Tufts Medicine
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Expanding Thrombectomy Indications for Large Core Infarctions

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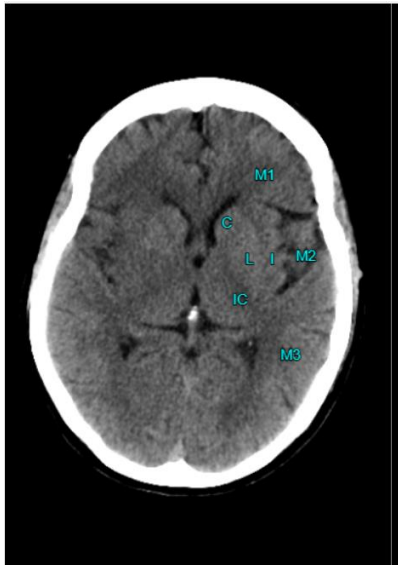
Disclosures

Co-Founder, Shareholder, Investor, Consultant for CereVasc Inc.

Data Safety Monitoring Board Member, Stryker Inc.

ASPECT Score in Acute Stroke

UNIVERSITY OF CALGARY



Each area of grey white loss constitutes 1 deduction point

Subganglionic Nuclei:
- M1 - *Frontal operculum* -1
- M2 - *Anterior temporal lobe* -1
- M3 - *Posterior temporal lobe* -1

Supraganglionic Nuclei:
- M4 - *Anterior MCA* -1
- M5 - *Lateral MCA* -1
- M6 - *Posterior MCA* -1

Basal Ganglia:
- Caudate (C) -1
- Lentiform Nucleus (L) -1
- Insula (I) -1
- Internal Capsule (IC) *Post Limb* -1

Total ASPECTS Score. /10

ASPECTS in Acute Stroke (aspectsinstroke.com)

CALGARY STROKE PROGRAM

ASPECTS Neurovascular Education
Web Dev: Nima Kashani
ASPECTS - 2024

RESCUE-JAPAN LIMIT Trial

BACKGROUND

Endovascular therapy for acute ischemic stroke is generally avoided when the infarction is large, but the effect of endovascular therapy with medical care as compared with medical care alone for large strokes has not been well studied.

METHODS

We conducted a multicenter, open-label, randomized clinical trial in Japan involving patients with occlusion of large cerebral vessels and sizable strokes on imaging, as indicated by an Alberta Stroke Program Early Computed Tomographic Score (ASPECTS) value of 3 to 5 (on a scale from 0 to 10, with lower values indicating larger infarction). Patients were randomly assigned in a 1:1 ratio to receive endovascular therapy with medical care or medical care alone within 6 hours after they were last known to be well or within 24 hours if there was no early change on fluid-attenuated inversion recovery images. Alteplase (0.6 mg per kilogram of body weight) was used when appropriate in both groups. The primary outcome was a modified Rankin scale score of 0 to 3 (on a scale from 0 to 6, with higher scores indicating greater disability) at 90 days. Secondary outcomes included a shift across the range of modified Rankin scale scores toward a better outcome at 90 days and an improvement of at least 8 points in the National Institutes of Health Stroke Scale (NIHSS) score (range, 0 to 42, with higher scores indicating greater deficit) at 48 hours.

RESULTS

A total of 203 patients underwent randomization; 101 patients were assigned to the endovascular-therapy group and 102 to the medical-care group. Approximately 27% of patients in each group received alteplase. The percentage of patients with a modified Rankin scale score of 0 to 3 at 90 days was 31.0% in the endovascular-therapy group and 12.7% in the medical-care group (relative risk, 2.43; 95% confidence interval [CI], 1.35 to 4.37; P=0.002). The ordinal shift across the range of modified Rankin scale scores generally favored endovascular therapy. An improvement of at least 8 points on the NIHSS score at 48 hours was observed in 31.0% of the patients in the endovascular-therapy group and 8.8% of those in the medical-care group (relative risk, 3.51; 95% CI, 1.76 to 7.00), and any intracranial hemorrhage occurred in 58.0% and 31.4%, respectively (P<0.001).

CONCLUSIONS

In a trial conducted in Japan, patients with large cerebral infarctions had better functional outcomes with endovascular therapy than with medical care alone but had more intracranial hemorrhages. (Funded by Mihara Cerebrovascular Disorder Research Promotion Fund and the Japanese Society for Neuroendovascular Therapy; RESCUE-Japan LIMIT ClinicalTrials.gov number, NCT03702413.)

The NEW ENGLAND JOURNAL of MEDICINE

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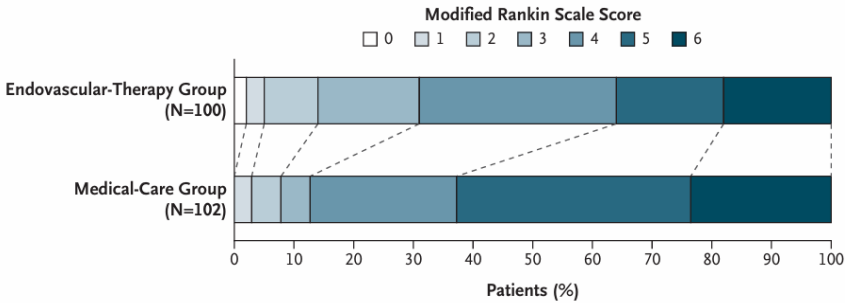
Endovascular Therapy for Acute Stroke with a Large Ischemic Region

S. Yoshimura, N. Sakai, H. Yamagami, K. Uchida, M. Beppu, K. Toyoda, Y. Matsumaru, Y. Matsumoto, K. Kimura, M. Takeuchi, Y. Yazawa, N. Kimura, K. Shigeta, H. Imamura, I. Suzuki, Y. Enomoto, S. Tokunaga, K. Morita, F. Sakakibara, N. Kinjo, T. Saito, R. Ishikura, M. Inoue, and T. Morimoto

APRIL 7, 2022 VOL. 386 NO. 14



Modified Rankin Scale Score at 90 Days	0	1	2	3	4	5	6
Endovascular-therapy group — no. (%)	2 (2.0)	3 (3.0)	9 (9.0)	17 (17.0)	33 (33.0)	18 (18.0)	18 (18.0)
Medical-care group — no. (%)	0	3 (2.9)	5 (4.9)	5 (4.9)	25 (24.5)	40 (39.2)	24 (23.5)

RESCUE-JAPAN LIMIT Trial

Subgroup	Endovascular-Therapy Group (N=100)	Medical-Care Group (N=102)	Relative Risk (95% CI)
	no. of patients		
Age			
<75 yr	42	43	2.05 (0.98–4.27)
≥75 yr	58	59	3.05 (1.19–7.85)
Interval between the time that a patient was last known to be well and hospitalization			
<120 min	35	35	2.60 (1.04–6.52)
≥120 min	65	67	2.32 (1.08–4.96)
Interval between the time that a patient was last known to be well and randomization			
<6 hr	70	74	2.43 (1.25–4.74)
≥6 hr	30	28	2.49 (0.73–8.45)
NIHSS score			
<21	40	47	2.22 (1.11–4.42)
≥21	60	55	3.21 (1.12–9.16)
Use of rt-PA			
Yes	26	29	2.23 (0.76–6.55)
No	74	73	2.52 (1.25–5.07)

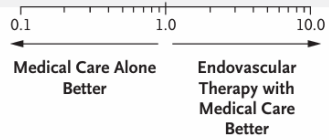


Figure 3. Subgroup Analyses of a Modified Rankin Scale Score of 0 to 3 at 90 Days (Primary Outcome).

The analysis of the interval between the time that a patient was last known well and randomization was performed on a post hoc basis. Scores on the National Institutes of Health Stroke Scale (NIHSS) range from 0 to 42, with higher scores indicating greater deficit. The trial was not powered and had no prespecified correction for multiple comparisons for a definitive analysis of subgroups. The term rt-PA denotes recombinant tissue plasminogen activator.

ANGEL-ASPECT Trial

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Trial of Endovascular Therapy for Acute Ischemic Stroke with Large Infarct

X. Huo, G. Ma, X. Tong, X. Zhang, Y. Pan, T.N. Nguyen, G. Yuan, H. Han, W. Chen, M. Wei, Jiangang Zhang, Z. Zhou, X. Yao, G. Wang, W. Song, X. Cai, G. Nan, D. Li, A.Y.-C. Wang, W. Ling, C. Cai, C. Wen, E. Wang, L. Zhang, C. Jiang, Y. Liu, G. Liao, X. Chen, T. Li, S. Liu, J. Li, F. Gao, N. Ma, D. Mo, L. Song, X. Sun, X. Li, Y. Deng, G. Luo, M. Lv, H. He, A. Liu, Jingbo Zhang, S. Mu, Lian Liu, J. Jing, X. Nie, Z. Ding, W. Du, X. Zhao, P. Yang, Liping Liu, Yilong Wang, D.S. Liebeskind, V.M. Pereira, Z. Ren, Yongjun Wang, and Z. Miao, for the ANGEL-ASPECT Investigators*

N ENGL J MED 388;14 NEJM.ORG APRIL 6, 2023

BACKGROUND

The role of endovascular therapy for acute stroke with a large infarction has not been extensively studied in differing populations.

METHODS

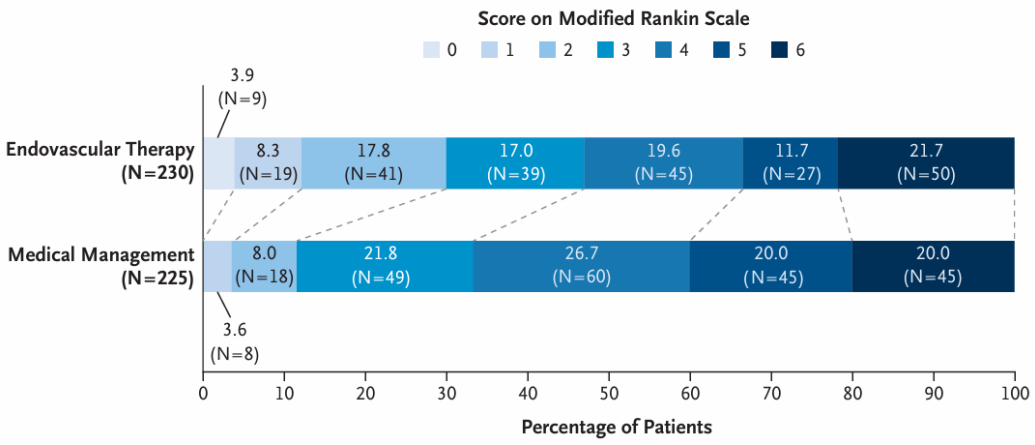
We conducted a multicenter, prospective, open-label, randomized trial in China involving patients with acute large-vessel occlusion in the anterior circulation and an Alberta Stroke Program Early Computed Tomography Score of 3 to 5 (range, 0 to 10, with lower values indicating larger infarction) or an infarct-core volume of 70 to 100 ml. Patients were randomly assigned in a 1:1 ratio within 24 hours from the time they were last known to be well to undergo endovascular therapy and receive medical management or to receive medical management alone. The primary outcome was the score on the modified Rankin scale at 90 days (scores range from 0 to 6, with higher scores indicating greater disability), and the primary objective was to determine whether a shift in the distribution of the scores on the modified Rankin scale at 90 days had occurred between the two groups. Secondary outcomes included scores of 0 to 2 and 0 to 3 on the modified Rankin scale. The primary safety outcome was symptomatic intracranial hemorrhage within 48 hours after randomization.

RESULTS

A total of 456 patients were enrolled; 231 were assigned to the endovascular-therapy group and 225 to the medical-management group. Approximately 28% of the patients in both groups received intravenous thrombolysis. The trial was stopped early owing to the efficacy of endovascular therapy after the second interim analysis. At 90 days, a shift in the distribution of scores on the modified Rankin scale toward better outcomes was observed in favor of endovascular therapy over medical management alone (generalized odds ratio, 1.37; 95% confidence interval, 1.11 to 1.69; P=0.004). Symptomatic intracranial hemorrhage occurred in 14 of 230 patients (6.1%) in the endovascular-therapy group and in 6 of 225 patients (2.7%) in the medical-management group; any intracranial hemorrhage occurred in 113 (49.1%) and 39 (17.3%), respectively. Results for the secondary outcomes generally supported those of the primary analysis.

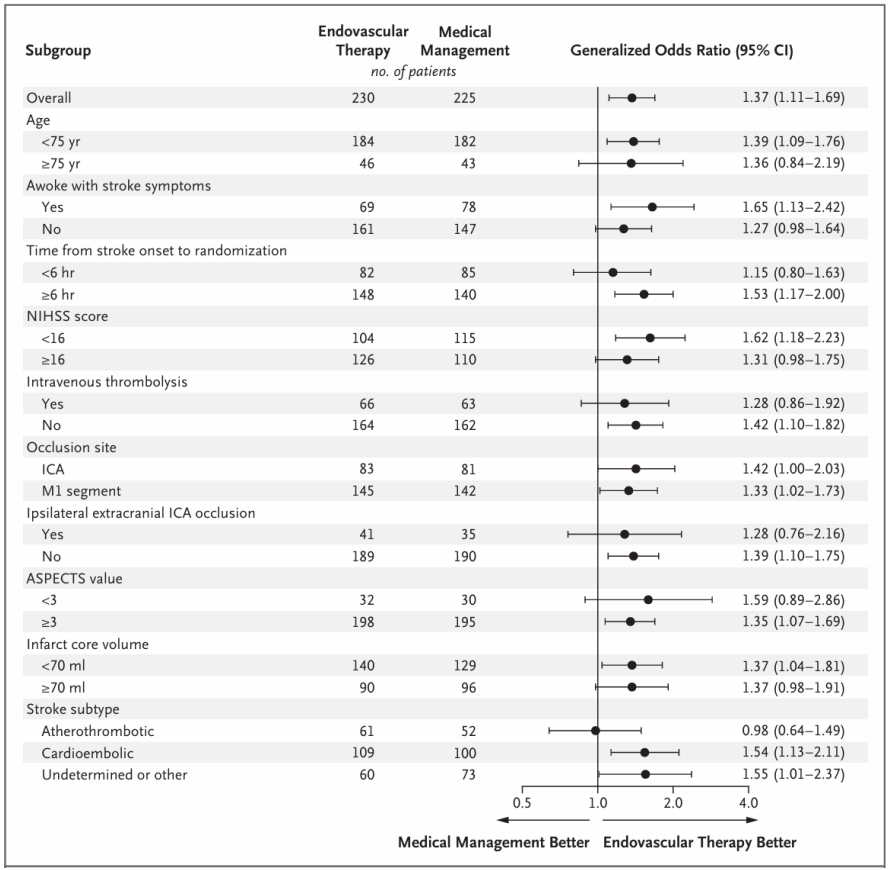
CONCLUSIONS

In a trial conducted in China, patients with large cerebral infarctions had better outcomes with endovascular therapy administered within 24 hours than with medical management alone but had more intracranial hemorrhages. (Funded by Covidien Healthcare International Trading [Shanghai] and others; ANGEL-ASPECT ClinicalTrials.gov number, NCT04551664.)



ANGEL-ASPECT Trial

Subgroup	Endovascular Therapy	Medical Management	Generalized Odds Ratio (95% CI)
	no. of patients		
Overall	230	225	1.37 (1.11–1.69)
Age			
<75 yr	184	182	1.39 (1.09–1.76)
≥75 yr	46	43	1.36 (0.84–2.19)
Awoke with stroke symptoms			
Yes	69	78	1.65 (1.13–2.42)
No	161	147	1.27 (0.98–1.64)
Time from stroke onset to randomization			
<6 hr	82	85	1.15 (0.80–1.63)
≥6 hr	148	140	1.53 (1.17–2.00)
NIHSS score			
<16	104	115	1.62 (1.18–2.23)
≥16	126	110	1.31 (0.98–1.75)
Intravenous thrombolysis			
Yes	66	63	1.28 (0.86–1.92)
No	164	162	1.42 (1.10–1.82)
Occlusion site			
ICA	83	81	1.42 (1.00–2.03)
M1 segment	145	142	1.33 (1.02–1.73)
Ipsilateral extracranial ICA occlusion			
Yes	41	35	1.28 (0.76–2.16)
No	189	190	1.39 (1.10–1.75)
ASPECTS value			
<3	32	30	1.59 (0.89–2.86)
≥3	198	195	1.35 (1.07–1.69)
Infarct core volume			
<70 ml	140	129	1.37 (1.04–1.81)
≥70 ml	90	96	1.37 (0.98–1.91)
Stroke subtype			
Atherothrombotic	61	52	0.98 (0.64–1.49)
Cardioembolic	109	100	1.54 (1.13–2.11)
Undetermined or other	60	73	1.55 (1.01–2.37)



SELECT2 Trial

BACKGROUND

Trials of the efficacy and safety of endovascular thrombectomy in patients with large ischemic strokes have been carried out in limited populations.

METHODS

We performed a prospective, randomized, open-label, adaptive, international trial involving patients with stroke due to occlusion of the internal carotid artery or the first segment of the middle cerebral artery to assess endovascular thrombectomy within 24 hours after onset. Patients had a large ischemic-core volume, defined as an Alberta Stroke Program Early Computed Tomography Score of 3 to 5 (range, 0 to 10, with lower scores indicating larger infarction) or a core volume of at least 50 ml on computed tomography perfusion or diffusion-weighted magnetic resonance imaging. Patients were assigned in a 1:1 ratio to endovascular thrombectomy plus medical care or to medical care alone. The primary outcome was the modified Rankin scale score at 90 days (range, 0 to 6, with higher scores indicating greater disability). Functional independence was a secondary outcome.

RESULTS

The trial was stopped early for efficacy; 178 patients had been assigned to the thrombectomy and 174 to medical care. The median ischemic-core volumes were 74 ml and 77 ml in the two groups, respectively. The generalized odds ratio for a shift in the distribution of modified Rankin scale scores toward better outcomes in favor of thrombectomy was 1.51 (95% confidence interval [CI], 1.20 to 1.89; P<0.001). A total of 20% of the patients in the thrombectomy group and 7% in the medical-care group had functional independence (relative risk, 2.97; 95% CI, 1.60 to 5.51). Mortality was similar in the two groups. In the thrombectomy group, arterial access-site complications occurred in 5 patients, dissection in 10, cerebral-vessel perforation in 7, and transient vasospasm in 11. Symptomatic intracranial hemorrhage occurred in 1 patient in the thrombectomy group and in 2 in the medical-care group.

CONCLUSIONS

Among patients with large ischemic strokes, endovascular thrombectomy resulted in better functional outcomes than medical care but was associated with vascular complications. Cerebral hemorrhages were infrequent in both groups. (Funded by Stryker Neurovascular; SELECT2 ClinicalTrials.gov number, NCT03876457.)

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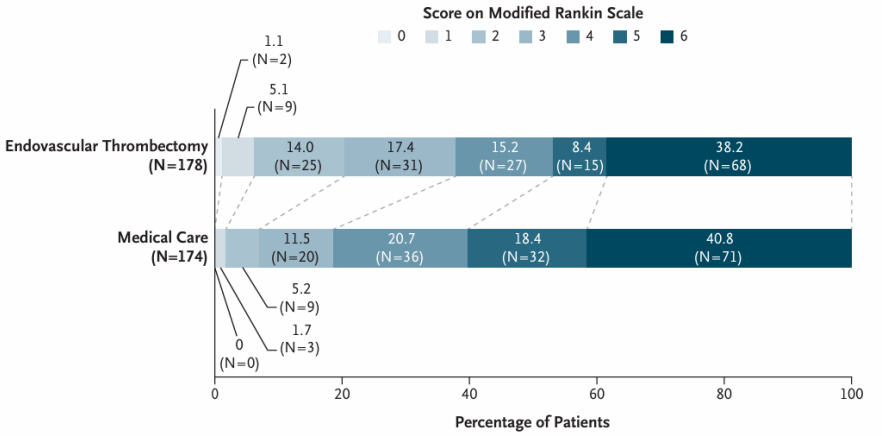
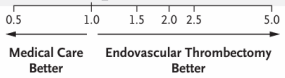
Trial of Endovascular Thrombectomy for Large Ischemic Strokes

A. Sarraj, A.E. Hassan, M.G. Abraham, S. Ortega-Gutierrez, S.E. Kasner, M.S. Hussain, M. Chen, S. Blackburn, C.W. Sitton, L. Churilov, S. Sundararajan, Y.C. Hu, N.A. Herial, P. Jabbour, D. Gibson, A.N. Wallace, J.F. Arenillas, J.P. Tsai, R.F. Budzik, W.J. Hicks, O. Kozak, B. Yan, D.J. Cordato, N.W. Manning, M.W. Parsons, R.A. Hanel, A.N. Aghaebrahim, T.Y. Wu, P. Cardona-Portela, N. Pérez de la Ossa, J.D. Schaafsma, J. Blasco, N. Sangha, S. Warach, C.D. Gandhi, T.J. Kleinig, D. Sahlein, L. Elijovich, W. Tekle, E.A. Samaniego, L. Maali, M.A. Abdulrazzak, M.N. Psychogios, A. Shuaib, D.K. Pujara, F. Shaker, H. Johns, G. Sharma, V. Yogendrakumar, F.C. Ng, M.H. Rahbar, C. Cai, P. Lavori, S. Hamilton, T. Nguyen, J.T. Fifi, S. Davis, L. Wechsler, V.M. Pereira, M.G. Lansberg, M.D. Hill, J.C. Grotta, M. Ribo, B.C. Campbell, and G.W. Albers, for the SELECT2 Investigators*



SELECT2 Trial

Subgroup	No. of Patients	Generalized Odds Ratio (95% CI)
Age		
<70 yr	203	1.66 (1.22–2.27)
≥70 yr	149	1.36 (1.01–1.84)
NIHSS score at presentation		
<20	197	1.53 (1.12–2.10)
≥20	155	1.52 (1.12–2.07)
Occlusion location		
Internal carotid artery	146	1.31 (0.93–1.85)
Middle cerebral artery	206	1.68 (1.24–2.27)
Interval between time that patient was last known to be well and randomization		
<12 hr	211	1.48 (1.12–1.96)
≥12 hr	141	1.58 (1.09–2.28)
<6 hr	100	1.63 (1.09–2.46)
≥6 hr	252	1.49 (1.14–1.94)
Ischemic-core volume		
<70 ml	124	1.39 (0.93–2.07)
≥70 ml	228	1.62 (1.25–2.12)
<100 ml	235	1.57 (1.18–2.09)
≥100 ml	117	1.55 (1.11–2.16)
<150 ml	308	1.51 (1.19–1.93)
≥150 ml	44	1.73 (1.02–2.94)
ASPECTS value		
0–2	20	1.40 (0.91–2.16)
3–5	290	1.61 (1.25–2.07)
6–10	42	1.24 (0.65–2.37)
Mismatch ratio ≥1.8 and mismatch volume ≥15 ml		
Yes	194	1.36 (1.00–1.84)
No	124	1.83 (1.30–2.58)
Mismatch ratio ≥1.2 and mismatch volume ≥10 ml		
Yes	298	1.44 (1.13–1.83)
No	31	2.54 (1.26–5.14)
Subgroup A	328	1.54 (1.22–1.94)
Subgroup B	202	1.58 (1.19–2.09)
Affected hemisphere		
Left	156	1.42 (1.02–1.95)
Right	196	1.60 (1.18–2.19)
Geographic region		
United States	280	1.63 (1.26–2.11)
Other	72	1.13 (0.72–1.75)



TENSION Trial

Endovascular thrombectomy for acute ischaemic stroke with established large infarct: multicentre, open-label, randomised trial

Martin Bendszus, Jens Fiehler, Fabien Subtil, Susanne Bonekamp, Anne Hege Aamodt, Blanca Fuentes, Elke R Gizewski, Michael D Hill, Antonin Krajina, Laurent Pierot, Claus Z Simonsen, Kamil Zeleňák, Rolf A Blauenfeldt, Bastian Cheng, Angélique Denis, Hannes Deutschmann, Franziska Dorn, Fabian Flottmann, Susanne Gellißen, Johannes C Gerber, Mayank Goyal, Jozef Haring, Christian Herweh, Silke Hopf-Jensen, Vi Tuan Hua, Märit Jensen, Andreas Kastrup, Christiane Fee Keil, Andrej Klepanec, Egon Kurča, Ronni Mikkelsen, Markus Möhlenbruch, Stefan Müller-Hülsbeck, Nico Münnich, Paolo Pagano, Panagiotis Papanagiotou, Gabor C Petzold, Mirko Pham, Volker Puetz, Jan Raupach, Gernot Reimann, Peter Arthur Ringleb, Maximilian Schell, Eckhard Schlemm, Silvia Schönenberger, Bjørn Tennøe, Christian Ulfert, Kateřina Vališ, Eva Vítková, Dominik F Vollherbst, Wolfgang Wick, Götz Thomalla, on behalf of the TENSION Investigators*

Lancet 2023; 402: 1753–63

Summary

Background Recent evidence suggests a beneficial effect of endovascular thrombectomy in acute ischaemic stroke with large infarct; however, previous trials have relied on multimodal brain imaging, whereas non-contrast CT is mostly used in clinical practice.

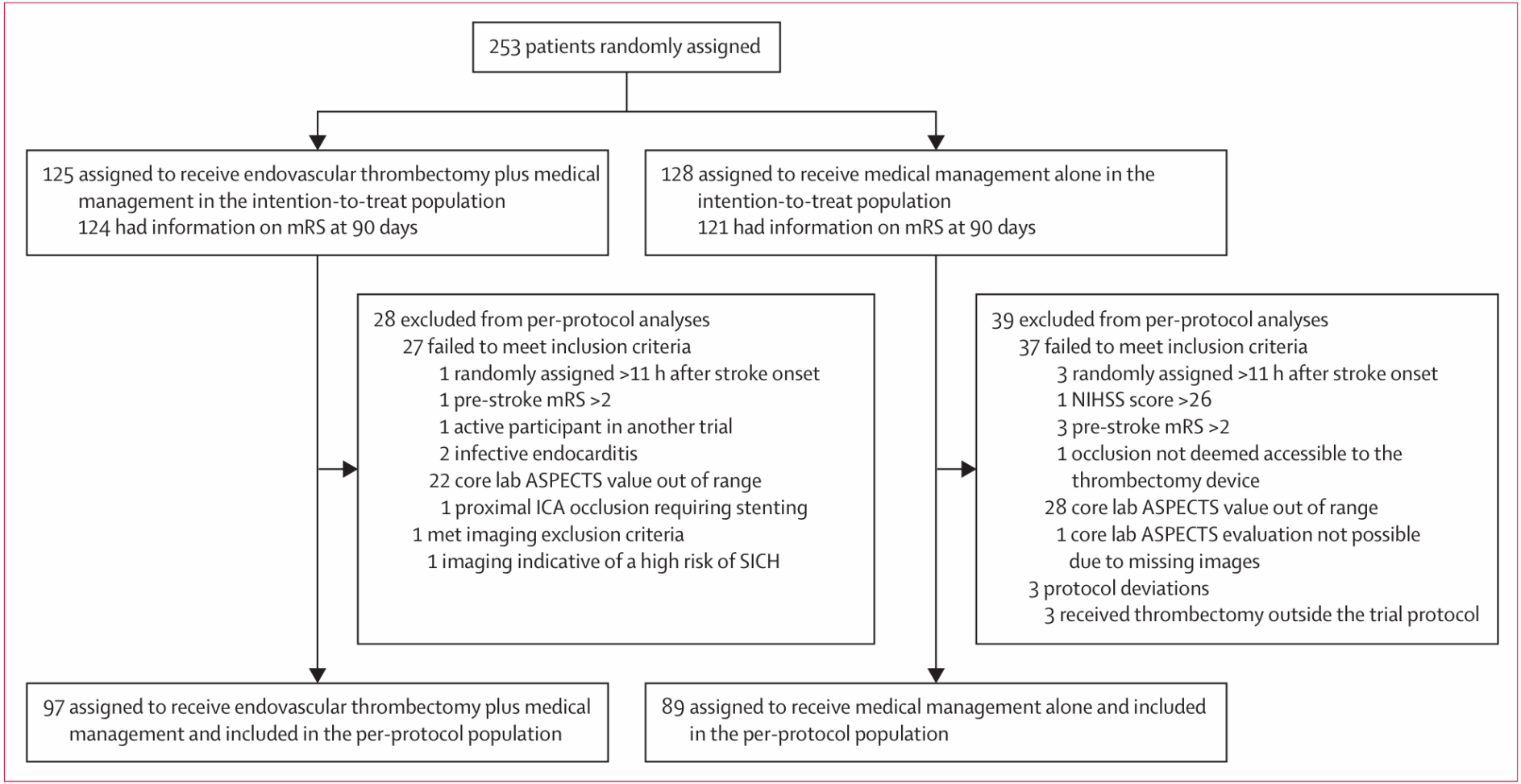
Methods In a prospective multicentre, open-label, randomised trial, patients with acute ischaemic stroke due to large vessel occlusion in the anterior circulation and a large established infarct indicated by an Alberta Stroke Program Early Computed Tomographic Score (ASPECTS) of 3–5 were randomly assigned using a central, web-based system (using a 1:1 ratio) to receive either endovascular thrombectomy with medical treatment or medical treatment (ie, standard of care) alone up to 12 h from stroke onset. The study was conducted in 40 hospitals in Europe and one site in Canada. The primary outcome was functional outcome across the entire range of the modified Rankin Scale at 90 days, assessed by investigators masked to treatment assignment. The primary analysis was done in the intention-to-treat population. Safety endpoints included mortality and rates of symptomatic intracranial haemorrhage and were analysed in the safety population, which included all patients based on the treatment they received. This trial is registered with ClinicalTrials.gov, NCT03094715.

Findings From July 17, 2018, to Feb 21, 2023, 253 patients were randomly assigned, with 125 patients assigned to endovascular thrombectomy and 128 to medical treatment alone. The trial was stopped early for efficacy after the first pre-planned interim analysis. At 90 days, endovascular thrombectomy was associated with a shift in the distribution of scores on the modified Rankin Scale towards better outcome (adjusted common OR 2·58 [95% CI 1·60–4·15]; p=0·0001) and with lower mortality (hazard ratio 0·67 [95% CI 0·46–0·98]; p=0·038). Symptomatic intracranial haemorrhage occurred in seven (6%) patients with thrombectomy and in six (5%) with medical treatment alone.

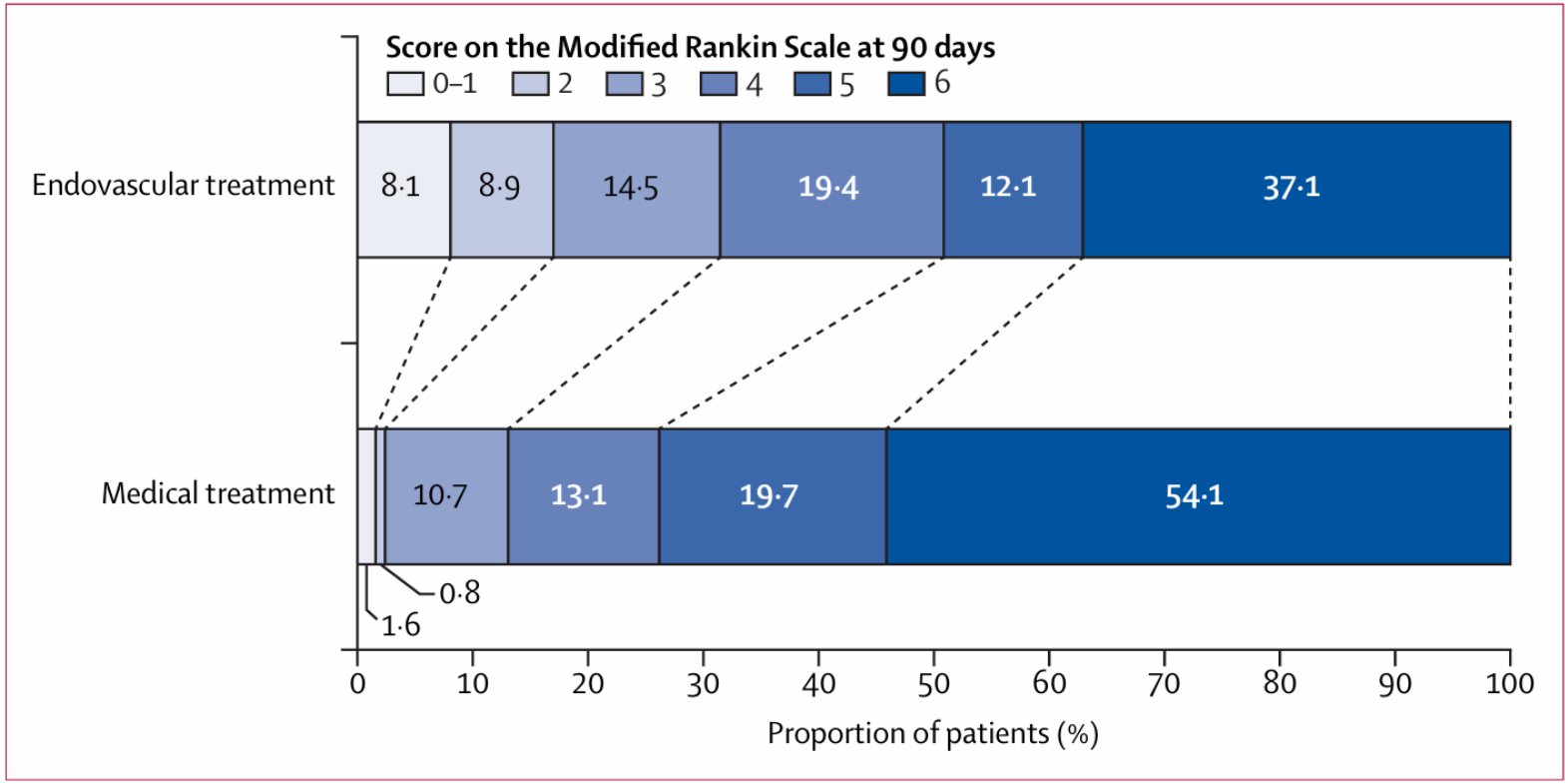
Interpretation Endovascular thrombectomy was associated with improved functional outcome and lower mortality in patients with acute ischaemic stroke from large vessel occlusion with established large infarct in a setting using non-contrast CT as the predominant imaging modality for patient selection.

Added value of this study

TENSION was the first clinical trial to randomly assign patients with acute ischaemic stroke due to large vessel occlusion in the anterior circulation and a large infarct without the use of extended imaging and based on standard-of-care stroke imaging, which was non-contrast CT in 82% of patients and MRI in 18%. Patients were randomly assigned to receive either endovascular thrombectomy or medical treatment (standard of care) alone up to 12 h after stroke onset. At 90 days, there was a shift in the distribution of scores on the modified Rankin Score towards better outcomes in favour of endovascular thrombectomy. Mortality was lower with endovascular thrombectomy, which also represents a novel finding not observed in the previous trials of thrombectomy for stroke patients with large core. There were no safety concerns with endovascular thrombectomy.


253 patients randomly assigned
125 assigned to receive endovascular thrombectomy plus medical management in the intention-to-treat population
124 had information on mRS at 90 days
128 assigned to receive medical management alone in the intention-to-treat population
121 had information on mRS at 90 days
28 excluded from per-protocol analyses
27 failed to meet inclusion criteria
1 randomly assigned >11 h after stroke onset
1 pre-stroke mRS >2
1 active participant in another trial
2 infective endocarditis
22 core lab ASPECTS value out of range
1 proximal ICA occlusion requiring stenting
1 met imaging exclusion criteria
1 imaging indicative of a high risk of SICH
39 excluded from per-protocol analyses
37 failed to meet inclusion criteria
3 randomly assigned >11 h after stroke onset
1 NIHSS score >26
3 pre-stroke mRS >2
1 occlusion not deemed accessible to the thrombectomy device
28 core lab ASPECTS value out of range
1 core lab ASPECTS evaluation not possible due to missing images
3 protocol deviations
3 received thrombectomy outside the trial protocol
97 assigned to receive endovascular thrombectomy plus medical management and included in the per-protocol population
89 assigned to receive medical management alone and included in the per-protocol population

TENSION Trial



Lancet 2023; 402: 1753–63

LASTE Trial

ORIGINAL ARTICLE

Trial of Thrombectomy for Stroke with a Large Infarct of Unrestricted Size

V. Costalat, T.G. Jovin, J.F. Albucher, C. Cognard, H. Henon, N. Nouri, B. Gory, S. Richard, G. Marnat, I. Sibon, F. Di Maria, M. Annan, G. Boulouis, P. Cardona, M. Obadia, M. Piotin, R. Bourcier, B. Guillon, S. Godard, A. Pasco-Papon, O.F. Eker, T.-H. Cho, G. Turc, O. Naggara, S. Velasco, M. Lamy, F. Clarençon, S. Alamowitch, A. Renu, L. Suissa, H. Brunel, J.-C. Gentric, S. Timsit, C. Lamy, C. Chivot, F. Macian-Montoro, C. Mounayer, O. Ozkul-Wermester, C. Papagiannaki, V. Wolff, R. Pop, A. Ferrier, E. Chabert, F. Ricolfi, Y. Béjot, E. Lopez-Cancio, P. Vega, L. Spelle, C. Denier, M. Millán, J.F. Arenillas, M. Mazighi, E. Houdart, M. del Mar Freijo, A. Duhamel, N. Sanossian, D.S. Liebeskind, J. Labreuche, B. Lapergue, and C. Arquizan, for the LASTE Trial Investigators*

N ENGL J MED 390;18 NEJM.ORG MAY 9, 2024

BACKGROUND

The use of thrombectomy in patients with acute stroke and a large infarct of unrestricted size has not been well studied.

METHODS

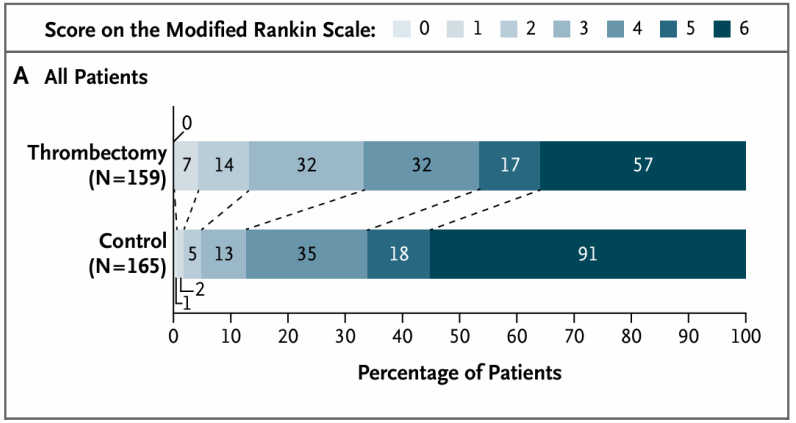
We assigned, in a 1:1 ratio, patients with proximal cerebral vessel occlusion in the anterior circulation and a large infarct (as defined by an Alberta Stroke Program Early Computed Tomographic Score of ≤5; values range from 0 to 10) detected on magnetic resonance imaging or computed tomography within 6.5 hours after symptom onset to undergo endovascular thrombectomy and receive medical care (thrombectomy group) or to receive medical care alone (control group). The primary outcome was the score on the modified Rankin scale at 90 days (scores range from 0 to 6, with higher scores indicating greater disability). The primary safety outcome was death from any cause at 90 days, and an ancillary safety outcome was symptomatic intracerebral hemorrhage.

RESULTS

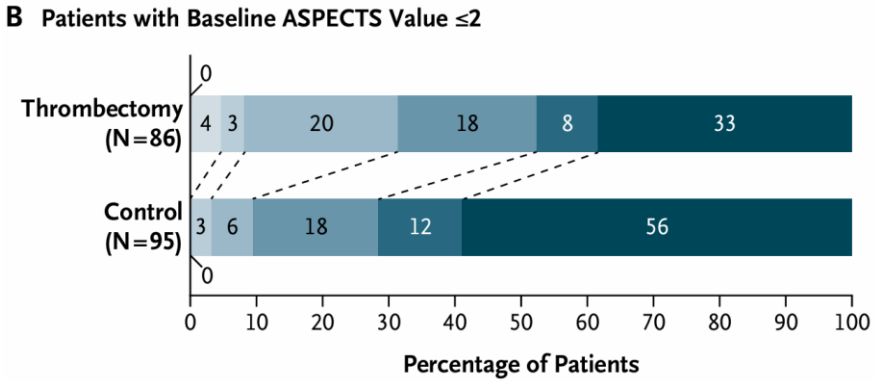
A total of 333 patients were assigned to either the thrombectomy group (166 patients) or the control group (167 patients); 9 were excluded from the analysis because of consent withdrawal or legal reasons. The trial was stopped early because results of similar trials favored thrombectomy. Approximately 35% of the patients received thrombolysis therapy. The median modified Rankin scale score at 90 days was 4 in the thrombectomy group and 6 in the control group (generalized odds ratio, 1.63; 95% confidence interval [CI], 1.29 to 2.06; P<0.001). Death from any cause at 90 days occurred in 36.1% of the patients in the thrombectomy group and in 55.5% of those in the control group (adjusted relative risk, 0.65; 95% CI, 0.50 to 0.84), and the percentage of patients with symptomatic intracerebral hemorrhage was 9.6% and 5.7%, respectively (adjusted relative risk, 1.73; 95% CI, 0.78 to 4.68). Eleven procedure-related complications occurred in the thrombectomy group.

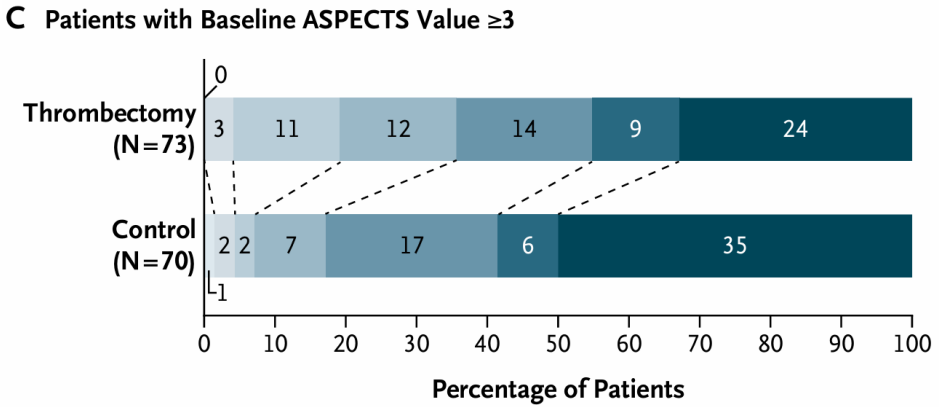
CONCLUSIONS

In patients with acute stroke and a large infarct of unrestricted size, thrombectomy plus medical care resulted in better functional outcomes and lower mortality than medical care alone but led to a higher incidence of symptomatic intracerebral hemorrhage. (Funded by Montpellier University Hospital; LASTE ClinicalTrials.gov number, NCT03811769.)



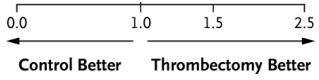
LASTE Trial


B Patients with Baseline ASPECTS Value ≤2
Thrombectomy (N=86)
Control (N=95)
0
4 3 20 18 8 33
3 6 18 12 56
0
0 10 20 30 40 50 60 70 80 90 100
Percentage of Patients


C Patients with Baseline ASPECTS Value ≥3
Thrombectomy (N=73)
Control (N=70)
0
3 11 12 14 9 24
2 2 7 17 6 35
1
0 10 20 30 40 50 60 70 80 90 100
Percentage of Patients

LASTE Trial

Subgroup	Control	Thrombectomy	Generalized Odds Ratio (95% CI)
	no. of patients		
Overall	165	159	1.63 (1.29–2.06)
Age			
≤70 yr	64	64	2.03 (1.36–3.03)
>70 yr	101	95	1.44 (1.08–1.90)
Sex			
Female	77	77	1.54 (1.10–2.15)
Male	88	82	1.72 (1.24–2.39)
Intravenous thrombolysis therapy			
No	107	104	1.69 (1.27–2.25)
Yes	58	55	1.52 (1.01–2.28)
Baseline NIHSS score			
<20	57	62	1.80 (1.20–2.69)
≥20	108	97	1.53 (1.15–2.03)
Baseline ASPECTS value			
≤2	95	86	1.77 (1.30–2.41)
≥3	70	73	1.47 (1.02–2.09)
Baseline infarct volume			
<100 ml	35	34	1.44 (0.85–2.45)
100–150 ml	58	64	1.77 (1.20–2.60)
>150 ml	72	61	1.58 (1.11–2.23)
Occlusion of intracranial segment of ICA			
No	91	90	1.55 (1.12–2.13)
Yes	74	69	1.79 (1.27–2.51)
Time from symptom onset to randomization			
<4.5 hr	86	78	1.69 (1.21–2.36)
4.5 to 6.5 hr	79	81	1.59 (1.14–2.21)
Directly admitted to thrombectomy-capable center			
Yes	71	70	1.66 (1.17–2.34)
No	94	89	1.61 (1.17–2.20)
Qualifying imaging method			
Computed tomography	25	28	1.34 (0.78–2.30)
Magnetic resonance imaging	140	131	1.71 (1.32–2.21)



Systematic review

Endovascular thrombectomy for large ischemic strokes: meta-analysis of six multicenter randomized controlled trials

Huanwen Chen [1,2] Marco Colasurdo [3]

Table 1 Study characteristics

Study characteristics	RESCUE-Japan-LIMIT	ANGEL-ASPECT	SELECT2	TESLA	TENSION	LASTE
Location	Japan	China	North America, Australia	United States	Europe, Canada	Europe, United States
Inclusion criteria						
Age (years)	≥18	18–80	18–85	18–85	≥18	≥18
Pre-stroke mRS score	0 or 1	0 or 1	0 or 1	0 or 1	0 to 2	0 or 1
Site of occlusion	ICA or M1	ICA or M1	ICA or M1	ICA or M1	ICA or M1	ICA, M1, or M2
Time window	Up to 6 hours (or MRI FLAIR negative)	Up to 24 hours	Up to 24 hours	Up to 24 hours	Up to 12 hours	Up to 7 hours (or MRI FLAIR negative)
ASPECTS criteria	CT or MR ASPECTS 3–5	CT ASPECTS 3–5	CT ASPECTS 3–5	CT ASPECTS 2–5	CT or MR ASPECTS 3–5	CT or MR ASPECTS 0–5
Additional imaging criteria	–	Core volume 70–100 mL also qualified	Core volume ≥50 mL also qualified. Patients with established infarcts were excluded	–	–	ASPECTS must be 4or 5 for age ≥80 years

ASPECTS, Alberta Stroke Program Early CT Score; FLAIR, fluid-attenuated inversion recovery; ICA, internal carotid artery; mRS, modified Rankin Scale.

Systematic review

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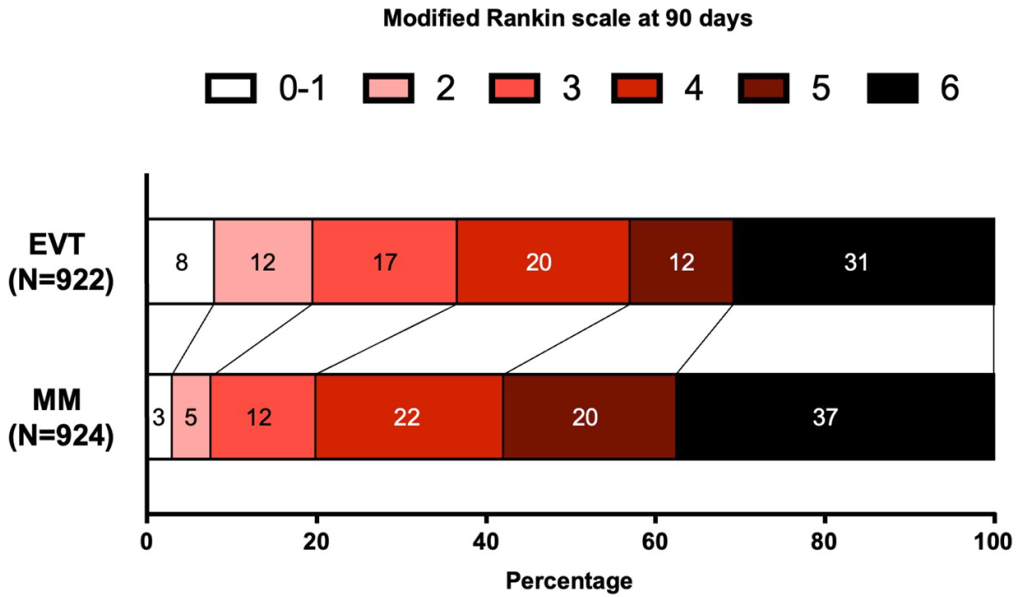
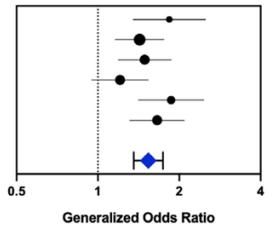


Figure 1 Pooled 90-day modified Rankin Scale outcomes from RESCUE-Japan-LIMIT, ANGEL-ASPECT, SELECT2, TESLA, TENSION, and LASTE. EVT, endovascular thrombectomy; MM, medical management.

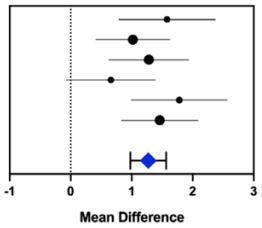
A. mRS shift



Study	Weight (%)	Odds Ratio	Lower	Upper	p-value
RESCUE	12.1	1.84	1.35	2.50	0.000
ANGEL	20.4	1.43	1.16	1.75	0.001
SELECT2	18.5	1.49	1.19	1.87	0.000
TESLA	17.0	1.21	0.95	1.54	0.124
TENSION	14.0	1.87	1.41	2.46	0.000
LASTE	17.8	1.66	1.31	2.09	0.000
Overall		**1.54**	**1.36**	**1.74**	**0.000**

Cochran's Q = 7.98; p=0.16
I^2 = 35.8%

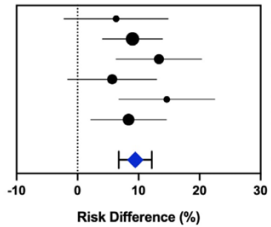
B. Utility-weighted mRS



Study	Weight (%)	Mean Difference	Lower	Upper	p-value
RESCUE	13.0	1.58	0.79	2.37	0.000
ANGEL	20.9	1.02	0.42	1.62	0.001
SELECT2	18.3	1.28	0.63	1.93	0.000
TESLA	15.1	0.66	-0.07	1.39	0.075
TENSION	13.1	1.78	1.00	2.56	0.000
LASTE	19.6	1.46	0.83	2.09	0.000
Overall		**1.27**	**0.98**	**1.57**	**0.000**

Cochran's Q = 5.95; p=0.31
I^2 = 9.4%

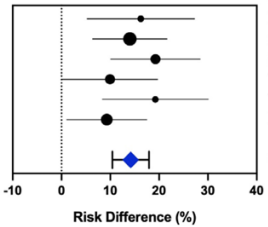
C. mRS 0-2



Study	Weight (%)	Risk Difference	Lower	Upper	p-value
RESCUE	10.1	6.31%	-2.21%	14.82%	0.146
ANGEL	30.3	9.00%	4.09%	13.91%	0.000
SELECT2	14.9	13.33%	6.33%	20.33%	0.000
TESLA	13.8	5.67%	-1.62%	12.95%	0.127
TENSION	11.8	14.63%	6.77%	22.49%	0.000
LASTE	19.0	8.36%	2.16%	14.56%	0.008
Overall		**9.46%**	**6.75%**	**12.16%**	**0.000**

Cochran's Q = 4.56; p=0.47
I^2 = 0.0%

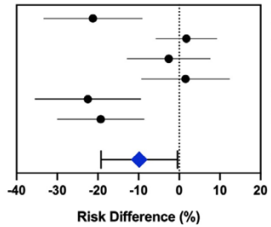
D. mRS 0-3



Study	Weight (%)	Risk Difference	Lower	Upper	p-value
RESCUE	11.6	16.25%	5.26%	27.25%	0.004
ANGEL	24.2	14.00%	6.38%	21.62%	0.000
SELECT2	16.7	19.25%	10.10%	28.40%	0.000
TESLA	14.7	9.94%	0.19%	19.69%	0.046
TENSION	11.9	19.23%	8.39%	30.07%	0.001
LASTE	20.8	9.29%	1.08%	17.49%	0.027
Overall		**14.18%**	**10.44%**	**17.93%**	**0.000**

Cochran's Q = 4.24; p=0.52
I^2 = 0.0%

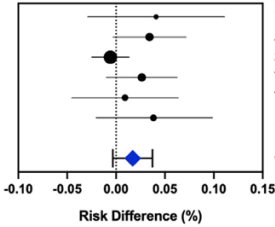
E. 90-day mortality



Study	Weight (%)	Risk Difference	Lower	Upper	p-value
RESCUE	15.7	-21.22%	-33.32%	-9.11%	0.001
ANGEL	18.8	1.74%	-5.73%	9.20%	0.648
SELECT2	17.0	-2.60%	-12.81%	7.61%	0.617
TESLA	16.6	1.54%	-9.26%	12.34%	0.780
TENSION	15.1	-22.46%	-35.43%	-9.49%	0.001
LASTE	16.7	-19.30%	-29.94%	-8.67%	0.000
Overall		**-9.83%**	**-19.23%**	**-0.42%**	**0.041**

Cochran's Q = 24.2; p<0.001
I^2 = 79.4%

F. Symptomatic ICH



Study	Weight (%)	Risk Difference	Lower	Upper	p-value
RESCUE	7.2	4.10%	-2.90%	11.10%	0.251
ANGEL	18.5	3.42%	-0.32%	7.16%	0.073
SELECT2	34.6	-0.58%	-2.49%	1.34%	0.556
TESLA	19.2	2.63%	-0.99%	6.25%	0.155
TENSION	10.8	0.91%	-4.53%	6.36%	0.743
LASTE	9.6	3.82%	-2.04%	9.86%	0.201
Overall		**1.70%**	**-0.32%**	**3.72%**	**0.100**

Cochran's Q = 6.64; p=0.25
I^2 = 35.0%

Figure 2 Pooled outcome measures across six randomized controlled trials comparing endovascular thrombectomy with medical management for patients with large ischemic strokes. ICH, intracranial hemorrhage; mRS, modified Rankin Scale.

Systematic review

Endovascular thrombectomy for large ischemic strokes: meta-analysis of six multicenter randomized controlled trials

Huanwen Chen [1,2] Marco Colasurdo [3]

Conclusions This study provides strong evidence that EVT is effective for patients presenting within 6 hours of stroke onset, ASPECT scores of 3 to 5, and intracranial ICA or proximal M1 occlusion. Use of EVT beyond 6 hours or for more distal occlusions requires further investigation.

Systematic review

Endovascular thrombectomy for large ischemic strokes: meta-analysis of six multicenter randomized controlled trials

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Table 2 Number needed to treat for favorable clinical outcomes

90-Day outcome	Number needed to treat	95% CI
Better functional status (mRS score shift)	4.7	3.7 to 6.6
Independent walking (mRS score 0–3)	7.1	5.6 to 9.6
Functional independence (mRS score 0–2)	10.6	8.2 to 14.8

mRS, modified Rankin Scale.

Clinical Neuroradiology
https://doi.org/10.1007/s00062-024-01414-2

ORIGINAL ARTICLE

Endovascular Thrombectomy for Large Ischemic Strokes with ASPECTS 0–2: a Meta-analysis of Randomized Controlled Trials

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Received: 8 January 2024 / Accepted: 14 April 2024

Table 1 Study designs of eligible randomized controlled trials

	SELECT2	ANGEL-ASPECT	TENSION	LASTE
NCT number	NCT03876457	NCT04551664	NCT03094715	NCT03811769
Participating country (ies)	USA, Canada, Europe, Australia, New Zealand	China	Europe, Canada	France, Spain
Imaging modality	CTP (98.3%)	NCCT	NCCT (82.2%)	MRI (83.6%)
	MRI (1.7%)	CTP	MRI (17.8%)	NCCT (16.4%)
Definition of large core	ASPECTS 3–5 or core volume ≥ 50 ml	ASPECTS 3–5 or core volume 70–100 ml	ASPECTS 3–5	< 80y: ASPECTS 0–5 ≥ 80y: ASPECTS 4–5
Inclusion criteria				
Time window	≤ 24h (to thrombectomy)	≤ 24h (to thrombectomy)	≤ 11h (to randomization)	≤ 6h 30 min or negative FLAIR
Age	18–85y	18–80y	≥ 18y	≥ 18y
Prestroke mRS	0–1	0–1	0–2	0–1
Admission NIHSS	0–42	6–30	0–26	0–42
N total	352	456	253	324
N ASPECTS 0–2	20	62	38	181
	/352 (5.6%)	/456 (13.6%)	/253 (15.0%)	/324 (55.9%)
Primary outcome	90-day mRS shift	90-day mRS shift	90-day mRS shift	90-day mRS shift

Abbreviations: *CTP* computed tomography perfusion; *MRI* magnetic resonance imaging; *NCCT* non-contrast computed tomography; *ASPECTS* Alberta Stroke Program Early CT Score; *FLAIR* fluid attenuated inversion recovery; *mRS* modified Rankin Scale; *NIHSS* National Institutes Health Stroke Scale

Endovascular Thrombectomy for Large Ischemic Strokes with ASPECTS 0-2: a Meta-analysis of Randomized Controlled Trials

OBJECTIVE:

Meta-analysis of randomized controlled trials (RCT) to compare endovascular thrombectomy (EVT) versus best medical treatment (BMT) in acute ischemic stroke with very large infarct (ASPECTS 0-2).

METHODS

Meta-analysis
generic inverse variance

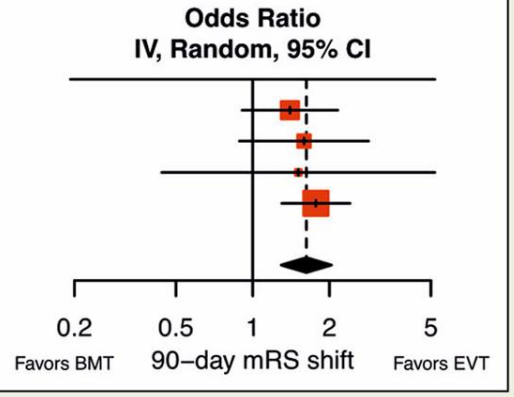
Four RCTs
with subgroup analysis of ASPECTS 0-2

n=301 patients

FINDINGS

Study	logOR	SE	Weight	Odds Ratio 95% CI
SELECT2	0.34	0.22	27.5%	1.40 [0.91; 2.16]
ANGEL–ASPECT	0.46	0.30	15.1%	1.59 [0.89; 2.85]
TENSION	0.41	0.63	3.4%	1.51 [0.44; 5.19]
LASTE	0.57	0.16	54.0%	1.77 [1.30; 2.41]
Total (95% CI)			**100.0%**	**1.62 [1.29; 2.04]**

Test for overall effect: Z = 4.19 (P < 0.001)



PRIMARY OUTCOME

90-day mRS shift

CONCLUSION

This meta-analysis suggests a potential treatment effect of EVT in specific patients with ASPECTS 0-2, challenging the use of ASPECTS for treatment selection in acute ischemic stroke.

An individual patient meta-analysis of RCTs is required to strenghten evidence in ASPECTS 0-2.

HOW CAN WE EXPLAIN THE RESULTS OF THE LARGE CORE TRIALS ?

- IMAGING CORE IS DIFFERRENT THAN REAL CORE

VIEWS & REVIEWS

Reversible diffusion-weighted imaging lesions in acute ischemic stroke

A systematic review

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Neurology® 2020;94:571-587. doi:10.1212/WNL.0000000000009173

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Abstract

Objectives

To systematically review the literature for reversible diffusion-weighted imaging (DWIR) lesions and to describe its prevalence, predictors, and clinical significance.

Methods

Studies were included if the first DWI MRI was performed within 24 hours of stroke onset and follow-up DWI or fluid-attenuated inversion recovery (FLAIR)/T2 was performed within 7 or 90 days, respectively, to measure DWIR. We abstracted clinical, imaging, and outcomes data.

Results

Twenty-three studies met the study criteria. The prevalence of DWIR was 26.5% in DWI-based studies and 6% in FLAIR/T2-based studies. DWIR was associated with recanalization or reperfusion of the ischemic tissue with or without the use of tissue plasminogen activator (t-PA) or endovascular therapy, earlier treatment with t-PA, shorter time to endovascular therapy after MRI, and absent or less severe perfusion deficit within the DWI lesion. DWIR was associated with early neurologic improvement in 5 of 6 studies (defined as improvement in the NIH Stroke Scale (NIHSS) score by 4 or 8 points from baseline or NIHSS score 0 to 2 at 24 hours after treatment or at discharge or median NIHSS score at 7 days) and long-term outcome in 6 of 7 studies (defined as NIHSS score ≤1, improvement in the NIHSS score ≥8 points, or modified Rankin Scale score up to ≤2 at 30 or 90 days) likely due to reperfusion.

Conclusions

DWIR is seen in up to a quarter of patients with acute ischemic stroke, and it is associated with good clinical outcomes following reperfusion. Our findings highlight the pitfalls of DWI to define ischemic core in the early hours of stroke.

Stroke

CLINICAL AND POPULATION SCIENCES

Ischemic Core Overestimation on Computed Tomography Perfusion

Álvaro García-Tornel, MD; Daniel Campos, MD; Marta Rubiera, MD, PhD; Sandra Boned, MD, PhD; Marta Olivé-Gadea, MD; Manuel Requena, MD, PhD; Ludovico Ciolli, MD; Marian Muchada, MD, PhD; Jorge Pagola, MD, PhD; David Rodriguez-Luna, MD, PhD; Matias Deck, MD; Jesus Juega, MD; Noelia Rodríguez-Villatoro, MD, PhD; Estela Sanjuan, RN, PhD; Alejandro Tomasello, MD; Carlos Piñana, MD; David Hernández, MD; José Álvarez-Sabin, MD, PhD; Carlos A. Molina, MD, PhD; Marc Ribó, MD, PhD

BACKGROUND AND PURPOSE: Different studies have pointed that CT perfusion (CTP) could overestimate ischemic core in early time window. We aim to evaluate the influence of time and collateral status on ischemic core overestimation.

METHODS: Retrospective single-center study including patients with anterior circulation large-vessel stroke that achieved reperfusion after endovascular treatment. Ischemic core and collateral status were automatically estimated on baseline CTP using commercially available software. CTP-derived core was considered as tissue with a relative reduction of cerebral blood flow <30%, as compared with contralateral hemisphere. Collateral status was assessed using the hypoperfusion intensity ratio (defined by the proportion of the time to maximum of tissue residue function >6 seconds with time to maximum of tissue residue function >10 seconds). Final infarct volume was measured on 24 to 48 hours noncontrast CT. Ischemic core overestimation was considered when CTP-derived core was larger than final infarct.

RESULTS: Four hundred and seven patients were included in the analysis. Median CTP-derived core and final infarct volume were 7 mL (interquartile range, 0–27) and 20 mL (interquartile range, 5–55), respectively. Median hypoperfusion intensity ratio was 0.46 (interquartile range, 0.23–0.59). Eighty-three patients (20%) presented ischemic core overestimation (median overestimation, 12 mL [interquartile range, 41–5]). Multivariable logistic regression analysis adjusted by CTP-derived core and confounding variables showed that poor collateral status (per 0.1 hypoperfusion intensity ratio increase; adjusted odds ratio, 1.41 [95% CI, 1.20–1.65]) and earlier onset to imaging time (per 60 minutes earlier; adjusted odds ratio, 1.14 [CI, 1.04–1.25]) were independently associated with core overestimation. No significant association was found with imaging to reperfusion time (per 30 minutes earlier; adjusted odds ratio, 1.17 [CI, 0.96–1.44]). Poor collateral status influence on core overestimation differed according to onset to imaging time, with a stronger size of effect on early imaging patients ($P_{interaction}$ <0.01).

CONCLUSIONS: In patients with large-vessel stroke that achieve reperfusion after endovascular therapy, poor collateral status might induce higher rates of ischemic core overestimation on CTP, especially in patients in earlier window time. CTP reflects a hemodynamic state rather than tissue fate; collateral status and onset to imaging time are important factors to consider when estimating core on CTP.

Ischemic Core Overestimation on Computed Tomography Perfusion

Álvaro García-Tornel, MD; Daniel Campos, MD; Marta Rubiera, MD, PhD; Sandra Boned, MD, PhD; Marta Olivé-Gadea, MD; Manuel Requena, MD, PhD; Ludovico Ciolli, MD; Marian Muchada, MD, PhD; Jorge Pagola, MD, PhD; David Rodriguez-Luna, MD, PhD; Matias Deck, MD; Jesus Juega, MD; Noelia Rodríguez-Villatoro, MD, PhD; Estela Sanjuan, RN, PhD; Alejandro Tomasello, MD; Carlos Piñana, MD; David Hernández, MD; José Álvarez-Sabin, MD, PhD; Carlos A. Molina, MD, PhD; Marc Ribó, MD, PhD

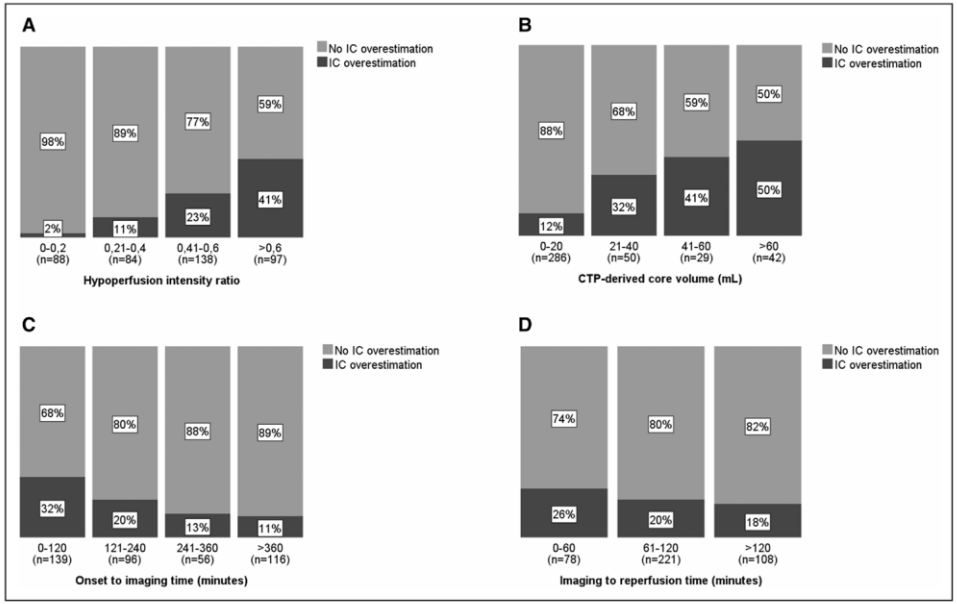

Figure 3. Bar graphs representing proportion of patients with ischemic core (IC) overestimation.
Bar graphs representing proportion of patients with IC overestimation depending on hypoperfusion intensity ratio (**A**), onset to imaging time (**B**), CT perfusion (CTP)-derived core volume (**C**), and imaging to reperfusion time (**D**).

CONCLUSIONS: In patients with large-vessel stroke that achieve reperfusion after endovascular therapy, poor collateral status might induce higher rates of ischemic core overestimation on CTP, especially in patients in earlier window time. CTP reflects a hemodynamic state rather than tissue fate; collateral status and onset to imaging time are important factors to consider when estimating core on CTP.

RESEARCH ARTICLE

Reversible Ischemic Lesion Hypodensity in Acute Stroke CT Following Endovascular Reperfusion

Gabriel Broocks, MD, Rosalie McDonough, MD, Lukas Meyer, MD, Matthias Bechstein, MD, Helge Kniep, Dipllng, Gerhard Schön, MSc, Marie Teresa Nawka, MD, Jens Fiehler, MD, Uta Hanning, MD, MHBA, Peter Sporns, MD, MHBA, Ewgenia Barow, MD, Jens Minnerup, MD, and Andre Kemmling, MD, MHBA

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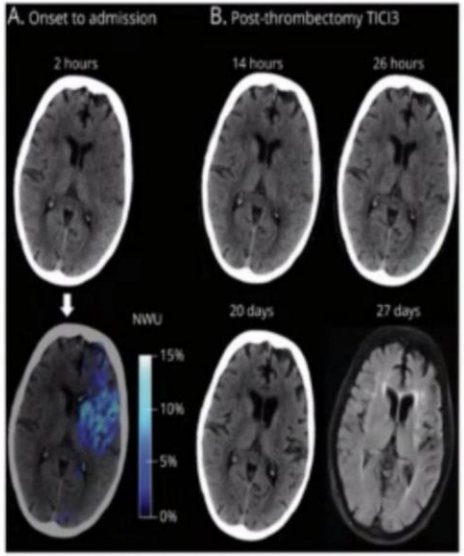
Neurology® 2021;97:e1075-e1084. doi:10.1212/WNL.0000000000012484

Figure 1 Reversible Ischemic Lesion Hypodensity on NECT After Complete Vessel Recanalization (mTICI Score 3)



Reversible ischemic lesion hypodensity on nonenhanced CT (NECT) after complete vessel recanalization (modified Thrombolysis in Cerebral Infarction [mTICI] score 3). Although some brain atrophy is visible in late follow-up imaging, no infarct lesion or cavitation is present. (A) Onset to admission. Admission NECT 2 hours after stroke onset shows readily visible early ischemic lesion hypodensity involving left basal ganglia and peri-insular cortex with sulcal effacement. Overlay of quantitative voxel-wise values of net water uptake within the lesion is shown. Net water uptake (NWU) per voxel was calculated from individual ischemic voxel density values in relation to contralateral normal values (median of mirrored voxel cluster for noise reduction). (B) After thrombectomy. Early follow-up CT at 14 and 26 hours shows regressing edema with reversible hypodensity and reappearing sulci. Late follow-up CT at 20 days and fluid-attenuated inversion recovery MRI at 27 days show some brain atrophy but no definite infarct lesion or cavitation.

Brooks G, Neurology 2021

POSSIBLE EXPLANATIONS

- IMAGING CORE IS DIFFERRENT THAN REAL CORE

- THERE IS BENEFIT FROM REPERFUSION BEYOND PENUMBRAL SALVAGE
  - Edema reduction
  - Neuroprotection/recovery enhancement

Original research

How much of the outcome improvement after successful recanalization is explained by follow-up infarct volume reduction?

Helge Kniep ,[1] Lukas Meyer ,[1] Gabriel Broocks ,[1] Matthias Bechstein ,[1] Friederike Austein ,[1] Rosalie V McDonough,[1,2] Caspar Brekenfeld,[1] Fabian Flottmann ,[1] Milani Deb-Chatterji,[3] Anna Alegiani,[4] Uta Hanning ,[1] Goetz Thomalla,[5] Jens Fiehler ,[1] Susanne Gellissen[1]

Ischemic stroke

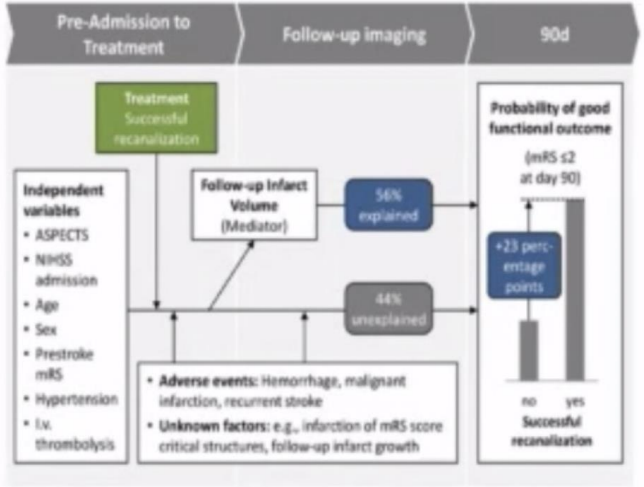


Figure 2 Mediation model layout and resultant overview. ASPECTS, Alberta Stroke Program Early CT Score; mRS, modified Rankin Scale; NIHSS, National Institutes of Health Stroke Scale.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Previous works suggest that mechanical thrombectomy (MT)-related follow-up infarct volume (FIV) reduction has only limited association with outcome comparing MT independently of recanalization success versus medical care. However, FIV is used as surrogate for treatment efficiency in MT. It remains unclear to what extent the relationship between successful recanalization versus persistent occlusion and functional outcome is explained by FIV reduction and if FIV is a reliable imaging endpoint for clinical trials.

WHAT THIS STUDY ADDS

⇒ In this German Stroke Registry-based study including 429 patients with acute ischemic stroke, 56% of the improvement of outcome after successful recanalization was explained by FIV reduction, 44% by other factors.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Results corroborate established pathophysiological assumptions and confirm the value of FIV as an imaging endpoint in clinical trials. Treatment effects not explained by FIV reduction reflect the remaining mismatch between radiological and clinical outcome measures.

Edema Reduction versus Penumbra Salvage: Investigating Treatment Effects of Mechanical Thrombectomy in Ischemic Stroke

Gabriel Broocks, MD,[1] Andre Kemmling, MD,[2] Helge Kniep, MD Dipl.Ing,[1] Lukas Meyer, MD,[1] Tobias D. Faizy, MD,[1] Uta Hanning, MD,[1] Leander D. Rimmele, MD,[3] Susan Klapproth, MD,[1] Gerhard Schön, MSc,[4] Kamil Zeleňák, MD,[5] Jens Fiehler, MD,[1] and Rosalie McDonough, MD MSc[1,6]

Impact of thrombectomy on functional outcome: Edema reduction versus penumbra salvage

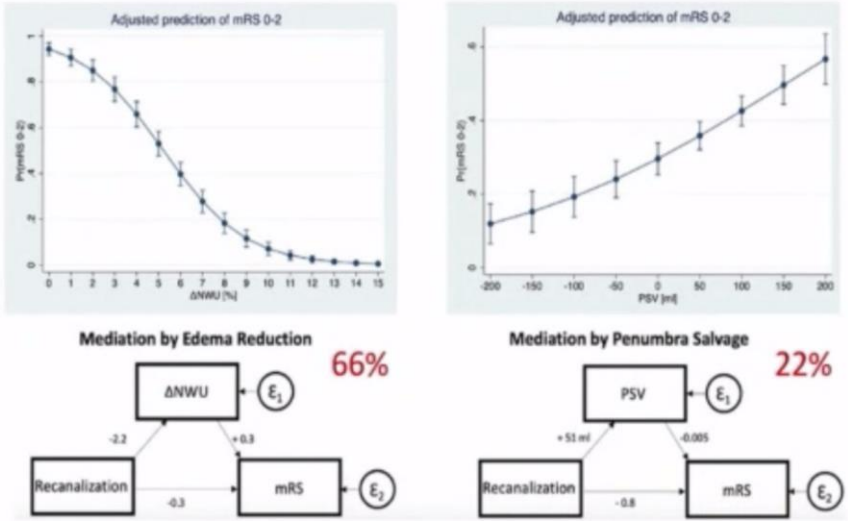


FIGURE: Impact of vessel recanalization on functional outcome (Probability (Pr) for mRS 0-2 at day 90) according to the degree of edema reduction and penumbra salvage. Both mediation models are illustrated. The upper graphs show the association of ΔNWU (ie, additional edema formation from admission to follow-up) and PSV with outcome (y-axis). Below, mediation models are depicted showing the association of the independent variable (recanalization status) with the mediator variables (ΔNWU and PSV), and mRS at day 90. mRS = modified Rankin Scale; NWU = net water uptake; PSV = penumbra salvage volume.

Brooks et al., Ann Neurol 2023

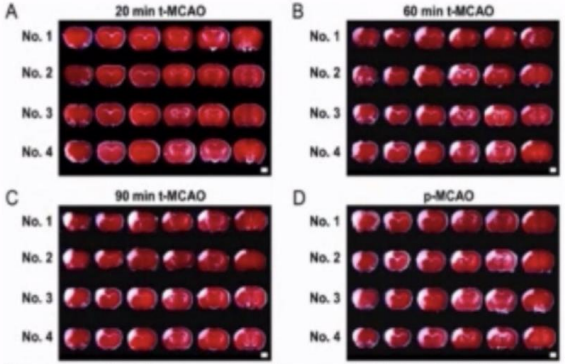
cells

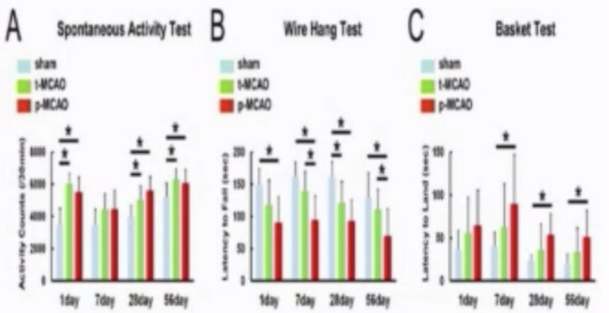
MDPI

Article

Early Reperfusion Following Ischemic Stroke Provides Beneficial Effects, Even after Lethal Ischemia with Mature Neural Cell Death

Yasue Tanaka [1], Nami Nakagomi [2], Nobutaka Doe [3], Akiko Nakano-Doi [4,5], Toshinori Sawano [6], Toshinori Takagi [1], Tomohiro Matsuyama [5], Shinichi Yoshimura [1,4,*] and Takayuki Nakagomi [4,5,*]



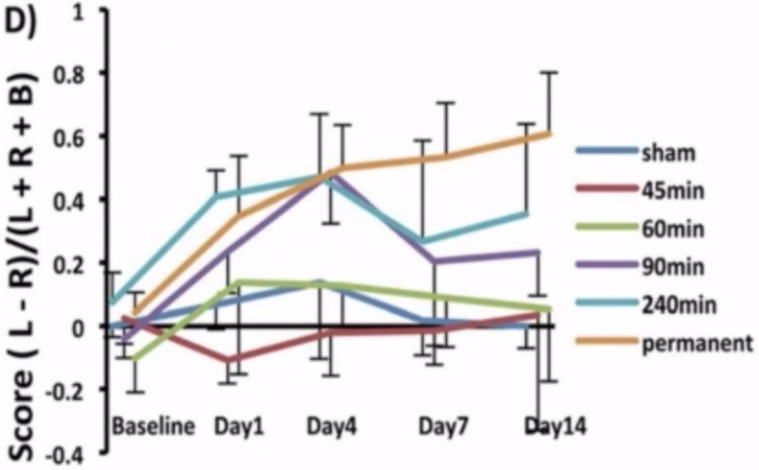


In conclusion, we showed that early reperfusion reduced blood vessel damage, accelerated neuroregenerative and vaculogenerative reparative processes, and reduced behavioral expression of neurological damage. The precise mechanisms underlying these events should be clarified in future studies. However, the current study showed that early reperfusion might be a useful treatment in stroke patients that experienced lethal brain ischemia characterized by death of mature neurons and glia.

Tanaka et al., Cells 2020

Early Reperfusion After Brain Ischemia Has Beneficial Effects Beyond Rescuing Neurons

Masaki Tachibana, MD; Tetsuro Ago, MD, PhD; Yoshinobu Wakisaka, MD, PhD; Junya Kuroda, MD, PhD; Masahiro Shijo, MD, PhD; Yoji Yoshikawa, MD; Motohiro Komori, MD; Ataru Nishimura, MD, PhD; Noriko Makihara, MD, PhD; Kuniyuki Nakamura, MD, PhD; Takanari Kitazono, MD, PhD



Conclusions—Early reperfusion after ischemia enhances the survival of endothelial cells and pericytes within ischemic areas even after the infarct is established, resulting in efficient intrainfarct fibrosis and peri-infarct astrogliosis. These effects might be associated with efficient peri-infarct reorganization and functional recovery. (***Stroke*. 2017;48: 2222-2230. DOI: 10.1161/STROKEAHA.117.016689.)**

Tachibana et al, Stroke 2017

Summary: EVT in large core infarct patients

- **Strong therapy effects** in terms of better functional outcome **for EVT**
- **Therapy effect** is **largely independent from the modality of imaging**
  → no need for advanced imaging in most cases

- **High mortality** for EVT and BMT
- **Slightly increased risk of hemorrhage** for EVT

Do we have to treat all AIS-LVO patients now? We should definitely consider to do so!

How Can We Explain These Results?

- There is a strong treatment effect of mechanical thrombectomy (MT) is low-ASPECTS patients compared to medical management (MM)
- The Therapy Effect is largely Independent from Imaging Modality (CT, MRI, CTP)
- Mortality is High for Both MT and MM
- Risk of ICH is slightly higher in MT
- Number needed to treat, and ethical and cost considerations need to be considered based on local healthcare conditions and standards

Conclusions

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Thank You !....