anatomy to compare Comaneci vs balloon assisted catheterization of small feeders.

Methods and Methods Patient is a 37-year-old man who presented with sudden onset of severe headache and left sided weakness. Initial CT head and MRA showed left basal ganglia hemorrhage associated with left thalamic AVM. Using a 3D model of the AVM, 30 iterations of micro-catheterization was performed with balloon (Hyperform 4x7mm), Comaneci Petit (24mm length) stent, and without any device assistance (10 each).

Results During the embolization procedure, Comaneci stent provided adequate support distal to the origin of the arterial feeder to the AVM, and the microcatheter was successfully navigated into the small sharply angled feeder (**figure 1A**). Experimental model showed similar effectiveness of balloon and Comaneci stent with 3/10 first-attempt success rate for micro-catheterization, and 0/10 without any device (**figure 1B**). Patient tolerated the procedure well with no ischemic or hemorrhagic complications.

Conclusion Comaneci stent showed similar efficacy compared to a balloon for distal micro catheterization without distal flow-arrest. Our technical report along with the 3-D model experiments provide insights into the utility of Comaneci vs balloon assisted micro-catheterization of the small sharply angled feeders in AVM embolization.

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E-139 COMPREHENSIVE IN-VITRO NEUROVASCULAR MODEL ASSESSMENT FOR IMPLANT SIMULATION

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Introduction Although current microcatheter technologies have advanced in recent years, corresponding endovascular models still lag behind. Animal models are unable to replicate consistent large and wide neck bifurcation aneurysms with sufficient neurovascular feeders. A system is needed that accurately models vessel tortuosity, flow patterns, detects downstream migration of neurovascular embolic devices, along with displaying and storing peri-procedural and long-term pressure and flow data. This submission utilizes an in-vitro flow model to test the stability of endovascular devices.

Materials and Methods This research brings together clinical, biological, and engineering expertise for the development of benchtop flow models for mechanical assessments of device stability. A full Circle of Willis (CW) in-vitro vessel model was fabricated into vessel analogs using a biomimetic photopolymer, Agilus30[®] and constructed using a PolyJet[®] (UV-cured) 3D-printing additive manufacturing process, capable of replicating accurate anatomical tortuosity. Typical aneurysm positions, verified by a collaborating neuro-interventional surgeon, was 3D-printed at the basilar bifurcation, the posterior communicating (PCA) branch, and at the anterior communicating (ACA) bifurcation (**Abstract 139 figure 1**).

Results To confirm the usability of the flow model, a novel polymer aneurysm device, NeuroCURE[®], was deployed under temporary balloon occlusion. The in-vitro model monitored

Abstract E-139 Figure 1 CAD model of CW (Top) CW model interior (Bottom) Physiologically-relevant patient flow parameters were tuned within the system using a Super Pump AR (ViVITro Labs). A data acquisition system (DAQ) with LabVIEW[®] software recorded real time pressure and flow waveforms, mean arterial pressures (MAP) and flows through each inlet and outlet branch of the 3D-printed CW model. The flow model included an introducer for microcatheter and device delivery access

real-time pressure information intra- and post-device delivery. Modified Raymond-Roy (MRR) was used to evaluate post-treatment. The Agilus30[®] model reproduced a working CW model, and the NeuroCURE device delivery provided validation of the surgical simulation technique. Real-time pressure and flow data provided a greater understanding of flow distribution throughout the CW.

Conclusion This in-vitro aneurysm flow model utilized the latest in UV-cured 3D-printing techniques to provide a realistic simulation of neurovascular tortuosity and aneurysm device delivery. Future additions to the comprehensive flow model include an inline imaging system to quantify any particles (number and size, in accordance with ((USP) XXV <788>)) that may be released during endovascular device delivery. Lastly, the model will be a closed-loop sterile system that can run for up to one-month for long-term device integrity testing, complementing in vivo testing of device biocompatibility.

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E-140 SINGLE CENTER CASE STUDIES COMPRISING OF EARLY CAROTID STENTING IN PATIENTS WHO PRESENT WITH ISCHEMIC STROKES

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Introduction Carotid artery stenting (CAS) has evolved as an alternative treatment for carotid artery disease. In most patients the indication for carotid intervention has been based on neurological symptoms in combination with the degree of stenosis in the ipsilateral carotid artery.¹ Recently, the role of timing of revascularization in the prevention of recurrent stroke in symptomatic patients has gained interest. CREST (Carotid Revascularization Endarterectomy versus Stenting Trial) reported the shortest median interval; this was still 22 days for CEA and 18 days for CAS.² Because of the high risk of early stroke recurrence after plaque rupture, it is now accepted that intervention offers the greatest benefit when performed soon after the onset of neurological symptoms.

Methods Data were analyzed for early carotid stenting, patients who had a stroke as a presenting complaint were only chosen for this study. Thirty cases were identified between Oct 2015 and Feb 2021, that had a stroke and associated with severe carotid disease in the same vascular territory as the stroke. A statistical analysis was performed to reveal interesting data. Out of the 30 patients, 1 patient (3.3%) had an intraparenchymal hemorrhagic conversion in the stroke vascular area, 1 patient (3.3%) had a periprocedural subarachnoid hemorrhage, 1 patient (3.3%) had a reperfusion injury and developed seizures, and 1 patient (3.3%) had a new stroke. The mean time to perform carotid stenting was 2.6 days, median was 2 days.

Conclusion Early carotid stenting should be considered, when waiting 4-6 weeks might not be a feasible option due to high risk of recurrent stroke. The rate of complications is lower than what has been published in case reports and meta-analyses in the literature, likely due to improved periprocedural management of platelet activity and blood pressure. Our data suggests that early carotid stenting is feasible and should be considered an option in selected cases. Larger data sets will need to be analyzed to get a clear idea of the overall complication rate.

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E-141 CT ANGIOGRAPHY IN PATIENTS PRESENTING WITH LOWER NIH STROKE SCALES

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Introduction Mechanical thrombectomy (MT) is the standard-of-care treatment for patients with ischemic stroke (IS) with proximal large intracranial vessel occlusion within 6 hours from onset of symptoms. More than half of those who receive tPA for a M2 occlusion still do not achieve adequate recanalization. M2 IS may have a low growth rate of infarct volume and smaller final infarct volumes than found with main MCA trunk infarctions, but can be just as disabling, particularly if language centers are involved. The ideal selection

criteria for MT in patients with M2 occlusions remain controversial, which leads to heterogeneous practice patterns among stroke specialists. We analyzed M1 and M2 strokes who underwent MT and their CT perfusion (CTP) data.

Method We first analyzed 34 patients CTP data, 17 each with M1 and M2 strokes and compared their NIH stroke scales and their CBF < 30% (core) and Tmax > 6 seconds (hypoperfused). As expected, we found that M1 strokes have a larger ischemic core and a larger hypoperfused area than M2 strokes (CBF > 30 for M1 was 46.5, while CBF > 30 for M2 was 5.9, p < 0.05. Tmax > 6 for M1 was 132.4, while Tmax > 6 for M2 was 31.6, (p < 0.05). Also, we found that M2 stroke were less likely to present with a CBF defect (78% of M1 patients with mean CBF defect of 46.5 +/- 15.0 and 35% of patients with M2 defect with mean CBF defect of 5.9 +/- 3.4) Although, their NIH scores didn't reveal a statistical difference (NIH for M1 was 14.0, while NIH for M2 was 8.5, p = 0.07.)

Next, we analyzed the relationship between M2 strokes with NIH stroke scales of less than and greater than 6, and the Tmax > 6 defect volume associated.

There was no trend which could be correlated with Tmax > 6 volume with increase in NIHSS (p=0.4) The average Tmax volume for patients with M2 defect was analyzed and found to be between 0 - 87 with a mean of 31.6 +/- 6.7. 71% of M2 lesions presented with an ischemic (Tmax > 6) volume of 44 ml at risk which could potentially be considered for endovascular treatments.

We found NIH < 6 was statistically not different than NIH >= 6 (NIH < 6 was 20.7 while NIH >= 6 was 41.3, p 0.14)

Conclusion CTP should be ordered for patients presenting with strokes with NIH < 6. Also, Boned et al. showed that CTP overestimated infarct core for more than 10 mL in 38% of the patients. Choosing not to proceed with CT angiography based on CTP and NIH stroke scale-based patient selection may deny treatment to patients who might benefit from reperfusion therapy. 71% of M2 strokes present with Tmax > 6 of 44ml which could potentially be considered for endovascular treatments.

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E-142 VARIATIONS, ANOMALIES AND COLLATERALIZATION OF INTRACRANIAL VASCULAR ANATOMY AND ASSOCIATION WITH INTRACRANIAL ANEURYSMS

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Background Intracranial arterial variations are a frequent finding in general population which can be incidentally discovered during imaging. Knowledge of these vascular variations and anomalies has a clinical impact because some of them are associated with the intracranial aneurysm and others cause changes in collateral circulation. The aim of this study was threefold: (1) to determine the proportion of variant anatomy at circle of Willis the evaluation of associated anomalies; (2) to highlight their clinical importance with example cases of