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Flow Diverter Therapy for Unruptured Small and Mediu m-Sized Intracranial Aneurysms

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Purpose:
The Pipeline embolization device (PED, Medtronic) was introduced clinically in 2015 for the treatment of unruptured or chronically ruptured large and giant intracranial aneurysms. Since 2020, its indications have been expanded to include small aneurysms (> 5 mm). While there is established evidence for large and giant aneurysms, data for small to medium-sized aneurysms are limited. Therefore, we report the outcomes of PED placement for small to medium-sized unruptured aneurysms performed at our institution.

Methods:
From June 2013 to October 2021, we targeted 102 cases with 104 aneurysms in which the parent vessel diameter was less than 5 mm, the neck length was at least 4 mm, or the dome-to-neck (D/N) ratio was less than 1.5 out of a total of 128 aneurysms with a diameter of 12 mm or less treated with PED placement at our institution.

Results:
The mean age of the patients was 57.7 ± 12.1 years, with 90.4% being female. The mean aneurysm size was 9.2 mm, neck length 5.3 mm, and D/N ratio 1.8. Coil embolization (CE) was used concurrently in 43.3% of cases, and PED Shield with surface modification was used in 47.1%. Follow-up angiography at approximately one year showed a complete occlusion rate of 92.3%, with no significant parent vessel stenosis or clinical complications. The use of CE or PED Shield was associated with early aneurysm occlusion. There was no significant difference in complete occlusion rates between younger and older patients. Branching from the aneurysm was a significant factor for incomplete occlusion.

Conclusions:
PED placement for unruptured intracranial aneurysms achieves a high complete occlusion rate with safety. However, careful consideration should be given to its use in cases where branching from the aneurysm occurs.