**Methods** With approval, we retrospectively reviewed stroke interventions in the intracranial carotid and M1 middle cerebral artery at our institution over a two year period. All patients are screened for small infarcts based on a non-contrast head CT and perfusion imaging for treatment eligibility. For analysis, we included those patients with successful reperfusion only. We collected stroke risk factors, time to treatment, stroke scale, and additional medical co-morbidities: cardiomyopathy, chronic lung disease, chronic kidney disease, body mass index >30, early hyperglycemia (any 24 hour post-procedure blood sugar >150 gm/dl), history of malignancy, and dementia. These co-variates were placed into a univariate analysis to identify predictors for a poor outcome, defined as a modified Rankin Scale >2 at 90 days. Covariates with a p value of <0.2 were included in a multiple logistic regression model to identify independent predictors.

**Results** We analyzed 120 patients with mean age 70 (SD 13) years, median NIHSS 16, and mean time to reperfusion 408 (SD 345) minutes. Poor outcome was seen in 44 patients (37%) with mortality in 21 patients (17.5%).

After controlling for age and stroke score, early hyperglycemia was the only co-variate independently associated with poor outcome (OR 2.72, 95% CI 1.04–7.06, p = 0.04) and mortality (OR 3.18, 95% CI 1.28–7.86, p = 0.013).

**Conclusions** In selected stroke patients with successful endovascular reperfusion, early hyperglycemia may be independently associated with poor outcome and mortality over other medical co-morbidities. Further prospective study confirming this effect may further develop treatment strategies to prevent this injury.

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## E-096 THE ROLE OF *IN-VITRO* MODELING IN ADDRESSING CHALLENGING OCCLUSIONS

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**Introduction/purpose** Despite significant advances in the recanalization rates of large vessel occlusions, significant challenges remain, with ~25% of occlusions not achieving TICI 2 b-3 reperfusion, or occlusions requiring multiple passes to reopen. Observations from clinical experience can be translated to *in-vitro* models, where device-clot interactions which are not visible in a clinical setting can be studied. Such models may inform both technology development and technique refinement.

**Materials and methods** Clots retrieved from patients in known challenging cases were observed macroscopically, and their composition was quantified histologically. This information was used to reverse engineer clot analogues which were then introduced into patient-specific *in-vitro* neurovascular models which replicated the anatomy of the challenging clinical cases, as well as physiological flow and pressure conditions. Simulated thrombectomies were performed and recorded under high magnification to closely observe the physical interaction between the challenging clot and the device. Specific mechanical properties of the clot analogues were also measured.

**Results** Reverse engineered clot analogues have been combined with *in-vitro* vascular models to successfully simulate a number of challenging clinical scenarios, and the behavior observed *in-vitro* appears to closely replicate that observed clinically. Fibrin rich clot has involved in several of the challenging clinical cases studied by the authors. Clot analogues simulating such thrombi were produced in the laboratory with a low erythrocyte and high fibrin content. Physical properties of the resultant clots were studied, and higher than normal frictional characteristics were observed. Analysis of *in-vitro* thrombectomy procedures with these clots showed a number of mechanisms at play, with the frictional properties of the clot having a significant impact on the ability (or number of passes required) to successfully recanalise the occluded vessel. The observed clot/device/vessel interaction and consequent clot retrieval outcomes appeared to closely match the recorded details of the clinical cases in question.

**Conclusion** *In-vitro* modelling may provide valuable insights into the mechanisms behind failed and challenging thrombectomy cases. The direct visualization of device-clot interaction that is possible in a transparent *in-silico* model allows a thrombectomy procedure to be witnessed in a different way than is possible *in-vivo*. Reverse engineering of retrieved clots to generate realistic clot analogues can help to enhance the clinical relevance of these *in-vitro* models. Better understanding of the detailed mechanisms of action in mechanical thrombectomy procedures may help in the optimization of procedural techniques as well as the design of improved devices.

**Disclosures M. Gilvarry:** 5; C; Neuravi Ltd. **D. Vale:** 5; C; Neuravi Ltd.

## E-097 USE OF THE CATALYST 5 DISTAL ACCESS CATHETER FOR TREATMENT OF INTRACRANIAL ANEURYSMS: THE FIRST NORTH AMERICAN EXPERIENCE

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**Introduction** Distal intracranial support systems provide a safe and stable foundation during endovascular approaches to intracranial aneurysms. Increased catheter support allows for precise manipulation of microcatheters/devices, critical when dealing with distal targets, larger device-delivery systems, and increased vessel tortuosity. The Navien and Neuron catheters were developed to meet this demand. Here, we report the first published experience using the AXS Catalyst 5 catheter (Stryker), the newest next-generation distal access catheter.

**Methods** A single-center aneurysm database was reviewed to identify patients who underwent endovascular embolization with the Catalyst 5 (Figure 1). Patient demographics, equipment utilized, cervical ICA tortuosity, intraprocedural catheter positions, and periprocedural complications were documented.

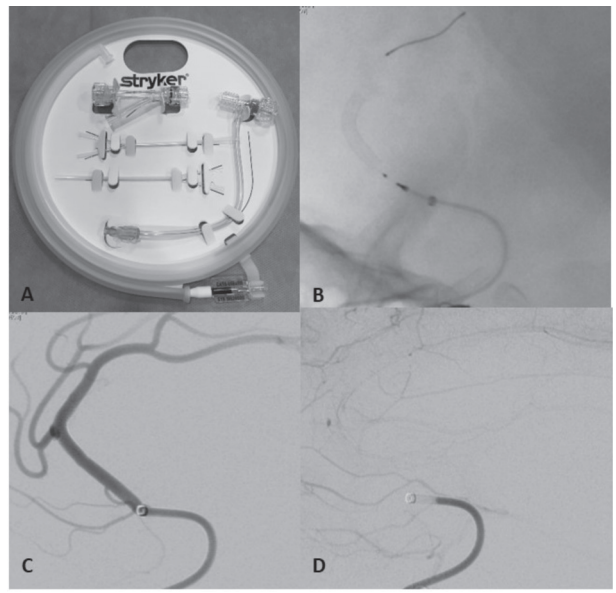
**Results** 32 patients underwent 36 embolizations of 40 aneurysms (Table 1). The average age was 57.9 ± 13.7. 5 (13.9%) were male. 38 (95%) aneurysms were located anteriorly. 36 (90%) were small aneurysms, 1 (2.5%) was a large aneurysm, and 3 (7.5%) were giant, with an average size of 6.9 mm. 32

**Abstract E-097 Table 1**

| | Number (%) |
|---|---|
| Total cases | 36 |
| Total patients | 32 |
| Age (years) | 57.9 ± 13.7 |
| Male | 5 (13.9) |
| Total aneurysms treated | 40 |
| Aneurysm size, average | 6.9 mm |
| Anterior circulation | 38 (95) |
| Cavernous | 5 (12.5) |
| Clinoidal | 4 (10.0) |
| Ophthalmic | 13 (32.5) |
| Communicating | 8 (20.0) |
| Anterior communicating | 6 (15.5) |
| Distal ACA | 2 (5) |
| Posterior circulation | 2 (10) |
| PICA | 1 (2.5) |
| Vertebral | 1 (2.5) |
| Triaxial system | 36 |
| Guide sheath | |
| NeuronMax | 30 (83.3) |
| Select catheter | |
| JB-1 | 31 (86.1) |
| Guide catheter | |
| Catalyst 058 | 36 (100) |
| Microcatheter | |
| Marksman 0.027 inch | 3 (8.3) |
| Via 0.027 inch | 34 (94.4) |
| Other catheters | 11 (30.6) |
| Pipeline embolization devices (33 cases, 32 patients) | 40 |
| WEB devices (2 cases) | 2 |
| Coils (3 cases) | 32 |
| Cervical tortuosity | 15 (41.2%) |
| Guide catheter position | |
| Cervical ICA | 0 (0) |
| Petrous ICA | 1 (2.7) |
| Proximal cavernous ICA | 6 (16.7) |
| Distal cavernous/clinoidal ICA | 24 (66.7) |
| Ophthalmic | 1 (2.7) |
| Communicating | 1 (2.7) |
| ACA | 1 (2.7) |
| Distal vertebral | 2 (5.4) |
| Clinical success | |
| Catalyst tracked to target | 36 (100) |
| Successful treatment | 36 (100) |

patients received a total of 40 pipeline embolization devices (Table 2), 2 received the WEB embolization device, and 3 patients received coils. The Catalyst was used with the Marksman microcatheter in 3 (8.3%) cases, and the VIA microcatheter in 34 (94.4%) cases. The Catalyst was successfully advanced in all cases (Figure 2), with the distal tip located in the petrous ICA 1 (2.7%), proximal cavernous 6 (16.7), distal cavernous/clinoidal 24 (66.7%), ophthalmic 1 (2.7%), communicating 1 (2.7), distal ACA 1 (2.7%), and distal vertebral artery 2 (5.4%). No patients experienced iatrogenic vessel dissection or other complications related to the catheter.

**Conclusions** The Catalyst 5 is an adept distal access catheter for cerebral aneurysm embolization with facile utility in the deployment of PEDs, WEB devices, as well as traditional aneurysm coiling. This catheter has outstanding trackability and stability during device deployment, and is a useful option to have when achieving distal access and support in an atraumatic fashion in the treatment of intracranial aneurysms.




**Abstract E-097 Figure 1** (A) The Catalyst5 distal access catheter. (B) Pipeline embolization of an 2.7mm L A2-A3 aneurysm. The FlexPED is in the A2/A3 junction with the VIA and Catalyst catheters. (C) Good distal ACA filling without vasospasm after PED deployment. (D) Contrast stasis after deployment.

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## E-098 COMPARE THE PROGNOSTIC VALUE BETWEEN DIFFUSION VOLUME AND PERFUSION/DIFFUSION MISMATCHING

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**Background and purpose** Diffusion (DWI) change area regard as cytotoxic edema and ischemic core. And perfusion/diffusion mismatching (P/D-mismatch) is regard as ischemic penumbra and targeted tissue to ischemic stroke treatment. Exact diffusion volume may be important to speculate the patient prognosis. But there were no studies which compare the clinical significance of the diffusion volume and P/D-mismatch.

**Materials and methods** 57 patients whom treated additional IA-Tx, non-recanalised after IV-tPA with anterior circulation and major vessel occlusion, were analyzed retrospectively. Diffusion volume was calculated from MR graphic program and P/D-mismatch was evaluated by radiologist who was not involved in patient treatment. Statistical analysis were done according to the DWI volume and P/D-mismatch, in recanalization, favorable outcome, and significant hemorrhage.

**Results** P/D-mismatch was statistical significant prospect on favorable outcome ($\chi^2$, p = 0.000), neuroloic improvement ($\chi^2$, p = 0.000), significant hemorrhage ($\chi^2$, p = 0.043),