

'Y-stenting' for Endovascular Coiling of Small Basilar Tip Aneurysm

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This 58-year-old woman was transferred from a local hospital due to symptoms of acute headache and decreased consciousness. Computed tomography revealed a subarachnoid hemorrhage with blood clot in prepontine cistern. On the first day in the hospital, diagnostic cerebral angiography revealed a basilar tip aneurysm. We performed basilar artery to bilateral posterior cerebral artery(PCA) stent placement to reconstruct the basilar artery apex.

KEY WORDS : Stent · Coil · Small aneurysm.

Introduction

Endovascular treatment of intracranial aneurysms has substantially improved in recent years. Despite rapid advancement in the development of endovascular devices such as new coil configurations, embolic materials, and stents, small wide-necked aneurysms still pose a therapeutic challenge.

In the present paper, we present a one patient with a small, acutely ruptured, complex aneurysm of the basilar tip aneurysm who was treated by means of a crossing stent technique.

Case Report

This 58-year-old woman was transferred from a local hospital due to symptoms of acuter headache and decreased consciousness. Computed tomography revealed a subarachnoid hemorrhage with blood clot in prepontine cistern (Fig. 1). The clinical condition at presentation was eq-

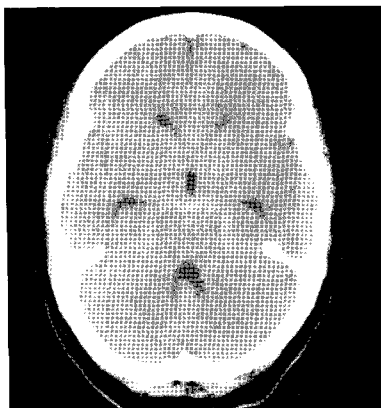


Fig. 1. Initial noncontrast brain computed tomography scan. Showing subarachnoid hemorrhage in the prepontine cistern.

ivalent to grade III of the Hunt and Hess grading scale. On the first day in the hospital, diagnostic cerebral angiography revealed a basilar tip aneurysm, measuring approximately 2×2 mm in size (Fig. 2). Subsequently, we performed basilar artery to posterior cerebral artery(PCA) stent placement to reconstruct the basilar artery apex.

Following placement of two Neuroform stents (Boston Scientific

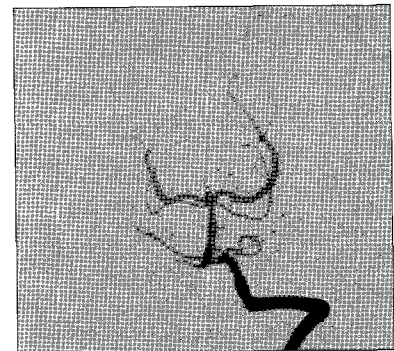


Fig. 2. Frontal view of the left vertebral angiogram showing the small aneurysm at the basilar artery bifurcation before stent assisted coiling.

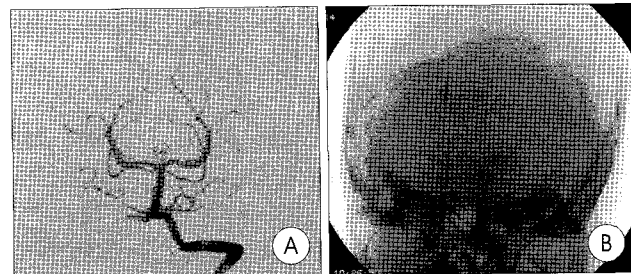


Fig. 3. A : Frontal view of the left vertebral angiogram showing the small aneurysm at the basilar artery bifurcation after stent assisted coiling. B : Frontal view unsubtracted left vertebral angiography demonstrating an optimal stents position and no residual filling in aneurysm just after treatment.

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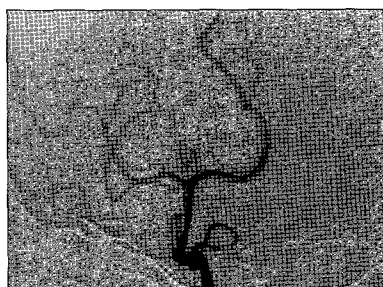


Fig. 4. Follow up angiography 6 months after treatment reveals complete occlusion of the aneurysm.

(aspirin 325mg/day and Plavix 75mg/day) for 3 months and was heparinization for 3 days. The patient was discharged from the hospital without any neurological defects on the 18th day of the hospitalization. Follow-up angiography 6 months following treatment revealed complete occlusion of the aneurysm (Fig. 4).

Technique

Patient was not pretreated with clopidogrel and aspirin. On the first day in the hospital, an aneurysm at the basilar apex aneurysm was found in cerebral angiography, and the coiling was implemented under Monitored Anesthesia Care (M.A.C) by using Propofol and Alfentanil. A 6F guide catheter was placed within the left vertebral artery. Utilizing over-the-wire technique, a microcatheter was advanced into the left PCA. A 300cm 0.014-inch microwire was passed through the microcatheter into the distal PCA and the microcatheter was removed. In case, 3 × 20mm and 3 × 15mm Neuroform stents were prepared by attaching the stent delivery catheter and stabilizer to heparinized saline flushed, and advancing the stabilizer into the delivery catheter proximal to the stent. The initial stent placed was 20mm in length and was deployed from the left PCA into the basilar artery. The microwire was pulled retrograde into basilar artery, then advanced through the stent struts. The second, 15mm stent, was advanced over the wire through the first stent within the basilar artery then through the struts of the left PCA stent and into the right PCA. The stents were deployed over the neck of the aneurysm in satisfactory position. A Excelsior SL 10 microcatheter (Boston Scientific) and a Transcend 14 microwire (Boston Scientific) were used success to access the aneurysm through the interstices of the stent. A Guglielmi detachable coil (ultra-soft 2mm × 2cm) was advanced through the microcatheter into the aneurysm.

Discussion

The treatment of intracranial aneurysms with endovascular coils has become an important and well known alternative

to microsurgical clip placement^{1,5,6}. Detachable coils are established as a safe and effective treatment option for some patients with intracranial aneurysms^{9,10}. Although this treatment does represent a useful option for the treatment of certain types of complicated aneurysms, wide-necked or broad-based aneurysms are still complicated to embolize because of the risk of coil migration or coil protrusion into the parent vessel³.

Complete isolation of the aneurysm from the circulation is the obvious goal of both open and endovascular treatment. In various endovascular series, complete aneurysms occlusion rates between 21% and 84% when using detachable coils are reported^{8,11,13,14}, the relatively broad range being explained by differences in aneurysm size and morphological composition. For example Pierot, et al¹³, reported a 73.5% rate of total occlusions in a series of basilar apex aneurysms.

In analyzing factors that might influence the long-term stability of the angiographic result, Fernandez Zubillaga et al.³, found a positive correlation between angiographic result and aneurysm neck size. They observed that narrow-necked aneurysms could be obliterated completely in 85% of cases, whereas in wide-neck aneurysms complete occlusion was accomplished only 15% of the time, a result that has been reported by others as well^{3,11}.

The Neuroform stent, a Nitinol self-expanding stent delivered through a microcatheter, offers several substantial advantages over the preexisting balloon expandable coronary stents primarily related to the increased flexibility of the stent and delivery system, which allows safe negotiation and deployment within even the most tortuous segments of the cerebrovasculature⁷. The application of an endovascular stent as an adjunctive technique to the coil embolization has evolved quickly in the recent period⁷.

Stent-assisted coiling provides important technical and theoretical advantages^{2,7}. By providing secure and durable protection of the parent vessel, a broad-necked aneurysm theoretically could be more completely packed with coils with less risk rupturing, coil migration, or parent artery obstruction. The stents may produce flow redirection and disruption of the aneurysm inflow and outflow zones resulting in hemodynamic uncoupling of the parent vessel-aneurysm complex. This hemodynamic advantage may help to reduce coil compaction in the region of the inflow zone and prevent subsequent growth of the aneurysm. In addition, the stent potentially provides a physical matrix for endothelial growth and allows appropriate remodeling of the parent vessel along the aneurysm neck^{2,7}.

Although these stents were not infrequently employed effectively, their lack of flexibility made navigation through the tortuous cerebrovasculature difficult, and sometimes dangerous or technically impossible⁷. Perez-Arjona E et al.¹², des-

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cribed its application in the stent assist coil treatment of a basilar top aneurysms, using of this method, however, may be limited by the damaging the microcatheter through the stent struts into aneurysm and migration of first deployed stent.

Especially, small wide-necked aneurysms, however, this might be of limited use. Although small aneurysms are frequently encountered, the endovascular treatment of these lesions can be technically demanding. Small size makes for challenging aneurysm catheterization, risk of dome perforation by microcatheter that load and spring forward, and difficulty placing multiple coils⁴. In many patients with small aneurysms, it is often not possible to place more than a single coil. Therefore, approximately coil selection is very important.

Crossing the Neuroform stent method may represent a variable therapeutic option, especially in the treatment of small size wide neck aneurysms, in which direct coiling is not considered feasible or believed to be too dangerous.

Conclusion

The Neuroform stent is a useful device for the treatment of aneurysms that may not otherwise be amenable to surgical or traditional endovascular treatment strategies. This technique represents a viable treatment option for the selection of patients with small size wide neck basilar artery aneurysms. However as further long-term follow-up review is necessary.

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Commentary

This paper is reporting an application of "Y" configuration double stenting technique for coil embolization for a small sized (2 × 2mm) and relatively wide necked basilar tip aneurysm which seem to be challenging with ordinary coiling technique. In the field of endovascular coil treatment for cerebral aneurysms, intravascular stent-assisted technique has not only widened the indications for coil embolizations and also improved the safety of this treatment. While intravascular stents can help most of the technical challenges afforded by the wide neck of sidewall aneurysms, in some aneurysms with complex geometry at the tip of basilar artery, deployment of single stent may not sufficiently protect the contralateral PCA from coil herniation. Since Chow et al.¹⁾ introduced the first experience with Neuroform "Y" stenting technique to overcome this limitation of single stent in the treatment of this particular type of aneurysm in 2004, a few more experiences have been reported²⁾.

However some points need to be mentioned in using this technique. In the first instance, because of poor radio-opacity of the struts of NeuroformTM, it is not possible during fluoroscopic procedures to confirm whether the second stent that passing through a window of the first stent is deployed properly or not, and also whether satisfactory reconstruction of the apex of basilar artery is established or not. Currently, the useful imaging method that can visualize the strut configuration of the NeuroformTM is the source images of MD-CTA. Secondly, there remains some possibility of thrombus formation generated by turbulence flow with the transluminal flow environment of "Y" configuration of stent struts. So, lifetime use of aspirin is advisable following this kind of procedure. Finally, in order to avoid unnecessary complex procedure that might be in this particular case, instead of the straight "Y" configuration double stenting from the beginning without even trial of aneurysm coiling after the first NeuroformTM deployment, I would like suggest that attempt of aneurysm coiling always

need to be tried first before taking the second Neuroform™ in. Based on our experiences of 14 stent assisted coiling for basilar tip aneurysms, thanks to the good conformable property and open cell structure of the Neuroform™, even single stent deployment can make efficient remodeling of the wide neck to protect coils from herniation in most of the wide necked basilar tip aneurysms but not very complex geometry.

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