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Current Status of the PulseRider in the Treatment of Bifurcation Aneurysms: A Systematic Review

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Introduction

The PulseRider is an innovative stent-like device designed for the treatment of intracranial bifurcation aneurysms. The device is designed to remodel bifurcation points while protecting vessel branches and providing support during coil embolization. The goal of this study was to assess the current evidence on safety and effectiveness of the PulseRider (Figure 1).

Methods

A systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Figure 2). The following databases were searched: PubMed, Ovid MEDLINE, and Scopus. The search strategy consisted of 'pulserider', 'bifurcation aneurysm', and 'endovascular' in both AND and OR combinations. Studies included in the review were original research articles in peer-reviewed journals. The manuscripts were thoroughly examined and compared on study design, outcomes, and results.

Figure 1

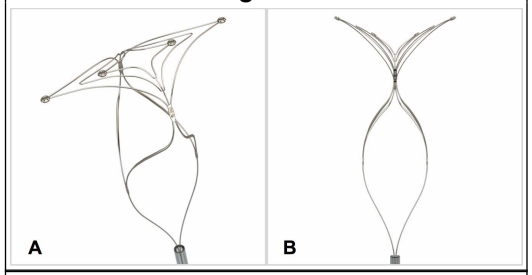
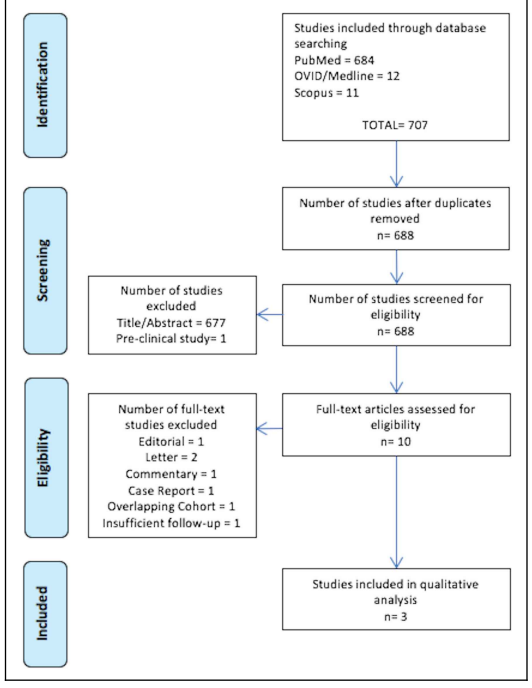


Figure 2



Results

A total of 3 studies were identified describing the use of the PulseRider device in the treatment of 63 patients with 63 bifurcation aneurysms. We identified 2 multicenter case series and 1 single-arm clinical trial. The majority of aneurysms treated were located at the basilar tip (37, 58.7%). All devices were successfully deployed and there were 5 periprocedural complications (7.9%); including 2 intraoperative aneurysm ruptures, 1 vessel dissection, and 2 thrombus formations. Immediate complete aneurysm occlusion was achieved in 61.9% (39/63) of cases and at the 6-month imaging follow-up, 66.7% (42/63) achieved complete aneurysms occlusion. There was 1 recanalization reported in one of the multicenter case series within the 6-month follow-up.

Table 1

Table 1. Study outcomes.

Reference (year)	PulseRider Configuration (n)	Intraoperative Complications (n)	Complete Occlusion at Placement (%)	Residual Neck at Placement (%)	Residual Aneurysm at Placement (%)	Post-operative Antiplatelet Therapy	mRS (0-2) at Discharge (%)	mRS (0-2) at 6 months	Complete Occlusion at 6 months (%)	Residual Neck at Placement (%)	Residual Aneurysm at 6 months (%)
Mukherjee et al. (2016)	T (7), Y (3)	Asymptomatic non-occlusive thrombus formation (1)	10 (100)	0	0	Clopidogrel (75 mg) and Aspirin (75 mg) daily for 3 months; Aspirin (75 mg) ad lifelong	10 (100)	10 (100)	10 (100)	0	0
Gory et al. (2017)	Not reported	Intraoperative aneurysm rupture (1)	11 (57.9)	6 (31.6)	2 (10.5)	Not standardized. Clopidogrel (75 mg) for 3 months and Aspirin (75 - 325 mg) for 12 months or lifelong	Not reported	Not reported*	12 (63.1)	6 (31.6)	1 (5.3)
Spiotta et al. (2017)	T (23), Y (11)	Intraoperative aneurysm rupture (3), Thrombus formation (1), vessel dissection (1)	18 (52.9)	9 (26.5)	7 (20.6)	Clopidogrel (75 mg) and Aspirin (75 mg) daily for 6 months	Not reported	32 (94.1)	20 (60.6)	9 (27.3)	3 (12.1)

mRS: modified Rankin Scale.
* Authors reported a permanent 6-month morbidity rate of 3.5%. The patient who suffered the intraoperative aneurysm rupture improved clinically but remained with neurological symptoms.

Conclusions

The literature suggests the PulseRider is safe and probably effective for the treatment of intracranial bifurcation aneurysms, however, current evidence is limited to a small sample and short follow-up. In addition, the device has not been compared to other treatment modalities.

Learning Objectives

By the conclusion of this session, participants should be able to:

1) Describe the importance of new technologies for the treatment bifurcation aneurysms.

2) Discuss, in small groups the current evidence of the PulseRider for the treatment of intracranial aneurysms.

3) Identify a useful addition to the endovascular armamentarium.