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Transradial Thrombectomy with 6Fr Aspiration Catheters through the 7F Piraeus 87 NeuGlide Catheter: A Single-Center Retrospective Observational Study

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Abstract

Background

Transradial access (TRA) may reduce access-site complications and improve patient comfort. However, combining radial access with 6F aspiration catheters remains challenging because conventional radial guide catheters cannot reliably accommodate these systems. The Piraeus 7F 87 NeuGlide is a radial 7F-sheath-compatible guide platform that accommodates 6F aspiration catheters while maintaining proximal support.

Methods

We performed a single-center retrospective observational study of consecutive patients who underwent thrombectomy for acute large- or medium-vessel occlusion via TRA using the 7F 87 NeuGlide catheter. Patient characteristics, lesion location, workflow metrics, expanded Thrombolysis in Cerebral Infarction (eTICI), clinical outcomes, and complications were recorded.

Results

Seventeen patients underwent thrombectomy with a mean age of 72.6 ± 14.0 years and mean admission NIHSS score of 15.2 ± 8.6. Transradial advancement was achieved in 16/17 cases (94.1%), with one conversion to transfemoral access. Mean procedure time was 29.0 ± 14.2 minutes, mean puncture-to-first target angiogram time was 8.6 ± 3.2 minutes, and mean thrombectomy passes was 1.5 ± 0.9. Among procedures completed transradially, eTICI 2b–3 was achieved in 16/16 and eTICI 2c–3 in 14/16. In the total cohort, eTICI 2b–3 was achieved in 17/17. First-pass eTICI 2b–3 reperfusion was achieved in 14/17 (82.4%). No distal embolization, vasospasm, vessel rupture/dissection, or access-site complications occurred.

Conclusions

Transradial thrombectomy using the Piraeus 7F 87 NeuGlide catheter was feasible and achieved target-vessel access, high-quality reperfusion, and no access-site complications. These findings support the feasibility of using a 7F radial-compatible guide catheter with 6F aspiration catheters for transradial thrombectomy.

Level of Evidence

Level 4, Case Series

Introduction

Acute ischemic stroke (AIS) due to large-vessel occlusion remains a major cause of mortality and long-term disability. Mechanical thrombectomy is now the standard of care for appropriately selected patients with AIS [1, 2]. Although transfemoral access (TFA) has historically been the dominant route for thrombectomy because of its familiarity and strong guide support, transradial access (TRA) has drawn interest because of the opportunity to reduce access-site complications, facilitate earlier mobilization, and improve patient comfort [3].

Published experience supports TRA as a feasible alternative to TFA for thrombectomy, with comparable reperfusion and clinical outcomes in selected patients and a favorable access-site safety profile [3–6]. However, technical limitations continue to constrain wider adoption.

A major barrier to TRA for aspiration thrombectomy is combining radial access with large-bore aspiration systems. In previous radial thrombectomy workflows, operators have relied on direct access techniques or smaller guide systems with lower-profile intermediate catheters due to the incompatibility of conventional radial guide catheters with 6F aspiration catheters [4, 7]. Direct radial access allows for the introduction of larger devices but eliminates the protective sheath which increases the risk of occlusion or injury to the radial artery [8]. Smaller intermediate-catheter caliber constrains the aspiration lumen, which diminishes maximum suction force and may compromise clot engagement and retrieval, potentially reducing the efficiency of radial thrombectomy. Recent reports have demonstrated the feasibility of 7F radial-compatible guide systems, however clinical data evaluating dedicated large-bore aspiration thrombectomy workflows remain limited, particularly with detailed workflow and outcome metrics [9, 10].

The Piraeus 7F 87 NeuGlide catheter (Piraeus Medical, Maple Grove, Minnesota, USA) accommodates 6F aspiration catheters while maintaining compatibility with 7F introducer sheaths [11]. Evidence regarding its use for AIS thrombectomy remains limited. We describe the technical, procedural, angiographic, clinical, and safety outcomes of consecutive thrombectomy procedures attempted via TRA using this system.

Methods

Study Design

This retrospective observational study was conducted at two hospitals within a single high-volume regional neurointerventional service. The study was reviewed and approved by the Department of Ethics Committee. Formal IRB review was not required because the study involved retrospective analysis of existing clinical data without direct patient contact. The requirement for informed consent was waived because the study posed minimal risk to patients.

Clinical, procedural, angiographic, and follow-up data were obtained from the institutional electronic health record and procedural imaging systems and reviewed by the study investigators.

Patient Selection

We included consecutive patients with AIS caused by large- or medium-vessel occlusion in whom mechanical thrombectomy was attempted through right TRA using a 7F sheath and 87 NeuGlide catheter between March 2025 and March 2026. Access route and device selection were determined by the treating neurointerventionalist. Cases converted to TFA were retained. Patients were excluded if the 87 NeuGlide was not used for thrombectomy or procedural documentation was insufficient.

Baseline and Clinical Variables

Baseline variables included age, sex, vascular risk factors, premorbid modified Rankin Scale (mRS) score, National Institutes of Health Stroke Scale (NIHSS) score at presentation, occlusion location, tandem-lesion status, and stroke laterality.

Clinical outcomes included mRS score at discharge and 90 days, favorable functional outcome defined as an mRS score of 0 to 2, in-hospital mortality, 90-day mortality, and 1-year mortality when follow-up was available. Cause of death was recorded when documented.

Procedural Techniques

Radial artery patency and diameter were assessed with ultrasonography before access. A radial artery diameter of ≥ 1.7 mm was preferred but not required, and final access selection remained at the operator's discretion based on clinical and anatomic assessment. All procedures were initiated through right radial access using a 23-cm Prelude Ideal 7Fr sheath. Heparin 3000 U was administered for antithrombotic prophylaxis. Nitroglycerin 200 μg and verapamil 2.5 mg were administered unless contraindicated.

The 87 NeuGlide catheter was advanced through the sheath and over a 5F inner catheter and a 0.035-inch guidewire into the parent artery of the target vascular territory. The catheter has a 0.087-inch inner diameter, permitting passage of compatible 6F aspiration catheters.

Aspiration catheters included the FreeClimb 70 and Zoom 7X for proximal occlusions and the FreeClimb 54 for more distal occlusions, including M3 lesions. Catheter selection was based on occlusion location and operator judgment. Aspiration thrombectomy without a stent retriever was used in all cases. Any adjunctive or rescue treatment, including angioplasty, stenting, intra-arterial medication administration, or conversion to transfemoral access, was recorded. The treatment strategy for both lesions was recorded in patients with tandem occlusions. A procedural schematic is provided in **Supplementary Fig. 1**.

Outcome Measures

The primary technical outcome was transradial technical success, defined as successful sheath placement and advancement and positioning of the 87 NeuGlide catheter sufficient to perform thrombectomy without conversion to transfemoral access. Conversion to transfemoral access was recorded separately. Procedural outcomes included last-known-well-to-puncture time, puncture-to-first target-vessel angiography time, total procedure time, fluoroscopy time, and number of thrombectomy passes. Angiographic outcomes included modified first-pass effect and final reperfusion according to the expanded Thrombolysis in Cerebral Infarction (eTICI) scale. Modified first-pass effect was defined as eTICI 2b to 3 reperfusion after a single thrombectomy pass without rescue therapy. Successful final reperfusion was defined as eTICI 2b to 3, and near-complete or complete reperfusion was defined as eTICI 2c to 3. Final eTICI grades were obtained from procedural reports and verified through retrospective review of the angiographic images by the study investigators. Disagreement or uncertainty was resolved through review by a senior neurointerventionalist.

Safety outcomes collected included distal embolization, vasospasm, vessel rupture or dissection, access-site complications, symptomatic hemorrhagic transformation, delayed intracranial hemorrhage, and mortality. Adverse events were identified through review of procedural reports, postprocedural imaging, inpatient documentation, and available follow-up records. Access-site complications included radial artery occlusion, hematoma, pseudoaneurysm, dissection, access-site bleeding, or any access-related event requiring additional monitoring or treatment. Routine postprocedural radial artery ultrasonography was not performed unless clinically indicated.

Patient-level baseline characteristics, procedural and angiographic data, and clinical outcomes are reported in **Supplementary Tables S1 through S3**.

Time Metrics

Last-known-well-to-puncture time was measured to radial artery puncture; puncture-to-first target-vessel angiography to the first target-vessel acquisition; and total procedure time to completion of hemostasis. Fluoroscopy time was obtained from the procedural record.

Statistical Analysis

All data were analyzed using R, version 4.5.2 (R Foundation for Statistical Computing, Vienna, Austria) stats package [12]. Age was summarized as mean (SD). Other continuous and ordinal variables were summarized as median (IQR). Categorical variables were reported as number/total number and percentage. Exact binomial 95% CIs were calculated using the Clopper–Pearson method for key binary technical, angiographic, and safety outcomes. Missing data were acknowledged, and analyses were performed using available-case denominators.

Exploratory subgroup analyses compared procedural workflow metrics by occlusion location, categorized as M1 versus non-M1, and by laterality, categorized as left versus right. Midline posterior

circulation occlusions were not included in the laterality comparison. Procedural metrics were compared using 2-sided Welch 2-sample t tests. No adjustment was made for multiple comparisons.

Results

Patient and Baseline Characteristics

Seventeen consecutive patients underwent thrombectomy procedures using the 87 NeuGlide catheter initiated via TRA. Baseline demographic, clinical, and lesion characteristics are summarized in Table 1. Mean age was 72.6 ± 14.0 years, and 7 patients (41.2%) were women. Median admission National Institutes of Health Stroke Scale score was 14 (IQR, 7–22). Patient-level baseline characteristics and comorbidities are provided in **Supplementary Table S1**.

Table 1
Baseline and lesion characteristics

Characteristic	Value (%)
No. of patients	17
Age, SD, y	72.6 ± 14.0
Female sex	7 (41.2)
White race	10 (58.8)
Hispanic/Latino ethnicity	3 (17.6)
Comorbidities	
Hypertension	16 (94.1)
Hyperlipidemia	13 (76.5)
Coronary artery disease	11 (64.7)
Atrial fibrillation	6 (35.3)
Diabetes mellitus	4 (23.5)
Baseline Stroke Severity	
Premorbid mRS	2 (1–2)
Premorbid mRS 0–2	13 (76.5)
Admission NIHSS	14 (7–22)
Occlusion site	
ICA terminus	2 (11.8)
M1 MCA	7 (41.2)
Distal MCA (M2/M3)	6 (35.3)
Basilar artery	2 (11.8)
Data are presented as No./total (%) or median (IQR) unless otherwise indicated.	

Abbreviations: NIHSS = National Institutes of Health Stroke Scale; mRS = modified Rankin Scale; ICA = internal carotid artery; SD = standard deviation, IQR, interquartile range.

Lesion Characteristics

Occlusions involved the ICA terminus, M1, M2/M3, and basilar artery, with two tandem lesions. Lesion characteristics and laterality are summarized in Table 1.

Procedural Outcomes

Procedural characteristics, device use, workflow metrics, and angiographic outcomes are summarized in Table 2. All procedures used an aspiration-only thrombectomy strategy. Transradial technical success was achieved in 16 of 17 patients (94.1%; 95% CI, 71.3%–99.9%). One patient required conversion to transfemoral access after the procedure could not be completed through the radial approach.

Table 2
Summary of procedural metrics

Characteristic	No./total (%)	95% CI
Proximal radial access	17 (100.0)	-
Right radial access	17 (100.0)	-
23-cm Prelude Ideal sheath	17 (100.0)	-
Radial artery diameter ≥ 1.7 mm*	10/14 (71.44)	-
Procedural Metrics		
LKW-to-puncture time, min	301 (145–555)	-
Procedure time, min	22 (19–36)	-
Puncture-to-first target angiogram, min	9 (7–11)	-
Fluoroscopy time, min	9.3 (7.3–17.7)	-
Intermediate catheter used	17 (100)	-
Type of aspiration catheter used:		-
FC70 + FC54	4 (23.5)	-
FC70	9 (52.9)	-
FC54	3 (17.6)	-
Zoom X	1 (5.9)	-
Aspiration-catheter only strategy	17 (100.0)	-
Thrombectomy Outcomes**		
Number of thrombectomy passes	1 (1–2)	-
Technical access success	16/17 (94.1)	71.3–99.9
Modified first-pass effect	14/17 (82.4)	56.6–96.2
Final eTICI 2b–3	17/17 (100.0)	80.5–100
Final eTICI 2c–3	14/17 (82.4)	56.6–96.2
Data are presented as No./total (%) or median (IQR) unless otherwise indicated. Confidence intervals for thrombectomy and angiographic outcomes were calculated using the exact Clopper–Pearson method.		

Abbreviations: eTICI, expanded Thrombolysis in Cerebral Infarction; IQR, interquartile range.

*Radial artery diameter only measured in 14 patients

**Outcomes including one case which was completed following conversion to TFA – first pass effect was achieved and final eTICI was 2b in TFA patient.

Median last-known-well-to-puncture time was 301 minutes (IQR, 145–555). Median procedure time was 22 minutes (IQR, 19–36), median puncture-to-first target-vessel angiography time was 9 minutes (IQR, 7–11), and median fluoroscopy time was 9.3 minutes (IQR, 7.3–17.7). The median number of thrombectomy passes was 1 (IQR, 1–2). Case-level procedural and angiographic findings are provided in **Supplementary Table S2**. Representative cases are shown in Fig. 1.

Reperfusion Outcomes

Modified first-pass effect was achieved in 13 of 16 patients whose procedures were completed transradially (81.3%) and in the patient converted to transfemoral access, resulting in a full-cohort rate of 14 of 17 patients (82.4%; 95% CI, 56.6%–96.2%).

Among procedures completed transradially, final eTICI 2b–3 reperfusion was achieved in all 16 patients, and final eTICI 2c–3 reperfusion was achieved in 14 of 16 (87.5%). The patient converted to transfemoral access achieved final eTICI 2b reperfusion. In the full cohort, final eTICI 2b–3 reperfusion was achieved in all 17 patients (100%; 95% CI, 80.5%–100%), and final eTICI 2c–3 reperfusion was achieved in 14 of 17 (82.4%; 95% CI, 56.6%–96.2%).

Exploratory Subgroup Analyses

Exploratory subgroup analyses demonstrated no statistically significant differences in procedure time, puncture-to-first target-vessel angiography time, fluoroscopy time, or thrombectomy passes by occlusion location (M1 vs non-M1) or laterality (right vs left). Complete results are provided in **Supplementary Table S4**. These analyses were underpowered and should not be interpreted as evidence of equivalence between groups but instead considered exploratory and hypothesis-generating.

Clinical Outcomes

Median discharge mRS score was 2 (IQR, 1–4), and 9 of 17 patients (52.9%) had an mRS score of 0 to 2 at discharge. Among the 13 patients with a premorbid mRS score of 0 to 2, 9 (69.2%) had a discharge mRS score of 0 to 2.

Ninety-day follow-up was available for 12 patients. Median 90-day mRS score was 3 (IQR, 1–6), and 5 of 12 patients (41.7%) had an mRS score of 0 to 2. In-hospital mortality occurred in 2 of 17 patients (11.8%), and 90-day mortality occurred in 4 of 12 patients with available follow-up (33.3%). One-year mortality was 4 of 5 patients with available 1-year follow-up (80.0%). Two deaths were attributed to stroke-related causes and 2 to cardiopulmonary causes. Clinical outcomes are summarized in Table 3, with patient-level details provided in **Supplementary Table S3.**

Table 3
Procedural complications and clinical outcomes

Characteristic	No./total (%)	95% CI
Distal embolization	0/17 (0.0)	0.0–19.5
Vasospasm	0/17 (0.0)	0.0–19.5
Vessel rupture/dissection	0/17 (0.0)	0.0–19.5
Access-site complication	0/17 (0.0)	0.0–19.5
Symptomatic Hemorrhagic transformation	1/17 (5.9)	0.1–28.7
Delayed asymptomatic intracranial hemorrhage	1/17 (5.9)	0.1–28.7
Clinical outcomes		
Length of stay in days	8 (4–12)	-
Discharge mRS	2 (1–4)	-
Discharge mRS 0–2	9/17 (52.9)	-
90-d mRS†	3 (1–6)	-
90-d mRS 0–2†	5/12 (41.7)	-
Mortality outcomes		
In-hospital mortality	2/17 (11.8)	-
90-d mortality†	4/12 (33.3)	-
1-y mortality‡	4/5 (80.0)	-

Data are presented as No./total (%) or median (IQR) unless otherwise indicated. Confidence intervals for thrombectomy and angiographic outcomes were calculated using the exact Clopper–Pearson method.

†N = 12 with 90-day follow-up available. ‡N = 5 with 1-year follow-up available. **Abbreviations**: IQR, interquartile range; mRS, modified Rankin Scale.

Abbreviations: IQR, interquartile range; mRS, modified Rankin Scale.

Safety and Complications

No distal embolization, vasospasm, vessel rupture or dissection, or clinically recognized access-site complications were observed.

Symptomatic hemorrhagic transformation occurred in 1 patient (5.9%; 95% CI, 0.1%–28.7%) on postoperative day 1. Delayed asymptomatic intracranial hemorrhage occurred in 1 patient (5.9%; 95% CI, 0.1%–28.7%). No additional procedural complications were identified.

Discussion

In this retrospective series, TRA mechanical thrombectomy using the 87 NeuGlide and 6F aspiration was technically feasible, with efficient target-vessel access, high rates of reperfusion, and no clinically recognized access-site complications.

The smaller caliber of the radial artery has historically constrained large-bore aspiration through TRA when compared to traditional TFA [13, 14]. Because larger aspiration catheter diameter has been associated with improved first-pass effect and recanalization, combining large-bore aspiration with the established benefits of TRA may be advantageous [15–18]. This study expands the emerging experience with 7F-compatible guide systems by focusing specifically on aspiration thrombectomy and providing detailed procedural workflow, angiographic, and clinical outcomes within a consecutive AIS cohort.

Our findings are generally consistent with previous reports demonstrating the feasibility and safety of TRA thrombectomy using a variety of radial workflows, including a previous series investigating the 87 NeuGlide for neurointervention [5, 9, 19–24]. Contrary to the present study, the previous 87 NeuGlide series investigated device utility across several different neurointerventional procedures and was not limited to aspiration thrombectomy, focusing on access and navigation metrics [9]. Recent reports describing other 7F-compatible guide systems, including the Zebra platform, further support the technical feasibility of large-bore aspiration through slender radial sheaths [10].

The 23-cm sheath configuration with the 87 NeuGlide provides continuous support across the radial and brachial arteries and may limit repeated catheter-vessel interaction compared with direct-access techniques. No clinically recognized vasospasm occurred, although this study was not designed to attribute this finding to sheath configuration. Representative cases (Fig. 1) illustrate guide-catheter positioning and target-vessel catheterization.

Heterogeneity in TRA technique and operator experience may contribute to variability in procedural performance and adoption. Prior studies demonstrate improvements in procedure duration, fluoroscopy use, puncture-to-recanalization time, and reperfusion with increasing operator experience [19, 25]. Standardized radial workflows that accommodate large-bore aspiration while remaining adaptable to patient anatomy may reduce reliance on multiple technical variations and provide benefit to neurointerventionalists.

This study has several limitations that should be considered when interpreting the results. The small sample size (n = 17) limits generalizability and reduces the ability to detect less frequent complications or differences in outcomes. The retrospective, single-center design introduces potential selection bias, as patient inclusion and procedural approach were not randomized and may have been influenced by operator preference or anatomical favorability. Additionally, there was no control group and no direct comparison between TRA and TFA, limiting conclusions regarding relative efficacy. Operator selection of radial access cases may further bias results toward more favorable anatomy. Anatomical variables such as aortic arch configuration and extracranial vessel tortuosity were not systematically classified, limiting

assessment of how anatomical complexity may have influenced procedural success. In addition, minor angiographic or access-site events may have been underrecognized due to the lack of routine postprocedural vascular ultrasound. Clinical follow-up was incomplete for some patients, which may limit interpretation of 90-day functional outcomes. Furthermore, heterogeneity in lesion location and case complexity, including the presence of tandem lesions, introduces variability that may affect procedural and clinical results.

Prospective multicenter studies are needed to establish the reproducibility and generalizability of this workflow. Comparative studies of large-bore TRA and conventional TFA aspiration workflows would further clarify relative procedural and clinical outcomes.

Conclusion

This preliminary experience demonstrates that transradial thrombectomy using the 7Fr-compatible 87 NeuGlide system and large-bore aspiration is feasible and yields encouraging procedural and angiographic outcomes when utilized for the treatment of AIS. Previous limitations on use of large-bore aspiration catheters in this workflow may be addressed by 7Fr-compatible guide catheters. These findings add to the growing literature supporting radial thrombectomy approaches by characterizing their performance within a dedicated aspiration thrombectomy workflow. Further study is warranted to define its role relative to other radial and femoral strategies.

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Figures

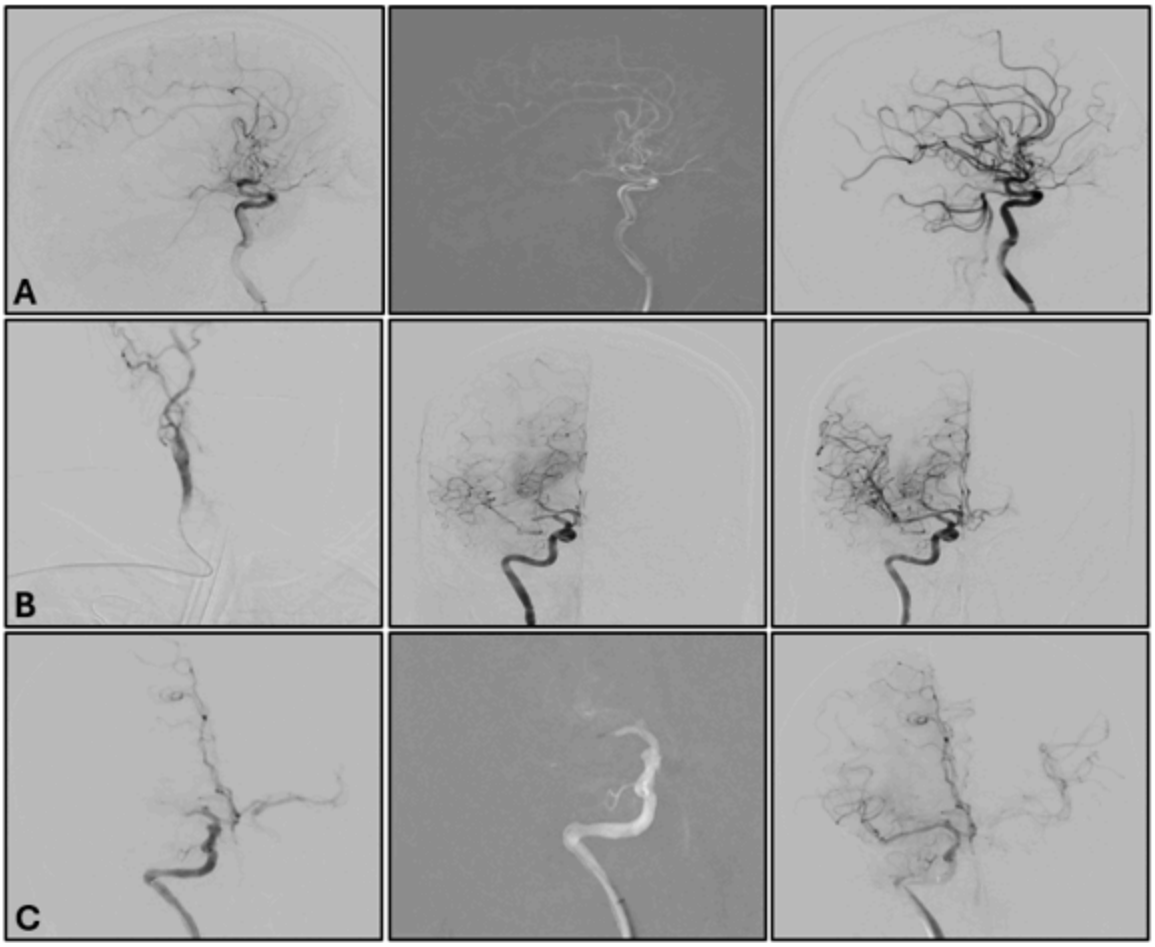


Figure 1

Representative angiographic cases demonstrating transradial aspiration thrombectomy using large-bore aspiration catheters through the Piraeus 87 NeuGlide system. (A) 70-year-old male with a left M2 occlusion treated via TRA thrombectomy demonstrating initial angiography, guide catheter positioning, and final reperfusion. **(B)**79-year-old female with right M1 occlusion. Marked cervical internal carotid artery tortuosity with subsequent successful catheter navigation and reperfusion. **(C)** 91-year-old female with a right M1 occlusion treated via TRA thrombectomy demonstrating initial angiography, guide catheter positioning, and final reperfusion.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementalMaterials3.docx