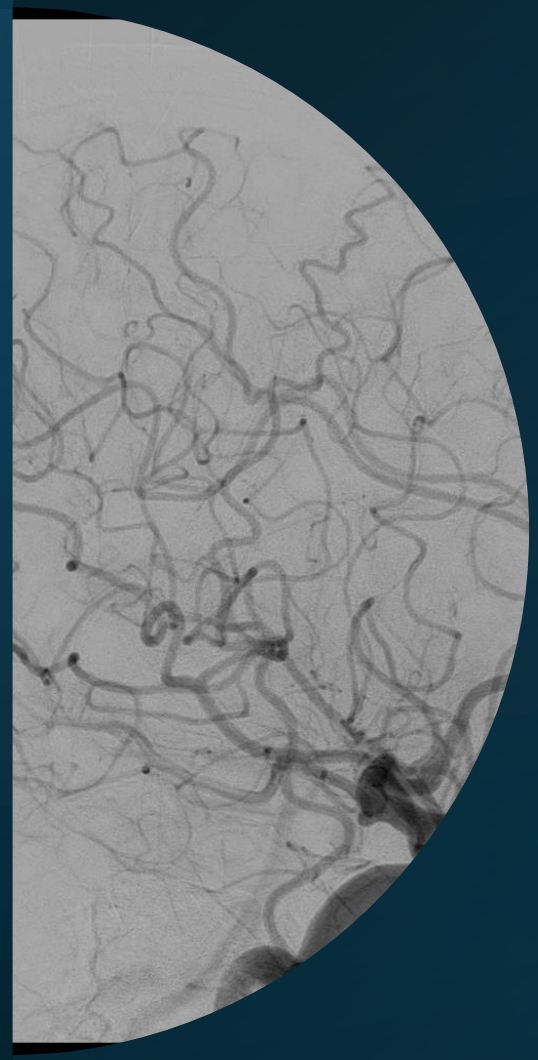
Prise en charge de l'AVC par l'anesthésiste réanimateur



Dimanche 23 juin

RASA 2024

GOUDY Pierre
Réanimation neurochirurgicale

Liens d’intérêts

Honoraires reçus de la part de Sanofi en tant que conférencier pour ce topic

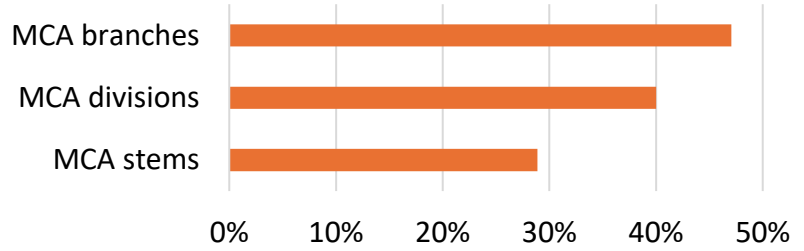
Sanofi ne recommande en aucun cas l’usage des produits en dehors de leurs indications approuvées.
Merci de consulter le résumé des caractéristiques du(es) produit(s) avant de le(s) prescrire.
Les informations ci-après sont fournies pour un usage médical et scientifique uniquement,
et sont destinées exclusivement aux participants de cette manifestation scientifique.

Pourquoi ce topic ?

Thrombolyse intraveineuse

4 h 30

Recanalization



Wolpert et al. Am J Neuroradiol. 1993; 14:3-13

Editorial: Time Is Brain!

Camilo R. Gomez, M.D.

J Stroke Cerebrovasc Dis 1993;3:1–2

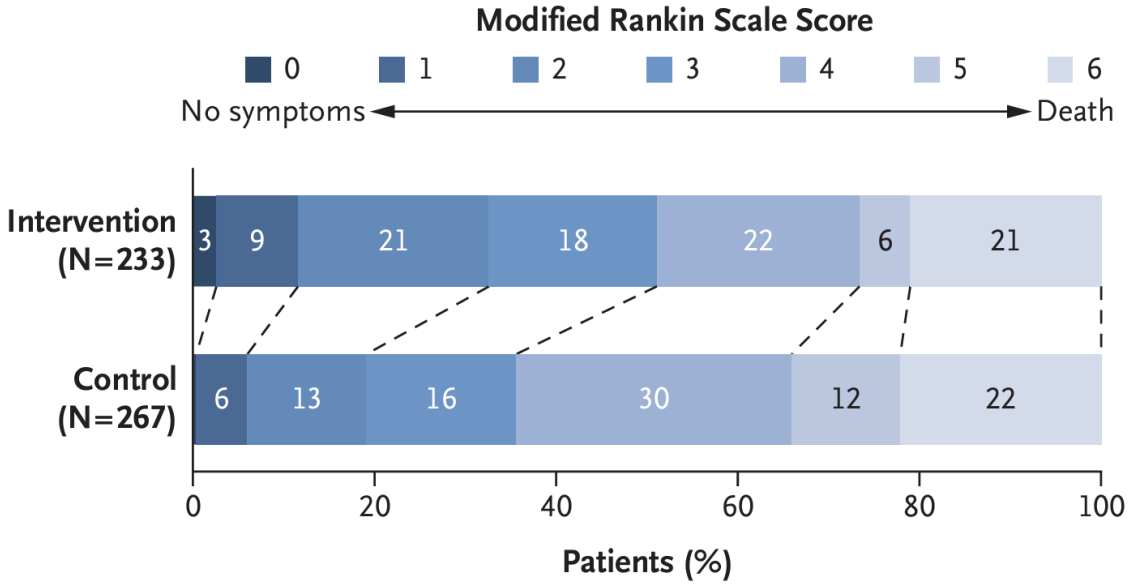
2015

The NEW ENGLAND JOURNAL of MEDICINE

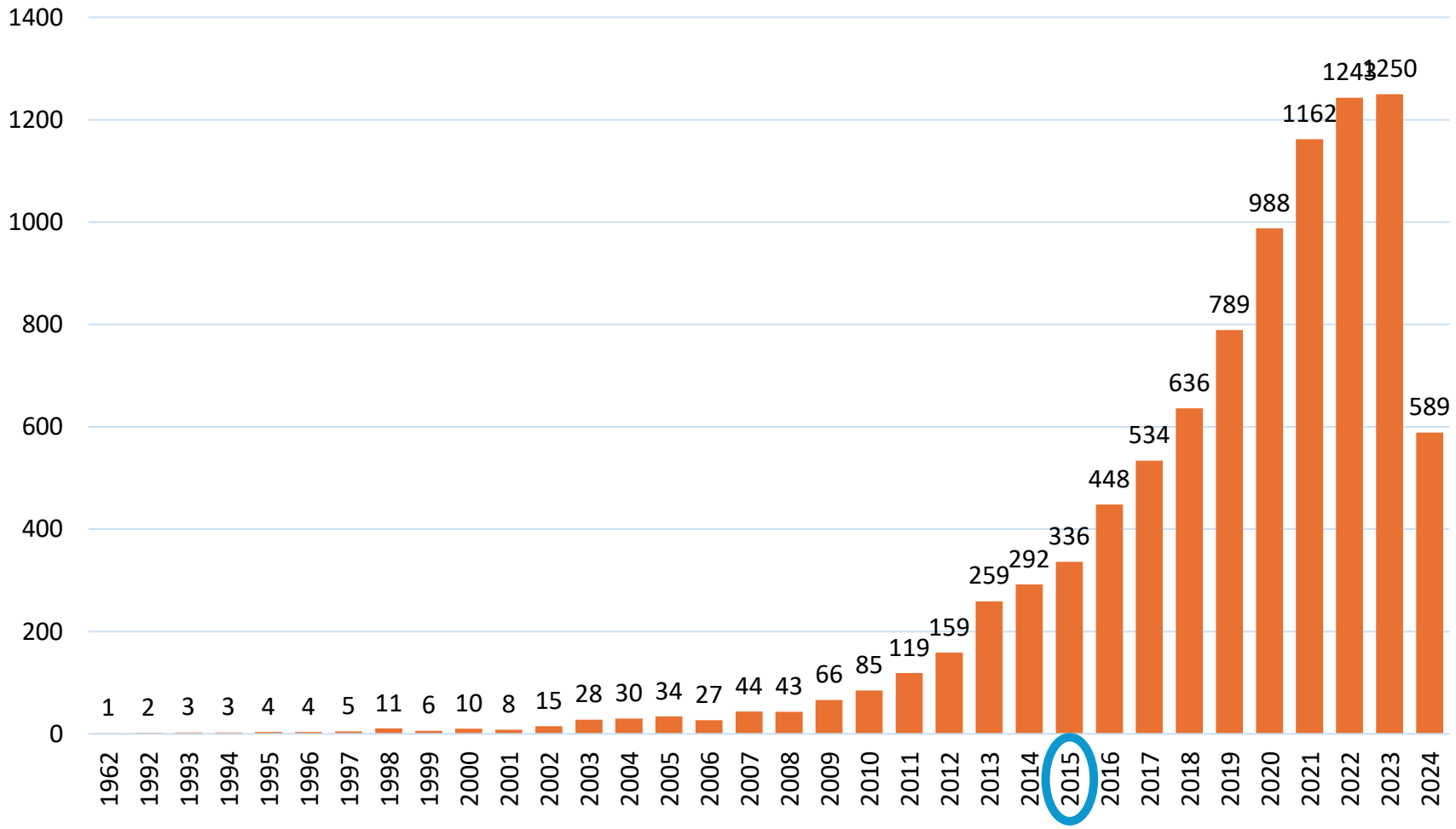
ESTABLISHED IN 1812 JANUARY 1, 2015 VOL. 372 NO. 1

A Randomized Trial of Intraarterial Treatment for Acute Ischemic Stroke

6 h



Pourquoi ce topic ?



Pourquoi ce topic ?

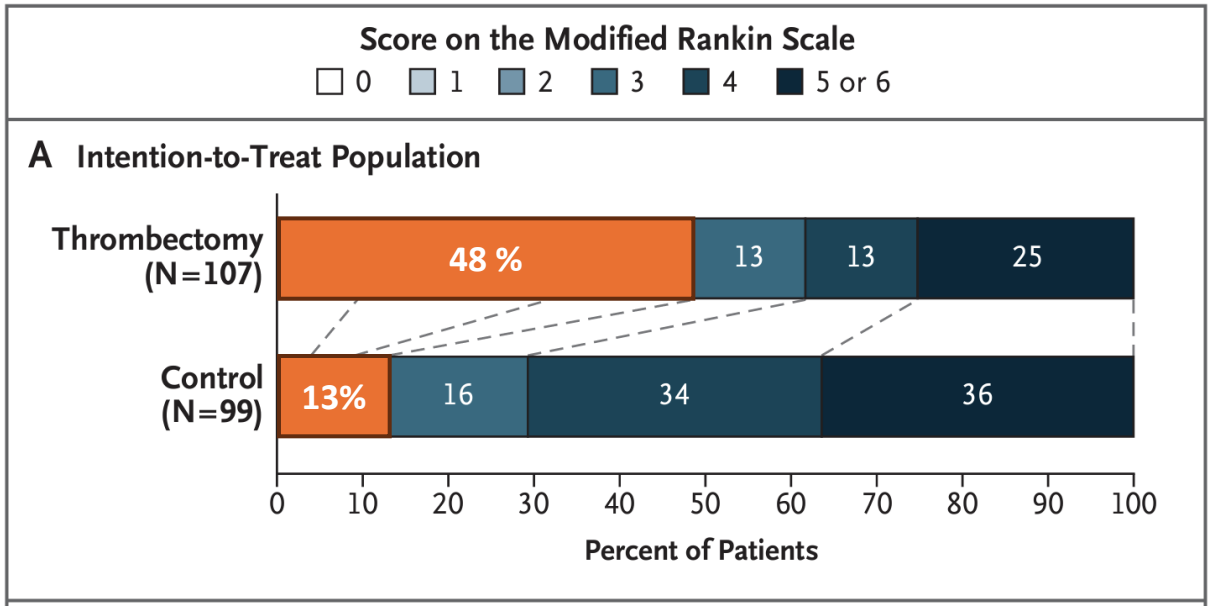
The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 4, 2018 VOL. 378 NO. 1

Thrombectomy 6 to 24 Hours after Stroke with a Mismatch between Deficit and Infarct

R.G. Nogueira, A.P. Jadhav, D.C. Haussen, A. Bonafe, R.F. Budzik, P. Bhuva, D.R. Yavagal, M. Ribo, C. Cognard, R.A. Hanel, C.A. Sila, A.E. Hassan, M. Millan, E.I. Levy, P. Mitchell, M. Chen, J.D. English, Q.A. Shah, F.L. Silver, V.M. Pereira, B.P. Mehta, B.W. Baxter, M.G. Abraham, P. Cardona, E. Veznedaroglu, F.R. Hellinger, L. Feng, J.F. Kirmani, D.K. Lopes, B.T. Jankowitz, M.R. Frankel, V. Costalat, N.A. Vora, A.J. Yoo, A.M. Malik, A.J. Furlan, M. Rubiera, A. Aghaebrahim, J.-M. Olivot, W.G. Tekle, R. Shields, T. Graves, R.J. Lewis, W.S. Smith, D.S. Liebeskind, J.L. Saver, and T.G. Jovin, for the DAWN Trial Investigators*

- 6 h à 24 h
- Mismatch radio-clinique
- ICA / MCA_p



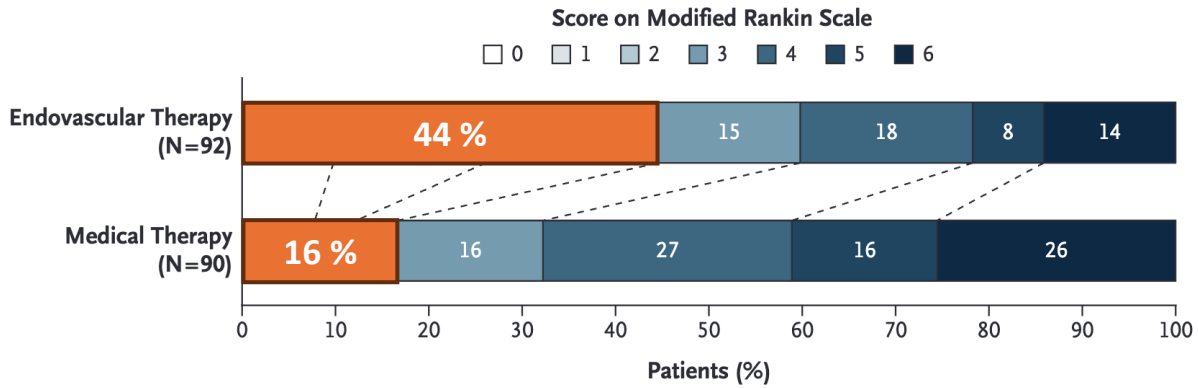
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Thrombectomy for Stroke at 6 to 16 Hours with Selection by Perfusion Imaging

G.W. Albers, M.P. Marks, S. Kemp, S. Christensen, J.P. Tsai, S. Ortega-Gutierrez, R.A. McTaggart, M.T. Torbey, M. Kim-Tenser, T. Leslie-Mazwi, A. Sarraj, S.E. Kasner, S.A. Ansari, S.D. Yeatts, S. Hamilton, M. Mlynash, J.J. Heit, G. Zaharchuk, S. Kim, J. Carrozzella, Y.Y. Palesch, A.M. Demchuk, R. Bammer, P.W. Lavori, J.P. Broderick, and M.G. Lansberg, for the DEFUSE 3 Investigators*

- 6 h à 16 h
- Mismatch radiologique
- ICA / MCA_p



Pourquoi ce topic ?

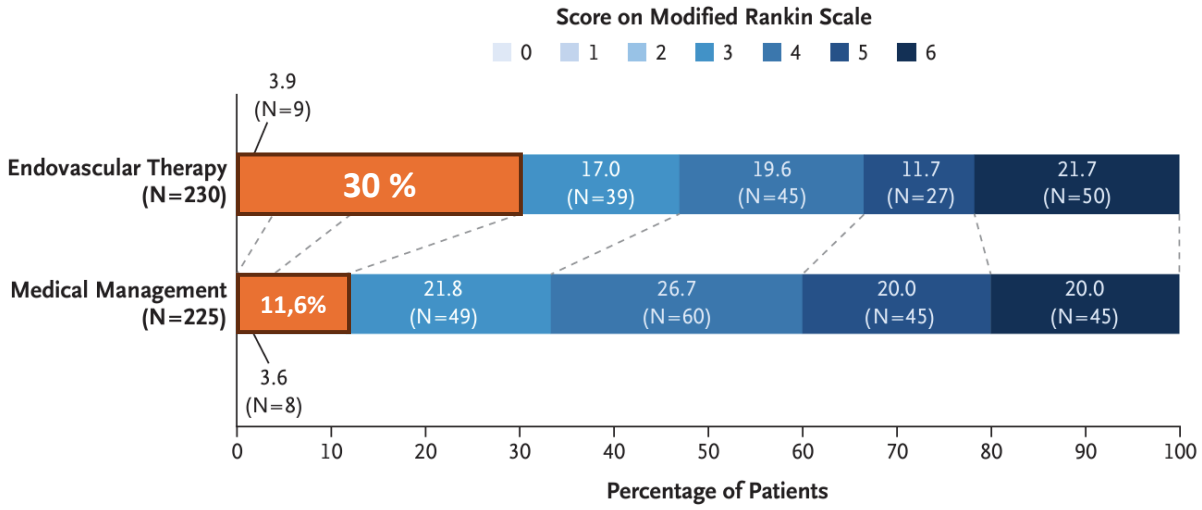
The NEW ENGLAND JOURNAL of MEDICINE
APRIL 6, 2023

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*

- 24 h
- V_{median} = 62 mL
- ICA / M_1 / M_2



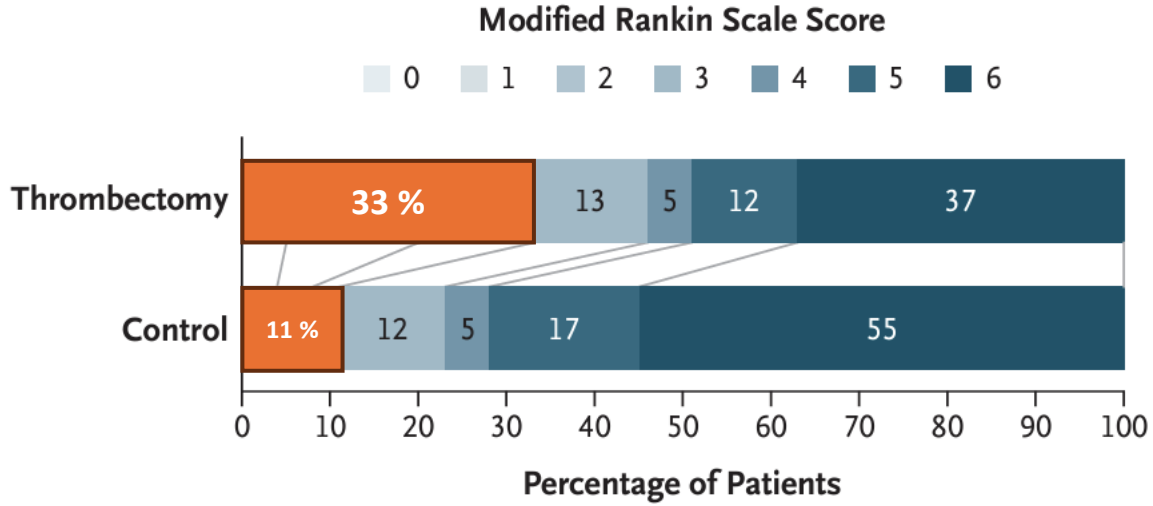
The NEW ENGLAND JOURNAL of MEDICINE
OCTOBER 13, 2022

ORIGINAL ARTICLE

Trial of Endovascular Treatment of Acute Basilar-Artery Occlusion

C. Tao, R.G. Nogueira, Y. Zhu, J. Sun, H. Han, G. Yuan, C. Wen, P. Zhou, W. Chen, G. Zeng, Y. Li, Z. Ma, C. Yu, J. Su, Z. Zhou, Z. Chen, G. Liao, Y. Sun, Y. Ren, H. Zhang, J. Chen, X. Yue, G. Xiao, Li Wang, R. Liu, W. Liu, Y. Liu, Li Wang, C. Zhang, T. Liu, J. Song, R. Li, P. Xu, Y. Yin, G. Wang, B. Baxter, A.I. Qureshi, X. Liu, and W. Hu, for the ATTENTION Investigators*

- 12 h
- BA



Pourquoi ce topic ?

Free access | Research article | First published online February 26, 2019

European Stroke Organisation (ESO) – European Society for Minimally Invasive Neurological Therapy (ESMINT) Guidelines on Mechanical Thrombectomy in Acute Ischaemic StrokeEndorsed by Stroke Alliance for Europe (SAFE)

Guillaume Turc ✉, Pervinder Bhogal, [...], and Jens Fiehler (+8) View all authors and affiliations

Volume 4, Issue 1 | https://doi.org/10.1177/2396987319832140

EUROPEAN STROKE ORGANISATION

Recommendations

In adults with anterior circulation LVO-related acute ischaemic stroke presenting within 6 hours after symptom onset, we recommend MT plus BMM, including IVT whenever indicated, over BMM alone to improve functional outcome.Quality of evidence: High ⊕⊕⊕⊕Strength of recommendation: Strong ↑↑

In adults with anterior circulation LVO-related acute ischaemic stroke presenting between 6 and 24 hours from time last known well and fulfilling the selection criteria of DEFUSE-3* or DAWN** we recommend MT plus BMM over BMM alone to improve functional outcome.Quality of evidence: Moderate ⊕⊕⊕Strength of recommendation: Strong ↑↑

- In LVO-related ischaemic stroke patients eligible for both treatments, we recommend IVT plus MT over MT alone. Both treatments should be performed as early as possible after hospital arrival. MT should not prevent the initiation of IVT, and IVT should not delay MT.Quality of evidence: Very low ⊕, Strength of recommendation: Strong ↑↑
- In LVO-related ischaemic stroke patients not eligible for IVT, we recommend MT as standalone treatment.Quality of evidence: Low ⊕⊕, Strength of recommendation: Strong ↑↑

Pourquoi ce topic ?

Evidence-based Recommendation

For adults with BAO-related acute ischaemic stroke presenting within 6 hours from the time last seen well, **we suggest EVT plus BMT over BMT alone***.
The recommendation considers only patients with NIHSS ≥ 10 (please see also PICO 4)

Quality of evidence: **Very low** ⊕
Strength of recommendation: **Weak for intervention** ↑?

Evidence-based Recommendation

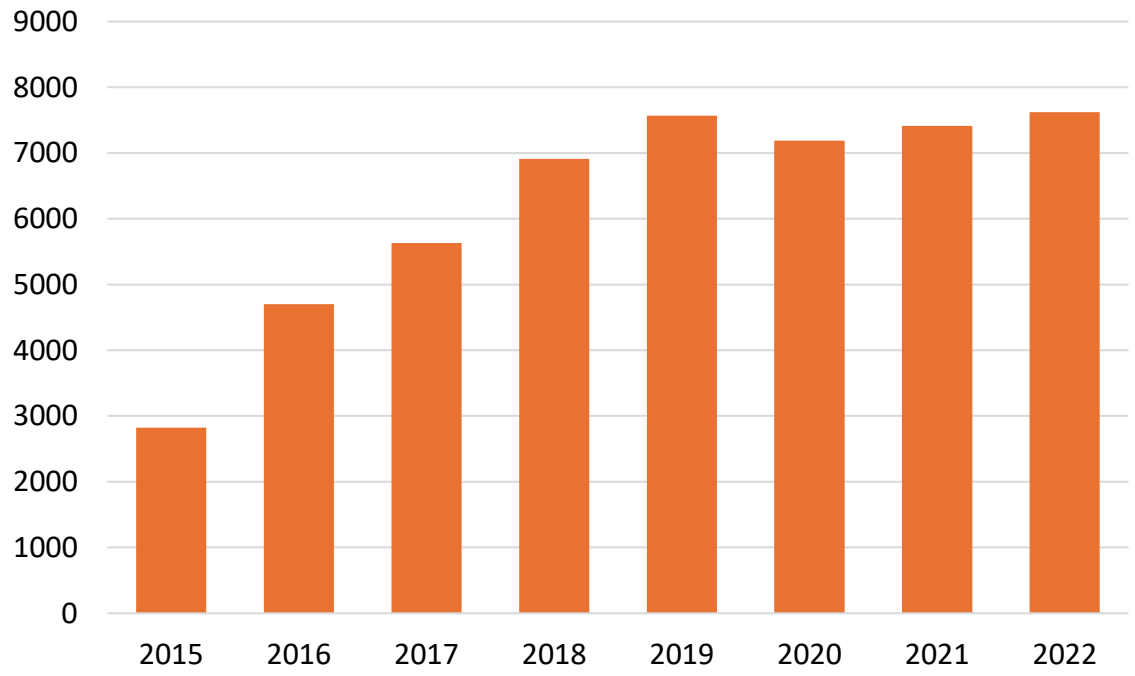
For adults with BAO-related acute ischaemic stroke presenting within 6–24 hours from the time last known well, **we suggest EVT plus BMT over BMT alone**.*
The recommendation considers only patients with NIHSS ≥ 10 (please see also PICO 4).

Quality of evidence: **Very low** ⊕
Strength of recommendation: **Weak for intervention** ↑?

Pourquoi ce topic ?

SOCIETE FRANCAISE DE NEURORADIOLOGIE

Nombre de thrombectomies

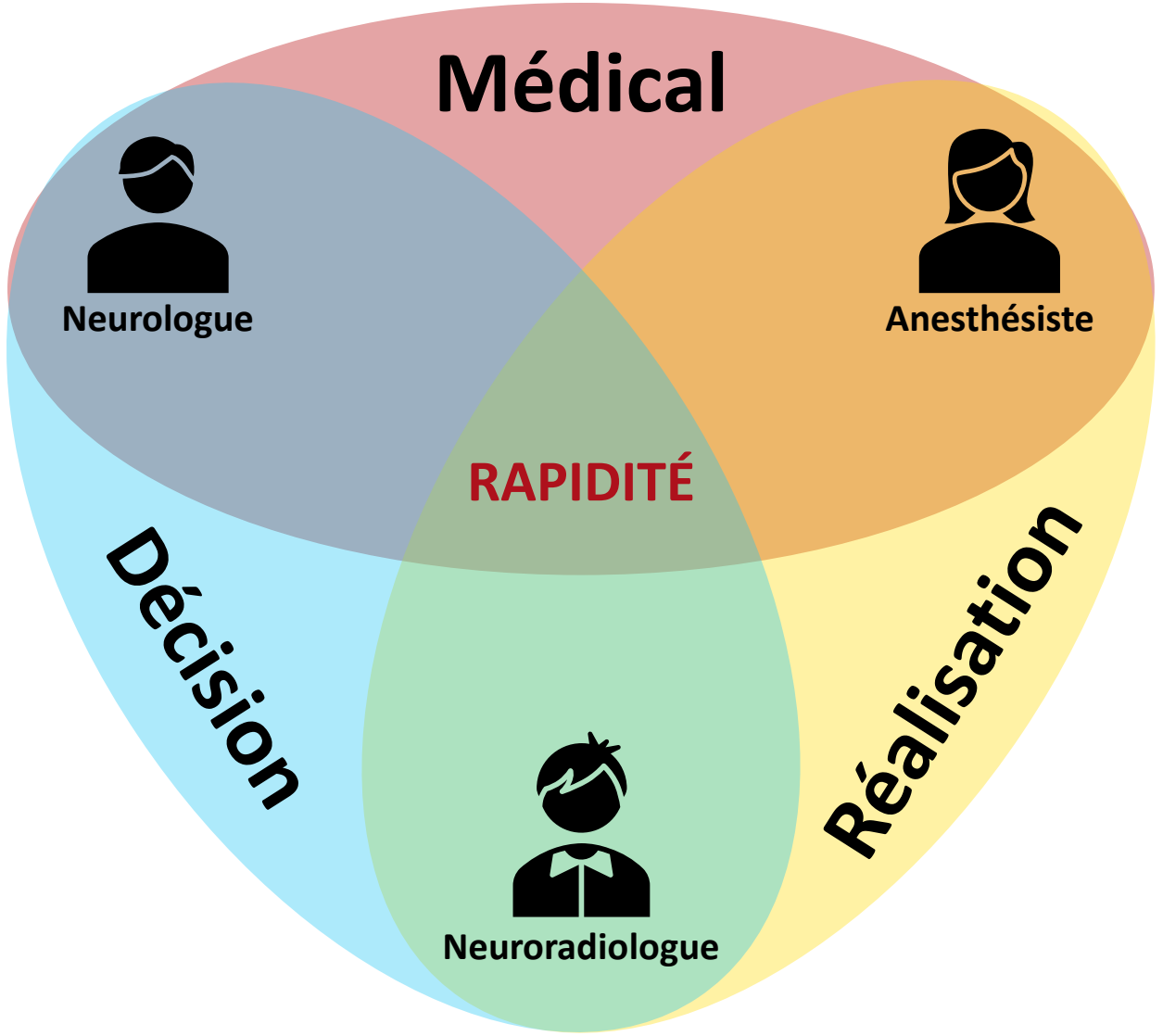


Centres neuroradiologies au 17/11/23

Source : www.sfnr.net

- Moins de 100 activités
- Entre 100 et 250 activités
- Entre 250 et 350 activités
- Plus de 350 activités

Prise en charge thérapeutique



Prise en charge thérapeutique

Anesthésiste

Stabilité hémodynamique

Surveillance neurologique

Protection des voies aériennes supérieures

Neuroprotection

Efficacité de la thérapeutique

Prise en charge thérapeutique

Anesthésiste

Prévention ACSOS

Pression artérielle

P_aO_2

P_aCO_2

- Œdème cérébral
- Aggravation ischémie
- Transformation hémorragique

Prise en charge thérapeutique

Anesthésiste

Prévention ACSOS

Pression artérielle

P_aO_2

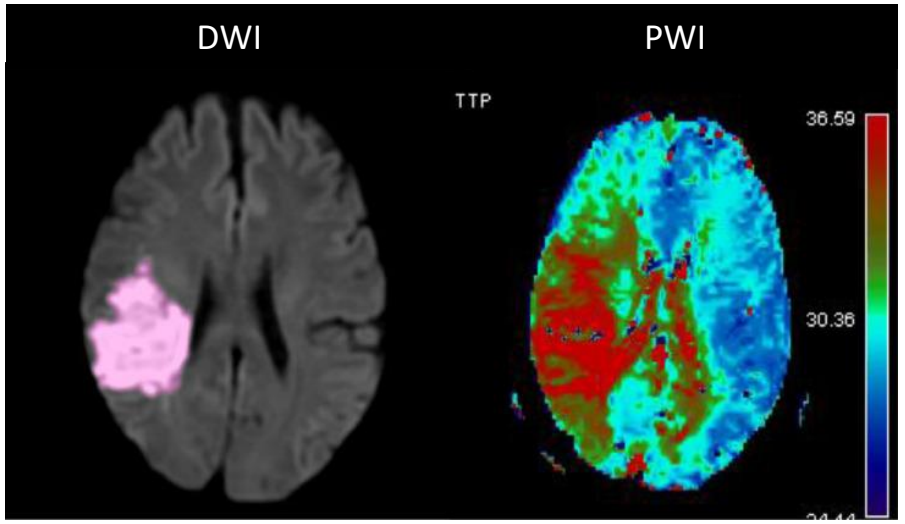
P_aCO_2

Œdème cérébral

Aggravation ischémie

Transformation hémorragique

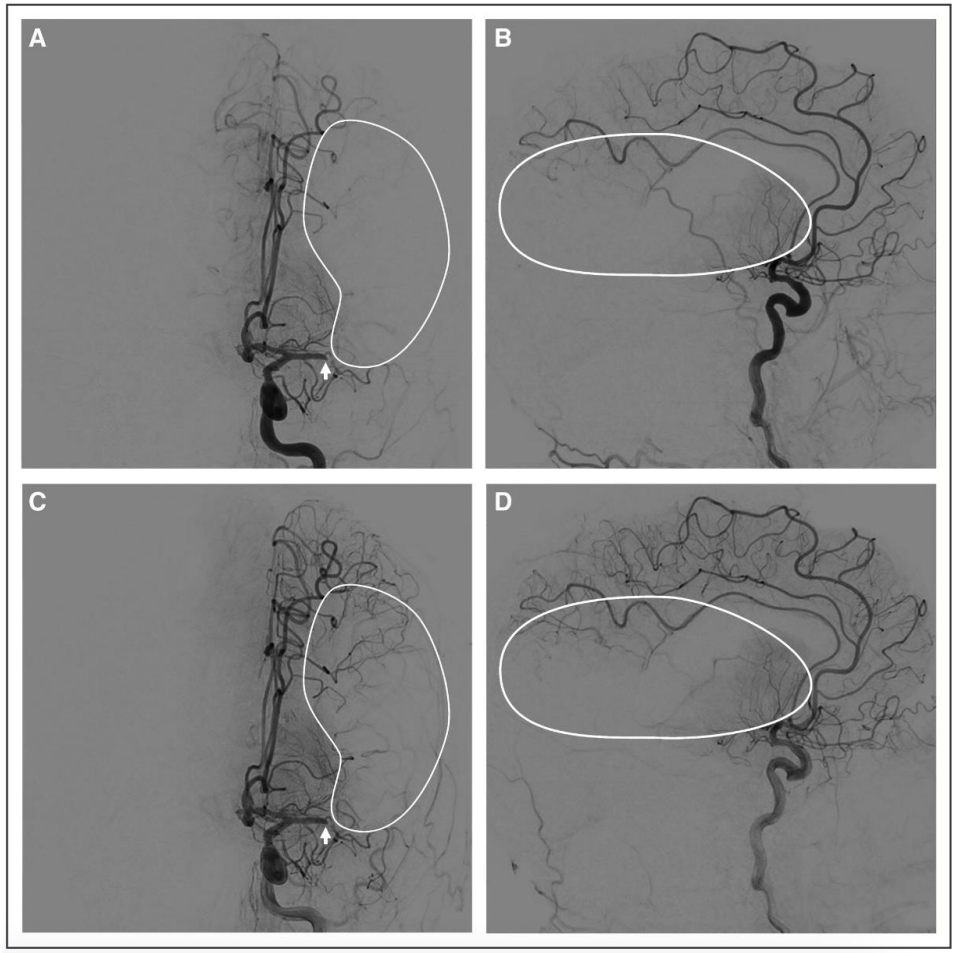
Pénombre ischémique



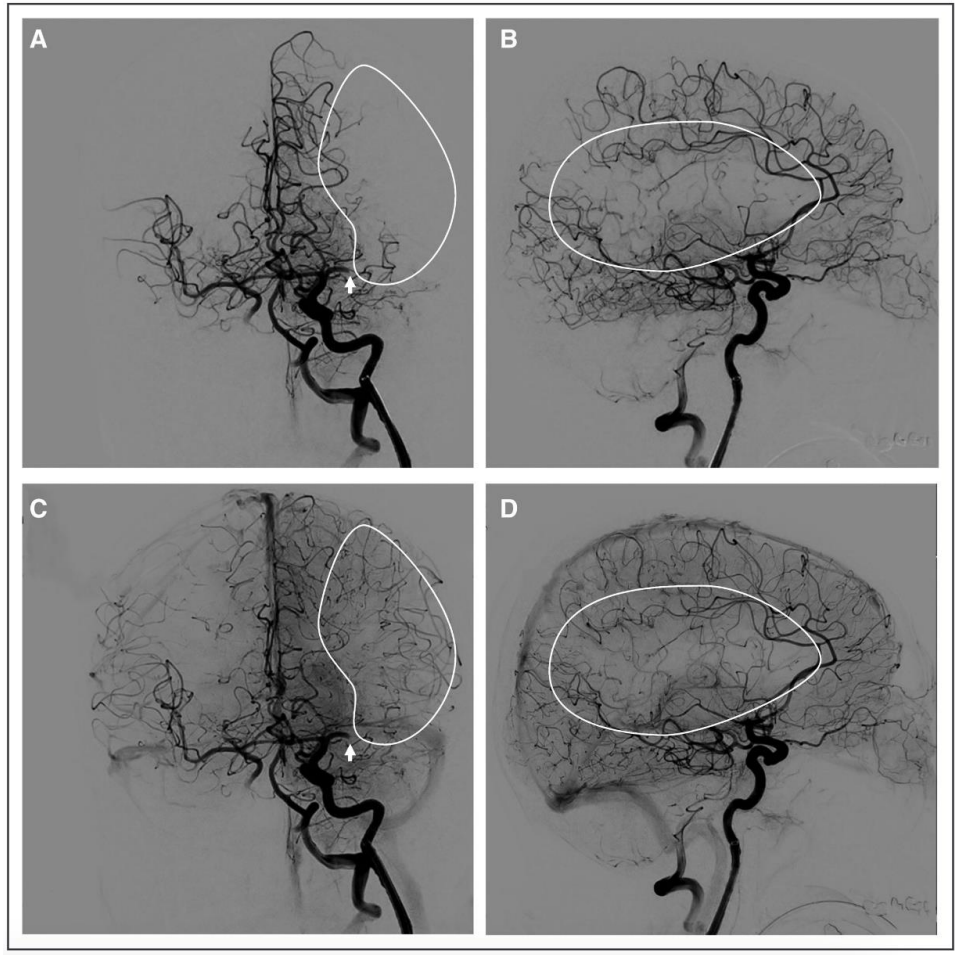
Sodaei F, Shahmaei V. Radiol Case Rep. 2020;15(10):2041-2046

Pénombre ischémique

Poor collaterals

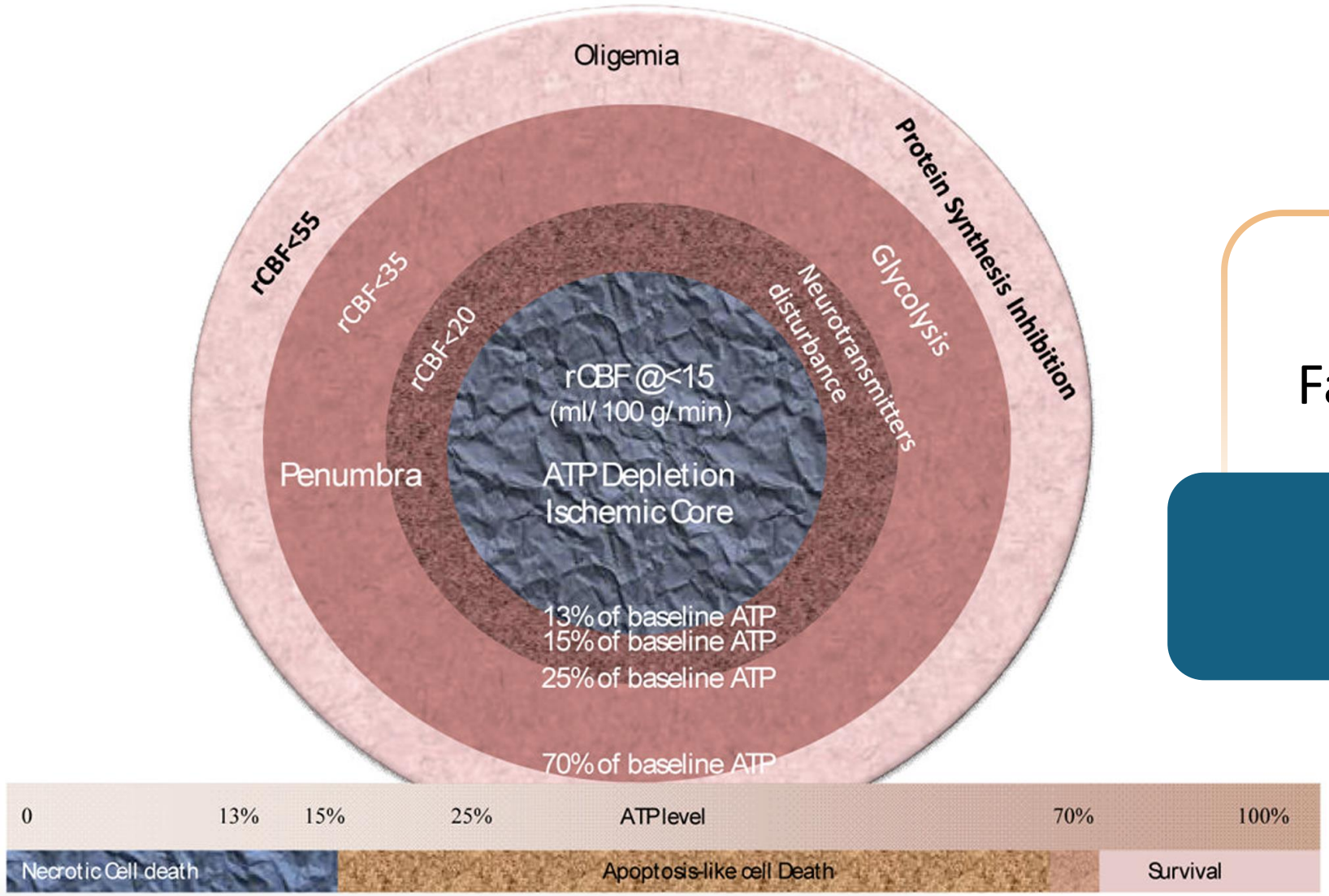


Good collaterals



Uniken Venema SM and al. Stroke. 2022 Oct;53(10):3222-3234

Pénombre ischémique

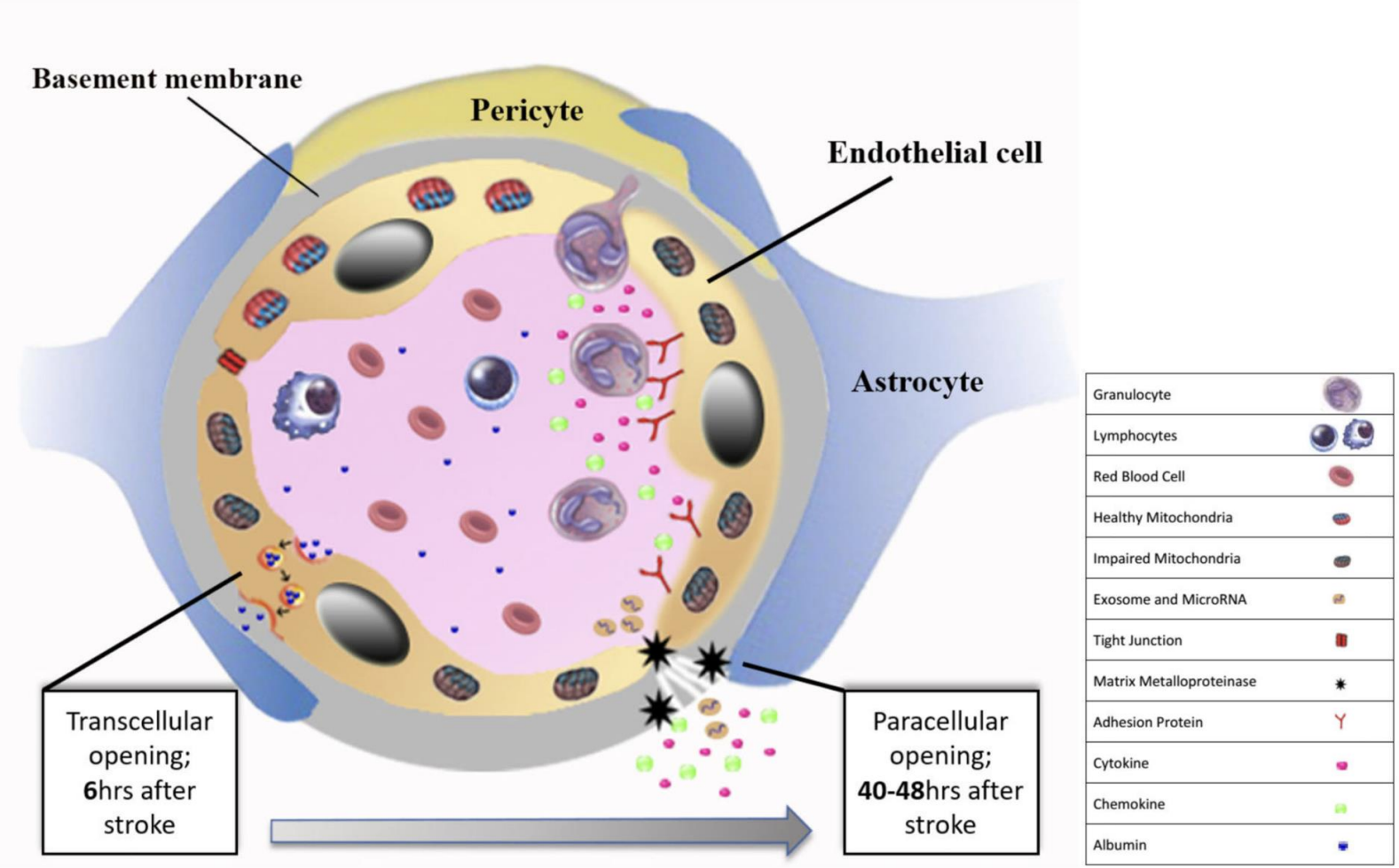


Liu S, Levine SR, Winn HR. J Exp Stroke Transl Med. 2010 Mar 15;3(1):47-55

Maintien d'une PPC
Favoriser la collatéralité

HTA contrôlée ?

Rupture de la BHE



Sarvari S and al. Metab Brain Dis. 2020 Aug;35(6):851-868

Transformation hémorragique

Œdème vasogénique

Éviter HTA ?

Quelle cible tensionnelle ?

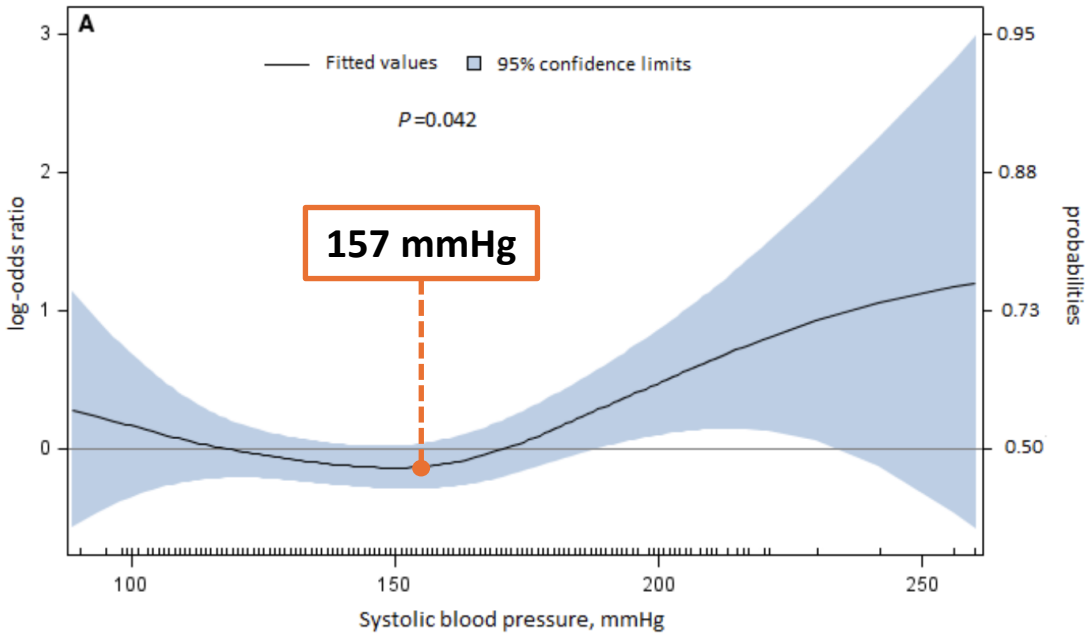
Avant la thrombectomie

Mortality and Disability According to Baseline Blood Pressure in Acute Ischemic Stroke Patients Treated by Thrombectomy: A Collaborative Pooled Analysis

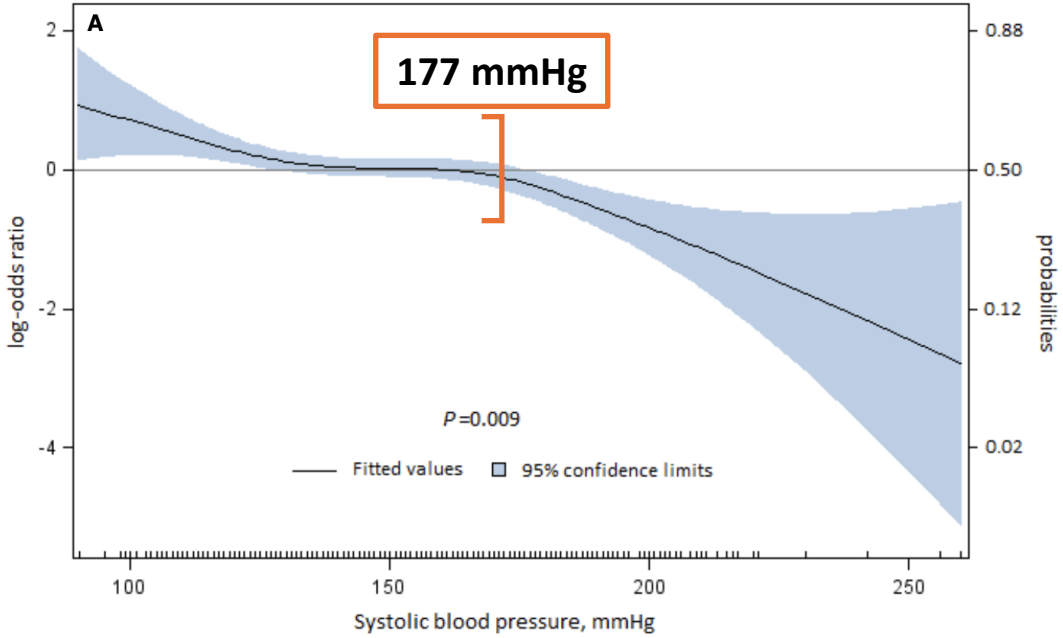
Benjamin Maïer, MD; Benjamin Gory, MD, PhD; Guillaume Taylor, MD; Julien Labreuche, BST; Raphaël Blanc, MD; Michael Obadia, MD; Marie Abrivard, MSc; Stanislas Smajda, MD; Jean-Philippe Desilles, MD; Hocine Redjem, MD; Gabriele Ciccio, MD; Anne Claire Lukaszewicz, MD, PhD; Francis Turjman, MD, PhD; Roberto Riva, MD; Paul Emile Labeyrie, MD, MSc; Alain Duhamel, MD, PhD; Jacques Blacher, MD, PhD; Michel Piotin, MD, PhD; Bertrand Lapergue, MD, PhD; Mikael Mazighi, MD, PhD; on behalf of the Endovascular Treatment in Ischemic Stroke (ETIS) Research Investigators*

American Heart Association | American Stroke Association

Day-90 all-cause mortality



Favorable outcome (mRS: 0-2) at M-3



Quelle cible tensionnelle ?

Avant la thrombectomie

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

American Heart Association | American Stroke Association

3.2. Blood Pressure	COR	LOE
1. Hypotension and hypovolemia should be corrected to maintain systemic perfusion levels necessary to support organ function.	I	C-EO
2. Patients who have elevated BP and are otherwise eligible for treatment with IV alteplase should have their BP carefully lowered so that their SBP is <185 mm Hg and their diastolic BP is <110 mm Hg before IV fibrinolytic therapy is initiated.	I	B-NR
The RCTs of IV alteplase required the BP to be <185 mm Hg systolic and <110 mm Hg diastolic before treatment and <180/105 mm Hg for the first 24 hours after treatment. Options to treat arterial hypertension in patients with AIS who are candidates for immediate reperfusion therapy are given in Table 5. Some observational studies suggest that the risk of hemorrhage after administration of alteplase is greater in patients with higher BPs[125–131] and in patients with more BP variability.[132] The exact BP at which the risk of hemorrhage after IV alteplase increases is unknown. It is thus reasonable to target the BPs used in the RCTs of IV alteplase.		
3. In patients for whom mechanical thrombectomy is planned and who have not received IV fibrinolytic therapy, it is reasonable to maintain BP ≤185/110 mm Hg before the procedure.	IIa	B-NR

Quelle cible tensionnelle ?

Pendant la thrombectomie

SPECIAL ARTICLE

Society for Neuroscience in Anesthesiology and Critical Care Expert Consensus Statement

Anesthetic Management of Endovascular Treatment for Acute Ischemic Stroke*

Endorsed by the Society of NeuroInterventional Surgery and the Neurocritical Care Society

Talke, Pekka O. MD*; Sharma, Deepak MD, DM†; Heyer, Eric J. MD, PhD‡; Bergese, Sergio D. MD§; Blackham, Kristine A. MD‖; Stevens, Robert D. MD¶

Author Information

Journal of Neurosurgical Anesthesiology 26(2):p 95-108, April 2014. | **DOI:** 10.1097/ANA.0000000000000042

SNACC
SOCIETY FOR NEUROSCIENCE IN ANESTHESIOLOGY AND CRITICAL CARE

Recommendations

We recommend that hemodynamic monitoring and management, as outlined below, should be started as soon as diagnosis of AIS has been made (class IIa, level of evidence C). Heart rate and cardiac rhythm should be monitored continuously and blood pressure should be monitored continuously or measured at least once every 3 minutes. We recommend that systolic blood pressure should be maintained >140 mm Hg (fluids and vasopressors) and <180 mm Hg (with or without IV tPA), and diastolic blood pressure <105 mm Hg (class IIa, level of evidence B). Cause of hypotension should be investigated (volume depletion, myocardial infarction, cardiac arrhythmia, blood loss, retroperitoneal hemorrhage, and aortic dissection) and treated if possible. We also recommend that blood pressure targets may be adjusted (lowered) in communication with the neurointerventionalists and neurologists following successful recanalization of occluded vessel(s) (class IIb, level of evidence C), as reperfused brain often lacks autoregulation leading to high risk of hyperperfusion leading potentially to hemorrhagic conversion.

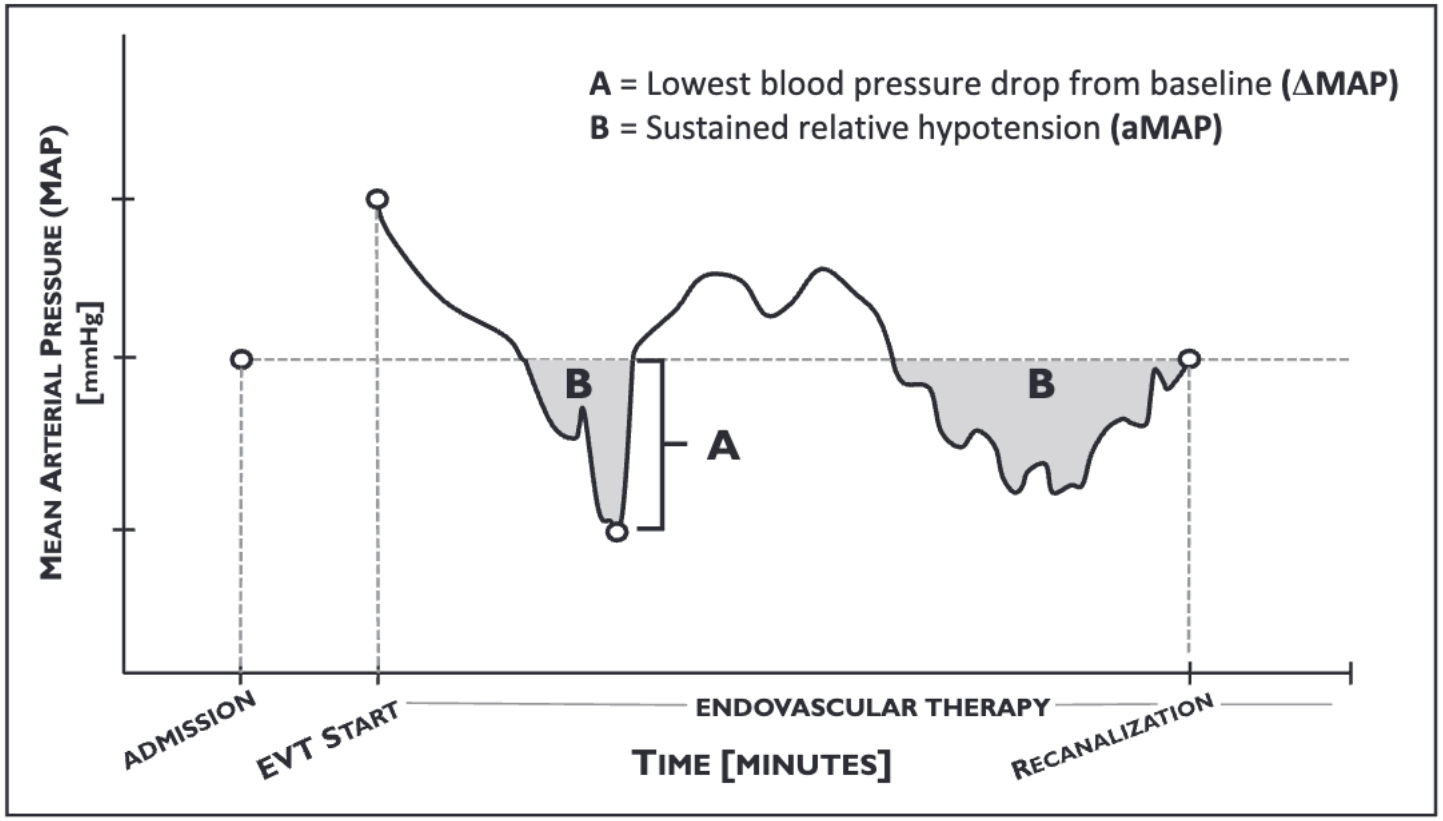
Quelle cible tensionnelle ?

Pendant la thrombectomie

Decreases in Blood Pressure During Thrombectomy Are Associated With Larger Infarct Volumes and Worse Functional Outcome

Nils H. Petersen, Santiago Ortega-Gutierrez, Anson Wang, Gloria V. Lopez, Sumita Strander, Sreeja Kodali, Andrew Silverman, Binbin Zheng-Lin, Sudeepta Dandapat, Lauren H. Sansing, Joseph L. Schindler, Guido J. Falcone, Emily J. Gilmore, Hardik Amin, Branden Cord, Ryan M. Hebert, Charles Matouk and Kevin N. Sheth

Originally published 4 Jun 2019 | https://doi.org/10.1161/STROKEAHA.118.024286 | Stroke. 2019;50:1797–1804



Quelle cible tensionnelle ?

Pendant la thrombectomie

Decreases in Blood Pressure During Thrombectomy Are Associated With Larger Infarct Volumes and Worse Functional Outcome

Nils H. Petersen, Santiago Ortega-Gutierrez, Anson Wang, Gloria V. Lopez, Sumita Strander, Sreeja Kodali, Andrew Silverman, Binbin Zheng-Lin, Sudeepta Dandapat, Lauren H. Sansing, Joseph L. Schindler, Guido J. Falcone, Emily J. Gilmore, Hardik Amin, Branden Cord, Ryan M. Hebert, Charles Matouk and Kevin N. Sheth

Originally published 4 Jun 2019 | https://doi.org/10.1161/STROKEAHA.118.024286 | Stroke. 2019;50:1797–1804

		Favorable Outcomes (mRS 0–2)	Unfavorable Outcomes (mRS 3–6)	*P* Value
Total patients	390	96	198	
Baseline SBP, mm Hg±SD	149±26	142±24	152±25	0.001
Baseline MAP, mm Hg±SD	106±19	102±17	107±19	0.055
Mean minimum SBP, mm Hg±SD	113±26	114±25	110±27	0.182
Mean minimum MAP, mm Hg±SD	80±18	82±18	77±19	0.043
Mean maximum SBP, mm Hg±SD	186±31	183±33	189±31	0.164
Mean maximum MAP, mm Hg±SD	132±23	130±23	134±22	0.211
Mean procedural SBP, mm Hg±SD	144±19	143±22	144±18	0.494
Mean procedural MAP, mm Hg±SD	100±13	99±15	100±12	0.394
Patients with intraprocedural blood pressure reduction below admission, n (%)	339 (87)	80 (83)	176 (89)	0.183
Mean ΔSBP, mm Hg±SD	37±34	28±29	43±35	<0.001
Mean ΔMAP, mm Hg±SD	26±23	20±21	30±24	0.002
Mean percent ΔSBP, %±SD	23±20	18±19	26±21	0.002
Mean percent ΔMAP, %±SD	22±20	19±19	26±21	0.005
SBP hypotensive area, mm Hg×min	592 (118–1968)	370 (43–1120)	786 (190–2714)	<0.001
MAP hypotensive area, mm Hg×min	409 (58–1431)	225 (20–990)	603 (94–1943)	<0.001

Quelle cible tensionnelle ?

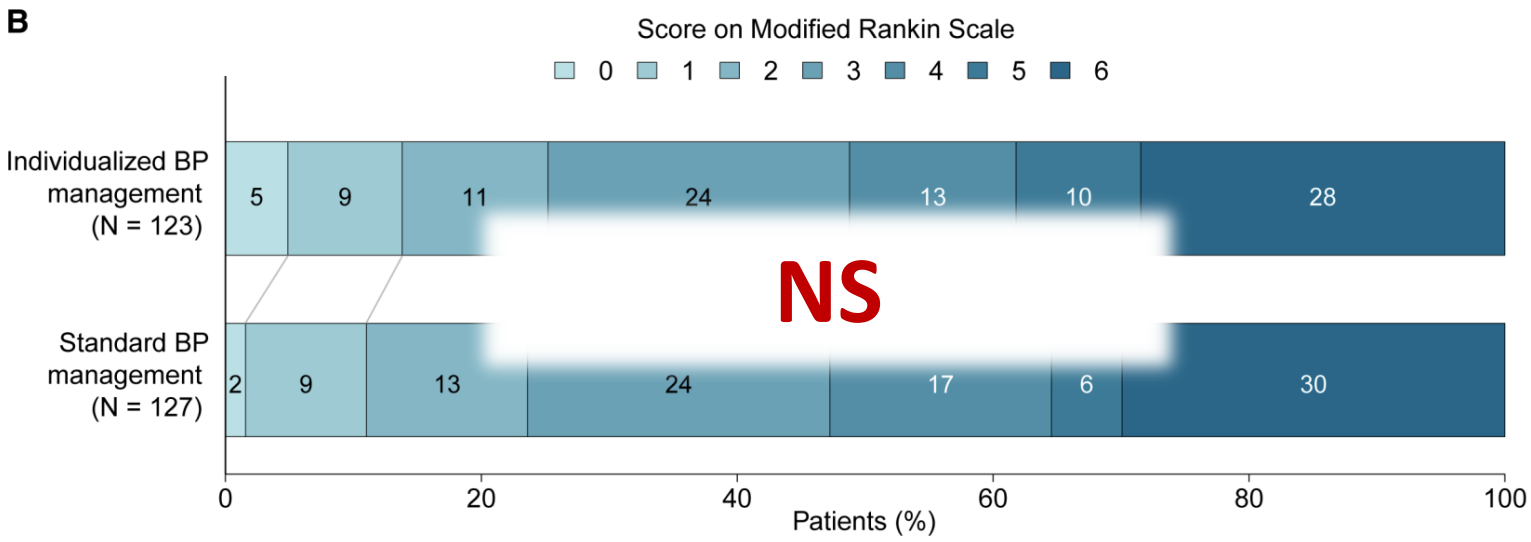
Un objectif tensionnel individualisé ?

Pendant la thrombectomie

Effect of Individualized Versus Standardized Blood Pressure Management During Endovascular Stroke Treatment on Clinical Outcome: A Randomized Clinical Trial

Min Chen ✉, Jan Meis, Arne Potreck, Lukas D. Sauer, Meinhard Kieser, Martin Bendszus, Wolfgang Wick, Peter A. Ringleb, Markus A. Möhlenbruch and Silvia Schönenberger ✉

Originally published 21 Sep 2023 | https://doi.org/10.1161/STROKEAHA.123.044062 | Stroke. 2023;54:2755–2765



Blood pressure characteristics	Mean (SD)		*P* value*
	Individualized (n=123)	Standard (n=127)	
Blood pressure values, mm Hg			
Baseline SBP	171 (25)	171 (30)	0.89
Mean intraprocedural SBP†	157 (19)	154 (18)	0.16
Minimal intraprocedural SBP†	132 (21)	130 (22)	0.37
Maximal intraprocedural SBP†	181 (24)	179 (24)	0.50
Mean intraprocedural MAP‡	110 (14)	107 (13)	0.09
Minimal intraprocedural MAP‡	94 (14)	91 (16)	0.18
Maximal intraprocedural MAP‡	127 (19)	126 (18)	0.79
Time of SBP in target range,† min	39 (37)	54 (47)	0.007
Time of SBP in extended target range (ie, target range ±10 mm Hg),† min	62 (53)	70 (52)	0.25
Proportion of intraprocedural time with SBP in target range,† %	44 (26)	61 (29)	<0.001
Proportion of intraprocedural time with SBP in extended target range (ie, target range±10 mm Hg),† %	71 (25)	80 (25)	0.006
Difference between baseline SBP and minimal intraprocedural SBP as fraction of baseline SBP,† %	22 (12)	23 (15)	0.71
Difference between baseline SBP and maximal intraprocedural SBP as fraction of baseline SBP,† %	7 (12)	7 (18)	0.83

Quelle cible tensionnelle ?

Un objectif tensionnel individualisé ?

Pendant la thrombectomie

Study protocol | Open access | Published: 26 July 2022

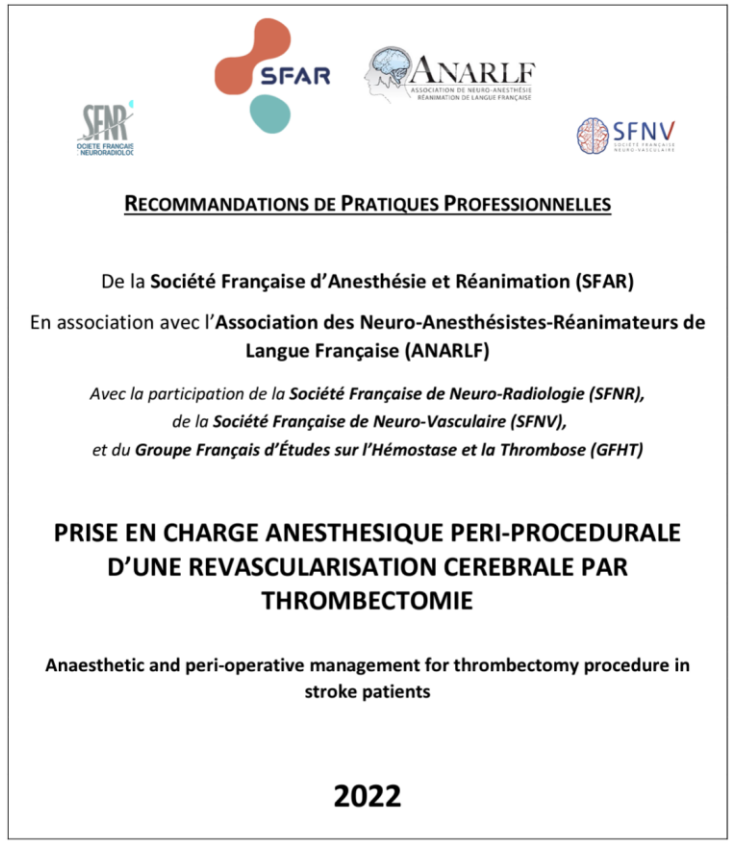
Effect of an individualized versus standard blood pressure management during mechanical thrombectomy for anterior ischemic stroke: the DETERMINE randomized controlled trial

Benjamin Maïer ✉, Benjamin Gory, Russell Chabanne, Benoît Tavernier, Baptiste Balanca, Gérard Audibert, Laurie-Anne Thion, Morgan Le Guen, Thomas Geeraerts, Lionel Calviere, Vincent Degos, Bertrand Lapergue, Sebastien Richard, Azeddine Djarallah, Ornellia Mophawe, Perrine Boursin, Chloé Le Cossec, Raphael Blanc, Michel Piotin, Mikael Mazighi & Etienne Gayat on behalf of the DETERMINE Investigators

ESOC 2024

Quelle cible tensionnelle ?

Après la thrombectomie



RECOMMANDATIONS DE PRATIQUES PROFESSIONNELLES

De la **Société Française d'Anesthésie et Réanimation (SFAR)**

En association avec l'**Association des Neuro-Anesthésistes-Réanimateurs de Langue Française (ANARLF)**

*Avec la participation de la **Société Française de Neuro-Radiologie (SFNR)**, de la **Société Française de Neuro-Vasculaire (SFNV)**, et du **Groupe Français d'Études sur l'Hémostase et la Thrombose (GFHT)***

PRISE EN CHARGE ANESTHESIQUE PERI-PROCEDURALE D'UNE REVASCULARISATION CEREBRALE PAR THROMBECTOMIE

Anaesthetic and peri-operative management for thrombectomy procedure in stroke patients

2022

Favoriser la collatéralité
Limiter l'évolution du core ischémique

R2.1.1 - Les experts suggèrent, en cas de recanalisation TICI <2b, de maintenir une pression artérielle systolique post-procédure entre 130 et 180 mmHg pour améliorer le pronostic neurologique à 3 mois.
Avis d'experts (Accord fort)
R2.1.2 - Les experts suggèrent, en cas de recanalisation TICI ≥2b, de maintenir une pression artérielle systolique post-procédure entre 130 et 160 mmHg pour améliorer le pronostic neurologique à 3 mois.
Avis d'experts (Accord fort)

Limiter les conséquences de l'ischémie/reperfusion
Limiter l'œdème vasogénique et l'hémorragie

Quelle cible tensionnelle ?

Après la thrombectomie

Original Investigation FREE

September 5, 2023

Intensive vs Conventional Blood Pressure Lowering After Endovascular Thrombectomy in Acute Ischemic Stroke

The OPTIMAL-BP Randomized Clinical Trial

Hyo Suk Nam, MD, PhD[1]; Young Dae Kim, MD, PhD[1]; JoonNyung Heo, MD[1]; et al

» Author Affiliations | Article Information

JAMA. 2023;330(9):832-842. doi:10.1001/jama.2023.14590

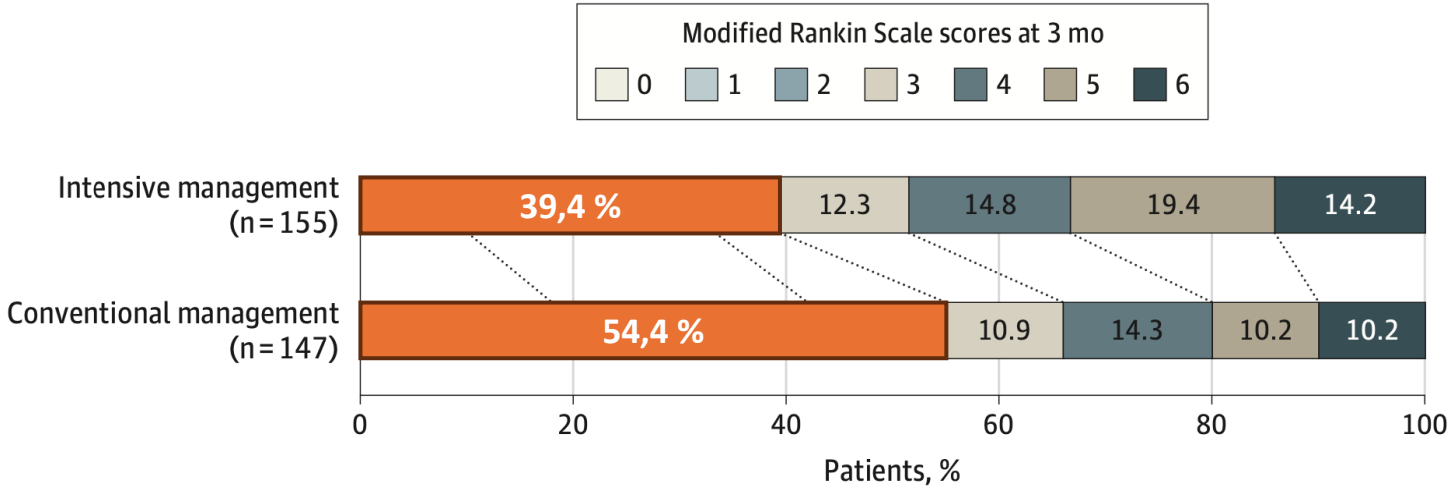


Table 2. Primary and Secondary Outcomes

Outcomes	Intensive management (n = 155)	Conventional management (n = 150)	Risk difference, % (95% CI)	Odds ratio (95% CI)		*P* value
				Unadjusted	Adjusted[a]	
Primary efficacy outcome						
Functional independence at 3 mo (mRS score 0-2), No./total (%)	61/155 (39.4)	80/147 (54.4)	−15.1 (−26.2 to −3.9)	0.54 (0.34 to 0.86)	0.56 (0.33 to 0.96)	.03
Primary safety outcomes						
Symptomatic intracerebral hemorrhage, No./total (%)	14/155 (9.0)	12/149 (8.1)	1.0 (−5.3 to 7.3)	1.13 (0.51 to 2.54)	1.10 (0.48 to 2.53)	.82
Death related to index stroke within 3 mo, No./total (%)	12/155 (7.7)	8/147 (5.4)	2.3 (−3.3 to 7.9)	1.46 (0.58 to 3.68)	1.73 (0.61 to 4.92)	.31

Quelle cible tensionnelle ?

Un objectif tensionnel individualisé ?

Après la thrombectomie

0 – 2 h

2– 4 h

4 – 12 h

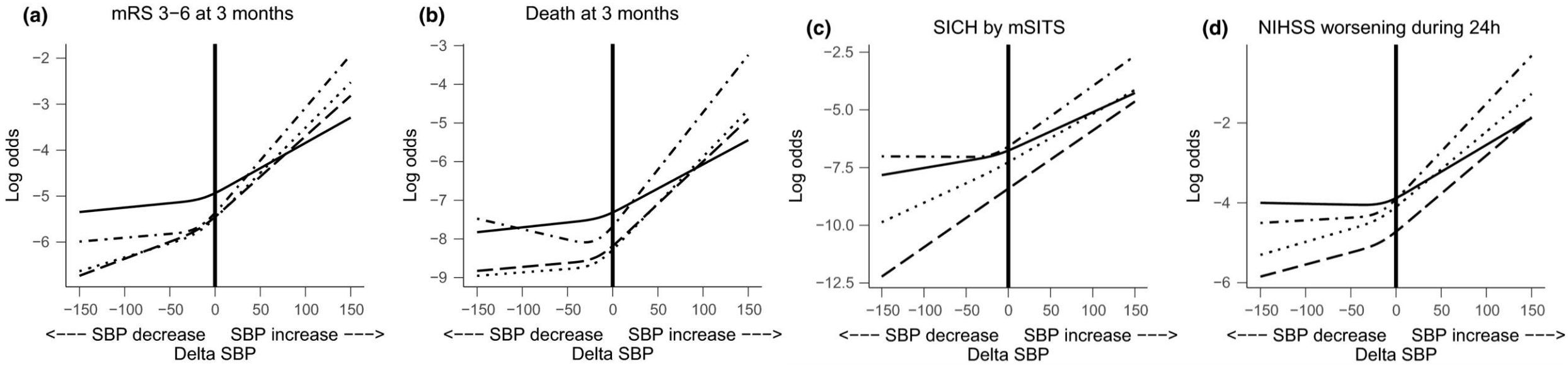
12 – 24 h

ORIGINAL ARTICLE | Open Access

Magnitude of blood pressure change and clinical outcomes after thrombectomy in stroke caused by large artery occlusion

Mohammad Anadani, Marius Matusevicius, Georgios Tsivgoulis, André Peeters, Ana Paiva Nunes, Michelangelo Mancuso, Christine Roffe, Adam de Havenon, Niaz Ahmed

First published: 07 March 2021 | https://doi.org/10.1111/ene.14807 | Citations: 10



PEC thérapeutique

Anesthésiste

Prévention ACSOS

Pression artérielle

P_aO_2

P_aCO_2

Œdème cérébral

Aggravation ischémie

Transformation hémorragique

Ventilation

Quelles P_aO_2 et P_aCO_2 ?

Review

Ventilation Targets for Patients Undergoing Mechanical Thrombectomy for Acute Ischemic Stroke: A Systematic Review

Alessandro Scudellari [1], Paula Dudek [2], Luca Marino [3], Rafael Badenes [4,*] and Federico Bilotta [5]

First Author Year Reference	Study Design Number of Patients (N)	Primary Endpoint	Secondary Endpoint	Key Message
López et al. 2019 [6]	Prospective. $N = 333$ $pO_2 > 120$ mmHg: $n = 119$ $pO_2 < 120$ mmHg: $n = 214$	mRS at 90 days	ICU length of stay and NIHSS at 24 h.	O_2
Cheng et al., 2021 [7]	RCT. $N = 175$ NBO: $n = 88$ Control group: $n = 87$	mRS score at 90 days	NIHSS at 24 h, infarct volume, mortality, symptomatic ICH, fatal ICH, pneumonia, urinary infection, seizures	O_2
Takahashi et al., 2014 [11]	Retrospective. $N = 86$	mRS at 90 days		↗ CO_2
Mundiyanapurath et al., 2016 [12]	Observational study with retrospective and prospective phases $N = 124$ Retrospective group: $n = 60$ Prospective group: $n = 64$	mRS at 90 days		↗ CO_2
Athiraman et al., 2018 [13]	Retrospective. $N = 88$	mRS at discharge	mRS at 90 days	↗ CO_2
Parr et al., 2022 [14]	Retrospective. $N = 88$	mRS at 90 days	Ischemic penumbra and infarct volume	↘ CO_2

Pas d'hypoxie **Hyperoxie délétère ?**

Pas d'hypocapnie **Hypercapnie ?**

Ventilation

Rôle de la capnie

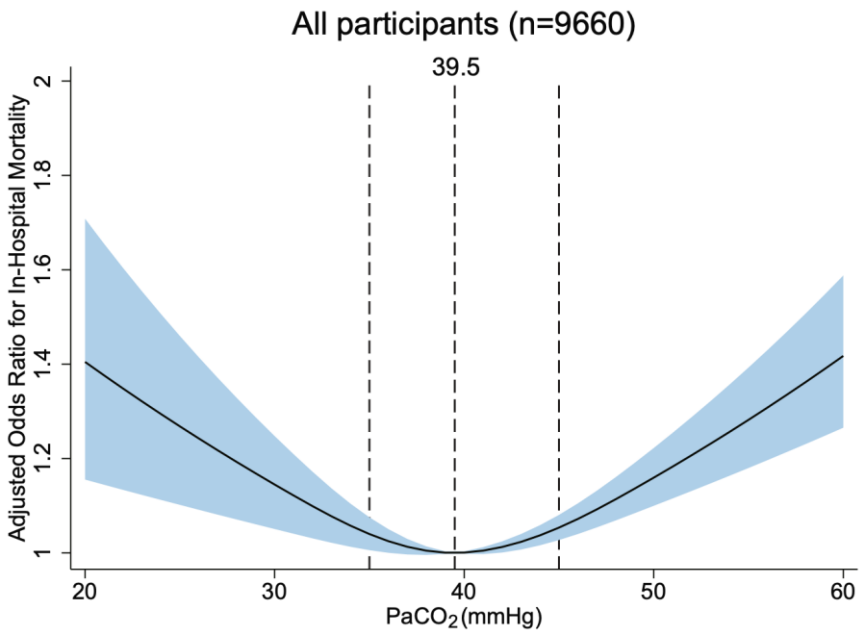
ORIGINAL WORK

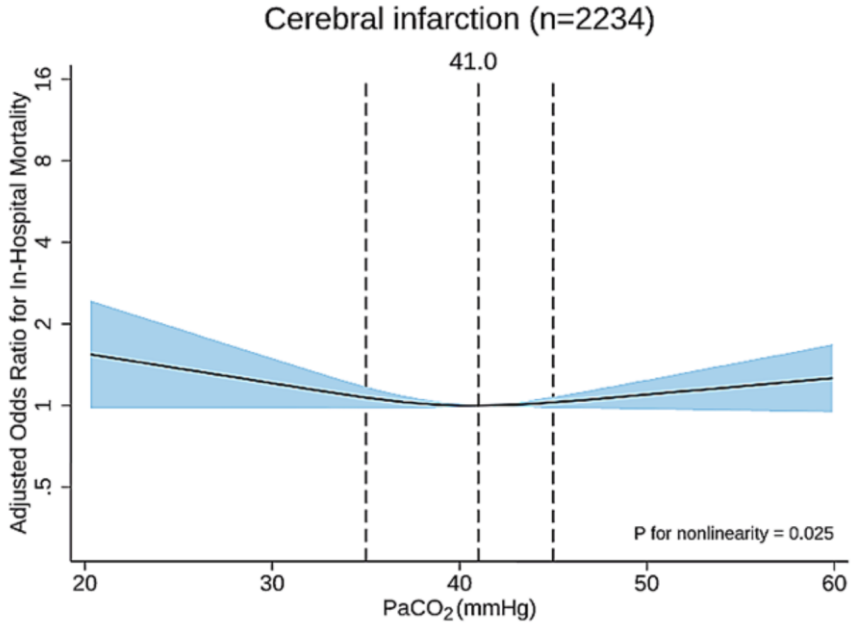
Optimal Targets of the First 24-h Partial Pressure of Carbon Dioxide in Patients with Cerebral Injury: Data from the MIMIC-III and IV Database

Gengxin Cai[1†], Xiunong Zhang[2†], Qitian Ou[2†], Yuan Zhou[3], Linqiang Huang[2], Shenglong Chen[2], Hongke Zeng[2], Wenqiang Jiang[2*] and Miaoyun Wen[1,2,4*]

Optimisation de la PPC +/- Absence d'HTIC

Hypercapnie permissive ?





Ventilation

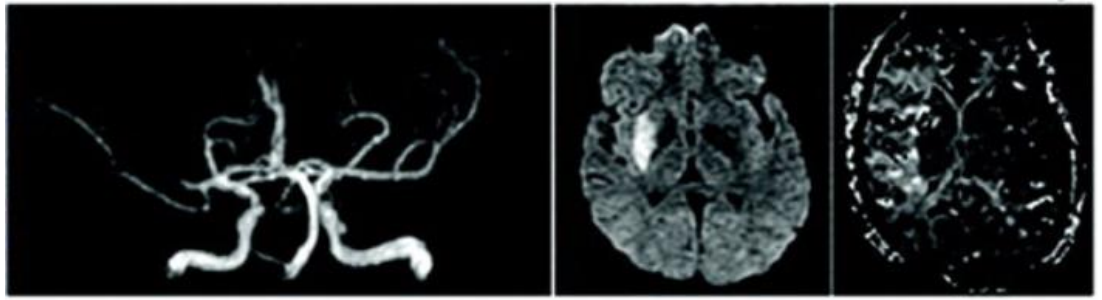
Rôle de la capnie

Stroke
Volume 38, Issue 11, 1 November 2007; Pages 3045-3048
https://doi.org/10.1161/STROKEAHA.107.482810

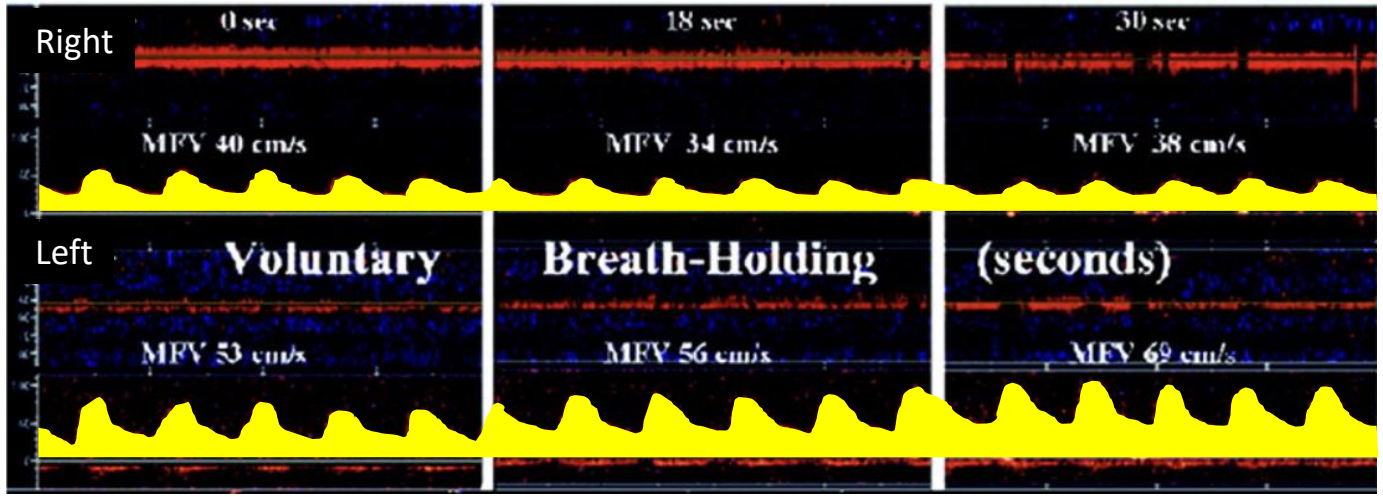
RESEARCH LETTERS

Reversed Robin Hood Syndrome in Acute Ischemic Stroke Patients

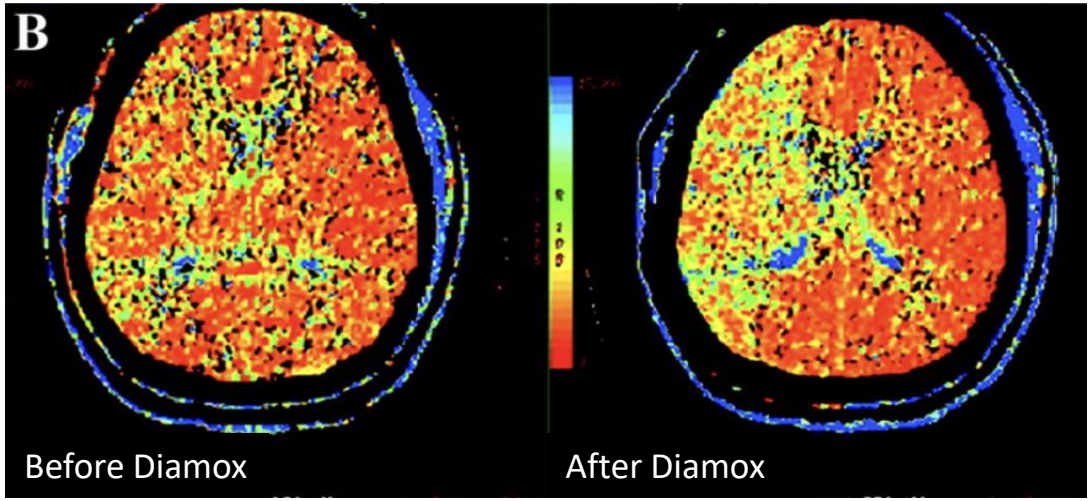
Andrei V. Alexandrov, MD, Vijay K. Sharma, MD, Annabelle Y. Lao, MD, Georgios Tsivgoulis, MD, Marc D. Malkoff, MD, and Anne W. Alexandrov, PhD



Respiration retenue pendant 30 secondes



CT - Perfusion



En pratique

CHU de Toulouse

O_2

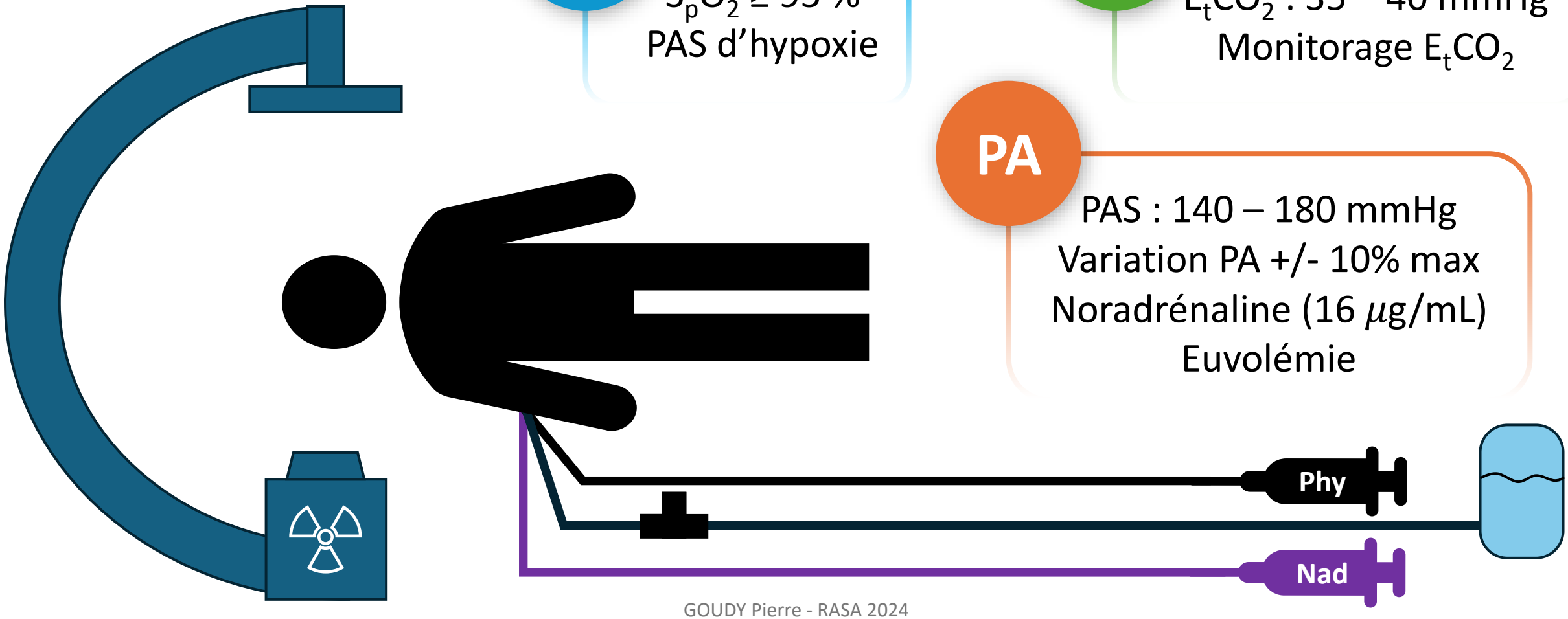
$S_pO_2 \geq 95\ \%$
PAS d'hypoxie

CO_2

E_tCO_2 : 35 – 40 mmHg
Monitorage E_tCO_2

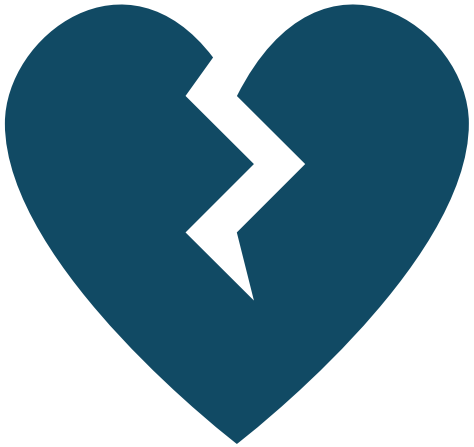
PA

PAS : 140 – 180 mmHg
Variation PA +/- 10% max
Noradrénaline (16 μg/mL)
Euvolémie



Thrombectomie : quelle anesthésie ?

Anesthésie générale



Sédation Simple

Thrombectomie : quelle anesthésie ?

JAMA Neurology | Original Investigation

Outcomes After Endovascular Therapy With Procedural Sedation vs General Anesthesia in Patients With Acute Ischemic Stroke
The AMETIS Randomized Clinical Trial

Russell Chabanne, MD, MSc; Thomas Geeraerts, MD, PhD; Marc Begard, MD; Baptiste Balança, MD, PhD; Francesca Rapido, MD; Vincent Degos, MD, PhD; Benoit Tavernier, MD, PhD; Serge Molliex, MD, PhD; Lionel Velly, MD, PhD; Franck Verdonk, MD, PhD; Anne-Claire Lukaszewicz, MD, PhD; Pierre-François Perrigault, MD; Jean-François Albucher, MD; Christophe Cognard, MD, PhD; Adrien Guyot, MD; Charlotte Fernandez, MD; Aurélie Masgrau, MSc; Ricardo Moreno, MD, MSc; Anna Ferrier, MD; Samir Jaber, MD, PhD; Jean-Etienne Bazin, MD, PhD; Bruno Pereira, PhD; Emmanuel Futier, MD, PhD; for the ANARLF Network for the AMETIS Study Group

Outcome	No. (%)		Standardized difference (95% CI)		
	General anesthesia (n = 135)	Procedural sedation (n = 138)	Absolute difference	Relative risk	*P* value
Primary outcome					
Primary composite outcome	38 (28.2)	50 (36.2)	8.1 (−2.3 to 19.1)	1.29 (0.91 to 1.82)	.15
Components of primary outcome[a]					
Functional independence at 90 d[b]	45 (33.3)	54 (39.1)	6 (−6 to 17)	1.18 (0.86 to 1.61)	.32
Absence of any major periprocedural complications at 7 d	89 (65.9)	93 (67.4)	1 (−10 to 13)	1.02 (0.86 to 1.21)	.80
Secondary outcomes					
Clinically important events					
Hypotension[l]	118 (87.4)	62 (44.9)	−42 (−52 to −32)	0.51 (0.42 to 0.63)	<.001
Hypoxemia[m]	7 (5.2)	13 (9.4)	4 (−2 to 10)	1.82 (0.75 to 4.41)	.19
Severe hypoxemia[n]	3 (2.2)	4 (2.9)	0 (−3 to 4)	1.30 (0.30 to 5.72)	.72
Aspiration	1 (0.7)	3 (2.2)	1 (−1 to 4)	2.93 (0.31 to 27.86)	.32
Conversion to general anesthesia	NA	15 (10.9)	NA	NA	NA

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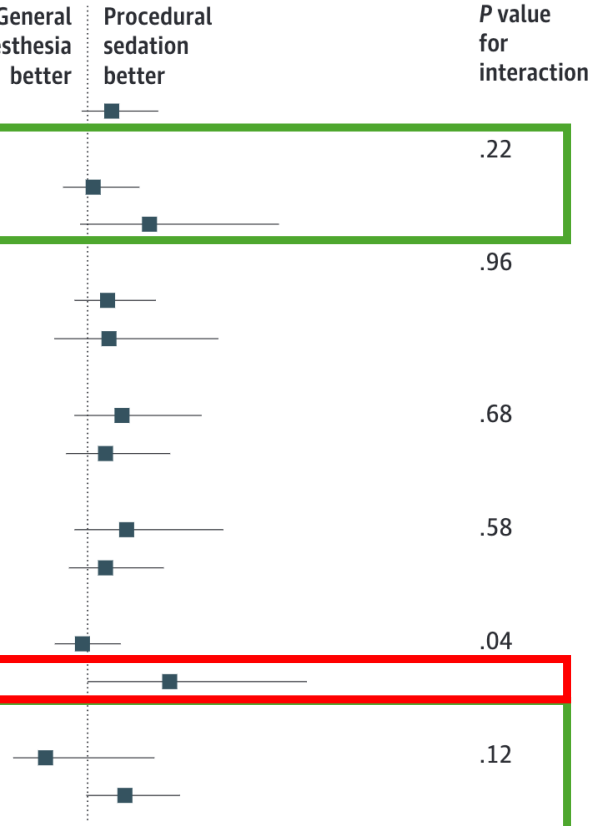
Characteristic	Patients, No.	Functional independence and absence of any major periprocedural complication, %		Risk ratio for functional independence and absence of any major periprocedural complication (95% CI)	*P* value for interaction
		General anesthesia	Procedural sedation		
Overall	273	28.2	36.2	1.29 (0.91–1.82)	
Baseline NIHSS score					.22
≤15	135	40.0	42.9	1.13 (0.57-2.23)	
>15	138	17.1	29.4	1.72 (0.91–3.23)	
Intravenous thrombolysis					.96
Yes	132	41.9	51.4	1.23 (0.85–1.78)	
No	141	16.4	20.6	1.25 (0.62–2.51)	
Thrombectomy delay >6 h or wake-up/unwitnessed stroke					
Yes	112	29.8	41.8	1.40 (0.85–2.32)	.68
No	161	26.9	32.5	1.21 (0.75–1.95)	
Wake-up or unwitnessed stroke					
Yes	86	30.4	45.0	1.48 (0.85–2.58)	.58
No	187	27.0	32.7	1.21 (0.78–1.89)	
Age, y					
≤70	100	52.1	48.1	0.93 (0.62–1.37)	.04
>70	173	14.9	29.1	1.95 (1.01–3.55)	
Tandem lesion					
Yes	46	26.1	13.0	0.50 (0.14–1.76)	.12
No	216	29.5	42.3	1.43 (0.99–2.07)	



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	General Anesthesia (N= 135)	Procedural Sedation (N= 138)	P Value
RASS score, median (IQR)			
At groin puncture[a]	-4 (-5 ; 0)	0 (-1 ; 0)	<.001
At the end of procedure[b]	-5 (-5 ; -4)	-1 (-2 ; 0)	<.001
Anesthetic drugs, No. (%)			
Propofol	113 (83.7)	58 (42.0)	<.001
Dose, median (IQR), mg	190 (140 ;380)	101 (50 ;152)	<.001
Thiopental	8 (5.9)	2 (1.5)	.05
Dose, median (IQR), mg	450 (365 ;500)	437 (375 ;500)	.99
Etomidate	33 (24.4)	1 (0.7)	<.001
Dose, median (IQR), mg	20 (20 ;30)	20 (20 ;20)	.46
Midazolam	2 (1.5)	17 (12.3)	<.001
Dose, median (IQR), mg	2.5 (2 ;3)	1.5 (1 ;2)	<.001
Ketamine	5 (3.7)	5 (3.6)	.97
Dose, median (IQR), mg	150 (10 ;150)	10 (10 ;30)	<.001
Inhaled anesthetics	87 (64.4)	10 (7.3)	<.001
Sufentanil	77 (57.0)	41 (29.7)	<.001
Dose, median (IQR), µg	10 (10 ;20)	10 (5 ;15)	<.001
Remifentanil	49 (36.3)	75 (54.4)	<.001
Dose, median (IQR), µg	342 (228 ;564)	137 (83 ;245)	<.001
Fentanil	1 (0.7)	1 (0.7)	.99
Dose, median (IQR), µg	422 (422 ;422)	124 (124 ;124)	.32
Vasopressors, No. (%)	131 (97.1)	81 (58.7)	<.001
Antihypertensive therapy, No. (%)	6 (4.4)	7 (5.1)	.81
Fluid volume, median (IQR), mL	500 (500 ;1000)	500 (250 ;500)	<.01
Anesthesiologist intervention feasibility score, median (IQR)[c]	4 (4 ;5)	4 (4 ;5)	.77
Ideal anesthesiologist intervention feasibility score, No. (%)[d]	41 (31.1)	48 (36.7)	.33
Patient intervention acceptability score, median (IQR)[e]	4 (3 ;5)	4 (3 ;4)	.19

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Thrombectomie : quelle anesthésie ?

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PRISE EN CHARGE ANESTHESIQUE PERI-PROCEDURALE D'UNE REVASCULARISATION CEREBRALE PAR THROMBECTOMIE

Anaesthetic and peri-operative management for thrombectomy procedure in stroke patients

2022

R1.1.1 - Les experts suggèrent de privilégier l'anesthésie générale avec intubation orotrachéale réalisée par une équipe anesthésique, plutôt que l'anesthésie locale seule, afin d'améliorer le pronostic neurologique à 3 mois, lorsqu'au moins une des situations suivantes est présente :

- **en cas d'atteinte de la circulation postérieure**
- **en cas de neuronavigation radiologique prévue délicate**
- **en cas de score NIHSS ≥ 15**
- **en cas d'altération de la vigilance**
- **en cas de défaillance respiratoire**
- **en cas d'agitation du patient**
- **en cas de vomissements.**

Avis d'experts (Accord fort)

R1.1.2 - À l'exception des situations ci-dessus nécessitant une intubation, les experts suggèrent de ne pas privilégier une anesthésie générale, par rapport à une anesthésie locale sous surveillance par une équipe d'anesthésie, pour améliorer le pronostic neurologique à 3 mois.

Avis d'experts (Accord fort)

Thrombectomie : quelle anesthésie ?

AG : Extubation ?

Original Article | Open Access

Ventilation time and prognosis after stroke thrombectomy: the shorter, the better!

S. Fandler-Höfler, S. Heschl, M. Kneihsl, P. Argüelles-Delgado, K. Niederkorn, A. Pichler, H. Deutschmann, F. Fazekas, A. Berghold, C. Enzinger, T. Gattringer

First published: 17 February 2020 | https://doi.org/10.1111/ene.14178 | Citations: 19

	Early extubation (≤6 h) *n* = 258 (57.7%)	Delayed extubation (6–24 h) *n* = 124 (27.7%)	*P* value	Late extubation (>24 h) *n* = 65 (14.5%)	*P* value[a]
Clinical data					
Age (years, mean ± SD)	68.6 ± 13.3	70.8 ± 13.2	0.15	67.6 ± 13.4	0.34
Male sex	132 (51.2%)	67 (54.0%)	0.34	35 (53.8%)	0.52
Arterial hypertension	172 (66.7%)	92 (74.2%)	0.14	49 (75.4%)	0.31
Dyslipidaemia	59 (22.9%)	32 (25.8%)	0.53	8 (12.3%)	**0.04**
Chronic heart disease[b]	42 (16.3%)	25 (20.2%)	0.35	20 (30.8%)	**0.01**
Diabetes mellitus	37 (14.3%)	21 (16.9%)	0.51	16 (24.6%)	0.06
Atrial fibrillation	99 (38.4%)	59 (47.6%)	0.09	27 (41.5%)	0.98
Stroke of unknown symptom onset	64 (24.8%)	19 (15.3%)	**0.04**	8 (12.3%)	0.08
Pre-stroke mRS (median, IQR)	0 (0–0)	0 (0–0)	0.12	0 (0–1)	**0.02**
NIHSS at admission (median, IQR)	14 (10–17)	15 (13–18)	**<0.001**	17 (14–19)	**<0.001**
MCA/M1 occlusion	172 (66.7%)	80 (64.5%)	0.68	41 (63.1%)	0.65
Intracranial ICA occlusion	49 (19.0%)	25 (20.2%)	0.79	20 (30.8%)	**0.04**
Admission outside core working hours	111 (43.0%)	102 (82.3%)	**<0.001**	43 (66.2%)	0.12
Intervention					
Intravenous thrombolysis	147 (57.2%)	67 (54.0%)	0.56	46 (70.8%)	**0.03**
Time to groin puncture (min, median, IQR)	195 (154–245)	210 (169–250)	0.16	204 (160–254)	0.78
Time to recanalization (min, median, IQR)	250 (204–306)	279 (233–324)	0.06	277 (222–302)	0.94
Successful recanalization (TICI 2b–3)	235 (92.5%)	106 (86.2%)	0.05	49 (76.6%)	**0.001**
Peri-interventional dissection	10 (3.9%)	2 (1.6%)	0.24	0 (0%)	0.15
Outcome parameters					
Pneumonia rate within NICU/stroke unit	20 (9.6%)	22 (20.6%)	**0.007**	18 (27.7%)	**0.004**
Symptomatic intracranial haemorrhage	7 (2.7%)	2 (1.6%)	0.51	6 (9.2%)	**0.004**
Duration of stay in the NICU/stroke unit (days, median, IQR)	3 (2–6)	4 (2–5)	0.86	6 (2–11)	**<0.001**
NIHSS at discharge from NICU/stroke unit (median, IQR)	5 (2–12)	10 (5–18)	**<0.001**	18 (10–22)	**<0.001**
mRS 3 months post-stroke[c] (median, IQR)	2 (1–4)	4 (2–5)	**<0.001**	6 (4–6)	**<0.001**
Favourable outcome at 3 months (mRS 0–2)	142 (55.5%)	41 (33.9%)	**<0.001**	5 (7.8%)	**<0.001**

Thrombectomie : quelle anesthésie ?

AG : Extubation ?

Original Article | Open Access

Ventilation time and prognosis after stroke thrombectomy: the shorter, the better!

S. Fandler-Höfler, S. Heschl, M. Kneihsl, P. Argüelles-Delgado, K. Niederkorn, A. Pichler, H. Deutschmann, F. Fazekas, A. Berghold, C. Enzinger, T. Gattringer

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Table 3 Binary multivariable logistic regression model for the target variable 'favourable outcome' (modified Rankin Scale 0–2) in patients extubated within 24 h

Test variable	Odds ratio	95% confidence interval	*P* value
Clinical data and intervention			
Age (per year)	0.95	0.93–0.97	**<0.001**
Pre-stroke mRS (per point)	0.66	0.47–0.93	**0.02**
NIHSS at admission (per point)	0.90	0.86–0.95	**<0.001**
Peri-interventional management			
Successful recanalization (TICI 2b–3 vs. 0–2a)	6.97	2.38–20.4	**<0.001**
Early extubation (within 6 h vs. 6–24 h)	1.93	1.15–3.24	**0.01**

En Pratique

CHU de Toulouse

AL

- ☑ Vigile conscient
- ☑ Respiration
- ☑ Calme
- ☑ ~~Vomissements~~
- ☑ Neuroradiologue

⚠

- ⚠ Hémisphère gauche
- ⚠ Circulation postérieure

AIVOC REMIFENTANIL
(max 2 ng/ml)
+
AL LIDOCAÏNE
(10 mg/ml), maximum 10 ml

ONDANSETRON 4mg
+
DROPERIDOL 0,625mg

ETOMIDATE
+
SUXAMETHONIUM

Réveil + EOT rapide

Evaluation neurologique précoce

Surveillance complications

Diminution morbi mortalité

En Pratique

Après anesthésie générale

CHU de Toulouse

Transformation hémorragique
Volume lésionnel important
Echec de recanalisation

NON

Défaillance respiratoire

NON

Trouble de la vigilance
(ouverture des yeux)

NON

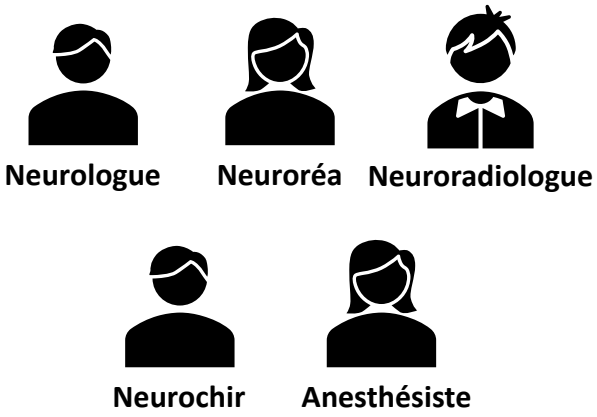
Trouble de la déglutition
Absence de toux

NON

EOT

USINV

OUI



Neuroréanimation ?
Craniectomie ?

OUI

OUI

OUI

Neuroréanimation ?

Conclusion

Thrombectomie	Thérapeutique essentielle dans l'AVC ischémique Prise en charge multidisciplinaire Place essentielle de l'anesthésiste - réanimateur
Anesthésiste	Pénombre ischémique et collatéralités Objectifs stricts de pressions artérielles Objectifs individualisés ?
Prise en charge	Nombreuses recommandations récentes Surveillance post opératoire spécialisée
Avenir	Nombreuses études en cours Cible de pression artérielle Bénéfices de l'hyperoxie et de l'hypercapnie

Merci pour votre attention