of the aneurysms is difficult because of the intimate relationship between PICA and the medulla. Therefore, endovascular therapy became a primary treatment for PICA aneurysms.[3] However, endovascular therapy is not always easy, many challenges need addressed in the procedure.[4] Herein, we describe a patient who failed coil embolization of aneurysm arises from VA-PICA junction due to acute in-stent thrombosis and then treated with tirofiban hydrochloride and two Neuroform EZ stents. By now, this is firstly demonstrated that this therapy is effective for PICA aneurysms and acute in-stent thrombosis. The 6-month follow-up results in a well recovery after the endovascular therapy.

Case Report

A 63-year-old man was admitted to the emergency department with a history of sudden headache and vomiting for 3 days. The neurological physical examination was normal, except for moderate neck rigidity, and the modified Rankin Scale (mRS) 3 at admission was recorded. Brain computed tomography (CT) showed high density around the medulla, mesencephalon, and base of telencephalon [Figure 1a and b]. A diagnosis of subarachnoid hemorrhage (SAH) was

Department of Neurology, The Affiliated Hospital of Qingdao University, Qingdao, China

Address for correspondence:
Prof. Yong Zhang, Department of Neurology, The Affiliated Hospital of Qingdao University, No. 16 Jiangsu Road, Qingdao 266000, China.
E-mail: bravezhang@126.com

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considered and modified Fisher grade was 4 according to the CT presentation. Nevertheless, no obvious vascular abnormalities were found in the follow cerebral CT angiography (CTA) and digital subtraction angiography (DSA) [Figure 1c and d]. The magnetic resonance imaging (MRI) of the brain and cervical spine did not show any abnormalities or indications of SAH as well. Laboratory examinations of the patient including complete blood cell count, platelet count, function testing, and coagulation tests were all within the normal range. We initially diagnosed the patient as having perimesencephalic nonaneurysmal SAH. The patient had undergone conservative treatment and recovered gradually without development of any complications.

Five days later, the patient was recompleting for sudden severe headache with nausea and vomiting. Furthermore, he had experienced a 10-min respiratory depression. CT scan showed a predominant left-sided perimesencephalic SAH. A repeat DSA examination of cerebral was performed within 24 h. DSA showed cystic dilatation with a diameter of 1.5 mm × 1.5mm on the right proximal PICA. A diagnosis of SAH secondary to a proximal PICA aneurysm was reached [Figure 2].

The patient was treated under general anesthesia and heparinization. A bilateral femoral artery puncture was performed. After 6F ENVOY DA (Medos International SARL, USA) guiding catheter positioning at V2 segment, a microcatheter Excelsior XT-27 (Stryker, Ireland) and microwire Synchro 2 (Stryker, USA) were navigated to PICA. A 3 mm × 15 mm Neuroform EZ stent was then deployed at the PICA and right VA. Another microcatheter Echelon-10 (Stryker, USA) and microwire Synchro 2 were navigated and advance to the aneurysm via the right femoral artery. The initial attempt was to occlude the sac with 1.5 mm × 2.0 mm coil but fail to the size of the aneurysm. The coil was then retrieved. With the following angiography, blood flow in the right VA was found to stagnate due to thrombogenesis. Ten milliliters tirofiban hydrochloride (Crand Pharma Co., Ltd, China) was subjected through the microcatheter and continuously intravenous pumping for 24 h (6 ml/h). Meanwhile, another 3.5 mm × 15 mm Neuroform EZ stent was implanted into the right VA. Angiogram showed reperfusion and no aneurysm development [Figure 3]. The operation was then terminated. The patient recovered from general anesthesia with no neurological deficits. Three days after the implantation, head CT showed that most of the SAHs had been absorbed. No discernable infarction was found in the cerebellum or brainstem. The mRS dropped to 1 at discharge according to clinical symptoms.

The patient remained taking aspirin (100 mg/d) and clopidogrel (75 mg/d) for 3 months, followed by lifelong aspirin as monotherapy. Six-month DSA follow-up showed no recurrence of the aneurysm and complete patency of the right PICA at the site of aneurysm formation [Figure 4].

Discussion

Clinical diagnosis of aneurysms mainly depends on injury history and CT examination.[5] The patient claimed a severe headache for 3 days, and the CT scan showed the hemorrhagic sign around the medulla and mesencephalon. CTA, MRI, and DSA data did not show a source of SAH originated from. However, the aneurysm was found located in posterior circulation when the second hemorrhage around the medulla. The angiogram indicated the aneurysm located at VA-PICA junction. There are several factors might cause difficulties during angiography process: spontaneous thrombosis, destruction of the aneurysm by hemorrhage, inadequate angiographic technique, or disguise an aneurysm by arterial spasm.[6-8] We believe that the initial DSA and CTA data have failed to reveal the aneurysm in our study, which was the arterial spasm interference.

Endovascular therapy remains the most common treatment for ruptured aneurysms in the posterior circulation.[9] In the study, the coil embolization for the aneurysm was failed due to the excess diameter of the chosen coil. The Neuroform EZ stent was designed for the treatment of intracranial wide-necked and fusiform aneurysms.[10] The stent not only renders mechanical and hemodynamic benefits for aneurysm occlusion by

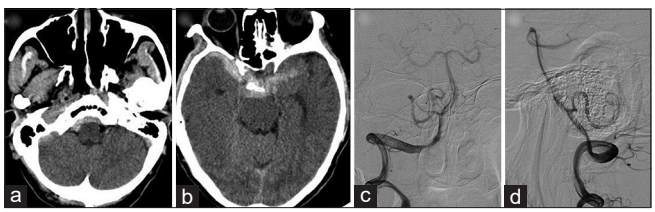

Figure 1: (a and b) Computed tomography: High density was seen in the subarachnoid space, which around the medulla and mesencephalon; (c and d) Digital subtraction angiography: No obvious abnormalities were found. (day 1)

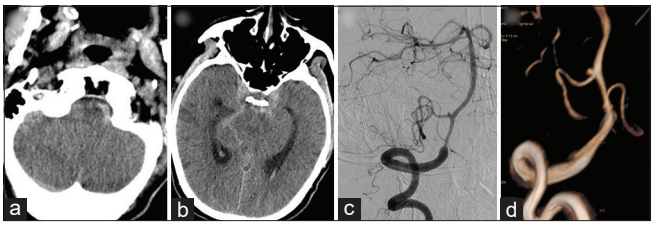

Figure 2: (a and b) Computed tomography: High density was seen in the subarachnoid space and around the medulla; (c and d) Digital subtraction angiography: A aneurysm on the right proximal posterior inferior cerebellar artery trunk was found. (day 6)

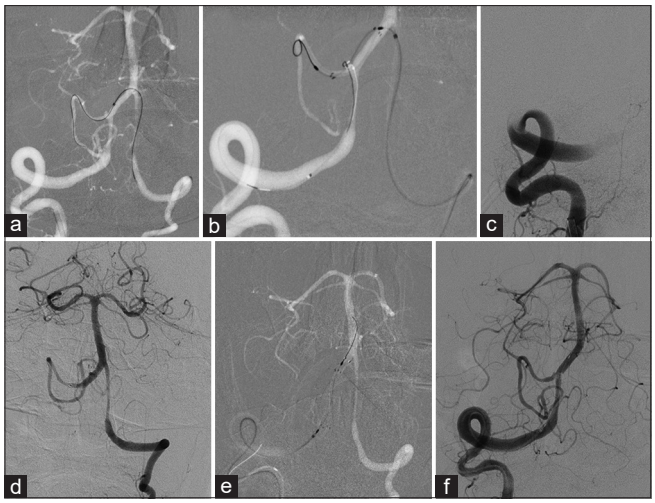

Figure 3: Operation process: (a and b) Neuroform stent was implanted into the posterior inferior cerebellar artery; a coil was trying to implanted into the aneurysm. (c) The right vertebral artery was stagnated. (d-f) Neuroform stent was implanted into the right proximal VA

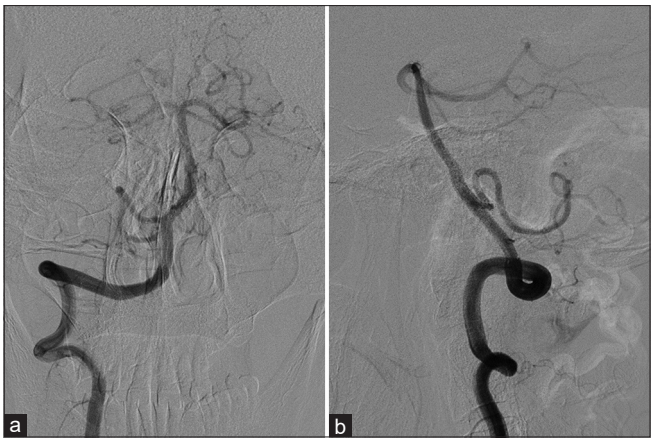

Figure 4: (a and b) Digital subtraction angiography: digital subtraction angiography image of the right VA frontal and lateral view showing complete occlusion of the aneurysm with complete patency of the posterior inferior cerebellar artery branches. (6 month)

preventing and repairing coil protrusion into the parent artery but also reduces and modifies the aneurysm inflow pattern adequately. Moreover, it is an excellent option for the intracranial aneurysms located at the bifurcation.[11] Here, we believe that the stents could change the curvature of the parent artery and objectively change the hemodynamics. Another reason was that acute thrombus formation inside the aneurysm sac promotes the healing of the aneurysm at the same time. Thrombosis in the right VA during operation may be due to the long procedure time and the use of hemostatic drugs before the operation. Tirofiban hydrochloride and the second stent were intended to prevent thrombosis and to remain the patency of the parent artery after successive operations. The aneurysm was successfully occluded at 6-month follow-up.

In our experience, the treatment of PICA aneurysms with Neuroform EZ stent shows favorable results. A combination of tirofiban hydrochloride and Neuroform EZ stent could be an effective approach in treating acute thrombotic complications.

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Conflicts of interest

There are no conflicts of interest.

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