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Case Report

Telescoping pipeline vantage embolization devices with shield technology for the treatment of a giant, symptomatic dolichoectatic basilar trunk aneurysm

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ABSTRACT

Background: Dolichoectatic basilar trunk aneurysms are exceedingly rare and carry a poor prognosis. Treatment strategies are often reserved for patients with severe and progressive symptoms.

Case Description: A patient in their 40s with a dolichoectatic basilar trunk aneurysm developed significant progression of the lesion and neurologic decline, necessitating treatment. He underwent flow diversion utilizing multiple telescoping Pipeline Vantage Embolization Devices with Shield Technology for treatment. At 1-year follow-up, the aneurysm was stable in size and the patient remained at his neurologic baseline.

Conclusion: This case illustrates the need for continued development of next-generation endovascular devices as these aneurysms have limited management options.

Keywords: Aneurysm, Case report, Flow diverter, Intervention, Technique

INTRODUCTION

Dolichoectatic basilar trunk aneurysms are exceedingly rare and carry a poor prognosis with nearly half experiencing aneurysmal progression within 5 years of diagnosis.[8] These large nonsaccular aneurysms frequently present with symptoms of ischemia, brainstem compression, or subarachnoid hemorrhage, and current treatment strategies can be associated with significant morbidity.[1] As such, intervention is often reserved for those patients with severe symptoms or clinical progression.[1,4] We present a case of a giant, progressively symptomatic dolichoectatic basilar trunk aneurysm that was treated by telescoping multiple Pipeline Vantage Embolization Devices with Shield Technology.

CASE DESCRIPTION

In 2013, a patient in their 30s presented with transient right-sided weakness and was found to have a small left pontine stroke as well as a dolichoectatic basilar trunk aneurysm without evidence of mass effect on the brainstem or intraluminal thrombi [Figures 1a-d]. He was started

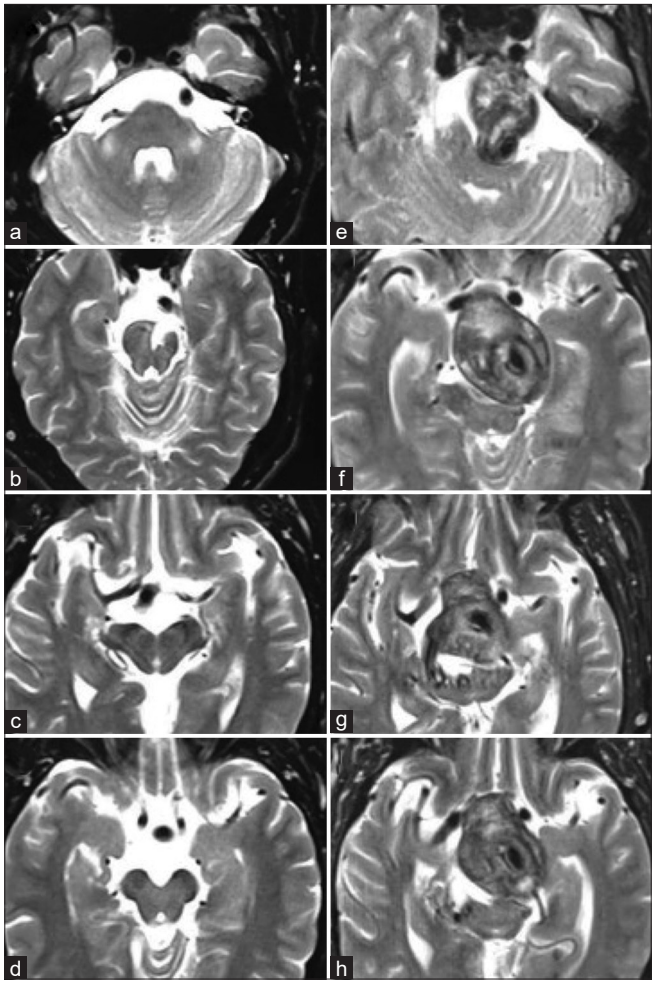

Figure 1: (a-d) T2-weighted axial magnetic resonance image (MRI) from 2013 showing chronic left pontine stroke and a dolichoectatic basilar trunk. (e-h) T2-weighted axial MRI from 2020 showing significant interval enlargement of the dolichoectatic basilar trunk now with periluminal thrombus and brainstem compression.

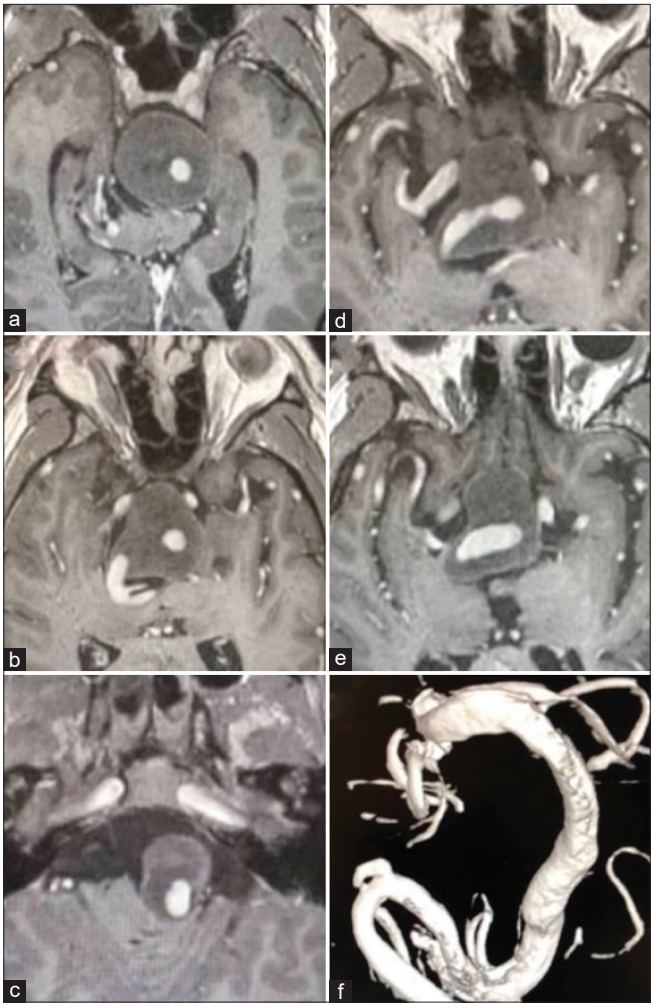

Figure 2: (a-e) T1-weighted axial magnetic resonance image showing massive partially thrombosed enlargement of the aneurysm with hydrocephalus and brainstem/optic chiasm compression and (f) associated 3D rotational angiography.

on antiplatelet therapy and his symptoms resolved without further intervention.

Seven years later, he presented with progressive headaches, dysphonia, swallowing dysfunction, and dysarthria. On physical examination, the patient had a dense right temporal hemianopsia and redemonstrated dysphonia, swallowing dysfunction, and dysarthria. Repeat imaging demonstrated interval enlargement of the aneurysm with significant periluminal thrombosis causing mass effect on the optic chiasm, brainstem, and cerebral aqueduct resulting in obstructive hydrocephalus [Figures 1e-g, Figures 2 and 3]. Interestingly, the patent lumen of the aneurysm only mildly increased in diameter compared to when the aneurysm was diagnosed in 2013.

Due to the progressive nature of the lesion and his worsening symptoms, the decision was made to proceed with intervention. However, given the extent of thrombosis within the aneurysm and the involvement of the basilar apex, it was believed that bypassing with flow reversal and vertebral artery sacrifice carried too much risk of periprocedural mortality and would not result in any further meaningful reduction in the size and resultant mass effect of the thrombosed portion of the aneurysm.[5] The use of a flow diverting stent through the patent lumen was felt to be a less aggressive option that, at minimum, would reduce the risk of aneurysm propagation in the future and may subsequently reduce the size of the thrombus over time.[8] However, even the diameter and length of the patent portion of the aneurysm was too large for any conventional flow diverting stents as even the largest Food and Drug Administration (FDA) approved flow diverters can only accommodate parent vessel diameters up to 6 mm. As such, FDA compassionate use exemption was obtained to utilize multiple Pipeline Vantage Embolization Devices with Shield Technology as these are manufactured with a

Figure 3: (a) Coronal and (b) sagittal T1-weighted magnetic resonance image showing massive partially thrombosed enlargement of the aneurysm, marked by the dashed lines, with hydrocephalus and brainstem/optic chiasm compression. (c) AP and (d) lateral left vertebral angiogram demonstrating mildly increased caliber of the patent portion of the aneurysm when compared to 2013.

large enough diameter to allow for good stent apposition within the large bore of the patent portion of the aneurysm. Before aneurysm treatment, the patient underwent ventriculoperitoneal shunting to treat the hydrocephalus as no aneurysm treatment strategy would immediately reduce the ventricular obstruction and shunting would be much more difficult once he was on dual antiplatelet therapy. After the patient consented to the procedure, 6 mm × 50 mm stents were deployed in a telescoping fashion to provide coverage across the entire lesion [Figure 4].[6]

The patient tolerated the procedure well and was discharged at his neurologic baseline. At nearly 1-year follow-up, the aneurysm was relatively stable in size and the patient remained at his neurologic baseline [Figure 5].

DISCUSSION

Dolichoectatic basilar trunk aneurysms remain some of the most difficult to treat with significant morbidity and mortality associated with any intervention.[2,5,8] In this case, a variety of interventions were considered as observation was thought to be inappropriate due to the significant progression of the lesion and worsening symptomatology. As previously mentioned, radial artery to posterior cerebral artery bypass with flow reversal and vertebral artery sacrifice was discussed; however, given that the patient had significant comorbidities

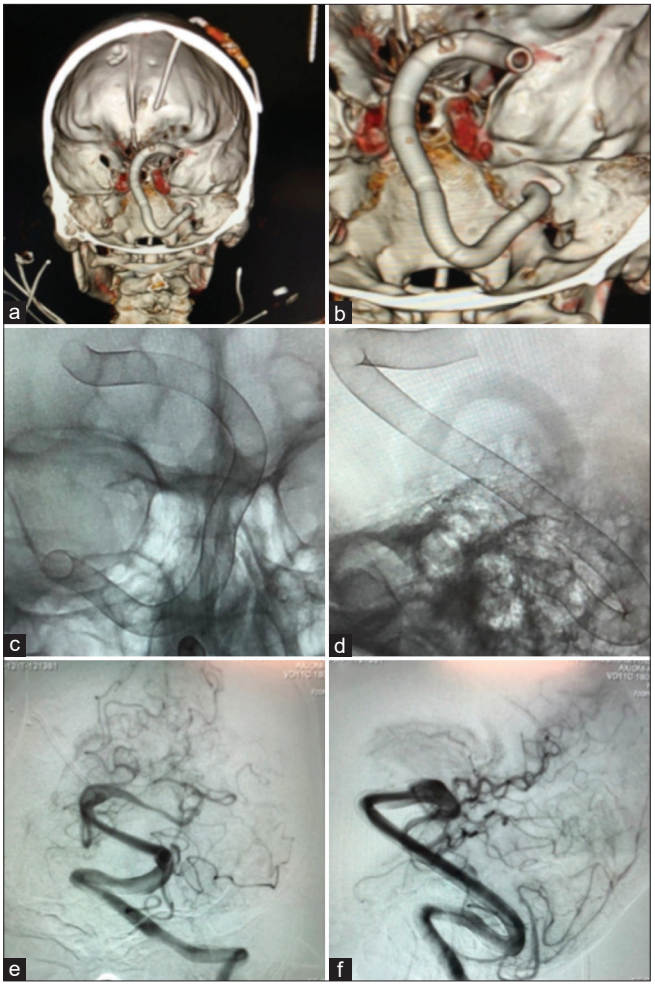

Figure 4: (a and b) 3D computed tomography reconstructions of the telescoping stent construct. (c) AP and (d), lateral plane X-rays demonstrating placement of the stents within the aneurysm. (e) AP and (f) lateral left vertebral artery angiograms demonstrating patency of the stents without distal emboli after deployment.

and the majority of the aneurysm had already spontaneously thrombosed, this surgery was thought to confer excessive risk. In addition, if there was aneurysm growth following this intervention, endovascular treatment would be extremely difficult. As such, this option was felt to be better utilized if flow diversion failed. However, after considering the flow diverting stents that were available, none were large enough in diameter to be well apposed within the patent portion of the aneurysm after deployment. As such, we received FDA compassionate use approval to use the Pipeline Vantage Embolization Device with Shield Technology as these stents are manufactured with diameters larger than 6 mm which would allow for good stent apposition in this case and prevent an endoleak from occurring. The Vantage devices are also coated with phosphorylcholine to decrease intraluminal thrombogenicity.[7] This is especially advantageous in this case as the most frequent complication of flow diversion

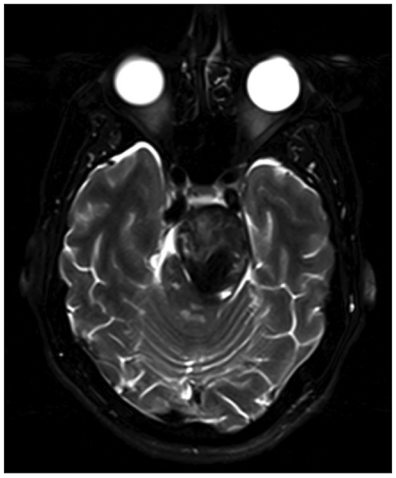

Figure 5: Follow-up T2-weighted axial magnetic resonance image at 1 year demonstrating stability in size of the aneurysm.

in dolichoectatic basilar trunk aneurysms is perforator occlusion and subsequent brainstem stroke.[2,3,5,8]

CONCLUSION

To the best of our knowledge, this is the first report deploying multiple Pipeline Vantage Embolization Devices telescopically to treat a symptomatic partially thrombosed giant, dolichoectatic basilar trunk aneurysm. Our case illustrates the need for continued development of next generation flow diverters as there still remains aneurysms with very limited and potentially high risk, management options.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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