groups, respectively. Length of stay (LOS) was shorter in the low NIHSS group compared to the high (9 ± 7.5 vs. 10.9 ± 11.3 days, p<0.001). Clinical outcomes at every follow up interval, including NIHSS at 24 hours and discharge, and mRS at discharge and 90 days, were better in the low NIHSS group. The delta and percentage change NIHSS values (comparing admission to 24 hours low values) were actually negative for the low NIHSS group, with patients experiencing clinical worsening in NIHSS in the low group (-2.02 ± 6.95 or -76 ± 269%) compared to a improvement in the high NIHSS group (+4.45 ± 8.05 or 24 ± 58%). Subsequent stratification of the low NIHSS group into ‘ultra-low’ (i.e. NIHSS 1–3) and low (i.e. NIHSS 4–5) groups revealed that this increase in NIHSS at 24 hours relative to admission was only observed in the ultra-low group. Mortality was lower in the low NIHSS group (10.4% versus 24.5%, p<0.001).

Conclusions MT is an effective and safe treatment for appropriately selected ischemic stroke patients presenting with low NIHSS. Diabetes and prior stroke are predictors of functional dependence at 90 days, and prior stroke is also associated with mortality, suggesting that MT should be offered judiciously to patients with these risk factors. Our findings signal the need for a randomized trial comparing MT versus medical management for LVO patients with low NIHSS.

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Introduction Neuroendovascular procedures are associated with a high level of technical complexity. Complex, tortuous, and branched vasculature must be navigated to distal intracranial sites in order to treat high-risk vascular pathologies. Neuroendovascular robotics is an emerging field with potential to improve the safety and success of these procedures. We propose a dexterous and actively steerable microcatheter for robotic-assisted neuroendovascular navigation. We present initial experimental validation of the feasibility of branch selection and active compliance of this catheter. Such technology has the potential to 1) increase technical precision, 2) reduce procedural time, 3) reduce radiation exposure, and 4) enable semi-automation of catheter navigation.

Materials and Methods We developed a multi-articulated self-steering microcatheter for neuroendovascular surgery. To enable traversal of tortuous cerebral vasculature, this catheter actively bends in two separate planes (figure 1a). Our system also includes series-elastic actuation for increased safety and to enable active compliance (self steering). In addition we used preoperative CT scans of the CCA and ICA to create a nominal path plan and to optimize the catheter design parameters to minimize the catheter’s passive bending. A simulation study was performed to compare ad-hoc catheter design to an optimized catheter design. We also developed catheter tip tracking in bi-plane fluoroscopic images.

Results With the initial catheter prototype, branch selection was performed on mock vasculature (figure 1b). Using the proposed vasculature-specific catheter design optimization, we fabricated an optimal catheter for a particular anatomy, reducing the path plan error by 44% in position and 38% in orientation, and resulting in a maximal passive deflection of the catheter tip of 2.34 mm. This design was autonomously navigated in a mock CCA bifurcation phantom. The segmentation algorithm tracked a guidewire during carotid insertion with an update frequency of 10 Hz and average error 0.55 mm. Finally, we demonstrated the feasibility of active compliance of this robot. During the experiment, the catheter tip autonomously responded to forces causing it to actively steer into a channel with an unknown geometry.

Conclusion A multi-articulating catheter for neuroendovascular navigation and with active compliance for self-steering was developed along with algorithms for vasculature-specific design optimization. The catheter traversed a mock carotid
Abstracts

BRIDGING THROMBOLYSIS DOES NOT INCREASE COMPLICATIONS OF RESCUE INTRACRANIAL STENTING

Introduction Given the mixed results of recent clinical trials, the role of bridging therapy with intravenous thrombolysis (IVT) in patients undergoing mechanical thrombectomy (MT) remains contested. These results highlight the need to identify subgroup specific strategies to optimize patient selection. Patients undergoing MT for intracranial atherosclerotic disease (ICAD) are more likely to require rescue intracranial stenting and an attendant load of dual antiplatelet drugs. Whether bridging thrombolysis increases hemorrhagic complications in patients requiring rescue intracranial stenting is unclear and may affect frontline thrombolysis decisions in patients with suspected ICAD related large vessel occlusions (LVOs). Here we determine whether bridging therapy modifies procedural and clinical outcomes in patients requiring rescue intracranial stenting after a failed MT.

Methods We performed a retrospective cohort study of the Stroke and Aneurysm Registry (STAR) from January 2015 to December 2021 and identified 8,988 patients who underwent MT, 108 (1.2%) of whom underwent rescue intracranial stenting after failed MT for anterior circulation LVOs. Prospectively defined baseline characteristics and clinical outcomes were compared.

Results 108 patients underwent rescue stenting, 32 (29.6%) of whom received IVT and 76 (70.4%) did not. Patients receiving IVT presented significantly earlier (700 [312–1178] vs 242 [179–333] min, p<0.001), but were otherwise comparable in baseline demographics. A similar number of mechanical thrombectomy passes were employed in both cohorts (3 [2–5] vs 3 [2–5], not significant) with comparable procedural times. Any post-procedural hemorrhage within the first 36 hours was similarly common between both groups (24.6% vs 31.3%). Symptomatic hemorrhage or type-2 parenchymal hematomas were rare in both groups, with a non-significant trend towards increased events with IVT (2 vs 4 events, 2.9% vs 12.5%, p=0.078). Good functional outcomes, defined as a modified Rankin score of 0–2 measured 90 days post discharge, were comparable between groups (23.7% vs 37.0%, p=0.209). IVT use did not associate with hemorrhagic complications or good functional outcomes at 90 days in multivariable binary logistic regression analyses.

Conclusions In this international, retrospective cohort study of likely highly-selected patients, IVT exposure did not modify hemorrhagic complications or outcomes in patients requiring intracranial rescue stenting after failed MT. These results are consistent with several randomized clinical trials which did not demonstrate increased hemorrhagic complications in unselected patients undergoing bridging thrombolysis. These data suggest that acute intracranial stenting (with attendant dual antiplatelet loading) may be safe in selected patients exposed to IVT and argue against withholding IVT for patients at higher risk of needing rescue stenting.

Abstract 0-018 Figure 1