Pipeline Embolization Device Indications

Pipeline Embolization Device (PED) offers an acceptable alternative for the treatment of difficult aneurysms according to their morphologies, including giant, wide-necked, fusiform, complex, and blister types.

PED was initially approved for adults with large or giant wide-necked (≥4 mm or no discernible neck) internal carotid artery aneurysms from the petrous to the superior hypophyseal segments. Studies have shown a superior aneurysm occlusion rate of 85 % at 6 months for the PED and mortality ranging from 2.6 to 4 %. There appears to be a knowledge gap in terms of the duration of dual antiplatelet therapy and efficacy of assessing platelet inhibition. However, increasing operator experience and favorable longer-term outcome data have led to the exploration of PED for a wide array of off-label uses. Given the paucity of good-quality studies comparing PED with other endovascular/surgical treatment options, several multicenter randomized trials are currently underway to answer these important questions [1)].

Pipeline embolization device (PED) can be utilized in the treatment of distal anterior circulation aneurysms with difficult anatomy for conventional surgical or endovascular techniques. Larger-scale studies with long-term follow-up are needed to further elucidate the durability of PED treatment and its effect on perforator-rich vascular segments [2)].

The use of the pipeline embolization device (PED) for posterior circulation aneurysms remains controversial. In a meta-analysis, Liang et al., 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, we 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 [3)].

References

1)
Murthy SB, Shah J, Mangat HS, Stieg P. Treatment of Intracranial Aneurysms With Pipeline Embolization Device: Newer Applications and Technical Advances. Curr Treat Options Neurol. 2016 Apr;18(4):16. doi: 10.1007/s11940-016-0399-0. PubMed PMID: 26923606.
2)
Lin N, Lanzino G, Lopes DK, Arthur AS, Ogilvy CS, Ecker RD, Dumont TM, Turner RD 4th, Gooch MR, Boulos AS, Kan P, Snyder KV, Levy EI, Siddiqui AH. Treatment of Distal Anterior Circulation Aneurysms With the Pipeline Embolization Device: A US Multicenter Experience. Neurosurgery. 2016 Jul;79(1):14-22. doi: 10.1227/NEU.0000000000001117. PubMed PMID: 26579967.
3)
Liang F, Zhang Y, Yan P, Ma C, Liang S, Jiang C. Outcomes and complications after the use of the pipeline embolization device in the treatment of intracranial aneurysms of the posterior circulation: A systematic review and meta-analysis. World Neurosurg. 2019 Apr 5. pii: S1878-8750(19)30972-6. doi: 10.1016/j.wneu.2019.03.291. [Epub ahead of print] PubMed PMID: 30959253.