Multiple Aneurysms with Single Flow Diverter: Less is More

Pérez-Martínez Luis E.¹; Martín del Campo Nerea¹; Roman-Zamudio Mariana.¹; Figueroa-Sánchez, José A., MD, MBA¹,².

¹ Tecnológico de Monterrey School of Medicine, Tecnológico de Monterrey University MSC, N.L., Mex.
² Zambrano Hellion Hospital, Department of Neurosurgery, Monterrey, N.L. Mex.
Disclosure

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Introduction

- Intracranial aneurysms are localized dilations of cerebral arterial walls that are prone to rupture.
- Often develop near a vessel bifurcation; preferentially in anterior cerebral circulation.
- Unruptured aneurysms have a benign course; 80-85% remain asymptomatic.
- High prevalence: 2-3% of population; 20-30% multiple aneurysms.
- 85% of subarachnoid hemorrhages are leading cause of hemorrhagic stroke.
- *Tandem aneurysms:* Two or more aneurysm located in close proximity on the same parent vessel.
Introduction

- Relevant factors for aneurysm formation:
  - Female gender, nicotine consumption, aneurysm multiplicity and patient age.

- Surgical Techniques
  - Simple clipping, temporary artery occlusion, wrapping and clipping, bypass and bipolar coagulation.

- Transluminal Embolization Techniques
  - Simple coiling, double catheter, balloon-assisted coiling, stent-assisted coiling and flow-diverting stents.
Case Presentation

- We describe the case of a 42-year-old female with tandem aneurysms treated with a single flow diverter.

- Relevant past history:
  - Aneurysm on right PCoA embolized four years ago.
  - Systemic arterial hypertension adequately controlled for six years
  - Type 1 obesity (BMI 32.5) and smoker

- The patient presents with occasional, non-intense headaches and chronic anxiety due to previous diagnosis of cerebral aneurysm.

- Receives 1 year treatment for anxiety and depression.

- Flow diverter was the choice of treatment due to the localization of the lesion and the patient psychiatric condition.
Treatment

- Multiple aneurysms in tandem on supraclinoid intracranial internal carotid.
  - Largest: 8 mm x 7.5 mm
  - Two Adjacent: 4.2 mm x 4 mm and 3.8 mm x 4 mm
- Flow diverters are approved for treating unruptured large and giant aneurysms from the internal carotid artery between the superior hypophyseal and cavernous segments.
- Use of FRED (flow redirection endoluminal device) model FRED4017 with 4mm fully open implant diameter and working length of 26 mm (total 31 mm).
- Flow change and intra-aneurysmal thrombus was achieved.
Imaging

Figure 1: DSA carotid artery lateral view showing multiple Aneurysms (green arrows)
   Largest: 8 mm x 7.5 mm
   Two Adjacent: 4.2 mm x 4 mm | 3.8 mm x 4 mm

Figure 2: DSA carotid artery lateral view FRED Flow Diverter
   Model: FRED4017
   Diameter: 4 mm | Length: 26 / 31 mm
Figures 3 and 4: DSA carotid artery lateral view. Flow change and intra-aneurysmal thrombus formation (green arrows)
Discussion

● Successful use of a single flow diverter device to treat tandem aneurysms; case report as a proof of concept.

● Several authors have used a single flow diverting device to treat tandem aneurysms, concluding they have an acceptable safety profile and are effective therapeutically. (Awad et al., 2017; Bhogal et al., 2018; John S. et al., 2017)

● Morbidity and Mortality rates of Flow Diverters: 8-10%
  ○ Complications: Side branch occlusion, perforator occlusion, intraprocedural vessel perforation/rupture, perianeurysmal edema and ischemic stroke due to occlusion or thromboembolism.

● Dual antiplatelet therapy is needed to minimize risk of device thrombosis.
Conclusions

- Off label use of flow diverters for tandem aneurysms is safe, feasible and efficacious.
- Especially useful for complicated situations (giant aneurysms, bifurcation location) and could represent a reduction in financial costs, operation time and radiation exposure.
- More investigation is required to promote its disseminated use as a treatment alternative and is currently limited to tandem aneurysms within 20-25 mm due to the flow diverter lengths available.