

Introduction

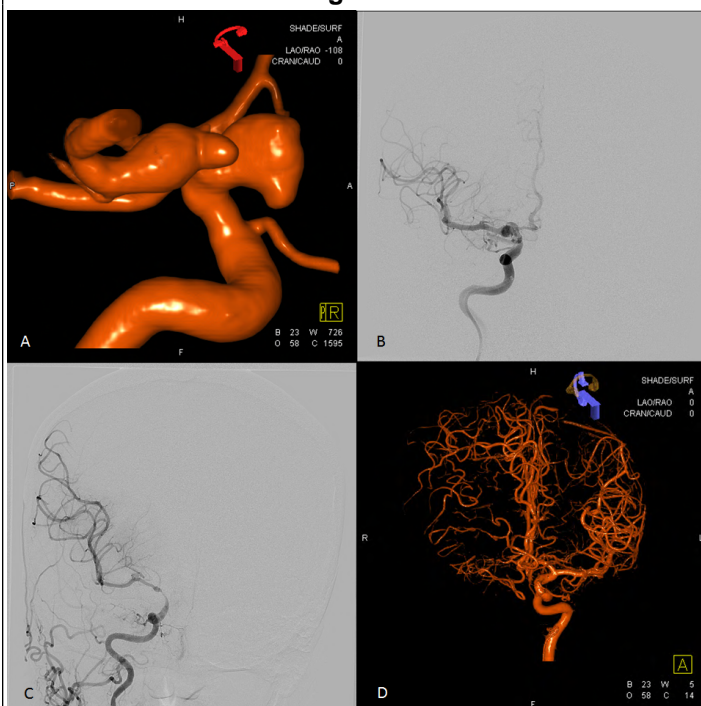
The Pipeline Embolization Device (PED) is increasingly used for both on- and off-label purposes for treatment of intracranial aneurysms. The device gradually slows flow of blood into the aneurysm, but the high metal coverage of PED promotes endothelialization of the device.

Occasionally, this leads to in-stent stenosis that is clinically well-tolerated. We present a multi-institutional PED series that includes 4 cases of gradual, asymptomatic tourniquet occlusion within the PED and parent vessel.

Methods

Institutional databases at each participating center were searched for patients treated with the Pipeline Embolization Device (ev3, Irvine, CA). We selected patients that had at least 50% stenosis or occlusion, and reviewed all relevant clinical and radiographic data.

Figure 1



Case 1

Learning Objectives

- 1) Be able to identify the common applications for Pipeline
- 2) Be able to describe the common complications with Pipeline
- 3) Be able to distinguish between acute thrombosis and tourniquet occlusion

Results

A total of 326 cases performed by 5 neurointerventionalists across 4 institutions were reviewed. Among these, there were 4 cases of complete occlusion and 2 cases of 50% stenosis, for an occlusion rate of 1.2%. All patients were clinically asymptomatic.

Conclusions

A gradual, tourniquet-like occlusion can occur following placement of PED, leading to vessel occlusion. This has been clinically well-tolerated by patients in our series due to the formation of pial collaterals as the stenosis progresses, likely due to ischemic preconditioning. Small parent vessel, preexisting stenosis, fusiform pathology, overlapping devices, and suboptimal antiplatelet therapy seem to be predisposing factors. Further experience and follow-up with these patients will allow us to characterize risk factors and optimize post-procedural therapy for these patients.

References

1. Bahl VK, Narang R: Elective stenting in small coronary arteries: lessons learnt from recent trials. *Indian Heart J* 53:275-281, 2001
2. Chalouhi N, Polifka A, Daou B, Kung D, Barros G, Tjoumakaris S, et al: In-Pipeline Stenosis: Incidence, Predictors, and Clinical Outcomes. *Neurosurgery* 77:875-879; discussion 879, 2015
3. Cohen JE, Gomori JM, Moscovici S, Leker RR, Itshayek E: Delayed complications after flow-diverter stenting: reactive in-stent stenosis and creeping stents. *J Clin Neurosci* 21:1116-1122, 2014
4. Dai D, Ding YH, Kelly M, Kadirvel R, Kallmes D: Histopathological findings following pipeline embolization in a human cerebral aneurysm at the basilar tip. *Interv Neuroradiol* 22:153-157, 2016
5. Daou B, Starke RM, Chalouhi N, Barros G, Tjoumakaris S, Rosenwasser RH, et al: P2Y12 Reaction Units: Effect on Hemorrhagic and Thromboembolic Complications in Patients With Cerebral Aneurysms Treated With the Pipeline Embolization Device. *Neurosurgery* 78:27-33, 2016
6. Daou B, Valle-Giler EP, Chalouhi N, Starke RM, Tjoumakaris S, Hasan D, et al: Patency of the posterior communicating artery following treatment with the Pipeline Embolization Device. *J Neurosurg*:1-6, 2016