The main concern with the use of the pipeline embolization device (PED) in treating cerebral aneurysms is the risk of hemorrhagic and thromboembolism, including several cases of branch artery occlusion and delayed occlusion of the stented parent vessel shortly after antiplatelet medications were discontinued, highlighting the potential need for long-term antiplatelet therapy, and disastrous bleeding complications in unruptured aneurysm.

In addition, these microcell stents are difficult to use in distal aneurysms located over the ICA bifurcation and basilar tip because of the stiffness of the device, and perforating vessel occlusion is more likely to occur due to the characteristics of the stent. Before the era of flow-diverting microcell stents, large cell intracranial stents like the Neuroform stent (Boston Scientific/Target Therapeutic, Fremont, CA, USA) and Enterprise stent without coiling were used to provide flow-diverting effects for complex intracranial aneurysms.

Aneurysm treatment with the Pipeline Embolization Device is associated with the lowest complication rates when used to treat small ICA aneurysms. Procedure-related morbidity and mortality are higher in the treatment of posterior circulation and giant aneurysms [1].

In-Pipeline stenosis

In-Pipeline stenosis (IPS) is a common, early, and mostly benign complication. Patients with internal carotid artery aneurysms are more likely to develop IPS. Aspirin plays a key role in preventing IPS [2].

Aneurysm clips placed on canine parent arteries bearing a Pipeline flow diverter were unable to reliably stop blood flow. Application of aneurysm clips can cause mild damage to the device and neointima, which might translate into thromboembolic risks. If possible, vascular control should be sought beyond the terminal ends of the implanted device [3].

Acute embolism following use of the PED for treatment of intracranial aneurysms is more common than hypothesized. The only identifiable risk factor for embolism appears to be greater aneurysm size, perhaps indicating significant disturbed flow across the aneurysm neck with ingress and egress through the PED struts. The strength of antiplatelet therapy, as measured by residual platelet aggregation, did not appear to be associated with cases of procedural embolism. Further work is needed to determine the implications of these findings and whether anticoagulation regimens can be altered to lower the rate of complications following PED deployment [4].

Significant heterogeneity in dual antiplatelet therapy regimens following Pipeline Embolization Device (PED) placement and associated costs, exists at major academic neurovascular centers. The most commonly used first line dual antiplatelet regimen consists of aspirin and clopidogrel. Two major alternate protocols involving ticagrelor and prasugrel, are administered to clopidogrel hypo-responders. The optimal dual antiplatelet regimen for patients with cerebrovascular conditions has not been established, given limited prospective data within the neurointerventional literature [5].

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