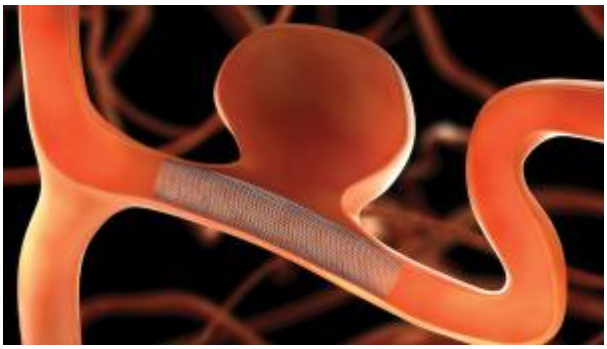
Pipeline embolization device for posterior circulation aneurysm



The use of the pipeline embolization device (PED) for posterior circulation aneurysms remains controversial. In a meta-analysis, Liang et al., from the Beijing Tiantan Hospital and Beijing Tsinghua Changgung Hospital, aimed to explore the safety and efficacy of PED for these aneurysms. Meta regression was used to identify predictors for incomplete aneurysm occlusion and procedure-related complications.

PubMed, Web of Science, and OVID databases were searched to identify all published references evaluating the treatment effect of PED for posterior circulation aneurysms. Only studies written in English, reporting original data, and including more than 10 cases were considered for inclusion. Patient demographics, aneurysm characteristics, angiographic, and clinical outcomes were extracted. A random effects model was adopted to pool the obliteration rates and complications rates across selected studies. Finally, they conducted meta-regression analysis to identify the predictors of the angiographic outcomes.

12 studies, including 358 patients with 365 aneurysms were included. The pooled complete aneurysm obliteration rate was 82% (95% confidence interval [CI], 73%-90%) and the pooled procedure-related complication rate was 18% (95% CI, 14%-22%). Increasing age predicted incomplete obliteration of aneurysms after PED treatment in these patients (P=0.01).

PED is an alternative to treat intracranial aneurysms of the posterior circulation, achieving high complete occlusion rates, but less effective in senile patients. However, the risk of procedure-related complications is not negligible. Further larger and long-term follow-up studies are needed before definitive conclusions might be drawn [1)].

From November 2015 to November 2016, 35 patients with 38 posterior circulation aneurysms were treated with the PED in this retrospective study. We evaluated the angiographic and clinical outcomes of these aneurysms at last follow-up, and made a comparison between anterior (n = 163) and posterior circulation (n = 38) aneurysms regarding the technical nuances, occlusion rate, complications rate, and time to occlusion to explore whether we should rationalize the use of the PED for these aneurysms.

With a median follow-up time of 5.5 months, complete occlusion was achieved in 33 aneurysms (91.7%). Aneurysms with stenosis parent artery tended to have lower occlusion rate (P = 0.064; odds ratio, 0.074; 90% confidence interval, 0.001-1.781), and V4 segment aneurysms tended to occlude

themselves much faster than vertebrobasilar junction aneurysms (median, 148 vs. 246 days, respectively; P = 0.076). The periprocedural complication rate was 10.8%, and no major adverse events occurred. Compared with anterior circulation aneurysms, shorter procedure time (116.0 vs. 135.4 minutes, P = 0.012) and higher occlusion rate (91.4% vs. 72.8%, P = 0.023) were achieved for posterior circulation aneurysms. Besides, technical event rate (8.1% vs. 14.1%, P = 0.424) and complication rate (10.8% vs. 18.4%, P = 0.338) tended to be lower. Survival analysis indicated a shorter interval to complete occlusion for V4 segment aneurysms compared with anterior circulation (148 vs. 191 days, respectively; P = 0.047).

PED has a favorable performance at posterior circulation, and it is rational to expand the indication to include these aneurysms. However, a case-control study is still needed to further expatiate whether the PED has advantages over traditional endovascular treatment [2].

In 2018, a retrospective review of prospectively maintained databases at 8 academic institutions was performed for the years 2009 to 2016 to identify patients with posterior circulation aneurysms treated with PED placement.

A total of 129 consecutive patients underwent 129 procedures to treat 131 aneurysms; 29 dissecting, 53 fusiform, and 49 saccular lesions were included. At a median follow-up of 11 months, complete and near-complete occlusion was recorded in 78.1%. Dissecting aneurysms had the highest occlusion rate and fusiform the lowest. Major complications were most frequent in fusiform aneurysms, whereas minor complications occurred most commonly in saccular aneurysms. In patients with saccular aneurysms, clopidogrel responders had a lower complication rate than did clopidogrel nonresponders. The majority of dissecting aneurysms were treated in the immediate or acute phase following subarachnoid hemorrhage, a circumstance that contributed to the highest mortality rate in those aneurysms.

In the largest series till 2018, fusiform aneurysms were found to have the lowest occlusion rate and the highest frequency of major complications. Dissecting aneurysms, frequently treated in the setting of subarachnoid hemorrhage, occluded most often and had a low complication rate. Saccular aneurysms were associated with predominantly minor complications, particularly in clopidogrel nonresponders [3].

In 2015, a case series publication of Albuquerque et al. stated that patient selection is essential for safe and effective PED treatment of posterior circulation aneurysms. The PED is equally effective in achieving aneurysm obliteration with an acceptable risk profile as it is in the anterior circulation. Dolichoectatic aneurysms were not included in this treatment cohort. PED may be a preferable alternative to open surgical treatment of posterior circulation aneurysms [4].

References

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