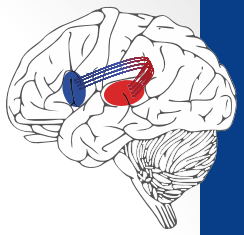
Hôpitaux universitaires Paris-Sud
Antoine-Béclère Bicêtre Paul-Brousse

Collège Français de Pathologie Vasculaire



Thrombectomie et prise en charge de l'AVC ischémique

Les indications

Pr Christian Denier

Neurologue, Faculté Paris Sud, Hôpital Bicêtre

16 mars 2016

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The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

A Randomized Trial of Intraarterial Treatment for Acute Ischemic Stroke

O.A. Berkhemer, P.S.S. Fransen, D. Beumer, L.A. van den Berg, H.F. Lingsma, A.J. Yoo, W.J. Schonewille, J.A. Vos, P.J. Nederkoorn, M.J.H. Wermer, M.A.A. van Walderveen, J. Staals, J. Hofmeijer, J.A. van Oostayen, G.J. Lycklama à Nijeholt, J. Boiten, P.A. Brouwer, B.J. Emmer, S.F. de Bruijn, L.C. van Dijk, L.J. Kappelle, R.H. Lo, E.J. van Dijk, J. de Vries, P.L.M. de Kort, W.J.J. van Rooij, J.S.P. van den Berg, B.A.A.M. van Hasselt, L.A.M. Aerden, R.J. Dallinga, M.C. Visser, J.C.J. Bot, P.C. Vroomen, O. Eshghi, T.H.C.M.L. Schreuder, R.J.J. Heijboer, K. Keizer, A.V. Tielbeek, H.M. den Hertog, D.G. Gerrits, R.M. van den Berg-Vos, G.B. Karas, E.W. Steyerberg, H.Z. Flach, H.A. Marquering, M.E.S. Sprengers, S.F.M. Jenniskens, L.F.M. Beenen, R. van den Berg, P.J. Koudstaal, W.H. van Zwam, Y.B.W.E.M. Roos, A. van der Lugt, R.J. van Oostenbrugge, C.B.L.M. Majoie, and D.W.J. Dippel.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Endovascular Therapy for Ischemic Stroke with Perfusion-Imaging Selection

B.C.V. Campbell, P.J. Mitchell, T.J. Kleinig, H.M. Dewey, L. Churilov, N. Yassi, B. Yan, R.J. Dowling, M.W. Parsons, T.J. Oxley, T.Y. Wu, M. Brooks, M.A. Simpson, F. Miteff, C.R. Levi, M. Krause, T.J. Harrington, K.C. Faulder, B.S. Steinfort, M. Priglinger, T. Ang, R. Scroop, P.A. Barber, B. McGuinness, T. Wijeratne, T.G. Phan, W. Chong, R.V. Chandra, C.F. Bladin, M. Badve, H. Rice, L. de Villiers, H. Ma, P.M. Desmond, G.A. Donnan, and S.M. Davis, for the EXTEND-IA Investigators*

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Randomized Assessment of Rapid Endovascular Treatment of Ischemic Stroke

M. Goyal, A.M. Demchuk, B.K. Menon, M. Eesa, J.L. Rempel, J. Thornton, D. Roy, T.G. Jovin, R.A. Willinsky, B.L. Sapkota, D. Dowlatshahi, D.F. Frei, N.R. Kamal, W.J. Montanera, A.Y. Poppe, K.J. Ryckborst, F.L. Silver, A. Shuaib, D. Tampieri, D. Williams, O.Y. Bang, B.W. Baxter, P.A. Burns, H. Choe, J.-H. Hao, C.A. Holmstedt, B. Jankowitz, M. Kelly, G. Linares, J.L. Mandzia, J. Shankar, S.-I. Sohn, R.H. Swartz, P.A. Barber, S.B. Coutts, E.E. Smith, W.F. Morrish, A. Weill, S. Subramaniam, A.P. Mitha, J.H. Wong, M.W. Lowerison, T.T. Sajobi, and M.D. Hill for the ESCAPE Trial Investigators*

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Thrombectomy within 8 Hours after Symptom Onset in Ischemic Stroke

T.G. Jovin, A. Chamorro, E. Cobo, M.A. de Miquel, C.A. Molina, A. Rovira, L. San Román, J. Serena, S. Abilleira, M. Ribó, M. Millán, X. Urra, P. Cardona, E. López-Cancio, A. Tomasello, C. Castaño, J. Blasco, L. Aja, L. Dorado, H. Quesada, M. Rubiera, M. Hernández-Pérez, M. Goyal, A.M. Demchuk, R. von Kummer, M. Gallofré, and A. Dávalos, for the REVASCAT Trial Investigators*

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

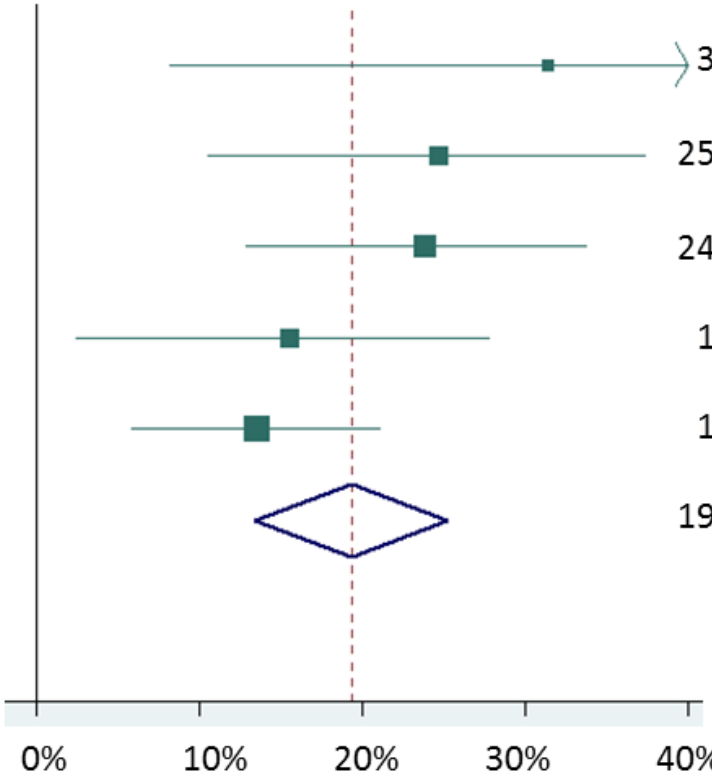
Stent-Retriever Thrombectomy after Intravenous t-PA vs. t-PA Alone in Stroke

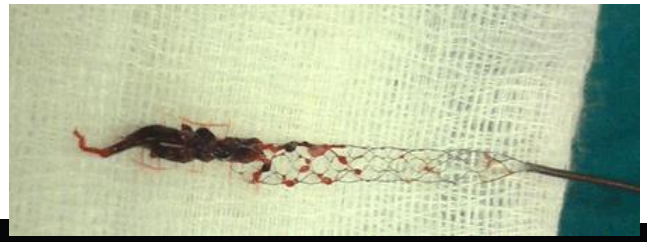
Jeffrey L. Saver, M.D., Mayank Goyal, M.D., Alain Bonafe, M.D., Hans-Christoph Diener, M.D., Ph.D., Elad I. Levy, M.D., Vitor M. Pereira, M.D., Gregory W. Albers, M.D., Christophe Cognard, M.D., David J. Cohen, M.D., Werner Hacke, M.D., Ph.D., Olav Jansen, M.D., Ph.D., Tudor G. Jovin, M.D., Heinrich P. Mattle, M.D., Raul G. Nogueira, M.D., Adnan H. Siddiqui, M.D., Ph.D., Dileep R. Yavagal, M.D., Blaise W. Baxter, M.D., Thomas G. Devlin, M.D., Ph.D., Demetrius K. Lopes, M.D., Vivek K. Reddy, M.D., Richard du Mesnil de Rochemont, M.D., Oliver C. Singer, M.D., and Reza Jahan, M.D., for the SWIFT PRIME Investigators*

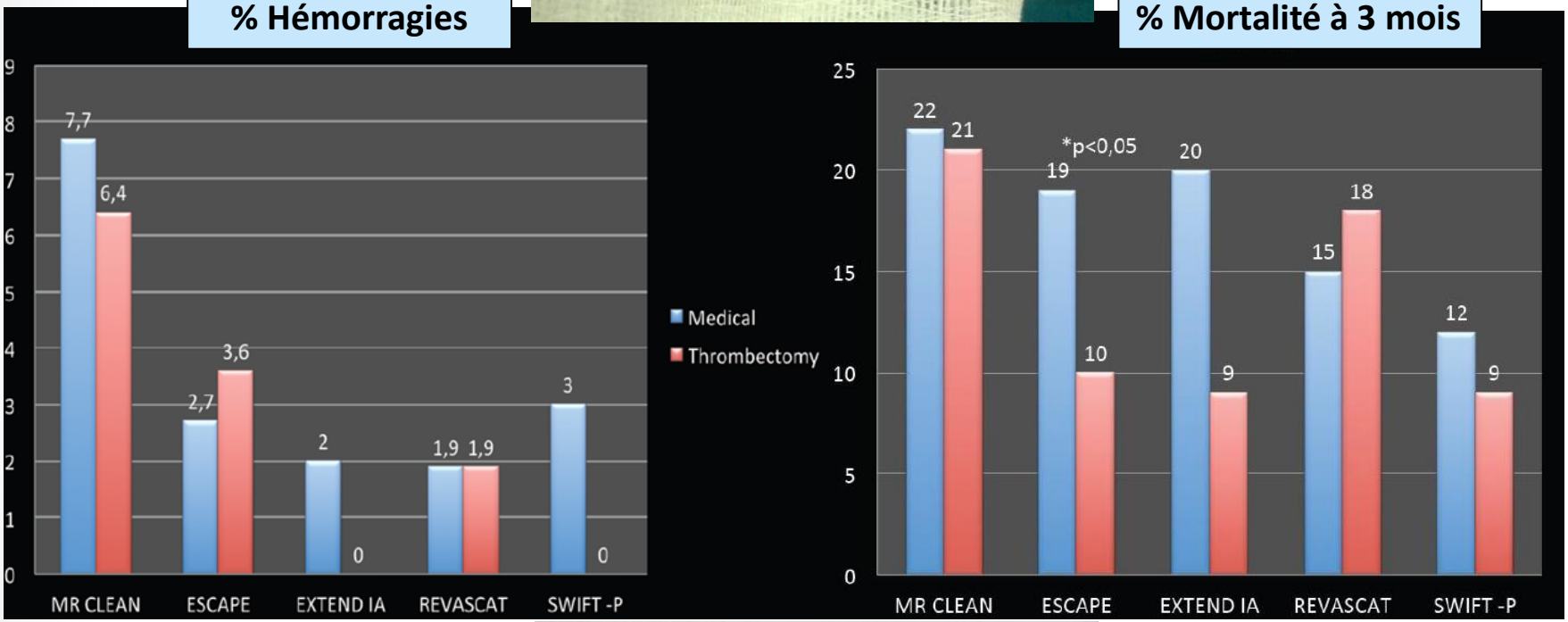
Méta-analyse des essais thérapeutiques concernant le bénéfice absolu thrombectomie versus trt de référence (rtPA IV seule le + svt): mRS ≤2

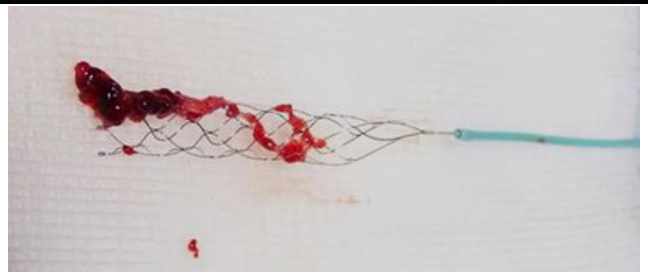
Etude	n	mRS≤2 Bras Intervention	mRS≤2 Bras Contrôle	Bénéfice absolu (IC95%)
EXTEND IA	70	71%	40%	31% (8%-50%)
SWIFT PRIME	191	60%	35%	25% (11%-38%)
ESCAPE	311	53%	29%	24% (13%-34%)
REVASCAT	206	44%	28%	16% (2%-28%)
MR CLEAN	500	33%	19%	14% (6%-21%)
Global (I^2=21,3%; p=0,28)				19% (13%-25%)

Random-effects






% Hémorragies
% Mortalité à 3 mois
Medical
Thrombectomy
MR CLEAN
ESCAPE
EXTEND IA
REVASCAT
SWIFT -P
7,7
6,4
2,7
3,6
2
0
1,9
1,9
3
0
22
21
19
10
20
9
15
18
12
9
*p<0,05



New consensus statement

Mechanical thrombectomy, **in addition to IV thrombolysis** within 4.5 hours … is recommended to treat acute stroke patients with large artery occlusions in the anterior circulation **up to 6 hours** …(Grade A, Level 1a, KSU Grade A).

Mechanical **thrombectomy should not prevent the initiation of IV thrombolysis** …and IV thrombolysis should not delay mechanical thrombectomy (Grade A, Level 1a, KSU Grade A).

Mechanical thrombectomy **should be performed as soon as possible** (Grade A, Level 1a, KSU Grade A).

If **IV thrombolysis is contraindicated mechanical thrombectomy is recommended as first-line** treatment in large vessel occlusions (Grade A, Level 1a, KSU Grade A)

Mechanical thrombectomy should be performed by a trained and experienced neurointerventionalist who meets national and/or international requirements (Grade B, Lev 2b, KSU Grade B)

ESO EUROPEAN STROKE ORGANISATION ESMINT ESNR

AHA/ASA Guideline

2015 American Heart Association/American Stroke Association Focused Update of the 2013 Guidelines for the Early Management of Patients With Acute Ischemic Stroke Regarding Endovascular Treatment

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Recommendations

Endovascular Interventions

1. **Patients eligible for intravenous r-tPA should receive intravenous r-tPA even if endovascular treatments are being considered *(Class I; Level of Evidence A)*.** (Unchanged from the 2013 guideline)
2. **Patients should receive endovascular therapy with a stent retriever if they meet all the following criteria *(Class I; Level of Evidence A)*.** (New recommendation):
   a. **Prestroke mRS score 0 to 1,**
   b. **Acute ischemic stroke receiving intravenous r-tPA within 4.5 hours of onset according to guidelines from professional medical societies,**
   c. **Causative occlusion of the ICA or proximal MCA (M1),**
   d. **Age ≥18 years,**
   e. **NIHSS score of ≥6,**
   f. **ASPECTS of ≥6, and**
   g. **Treatment can be initiated (groin puncture) within 6 hours of symptom onset**

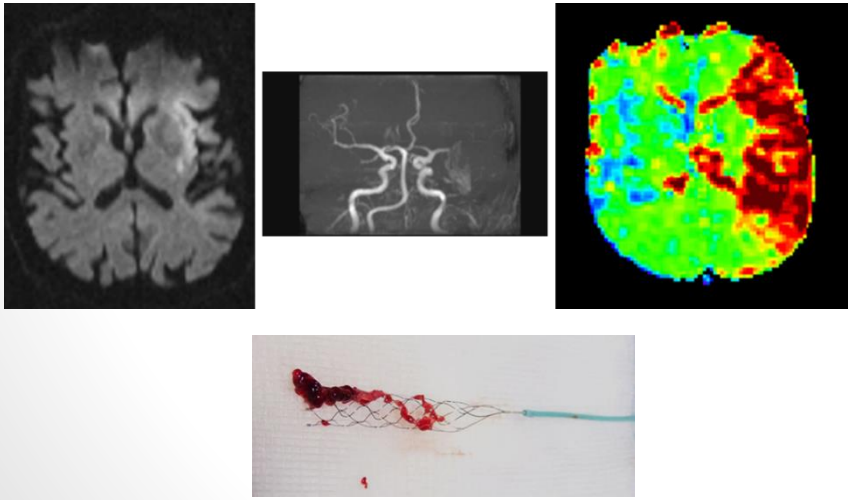
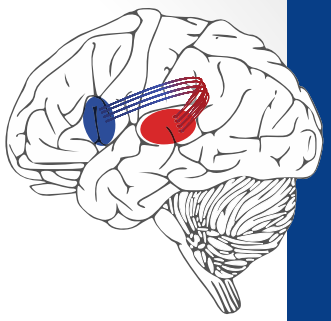


Tableau résumant les principales caractéristiques des études MR CLEAN, ESCAPE, EXTEND IA, REVASCAT, SWIFT–PRIME



	MR CLEAN	ESCAPE	EXTEND IA	REVASCAT	SWIFT-PRIME
N (TM/C)	233/267	165/150	35/35	103/103	98/98
NIHSS* (TM/C)	17/18	17/16	17/13	17/17	17/17
Site d'occlusion, % (ICA, M1/M2)	26/64/8	27/70/3	31/53/5	26/64/8	17/72/10
TT	6h	12h	8h	8h	6h
TIV	89%	73%	100%	73%	100%
Temps TIV (TM/C)	87/85	125/110	127/145	117/105	110/117
Temps TM	332 min	241 min	248 min	355 min	252** min
ST	81%	86%	100%	100%	100%
Reperfusion	59%	72%	89%	66%	83%
mRS 0-2 (TM)	33%	53%	71%	44%	60%
mRS 0-2 (C)	19%	29%	40%	28%	35%
Diff. mRS 0-2	14%	24%	31%	16%	25%
Hém. (TM/C)	7,7%/6,4%	3,6%/2,7%	0%/2%	1,9%/1,9%	0%/3%
Mortalité, % (TM/C)	21/22	10/19	9/20	18/16	9/12

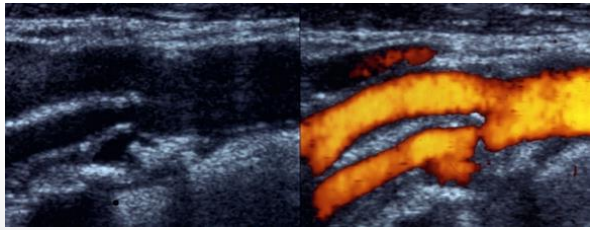
TM : thrombectomie mécanique;
C : groupe contrôle;
Site d'occlusion exprimé en % (artère carotide interne : ICA, segments proximaux de l'artère cérébrale moyenne=M1/M2) ;
TIV : % de patients ayant reçus la thrombolyse IV;
TT : fenêtre thérapeutique en heures;
Temps TM : temps de réouverture de l'artère.

** temps du premier déploiement du stent retriever ; ST: % d'utilisation des stent retrievers; Reperfusion: taux de TICI 2b/3.

*NIHSS médian; Hém.: % Hémorragies intracrâniennes symptômatiques ;

Patients with « large artery in anterior circulation »… mais encore (1/2)

MR CLEAN	233/267	66 (55–76)/ 66 (56–76)	17 (14–21) [3–30]/18 (14–22) [4–38]	IC ICA 0.4/1.1 ICA+M1 25.3/28 M1 66.1/62.0 M2 7.7/7.9 A1/A2 0.4/0.8
ESCAPE	165/150	71 (60–81)/ 70 (60–81)	16 (13–20)/17 (12–20)	ICA+M1 27.6/26 M1/all M2 68.1/7 M2 3.7/2.0
SWIFT PRIME	98/98	65±13/ 66±11	17 (13–20)/ 17 (13–19)	ICA 18.3/16.0 M1 67/77 M2 14/6
EXTEND-IA	35/35	69±12// 70±12	17 (13–20)/ 13 (9–19)	ICA 31/31 M1 57/51 M2 11/17
REVASCAT	103/103	66±11/ 67±10	17 (14–20)/ 17 (12–19)	ICA 0/1 ICA+M1 26/27 M1 65/64 M2 10/8



AHA/ASA Guideline

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6. Although the benefits are uncertain, the use of endovascular therapy with stent retrievers may be reasonable for carefully selected patients with acute ischemic stroke in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset and who have causative occlusion of the M2 or M3 portion of the MCAs, anterior cerebral arteries, vertebral arteries, basilar artery, or posterior cerebral arteries *(Class IIb; Level of Evidence C)*. (New recommendation)

CLASS IIb (WEAK) **Benefit ≥ Risk**

Suggested phrases for writing recommendations:
- May/might be reasonable
- May/might be considered
- Usefulness/effectiveness is unknown/unclear/uncertain or not well established

Patients with « large artery in anterior circulation »… (2/2): Basilar artery ?

Mechanical Recanalization in Basilar Artery Occlusion: The ENDOSTROKE Study

Oliver C. Singer, MD,[1] Joachim Berkefeld, MD,[2] Christian H. Nolte, MD,[3]

Methods: ENDOSTROKE is an investigator-initiated multicenter registry for patients undergoing EVT. This analysis includes 148 consecutive patients with BA occlusion, with 59% having received intravenous thrombolysis prior to EVT. Recanalization (defined as Thrombolysis in Cerebral Infarction [TICI] score 2b–3) and collateral status (using the American Society of Interventional and Therapeutic Neuroradiology/Society of Interventional Radiology collateral grading system) were assessed by a blinded core laboratory. Good (moderate) outcome was defined as a modified Rankin Scale score of 0 to 2 (0–3) assessed after at least 3 months (median time to follow-up = 120 days).

Results: Thirty-four percent had good and 42% had moderate clinical outcome; mortality was 35%. TICI 2b–3 recanalization was achieved by 79%. Age, hypertension, National Institutes of Health Stroke Scale scores, collateral status, and the use of magnetic resonance imaging prior to EVT predicted clinical outcome, the latter 3 remaining independent predictors in multivariate analysis. Independent predictors of recanalization were better collateral status and the use of a stent retriever. However, recanalization did not significantly predict clinical outcome.

Interpretation: Beside initial stroke severity, the collateral status predicts clinical outcome and recanalization in BA occlusion. Our data suggest that the use of a stent retriever is associated with high recanalization rates, but recanalization on its own does not predict outcome. The role of other modifiable factors, including the choice of pretreatment imaging modality and time issues, warrants further investigation.

Patients with « large artery in anterior circulation »… (2/2): Basilar artery ?

van der Hoeven *et al. Trials* 2013, **14**:200
http://www.trialsjournal.com/content/14/1/200

TRIALS

STUDY PROTOCOL Open Access

The Basilar Artery International Cooperation Study (BASICS): study protocol for a randomised controlled trial

Erik JRJ van der Hoeven[1], Wouter J Schonewille[2*], Jan Albert Vos[1], Ale Algra[3,4], Heinrich J Audebert[5], Eivind Berge[6], Alfonso Ciccone[7], Mikael Mazighi[8], Patrik Michel[9], Keith W Muir[10], Víctor Obach[11], Volker Puetz[12], Cristanne AC Wijman[13^], Andrea Zini[14], Jaap L Kappelle[3] and On behalf of the BASICS study group

Design: BASICS is a randomised controlled, multicentre, open label, phase III intervention trial with blinded outcome assessment, investigating the efficacy and safety of additional IAT after IVT in patients with BAO. The trial targets to include 750 patients, aged 18 to 85 years, with CT angiography or MR angiography confirmed BAO treated with IVT. Patients will be randomised between additional IAT followed by optimal medical care versus optimal medical care alone. IVT has to be initiated within 4.5 h from estimated time of BAO and IAT within 6 h. The primary outcome parameter will be favourable outcome at day 90 defined as a modified Rankin Scale score of 0–3.

« > 18 yo »…
Quid des enfants ?

- ***AVC chez enfants RARES: 1-8 / 100 000 / an***
- ***Multiples causes…***
- ***Délai de diagnostic: long (Δg: 8,8–16 h*** *(deVeber, 2010)*
- ***Centres hyper-spécialisés***
- ***Problématiques des « stroke mimics » > adultes***

Quid rtPA ?

- ***Protocoles de thrombolyse variés***
- ***NRI: essais > 18 ans***
- *« Large vessels occlusion » rare chez l'enfant*
- ***Protocole IRM + ARM nécessaire***
- ***Qq séries publiées*** *(Zanaty, 2014; Vega 2015)*

- ***NRI raisonnable si Dg étayé et délai adapté (IIb)***

Panel*: Conditions associated with childhood AIS

Cardiac
Congenital heart disease
Endocarditis
Valvular disease (congenital or acquired)
Cardiomyopathy
Cardiac arrhythmia

Haematological
Sickle cell disease
Thrombophilias (hereditary or acquired)
Iron deficiency anaemia

Cerebral arteriopathy
Moyamoya disease (primary)
Moyamoya syndrome (secondary)
Down's syndrome
Sickle cell disease
Neurofibromatosis type 1
Tuberous sclerosis
Post-cranial irradiation
Transient cerebral arteriopathy
Dissection
Post-infectious vasculitis
Fibromuscular dysplasia

Infections
Varicella zoster virus
Bacterial meningitis
Neuroborreliosis
Mycobacterium tuberculosis
Fungal

Genetic
Neurofibromatosis type 1
Tuberous sclerosis
PHACE syndrome
Fabry's disease
Homocysteinuria

Toxic
L-Asparaginase
Cranial irradiation

Malignancy
Lymphoma
Leukaemia
Brain tumours

Quid des « très âgés »? >> 80 ans…?

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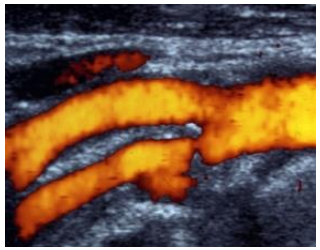
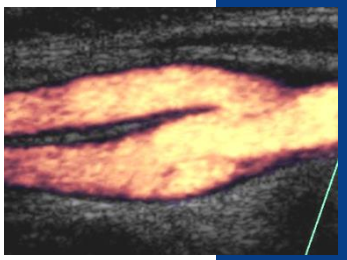
a. Prestroke mRS score 0 to 1,
b. Acute ischemic stroke receiving intravenous r-tPA within 4.5 hours of onset according to guidelines from professional medical societies,
c. Causative occlusion of the ICA or proximal MCA (M1),
d. Age ≥18 years,

- ***MR CLEAN: 16% > 80 ans avec effet positif (OR 3,24; 95% CI 1,21-8,62)***
- ***inclusions SWIFT PRIME & REVASCAT : < 80 ans***
- ***ESCAPE: Mortalité: -24% à M3 pour les -80 ans***
- ***Mortalité x2 au-delà de 80 ans…*** *(Villwock, 2014) // histoire naturelle…*
- ***Etudes dédiées nécessaires +++ (tenant compte Rankin pré stroke…)***





BMJ Open Acute ischaemic stroke outcomes following mechanical thrombectomy in the elderly versus their younger counterpart: a retrospective cohort study

Mark R Villwock, Amit Singla, David J Padalino, Eric M Deshaies

Eur Radiol
DOI 10.1007/s00330-015-3969-8

NEURO

Endovascular mechanical recanalization of acute ischaemic stroke in octogenarians

Erasmia Broussalis[1,2,3,6] · F. Weymayr[1] · W. Hitzl[4] · A. F. Unterrainer[5] · E. Trinka[3] · M. Killer[2,3]

CASE REPORT

Successful endovascular stroke therapy in a 103-year-old woman

SoHyun Boo,[1] Uzoma B Duru,[2] Matthew S Smith,[2] Ansaar T Rai[1]

En cas de contre indications au rt PA IV

Traitement anticoagulant en cours, TC, post chirurgical, …

In carefully selected patients with anterior circulation occlusion who have contraindications to intravenous r-tPA, endovascular therapy with stent retrievers completed within 6 hours of stroke onset is reasonable *(Class IIa; Level of Evidence C)*. Inadequate data are available at this time to determine the clinical efficacy of endovascular therapy with stent retrievers for those patients whose contraindications are time based or not time based (eg, prior stroke, serious head trauma, hemorrhagic coagulopathy, or receiving anticoagulant medications). (New recommendation)

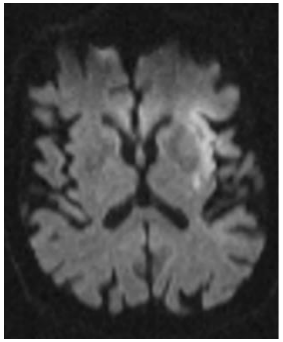
CLASS IIa (MODERATE) **Benefit >> Risk**

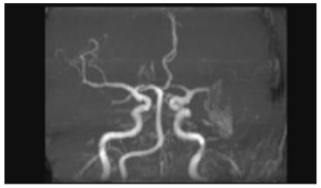
Suggested phrases for writing recommendations:

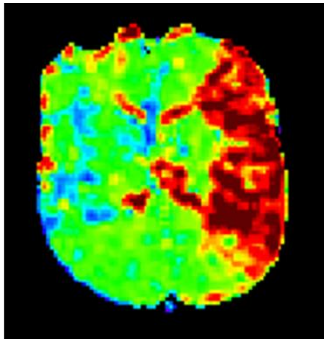
- Is reasonable
- Can be useful/effective/beneficial
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is probably recommended/indicated in preference to treatment B
  - It is reasonable to choose treatment A over treatment B

Quid de la fenêtre thérapeutique ??

Study	n	Age, Mean±SD (IQR), y	NIHSS Score, Median (IQR) [Range]	Territory, %	ASPECTS, Median (IQR)	Device Deployment in Active Group	Onset to IV r-tPA, Mean±SD, Median (IQR), min	Time Onset to Groin Puncture, Mean±SD, Median (IQR), min	TICI Grade 2b/3 Recanalization, %	Time to Reperfusion Mean±SD, Median (IQR), min
MR CLEAN	233/267	66 (55–76)/ 66 (56–76)	17 (14–21) [3–30]/18 (14–22) [4–38]	IC ICA 0.4/1.1 ICA+M1 25.3/28.2 M1 66.1/62.0 M2 7.7/7.9 A1/A2 0.4/0.8	9 (7–10)/ 9 (8–10)	83.7% 81.5% stent retriever IAT 21%	85 (67–110)/ 87 (65–116)	260 (210–313)	59	332 (279–394)
ESCAPE	165/150	71 (60–81)/ 70 (60–81)	16 (13–20)/17 (12–20)	ICA+M1 27.6/26.5 M1/all M2 68.1/71.4 M2 3.7/2.0	9 (8–10)/ 9 (8–10)	91.5% 72.7% stent retriever	110 (80–142)/ 125 (89–183)		72.40	
SWIFT PRIME	98/98	65±13/ 66±11	17 (13–20)/ 17 (13–19)	ICA 18.3/16.0 M1 67/77 M2 14/6	9 (7–10)/ 9 (8–10)	88.8% All stent retriever	110.5 (85–156)/ 117 (80–155)	224 (165–275)	88	
EXTEND-IA	35/35	69±12// 70±12	17 (13–20)/ 13 (9–19)	ICA 31/31 M1 57/51 M2 11/17		77% All stent retriever	127 (93–162)/ 145 (105–180)	210 (166–251)	86	248 (204–277)
REVASCAT	103/103	66±11/ 67±10	17 (14–20)/ 17 (12–19)	ICA 0/1 ICA+M1 26/27 M1 65/64 M2 10/8	7 (6–9)/ 8 (6–9)	95% All stent retriever	118 (90–150)/ 105 (86–138)	269 (201–340)	66	355 (269–430)

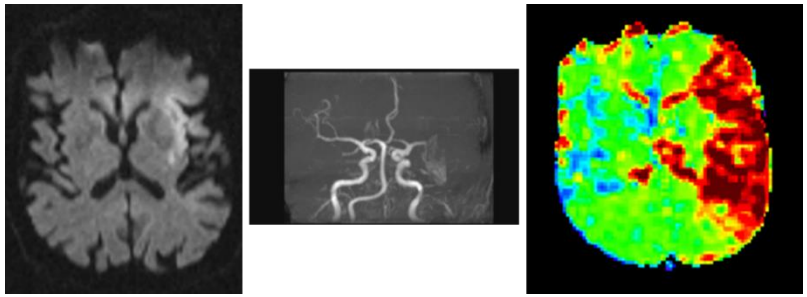






Quid de la fenêtre thérapeutique ??

- ***REVASCAT & ESCAPE: trt >> H8 / H12…***
- ***Bénéfice : tjrs après H6 mais effectif petit…***
- ***Prévoir imagerie pour trier / mismatch…***



MR CLEAN	Standard (±IV r-tPA)+IA UK, r-tPA, device vs standard (±IV r-tPA)	Not required	>18	6 h to IAT
ESCAPE	Standard (±IV r-tPA)+stent retriever "recommended" vs standard (±IV r-tPA)	Not required	>18	12 h to randomization
SWIFT PRIME	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Required	18–80	6 h to groin
EXTEND-IA	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Required	≥18	6 h to groin Complete in 8 h
REVASCAT	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Not required	18–80 (85)	8 h to groin

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g. Treatment can be initiated (groin puncture) within 6 hours of symptom onset

Relation délai / efficacité et rt PA IV

ARTICLES

Association of outcome with early stroke treatment: pooled analysis of ATLANTIS, ECASS, and NINDS rt-PA stroke trials

*The ATLANTIS, ECASS, and NINDS rt-PA Study Group Investigators**

- ***Données individuelles de 6 essais (NINDS, ATLANTIS, ECASS)***
- ***2775 pts (<H3, n=928 & >H3, n=1847)***

Lancet 2004:363;768-774

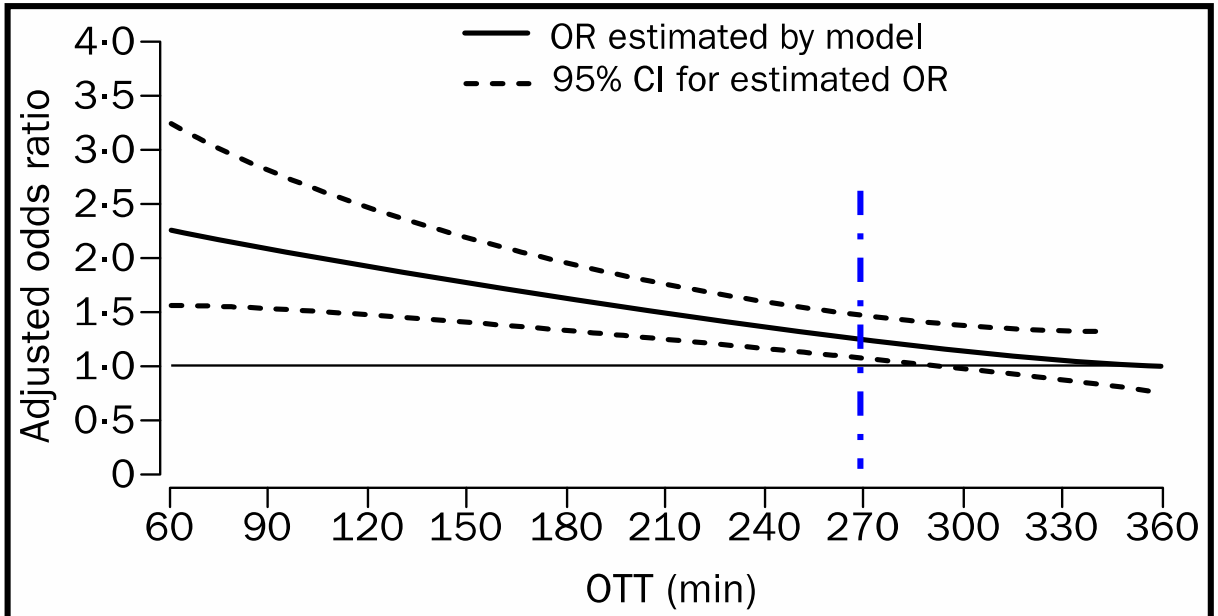
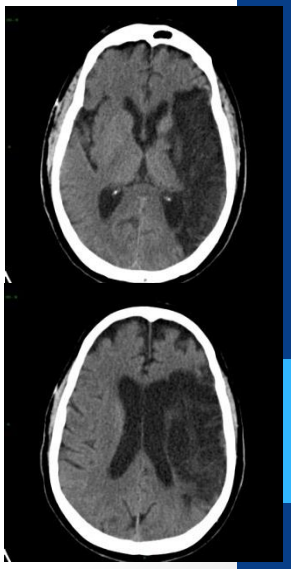
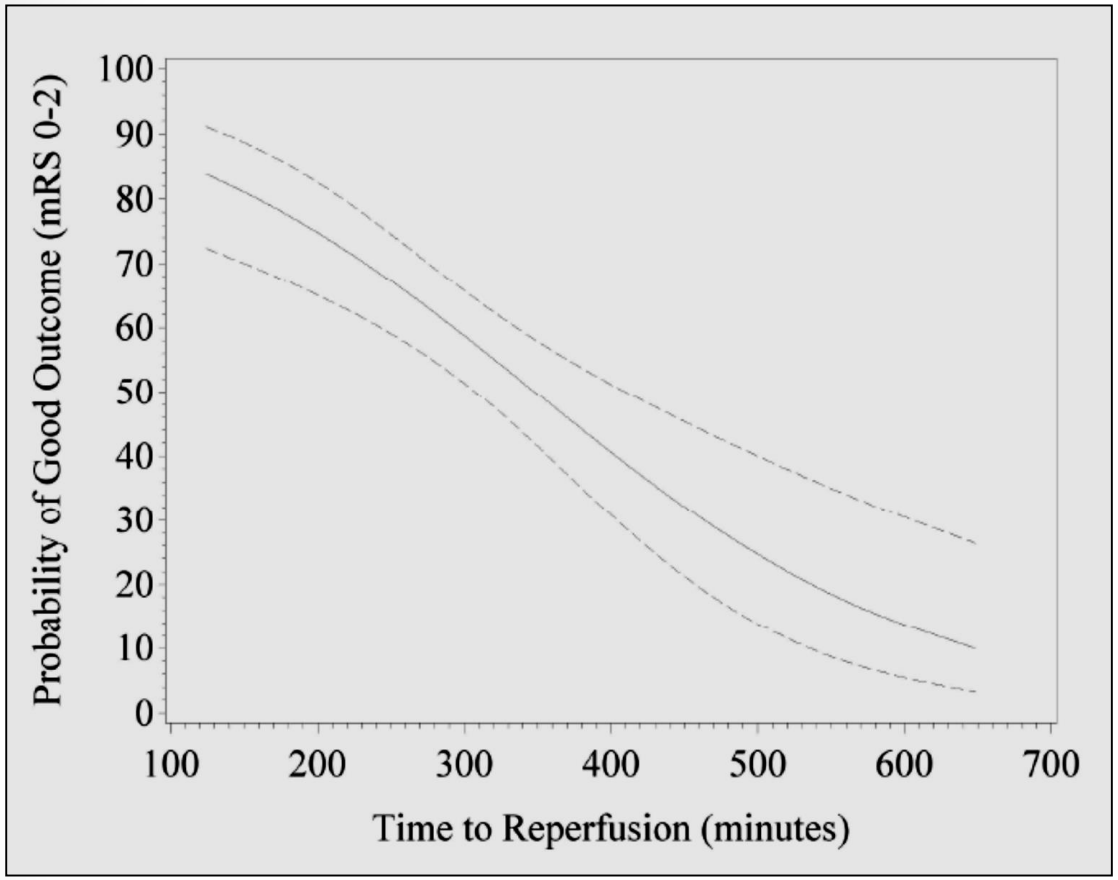


Figure 3: **Model estimating odds ratio for favourable outcome at 3 months in rt-PA-treated patients compared with controls by OTT**

Adjusted for age, baseline glucose concentration, baseline NIHSS measurement, baseline diastolic blood pressure, previous hypertension, and interaction between age and baseline NIHSS measurement.



Relation délai symptômes-recanalisation / reperfusion et bon pronostic fonctionnel à 3 mois (mRS ≤2) (n=202)(d'après Sheth et al.)



Quid de Trt >> H8 / H12 ?… (REVASCAT & ESCAPE)

AHA/ASA Guideline

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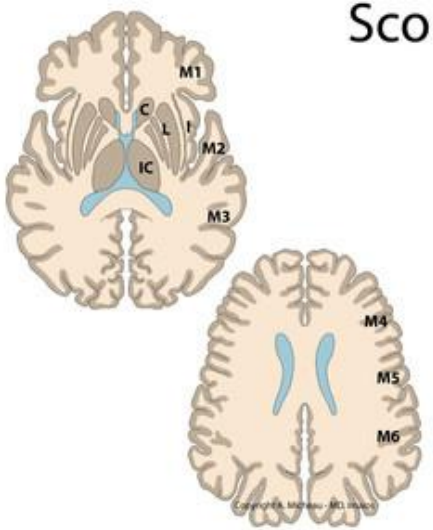
When treatment is initiated beyond 6 hours from symptom onset, the effectiveness of endovascular therapy is uncertain for patients with acute ischemic stroke who have causative occlusion of the ICA or proximal MCA (M1) *(Class IIb; Level of Evidence C)*. Additional randomized trial data are needed. (New recommendation)

Quid du score ASPECT ? étendue lésionnelle??



Score ASPECTS

- ☐ C- Noyau caudé
- ☐ I- Ruban insulaire
- ☐ IC- Capsule interne
- ☐ L- Noyau Lenticulaire
- ☐ M1- ACM antérieur
- ☐ M2- Territoire de l'ACM devant le ruban insulaire
- ☐ M3- ACM postérieure
- ☐ M4- Territoire ACM antéro-supérieur
- ☐ M5- Territoire ACM latéro-supérieur
- ☐ M6- Territoire ACM postéro-inférieur

Score ASPECTS = /10

	Treatment Groups	Eligibility									
Study	Active vs Control	IV r-tPA Eligible	Age, y	Time	Territory	NIHSS Score	Prestroke Function	Anticoagulation/ Coagulopathy	ASPECTS	Vascular Imaging	Other Imaging
MR CLEAN	Standard (±IV r-tPA)+IA UK, r-tPA, device vs standard (±IV r-tPA)	Not required	>18	6 h to IAT	Anterior circulation	>2	None	Exclusion criteria	No	CTA, MRA, DSA	
ESCAPE	Standard (±IV r-tPA)+stent retriever "recommended" vs standard (±IV r-tPA)	Not required	>18	12 h to randomization	ICA/MCA	>5	Barthel score ≥90	No exclusion criteria	≥6	CTA	Multiphase CTA or CT perfusion for detection of core size and collaterals
SWIFT PRIME	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Required	18–80	6 h to groin	ICA/M1	8–29	mRS score 0–1	Exclusion criteria	≥6	CTA, MRA	CT or MRI mismatch for first 71 ASPECTS ≥6 for remaining 125
EXTEND-IA	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Required	≥18	6 h to groin Complete in 8 h	Anterior circulation	None	mRS score 0–1	Exclusion criteria	No	CTA, MRA	CT/MRI mismatch
REVASCAT	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Not required	18–80 (85)	8 h to groin	ICA/M1	≥6	mRS score 0–1	Exclusion criteria	≥7 (noncontrast CT) ≥6 (MRI-DWI) ≥8 (age >81–85 y)	CTA, MRA, DSA	CT perfusion, CTA source, or MRI-DWI required if >4.5 h

Critères de gravité clinique ??
NIHSS >6 ??

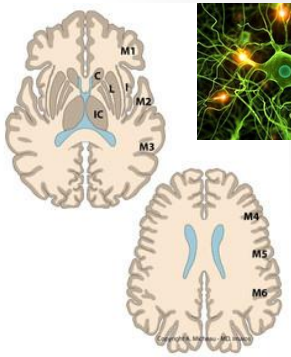
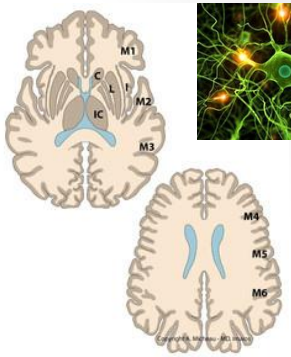


Table 2. Selected Eligibility Criteria for Recent Randomized, Clinical Trials of Endovascular Treatments for Acute Ischemic Stroke

	Treatment Groups	Eligibility									
Study	Active vs Control	IV r-tPA Eligible	Age, y	Time	Territory	NIHSS Score	Prestroke Function	Anticoagulation/ Coagulopathy	ASPECTS	Vascular Imaging	Other Imaging
MR CLEAN	Standard (±IV r-tPA)+IA UK, r-tPA, device vs standard (±IV r-tPA)	Not required	>18	6 h to IAT	Anterior circulation	>2	None	Exclusion criteria	No	CTA, MRA, DSA	
ESCAPE	Standard (±IV r-tPA)+stent retriever "recommended" vs standard (±IV r-tPA)	Not required	>18	12 h to randomization	ICA/MCA	>5	Barthel score ≥90	No exclusion criteria	≥6	CTA	Multiphase CTA or CT perfusion for detection of core size and collaterals
SWIFT PRIME	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Required	18–80	6 h to groin	ICA/M1	8–29	mRS score 0–1	Exclusion criteria	≥6	CTA, MRA	CT or MRI mismatch for first 71 ASPECTS ≥6 for remaining 125
EXTEND-IA	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Required	≥18	6 h to groin Complete in 8 h	Anterior circulation	None	mRS score 0–1	Exclusion criteria	No	CTA, MRA	CT/MRI mismatch
REVASCAT	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Not required	18–80 (85)	8 h to groin	ICA/M1	≥6	mRS score 0–1	Exclusion criteria	≥7 (noncontrast CT) ≥6 (MRI-DWI) ≥8 (age >81–85 y)	CTA, MRA, DSA	CT perfusion, CTA source, or MRI-DWI required if >4.5 h

Critères de gravité clinique ??
NIHSS >6 ??



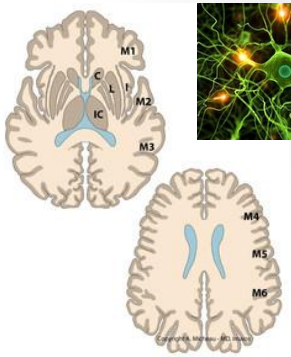
Recommendations
Endovascular Interventions

1. **Patients eligible for intravenous r-tPA should receive intravenous r-tPA even if endovascular treatments are being considered *(Class I; Level of Evidence A)*.** (Unchanged from the 2013 guideline)
2. **Patients should receive endovascular therapy with a stent retriever if they meet all the following criteria *(Class I; Level of Evidence A)*.** (New recommendation):
   a. **Prestroke mRS score 0 to 1,**
   b. **Acute ischemic stroke receiving intravenous r-tPA within 4.5 hours of onset according to guidelines from professional medical societies,**
   c. **Causative occlusion of the ICA or proximal MCA (M1),**
   d. **Age ≥18 years,**
   e. **NIHSS score of ≥6,**
   f. **ASPECTS of ≥6, and**
   g. **Treatment can be initiated (groin puncture) within 6 hours of symptom onset**

Table 2. Selected Eligibility Criteria f … cute Ischemic Stroke

Study	Treatment Groups: Active vs Control	IV r-tPA Eligible								Vascular Imaging	Other Imaging
MR CLEAN	Standard (±IV r-tPA)+IA (IK, r-tPA, device vs standard (±IV r-tPA)	Not required								CTA, MRA, DSA	
ESCAPE	Standard (±IV r-tPA)+stent retriever "recommended" vs standard (±IV r-tPA)	Not required								CTA	Multiphase CTA or CT perfusion for detection of core size and collaterals
SWIFT PRIME	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Required								CTA, MRA	CT or MRI mismatch for first 71 ASPECTS ≥6 for remaining 125
EXTEND-IA	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Required								CTA, MRA	CT/MRI mismatch
REVASCAT	Standard (±IV r-tPA)+stent retriever vs standard (±IV r-tPA)	Not required	18–80 (86)	8 h to groin in 8 h	ICA/M1	≥6	mRS score 0–1	Exclusion criteria	≥7 (noncontrast CT) ≥6 (MRI-DWI) ≥8 (age >81–85 y)	CTA, MRA, DSA	CT perfusion, CTA source, or MRI-DWI required if >4.5 h

NIHSS <6 ?? PréStroke RS>1 ? ASPECTS<6?



AHA/ASA Guideline

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A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Although its benefits are uncertain, the use of endovascular therapy with stent retrievers may be reasonable for patients with acute ischemic stroke in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset and who have prestroke mRS score >1, ASPECTS <6, or NIHSS score <6 and causative occlusion of the ICA or proximal MCA (M1) *(Class IIb; Level of Evidence B-R)*. Additional randomized trial data are needed. (New recommendation)

CLASS IIb (WEAK) **Benefit ≥ Risk**

Suggested phrases for writing recommendations:

- May/might be reasonable
- May/might be considered
- Usefulness/effectiveness is unknown/unclear/uncertain or not well established

Quelles anesthésies ? AL / AG ??

Type of Anesthesia and Differences in Clinical Outcome After Intra-Arterial Treatment for Ischemic Stroke

Lucie A. van den Berg, MD; Diederik L.H. Koelman, BSc; Olvert A. Berkhemer, MD; Anouk D. Rozeman, MD; Puck S.S. Fransen, MD; Debbie Beumer, MD; Diederik W. Dippel, MD, PhD; Aad van der Lugt, MD, PhD; Robert J. van Oostenbrugge, MD, PhD; Wim H. van Zwam, MD, PhD; Patrick A. Brouwer, MD; Sjoerd Jenniskens, MD; Jelis Boiten, MD, PhD; Geert A. Lycklama à Nijeholt, MD, PhD; Jan Albert Vos, MD, PhD; Wouter J. Schonewille, MD, PhD; Charles B.L.M. Majoie, MD, PhD; Yvo B.W.E.M. Roos, MD, PhD; for the MR CLEAN pretrial study group*

Background and Purpose—Intra-arterial treatment (IAT) in patients with acute ischemic stroke (AIS) can be performed with or without general anesthesia (GA). Previous studies suggested that IAT without the use of GA (non-GA) is associated with better clinical outcome. Nevertheless, no consensus exists about the anesthetic management during IAT of AIS patients. This study investigates the association between type of anesthesia and clinical outcome in a large cohort of patients with AIS treated with IAT.

Methods—All consecutive patients with AIS of the anterior circulation who received IAT between 2002 and 2013 in 16 Dutch hospitals were included in the study. Primary outcome was functional outcome on the modified Rankin Scale at discharge. Difference in primary outcome between GA and non-GA was estimated using multiple ordinal regression analysis, adjusting for age, stroke severity, occlusion of the internal carotid artery terminus, previous stroke, atrial fibrillation, and diabetes mellitus.

Results—Three hundred forty-eight patients were included in the analysis; 70 patients received GA and 278 patients did not receive GA. Non-GA was significantly associated with good clinical outcome (odds ratio 2.1, 95% confidence interval 1.02–4.31). After adjusting for prespecified prognostic factors, the point estimate remained similar; statistical significance, however, was lost (odds ratio 1.9, 95% confidence interval 0.89–4.24).

Conclusions—Our study suggests that patients with AIS of the anterior circulation undergoing IAT without GA have a higher probability of good clinical outcome compared with patients treated with general anesthesia. (***Stroke*. 2015;46:1257-1262. DOI: 10.1161/STROKEAHA.115.008699.**)

Protocol

Sedation vs. Intubation for Endovascular Stroke TreAtment (SIESTA) – a randomized monocentric trial

Silvia Schönenberger[1,*], Markus Möhlenbruch[2], Johannes Pfaff[2], Sibu Mundiyanapurath[1],

Background **The optimal peri-interventional management of sedation and airway for endovascular stroke treatment (EST) appears to be a crucial factor for treatment success. According to retrospective studies, the widely favored general anesthesia with intubation seems to be associated with poor functional outcome compared to a slightly sedated non-intubated condition (conscious sedation).**

Method **SIESTA is a monocentric, prospective, randomized parallel-group, open-label treatment trial with blinded endpoint evaluation (PROBE design). The study compares the non-intubated with the intubated state in patients receiving endovascular treatment of acute ischemic anterior circulation stroke. The primary endpoint is early neurological improvement as by National Institutes of Health Stroke Scale (NIHSS) after 24 h (difference between NIHSS on admission and NIHSS after 24 h). Secondary endpoints include: functional outcome after three-months as by modified Rankin Scale (mRS), mortality, parameters of ventilation and critical care, feasibility, and safety, i.e. complications related to endovascular stroke treatment.**

Conclusion **The aims of this study are to prospectively clarify whether the non-intubated state of conscious sedation is feasible, safe, and superior with regard to early neurological improvement compared to the intubated state of general anesthesia in patients receiving acute endovascular stroke treatment.**

Key words: acute ischemic stroke, conscious sedation, endovascular stroke treatment, intraarterial thrombolysis, general anesthesia, mechanical thrombectomy

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AHA/ASA Guideline

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A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists.

Endorsed by the American Association of Neurological Surgeons (AANS); Congress of Neurological Surgeons (CNS); AANS/CNS Cerebrovascular Section; American Society of Neuroradiology; and Society of Vascular and Interventional Neurology

Recommendations

Endovascular Interventions

1. **Patients eligible for intravenous r-tPA should receive intravenous r-tPA even if endovascular treatments are being considered *(Class I; Level of Evidence A)*. (Unchanged from the 2013 guideline)**
2. **Patients should receive endovascular therapy with a stent retriever if they meet all the following criteria *(Class I; Level of Evidence A)*.** (New recommendation):
   a. **Prestroke mRS score 0 to 1,**
   b. **Acute ischemic stroke receiving intravenous r-tPA within 4.5 hours of onset according to guidelines from professional medical societies,**
   c. **Causative occlusion of the ICA or proximal MCA (M1),**
   d. **Age ≥18 years,**
   e. **NIHSS score of ≥6,**
   f. **ASPECTS of ≥6, and**
   g. **Treatment can be initiated (groin puncture) within 6 hours of symptom onset**

Comments and Opinions

Endovascular Therapy in Acute Ischemic Stroke

Challenges and Transition From Trials to Bedside

Mayank Goyal, MD; Amy Y.X. Yu, MD; Bijoy K. Menon, MD; Diederik W.J. Dippel, MD; Werner Hacke, MD; Stephen M. Davis, MD; Marc Fisher, MD; Dileep R. Yavagal, MD; Francis Turjman, MD; Jeffrey Ross, MD; Shinichi Yoshimura, MD; Zhongrong Miao, MD; Rohit Bhatia, MD; Mohammed Almekhlafi, MD; Yuichi Murayama, MD; Sung-Il Sohn, MD; Jeffrey L. Saver, MD; Andrew M. Demchuk, MD; Michael D. Hill, MD

Table. Scenarios for Thrombectomy Where Evidence Is Sparse

The extremes of ages (pediatric and very elderly population)
Mild stroke
Stroke with delayed presentation or unknown onset
Ischemic stroke with distal occlusions
Ischemic stroke of the posterior circulation
Conscious sedation versus general anesthesia
Optimal approach to tandem intracranial and extracranial occlusions
Periprocedural blood pressure and antiplatelet management

(*Stroke*. 2016;47:548-553. DOI: 10.1161/STROKEAHA.115.011426.)
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