Endovascular Treatment of a Partially Thrombosed Giant Basilar Tip Aneurysm Using Interlocking Detachable Coils

—Case Report—

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Abstract

A 65-year-old female presented with visual acuity loss. Magnetic resonance imaging confirmed the presence of a partially thrombosed giant aneurysm on the basilar tip. Cerebral angiography showed the opacified lumen of the aneurysm was 25×15 mm with a broad-based neck. Using a transfemoral approach, a microcatheter was guided through the vertebral artery and placed directly into the aneurysm under local anesthesia. Interlocking detachable coils were deposited into the patent portion of the aneurysm, resulting in 95% obliteration of the aneurysm and preservation of the parent artery. No complication was observed during or after surgery. Follow-up angiography 2 months later demonstrated the aneurysm was 95% occluded. No coil compaction was observed. Endovascular coil embolization therapy provides a therapeutic option for management of basilar tip aneurysms.

Key words: endovascular surgery, interlocking detachable coil, aneurysm, basilar tip

Introduction

Aneurysms of the posterior circulation are more difficult to treat and have a worse surgical outcome than those arising in the anterior circulation.⁽¹⁾ In particular, aneurysms at the basilar artery bifurcation are the most difficult cerebrovascular lesions for neurosurgeons to manage. The natural history of untreated giant aneurysms is associated with poor outcome, as mortality is up to 80% within several years. Giant aneurysms that were unruptured at presentation have a 2-year mortality rate of 62%.⁽¹⁵⁾ The aim of neurosurgical therapy for cerebral aneurysms is to prevent rebleeding or rupture and to reduce the mass effect. The treatment of choice for intracranial aneurysms is surgical clipping. However, surgical treatment of basilar tip aneurysms is characterized by a high morbidity and mortality because of the deep location behind the posterior clinoids, the narrow operating field in the interpeduncular cistern, and their close anatomical relationship to vital brain stem perforation branches.^(3,10,14) Recently, the placement of various types of plat-

inum coils within the lumen of the aneurysm has become possible.^(2,4,5,12)

We described a patient with a partially thrombosed giant basilar tip aneurysm which was embolized using interlocking detachable coils (IDC).

Case Report

A 65-year-old female presented with loss of left visual acuity. Brain magnetic resonance imaging confirmed the presence of a partially thrombosed giant aneurysm on the basilar tip (Fig. 1). Cerebral angiography demonstrated that the opacified lumen of the aneurysm measured was 25×15 mm with a broad-based neck (Fig. 2).

The aneurysm was treated by coil embolization using IDC (Target Therapeutics Inc., Fremont, Cal., U.S.A.). Under local inguinal lidocaine anesthesia, a 7.0 Fr guiding catheter was introduced into the left vertebral artery via the transfemoral approach. Heparin (4000 U) was then injected intravenously for systemic anticoagulation. A coaxial microcatheter (FasTracker 18MX catheter®; Target Ther-

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Fig. 1 T₂-weighted magnetic resonance (MR) image revealing a low intensity mass including an area of high intensity (left), and T₁-weighted MR image with gadolinium-diethylenetriaminepenta-acetic acid showing partial enhancement in the low intensity area (right).

Fig. 2 Right vertebral angiograms, frontal (left) and lateral views (right), demonstrating the giant basilar tip aneurysm before embolization.

apeutics Inc.) introduced through the guiding catheter was passed under fluoroscopic guidance through the intracranial vertebral and basilar arteries and finally into the aneurysm. Angiography confirmed the catheter placement within the aneurysm lumen. Fourteen coils with a total length of 210 cm were placed in the aneurysm to achieve occlusion. Immediate post-embolization angiography showed the aneurysm to be approximately 95% occluded (Fig. 3). Systemic anticoagulation was then reversed with intravenous protamine sulfate.

Follow-up post-embolization angiography 2 months later demonstrated that the aneurysm was 95% occluded. There was no coil compaction observed. Her visual acuity loss disappeared 2 months after embolization.

Fig. 3 Right vertebral angiograms, frontal (left) and lateral views (right), demonstrating approximately 95% occlusion of the aneurysm following placement of platinum coils within the aneurysm.

Discussion

Endovascular treatment of aneurysms was initially based on using detachable balloons in 1974.¹⁶⁾ The new detachable balloon was used to occlude a giant aneurysm of the right middle cerebral artery in 1979.¹⁷⁾ Endovascular treatment of 26 aneurysms in 25 patients with intra-aneurysm occlusion was previously limited to balloon embolization.⁸⁾ However, the balloons cannot adapt to the irregular shape of the aneurysm, and so stress on the aneurysm may occur during balloon placement and detachment, increasing the risk of aneurysm rupture.

Recently, the placement of soft metallic coils within the lumen of the aneurysm has become possible, using the Guglielmi detachable coils (Target Therapeutics Inc.).⁴⁻⁶⁾ These coils are based on the principle of electrothrombosis and allow more controlled coil placement and detachment.^{13,19)} The IDC used in the present study is detached mechanically. The proximal end of the platinum coil is connected to an introducing wire catheter by an interlocking junction. When the coil is pushed out of the catheter, the interlock is disconnected, and the coil is detached immediately. However, caution needs to be exercised since the position and structure of the coil may change before its release, causing continued stress on the aneurysm wall.

Embolization for the treatment of thrombotic aneurysm is controversial, because the coil can migrate into the intraluminal thrombus or blood flow, causing compacting of the coil and facilitating the patency of the aneurysm again. Little data has been published regarding the efficacy of endovascular occlusion on symptoms and signs relating to mass effect.⁷⁾ The size of the aneurysm neck is well correlat-

ed with the outcome of the endovascular treatment. Complete aneurysm occlusion was possible in 85% of small-necked aneurysms but in only 15% of wide-necked aneurysms.¹⁹⁾ Large and giant aneurysms with a wide neck are difficult to treat by intracranial aneurysmal occlusion using detachable platinum coils. Platinum microcoils were successfully used in patients with intracranial aneurysms containing thrombus with a broad-based neck.⁹⁾ The patients presented with cerebellar symptoms related to the mass effect of the aneurysm before surgery. However, follow-up angiography 4 months after embolization revealed obliteration of aneurysms, and the cerebellar symptoms had disappeared. Electrically detachable coils were used to treat 13 patients with basilar artery bifurcation aneurysms by electrothrombosis.¹¹⁾ Two patients had presented mass effects, and in one of these, follow-up angiography 6 months after embolization revealed complete disappearance of the aneurysm, and an excellent outcome was achieved. Endovascular techniques were used to treat 13 aneurysms with mass effect, but improvement of neurological signs was achieved in only one patient who had improved visual acuity following therapy.¹⁸⁾

In our patient, endovascular management of a partially thrombosed giant basilar tip aneurysm was achieved using an IDC device. Almost complete occlusion of the aneurysm was achieved. Follow-up angiography after embolization showed an absence of coil compaction. Visual acuity loss caused by the mass effect of the aneurysm disappeared 2 months after embolization. There were no other complications. Only a few follow-up studies on aneurysmal coil embolization are available because of the relatively short history of this treatment. In the future, strict angiographic and long-term clinical follow-up is needed. Endovascular coil embolization therapy provides a therapeutic option for management of basilar tip aneurysms.

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