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RUPTURED INTRACRANIAL ANEURYSMS TREATED WITH THE PIPELINE EMBOLEZIZATION DEVICE: A SYSTEMATIC REVIEW AND POOLED ANALYSIS OF INDIVIDUAL PATIENT DATA

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Objective The pipeline embolization device (PED) is a flow diverting stent used for the treatment of intracranial aneurysms. This technique necessitates dual antiplatelet therapy (DAPT) and aneurysm occlusion is delayed. Despite these limitations, the PED is used for a subset of ruptured aneurysms not amenable to traditional treatment techniques. We seek to evaluate the safety and efficacy of this practice.

Methods A systematic review of the PubMed and MEDLINE databases from January of 2011 to October of 2019 was performed to identify studies of ruptured intracranial aneurysms treated with the PED. Inclusion required publication in English, a minimum of 5 cases and reporting of clinical outcome and complications. Duplicate patient reports from the same author(s) were excluded. Individual patient data was collected for pooled analysis.

Results Individual patient data was collected for 140 patients with 140 ruptured aneurysms treated with the PED from 11 studies. Seventy-four (73.3%) out of 101 patients were female and the mean age of 50.9 years. Hunt and Hess score was 1–3 for 84.2% of patients. Mean aneurysm size was 6.0 mm and the majority were blister (51.0%) or dissecting (26.9%) in morphology. Aneurysms re-hemorrhaged following PED placement in 3 (2.1%) cases: 3 mm saccular ICA aneurysm, 21 mm saccular ICA aneurysm, and 34 mm fusiform ICA aneurysm. Larger aneurysm size (p=0.05) and saccular morphology (p=0.01) were associated with aneurysm re-hemorrhage. Of the 125 patients with radiographic follow up, 104 (83.2%) had complete aneurysm occlusion. Slower aneurysm size was associated with complete aneurysm occlusion (p=0.03). Symptomatic neurologic complications occurred in 18 (12.4%) and symptomatic neurologic complications were associated with increasing Hunt and Hess score and Fisher grade.

Conclusion The majority of ruptured aneurysms treated with the PED and reported in the literature were blister or dissecting in morphology. Treatment of ruptured aneurysms was associated with a re-hemorrhage rate of 2.1% and complete occlusion rate of 83.2%. Flow diversion with the PED is a viable option for ruptured aneurysms not amenable to traditional surgical and endovascular treatment options.