O-028 OPERCULAR INDEX SCORE (OIS): A NOVEL PREDICTOR OF COLLATERAL ROBUSTNESS AND NEUROLOGIC OUTCOMES IN THE ENDOVASCULAR MANAGEMENT OF ACUTE ISCHEMIC STROKE

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Purpose Assessment of collaterals is imperative in patient selection for endovascular reperfusion in acute ischemic stroke (AIS). The purpose of this study was to evaluate the correlation between a novel CTA based collateral scoring system: the Opercular IndexScore (OIS), with the capillary index score (CIS) at angiography and neurologic outcomes at 90 days following endovascular treatment of acute ischemic stroke.

Materials and methods Data from 58 patients with AIS who underwent clinical assessment, institutional stroke based CT imaging (noncontrast CT, CT Perfusion with CTA reconstructions) and endovascular reperfusion were included in this study. OIS was retrospectively calculated from CTA images as the ratio of the number of opacified branches in the Sylvian fissure on the normal side to those on the affected side and dichotomized into favorable OIS (fOIS i.e. OIS $\leq$ 2) and poor OIS (pOIS i.e. OIS $>$ 2). CIS was defined as favorable (CIS $\geq$ 2) or unfavorable (CIS $<$ 2). Good neurological outcome was defined as mRS $\leq$2 at 90 days. Baseline clinical, CT and angiographic variables between fOIS and pOIS were compared using students t-test for continuous and chi-squared test for categorical variables. Multivariate regression analysis was utilized to identify correlation of any variables with a good neurologic outcome. The ability of fOIS to predict a good neurologic outcome was assessed using sensitivity, specificity, positive predictive value, negative predictive value and AUC using an ROC analysis.

Results Thirty-five patients had fOIS and 20 patients had pOIS. There was no difference in mean age ($p = 0.96$), gender ($p = 0.31$), side of occlusion ($p = 0.11$), use of IV-tPA ($p = 0.73$), ASPECTS ($p = 0.61$), door-to-puncture time ($p = 0.49$), door to recanalization time ($p = 0.81$), recanalization rate (0.32) or TICI scores ($p = 0.78$). There was a trend towards lower NIHSS in the fOIS group ($p = 0.07$). At angiography, 82.9% of patients ($n = 29$) with fOIS had a fCIS and 40.0% of patients ($n = 14$) with pOIS group had a fCIS ($p = 0.002$). Patients with fOIS had an 80.0% ($n = 28$) rate of good neurological outcomes compared to 15.0% ($n = 3$) in the pOIS group ($p < 0.0001$). On multivariate logistic regression analysis adjusting for baseline NIHSS, OIS and device used, a favorable OIS was the only variable independently associated with good neurological outcome (OR = 17.2, 95% CI = 3.8–104.3). In predicting good neurological outcome, fOIS demonstrated a sensitivity of 90.3%, specificity of 70.8%, positive predictive value of 80.0% and negative predictive value of 85%. The AUC was 82.2. Interobserver agreement was substantial with a kappa value of 0.64 95% CI = 0.41–0.88.

Conclusion OIS is a practical, noninvasive scoring system that can be used to predict collateral robustness and good clinical outcome among patients undergoing endovascular recanalization in the treatment of acute ischemic stroke.

Disclosures A. Copelan: None. **M. Chehab:** None. **S. Xli:** None. **W. Brinjikji:** None. **Z. Wilseck:** None. **D. Kallmes:** None. **J. Wilseck:** None.

O-029 ACUTE THROMBUS FORMATION ON FLOW DIVERTERS IMAGED IN VIVO USING OPTICAL COHERENCE TOMOGRAPHY

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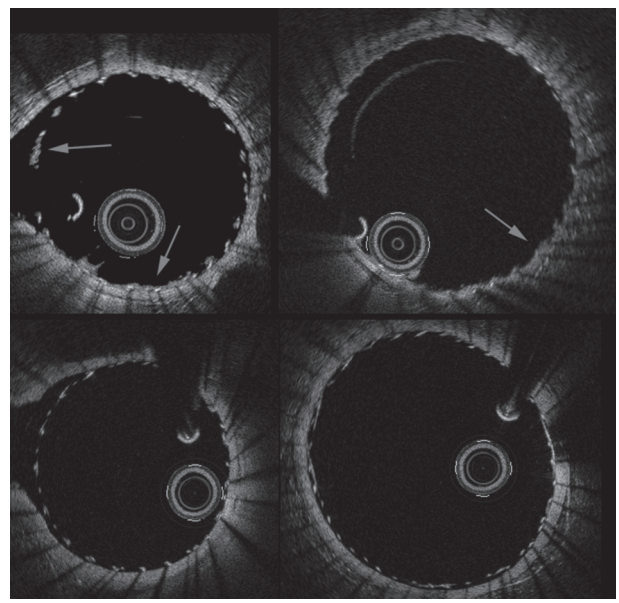
Introduction In vitro studies have shown that Pipeline Embolization Device+Shield Technology (Shield) with a surface modification of a 3 nm thick modified phosphorylcholine is less thrombogenic.[1] We hypothesize that Shield has less thrombus formation in vivo as compared to Pipeline Embolization Devices (PED) regardless of dual antiplatelet therapy (DAPT).

Methods Forty rabbits with elastase induced aneurysms were randomly assigned to receive a Shield or PED. For each device, half of the animals received DAPT. In each of the four groups, 10 animals were enrolled for a period of 30 days. Herein, we report on 32 animals that have reached the study endpoint to date. Animals that received DAPT (10 mg/kg each of aspirin and clopidogrel) were started a 5 days prior to implant and continued until the endpoint at 30 days. At the time of implant optical coherence tomography (OCT, Dragonfly, St Jude) was performed before and after angioplasty, and repeated at terminal follow-up. Thrombus formation was assessed at 4 locations along the implant (distal end, at the level of the vertebral artery, at the aneurysm neck, and at the proximal end) as present or absent. Aneurysm occlusion was assessed on digital subtraction angiography after 30 days and according to the scale of Darsaut et al.[2]

Results Baseline characteristics (e.g., aneurysm size, neck size, parent vessel diameter) were not different between the four groups ($p > 0.1$). Animals receiving DAPT had a significant reduction in PRU values (69 ± 28 vs 247 ± 41, $p < 0.0001$) and no change in ARU (649 ± 31 vs 659 ± 9, $p > 0.05$). The Shield was more likely to have no thrombus



Abstract O-029 Figure 1 Top panel shows thrombus formation on the PED surface (arrows) absent in the Shield device (bottom panel), after implantation. Left images taken at the origin of the vertebral artery, and right images are acquired proximal to the aneurysm

or thrombus only at one of the four locations as compared to PED (OR 0.10 95% CI 0.02–0.56, p = 0.01). There was no difference in thrombus at the four locations as a function of DAPT (p > 0.05). There was no dependence on aneurysm occlusion on the device used or PRU value; however, achieving complete or near complete occlusion was negatively and marginally correlated with the aneurysm neck size (Spearman's rho = 0.314; p = 0.049).

Conclusion The hypothesis that Shield technology reduces acute thrombus formation regardless of DAPT has been confirmed in vivo using OCT.

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O-030 CHANGES IN CONTRAST TRANSIT TIMES ON DIGITAL SUBTRACTION ANGIOGRAPHY POST PIPELINE EMBOLIZATION DEVICE DEPLOYMENT

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Introduction Pipeline Embolization Devices (PED) has been introduced as a new method to treat aneurysms that are otherwise difficult to treat surgically or with endovascular means. It is postulated that hemodynamic changes occur post deployment which affect the distal vascular bed. In this paper we evaluated changes in the contrast transit times on angiography post PED implementations.

Methods Medical charts and digital subtraction angiographic (DSA) films for patients treated with PED were included. Only anterior circulations, un-ruptured aneurysms, located proximal to the internal carotid artery terminus were included. DSA images were analyzed using custom made software for the time-density relationship at baseline and compared to post PED implementation. All analysis was done over region of interest over the middle cerebral artery (M1 segment). Analysis included $TT_{10\%–100\%}$ (time needed for the contrast to change from 10% image intensity to 100), $TT_{100\%–10\%}$ (time needed for the contrast to change from 100% image intensity to 10%), and $TT_{25\%–25\%}$ (time needed for the contrast to change from 25% image intensity-up slope to 25%-down slope of the curve).

Results A total of 44 patients were included in this study. Analysis over the M1 segment showed a significant decrease in the $TT_{10\%–100\%}$ (2.79 to 2.24 seconds, $P < 0.001$) post PED. There was significant correlation (Pearson's correlation) between the percentage change in $TT_{100\%–10\%}$ and the aneurysm size ($r = 0.34$, $P = 0.02$). There was a significant decrease in the $TT_{25\%–25\%}$ (7.07 to 6.41 seconds, $P = 0.016$) post PED (Figure 1). Moreover, there was significant correlation between the absolute or percent changes in $TT_{25\%–25\%}$ and the aneurysm size ($P = 0.05$; rho = 0.54 and 0.049; rho = 0.29 respectively) (Figure 1).

Conclusion Analysis shows that statistically significant hemodynamic changes do occur post PED deployment, as determined by differences in the contrast transit time post PED in the distal intracranial circulation. These hemodynamic changes might be more pronounced in large and giant aneurysms. The mechanism for this is not clear, yet hemodynamic changes affecting especially the vasculature distal of the PED might shed a light at the patho-physiology of the delayed parenchymal hemorrhage.

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O-031 ENDOVASCULAR MANAGEMENT OF INTRACRANIAL ARTERIOVENOUS MALFORMATIONS WITH VARIOUS ANGIOARCHITECTURE FEATURES IN THE PEDIATRIC POPULATION: IS SPETZLER-MARTIN GRADING PREDICTIVE?

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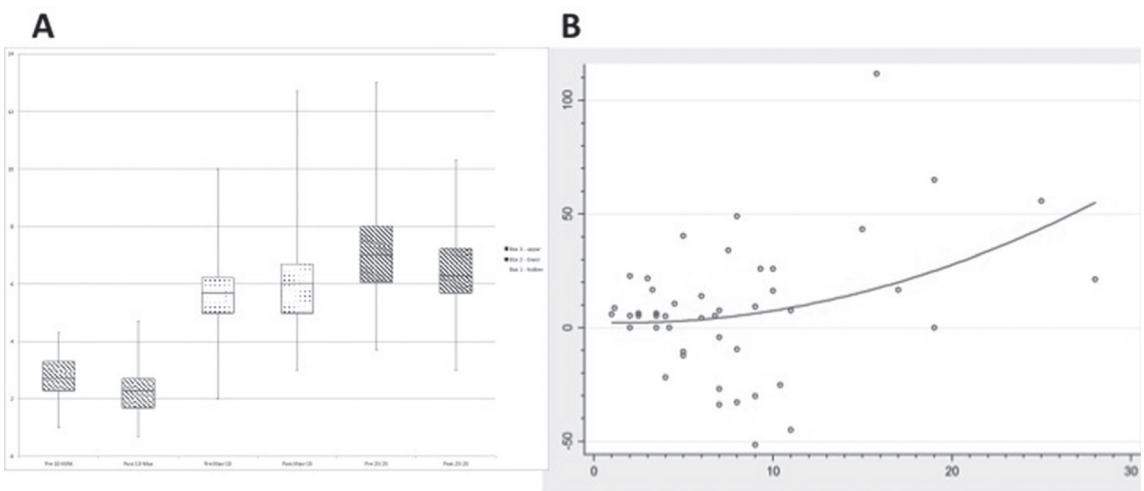

Abstract O-030 Figure 1