TECHNICAL EVALUATION OF BEVELED TIP ASPIRATION COMPARED TO FLAT TIP ASPIRATION FOR ACUTE ISCHEMIC STROKE TREATMENT

Introduction/Purpose: Zoom Aspiration Catheters (Imperative Care, Campbell, CA) have a unique beveled TRX Tip intended to improve clot digestion rates. The TRX Tip is angled 60-degrees, resulting in an approximate increase in surface area of 15%. Therefore, the Zoom TRX Tip has the equivalent surface area of 0.076", greater than current conventional catheters tip diameters (0.064-0.074°). However, there still remains insufficient scientific rationale why and how a 60-degree beveled tip enhances clot ingestion compared to conventional flat tip aspiration.

Materials and Methods: To understand the impact of the bevel tip shape compared to the common flat-tip shape, benchtop testing was performed to analyze the mechanical properties and actions of clot ingestion using a beveled-tip aspiration catheter compared to a flat-tip aspiration catheter. Test articles were assessed with the Bioengineering Devices Laboratory (BDL) benchtop flow model at Northern Arizona University (NAU). The model consists of a programmable, hydraulic pulsatile pump system (SuperPump AR, ViVitro Labs) that simulates physiological neurovascular flows and pressures. The benchtop accommodates swappable 3D-printed circle of Willis (CW) flow models made from UV cured and acrylic-based co-polymers, which can replicate the mechanical properties of human vessels. The model also incorporates a novel and stable blood analog to mimic the viscosity and shear-thinning of blood, allowing real-time pressure and flow measurements at each CW branch. Two published synthetic blood clot analogs (soft and hard clots) was used to simulate clot aspiration.

Results: To confirm aspiration effectiveness, the test articles (Zoom 88 (Z88), Zoom 71 (Z71), HydroMax (NM), Ballast (Ball), Walrus (W-BGC), Flowgate (F-BGC), and React (R68)) were advanced to the MCA and used to remove soft and hard clot analogs. Various properties were evaluated during clot ingestion – tip geometry, catheter-to-vascular ratio (CVR), real-time pressure measurements corresponding to aspiration force, clot integration imaging, clot digestion rate into the vacuum pump, and first-pass efficiency (FPE) determined by real-time branch flow measurements.

Conclusion: Preliminary data from aspiration force suggest that the beveled tip devices corresponded to greater clot integration and faster digestion rates while requiring less aspiration force. Larger-bore TRX Tip catheters, with greater CVR can also enhance clot integration and digestion rates. Therefore, improved clot integration provided by the beveled tip, can be associated with the enhanced rates of FPE, reduced procedure duration, and improved recanalization rates, compared to conventional aspiration catheters, as assessed in the benchtop flow model.

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Abstract E-280 Figure 1 Top) TRX tip – full clot integration. Bottom) Flat tip – proximal clot integration

A MULTICENTER STUDY EVALUATING ACCESS SITE AND BAD SCORE CATEGORIZATION IN REPERFUSION TIMING AND OUTCOMES IN ANTERIOR CIRCULATION ACUTE ISCHEMIC LARGE VESSEL OCCLUSIONS UNDERGOING MECHANICAL THROMBECTOMY

Introduction: Given the multifactorial nature of stroke outcomes, recent efforts have been made to better predict time to reperfusion and improved patient outcomes. In previous studies, the B.A.D. score - consisting of bovine arch, aortic
arch, and internal carotid artery dolichoarteriopathy categorization has been shown to be a predictor of prolonged time to reperfusion as well as functional outcome for patients with transfemoral access. We aimed to assess this grading system with consideration to transfemoral versus transradial access.

Methods We retrospectively compared transradial versus transfemoral access for acute anterior circulation ischemic stroke requiring mechanical thrombectomy at two high-volume comprehensive stroke centers. Local institutional review board approval was obtained prior to analysis. Bovine arch, aortic arch, and internal carotid artery dolichoarteriopathy categorization was made for every patient, with higher B.A.D. scores defined as a score of 2 or greater. The primary outcome was change in NIHSS grading from admission to discharge as well as at 24 hours post-thrombectomy. Procedural timing analysis included analysis of time from puncture to first pass and reperfusion. Patients requiring crossover between access sites and tandem occlusions were excluded.

Univariate analysis used Wilcoxon rank-sum test for continuous outcomes, while chi-square test and Fisher’s exact test were used for categorical comparisons. Significance was defined as p < 0.05.

Results A total of 220 patients were included in the analysis, 161 (73.2%) of which had femoral access. Demographic comparisons and patient presentation did not vary between patients with femoral vs. radial access. Additionally, access site did not show significant difference in B.A.D. scores. The femoral approach had a significantly greater proportion of ASPECT scores less than 9 (39% vs 19%, p = 0.017). A low B.A.D. score was associated with a significantly greater reduction in NIHSS scores from admission to discharge in transfemoral patients (–8 (SD: 8) vs –4 (SD: 7), p = 0.030), however this association was not observed in the transradial patients. No other primary endpoints, including functional outcomes and reperfusion time, showed significant differences in transradial versus transfemoral access or low versus high B.A.D. scores.

Conclusion Our analysis evaluates the prognostic value of the B.A.D. score in the context of varying access sites in predicting outcomes and revascularization time. In contrast to previously published findings in smaller patient cohorts, we demonstrate that B.A.D. score categorization did not show a major association with changes in patient outcomes as well as timing of revascularization. Future research should utilize larger patient samples to enhance preoperative anatomic evaluation models for major stroke outcomes and improve treatment guidance.


Introduction/Purpose Reducing stroke workflow time metrics when performing mechanical thrombectomy (MT) in stroke patients with suspected large vessel occlusion (LVO) has shown an association with improved clinical outcomes. We performed a systematic review and meta-analysis to compare safety and efficacy outcomes between a direct to angiostuite (DTAS) and a standard workflow (SW) strategy among stroke patients with suspected LVO who underwent MT.

Materials and Methods We performed a comprehensive literature search in Medline, Embase, and Web of Science databases between 2015 and 2021. Observational studies and clinical trials that compared DTAS versus SW strategy were assessed, all the studies where at least one outcome of interest was reported were included. The risk of bias was evaluated in all the included publications. We compared the rates of functional outcomes, reperfusion times, symptomatic intracranial hemorrhage, and stroke workflow metrics. Clinical, methodological, and statistical heterogeneity were measured. A random-effects model was used.

Results Twelve studies were included in the systematic review and eight in the meta-analysis with 2890 patients. The DTAS strategy was associated with higher odds of good functional outcome at 90-days (47.3% vs. 34.9%; Odds ratio [OR]: 1.58; 95% confidence interval [CI]: 1.16–2.14) and an average reduction in door-to-puncture time in minutes (mean differences [MD]: -35.09; 95% CI: -49.76 to -20.41) and door-to-reperfusion time in minutes (MD: -32.88; 95% CI: -50.75 to -15.01). There was no significant difference in symptomatic intracranial hemorrhage (OR: 0.80; 95% CI: 0.53–1.20), mortality (OR: 1.00; 95% CI: 0.60–1.67), or successful reperfusion rates (OR: 1.59; 95% CI: 0.99–2.56). Moreover, the DTAS was associated with greater odds of dramatic clinical improvement at 24 hours (OR: 1.79; 95% CI: 1.15–2.79).

Conclusion Patients who underwent the DTAS strategy had a significant reduction in door-to-puncture and door-to-reperfusion times. These time reductions resulted in an increased rate of early neurological and 90-day functional recovery without compromising safety in LVO patients undergoing MT.

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