

Abstract E-025 Figure 1 (a) Pre-treatment angiogram showing 8 mm aneurysm, (b) virtual deployment of 2.75×12 mm Pipeline FD, (c) placement of the same FD size across the aneurysm neck with the vessel opacified.

Conclusion Our early experience with the computational modeling system suggests that the technology can potentially accurately predict FD behavior and facilitate the selection of the optimal FD size for a vessel. The technology has great potential to reduce technical complications during FD treatment and improve treatment outcomes.

REFERENCES

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E-026

ENDOVASCULAR TREATMENT OF PERICALLOSAL ARTERY ANEURYSMS: SINGLE CENTER EXPERIENCE WITH EARLY FOLLOW UP

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Traditionally, microsurgical clipping has been the mainstay of treatment for pericallosal artery aneurysms (PAAs). However, this has changed in recent years with advancements in endovascular surgical techniques. We conducted a retrospective cohort study of pericallosal artery aneurysms that underwent endovascular treatment with coiling and flow diversion at our institution. 33 patients with 34 aneurysms were included (25 aneurysms ruptured, 9 unruptured or recurrent). Of the ruptured group, 22 were coiled (88%) and rest treated with flow diversion. Initial angiographic follow up rate was 72% at median of 159 days. Overall recurrence rate was 40% (10/25) at median of 376 days, all among coiled aneurysms. 6 recurrent aneurysms were retreated with further coiling (2) and flow diversion (4). Of the unruptured/recurrent group, 5 were coiled (55%) and remainder treated with flow diversion. Initial angiographic follow up rate was 100% at median of 267

days. Recurrence rate was 22% (2/9), both in coiled aneurysms. Overall, 27 aneurysms were treated with coiling, 9 with flow diversion and 3 with 'partial' flow diversion. All aneurysms treated with pipeline flow diversion achieved 100% occlusion. No re-rupture or new rupture was noted in our series. Good clinical outcome (modified Rankin scale, mRS 0–2) was seen in 79% of patients. Our study demonstrates that endovascular coiling for PAAs is associated with a definite rate of recurrence, which has to be monitored with timely angiography. We also demonstrate the excellent effectiveness of flow diversion for PAAs with either presentation.

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E-027

'DONUT' ANEURYSM OF THE ANTERIOR CEREBRAL ARTERY: A RARE VASCULAR PHENOMENON

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Introduction Intracranial aneurysms with a 'donut-shaped' appearance are believed to be the result of laminar flow within large or giant aneurysms leading to central stagnation, intraluminal thrombosis and eventual 'donut' shaped configuration. We present a patient who experienced SAH due to ruptured 'donut' aneurysm focusing on her unique anatomy and repair.

Materials and methods A 55 year old woman presented to the ED after developing a severe headache. CT revealed left-sided SAH with the epicenter in the region of the left carotid terminus. Subsequently she was further evaluated with CTA, and catheter angiogram. Treatment with platinum coils was staged. An initial dome protection at the proposed bleeding site allowed us to further evaluate the anatomy and flow dynamics with further 2D and 3D angiograms, including a carotid cross-compression angiogram. Subsequent treatment options were flow diversion, surgical clipping and coil embolization without or with stent protection. A patent anterior communicating artery allowed us to simply coil the aneurysm resulting

a sacrifice of flow via the left A1. Finally the patient was evaluated by a retinal specialist for post-treatment changes.

Results CTA and catheter angiography revealed a 25 mm donut-shaped giant aneurysm. Contrast entered via the proximal A1 and continued in a circular pattern. The outflow was separate, into the more distal A1. A Murphy's point along the superior margin of the donut represented the rupture site. Dome protection with coils at that location also disrupted the circulation of blood, reversed flow direction that now took the short route instead of the circular, long route. One week later an adequate carotid cross-compression angiogram revealed good cross-filling from right ACA to left ACA. That simplified our treatment options; the aneurysm was obliterated with coils. The left A1 segment was sacrificed. Following the procedure the patient noted 'black spots' in her vision in the left eye; neurologic exam was nonfocal; bedside acuity exam was 20/25. Retinal evaluation revealed small retinal hemorrhages in the left eye.

Conclusion Donut-shaped giant aneurysms are a rare subtype, accounting for $\leq 1\%$ of partially thrombosed giant aneurysms. The mechanism is proposed to be a circular, laminar flow within the aneurysm that leads to eventual central intraluminal thrombosis. In our patient the unusual feature is the separate inflow and outflow zones, separated by a 4-millimeter segment of the donut. The relationship to the optic tract remained unclear, to be further evaluated with an upcoming MRI. Our patient experienced visual symptoms shortly after final embolization and subsequently was found with several small retinal hemorrhages. How the optic nerve is associated with the aneurysm, is it possibly pinched between the aneurysm and the bony sella, or simply has some shared vascular supply, may be better determined by MRI.

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healthcare. Current device testing methods must be developed to quantify downstream particulate migration. *In vivo* models are limited by local vessel structure and may lack neurovascular feeder vessels. Limited feedback devalues assessment of particles and downstream movement of devices/materials. NAU's Bioengineering Devices Lab has developed an *in vitro* blood flow and stroke model, which replicates the conditions of the neurovascular system. In prior workings, the *in vitro* model has quantified material particles via filtration and microscopy to analyze captured particles. This process was time, resource, and data-intensive and required flow within the model to cease as researchers interchange filters. Now a noninvasive method allows researchers to quantify and characterize particles in real time.

Materials and methods These improvements are made possible through digital holography. Holography records a particle's amplitude and wavefront phase to produce a pattern that can create a 3D holographic image with a CMOS camera. The pump delivers pulsatile flow with a pressure profile that tunes to physiological conditions. The Holographic system consists of a HeNe laser and an in-line cuvette to analyze the liquid passing through with light refraction (figure 1).

Results Long and short term testing helps determine the potential material efficiency within the vascular system. Analysis of real-time data will quantify particulate size. Results then are compared to (<USP 788> - table 1) regulations.

Abstract E-028 Table 1 (<USP 788>) Specifications for injectable liquids and particulate size

Particulate Size	Required Specs
> 100 μm	0 particles
25 μm to 100 μm	< 300 particles
10 μm to 25 μm	< 3000 particles

E-028 PARTICLE SIZING THROUGH IN-LINE HOLOGRAPHY

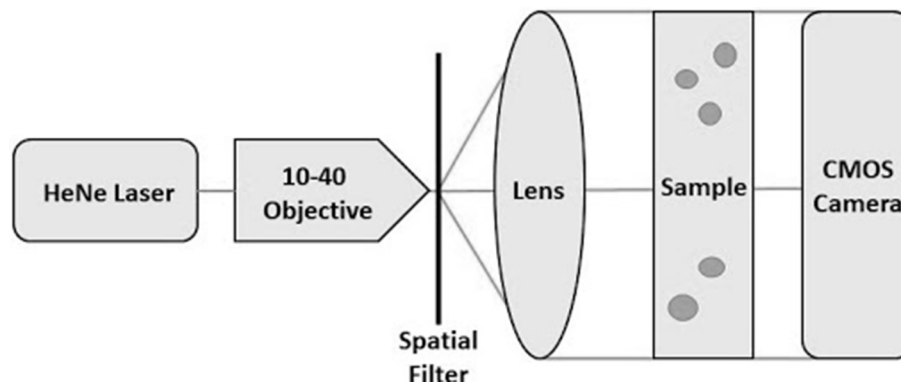
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Introduction/Purpose Endovascular devices are becoming more widely accepted ischemic stroke treatment options in patient

Conclusion The study results will help predict device performance within the neurovascular system to affirm the safety of the polymer biomaterial, PPODA-QT, in practical usage. With state of the art equipment and procedures, new innovative research arises.

Disclosures I. Smith: None.



Abstract E-028 Figure 1 Holography Imaging Setup. Laser diffraction compares the particle index to refraction of the particles to determine size. Digital convergence of 3D diffraction patterns to 2D particle image via algorithm is conducted. PPODA-QT injects into the in-vitro model's aneurysm bubble, and a LabView VI (National Instruments, TX) processes real-time particulate migration data