

Endovascular treatment for medium or distal vessel occlusion stroke (DISTAL): 12-month outcomes of a multicentre, open-label, randomised trial



Urs Fischer*, Alex Brehm*, Marc Ribo, Federica Rizzo, Daniel Strbian, Silja Rätty, Juan F Arenillas, Mario Martínez-Galdámez, Steven D Hajdu, Patrik Michel, Jan Gralla, Eike I Piechowiak, Daniel P O Kaiser, Volker Puetz, Frans Van den Bergh, Sylvie De Raedt, Flavio Bellante, Anne Dusart, Victoria Hellstern, Ali Khanfer, Guillermo Parrilla, Ana Morales, Jan S Kirschke, Silke Wunderlich, Jens Fiehler, Götz Thomalla, Robin Lemmens, Jo P Peluso, Manuel Bolognese, Alexander von Hessling, Adriaan van Es, Nyika D Kruyt, Jonathan M Coutinho, Carlos Castaño, Jens Minnerup, Wim van Zwam, Elisabeth Dhondt, Christian H Nolte, Paolo Machi, Christian Loehr, Heinrich P Mattle, Jan-Hendrik Buhk, Johannes Kaesmacher, Tomas Dobrocky, Panagiotis Papanagiotou, Angelika Alonso, Markus Holtmannspoetter, Andrea Zini, Leonardo Renieri, Fee Keil, Ido van den Wijngaard, Georg Kägi, Mikel Terceño, Martin Wiesmann, Sergio Amaro, Isabel Fragata, Mira Katan, Ronen R Leker, Jeffrey L Saver, Julie Staals, Nikki Rommers, Luzia Balmer, Marios Psychogios, on behalf of the DISTAL investigators†

Summary

Background Long-term evidence for endovascular treatment in medium or distal vessel occlusion stroke is scarce. Three out of four randomised trials reported no benefit of endovascular treatment over best medical treatment at 90 days. We aimed to assess efficacy of endovascular treatment plus best medical treatment versus best medical treatment alone at 12 months in patients enrolled in the DISTAL trial, as well as overall survival.

Methods DISTAL was an open-label, randomised trial with blinded endpoint assessment conducted at 55 hospitals in Europe and the Middle East. Adults (≥ 18 years) with acute ischaemic stroke due to medium or distal vessel occlusion (occlusion of co-dominant or non-dominant M2 or M3–M4 middle cerebral artery, A1–A3 anterior cerebral artery, or P1–P3 posterior cerebral artery) presenting from home within 6 h of last known well, or between 6 h and 24 h if neuroimaging demonstrated potentially salvageable tissue, were randomly assigned (1:1) through a centralised web-based system to endovascular treatment plus best medical treatment or best medical treatment alone. The prespecified primary outcome at 12 months was disability measured by use of the ordinal modified Rankin Scale (mRS; scores 5 and 6 combined) in the intention-to-treat population. The only safety outcome was overall survival. The trial is registered on ClinicalTrials.gov (NCT05029414) and is completed.

Findings Between Dec 16, 2021, and July 10, 2024, we enrolled 553 patients. Ten patients declined post-hoc consent, leaving 543 participants in the analysis (239 [44%] females and 304 [56%] males; median age 77 years, IQR 68–84). 271 (50%) were assigned to endovascular treatment plus best medical treatment and 272 (50%) to best medical treatment alone. The median NIHSS score at admission was 6 (IQR 5–9); 355 (65%) participants received intravenous thrombolysis. Predominant occlusion locations were the M2 (239 [44%]), M3 (146 [27%]), P2 (73 [13%]), and P1 (30 [6%]) segments. 12-month data were available for 524 (97%) participants. The median mRS score was 2 (IQR 1–4) in the endovascular treatment plus best medical treatment group and 2 (1–4) in the best medical treatment alone group. There was no difference in 12-month mRS distribution between endovascular treatment plus best medical treatment and best medical treatment alone (adjusted common odds ratio for better functional outcome 0·81, 95% CI 0·59–1·12; $p=0\cdot20$). Overall survival was similar between the two groups (hazard ratio 1·46, 95% CI 0·93–2·30; $p=0\cdot10$).

Interpretation In patients with a medium or distal vessel occlusion stroke, endovascular treatment plus best medical treatment was not associated with a reduction of disability or death at 12 months compared with best medical treatment. These results are consistent with the 90-day results. Routine endovascular treatment is therefore not supported for patients with mild-to-moderate medium or distal vessel occlusion stroke.

Funding Swiss National Science Foundation, Gottfried und Julia Bangerter-Rhyner-Foundation, Medtronic, Stryker Neurovascular, Phenox, Rapid Medical, and Penumbra.

Copyright © 2026 The Author(s). Published by Elsevier Ltd. This is an Open Access article under the CC BY 4.0 license.

Introduction

Endovascular treatment has been established as a highly effective treatment for acute ischaemic stroke caused by a large vessel occlusion, substantially

reducing the likelihood of disability or death.¹ Randomised trials over the past decades have demonstrated sustained long-term benefits of endovascular treatment over a broad range of imaging

Lancet Neurol 2026; 25: 571–80

Published Online
May 6, 2026
[https://doi.org/10.1016/S1474-4422\(26\)00169-9](https://doi.org/10.1016/S1474-4422(26)00169-9)

*Contributed equally

†Collaborators listed in the appendix (pp 4–10)

Department of Neurology, Inselspital Bern, University Hospital Bern, Bern, Switzerland (Prof U Fischer MD, H P Mattle MD, G Kägi MD); University of Bern, Bern, Switzerland (Prof U Fischer MD); Department of Diagnostic and Interventional Neuroradiology, University Hospital Basel, Basel, Switzerland (A Brehm PhD, Prof M Psychogios MD, L Balmer BSc); Department of Neurology, Hospital Vall d'Hebron, Barcelona, Spain (M Ribo PhD, F Rizzo MD); Department of Neurology, Helsinki University Hospital and University of Helsinki, Helsinki, Finland (D Strbian PhD, S Rätty MD); Stroke Program, Department of Neurology, Hospital Clínico Universitario Valladolid, IBIOVALL, Spain (Prof J F Arenillas MD); Clinical Neurosciences Research Group, Department of Medicine, University of Valladolid, IBGM, Consejo Superior de Investigaciones Científicas (CSIC) – Universidad de Valladolid, Valladolid, Spain (Prof J F Arenillas MD); Neuroradiology Unit, Department of Radiology, Hospital Clínico Universitario Valladolid, IBIOVALL, Valladolid, Spain (M Martínez-Galdámez MD); Department of Diagnostic and Interventional Neuroradiology,

Lausanne University Hospital, Lausanne, Switzerland (S D Hajdu MD); Department of Neurology, Lausanne University Hospital, Lausanne, Switzerland (P Michel MD); Department of Diagnostic and Interventional Neuroradiology, Inselspital, University Hospital Bern, Bern, Switzerland (Prof J Gralla MD, E I Piechowiak MD, J Kaesmacher MD, T Dobrocky MD); Institute of Neurology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany (D P O Kaiser MD); Dresden Neurovascular Center, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany (D P O Kaiser MD, V Puetz MD); Department of Neurology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany (V Puetz MD); Department of Radiology, Universitair Ziekenhuis Brussel (UZ Brussel), Brussels, Belgium (F Van den Bergh MD); Department of Neurology, Universitair Ziekenhuis Brussel (UZ Brussel), NEUR Research Group, Vrije Universiteit Brussel (VUB), Brussels, Belgium (S De Raedt PhD); Department of Neurology, Hôpital Civil Marie Curie, CHU Charleroi, Charleroi, Belgium (F Bellante MD, A Dusart MD); Department of Neuroradiology, Kantonsspital St Gallen, St Gallen, Switzerland (V Hellstern MD); Department of Neuroradiology, Klinikum Stuttgart, Stuttgart, Germany (A Khanafer MD); Department of Interventional Neuroradiology, University Hospital Virgen de la Arrixaca, El Palmar, Murcia, Spain (G Parrilla MD, A Morales MD); Department of Diagnostic and Interventional Neuroradiology, Technical University of Munich, School of Medicine and Health, Klinikum rechts der Isar, Munich, Germany (Prof J S Kirschke MD); Department of Neurology, Technical University of Munich, School of Medicine and Health, Klinikum rechts der Isar, Munich, Germany

Research in context

Evidence before this study

We searched PubMed on Feb 12, 2026, with no date restrictions, for randomised trials of endovascular treatment plus best medical treatment versus best medical treatment alone in adults with acute ischaemic stroke and medium or distal vessel occlusion stroke using the search key words ["randomised trial" OR "randomized Trial"] AND ["thrombectomy" OR "endovascular treatment"] AND ["medium" OR "distal"]. Conference abstracts were considered to account for emerging relevant evidence. We found four trials reporting functional outcome: the DISCOUNT trial with 244 patients in France, the DISTAL trial with 543 patients in Europe, the ESCAPE-MeVO trial with 530 patients in Europe and North America, and the ORIENTAL-MeVO trial with 563 patients in China. Out of the four trials, three reported neutral results regarding functional outcome at 90 days, while the study conducted in China reported better functional outcome at 90 days with endovascular treatment plus best medical treatment compared with best medical treatment alone. The main differences between the ORIENTAL-MeVO trial and the other trials are that patients in the ORIENTAL-MeVO trial were more severely affected (median National Institutes of Health Stroke Scale score of 10 vs 6) and less likely to receive intravenous thrombolysis (approximately 36% vs 65%), suggesting that in moderately affected patients with an acute

ischaemic stroke due to a medium or distal vessel occlusion, there is no benefit of endovascular treatment. However, no long-term outcomes have been reported. Thus, in patients with a medium or distal vessel occlusion stroke, whether endovascular treatment has clinical benefit at long-term follow-up remains unknown.

Added value of this study

DISTAL is the first study to report long-term outcomes of patients with medium or distal vessel occlusion stroke. It shows that endovascular treatment plus best medical treatment is not associated with reduced disability or death at 1 year compared with best medical treatment alone. Functional outcomes and mortality at 1 year were similar between the two groups. Quality of life scores did not favour endovascular treatment plus best medical treatment over best medical treatment alone.

Implications of all the available evidence

The neutral 1-year results of the DISTAL trial complement previous trial evidence, indicating that endovascular treatment in addition to best medical treatment does not reduce disability or mortality in moderately affected patients with medium or distal vessel occlusion. The results reaffirm that endovascular treatment should not be routinely offered to patients with medium or distal vessel occlusion stroke.

profiles, including patients with large infarct cores and extended time windows.²⁻⁴

By contrast, the role of endovascular treatment in patients with acute ischaemic stroke due to medium or distal vessel occlusion remains uncertain. These occlusions, typically involving second-order or more distal branches of the cerebral arteries (such as the M2 segment of the middle cerebral artery), account for a substantial proportion of acute ischaemic strokes and are associated with a wide spectrum of clinical severity and functional outcomes.⁵ Although prognosis is, on average, more favourable than for large vessel occlusion stroke, a considerable proportion of patients with medium or distal vessel occlusion stroke experience persistent disability despite best medical treatment, including intravenous thrombolysis.^{6,7}

Recent randomised trials evaluating endovascular treatment in this population have yielded mixed results. The first three trials showed no benefit in preventing disability or death at 90 days and suggested a possible increase in symptomatic intracranial haemorrhage,⁶⁻⁸ whereas the recently presented ORIENTAL-MeVO trial reported benefit in a Chinese population.⁹ Differences in trial design, patient selection, baseline stroke severity, use of intravenous thrombolysis, and health-care context might partly explain these discrepant findings, limiting the generalisability of individual trial results. Moreover, data on long-term recovery

trajectories after medium or distal vessel occlusion stroke remain scarce.

DISTAL was a randomised trial evaluating the effect of endovascular treatment on functional outcome in patients with medium or distal vessel occlusion presenting within 24 h of last known well and has reported 90-day results. This prespecified analysis assessed the benefits and harms of endovascular treatment plus best medical treatment versus best medical treatment alone on functional outcome, self-reported quality of life, and overall survival at 12 months.

Methods

Study design

DISTAL was an investigator-initiated, international, randomised, two-arm, assessor-blinded trial done at 54 hospitals across ten European countries (Switzerland, Germany, Spain, Belgium, the Netherlands, Finland, Italy, Sweden, the UK, and Portugal) and one hospital in the Middle East (Israel). The initial and final trial protocols, including a detailed overview of all changes, are published alongside the 90-day primary results.⁶ Over the course of the trial, the only change to the inclusion and exclusion criteria, trial procedures, analysis plan, or outcomes was the addition of the P3 segment of the posterior cerebral artery as a target vessel (date of change Sept 22, 2024). No major deviations affecting the 12-month prespecified endpoints occurred beyond those

already documented in the change overview. The protocol was approved by the relevant ethics committee at each participating site before enrolment commenced; the first site approved was the University Hospital Basel, Basel, Switzerland, by the Ethikkommission Nordwest- und Zentralschweiz (approval number: 2021-01692). A patient interest group (FRAGILE Suisse) was consulted during trial design, confirming the relevance of the primary endpoint and supporting the inclusion of a patient-reported quality-of-life measure.

The trial is registered at ClinicalTrials.gov (NCT05029414; date of first registration Aug 26, 2021) and is completed.

Participants

We designed the trial to enrol patients with acute ischaemic stroke due to medium or distal vessel occlusion, as identified by standard-of-care imaging at participating centres. Full inclusion and exclusion criteria are provided in the trial protocol and with the publication of the 90-day results.^{6,10}

In brief, patients were eligible if they presented with an acute ischaemic stroke due to an occlusion of the non-dominant or co-dominant M2 segment of the middle cerebral artery; the M3 or M4 segment of the middle cerebral artery; the A1, A2, or A3 segment of the anterior cerebral artery; or the P1, P2, or P3 segment of the posterior cerebral artery, as assessed on non-invasive imaging (CT or MR angiography). An M2 segment was deemed non-dominant or co-dominant if it perfused less or approximately half of the corresponding M1 territory, or if the occluded M2 segment was clearly smaller than the non-occluded M2 segment.

Participants were aged 18 years or older, had a National Institutes of Health Stroke Scale (NIHSS) score of 4 or higher (range 0–42, with higher scores indicating more severe neurological deficits) or clearly disabling symptoms, were living in their own household before the index event, and were not bedridden. Randomisation occurred within 6 h of last known well, or between 6 h and 24 h if neuroimaging demonstrated potentially salvageable tissue. Imaging-based exclusion criteria included known vascular anatomy precluding endovascular treatment, intracranial haemorrhage, or significant mass effect.

Written informed consent was obtained from all participants or their legally authorised representatives either before the study or post hoc (emergency consent procedures), according to country-specific requirements.

Randomisation and masking

Participants were randomly assigned (1:1 ratio) through a centralised web-based system to receive endovascular treatment plus best medical treatment or best medical treatment alone. Treatment allocation was generated dynamically by a minimisation algorithm (balancing for NIHSS score and site) implemented in secuTrial. No fixed allocation list existed. Each new patient was assigned

according to the current treatment-group balance, with a random component incorporated into the algorithm. Outcome assessments at 90 days and 12 months were performed by investigators or trial personnel masked to treatment allocation. To maintain masking, all sites were required to designate a dedicated outcome assessor who was not part of the treatment team; however, the success of this approach was not evaluated.

Procedures

Endovascular treatment was done according to local practice using stent retrievers, aspiration catheters, or a combination of both, with or without balloon guiding catheters. Device selection, procedural technique, anaesthesia, intraprocedural management, and postprocedural care were at the discretion of the treating physician. All participants received best medical treatment according to local standards based on current European Stroke Organisation and American Heart Association/American Stroke Association (AHA/ASA) guidelines.^{11,12}

Baseline imaging followed local standard of care protocols and included, at minimum, non-contrast CT or MRI, and CT or MR angiography. CT or MR perfusion imaging was optional but encouraged, particularly to aid differentiation between dominant and non-dominant M2 occlusions. All imaging data were transferred to an independent core laboratory (University Hospital Bern, Bern, Switzerland and Hôpitaux universitaires de Genève, Geneva, Switzerland) and assessed masked to group assignment by two expert readers following a standardised workflow.

Trained assessors masked to treatment allocation collected outcomes by means of standardised questionnaires, administered in person (preferred for the 90-day visit) or over the telephone (12-month ± 30-day visit). Biological sex and race were recorded as part of baseline demographic data collected (self-reported) at enrolment according to local clinical documentation procedures.

Outcomes

The primary endpoint of the trial, the 90-day mRS score has been published before.⁶ In this Article we report a prespecified analysis of the DISTAL trial, with 1-year mRS as the primary endpoint. The mRS is an ordinal scale ranging from 0 to 6, with higher scores indicating greater disability (0=no symptoms; 6=death). For analysis, scores of 5 and 6 were combined to avoid classifying a transition from death (6) to severe disability requiring constant care (5) as an improvement in functional outcome.

The secondary outcomes were excellent functional outcome (defined as mRS score of 0–1) at 12 months; functional independence (defined as mRS score of 0–2) at 12 months; health-related quality of life at 12 months, assessed with the EuroQol 5-Dimension 5-Level

(S Wunderlich MD); Department of Diagnostic and Interventional Neuroradiology, University Medical Center Hamburg Eppendorf, Hamburg, Germany (Prof J Fiehler MD); Department of Neurology, University Medical Center Hamburg Eppendorf, Hamburg, Germany (Prof G Thomalla MD); KU Leuven, Department of Neurosciences, Experimental Neurology; University Hospitals Leuven, Department of Neurology, Leuven, Belgium (Prof R Lemmens MD); Department of Interventional Neuroradiology, University Hospital Leuven, Leuven, Belgium (J P Peluso MD); Neurocenter, Cantonal Hospital of Lucerne, Lucerne, Switzerland (M Bolognese MD, A von Hessling MD); Section of Neuroradiology, Neurocenter, Cantonal Hospital of Lucerne, Lucerne, Switzerland (A von Hessling MD); Department of Radiology, Leiden University Medical Centre, Leiden, Netherlands (A van Es PhD); Department of Neurology, Leiden University Medical Center, Leiden, Netherlands (N D Kruijt PhD, I van den Wijngaard MD); University Neurovascular Center Leiden-the Hague, Leiden, Netherlands (A van Es PhD, N D Kruijt PhD, I van den Wijngaard MD); Department of Neurology, Amsterdam University Medical Center, location University of Amsterdam, Amsterdam, the Netherlands (Prof J M Coutinho PhD); Department of Interventional Neuroradiology, University Hospital Germans Trias i Pujol, Badalona, Spain (C Castaño MD); Department of Neurology, University of Münster, Münster, Germany (Prof J Minnerup MD); Department of Neurology, University of Lübeck, Lübeck, Germany (Prof J Minnerup MD); Department of Radiology and Nuclear Medicine, Maastricht University Medical Centre, Maastricht, the Netherlands (Prof W van Zwam MD); Department of Vascular and Interventional (Neuro-) Radiology (VINRAD), Ghent University Hospital, Ghent, Belgium (E Dhondt PhD); Department of Neurology and Experimental Neurology and

Center for Stroke Research Berlin (CSB), Charité – Universitätsmedizin Berlin, Berlin, Germany (C H Nolte MD); Division of Diagnostic and Interventional Neuroradiology, Geneva University Hospitals, Geneva, Switzerland (P Machi PhD); Department of Neuroradiology, Klinikum Vest, Recklinghausen, Germany (C Loehr MD); Department of Neuroradiology, Asklepios Hospital Hamburg St Georg, Hamburg, Germany (J-H Buhk MD); Department of Diagnostic and Interventional Neuroradiology, Hospital Bremen Mitte, Bremen, Germany (P Papanagiotou MD); Department of Radiology, Areteion University Hospital, National and Kapodistrian University of Athens, Athens, Greece (P Papanagiotou MD); Department of Neurology, University Medical Center Mannheim, University of Heidelberg, Mannheim, Germany (A Alonso MD); Department of Diagnostic and Interventional Neuroradiology, Hospital Nuremberg South Campus, Nuremberg, Germany (M Holtmannspoetter MD); IRCCS Istituto delle Scienze Neurologiche di Bologna, Maggiore Hospital, Bologna, Italy (A Zini MD); Interventional Neurovascular Unit, Careggi University Hospital, Florence, Italy (L Renieri MD); Institution of Neuroradiology, University Hospital Frankfurt, Goethe University, Frankfurt, Germany (F Keil MD); Department of Neurology and Radiology, Haaglanden Medical Center, Den Haag, Netherlands (I van den Wijngaard MD); Department of Neurology, Hospital Doctor Josep Trueta, Girona, Spain (M Terceño PhD); Department of Diagnostic and Interventional Neuroradiology, University Hospital RWTH Aachen, Aachen, Germany (Prof M Wiesmann MD); Department of Neurology, Hospital Clinic Barcelona, Barcelona, Spain (S Amaro MD); Neuroradiology Department, ULS São José, Lisboa, Portugal (I Fragata PhD); Department of Neurology, University Hospital Basel, Basel, Switzerland (Prof M Katan MD); Department of Neurology, Hadassah Hebrew University Medical Center, Jerusalem, Israel (Prof R R Leker MD);

(EQ-5D-5L) questionnaire (index score and visual analogue scale [VAS] analysed as continuous outcomes; five EQ-5D dimensions analysed as ordinal outcomes); and residential status (living at home vs other). EQ-5D-5L health states (defined by the five dimensions of mobility, self-care, usual activities, pain or discomfort, and anxiety or depression, each on five severity levels) were converted into a single preference-based utility index using the German EQ-5D-5L value set. Utilities are anchored at 1 (full health) and 0 (dead), with possible negative values for states considered worse than dead. The only safety outcome was overall survival, defined as time from stroke onset to death from any cause within 12 months.

Statistical analysis

All analyses were prespecified in a statistical analysis plan (appendix pp 16–20) for the 12-month follow-up of the DISTAL randomised trial, finalised before database lock. Analyses were conducted according to the treatment-policy estimand following the intention-to-treat principle, whereby participants were analysed in their randomised group (endovascular treatment plus best medical

treatment vs best medical treatment alone). The full analysis set comprised all randomised participants and was used for analyses of the mRS and mortality. For health-related quality of life and residential status, analyses were performed in a restricted analysis set including only participants alive at 1 year; outcomes for participants who died were treated as missing by design and results for these endpoints should therefore be interpreted as conditional on 1-year survival. Out-of-window 1-year visits were included in the main analyses. The trial sample size was determined for the primary 90-day endpoint, as described in the main trial report and protocol.^{6,10}

Baseline characteristics and 12-month outcomes were summarised by randomised groups using median (IQR) for continuous variables and n (%) for categorical variables. The primary analysis used adjusted mixed-effects ordinal regression, with a random intercept for centre. Prespecified covariates were included as fixed effects: age at baseline, NIHSS score at admission, pre-stroke mRS score, occlusion location (M2 or M1 segment of middle cerebral artery, M3 or M4 segment of middle

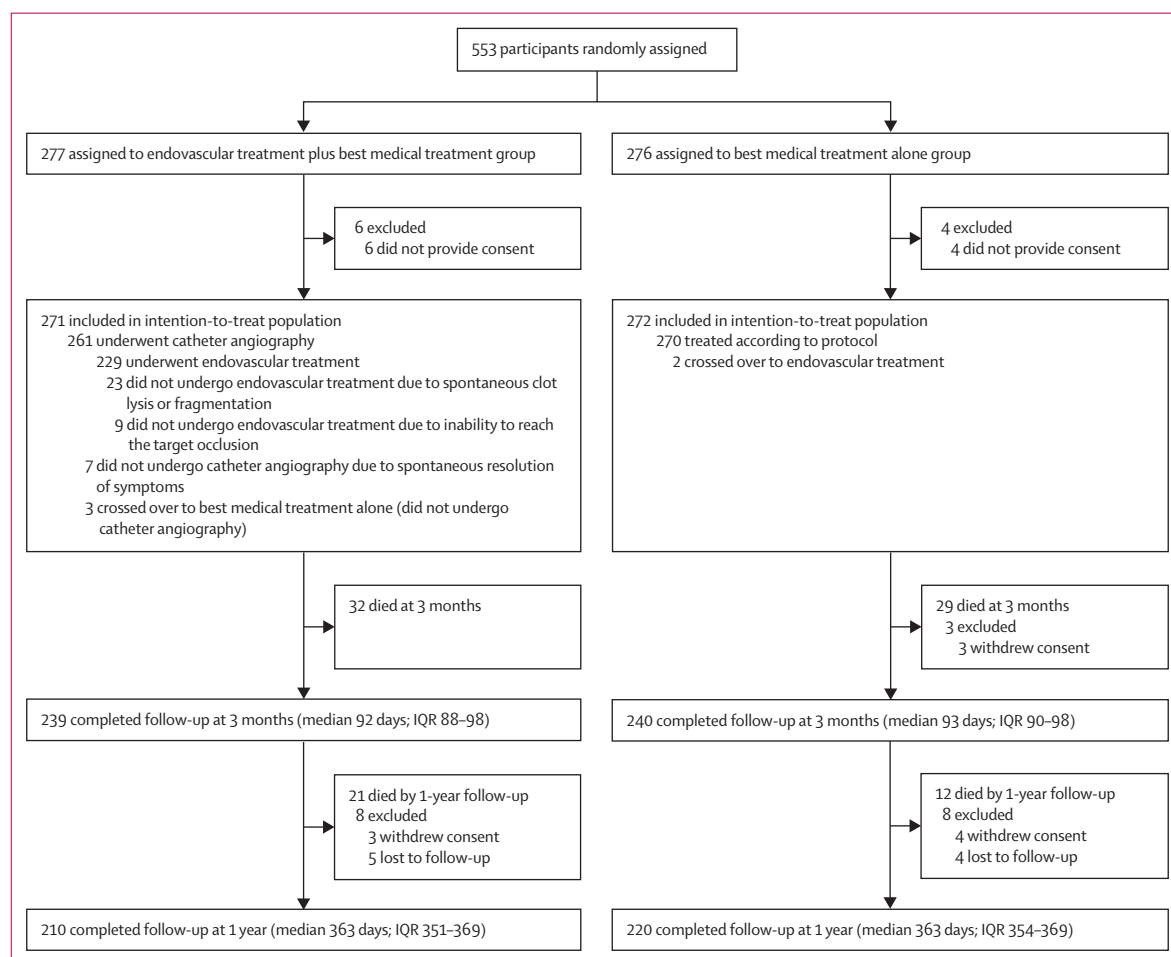


Figure 1: Trial profile

cerebral artery, posterior cerebral artery, or anterior cerebral artery), intravenous thrombolysis (yes or no), and time from last known well to randomisation (<6 h or 6–24 h). Treatment effects were reported as adjusted common odds ratios (ORs) with profile-likelihood 95% CIs whereby a common OR greater than 1 should be interpreted as a treatment effect in favour of endovascular treatment. The proportional odds assumption was assessed (Brant test and visual checks) and influential

observations were evaluated using residuals versus fitted values, leverage, and Cook's distance.

Binary mRS outcomes (mRS 0–1 and mRS 0–2) were analysed using adjusted mixed-effects logistic regression with a random intercept for study centre and the same covariate adjustment, reporting adjusted ORs with profile-likelihood 95% CIs; model diagnostics were assessed visually. EQ-5D-5L dimensions were analysed using adjusted ordinal regression models in the restricted analysis set with the same covariate adjustment; the centre random intercept was omitted because of convergence limitations related to small cluster sizes. Continuous EQ-5D-5L outcomes (index score and VAS) were analysed using linear regression in the restricted analysis set after assessment of residual distributions; robust standard errors were used to derive 95% CIs. Residential status was analysed using adjusted mixed-effects logistic regression with a random intercept for study centre, reporting adjusted ORs with profile-likelihood 95% CIs.

Overall survival (death from any cause within 12 months) was analysed as time from stroke onset to death using Kaplan–Meier curves and Cox regression, with hazard

Comprehensive Stroke Center and Department of Neurology, David Geffen School of Medicine of UCLA, Los Angeles, CA, USA (Prof J L Saver MD); Department of Neurology and Cardiovascular Research Institute (CARIM), Maastricht University Medical Centre, Maastricht, Netherlands (Prof J Staals PhD); Department of Clinical Research, University Hospital Basel, Basel, Switzerland (N Rommers PhD)

Correspondence to: Prof Dr Marios Psychogios, Department of Diagnostic and Interventional Neuroradiology, University Hospital Basel, 4031 Basel, Switzerland marios.psychogios@usb.ch or

Prof Dr Urs Fischer, Department of Neurology, University Hospital Bern, 3010 Bern, Switzerland urs.fischer@insel.ch

See Online for appendix

	Endovascular treatment plus best medical treatment (n=271)	Best medical treatment alone (n=272)
Age, years	77 (68–83)	78 (68–84)
>80 years	102 (38%)	111 (41%)
Sex		
Female	116 (43%)	123 (45%)
Male	155 (57%)	149 (55%)
Race		
White	265/270 (98%)	267/271 (99%)
Asian	2/270 (1%)	1/271 (0%)
Black or African American	0/270	1/271 (0%)
Other	3/270 (1%)	2/271 (1%)
mRS score before stroke		
0–1	223 (82%)	213/270 (79%)
2	28 (10%)	32/270 (12%)
3–4	20 (7%)	25/270 (9%)
NIHSS score on admission	6 (5–9)	6 (5–9)
Occlusion site		
M2 segment	129 (48%)	110 (40%)
M3 segment	62 (23%)	84 (31%)
M4 segment	3 (1%)	0
A1 segment	0 (0%)	1 (0%)
A2 segment	11 (4%)	5 (2%)
A3 segment	9 (3%)	5 (2%)
P1 segment	17 (6%)	13 (5%)
P2 segment	32 (12%)	41 (15%)
P3 segment	6 (2%)	11 (4%)
No occlusion	1 (0%)	2 (1%)
M1 segment	1 (0%)	0
Intravenous thrombolysis therapy	168 (62%)	187 (69%)
Time from last known well to randomisation, min	230 (138–539)	237 (139–598)
Time from last known well to imaging, min	203 (95–529)	211 (94–573)
Risk factors		
Hypertension	179/268 (67%)	176/265 (66%)
Hypercholesterolaemia	115/259 (44%)	124/258 (48%)
Diabetes	65/265 (25%)	66/261 (25%)
Previous stroke or TIA	61/267 (23%)	59/265 (22%)
Atrial fibrillation	68/262 (26%)	69/262 (26%)
Ischaemic heart disease	71/262 (27%)	82/255 (32%)

(Table 1 continues on next column)

	Endovascular treatment plus best medical treatment (n=271)	Best medical treatment alone (n=272)
(Continued from previous column)		
Pre-stroke living situation		
Own home	256/262 (98%)	257/262 (98%)
Nursing home	2/262 (1%)	2/262 (1%)
Residential home	3/262 (1%)	3/262 (1%)
Rehabilitation	1/262 (0%)	0/262
Time from imaging to arterial puncture, min	70 (54–95)	NA
Time from randomisation to arterial puncture, min	36 (25–50)	NA
Time from last known well to arterial puncture, min	292 (176–651)	NA
Perfusion imaging performed	227 (84%)	226 (83%)
General anaesthesia	129/260 (50%)	NA
First-line thrombectomy strategy		
Stent retriever only	36/245 (15%)	NA
Aspiration only (ADAPT)	36/245 (15%)	NA
Primary combined approach	148/245 (60%)	NA
Intra-arterial thrombolysis	7/245 (3%)	NA
Rescue with stent or PTA	1/245 (0%)	NA
Number of endovascular treatment passes	1 (1–2)	NA
Successful reperfusion (defined as final mTICI score of 2b or greater)	180/251 (72%)	NA

Data are n (%), n/N (%), or median (IQR). ADAPT=a direct aspiration first pass technique. mRS=modified Rankin Scale. mTICI=modified thrombolysis in cerebral infarction. NA=not applicable. NIHSS=National Institutes of Health Stroke Scale. PTA=percutaneous transluminal angioplasty. TIA=transient ischaemic attack.

Table 1: Baseline demographic and clinical characteristics of the patients

ratios reported. Participants were censored at the 1-year study visit (or end-of-study or withdrawal date) and censoring those lost to follow-up at the date of last contact. Models used the same covariate adjustment and were stratified by study centre.

Adverse event monitoring was completed only up to 90-day follow-up and adverse events were included in the article reporting the 90-day findings of the DISTAL trial.⁶

Missing data were primarily due to missed visits after unsuccessful contact attempts. Assuming data were missing at random, multiple imputation was performed using baseline and 90-day information. 100 imputed datasets were generated, models were fitted within each dataset, and estimates were combined using Rubin's rules. All analyses were performed in the imputed dataset.

Prespecified sensitivity analyses included assigning the worst possible EQ-5D-5L values to participants who died by 1 year (to assess the impact of treating quality-of-life outcomes as missing by design), repeating the primary mRS analysis in complete cases, removing patients with missing values for any of the variables included in the analysis, and repeating the primary analysis restricted to 12-month visits within the prespecified 12-month $\pm$ 30-day window. As a post-hoc exploratory analysis, the primary outcome was analysed in subgroups predefined for the analysis of the results at 90 days. All analyses were performed in R (version 4.4.3) using packages lme4 (1.1-37), ordinal (2023.12-4.1), survival (3.8-3), mice (3.17.0), miceadds (3.17-44), and sandwich (3.1-1).

An independent data safety monitoring board oversaw trial conduct.

Role of the funding source

The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

Between Dec 16, 2021, and July 10, 2024, we enrolled 553 patients. Ten patients refused post-hoc consent, leaving 543 participants for the analysis at 90 days (239 [44%] females and 304 [56%] males; median age 77 years, IQR 68–84). Two participants (1%) in the best medical treatment alone group crossed over and received endovascular treatment, while three participants (1%) in the endovascular treatment group crossed over and no catheter angiography was performed. Endovascular treatment was performed in 229 (85%) of 271 participants in the endovascular treatment plus best medical treatment group (figure 1).

Baseline characteristics (table 1) were well balanced between the two groups. Between the 90-day and 12-month follow-up, nine additional participants (five in the endovascular treatment plus best medical treatment group and four in the best medical treatment alone group) were lost to follow-up. Seven additional participants withdrew consent (three in the endovascular treatment plus best medical treatment group and four in the best medical treatment alone group) between the 90-day and 12-month follow-up. Attrition was therefore balanced between groups. Including the 94 participants who died during the 12-month follow-up (mRS score of 6), data on functional outcome at 12 months were available for 524 (97%) of 543 participants: 263 (97%) of 271 in the endovascular treatment plus best medical treatment group and 261 (96%) of 272 in the best medical treatment alone group (figure 1).

No difference in the distribution of mRS scores at 12 months was found between the groups (adjusted common OR for better functional outcome 0.81; 95% CI 0.59–1.12; $p=0.20$; table 2, figure 2). The median mRS score was 2 (IQR 1–4) in the endovascular treatment plus best medical treatment group and 2 (1–4) in the best

	Endovascular treatment plus best medical treatment (n=271)	Best medical treatment alone (n=272)	Adjusted effect size (95% CI)
mRS scores at 1-year follow-up	2 (1–4)	2 (1–4)	0.81 (0.59 to 1.12)
Excellent functional outcome (mRS 0–1)	102/263 (39%)	104/261 (40%)	0.90 (0.60 to 1.36)
Functional independence (mRS 0–2)	145/263 (55%)	148/261 (57%)	0.91 (0.60 to 1.37)
Living in own home	184/208 (88%)	192/217 (88%)	1.00 (0.53 to 1.87)
EQ-5D-5L utility index	0.88 (0.74–0.97)	0.91 (0.74–0.97)	–0.10 (–0.31 to 0.11)
EQ-5D-5L VAS	70 (50–85)	70 (50–80)	–0.73 (–10.98 to 9.52)
EQ-5D-5L domains			
Mobility	2 (1–3)	2 (1–3)	0.78 (0.53 to 1.15)
Self-care	1 (1–2)	1 (1–2)	0.64 (0.42 to 0.97)
Usual activities	1 (1–3)	1 (1–3)	0.79 (0.54 to 1.16)
Pain or discomfort	1 (1–2)	1 (1–2)	1.09 (0.75 to 1.58)
Anxiety or depression	1 (1–2)	1 (1–2)	0.97 (0.66 to 1.43)
All-cause mortality within 1-year follow-up	53/263 (20%)	41/261 (16%)	1.46 (0.93 to 2.30)

Data are n/N (%) or median (IQR), unless otherwise stated. Treatment effect is reported for functional outcome across the entire range of the mRS with categories 5–6 collapsed, and for the individual items of the EQ-5D-5L as an adjusted common odds ratio with 95% CI for an ordinal shift towards a better outcome with imputation of missing values; for mRS 0–2, mRS 0–1, and living situation as an adjusted odds ratio with 95% CI; and for EQ-5D-5L utility index and VAS score as adjusted β coefficient with 95% CI. Analyses of living in own home and EQ-5D-5L outcomes were restricted to participants alive at 1 year; denominators reflect participants with available data. EQ-5D-5L=EuroQol 5-Dimension 5-Level. mRS=modified Rankin Scale. VAS=visual analogue scale.

Table 2: Outcomes at 1 year with adjusted treatment effect

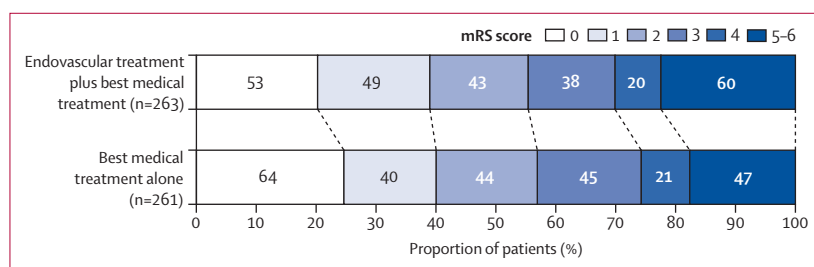


Figure 2: Distribution of mRS scores at 12-month follow-up stratified by treatment assignment in the modified intention-to-treat population with available mRS scores at 12-month follow-up
mRS=modified Rankin Scale.

medical treatment alone group. 102 (39%) of 263 patients in the endovascular treatment plus best medical treatment group had an mRS score of 0–1 as compared with 104 (40%) of 261 in the best medical treatment alone group. When comparing these findings with those at 90-day follow-up, the number of patients with an mRS score of 0–1 increased by eight from 94 (35%) of 271 to 102 (39%) of 263 in the endovascular treatment plus best medical treatment group, and by three from 101 (38%) of 272 to 104 (40%) of 261 in the best medical treatment alone group.⁶ The change in mRS score between 90 days and 365 days is shown in the appendix (p 15). In the endovascular treatment plus best medical treatment group, 58 (22%) of 263 patients showed an improvement of at least 1 point on the mRS between 90 days and 12 months, compared with 56 (21%) of 261 assigned to best medical treatment. In 56 (21%) of 263 patients in the endovascular treatment plus best medical treatment group and in 47 (18%) of 261 patients in the best medical treatment group, the mRS score worsened by at least 1 point.

Patient-reported outcomes at 12 months did not differ between groups as assessed by the median scores on the EQ-5D-5L utility index (0·88, IQR 0·74–0·97 vs 0·91, 0·74–0·97, adjusted β coefficient –0·10; 95% CI –0·31 to 0·11) and on the EQ-5D-5L VAS (70, IQR 50–85 vs 70, 50–80; adjusted β coefficient –0·73; 95% CI –10·98 to 9·52; table 2). The number of patients able to continue living at home 12 months after the stroke was similar in both groups (184 [88%] of 208 patients in the endovascular treatment plus best medical treatment group and 192 [88%] of 217 patients in the best medical treatment alone group; adjusted OR 1·00; 95% CI 0·53 to 1·87). Overall survival at 12 months did not differ between groups (adjusted hazard ratio 1·46; 95% CI 0·93–2·30; $p=0\cdot10$; figure 3). Reasons for death between 90 days and 1 year are shown in the appendix (p 14). The sensitivity analyses, in which the primary analysis for the outcome 12-month mRS was repeated in the population not having visits outside the prespecified time window and in the complete case dataset confirmed the results of the main analyses that there was no difference between the groups (appendix pp 12–13). Results of the sensitivity analysis assigning the worst possible EQ-5D-5L value to patients who died by 1 year also confirmed the findings of the main analysis for those outcomes.

Post-hoc subgroup analyses of the primary outcome (12-month mRS score) were broadly consistent with the primary analysis, although they suggested potential harm in patients who received intravenous thrombolysis (168 [62%] of 271 in the endovascular treatment plus best medical treatment group and 187 [69%] of 272 in the best medical treatment alone group; common OR 0·67, 95% CI 0·45–0·99) and in men (155 [57%] of 271 in the endovascular treatment plus best medical treatment group and 149 [55%] of 272 in the best medical treatment alone group; common OR for improved functional outcome 0·61, 95% CI 0·40–0·94; figure 4).

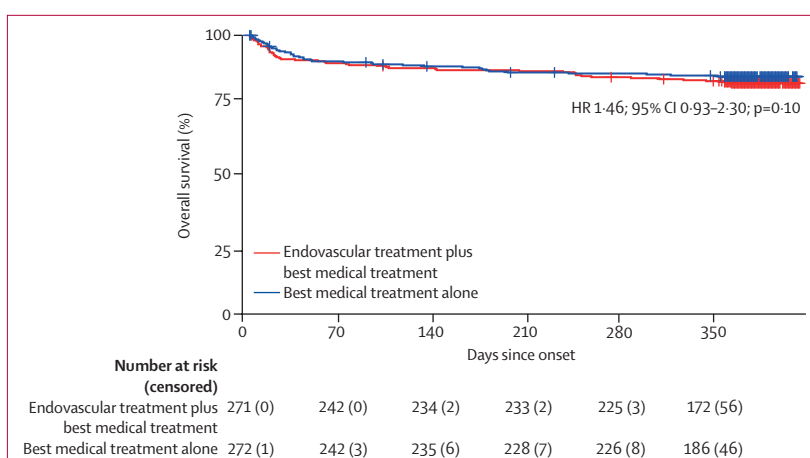


Figure 3: Kaplan-Meier overall survival curve for the intention-to-treat population

Patients were right-censored at the date of the 1-year study visit, the date of consent withdrawal, or the date of last contact if lost to follow-up. Overall, 449 patients were censored. HR=hazard ratio.

Discussion

In this prespecified 12-month analysis of the DISTAL randomised trial, endovascular treatment in addition to best medical treatment did not improve functional outcome when compared with best medical treatment alone in patients with medium or distal vessel occlusion stroke. The distribution of modified Rankin Scale scores at 12-months was similar between groups, and neither health-related quality of life nor overall survival differed between groups. These results extend the neutral findings of the primary 90-day analysis and indicate that, in the overall trial population, there is no delayed clinical benefit of endovascular treatment that becomes apparent only with longer follow-up. At the same time, some estimates at 12 months numerically trended against endovascular treatment more than at 90 days including all-cause mortality. However, as there is no obvious mechanistic explanation for a delayed endovascular treatment-associated mortality signal this should be interpreted cautiously. Post-hoc exploratory subgroup analyses suggested potential harm in patients treated with intravenous thrombolysis. This finding was not seen in the 90-day analysis and should be interpreted with caution. Nevertheless, a biological rationale for such an interaction cannot be excluded, warranting further investigation. Overall, our findings are in line with previous evidence from large vessel occlusion strokes that outcomes observed at 90 days could be extrapolated to 1 year.^{2,3,13}

Together with other randomised evidence evaluating the efficacy of endovascular treatment plus best medical treatment in medium or distal vessel occlusion stroke,^{6–8} the DISTAL 12-month results support the concept that in patients with predominantly mild-to-moderate deficits, the incremental benefit of endovascular treatment is low. Compared with large vessel occlusion, medium and distal occlusions typically involve smaller volumes of tissue at risk, more variable eloquence of the affected

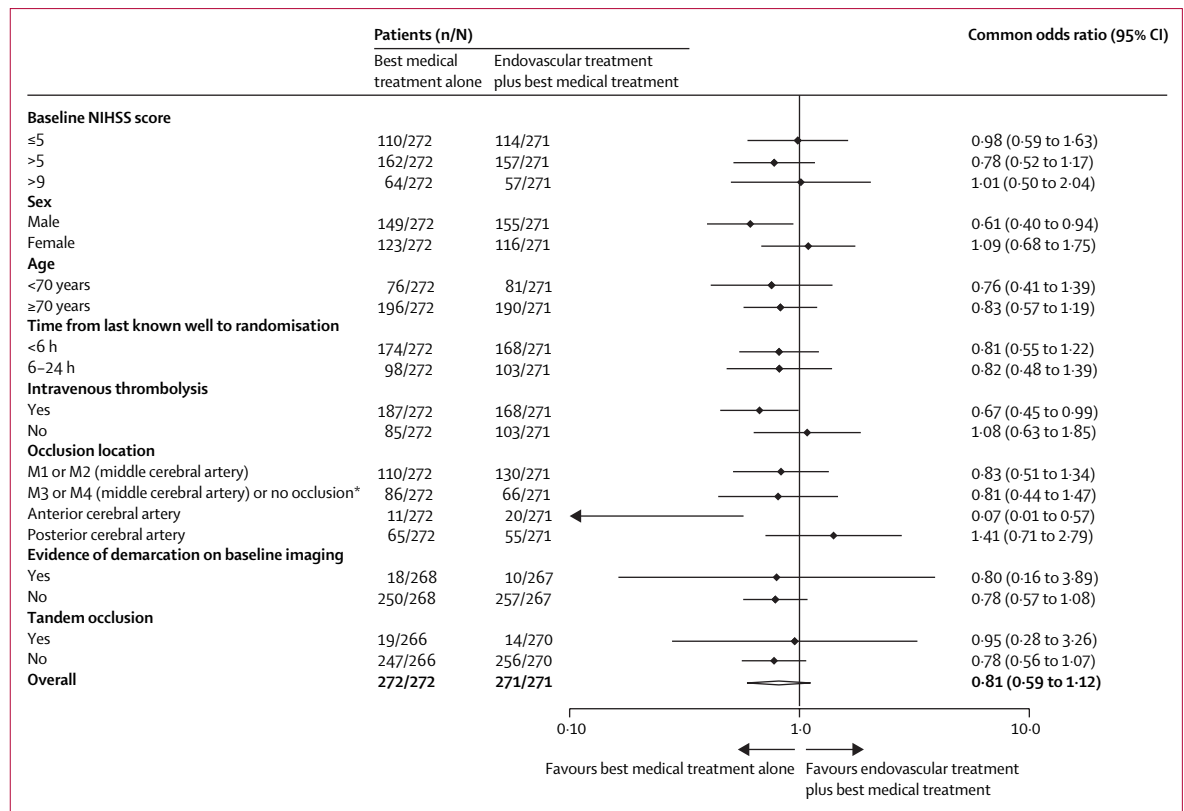


Figure 4: Post-hoc subgroup analysis of treatment effects on the modified Rankin Scale at 12-month follow-up

The widths of confidence intervals have not been adjusted for multiplicity and cannot be used to infer treatment effects. NIHSS=National Institutes of Health Stroke Scale. *In three participants, no occlusion was identified on core laboratory assessment, although site investigators had classified these as M3 or M4 occlusions; given the small number, these cases were grouped with the M3 or M4 occlusion category rather than analysed separately.

territory, and higher rates of spontaneous or intravenous thrombolysis-mediated recanalisation. In such settings, the potential clinical benefit of endovascular treatment might be attenuated, whereas procedural risks, delays, and resource use associated with endovascular treatment remain present. The absence of improved quality of life at 12 months further suggests that endovascular treatment did not confer a meaningful patient-perceived advantage in the trial population.

The recently presented ORIENTAL-MeVO trial (unpublished) adds an important counterpoint by reporting higher rates of functional independence at 90 days with endovascular treatment in a Chinese population with moderate-to-severe deficits and lower use of intravenous thrombolysis.⁹ In ORIENTAL-MeVO, the median 90-day mRS score was 2 in the endovascular treatment group versus 3 in the control group. Endovascular treatment increased functional independence (number needed to treat of 8) without significant differences in mortality or symptomatic intracranial haemorrhage, although any intracranial haemorrhage occurred more frequently with endovascular treatment. Several factors could plausibly explain the discrepant results across trials. First, baseline clinical

severity was higher in ORIENTAL-MeVO (NIHSS score eligibility threshold ≥ 6 and a reported median NIHSS score around 10), which reduces ceiling effects and increases the potential absolute benefit of successful reperfusion. Second, intravenous thrombolysis was less common (approximately 37%) in ORIENTAL-MeVO, which might enrich for patients who are thrombolysis-ineligible or less likely to recanalise with medical therapy alone. Third, perfusion-based selection in ORIENTAL-MeVO might have increased the proportion of patients with larger volume of salvageable tissue and thus with greater potential benefit from endovascular treatment. Finally, potential differences in ischaemic stroke mechanisms, such as the higher prevalence of intracranial atherosclerosis as the main cause of the stroke, and differences in health-care systems, might influence both natural history and the balance of procedural benefit and harm. Long-term outcomes from ORIENTAL-MeVO will be essential to determine whether the early benefit reported in that trial is sustained and to identify the patient groups most likely to benefit.

Our findings have practical implications for clinical practice and guideline development. In the context of three neutral randomised trials conducted in Europe

and North America, and the neutral 12-month results reported here,^{6–8} routine endovascular treatment for unselected patients with medium or distal vessel occlusion stroke cannot be recommended as already reflected in the recent update of AHA/ASA guidelines for the early treatment of acute ischaemic stroke.¹⁴ Instead, endovascular treatment should be considered within clinical trials, particularly for patients who have higher clinical severity, are ineligible for intravenous thrombolysis, or do not have an early improvement after intravenous thrombolysis. Future trials should focus on refining selection criteria (including occlusion dominance, infarct core and perfusion mismatch, and eloquence of the affected territory) and on standardising procedural strategies tailored to smaller calibre vessels.

Our study has limitations including the pragmatic trial design with its rather broad inclusion and exclusion criteria, allowing for the inclusion of patients with only minor clinical deficits. This might have led to the inclusion of primarily minor to moderately affected patients in the DISTAL trial, while the more severely affected patients with the highest perceived benefit of endovascular treatment were treated outside of the trial. This notion is supported by a recent analysis in which the baseline characteristics of patients with medium or distal vessel occlusion treated in and outside of a trial were compared in two high-volume centres, showing that baseline stroke severity was significantly higher in the group treated outside of the trial (median NIHSS score of 10 [IQR 7–15] vs 5 [4–7]).¹⁵ However, because comprehensive screening logs of potentially eligible patients treated outside the trial were not collected across all centres, the extent of this possible selection bias cannot be quantified. A further limitation was the heterogenous approach to endovascular treatment, as interventionalists could use their own judgment when selecting techniques and materials. While this pragmatic approach provides a realistic assessment of endovascular treatment effects in the context of contemporary treatment practice, it might have reduced the treatment effect due to suboptimal technical results. The recently presented randomised DISTALS trial suggests that a technical approach dedicated specifically to distal vessel might increase recanalisation rates while keeping haemorrhagic complications to a minimum.¹⁶ Furthermore, the trial was not powered to detect sex-specific treatment effects; therefore, the observed signal for potential harm in men should be interpreted with caution. Lastly, almost all patients were enrolled in European countries, and the most common race was White (98%), limiting generalisability across racial and ethnic groups.

In conclusion, in patients with acute ischaemic stroke due to medium or distal vessel occlusion enrolled in the DISTAL trial, endovascular treatment in addition to best medical treatment did not reduce disability or death at 12 months compared with best medical treatment alone.

These findings should mainly be generalised to patients with mild-to-moderate medium or distal vessel occlusion stroke, many of whom were eligible for and received intravenous thrombolysis, rather than to patients with more severe deficits or those ineligible for thrombolysis.

Contributors

UF, AB, MP: conceptualisation, funding acquisition, investigation, methodology, project administration, resources, supervision, validation, writing (original draft). MR, DS, AvE, IF, RRL, JLS, JS: conceptualisation, investigation, writing (review and editing). FR, SR, JFA, MM-G, SDH, PMi, EIP, DPOK, VP, FvDB, SDR, FB, AD, VH, AK, GP, AM, JSK, SW, GT, RL, JPP, MB, AvH, NDK, JMC, CC, JM, WvZ, ED, CHN, CL, HPM, J-HB, JK, TD, PP, AA, MH, AZ, LR, FK, IvdW, GK, MT, MW, SA: investigation, writing (review and editing). JG, PMA, JF, MK: conceptualisation, investigation, writing (review and editing), funding acquisition. NR: data curation, formal analysis, writing (review and editing). LB: project administration, writing (review and editing). UF, AB, and MP accessed and verified the data and are responsible for the decision to submit the manuscript. All authors had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Declarations of interests

UF reports research support from the Swiss National Science Foundation and the State Secretariat for Education, Research and Innovation; research support from the Swiss Heart Foundation, the Swiss Brain League and the Horton Foundation; research grants from Medtronic, Stryker, Rapid medical, Penumbra, Phenox, and Boehringer Ingelheim; consultancies for Medtronic, Bayer, Boehringer Ingelheim, Boston Scientific, CSL Behring, Merck, Siemens, and Takeda (fees paid to institution); participation in an advisory board for AstraZeneca (former Alexion/Portola), Auzone, Biogen, AbbVie, Siemens, and Corxel (fees paid to institution); membership of a clinical event committee of the COATING study (Phenox); membership of the data and safety monitoring committee of the TITAN, RESCIND, LATE_MIT, IN EXTREMIS, TENACITY, and RapidPulse trials; and is a past president of the Swiss Neurological Society and president-elect of the European Stroke Organisation. DS reports serving as a consultant to AstraZeneca and grants from Boehringer Ingelheim. JFA reports research grants from the Spanish Ministry of Science and Castilla y León Regional Government; and serving as a consultant to AstraZeneca, Medtronic, Amgen, and Chiesi. EIP reports research funding from Swiss National Science Foundation and Bayer. VH reports a proctoring and consulting agreement with WallabyPhenox and a consulting agreement with Qâpel Medical. JK is shareholder of Bonescreen. JF reports serving as a consultant for Acandis, Johnson & Johnson, Medtronic, Penumbra, Phenox, Stryker, and Terumo; and is managing director of and has equity in Eppdata. GT has received honoraria as consultant or lecturer from Acandis, AstraZeneca, Bayer, Boehringer Ingelheim, Bristol-Myers Squibb/Pfizer, Daiichi Sankyo, and TarGED. JP reports consultancy contracts with Terumo-Neuro and Johnson & Johnson. MB reports personal fees for advisory board participation from AstraZeneca and NovoNordisk, unrelated to the submitted manuscript. AvH is a co-author involved in the Tigerretriever registry from Rapid Medical. JMC reports research support from Bayer and AstraZeneca (all fees paid to his employer) and is co-founder and shareholder of TrianeCT. CHN received honoraria for lectures and/or advisory boards from AstraZeneca, Bayer, and Pfizer. JHB is a consultant for Acandis, eVasc, Johnson & Johnson, Medtronic, Terumo Neuro, Stryker, and Vesalio. TD reports a consultancy for Balt, OM Pharma; and research grants from the Medical Faculty of the University of Bern. MW declares that he has been working as a consultant for Stryker Neurovascular; has received reimbursement for lectures or travel support from Eisai, Bracco Imaging, Medtronic, Siemens Healthcare, and Stryker Neurovascular; and has received grants for research projects or educational exhibits from Ab medica, Acandis, Bracco Imaging, Cerenovus, Codman Neurovascular, Kaneka Pharmaceuticals, Medtronic, Mentice AB, Microvention, Phenox, Siemens Healthcare, and Stryker Neurovascular. MK reports funding from the Swiss national Science Foundation (213471, 182267); grants from the Swiss Heart Foundation and

USZ Foundation; has participated on advisory boards and/or received speaker honoraria for Medtronic, BMS, Pfizer/Jansen, and AstraZeneca; and has received in-kind contributions from Roche Diagnostics, Brahms Thermofisher Scientific not related to this study. RRL received speaker honoraria from IscemaView, Boehringer Ingelheim, Pfizer, Jansen, Biogen, Medtronic, and Abbott, served on the steering committee for the OCEANIC STROKE study and received support from Bayer for that, and received advisory board honoraria from Filterlex, all outside the submitted work. MP reports grants from the Swiss National Science Foundation (SNF) for the DISTAL trial (331C30_198783), ICARUS (32003B_220118), and TECNO trial (32003B_204977); a grant from Bangerter-Rhyner Stiftung for the DISTAL trial; unrestricted grants for the DISTAL trial from Stryker Neurovascular, Medtronic, Phenox, Penumbra, and Rapid Medical; an unrestricted grant for the ICARUS trial from Acandis; an unrestricted grant for the SPINNERS trial from Siemens Healthineers; a research agreement with Siemens Healthineers; serving as a local principal investigator for the ASSIST, EXCELLENT, TENSION, COATING, SURF, and ESCAPE-NEXT trials; and speaker fees from Stryker Neurovascular, Medtronic, Penumbra, Acandis, Phenox, and Siemens Healthineers. All other authors declare no competing interests.

Data sharing

De-identified individual participant data that underlie the results reported in this Article along with the analytical code will be made available starting 2 years after publication. Data will be shared with investigators whose proposed use of the data has been approved by an independent review committee ("learned intermediary") identified for this purpose. Researchers wishing to access the full dataset can file a request with the Data Access Committee of the Medical Faculty of the University of Basel (MF-DAC; med-dac@unibas.ch). The MF-DAC will act as an independent assessor of the request and grant access to the dataset if all ethical, legal, and scientific conditions are met.

Acknowledgments

The trial was funded by the Swiss National Science Foundation (grant ID 331C30_198783), the Gottfried und Julia Bangerter-Rhyner Foundation, and through unrestricted grants from Medtronic, Stryker Neurovascular, Phenox, Rapid Medical, and Penumbra.

References

- Goyal M, Menon BK, van Zwam WH, et al, and the HERMES collaborators. Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials. *Lancet* 2016; **387**: 1723–31.
- Thomalla G, Fiehler J, Subtil F, et al, and the TENSION Investigators. Endovascular thrombectomy for acute ischaemic stroke with established large infarct (TENSION): 12-month outcomes of a multicentre, open-label, randomised trial. *Lancet Neurol* 2024; **23**: 883–92.
- Sarraj A, Abraham MG, Hassan AE, et al, and the SELECT2 Investigators. Endovascular thrombectomy plus medical care versus medical care alone for large ischaemic stroke: 1-year outcomes of the SELECT2 trial. *Lancet* 2024; **403**: 731–40.
- Nogueira RG, Jadhav AP, Haussen DC, et al, and the DAWN Trial Investigators. Thrombectomy 6 to 24 hours after stroke with a mismatch between deficit and infarct. *N Engl J Med* 2018; **378**: 11–21.
- Saver JL, Chapot R, Agid R, et al, and the Distal Thrombectomy Summit Group. Thrombectomy for distal, medium vessel occlusions: a consensus statement on present knowledge and promising directions. *Stroke* 2020; **51**: 2872–84.
- Psychogios M, Brehm A, Ribo M, et al, and the DISTAL Investigators. Endovascular treatment for stroke due to occlusion of medium or distal vessels. *N Engl J Med* 2025; **392**: 1374–84.
- Goyal M, Ospel JM, Ganesh A, et al, and the ESCAPE-MeVO Investigators. Endovascular treatment of stroke due to medium-vessel occlusion. *N Engl J Med* 2025; **392**: 1385–95.
- Clarençon F. Mechanical thrombectomy in acute ischemic stroke related to a distal arterial occlusion: interim analysis of the DISCOUNT randomized controlled trial. *International Stroke Conference 2025*; Feb 5–7, 2025 (abstr LB047).
- Nogueira RGJX, Hu W. Endovascular treatment of medium vessel occlusion strokes with moderate or higher clinical severity. *International Stroke Conference 2026*; Feb 4–6, 2026 (abstr LB035).
- Marios-Nikos P, Alex B, Jens F, et al. Endovascular therapy plus best medical treatment (BMT) versus BMT alone for medium distal vessel occlusion sTroke (DISTAL): an international, multicentre, randomized-controlled, two-arm, assessor-blinded trial. *Eur Stroke J* 2024; **9**: 1083–92.
- Berge E, Whiteley W, Audebert H, et al. European Stroke Organisation (ESO) guidelines on intravenous thrombolysis for acute ischaemic stroke. *Eur Stroke J* 2021; **6**: 1–LXII.
- Powers WJ, Rabinstein AA, Ackerson T, et al. Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* 2019; **50**: e344–418.
- van den Berg LA, Dijkgraaf MGW, Berkhemer OA, et al, and the MR CLEAN Investigators. Two-year outcome after endovascular treatment for acute ischemic stroke. *N Engl J Med* 2017; **376**: 1341–49.
- Prabhakaran S, Gonzalez NR, Zachrisson KS, et al, and the Peer Review Committee. 2026 guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. *Stroke* 2026; **0**: STR.0000000000000513.
- Murillo-Olaizola A, Rodrigo-Gisbert M, Requena M, et al. Endovascular Treatment for Medium and Distal Vessel Occlusion Stroke: Are We Missing the Point? *Stroke Vasc Intervent Neurol* 2026; **6**: e002137.
- Saver JL, Gupta R, Guenego A, et al. Primary results of the DISTALS (Distal Ischemic Stroke Treatment With Adjustable Low-profile Stentriever) randomized trial of TIGERTRIEVER 13-EVT for DMVO. *International Stroke Conference 2026*; Feb 4–6, 2026 (abstr LB036).