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Incidence of Branch Occlusion and Ischemic Complications Following Pipeline Embolization of Posterior Circulation Aneurysms

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Introduction

Pipeline Embolization Device (PED) is used for treatment of intracranial aneurysms with increasing frequency due to high obliteration rate and low morbidity. While occlusion of covered branches in the anterior circulation is generally asymptomatic, this has not been studied in the posterior circulation.

Methods

A retrospective review of posterior circulation aneurysms treated with PED placement at eight academic institutions was performed from the years 2009 to 2016. Branch coverage and occlusion following PED placement was evaluated. Vessels that were assessed included the vertebral artery, posterior inferior cerebellar artery, anterior inferior cerebellar artery, superior cerebellar artery, and posterior cerebral artery.

Results

One-hundred and twenty-nine consecutive patients underwent treatment of 131 posterior circulation aneurysms with PED. Adjunctive coiling was used in 31% of procedures. Following PED placement, 1 or more branches were covered in 69% of procedures. At a median follow-up of 11 months, 13% of the covered vessels had occluded. Asymptomatic aneurysms ($p = 0.003$) and the use of adjunctive coiling ($p = 0.05$) were associated with a higher rate of branch occlusion after coverage. Thromboembolic complications occurred in 22.5% of procedures. The risk was significantly higher when branches were covered with PED compared to cases with no branch coverage ($p = 0.006$). In most cases, the territory involved by thromboembolic complications was supplied by the covered branch (79.5%). This was most commonly noted with posterior cerebral artery coverage. When more than one branch is covered, there was a significant increase in the rate of branch occlusion ($p = 0.03$), but not the rate of thromboembolic complications.

Conclusions

This is the first study to evaluate the fate of posterior circulation branches covered by PED with attention to risk of thromboembolic complications. Occluded branches were interestingly not associated with significant increase in thromboembolic rate compared to covered branches that remained patent.

Learning Objectives

To identify the incidence and predictors of branch occlusion and thromboembolic complications following PED placement in treatment of posterior circulation aneurysms.

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