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A challenging entity of unruptured giant saccular aneurysms of vertebrobasilar artery

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ABSTRACT

Purpose: Giant intracranial aneurysms commonly cause poor clinical outcome and few studies focus on them. This study is to retrospectively report the angiographic and clinical presentations in unruptured giant saccular vertebrobasilar aneurysms with and without endovascular treatment.

Methods: Out of 400 patients who had unruptured posterior circulation aneurysms in a single center, we found 10 unruptured giant (>25 mm) saccular vertebrobasilar aneurysms. Clinical and angiographic presentations as well as their clinical outcomes were assessed.

Results: Of the 10 giant aneurysms in 10 patients, three were left untreated. During 6 months follow-up, all 3 of these patients died from aneurysm rupture. The remaining 7 patients were treated by endovascular procedure, 5 received stent-assisted coiling, 1 was treated by parent artery occlusion (PAO), and 1 was treated by conventional coiling. Of these treated patients, only one survived during a 22 month period of follow-up.

Conclusions: Patients with giant saccular aneurysms of vertebrobasilar artery presenting mass effect may have extremely poor clinical outcomes and may not benefit from endovascular treatment.

1. Introduction

The giant intracranial aneurysm is defined as having a maximum diameter exceeding 2.5 cm and often appears in saccular form [1–3]. This type of aneurysms accounts for less 5% of all intracranial aneurysms and is rare in the region of posterior circulation [2,4]. Aneurysms of posterior circulation, especially vertebrobasilar aneurysms, can lead to extremely poor clinical presentations or fatal outcome such as ischemic effects, hydrocephalus, mass effect on the adjacent cranial nerves and brainstem, and common manifestations of acute subarachnoid hemorrhage [5–8]. Zhang et al. reported that 4 of 5 untreated patients with giant vertebrobasilar aneurysms had poor clinical outcomes [9]. Owing to the proximity of the brainstem and its complex neuroanatomy, the surgical procedure for giant vertebrobasilar aneurysm commonly confronts access limitations and technical challenges [7,10].

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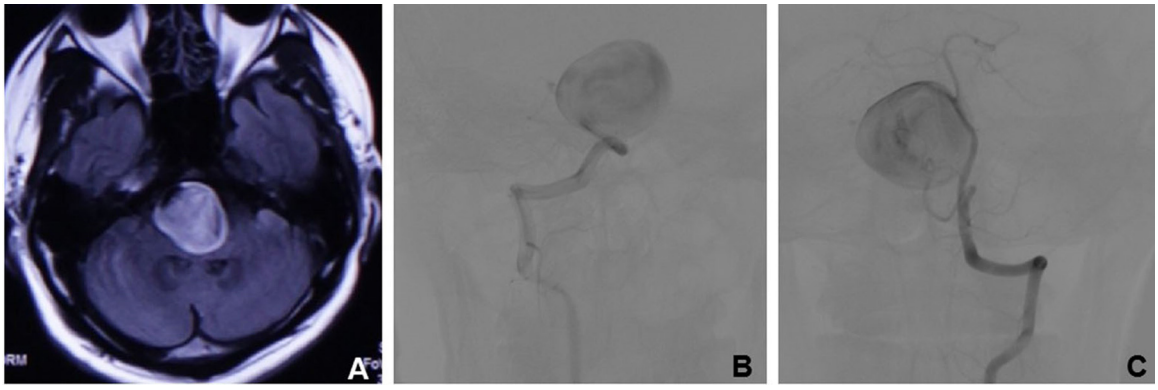

Fig. 1 – A vertebrobasilar junction giant saccular aneurysm. A 58-year-old man presented numbness. (A) Axial T1 MR imaging scan showed a giant mass in front of the pons. (B) Right vertebral artery angiogram showed a giant saccular aneurysm and the absence of basilar artery. (C) Left vertebral artery angiogram showed that the blood supply of left vertebral artery was not sufficient. This patient received conservative treatment because of a technical failure during the endovascular procedure. He died of aneurysmal rupture 6 months later.

In a study, the rate of excellent clinical outcome by surgical management for giant vertebrobasilar aneurysms was only 28.5% [7]. Additionally, results of a small study (8 patients) showed that endovascular embolization of giant vertebrobasilar aneurysms were also relatively difficult to cure [11]. However, there were few studies investigating highly complex giant aneurysms. The aim of this study is to report the challenges surrounding the current endovascular treatment methods of unruptured giant saccular vertebrobasilar aneurysms.

2. Methods and materials

A total of 10 consecutive patients with 10 unruptured giant saccular aneurysms of vertebrobasilar artery were enrolled between January 2008 and December 2014 at our hospital. All participants have signed the informed consent to participate in this study before they received endovascular treatment and the study was approved by the ethics committee of our hospital. There were 8 males and 2 females, and their mean age is 41.4 years (range 29–77 years). These patients had no history of subarachnoid hemorrhage (SAH). Clinical characteristics, including demographic characteristics, radiological findings such as computed tomography angiography (CTA), magnetic resonance angiography (MRA), digital subtract angiography (DSA) and medical reports were retrospectively reviewed. All patients underwent cerebral DSA with three-dimensional (3D) reconstruction to confirm the dome and neck of aneurysm, the parent artery, and the origin and trajectory of nearby arterial branches for assisting the plan of treatment. Representative cases are provided in Figs. 1 and 2.

Nine patients presented with headache or severe neurologic deficits (Tables 1 and 2), one patient was detected incidentally. Four aneurysms involved the basilar artery, three aneurysms involved vertebral artery and three aneurysms were located at vertebrobasilar junction. These 10 aneurysms were saccular in shape and the size ranged from 25 to 40 mm (31.0 mm $\pm$ 6.2 mm).

Giant saccular aneurysm commonly has a wide-neck and is difficulty to be occluded. Intracranial stent system could

Fig. 2 – A left vertebral artery giant aneurysm. A 77-year-old male presented with severe headache, gait disturbance, dysarthria, nystagmus and hypoesthsia. (A) Left vertebral artery angiogram (frontal views) showed a giant saccular aneurysm located at left vertebral artery, which was treated by stent-coils embolization. (B) Post-operative angiogram in frontal views: giant aneurysm was embolized incompletely. (C) Emergency post-operative CT scan showed subarachnoid hemorrhage from the rupture of the giant aneurysm. The patient lost consciousness rapidly and died 3 days later.