final reperfusion grade: full reperfusion (eTICI3) vs. non-full reperfusion (eTICI<3). The secondary outcome included a 90-day mRS shift analysis. Safety measures included symptomatic intracranial hemorrhage (sICH) and 90-day mortality.

Results Among 823 patients eligible for the analysis, 564 were matched in a 1:1 ratio. The two groups were balanced in baseline and clinical characteristics. Final reperfusion grade significantly modified the effect of pre-procedural IV-tPA on functional independence (P=0.008), where bridging therapy showed higher rates of functional independence (63.2% vs. 51.6%), adjusted OR 2.09, 95%CI[1.03–4.20], P=0.039) compared to non-bridging therapy in patients with full reperfusion. However, in non-fully reperfused patients, the rates of functional independence were comparable (40.3% vs. 43.7%), adjusted OR 0.62, 95%CI[0.31 to 1.25], P=0.18) among both therapies. Likewise, bridging therapy was associated with 90-day mRS shift to a lower degree of disability (adjusted common OR 1.59, 95%CI [1.03–2.48], P=0.039) in fully reperfused but not in non-fully reperfused (adjusted common OR 0.98, 95%CI [0.65-1.46], P=0.91). The effect size of pre-procedural IV-tPA on functional independence was comparable across different subgroups (Figure 1). The rates of sICH and 90-day mortality were similar among bridging vs. non-bridging in fully and non-fully reperfused patients.

Conclusion The impact of pre-procedural IV-tPA on functional outcome was evident in patients who achieved full reperfusion compared to non-fully reperfused patients. Our findings could be related to the effect of the remaining tPA in circulation on improving intracranial microcirculation and hence preventing the no-reflow phenomenon. Further studies are warranted to validate our results.

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STROKE PREDICTX: A TISSUE-BASED CLINICAL DECISION TOOL TO PREDICT STROKE OUTCOMES AFTER ENDOVASCULAR THERAPY

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Background Endovascular therapy (ET) has been established as the gold standard in the management of anterior circulation large vessel occlusion strokes (LVOS) up to 24 hours from symptoms onset. However, despite high odds of successful recanalization and improved clinical outcomes, up to 50% of treated patients do not achieve favorable functional outcomes. Being able to reliably identify patients that would benefit from thrombectomy is paramount. Artificial intelligence (AI) and machine learning (ML) tools have gained increasing popularity in stroke outcome prognostication due to their flexibility, easy implementation, and high performance. Using a large comprehensive stroke center registry, we sought to apply various ML techniques to predict 90-day outcomes after stroke ET.

Methods We used individual patient data from our prospectively collected thrombectomy database between 09/2010 and 03/2020. Patients with anterior circulation LVOS and complete 90-day outcome data were included. A random forest imputation algorithm was used for missing data. Our primary outcome was 90-day functional independence (defined as modified Rankin Scale score 0–2) and secondary outcome was 90-day mortality. Pre- and post-procedure models including clinical and neuroimaging parameters were developed. Several high performing classification algorithms were implemented (Logistic Regression, Elastic Net Regression, Support Vector Machine, Random Forest, Gradient Boosting, K-nearest neighbors, Naïve Bayes, and Artificial Neural Network) were implemented using a random 70%/30% training-test data split and 10-fold repeated cross-validation with 5 iterations on the training data for model calibration. Discriminative performance was evaluated using the area under the receiver operator characteristic curve (AUC) metric.

Results 1231 patients were included in the analysis split into training set (n= 861) and test set (n= 370). In the training data, 49.6% of the patients achieved independence at 90-days while 13.7% were dead. For functional independence prediction, the Elastic Net algorithm was the best performing on both pre-and post-procedure parameters with an AUC of 0.766 and 0.784 respectively. For mortality prediction, the Random Forest algorithm was the top performing model on the pre-procedure data (AUC=0.750) while the Artificial Neural Network algorithm performed best on post-procedure data (AUC=0.767). The inclusion of post-procedure information resulted in an improved discriminative performance for all developed algorithms. The prognostication models are made available in a web-based graphical user interface for easy use.

Conclusions Our pre-and post-procedural models reliably estimated clinical outcomes in stroke patients undergoing thrombectomy. They represent a step forward in creating simple and efficient prognostication tools to aid treatment decision-making.

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QUANTITATIVE ASSESSMENT OF DEVICE-CLOT INTEGRATION STRENGTH FOR THROMBECTOMY

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Introduction Both aspiration catheters (when clot ingestion is not achieved) and stent retrievers apply tensional force during device withdrawal to dislodge and remove clots. As the tensional force exceeds the device-clot integration strength (DCIS), the clot will disintegrate from the device and embolize. In this study, we aim to propose a standardized
COMBINATION RELEASE OF CHEMOKINES FROM COATED COILS TO TARGET ANEURYSM HEALING


Background Cerebral aneurysm healing is a dynamic process mediated by inflammation, ingrowth, and vessel wall remodeling. Heightened interest in developing surface modified coils to accelerate this process is on the rise. Monocyte chemotactant protein 1 (MCP-1) and osteopontin (OPN) have been identified separately as key mediators of the aneurysm healing process following coil embolization in the rodent model. The pathway of healing has been studied and it appears MCP-1 triggers a cascade with OPN as a downstream mediator.

Methods We use a novel polymer (Poly [glycolide-co-caprolactone]) (Rao pharmaceuticals) (CG910) to test whether coils can be dual coated with active proteins with sequential reliable release. Coils were coated with PLGA, CG910, and subsequently dipped with protein OPN (inner layer for delayed release) and MCP (outer layer for initial release). Release assays were utilized to measure protein elution from coils over time. To test in vivo feasibility, coated coils were implanted into carotid aneurysms to determine effect on aneurysm healing. ANOVA and student t-test was performed for assays with p<0.05.

Results Prior to rodent experiments, a significant amount of OPN and MCP release was measured early (within 2 days).

Using a 4x concentration of MCP, we were able to show that CG910 coated coils provided the most effective release of MCP over time of the available polymers. Within the carotid aneurysm model, MCP and OPN release caused a significant degree of ingrowth (74 and 80%) compared to PLGA and CG910 alone (58 and 53%). To study mechanism, Nos3 and MMP9 were investigated, and both had significant increases for the OPN and MCP groups compared to other coils (p<0.001).

A further analysis of proinflammatory markers Nos4 and NFKB showed increased overlap coefficients with CD31 for the OPN and MCP groups. To determine synergistic impact of dual coating, we measured ingrowth for MCP/OPN coils (63%) as well as overlap coefficients for Nos4 and NFKB with CD31. OPN staining was found primarily within the region of ingrowth whereas MCP staining was localized along the endothelium indicating variable release response in vivo.

Conclusions This study demonstrates that coated coils are viable to promote aneurysm healing. Dual coated coils may have synergistic benefit given different location of protein interaction measured in vivo. MCP-1 and OPN induce a proinflammatory state mediated by the upregulation of enzymes that generate reactive oxygen species and induce metalloproteinase activity. Further work is warranted to validate findings prior to advancement towards clinical trial.

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DEVELOPMENT OF A MECHANICAL TESTING REGIMEN FOR COMPARING SILICONE VESSEL MODELS TO HUMAN NEUROVASCULARITY

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Introduction Highly accurate silicone models of neurovascular anatomy can be used to simulate vessel tortuosity and blood flow during in vitro surgical training, device demonstrations, and medical device testing. This research aims to establish a testing regimen to characterize the material properties of new silicone model formulations [United Biologics (UB)] and statistically compare them to published human vessel data.

Materials and Methods Seven groups of mechanical testing procedures can characterize silicone material properties, and compare them to published human carotid vessel properties.