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First-pass efficacy with simplicity: Macrowire-only direct aspiration technique in posterior circulation mechanical thrombectomy

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Abstract

Background: During mechanical thrombectomy for large-vessel occlusions, a ledge effect makes navigating the aspiration catheters (ACs) to the occlusion difficult. New large-bore macrowires minimize this while ensuring flexibility and navigational control. We evaluated the technical feasibility of delivering large-bore ACs to posterior circulation occlusions.

Methods: This retrospective multicenter study evaluated patients treated for posterior circulation strokes with adjunct-free macrowire-only direct aspiration first-pass technique (MO-ADAPT) using 0.024- and 0.035-in macrowires between October 2022 and December 2024. Primary outcomes included successful catheter delivery, successful MO-ADAPT (i.e. adjunct-free catheter delivery and successful clot aspiration), and first-pass reperfusion (i.e. modified thrombolysis in cerebral infarction (mTICI) score $\geq$ 2b after one MO-ADAPT pass).

Results: Among 42 included patients (mean age 68.3 $\pm$ 15.4 years), adjunct-free delivery of ACs to the occlusion using macrowires only was successful in 95.2%. An MO-ADAPT primary approach achieved successful reperfusion in 81.0%, with first-pass reperfusion in 54.8%. Among patients with successful AC delivery, the aspiration success rate was 85.0%. Final mTICI scores of 3, 2c, and 2b after all procedures were seen in 78.6%, 14.3%, and 4.8%, respectively, regardless of thrombectomy method. No vascular complications were observed, and postprocedural intracranial hemorrhage and distal emboli occurred in 2.4% each. A favorable clinical outcome at 90 days was observed in 33.3% of cases. Multivariable analysis showed that underlying intracranial atherosclerotic disease was a negative predictor of both MO-ADAPT success and first-pass reperfusion; no factors predicted AC delivery success.

Conclusion: In this retrospective series, MO-ADAPT appeared to be technically feasible for treating posterior circulation strokes, with promising procedural results and a low complication rate. Observed failures were mainly associated with underlying intracranial atherosclerotic disease requiring stent retriever-assisted mechanical thrombectomy. Given the limited sample size and study design, further studies, ideally with larger cohorts and comparative designs, are necessary to clarify the relative safety, efficacy, and cost effectiveness of MO-ADAPT.

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Introduction

Endovascular mechanical thrombectomy has significantly improved outcomes in patients with acute ischemic stroke caused by large-vessel occlusion (LVO), offering rapid recanalization and improved functional outcomes.[1] Although most advancements and clinical experience have centered on anterior circulation strokes, posterior circulation occlusions account for approximately 20–25% of ischemic strokes and are associated with disproportionately higher rates of morbidity and mortality.[1] In these patients, timely revascularization remains important, particularly in the context of the complex vascular anatomy of the posterior circulation.[2]

Aspiration thrombectomy using aspiration catheters (ACs) is now widely employed for revascularization. However, procedural challenges persist, particularly the ledge effect, in which a mismatch at the catheter tip impedes smooth advancement of ACs because of disparity in diameter between the AC and the leading microwire/microcatheter.[3] This difficulty is further exacerbated in the posterior circulation, where vessel size, angulation, and stiffness can hinder catheter navigation.[2] Although traditional catheter delivery techniques rely on microcatheter–microwire combinations, emerging strategies now explore whether adjunct-free delivery using large-bore macrowires can streamline procedures and reduce time to reperfusion.

Recently introduced 0.024- and 0.035-in large-diameter macrowires offer an alternative to mitigate the ledge effect while maintaining trackability and flexibility.[4,5] Although available data remain limited, early reports describing their use in anterior circulation strokes suggest that the macrowire-only direct aspiration first-pass technique (MO-ADAPT) may offer advantages such as shorter procedure times and reduced reliance on adjunctive devices.[5–8]

Although prior studies have demonstrated promising results with macrowires for anterior circulation occlusions, their application in posterior circulation mechanical thrombectomy remains underexplored. Given the anatomic complexity of the vertebrobasilar system and the heightened technical demands of catheter navigation in this region, it is important to explore whether MO-ADAPT is feasible and safe in the context of posterior circulation occlusions. In this technical evaluation, we aimed to address this gap by assessing the feasibility, procedural performance, and clinical outcomes of the use of 0.024- and 0.035-in macrowires in adjunct-free aspiration thrombectomy for posterior circulation LVOs.

Methods

Study design

This multi-institutional retrospective study included patients who underwent MO-ADAPT thrombectomy for posterior circulation LVO at 15 centers between October 2022 and December 2024, with a mean follow-up duration of 3 months. The study was approved by local institutional review boards with waivers of informed consent.

Patient population

A retrospective review was conducted of prospectively collected data from patients with acute ischemic stroke involving large vessels in the posterior circulation in whom macrowire-guided ADAPT was performed. The patients included were adults (aged ≥18 years) who presented with acute posterior LVO, met mechanical thrombectomy eligibility criteria, and were treated with MO-ADAPT using 0.024- or 0.035-in macrowires for AC delivery as the first-line technique.

Exposure variables

Exposure variables included clinical, anatomical, and procedural characteristics (i.e. age, presence of underlying intracranial atherosclerotic disease (ICAD), tandem occlusion, baseline modified Rankin Scale (mRS) score, preprocedural National Institutes of Health Stroke Scale (NIHSS) score, vascular access site, occluded vessel location, type and position of the base catheter, whether the clot was traversed with a wire, final modified thrombolysis in cerebral infarction (mTICI) score, time from vascular access to final reperfusion, and time from aspiration system introduction to final reperfusion.

Outcome variable

Primary outcomes were defined as successful adjunct-free delivery of the AC; successful MO-ADAPT, defined as successful adjunct-free catheter delivery and successful clot aspiration; and first-pass reperfusion, defined as achievement of mTICI ≥ 2b after a single MO-ADAPT pass. The secondary outcome was a favorable clinical outcome at 90 days, defined as an mRS score of 0–2.

Statistical analysis

Descriptive statistics were reported as mean ± standard deviation or median (interquartile range (IQR)) for continuous variables, where appropriate, and as frequencies and percentages for categorical variables. Normality of continuous data was assessed using the Shapiro–Wilk test, and homogeneity of variances was evaluated with Levene's test. Continuous variables with normal distribution and equal variances were compared using a two-tailed Student's *t*-test, and Welch's *t*-test was used for those with unequal variances. Ordinal variables were compared using the Mann–Whitney *U* test. Categorical variables were analyzed using either the chi-squared test or Fisher's exact test, depending on the expected cell counts in contingency tables. Univariable and

Table 1. Clinical baseline and lesion characteristics in posterior circulation aspiration thrombectomy using macro-guidewires.

Variables	Total, $n = 42$	Successful MO-ADAPT, $n = 35$	Unsuccessful MO-ADAPT, $n = 7$	*P*-value
Age (years), mean ± SD	68.3 ± 15.4	68.2 ± 16.4	71.9 ± 10.7	.574
Presence of tandem occlusion, *n* (%)	3 (7.1)	3 (8.6)	0 (0.0)	>.999
Underlying ICAD as the source of LVO, *n* (%)	16 (38.1)	10 (28.6)	6 (85.7)	**.008**
Baseline mRS score, mean ± SD	0.8 ± 1.3	0.8 ± 1.3	0.9 ± 1.2	.846
Preprocedure NIHSS score, mean ± SD	20.1 ± 8.2	19.2 ± 9.0	17.7 ± 6.2	.723
Occluded vessel				.117
Basilar, *n* (%)	33 (78.6)	29 (82.9)	4 (57.1)	
P1, *n* (%)	6 (14.3)	3 (8.6)	3 (42.9)	
P2, *n* (%)	1 (2.4)	1 (2.9)	0 (0.0)	
Other, *n* (%)	2 (4.8)	2 (5.7)	0 (0.0)	
Access site				.631
Femoral, *n* (%)	33 (78.6)	28 (80.0)	5 (71.4)	
Radial, *n* (%)	9 (21.4)	7 (20.0)	2 (28.6)	
Base catheter				.167
Balloon guide, *n* (%)	1 (2.4)	0 (0.0)	1 (14.3)	
Nonballoon guide, *n* (%)	41 (97.6)	35 (100.0)	6 (85.7)	
Base catheter location				.748
V1, *n* (%)	2 (4.8)	2 (5.7)	0 (0.0)	
V2, *n* (%)	25 (59.5)	21 (60.0)	4 (57.1)	
V3, *n* (%)	7 (16.7)	5 (14.3)	2 (28.6)	
V4, *n* (%)	8 (19.0)	7 (20.0)	1 (14.3)	
Macrowire used				.428
0.024-in macrowire, *n* (%)	19 (45.2)	17 (48.6)	2 (28.6)	
0.035-in macrowire, *n* (%)	23 (54.8)	18 (51.4)	5 (71.4)	
Clot crossed with wire, *n* (%)	15 (35.7)	12 (34.3)	3 (42.9)	.686

ICAD: intracranial atherosclerotic disease; LVO: large-vessel occlusion; MO-ADAPT: macrowire-only direct aspiration first-pass technique; mRS: modified Rankin Scale; *n*: number of cases; NIHSS: National Institute of Health Stroke Scale; SD: standard deviation.
Bold value indicates statistical significance at $P < .05$.

multivariable binary logistic regression analyses were conducted, adjusting for potential confounders, to assess the association between exposure variables and outcomes. Model performance was evaluated using receiver operating characteristic curve analysis, with the area under the curve calculated to quantify discriminatory ability. A two-tailed *P*-value <.05 was considered statistically significant. All statistical analyses were performed using IBM SPSS Statistics, version 30.

Results

Patient characteristics

A total of 42 patients who underwent posterior circulation aspiration thrombectomy using macrowires were included in this study. The mean follow-up period was 3.1 months, with a median (IQR) of 2 (1–4) months. The mean patient age was 68.3 ± 15.4 years (Table 1). Tandem occlusions were identified in 7.1% of patients ($n = 3$), and 38.1% ($n = 16$) had ICAD as the underlying cause. The mean baseline mRS score was 0.8 ± 1.3. The mean preprocedural NIHSS score was 20.1 ± 8.2. Most occlusions (78.6%, $n = 33$) involved the basilar artery, with 14.3% ($n = 6$) located in the P1 segment, 2.4% ($n = 1$) in the P2 segment, and 4.8% ($n = 2$) in other arteries. No significant differences were noted between unsuccessful and successful MO-ADAPT, except for the prevalence of ICAD, which was significantly higher among unsuccessful cases, in which 85.7% ($n = 6$) of patients had ICAD compared with successful cases, in which 28.6% ($n = 10$) of patients had ICAD ($P = .008$).

Procedure-related variables

Femoral access was used in 78.6% of cases ($n = 33$), whereas radial access was used in 21.4% ($n = 9$) (Table 1). A balloon guide catheter was used in only one case (2.4%), with the remaining procedures (97.6%, $n = 41$) performed using nonballoon guide catheters. The base catheter was positioned in the V1 segment in 4.8% of cases ($n = 2$), in V2 in 59.5% ($n = 25$), in V3 in 16.7% ($n = 7$), and in V4 in 19.0% ($n = 8$). An Aristotle 0.024-in macrowire was used in 45.2% of cases ($n = 19$), and an Aristotle Colossus 0.035-in macrowire was used in 54.8% ($n = 23$). In 35.7% of cases ($n = 15$), the clot was crossed with the wire. No significant differences were observed in procedure-related variables between unsuccessful and successful MO-ADAPT cases. Table 2 provides a summary of the ACs used during the MO-ADAPT procedure.

Procedure outcomes and complications

Successful adjunct-free delivery of the AC using macrowires was achieved in 95.2% of cases ($n = 40$) (Table 3). Overall, an MO-ADAPT-first approach resulted in successful reperfusion without requiring an adjunctive device for delivery or thrombectomy in 81.0% of thrombectomies ($n = 34$), with first-pass reperfusion achieved in 54.8% ($n = 23$). Among patients with successful adjunct-free delivery, the

Table 2. Aspiration catheters used during the thrombectomy.

Aspiration catheter (manufacturer)	Number of patients (%)	Successful delivery (%)	Successful MO-ADAPT (%)
Zoom35 (Imperative Care)	2 (4.8)	2 (100)	1 (50.0)
Zoom45 (Imperative Care)	1 (2.4)	1 (100)	1 (100)
Zoom55 (Imperative Care)	2 (4.8)	2 (100)	2 (100)
Zoom71 (Imperative Care)	12 (28.6)	11 (91.7)	9 (75.0)
RED43 (Penumbra)	1 (2.4)	1 (100)	1 (100)
RED62 (Penumbra)	6 (14.3)	6 (100)	6 (100)
RED72 (Penumbra)	6 (14.3)	5 (83.3)	4 (66.7)
Hippo 72 (Q'Apel)	1 (2.4)	1 (100)	1 (100)
Cereglide71 (Cerenovus)	2 (4.8)	2 (100)	2 (100)
FreeClimb54 (Route 92 Medical)	1 (2.4)	1 (100)	1 (100)
SOFIA 5F (Microvention)	1 (2.4)	1 (100)	1 (100)
SOFIA 6F (Microvention)	7 (16.7)	7 (100)	6 (85.7)

MO-ADAPT: macrowire-only direct aspiration first-pass technique.

Table 3. Procedural outcomes and complication rates in patients undergoing aspiration thrombectomy with macro-guidewires.

Variables	Total, $n = 42$	Successful MO-ADAPT, $n = 35$	Unsuccessful MO-ADAPT, $n = 7$	*P*-value
Length of follow-up, median (IQR)	2 (1–4)	1 (1–4)	7 (2–10.5)	.106
Successful delivery of aspiration catheter to the clot, *n* (%)	40 (95.2)	35 (100.0)	5 (71.4)	**.024**
First-pass reperfusion, *n* (%)	23 (54.8)	23 (65.7)	0 (0.0)	**.002**
mTICI score				.571
0, *n* (%)	1 (2.4)	1 (2.9)	0 (0.0)	
2b, *n* (%)	2 (4.8)	2 (5.7)	0 (0.0)	
2c, *n* (%)	6 (14.3)	5 (14.3)	1 (14.3)	
3, *n* (%)	33 (78.6)	27 (77.1)	6 (85.7)	
Access to final reperfusion (minutes), mean ± SD	28.0 ± 18.3	22.8 ± 13.3	53.6 ± 19.0	**<.001**
Introduction of first aspiration system to final reperfusion (minutes), mean ± SD	10.5 ± 10.1	7.8 ± 7.2	25.1 ± 9.8	**<.001**
Number of ADAPT passes				**.021**
1, *n* (%)	26 (61.9)	24 (68.6)	2 (28.6)	
2, *n* (%)	11 (26.2)	9 (25.7)	2 (28.6)	
3 and 4, *n* (%)	4 (9.5)	2 (5.7)	2 (28.6)	
Vascular complication, *n* (%)	0 (0.0)	0 (0.0)	0 (0.0)	—
Symptomatic ICH, *n* (%)	1 (2.4)	0 (0.0)	1 (14.3)	.167
Distal thrombus, *n* (%)	1 (2.4)	1 (2.9)	0 (0.0)	>.999
Postprocedure (24 h) NIHSS, mean ± SD	12.5 ± 10.8	10.3 ± 9.7	17.3 ± 13.0	.160
90-day mRS, mean ± SD	3.3 ± 2.0	3.2 ± 2.0	3.9 ± 1.9	.417
Good clinical outcome at 90 days (mRS 0–2), *n* (%)	14 (33.3)	12 (34.3)	2 (28.6)	>.999
Change in mRS from baseline to 90 days, mean ± SD	2.5 ± 2.1	2.4 ± 2.1	3.0 ± 2.4	.526
Mortality, *n* (%)	10 (23.8)	8 (22.9)	2 (28.6)	>.999

ICH: intracranial hemorrhage; IQR: interquartile; MO-ADAPT: macrowire-only direct aspiration first-pass technique; mRS: modified Rankin scale; mTICI: modified treatment in cerebral infarction; *n*: number of cases; NIHSS: National Institute of Health Stroke Scale; SD: standard deviation.
Bold values indicate statistical significance at $P < .05$.

aspiration thrombectomy success rate was 85.0% (34/40). Final mTICI scores of 3, 2c, and 2b were observed in 78.6% ($n = 33$), 14.3% ($n = 6$), and 4.8% ($n = 2$) of patients, respectively, regardless of the method used for thrombectomy. The mean time from vascular access to final reperfusion was 28.0 ± 18.3 min, which was significantly longer in unsuccessful MO-ADAPT cases (53.6 ± 19.0 min) compared with successful cases (22.8 ± 13.3 min; $P < .001$). Similarly, the time from the introduction of the first aspiration system to final reperfusion was longer in cases of unsuccessful MO-ADAPT (25.1 ± 9.8 min) than in successful ones (7.8 ± 7.2 min; $P < .001$). A single ADAPT pass was performed in 61.9% of patients ($n = 26$), whereas 26.2% ($n = 11$) required two passes and 9.5% needed three or four passes ($n = 4$). The rate of single ADAPT passes was higher in the successful MO-ADAPT group compared with the unsuccessful group (68.6% vs. 28.6%; $P = .21$).

We performed univariable and multivariable binary logistic regression analyses to evaluate the association between exposure variables and procedural outcomes, including successful adjunct-free delivery of the AC, MO-ADAPT success, and first-pass reperfusion. None of the exposure variables were significantly associated with the successful adjunct-free delivery of the AC. However, underlying ICAD was significantly negatively associated with both MO-ADAPT success (odds ratio (OR) = 0.07, 95% confidence interval (CI) = 0.01–0.63; $P = .018$) and first-pass reperfusion (OR = 0.12, 95% CI = 0.03–0.51; $P = .004$) in univariable analysis (Table 4). In the multivariable logistic regression model, adjusted for age, baseline mRS, tandem

Table 4. Univariable and multivariable regression analyses evaluating association between exposure variables and outcomes.

		Univariable		Multivariable	
Outcome variable	Independent variable	OR/β (95% CI)	*P*-value	OR/β (95% CI)	*P*-value
MO-ADAPT success	Age	0.98 (0.93–1.04)	.565	0.86 (0.87–1.04)	.158
	Underlying ICAD	0.07 (0.01–0.63)	**.018**	0.04 (0.00–0.58)	**.030**
	Macrowire size	0.42 (0.07–2.48)	.341	0.89 (0.01–92.60)	.960
First-pass reperfusion	Age	0.99 (0.95–1.03)	.747	0.96 (0.87–1.05)	.348
	Underlying ICAD	0.12 (0.03–0.51)	**.004**	0.01 (0.00–0.23)	**.003**
	Macrowire size	0.53 (0.15–1.85)	.323	3.18 (0.27–37.87)	.360

Multivariate analysis is adjusted for age, baseline mRS, tandem occlusion, underlying ICAD, preprocedural NIHSS, access site, occluded vessel, base catheter used, and macrowire size.
CI: confidence interval; ICAD: intracranial atherosclerotic disease; MO-ADAPT: macrowire-only direct aspiration first-pass technique; mRS: modified Rankin scale; NIHSS: National Institute of Health Stroke Scale; OR: odds ratio.
Bold values indicate statistical significance at $P < .05$.

occlusion, underlying ICAD, preprocedural NIHSS, access site, occluded vessel, base catheter used, and macrowire size, underlying ICAD remained a significant predictor of both MO-ADAPT success (OR = 0.04, 95% CI = 0.00–0.58; $P = .030$) and first-pass reperfusion (OR = 0.01, 95% CI = 0.00–0.23; $P = .003$).

No vascular complications were reported. Symptomatic intracranial hemorrhage (ICH) occurred in one patient (2.4%) after an unsuccessful MO-ADAPT, and distal thrombus developed in one patient (2.4%) after a successful MO-ADAPT (Table 3).

Clinical outcomes

The mean 24-h postprocedure NIHSS for the overall cohort was 12.5 ± 10.8, with no significant difference observed between patients with successful and those with unsuccessful MO-ADAPT ($P = .160$) (Table 3). Similarly, the mean mRS at 90 days was 3.3 ± 2.0, again without a significant difference between the two groups ($P = .417$). A good clinical outcome at 90 days was observed in 33.3% of patients overall ($n = 14$), and the mean change in mRS from baseline to 90 days was 2.5 ± 2.1. The overall mortality rate after thrombectomy was 23.8% ($n = 10$), with no significant difference between the two groups ($P > .999$).

Bailout techniques used after unsuccessful MO-ADAPT

A total of seven patients (16.7%) experienced unsuccessful MO-ADAPT. In two patients (28.6%), macrowires failed to deliver the AC. In one of these cases, a microcatheter and microwire were used to deliver the AC; in the other, a microcatheter and stent retriever-assisted in the delivery. Recanalization was ultimately successful in both patients through a combined aspiration and stent retriever approach. Among patients with successful macrowire AC delivery but unsuccessful MO-ADAPT, one case required replacing a 0.035-in macrowire with a 0.024-in macrowire, which enabled recanalization using a combined aspiration and stent retriever technique. In three additional cases, stent retrievers were introduced after MO-ADAPT failure, all of which resulted in successful recanalization via the combined approach. One patient underwent balloon angioplasty and stenting to achieve recanalization. Overall, six patients (85.7%) had a final mTICI score of 3, and one patient (14.3%) had a score of 2c. Recanalization was accomplished with a single stent retriever-assisted pass in four cases (57.1%), whereas two and three passes were needed in one patient each (14.3%). Procedural details are summarized in Table 5.

Discussion

This study demonstrated that both 0.024- and 0.035-in macrowires can be used to deliver the AC in patients with posterior circulation strokes undergoing mechanical thrombectomy, demonstrating technical feasibility and encouraging procedural outcomes. Successful AC delivery to the clot was achieved in 95.2% of cases, with the clot being crossed by the macrowire in only 35.7%. The rate of MO-ADAPT success was 83.3%, and the mean time from vascular access to final reperfusion in successful MO-ADAPT was 22.8 ± 13.3 min. First-pass reperfusion was achieved in 54.8% of cases. No vascular complications were identified, and the incidences of symptomatic ICH and distal thrombus were both low (2.4% each). At 90 days, the mean mRS was 3.3 ± 2.0, with 33.3% of patients achieving good clinical outcomes (mRS 0–2). Multivariable regression analysis showed that macrowire size did not influence procedural success or final clinical outcomes. The presence of underlying ICAD was identified as the sole independent negative predictor of successful MO-ADAPT (OR = 0.04, 95% CI = 0.00–0.58; $P = .030$) and first-pass reperfusion (OR = 0.01, 95% CI = 0.00–0.23; $P = .003$).

Mechanical thrombectomy is the preferred intervention for selected patients with posterior circulation stroke who meet LVO, time window, imaging, and NIHSS criteria.[9,10] Stent retrievers, ACs, or a combination of both are typically used during the procedure.[11] Microcatheters and microwires are commonly used to navigate and deliver the AC to the thrombus through various thrombectomy techniques.[12] However, when using the ADAPT technique, a smaller caliber may be suboptimal for advancing the large-bore AC, potentially resulting in a ledge effect, which can impair the control and navigation over AC advancement.[13] To address this issue, larger-caliber guidewires, known as macrowires (0.024- and 0.035-in), received U.S. Food and Drug Administration 510(k) clearance for neurovascular

Table 5. Interventional methods used following unsuccessful direct aspiration first-pass technique.

Variables	Total, $n = 7$
Devices used to deliver aspiration catheter, *n* (%)	
Microcatheter Phenom 21	1 (14.3)
Microcatheter Velocity	1 (14.3)
Microwire Synchro 2 soft	2 (28.3)
Macrowire Aristotle 24	1 (14.3)
Stentretriever Solitaire 4 × 40	1 (14.3)
Type of stent retriever used to perform thrombectomy	
Solitaire 4 × 40	1 (14.3)
Solitaire 6 × 40	3 (42.9)
Trevo 3 × 32	1 (14.3)
Trevo 6 × 37	1 (14.3)
Tigertriever 17	1 (14.3)
Number of stent retriever-assisted passes	
1, *n* (%)	4 (57.1)
2, *n* (%)	1 (14.3)
3, *n* (%)	1 (14.3)

n: number of cases.

applications in 2019 and 2023, respectively.[14,15] These macrowires offer enhanced technical performance by minimizing the ledge effect, improving distal support, and providing greater stability during AC delivery.[4,16] Importantly, they frequently enable performing aspiration thrombectomy without requiring the wire to cross the clot, thereby reducing the risk of thrombus disruption and distal embolization.[4]

Since the clinical introduction of both macrowires, multiple studies have evaluated their technical performance and procedural outcomes in anterior circulation strokes. Both devices demonstrated high success rates, with AC delivery achieved in 80–100% of cases and MO-ADAPT success rates ranging from 90 to 100%.[5–8] The most notable complication reported was symptomatic ICH, occurring in approximately 2% of cases.[5] Vascular complications, such as vasospasm, were infrequent and reported in only 2–3% of cases.[6,7] In comparison, our data show a similarly promising success rate (95.2%) for AC delivery using macrowires alone in posterior circulation strokes. The observed MO-ADAPT success rate in this series was slightly lower (83.3%) relative to prior reports in the anterior circulation. Multivariable regression analysis indicated that reduced MO-ADAPT success was only associated with the presence of underlying ICAD, a key vascular pathology not reported in the aforementioned studies, which may partly explain the lower success rates observed. Notably, the posterior circulation has been associated with an elevated risk of ICAD-related stroke compared with the anterior circulation, suggesting higher odds of underlying ICAD in posterior circulation strokes.[17] Consistent with prior evidence on macrowire use, this study also reported minimal complication rates.

When compared with a 2020 meta-analysis encompassing 457 cases of aspiration thrombectomy in posterior circulation strokes, the current study demonstrates largely comparable outcomes.[18] The rates of successful recanalization achieved with ADAPT (81.0% in this study vs. 89.3% in the meta-analysis), final mTICI 2b/3 reperfusion (97.6% vs. 86.3%, respectively), good clinical outcomes at 90 days (33.3% vs. 36.7%, respectively), mortality (23.8% vs. 26.7%, respectively), vascular complications (0% vs. 2.4%, respectively), and symptomatic ICH (2.4% vs. 3.2%, respectively) were similar across the two studies. Notably, our data show favorable results in both shorter time to recanalization (28 min vs. 47.3 min) and lower rates of distal embolization (2.4% vs. 11.6%). The slight reduction in good clinical outcomes at 90 days observed in our cohort may be attributable to a higher baseline stroke severity (mean NIHSS: 20.1 vs. 15.8) and older patient age (mean: 68.3 vs. 65.5).

Our data, in conjunction with prior reports, support the use of MO-ADAPT as a technically feasible first-line approach for aspiration thrombectomy in both anterior and posterior circulation strokes, with encouraging procedural results. The current data suggest that macrowires may demonstrate procedural and clinical outcomes comparable with those achieved with conventional devices previously used in posterior circulation ADAPT, although controlled studies will be necessary to confirm this. Notably, MO-ADAPT demonstrated a shorter time to recanalization and a lower incidence of distal embolization. Furthermore, MO-ADAPT can decrease the number of devices used compared with stent retriever-assisted thrombectomy or standard ADAPT techniques, which may reduce costs; however, this needs to be confirmed in future cost-minimization analyses.

Limitations

To our knowledge, this is the first study to investigate the use of macrowires for performing ADAPT in the treatment of posterior circulation strokes; however, several limitations must be acknowledged. First, the data were retrospectively extracted and analyzed from a prospectively collected registry, introducing inherent limitations related to retrospective study design. Second, the dataset comprised nonconsecutive thrombectomy cases performed across multiple institutions over a relatively short timeframe—42 patients over 2 years across 15 centers—representing fewer than two cases per center per year. This low case volume raises the possibility of selection bias and limits the generalizability of the findings. Additionally, procedural decisions—specifically the determination of MO-ADAPT failure and transition to adjunctive devices such as microcatheters or stent retrievers—were left to the discretion of the treating physicians. This variability in clinical judgment could lead to either underestimation or overestimation of success rates, depending on individual operator thresholds. Finally, because the goal of this study was to evaluate the technical feasibility of using macrowires in thrombectomy procedures conducted in posterior circulation LVOs, it lacks a comparative arm, which limits our ability to draw statistical conclusions on the safety and efficacy of the technique. These aspects should be further evaluated in future comparative studies. Future studies incorporating larger, consecutively enrolled cohorts and standardized criteria for patient selection and procedural success across participating centers are warranted to validate these findings and enhance generalizability.

Conclusion

The use of 0.024- and 0.035-in macrowires for ADAPT without adjunctive microcatheters, microwires, or stent retrievers

appeared to be technically feasible for treatment of posterior circulation LVOs, with promising procedural results and a low rate of observed complications. Moreover, their use was associated with reduced mean time to reperfusion and lower rates of distal embolization relative to existing evidence. Unsuccessful MO-ADAPT was primarily associated with underlying ICAD and often necessitated the addition of stent retriever-assisted techniques to achieve successful reperfusion. Further studies, ideally with larger cohorts and comparative designs, are necessary to evaluate the relative safety, efficacy, and cost effectiveness of macrowires versus conventional AC delivery systems.

Abbreviations

AC	aspiration catheter
CI	confidence interval
IQR	interquartile range
ICAD	intracranial atherosclerotic disease
LVO	large-vessel occlusion
MO-ADAPT	macrowire-only direct aspiration first-pass technique
mRS	modified Rankin Scale
mTICI	modified thrombolysis in cerebral infarction
NIHSS	National Institutes of Health Stroke Scale
OR	odds ratio

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Dr Do serves on the board for Scientia Vascular.

Dr Chowdhry is a consultant and proctor for Medtronic and Microvention.

Dr Birnbaum is a consultant for Imperative Care and Rapid AI.

Dr Tonetti is a consultant for Scientia Vascular.

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Data availability

Data are available upon reasonable request to the corresponding author.

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