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PulseRider-assisted embolization of a distal anterior cerebral artery bifurcation aneurysm: illustrative case

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BACKGROUND PulseRider is an endovascular device that can be a useful adjunctive device for wide-necked bifurcation aneurysms. However, its use in distal vessels such as the anterior cerebral artery (ACA) has not been widely reported.

OBSERVATIONS The authors reported the case of a 75-year-old woman who underwent coiling of a 6.9-mm distal ACA aneurysm with PulseRider assistance. Using a partially intraaneurysmal deployment technique, the wide-necked aneurysm was successfully embolized, resulting in Raymond-Roy class II occlusion without intra- or periprocedural complications.

LESSONS This case illustrates a novel approach to treatment for wide-necked distal ACA aneurysms, which can be challenging to treat via traditional endovascular means. PulseRider can be safely used to treat distal ACA aneurysms with minimal residual aneurysm.

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KEYWORDS embolization; aneurysm; ACA; PulseRider

Wide-necked cerebral aneurysms can be challenging to treat endovascularly because of increased risk of distal coil migration or coil herniation into the parent vessel.[1] Bifurcation aneurysms are among the greatest of these challenges because of the difficulty of achieving adequate aneurysm occlusion while maintaining branch vessel patency.

The PulseRider (Cerenovus) is a nitinol adjunctive scaffold for coiling wide-necked aneurysms. The device, which has T- and Y-shaped configurations, has been particularly useful for stent-assisted coil embolization of basilar apex aneurysms.[2] It has also been described in the treatment of internal carotid artery terminus, middle cerebral artery (MCA) bifurcation, and anterior communicating artery (ACom) aneurysms.[3,4] However, no reports to our knowledge have described PulseRider-assisted embolization of a distal anterior cerebral artery (ACA) bifurcation aneurysm.

Illustrative Case

A 75-year-old woman presented with transient altered mental status, and a computed tomography angiogram (CTA) revealed an incidental cerebral aneurysm. Her neurological examination showed no deficits. She had a history of hypertension, was a never-smoker, and had no family history of cerebral aneurysms.

CTA revealed a right-sided, wide-necked ACA aneurysm (6.9 × 6.7 × 6.0 mm). Digital subtraction angiography further showed that the aneurysm was at the branch point of the right pericallosal and callosomarginal arteries, projecting superiorly and anteriorly with a 2.5-mm neck and a dome-to-neck ratio of 2.7 (Fig. 1). The aneurysm was considered suitable for treatment because of its moderate size and risk of rupture (PHASES [population, hypertension, age, size of aneurysm, earlier subarachnoid hemorrhage, site of aneurysm] score of 6). The patient elected for endovascular treatment and was premedicated with 7 days of preprocedural dual antiplatelet therapy (aspirin 325 mg and clopidogrel 75 mg daily).

Under general anesthesia, transfemoral access with an 8-Fr short sheath was obtained. Using coaxial technique, a Q'Apel Wahoo guide catheter (Q'Apel Medical) was advanced to the internal common carotid artery. Through the guide catheter, a Prowler

ABBREVIATIONS ACA = anterior cerebral artery; ACom = anterior communicating artery; CTA = computed tomography angiogram; MCA = middle cerebral artery; WEB = Woven EndoBridge.

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FIG. 1. Three-dimensional reconstruction of right internal carotid artery (ICA) demonstrating a multilobulated wide-necked saccular aneurysm (*arrow*) at the pericallosal-callosal marginal branch point (A2-A3 branch point).

Select microcatheter (Codman Neurovascular) was navigated into the aneurysm neck under roadmap guidance. A 10-mm T-configuration PulseRider stent with a 2.7- to 3.5-mm base was deployed with the leaflets in a partially intraaneurysmal configuration and the stem of the device in the proximal ACA. An Excelsior SL-10 (Stryker) microcatheter was then introduced into the dome through the PulseRider scaffold, and the aneurysm was embolized with five Target XL 360 coils (Stryker).

Postprocedural angiography demonstrated satisfactory embolization and only a small residual neck (Raymond-Roy class II) (Fig. 2). Flow was preserved in both the pericallosal and callosomarginal branch vessels, with no evidence of coil herniation into the parent or branch vessels. The patient remained neurologically intact and was discharged home on postprocedure day 1.

Discussion

Observations

To our knowledge, this is the first case report of the PulseRider applied to treating a distal ACA bifurcation aneurysm. This is considered an off-label use for the device, which currently has FDA approval for aneurysms originating on or near a vessel bifurcation of the basilar tip or carotid terminus. Since its approval, the PulseRider has been used off-label in locations such as the ACom and MCA, which have been reported already in the literature.[5]

Currently, there are various options to assist with the treatment of wide-necked aneurysms such as balloon-assisted, dual microcatheter, T-stenting, and Y-stenting procedures. Wide-necked bifurcation aneurysms demand complex endovascular approaches, which usually require multistent reconstructions that increase procedure difficulty while adding greater metal burden, which can result in thromboembolic complications.[6] Distal aneurysms present their own problems requiring adequate distal access and delivery of devices that often require a triaxial support system and usage of distal delivery catheters and require more navigable devices. Additionally, stent-assisted coiling alone is often inadequate when dealing with wide-necked bifurcation aneurysms that incorporate the origin of one or more bifurcation vessels.[3]

Our considerations for using the PulseRider in this case include its navigability and smaller metal burden compared with other stenting devices, which potentially lowers thromboembolic risk.[1] Y-stenting was another possibility, but implementing it requires a multistep process that introduces opportunities for complications.[2] The Woven EndoBridge (WEB) device, another alternative, requires favorable angulation of the parent artery relative to the aneurysm to achieve proper neck coverage and device deployment. Given the configuration of the aneurysm and the size of the aneurysm neck, the WEB device was not ideal in this case.

In our case, we found that the angle of the bifurcation of the ACA was appropriate for the T configuration, with one leaflet within the

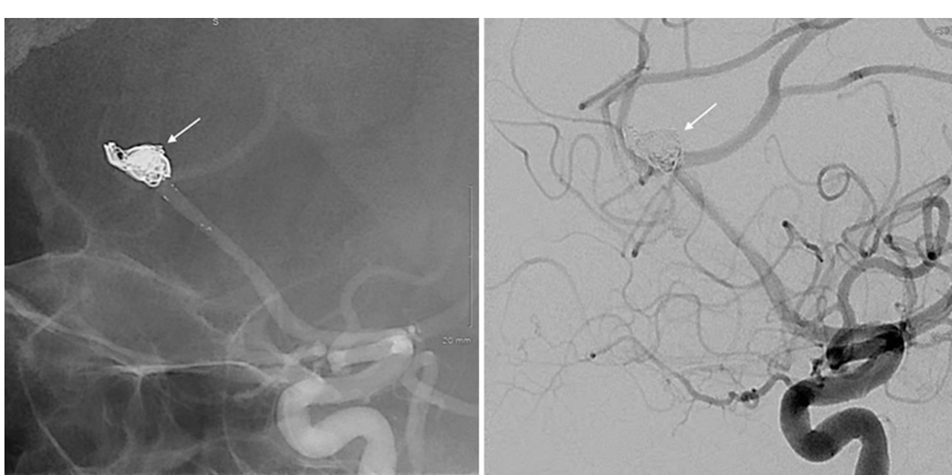

FIG. 2. Magnified lateral projections of right ICA demonstrating a PulseRider-assisted stent coiling of wide-necked A2-A3 aneurysm (*arrows*) with Raymond-Roy class II occlusion.

aneurysm and one leaflet in the inferior portion of the pericallosal artery. Because the aneurysm incorporated the origin of the pericallosal artery, this configuration protected against coil herniation into the branch vessel. Several attempts at deployment were necessary in order to find the optimal arrangement.

PulseRider use in off-label locations other than ACA showed adequate initial occlusion of bifurcation aneurysms (between 52.9% and 100% of cases of Raymond-Roy class I or II), high percentage of aneurysm occlusions at 6-month follow-up, few complications, and low recanalization rates.[3,7,8] However, a multicenter early postmarket study found that PulseRider efficacy (based on Raymond-Roy occlusion classes) was similar but not superior to Y-stent and WEB device and inferior to surgical clipping.[5] PulseRider can thus be viewed as another tool with its own advantages and disadvantages to be geared to specific cases.

Lessons

The PulseRider coil-adjunctive scaffold device can safely be used to treat distal, wide-necked, bifurcation aneurysms of the ACA. Relative to other devices, it has a flexible frame and low metal burden. Further studies are needed to characterize its role in other distal, wide-necked aneurysms.

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Disclosures

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author Contributions

Conception and design: Raper, Dang, Cotton, Lazaro. Acquisition of data: Dang. Analysis and interpretation of data: Dang, Lazaro, Khan, Hoang, Tanweer. Drafting the article: Dang, Cotton, Lazaro, Hoang. Critically revising the article: Raper, Dang, Cotton, Hoang, Tanweer. Reviewed submitted version of manuscript: Raper, Dang, Cotton, Hoang, Tanweer. Approved the final version of the manuscript on behalf of all authors: Raper. Administrative/technical/material support: Raper. Study supervision: Raper.

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