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CENTRE HOSPITALIER UNIVERSITAIRE

ANARLF
ASSOCIATION DE NEURO-ANESTHÉSIE
RÉANIMATION DE LANGUE FRANÇAISE
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THROMBECTOMIE MECANIQUE INTRACRANIENNE:

ANESTHESIE, SEDATION, ANALGESIE

GESTION DES TRAITEMENTS ADJUVANTS

Russell CHABANNE
Neuroréanimation
Anesthésie Neurochirurgie - Neuroradiologie Interventionnelle
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01/02/2023

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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

Texte validé par le Comité des Référentiels Cliniques de la SFAR le 16/05/2022, le conseil d'administration de la SFAR le 29/06/2022, le bureau de l'ANARLF le 29/06/2022, le conseil scientifique/d'administration de la SFNV le07/10/2022 et le conseil scientifique de la SFNR le 16/08/2022.

Auteurs : Hervé Quintard, Vincent Degos, Mikael Mazighi, Jérôme Berge, Pierre Boussemart, Russel Chabanne, Samy Figueiredo, Thomas Geeraerts, Yoann Launey, Ludovic Meuret, Jean-Marc Olivot, Julien Pottecher, Francesca Rapido, Sébastien Richard, Suzana Saleme, Virginie Siguret-Depasse, Olivier Naggara, Hugues De Courson, et Marc Garnier.

Anaesth Crit Care Pain Med 42 (2023) 101188

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Guidelines

Anaesthetic and peri-operative management for thrombectomy procedures in stroke patients☆

Hervé Quintard [a,*], Vincent Degos [b], Mikael Mazighi [c], Jérôme Berge [d], Pierre Boussemart [e], Russel Chabanne [f], Samy Figueiredo [g], Thomas Geeraerts [h], Yoann Launey [i], Ludovic Meuret [i], Jean-Marc Olivot [j], Julien Pottecher [k], Francesca Rapido [l], Sébastien Richard [m], Suzana Saleme [n], Virginie Siguret-Depasse [o], Olivier Naggara [p], Hugues De Courson [q], Marc Garnier [r]

Editorial

Periprocedural management of patients with acute ischemic stroke caused by large vessel occlusion

Bridget A. Schoon, Diederik W.J. Dippel. ***Anaesth Crit Care Pain Med;*** **2023**

AHA/ASA Guideline

2015 AHA/ASA Focused Update of the 2013 Guidelines for the Early Management of Patients With Acute Ischemic Stroke Regarding Endovascular Treatment

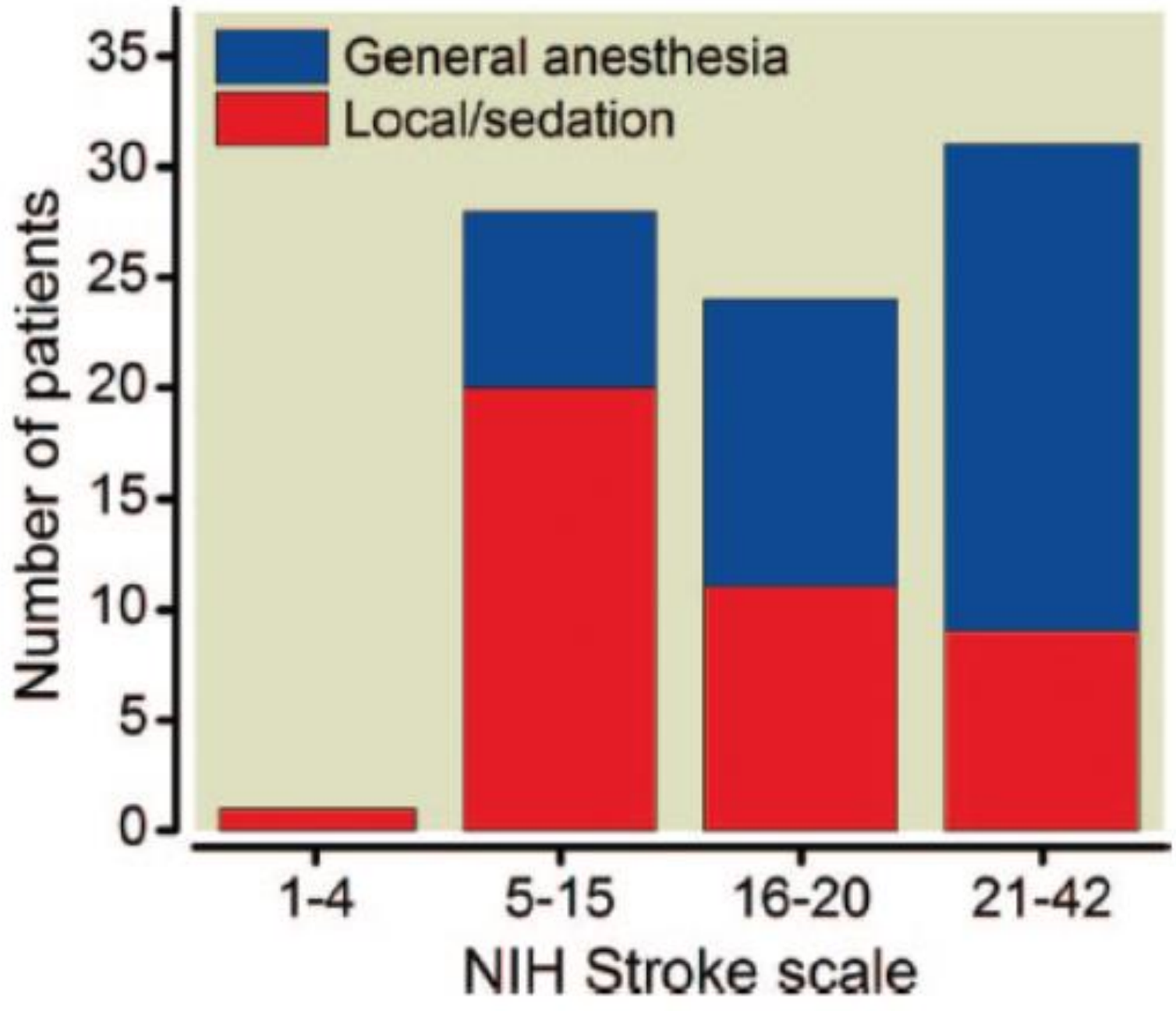
16. It might be reasonable to favor conscious sedation over general anesthesia during endovascular therapy for acute ischemic stroke. However, the ultimate selection of anesthetic technique during endovascular therapy for acute ischemic stroke should be individualized based on patient risk factors, tolerance of the procedure, and other clinical characteristics. Randomized trial data are needed *(Class IIb; Level of Evidence C).* (New recommendation)

Powers et al. *Stroke*; 2015

Studies on general compared with regional anaesthesia for endovascular therapy for acute stroke				
Study	**Patients**	**Anaesthetic management**	**Outcomes**	**Limitations**
Jumaa and colleagues [23]	Retrospective, single-centre, 126 patients with acute ischaemic stroke	Intubated or not intubated	Intubated patients had longer ICU stays, increased in-hospital mortality, worse clinical outcome, larger final infarct size	Intubated patients had higher baseline NIHSS scores
Nichols and colleagues [24]	Retrospective, 75 patients enrolled in IMS II trial with anterior circulation stroke	No sedation, mild sedation, heavy sedation, pharmacological paralysis	Lower sedation was associated with good outcome (modified Rankin score of 0–2), lower mortality and higher successful reperfusion rates	Patients with more sedation had higher baseline NIHSS scores and had less successful angiography reperfusion rates
Abou-Chebl and colleagues [25]	Retrospective, multicentre, 980 patients	General anaesthesia or conscious sedation	Independent predictors of poor outcome and mortality: age, NIHSS, general anaesthesia, recanalization, ICH, carotid terminus occlusion. Predictors of poor outcome: no stent placed	Patients with general anaesthesia had higher baseline NIHSS scores and were more likely to have carotid terminus occlusions
Davis and colleagues [39]	Retrospective, single-centre, 96 patients	General anaesthesia or local anaesthesia (local anaesthesia includes light sedation with midazolam and fentanyl, if needed, provided by the stroke neurologist)	Independent predictors for good outcomes are local anaesthesia, low baseline stroke scores, and SBP >140 mmHg. General anaesthesia is correlated with low arterial pressures	Patients with general anaesthesia had higher baseline NIHSS scores Good outcomes were associated high higher arterial pressures
Abou-Chebl and colleagues [37]	Retrospective, multicentre (18 sites), 281 patients	General anaesthesia (intubated) or local anaesthesia (not intubated, but unknown if sedated)	Independent predictors of mortality: hypertension, NIHSS, unsuccessful revascularization, nonutilization of balloon guide catheter, and general anaesthesia	Patients who received general anaesthesia had higher baseline NIHSS and lower baseline arterial pressures
Rai and colleagues [21]	Retrospective, single-centre, 190 patients	General anaesthesia or nongeneral anaesthesia (both monitored anaesthesia care and local)	General anaesthesia is not an independent factor when NIHSS, age, and recanalization are included. Arrival to puncture time is longer with general anaesthesia, and arterial pressure variations are larger with general anaesthesia	Patients who received general anaesthesia had higher baseline NIHSS. Time from arrival to the interventional suite, to puncture of the skin (i.e. start of intervention) was longer with general anaesthetic.

Wijayatilake et al. *Curr Opin Anaesthesiol*; 2016

BIAIS DE SELECTION



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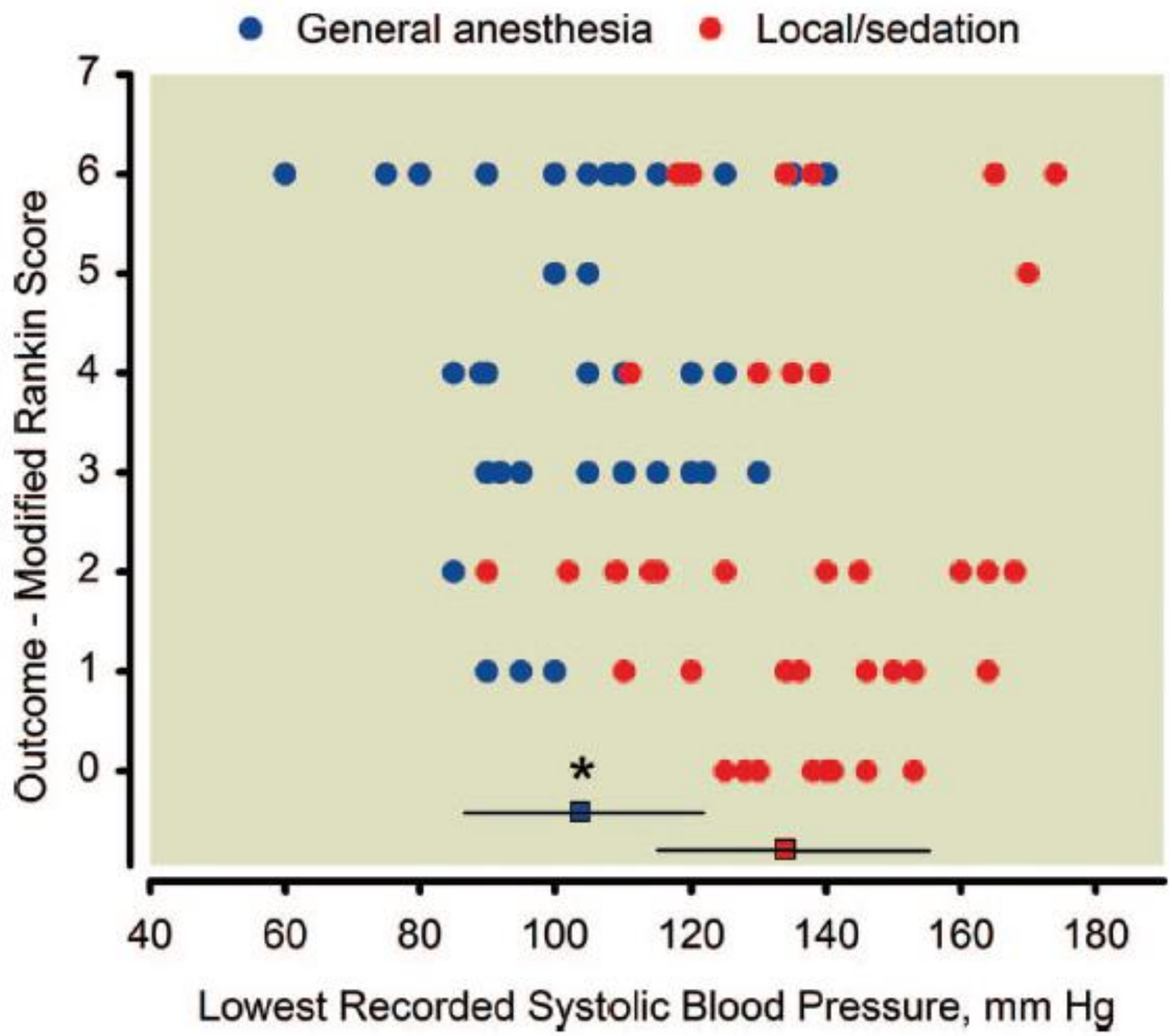
Davis et al. *Anesthesiology*; 2012

AG: ↘ DSC pénombre ?



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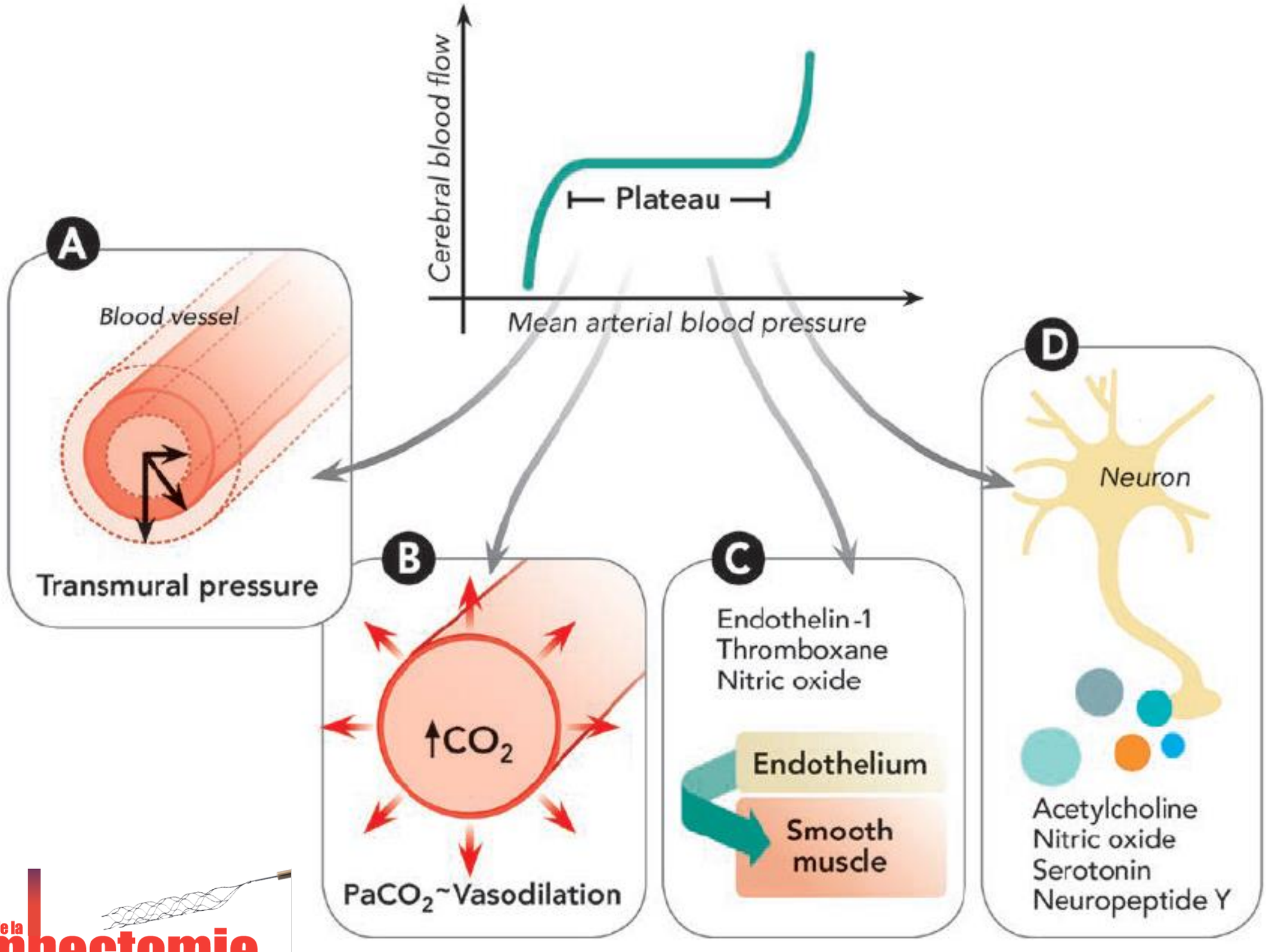
Davis et al. *Anesthesiology*; 2012

AUTOREGULATION CEREBRALE



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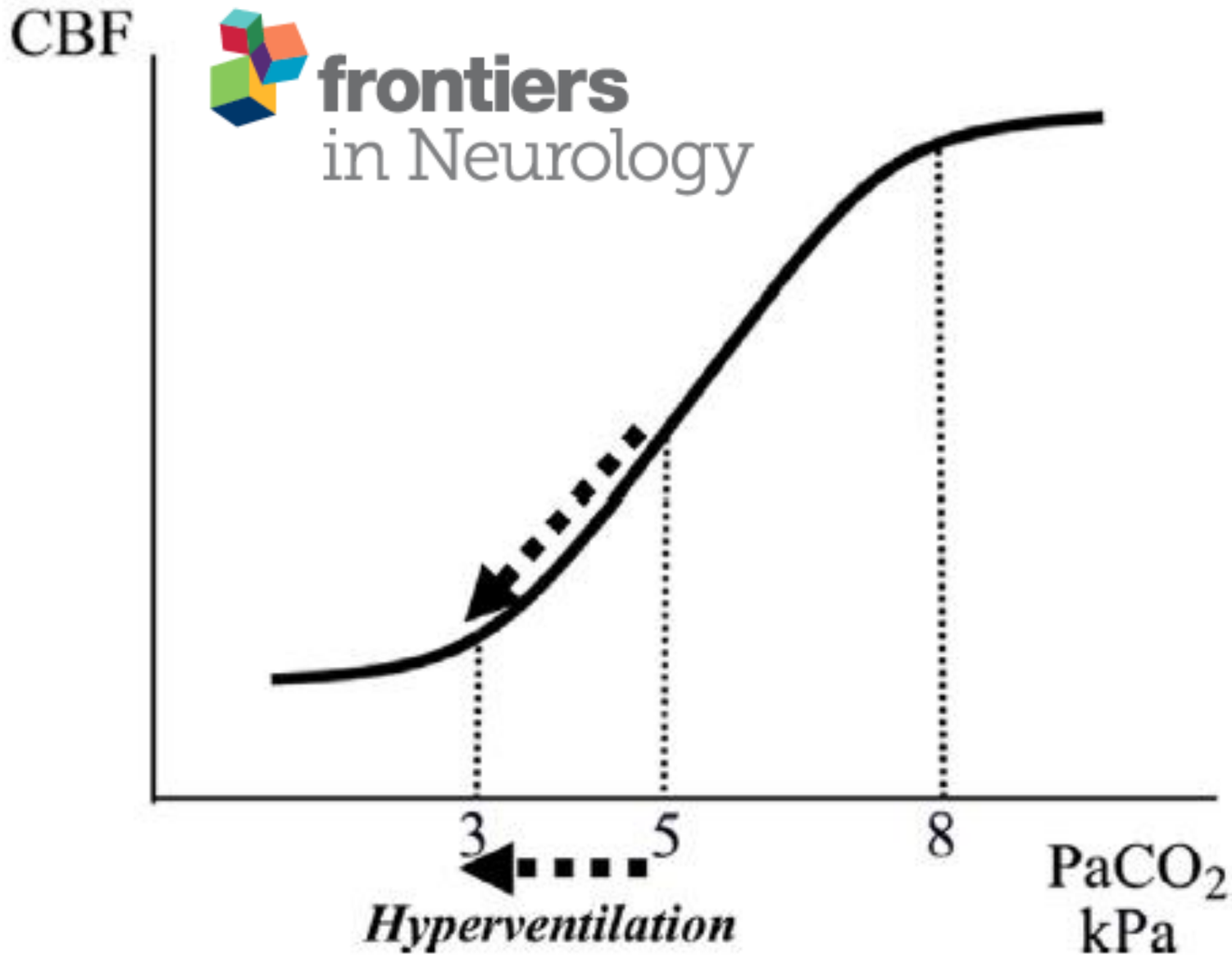
Rivera-Lara et al. *Anesthesiology*; 2017

CO2 ☞ Tonus Vasomoteur ☞ DSC



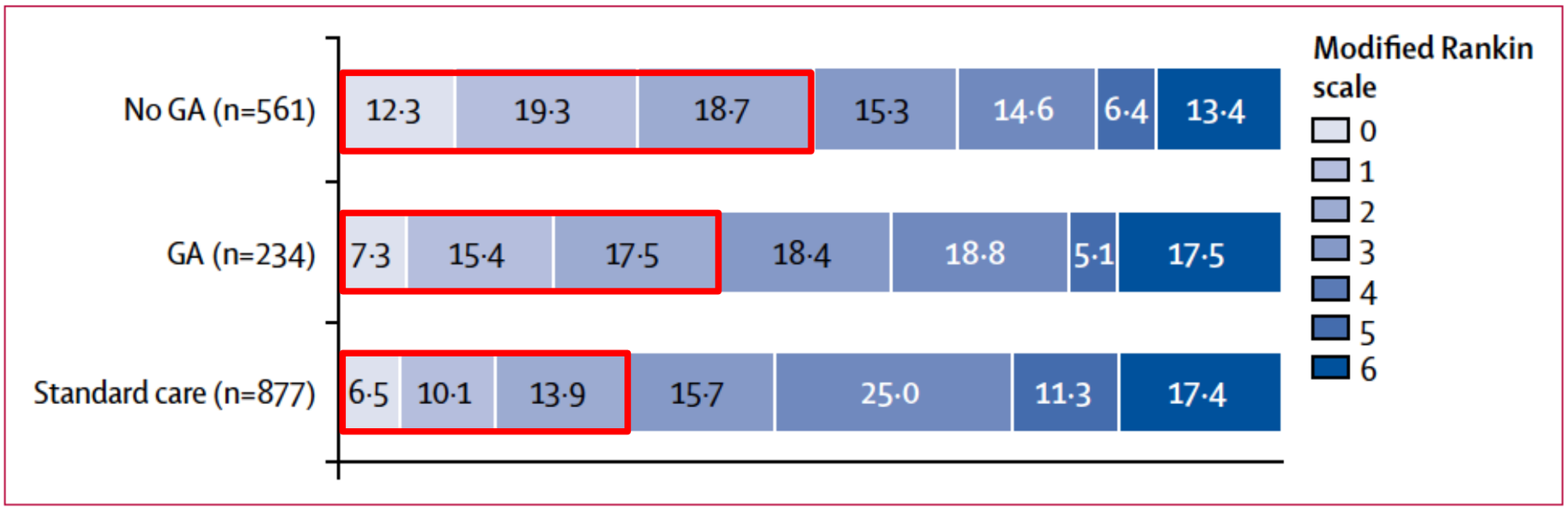
↗1mmHgPaCO2 ➽ ↘ 3.5% DSC

Nordström et al. *Front Neurol*; 2017

Effect of general anaesthesia on functional outcome in patients with anterior circulation ischaemic stroke having endovascular thrombectomy versus standard care: a meta-analysis of individual patient data

Bruce C V Campbell, Wim H van Zwam, Mayank Goyal, Bijoy K Menon, Diederik W J Dippel, Andrew M Demchuk, Serge Bracard, Philip White, Antoni Dávalos, Charles B L M Majoie, Aad van der Lugt, Gary A Ford, Natalia Pérez de la Ossa, Michael Kelly, Romain Bourcier, Geoffrey A Donnan, Yvo B W E M Roos, Oh Young Bang, Raul G Nogueira, Thomas G Devlin, Lucie A van den Berg, Frédéric Clarençon, Paul Burns, Jeffrey Carpenter, Olvert A Berkhemer, Dileep R Yavagal, Vitor Mendes Pereira, Xavier Ducrocq, Anand Dixit, Helena Quesada, Jonathan Epstein, Stephen M Davis, Olav Jansen, Marta Rubiera, Xabier Urra, Emilien Micard, Hester F Lingsma, Olivier Naggara, Scott Brown, Francis Guillemin, Keith W Muir*, Robert J van Oostenbrugge*, Jeffrey L Saver*, Tudor G Jovin*, Michael D Hill*, Peter J Mitchell*, for the HERMES collaborators*

	Standard care (n=893)	Endovascular thrombectomy with GA (n=236)	Endovascular thrombectomy without GA (n=561)	GA *vs* standard care*		No GA *vs* standard care*		No GA *vs* GA*	
				Effect size OR (95%CI)	p value	Effect size OR (95%CI)	p value	Effect size OR (95%CI)	p value
Primary outcome									
Functional outcome at 90 days (mRS)†	4 (2–5)	3 (2–4)	2 (1–4)	..	..	..	..	..	..
Covariate adjusted common odds ratio	..	..	..	1·52 (1·09–2·11)	0·014	2·33 (1·75–3·10)	<0·0001	1·53 (1·14–2·04)	0·0044
Propensity-score stratification common odds ratio	..	..	..	1·42 (1·09–1·84)	0·0084	2·21 (1·65–2·95)	<0·0001	1·44 (1·08–1·92)	0·012



Advantages of general anaesthesia	Disadvantages of general anaesthesia
Patient's airway is secured	(Potential) Delay in time to revascularization
Minimized risk of aspiration	Potential for allergy/reaction to anaesthetics
Maintained oxygenation	Increased risk of haemodynamic variations
Optimal control of carbon dioxide levels	Pharmacological effects on cerebral perfusion
Decreased patient movement	Requires postanaesthetic recovery area
No pain on clot retrieval	Equipment/staffing costs

Wijayatilake et al. *Curr Opin Anaesthesiol*; 2016

JAMA | Original Investigation

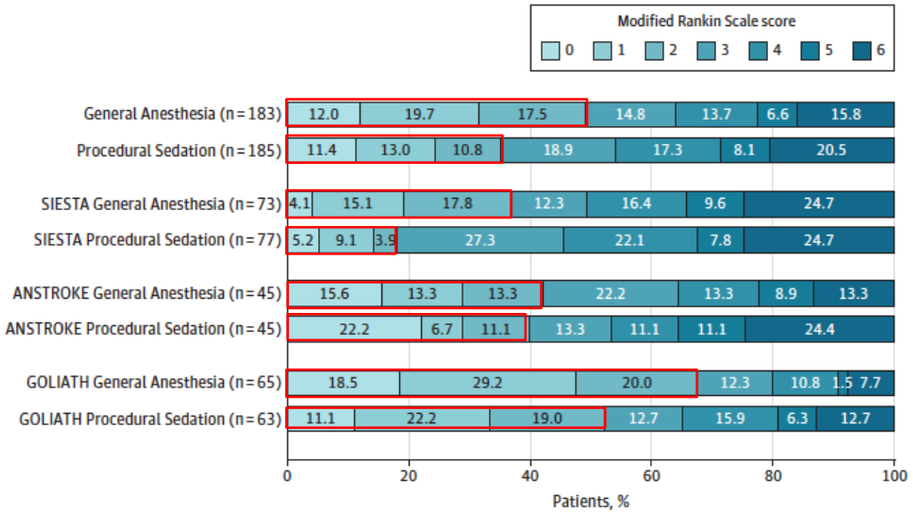
Association of General Anesthesia vs Procedural Sedation With Functional Outcome Among Patients With Acute Ischemic Stroke Undergoing Thrombectomy

A Systematic Review and Meta-analysis

Silvia Schönenberger, MD; Pia Löwhagen Hendén, MD; Claus Z. Simonsen, MD; Lorenz Uhlmann, MSc; Christina Klose; Johannes A. R. Pfaff, MD; Albert J. Yoo, MD; Leif H. Sørensen, MD; Peter A. Ringleb, MD; Wolfgang Wick, MD; Meinhard Kieser, PhD; Markus A. Möhlenbruch, MD; Mads Rasmussen, MD; Alexandros Rentzos, MD; Julian Bösel, MD

11,5% de conversion → AG (agitation, contraintes procédures…)
Même délais de reperfusion

Données individuelles
3 RCT monocentriques Européens
CJP: mRS J90
AVC circulation antérieure
NIHSS≥10
368 patients



Non-Time-Related Outcomes	General Anesthesia (n = 183)	Procedural Sedation (n = 185)	Absolute Difference (95% CI)[a]	General Anesthesia vs Procedural Sedation OR (95% CI)[b]	*P* Value[b]
Primary Outcome					
mRS after 3 mo[c,d]				1.58 (1.09 to 2.29)[e]	.02
Secondary Outcomes, No. (%)					
mRS score 0-2 after 3 mo	90 (49.2)	65 (35.1)	14.0 (4.1 to 24.0)	2.16 (1.31 to 3.54)	.003
mRS score 0-3 after 3 mo	117 (63.9)	100 (54.1)	9.9 (−0.1 to 19.9)	1.73 (1.06 to 2.82)	.03
In-hospital mortality	14 (7.7)	15 (8.1)	−0.5 (−6.0 to 5.0)	0.75 (0.32 to 1.75)	.51
Early neurological improvement in NIHSS[f]	−6.6 (−8.0 to −5.3)	−5.4 (−6.7 to −4.2)	−1.2 (−3.0 to 0.7)	−1.11 (−2.90 to 0.68)[g]	.22
Successful reperfusion (mTICI score of 2b or 3)[h]	133 (72.7)	117 (63.2)	9.4 (−0.1 to 18.9)	1.84 (1.12 to 3.01)	.02
Infarction growth, mL[i]	(n = 110)	(n = 108)			
Median (IQR)	15.0 (3.5 to 49.9)	21.0 (4.5 to 72.5)	−11.2 (−32.4 to 10.0)	−14.8 (−35.5 to 6.0)[g]	.17
Mean (SD)	44.3 (76.8)	55.5 (82.9)			
Hypotension (<20% of baseline)	143 (80.8)	95 (53.1)	27.7 (18.4 to 37.1)	4.3 (2.6 to 7.1)	<.001
Systolic blood pressure variability (>180 or <120 mm Hg)	145 (79.7)	114 (62.3)	17.4 (8.2 to 26.5)	2.4 (1.5 to 3.9)	<.001
Start of antibiotics within 72 h for suspected pneumonia[j]	34 (18.6)	36 (19.5)	−0.9 (−8.9 to 7.1)	0.85 (0.5 to 1.46)	.66

Conclusion des auteurs

- Meilleur pronostic sous AG → ↗ taux de reperfusion → facilité technique (immobilité)

- Si équipe dédiée pour anesthésie: pas d'augmentation des délais sous AG

- Les hypoTA et variabilité PA + fq sous AG mais n'ont pas d'impact s'ils sont faibles (protocoles, objectifs PA, gestion HDM avec amines…)

- Effet neuroprotecteur de AG (pharmacologiques, hypothermie, normocapnie…) ne peuvent être démontrés

JAMA October 1, 2019 Volume 322, Number 13

- **Validité extrinsèque?**
- **Gestion de la sédation?**
- **AVC moins sévères? (NIHSS<10)**
- **AVC circulation postérieure?**

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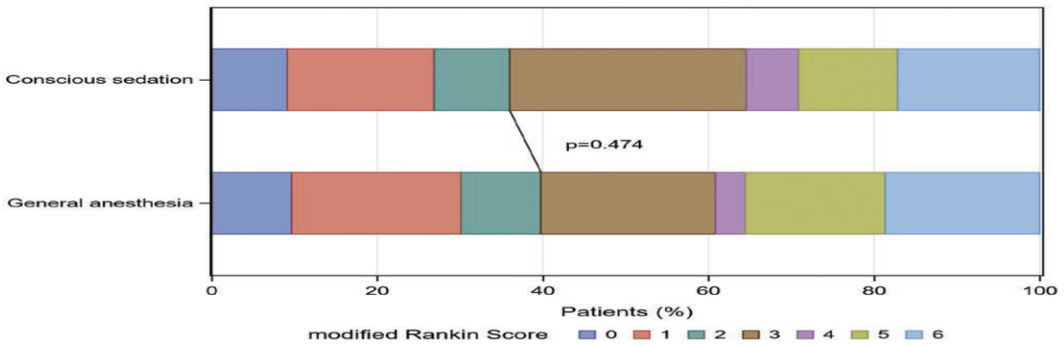
ANESTHESIOLOGY

General Anesthesia *versus* Sedation, Both with Hemodynamic Control, during Intraarterial Treatment for Stroke: The GASS Randomized Trial

ETUDE	MODALITES SEDATION	MODALITES ANESTHESIE GENERALE	CRITERES NON-INCLUSION NOTABLES
GASS	TCI remifentanil (maximum target 2 ng/mL), local anaesthesia with lidocaine 10 mg/mL (maximum 10 mL). PAS 140-185mmHg PAD<110mmHg SpO2>96%	IOT Etomidate (0.25-0.4mg/Kg) Succinylcholine (1mg/Kg) TCI Propofol (maximum target 4 microg/mL) TCI Remifentanil (0.5-4 ng/mL) Muscle relaxant reinjection as needed PAS 140-185mmHg PAD<110mmHg SpO2>96%	Contraindications to CS: **Glasgow coma scale** inferior to 8, **agitation** not allowing the patient to stay still during the procedure and **deglutition** disorders. **Body mass index** superior to 35 kg/m2.



RCT, 4 centers in France
Anesthetic and Hemodynamic control Protocol
341 patients
Primary outcome measure: favorable neurologic outcome (mRS 0-2) evaluated between 2 and 6 months after stroke

63 (36%) patients in the conscious sedation group
66 (40%) in the general anesthesia group
No statistical difference (relative risk, 0.91 [95% CI, 0.69 to 1.19]; P = 0.474)

	Conscious Sedation	General Anesthesia	Mean/Median/Risk Difference (95% CI)	*P* Value
Time from stroke onset to groin puncture, min*	248 ± 92	269 ± 85	–20 (–39 to –01)	0.040
Time from arrival at stroke center to groin puncture, min*	60 ± 39	69 ± 44	–10 (–19 to –01)	0.037
Time from stroke onset to recanalization, min*	307 ± 87	320 ± 96	–13 (–33 to 07)	0.203
Intraoperative hemodynamics††				
Episode(s) of hypotension	1 (1 to 2)	2 (1 to 2)	0 (–1 to 0)	0.001
≥ 1 episode of hypotension	129 (77)	163 (100)	–23 (–30 to –17)	< 0.0001

Maurice et al. *Anesthesiology*; 2022

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Cochrane Library

Cochrane Database of Systematic Reviews

Type of anaesthesia for acute ischaemic stroke endovascular treatment (Review)

Tosello R, Riera R, Tosello G, Clezar CNB, Amorim JE, Vasconcelos V, Joao BB, Flumignan RLG

7 essais randomisés avec outcomes d'intérets

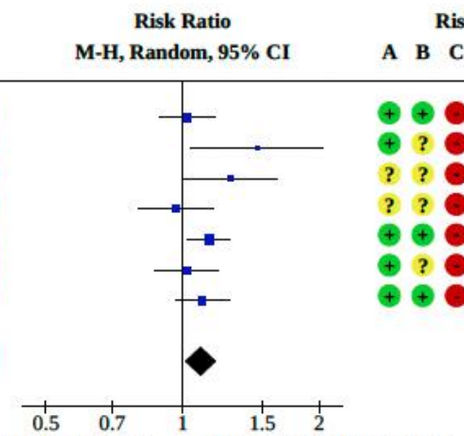
Analysis 1.6. Comparison 1: General anaesthesia versus non-general anaesthesia (early time point), Outcome 6: Target artery revascularisation (dichotomous; mTICI 2b-3)

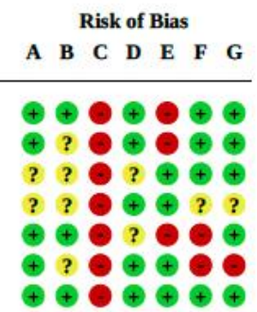
Study or Subgroup	General anaesthesia Events	Total	Non-general anaesthesia Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
AnStroke 2017	41	45	40	45	18.4%	1.02 [0.89 , 1.18]
CANVAS 2020	19	20	13	20	4.4%	1.46 [1.04 , 2.05]
GOLIATH 2018	50	65	38	63	8.0%	1.28 [1.00 , 1.62]
Hu 2020	53	72	51	67	11.4%	0.97 [0.80 , 1.17]
Maurice 2022	144	169	131	176	24.6%	1.14 [1.03 , 1.27]
Ren 2020	42	48	36	42	14.6%	1.02 [0.87 , 1.20]
SIESTA 2016	65	73	62	77	18.6%	1.11 [0.97 , 1.27]
Total (95% CI)		**492**		**490**	**100.0%**	**1.10 [1.02 , 1.18]**
Total events:	414		371			

Heterogeneity: Tau² = 0.00; Chi² = 8.48, df = 6 (P = 0.20); I² = 29%

Test for overall effect: Z = 2.43 (P = 0.02)

Test for subgroup differences: Not applicable





Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

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Cochrane Database Syst Rev. 2022 Jul 20;7(7):CD013690

Cochrane Library

Cochrane Database of Systematic Reviews

Type of anaesthesia for acute ischaemic stroke endovascular treatment (Review)

Tosello R, Riera R, Tosello G, Clezar CNB, Amorim JE, Vasconcelos V, Joao BB, Flumignan RLG

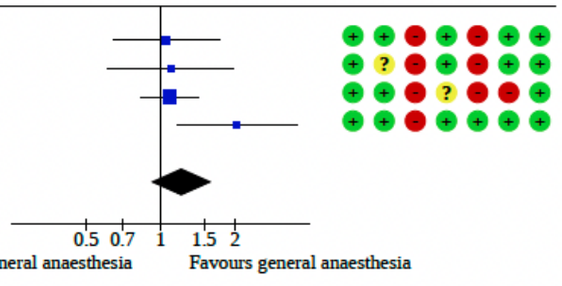
Analysis 2.1. Comparison 2: General anaesthesia versus non-general anaesthesia (long-term time point), Outcome 1: Functional outcome (dichotomous; mRS ≤ 2)

Study or Subgroup	General anaesthesia Events	Total	Non-general anaesthesia Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
AnStroke 2017	19	45	18	45	21.5%	1.06 [0.64 , 1.73]
CANVAS 2020	11	20	10	20	16.4%	1.10 [0.61 , 1.99]
Maurice 2022	66	169	63	176	44.3%	1.09 [0.83 , 1.43]
SIESTA 2016	27	73	14	77	17.8%	2.03 [1.16 , 3.56]
Total (95% CI)		**307**		**318**	**100.0%**	**1.21 [0.93 , 1.58]**
Total events:	123		105			

Heterogeneity: Tau² = 0.02; Chi² = 4.24, df = 3 (P = 0.24); I² = 29%

Test for overall effect: Z = 1.41 (P = 0.16)

Test for subgroup differences: Not applicable



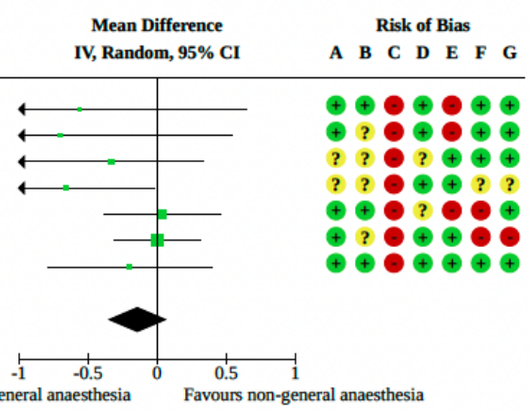
Analysis 2.3. Comparison 2: General anaesthesia versus non-general anaesthesia (long-term time point), Outcome 3: Functional outcome (continuous; mRS)

Study or Subgroup	General anaesthesia Mean	SD	Total	Non-general anaesthesia Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
AnStroke 2017	2.6	2.29	45	3.16	3.44	45	2.8%	-0.56 [-1.77 , 0.65]
CANVAS 2020	2.4	1.8	20	3.1	2.2	20	2.6%	-0.70 [-1.95 , 0.55]
GOLIATH 2018	2	1.51	65	2.33	2.27	63	9.1%	-0.33 [-1.00 , 0.34]
Hu 2020	2	1.51	72	2.66	2.27	67	9.8%	-0.66 [-1.31 , -0.01]
Maurice 2022	3.13	2.04	166	3.09	1.92	175	23.0%	0.04 [-0.38 , 0.46]
Ren 2020	2.5	0.76	48	2.5	0.76	42	41.1%	0.00 [-0.31 , 0.31]
SIESTA 2016	3.5	1.9	73	3.7	1.8	77	11.6%	-0.20 [-0.79 , 0.39]
Total (95% CI)			**489**			**489**	**100.0%**	**-0.14 [-0.34 , 0.06]**

Heterogeneity: Tau² = 0.00; Chi² = 5.54, df = 6 (P = 0.48); I² = 0%

Test for overall effect: Z = 1.38 (P = 0.17)

Test for subgroup differences: Not applicable



AVC circulation antérieure

270 patients
CJP composite: mRS J90 et complications

Open access Protocol

BMJ Open

Sedation versus general anaesthesia in endovascular therapy for anterior circulation acute ischaemic stroke: the multicentre randomised controlled AMETIS trial study protocol

Russell Chabanne,[1] Charlotte Fernandez-Canal,[1] Vincent Degos,[2] Anne-Claire Lukaszewicz,[3] Lionel Velly,[4] Segolene Mrozek,[5] Pierre-François Perrigault,[6] Serge Molliex,[7] Benoit Tavernier,[8] Claire Dahyot-Fizelier,[9] Franck Verdonk,[10] Elodie Caumon,[11] Aurélie Masgrau,[11] Marc Begard,[1] Emmanuel Chabert,[12] Anna Ferrier,[13] Samir Jaber,[14] Jean-Etienne Bazin,[1] Bruno Pereira,[15] Emmanuel Futier,[1,16] for the ANARLF Network and the AMETIS study group

BMJ Open 2019;**9**:e027561. doi:10.1136/bmjopen-2018-027561

640 patents
Non infériorité
Monocentrique
CJP mRS J90

Protocol

International Journal of Stroke WSO

Choice of ANesthesia for EndoVAScular Treatment of Acute Ischemic Stroke: Protocol for a randomized controlled (CANVAS) trial

Yuming Peng[1], Yan Li[1], Minyu Jian[1], Xiaoyuan Liu[1], Jian Sun[2], Bo Jia[1], Jia Dong[1], Min Zeng[1], Nan Lin[1], Li Zhang[3,4], Adrian W. Gelb[5], Matthew TV Chan[6] and Ruquan Han[1]

International Journal of Stroke
0(0) 1–7

DOI: 10.1177/1747493017706243
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THROMBECTOMIE SOUS ANESTHESIE LOCALE? SANS ANESTHESISTE?

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THROMBECTOMIE SOUS ANESTHESIE LOCALE? SANS ANESTHESISTE?

Thrombectomie sous AL : comment faire et quand savoir dire « STOP » ?

- **Seule ou associée à sédation?**
- **Eviter les raccourcis: « pas d'AG, pas d'équipe d'anesthésie » ou « Puisque l'équipe d'Anesthésie est indisponible, la procédure devra bien avoir lieu sous AL. »**
- **Choix d'équipe, réfléchi, au bénéfice du patient et non contraint**
- **Installation +++**
- **Peu douloureux sauf quand engagement du caillot dans dispositif et retrait, bref**
- **Mouvements, Agitation, Coma, Inhalation ➲ Anesthésie Générale**
- **Objectifs tensionnels +++**
- **NIHSS élevé? Aphasie? Lésion tandem? Comorbidités?**

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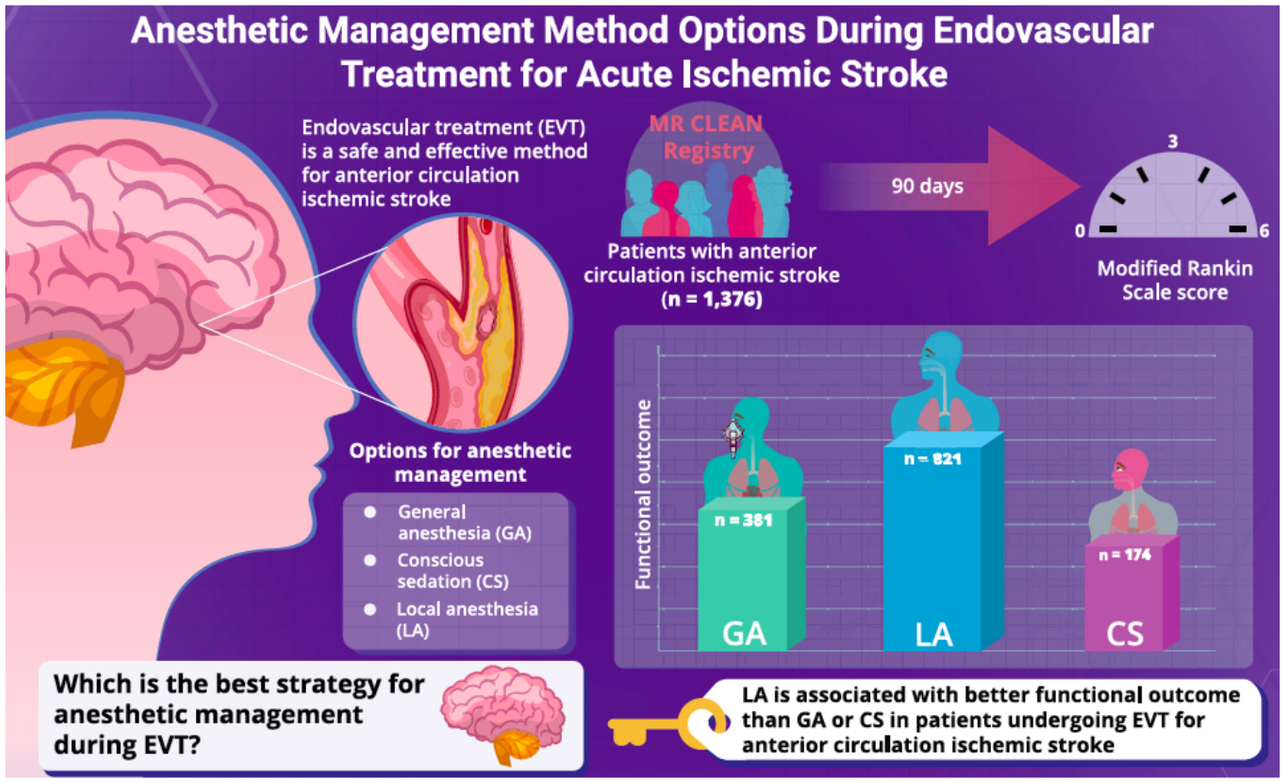
www.ecolethrombectomie.com

Taylor et al. *JEPU*; 2016

THROMBECTOMIE SOUS ANESTHESIE LOCALE? SANS ANESTHESISTE?



doi: 10.1212/WNL.0000000000008674

Neurology®

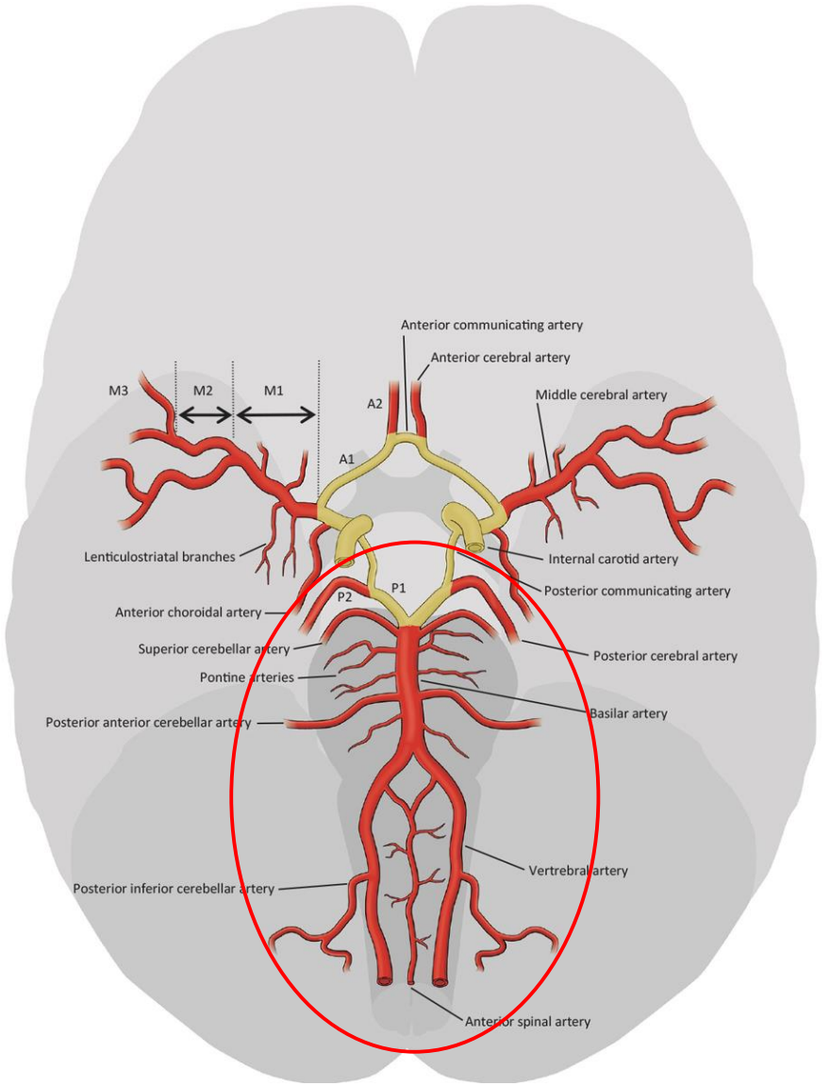
CLINICAL AND POPULATION SCIENCES

Local Anesthesia Without Sedation During Thrombectomy for Anterior Circulation Stroke Is Associated With Worse Outcome

Stroke. 2020;51:2951–2959. DOI: 10.1161/STROKEAHA.120.029194

Ecole de la Thrombectomie
www.ecolethrombectomie.com

AVC VERTEBRO-BASILAIRE



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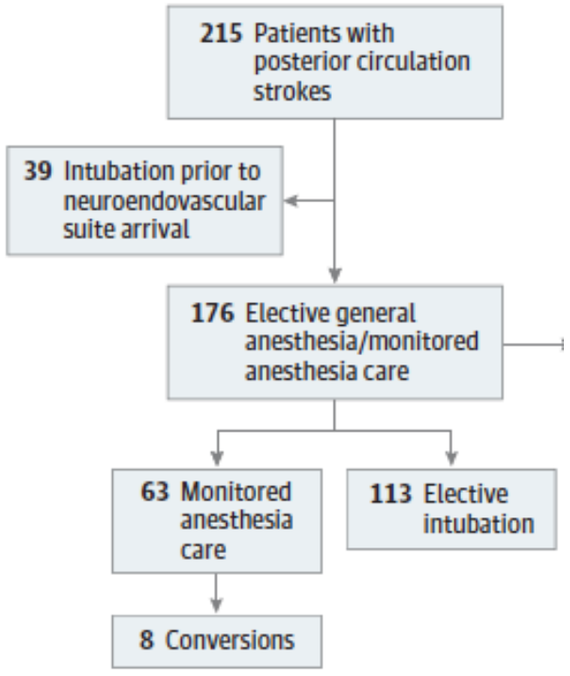
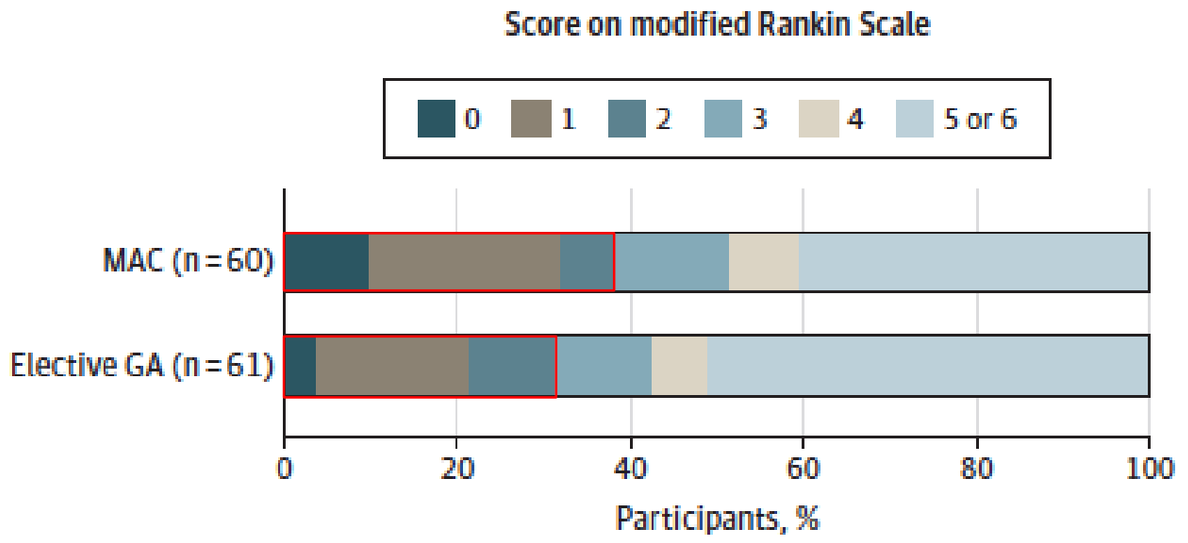
www.ecolethrombectomie.com

JAMA Neurology | Original Investigation

Monitored Anesthesia Care vs Intubation for Vertebrobasilar Stroke Endovascular Therapy

Ashutosh P. Jadhav, MD, PhD; Mehdi Bouslama, MD; Amin Aghaebrahim, MD; Leticia C. Rebello, MD; Matthew T. Starr, MD; Diogo C. Haussen, MD; Manasa Ranginani, MBBS; Matthew K. Whalin, MD, PhD; Tudor G. Jovin, MD; Raul G. Nogueira, MD





NS

AVC postérieur: envisageable sous sédation, sélection +++

JAMA Neurol; 2017

JAMA Neurology

RCT: General Anesthesia vs Conscious Sedation for Endovascular Treatment of Patients With Posterior Circulation Acute Ischemic Stroke

POPULATION

71 Men, 16 Women

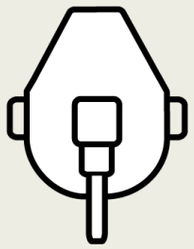
Adults ≥18 y with acute posterior circulation stroke suitable for recanalization

Mean age, 62 y

INTERVENTION

87 Patients randomized and analyzed

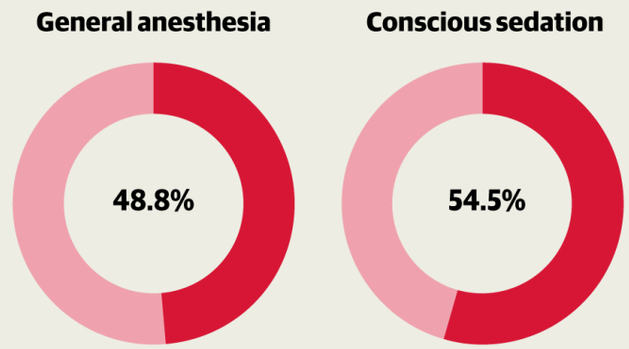
43 General anesthesia
Endovascular procedure with sedation by general anesthesia



44 Conscious sedation
Endovascular procedure with conscious sedation

FINDINGS

There was no significant difference between the 2 groups in proportion of participants with functional independence at 90-d post-procedure



Relative risk of primary outcome, general anesthesia vs conscious sedation,
0.89 (95% CI, 0.58-1.38)

SETTINGS / LOCATIONS

Two hospitals in China

PRIMARY OUTCOME

Proportion of participants with functional independence at 90-d post-procedure, defined modified Rankin score ≤2 as assigned by assessors blinded to group allocation (score range, 0 [no symptoms] to 6 [death])

Liang F, Wu Y, Wang X, et al the CANVAS II Group. General anesthesia vs conscious sedation for endovascular treatment of patients with posterior circulation acute ischemic stroke: an exploratory randomized clinical trial. *JAMA Neurol*. Published online September 26, 2022. doi:10.1001/jamaneurol.2022.3018

In the CS group, 13 people (29.5%) were ultimately transferred to GA.

CONCLUSION AND RELEVANCE The findings in this study suggest that CS was not better than GA for the primary outcome of functional recovery and was perhaps worse for the secondary outcome of successful reperfusion.

RECOMMANDATIONS

AHA/ASA Guideline

2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke

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

16. It is reasonable to select an anesthetic technique during endovascular therapy for AIS on the basis of individualized assessment of patient risk factors, technical performance of the procedure, and other clinical characteristics. Further randomized trial data are needed.	IIa	B-R	Recommendation revised from 2015 Endovascular.

Powers et al. *Stroke*; 2018

CHAMP 1. Modalités de prise en charge per-interventionnelle

Experts : Y. Launey (ANARLF) – S. Saleme (SFNR) – O. Naggara (SFNR) - L. Meuret (SFAR)

Question : Chez le patient présentant une occlusion artérielle cérébrale et éligible à un traitement endovasculaire, l'anesthésie locale seule, comparativement à l'anesthésie générale ou à la sédation, permet-elle d'améliorer le pronostic neurologique à 3 mois ?

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)

Question : Chez le patient présentant une occlusion artérielle cérébrale et éligible à un traitement endovasculaire, la sédation, comparativement à l'anesthésie générale, permet-elle d'améliorer le pronostic neurologique à 3 mois ?

R1.2 - A l'exception des situations nécessitant une intubation oro-trachéale (cf. R1.1.1), les experts suggèrent de ne pas privilégier une anesthésie générale par une équipe anesthésique par rapport à une sédation procédurale par une équipe anesthésique pour améliorer le pronostic neurologique à 3 mois.

Avis d'experts (Accord fort)

AVC

ALERTE

PA+++ (PA PRÉ INTERVENTIONNELLE?), CONTRAINTES SALLE NRI

ELLIGIBILITÉ TM	EVALUATION ANESTHÉSIQUE	INDICATION INDÉNIABLE AG?	AVIS NRISTE: PROCÉDURE?	PER-PROCEDURE	POST-PROCEDURE

Dans centre de TM?	• Salle NRI
	• Nriste, Neurologue, Urgentiste, Manips…
	• ATCD, ttt, allergie, jeun? (Aphasie 50%)
		• Agitation (aphasie++)
		• Tbe Vigilance
		• Dysphagie
		• Dyspnée, hypoxémie
		• Vomissements
		• FDR IOT/Ventilation diff ?(si conversion)
			• Vertébro-basilaire
			• Lésion Tandem
			• Accès vasculaire
			• Tolérance mvt
				• SAD? (Sédation++)
				• PA répétées (+/-désilet)
				• Objectifs PA 140<PAS<180mmHg (AG et SC)→Vol/Nad
				• Risque coagulopathie
				• AL seule?
				• Molécules ½ vie courte
				• Normoxie SpO2≥95%
				• Normocapnie /EtCO2++
				• Glycémie
					• SSPI
					• Extubation précoce
					• USINV-USC
					• PAS post procédure (mmHg):
					  • TICI <2B: 130-180
					  • TICI ≥ 2B: 130-160 (140-180?)

DELAI +++

SFAR
Société Française d'Anesthésie et de Réanimation

Hindman BJ, Dexter F. *Anesth Analg*; 2019

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- **Enquête déclarative 2019 congressistes et interventionnistes Europe / USA**
- **248/327 réponses, 48 pays**

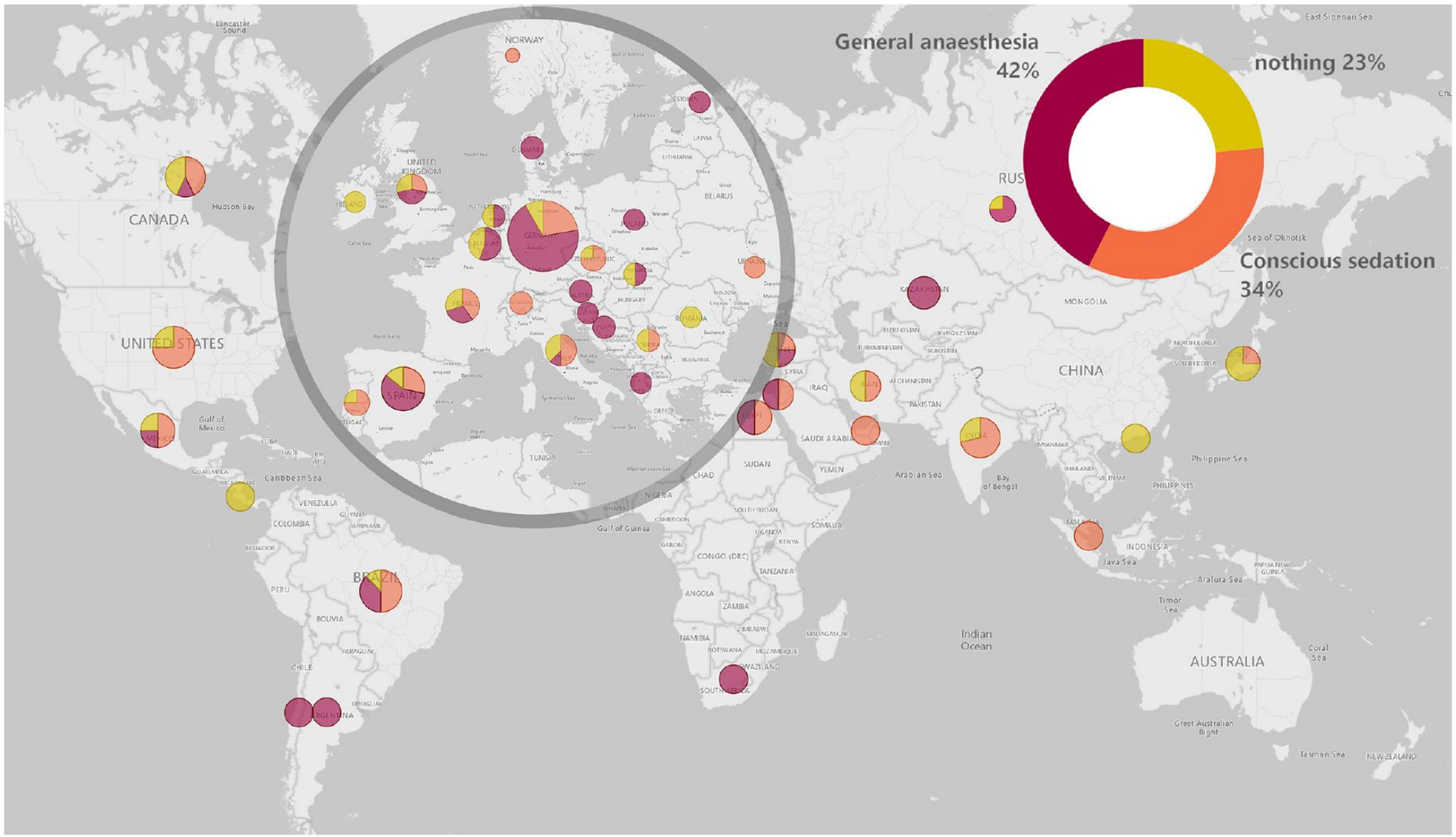

Figure 2 Default anesthesia protocol for thrombectomies used by survey participants overall (right upper corner) and by country. Red color indicates general anesthesia, orange color indicates conscious sedation and yellow color indicates that neither is used by default. Circle sizes are proportional to the number of respondents from each country. Please note that Europe has been magnified in this illustration.

Ospel JM, *et al*. *J NeuroIntervent Surg* 2020;**12**:1194–1198. doi:10.1136/neurintsurg-2020-015902

- **Enquête déclarative France pratiques 2018**
- **40 centres - 110/148 Nristes séniors**
- **36/40: équipe ARMPO immédiatement disponible H24**

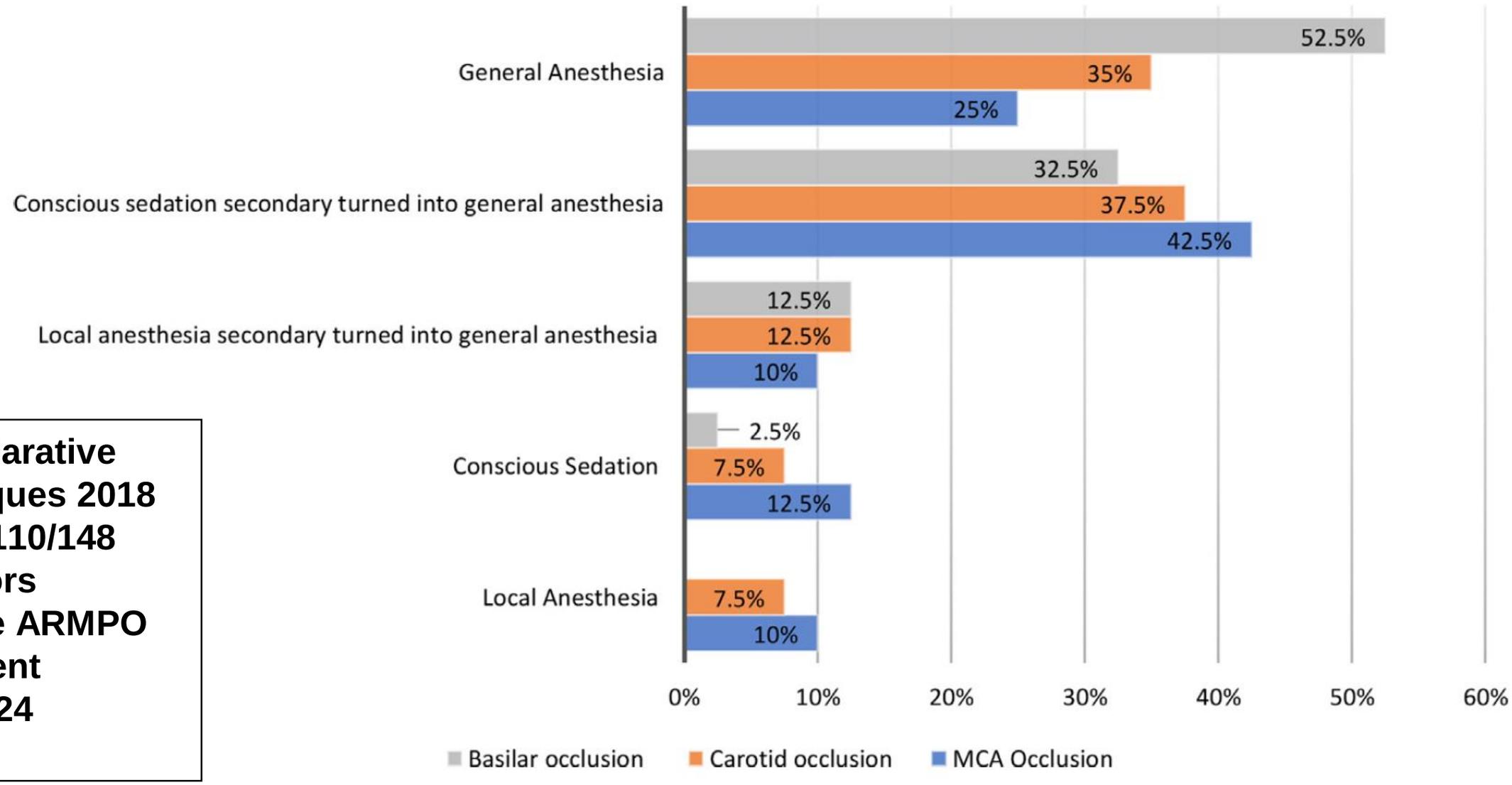

Fig. 2. Anesthetic considerations according to occlusion localization.

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Forestier G et al. *J Neuroradiol*; 2020

HAUTE AUTORITÉ DE SANTÉ

RAPPORT D'EVALUATION TECHNOLOGIQUE

Organisation de la prise en charge précoce de l'accident vasculaire cérébral ischémique aigu par thrombectomie mécanique

Juillet 2018

Conclusions sur la constitution des équipes et la formation des professionnels

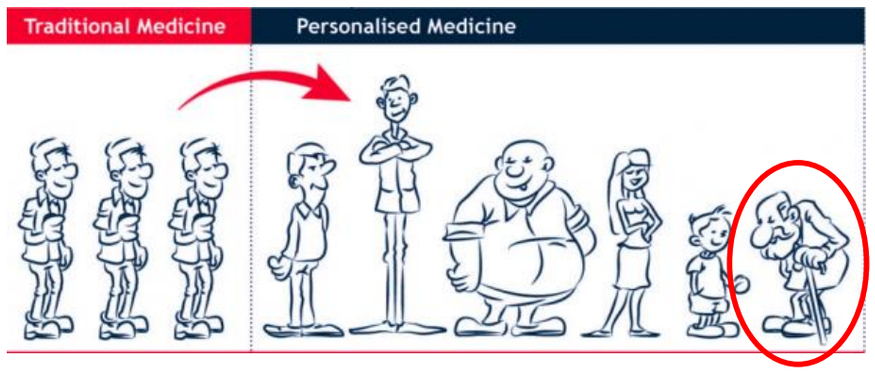
Composition de l'équipe de TM

Selon l'ensemble des recommandations analysées et l'avis des parties prenantes, la composition de l'équipe médicale et paramédicale requise pour la réalisation de la TM dans les conditions optimales est la suivante :

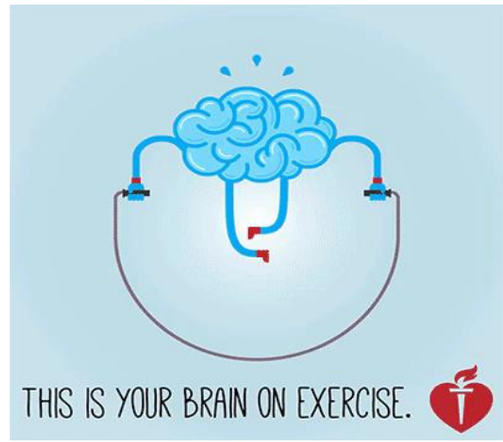
- un médecin opérateur de TM (*cf.* compétences ci-dessous) ;
- un anesthésiste ayant l'expérience de la prise en charge de patients traités par des actes de neuroradiologie interventionnelle ;
- un manipulateur d'électroradiologie médicale ;
- un infirmier d'anesthésie diplômé d'État (IADE) ;
- un aide-opératoire (médecin, infirmier ou manipulateur d'électroradiologie médicale).

- La sélection des patients éligibles à la TM est réalisée par concertation entre un neurologue, un neuroradiologue et un anesthésiste sur la base des examens cliniques et des données d'imagerie, réalisés sur place ou transmis par télémédecine. Le premier acte est de réaliser une imagerie cérébrale afin de confirmer l'infarctus cérébral.

AU FINAL… DU BON SENS




Stroke : Time lost is brain lost



- **Urgence interventionnelle absolue**
- **DELAIS +++**
- **PRESSION ARTERIELLE +++**

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THROMBECTOMIE MECANIQUE INTRACRANIENNE: GESTION DES TRAITEMENTS ADJUVANTS: AAP, AC

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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

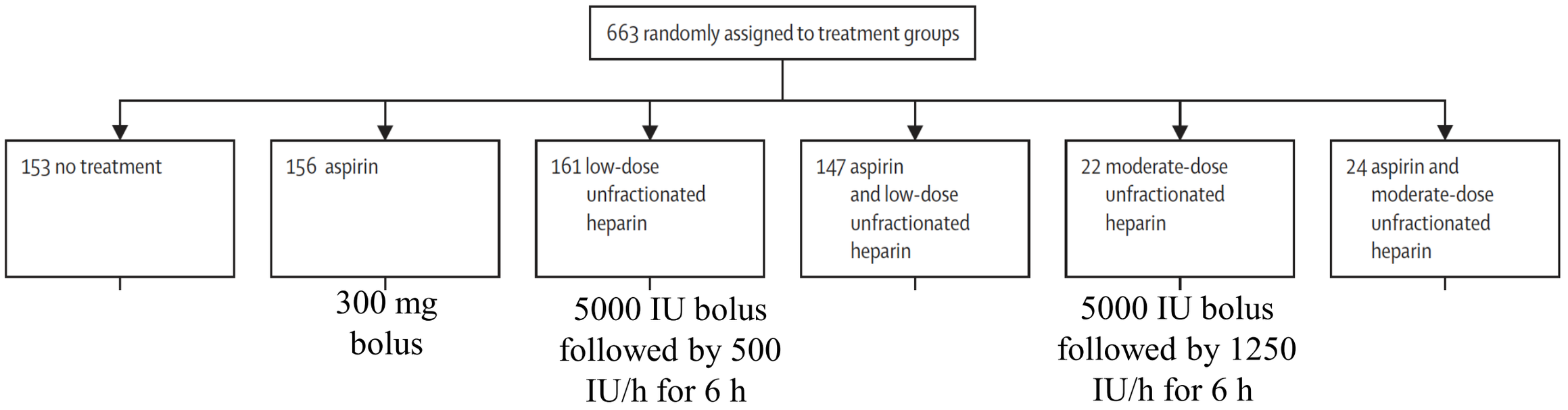
Texte validé par le Comité des Référentiels Cliniques de la SFAR le 16/05/2022, le conseil d'administration de la SFAR le 29/06/2022, le bureau de l'ANARLF le 29/06/2022, le conseil scientifique/d'administration de la SFNV le07/10/2022 et le conseil scientifique de la SFNR le 16/08/2022.

Auteurs : Hervé Quintard, Vincent Degos, Mikael Mazighi, Jérôme Berge, Pierre Boussemart, Russel Chabanne, Samy Figueiredo, Thomas Geeraerts, Yoann Launey, Ludovic Meuret, Jean-Marc Olivot, Julien Pottecher, Francesca Rapido, Sébastien Richard, Suzana Saleme, Virginie Siguret-Depasse, Olivier Naggara, Hugues De Courson, et Marc Garnier.

CHAMP 3. Gestion des anticoagulants et antiagrégants plaquettaires

Experts : V. Seguret (GFHT) – J. Pottecher (SFAR) – JM.Olivot (SFNV) – M. Mazighi (SFNV) –S. Richard (SFNV)

Safety and efficacy of aspirin, unfractionated heparin, both, or neither during endovascular stroke treatment (MR CLEAN-MED): an open-label, multicentre, randomised controlled trial



In this randomised controlled trial that was stopped early for concerns of safety, we found that periprocedural administration of aspirin or unfractionated heparin in patients with ischaemic stroke treated with endovascular treatment was associated with an increased risk of symptomatic intracranial haemorrhage. We also found no evidence for a beneficial effect on functional outcome of either treatment.

JAMA®

QUESTION Does administration of intravenous tirofiban before endovascular thrombectomy improve functional outcomes among patients with large vessel occlusion acute ischemic stroke?

CONCLUSION Among patients with large vessel occlusion acute ischemic stroke undergoing endovascular thrombectomy, treatment with intravenous tirofiban vs placebo before endovascular therapy resulted in no significant difference in disability severity at 90 days.

POPULATION

557 Men
391 Women

Adults with stroke and proximal intracranial large vessel occlusion

Mean age: **67** years

LOCATIONS

55
Hospitals
in China

INTERVENTION

950 Patients randomized
948 Patients analyzed

463
Tirofiban
Bolus of 10 μg/kg, followed by continuous infusion of 0.15 μg/kg/min, of tirofiban before endovascular thrombectomy

485
Placebo
Saline placebo before endovascular thrombectomy

PRIMARY OUTCOME

Global disability at 90 days, based on modified Rankin Scale (mRS) score (range, 0 [no symptoms] to 6 [death])

FINDINGS

Median (IQR) 90-day mRS score

Tirofiban	Placebo
3 (1 to 4)	**3** (1 to 4)

There was no significant difference in disability severity between groups by overall distribution of the mRS score at 90 days:

Adjusted common odds ratio for a lower level of disability,
1.08 (95% CI, 0.86 to 1.36); *P* = .50

RESCUE BT Trial Investigators. Effect of intravenous tirofiban vs placebo before endovascular thrombectomy on functional outcomes in large vessel occlusion stroke: the RESCUE BT randomized clinical trial. *JAMA*. Published August 9, 2022. doi:10.1001/jama.2022.12584

CHAMP 3. Gestion des anticoagulants et antiagrégants plaquettaires

Experts : V. Seguret (GFHT) – J. Pottecher (SFAR) – JM.Olivot (SFNV) – M. Mazighi (SFNV) –S. Richard (SFNV)

Question : Chez le patient présentant une occlusion artérielle cérébrale, et bénéficiant d'un traitement endovasculaire après avoir été préalablement traité par thrombolyse intraveineuse, l'héparinisation systémique per-procédure permet-elle d'améliorer le pronostic neurologique à 3 mois ?

R3.1 – Les experts suggèrent de ne pas procéder à une héparinisation systémique en per-procédure d'une revascularisation endovasculaire cérébrale chez des patients ayant bénéficié préalablement d'une thrombolyse intraveineuse, afin de ne pas aggraver le pronostic à 3 mois.
Avis d'experts (Accord fort)

Question : Chez le patient présentant une occlusion artérielle cérébrale, et bénéficiant d'un traitement endovasculaire sans avoir été préalablement traité par thrombolyse intraveineuse, l'héparinisation systémique per-procédure permet-elle d'améliorer le pronostic neurologique à 3 mois ?

ABSENCE DE RECOMMANDATION – À ce jour, la littérature disponible ne permet pas de se prononcer sur un éventuel intérêt de l'héparinisation systémique chez les patients présentant une occlusion artérielle cérébrale prise en charge par thrombectomie endovasculaire et n'ayant pas été traité préalablement par thrombolyse intraveineuse.

Question : Chez le patient présentant une occlusion artérielle cérébrale, et bénéficiant d'un traitement endovasculaire, l'antiagrégation per-procédure permet-elle d'améliorer le pronostic neurologique à 3 mois ?

R3.2 – En l'absence de thrombolyse intraveineuse préalable, les experts suggèrent de ne pas administrer systématiquement à tous les patients une anti-agrégation plaquettaire par anti-GPIIb/IIIa ou inhibiteur direct de la thrombine ; ce traitement pouvant être proposé en cas d'emboles distaux pendant la procédure de thrombectomie mécanique ou en cas d'occlusion persistante en fin de la procédure, afin d'améliorer le pronostic neurologique à 3 mois.
Avis d'experts (Accord fort)

R3.3 – Les experts suggèrent de ne pas administrer d'aspirine en per-procédure d'une revascularisation endovasculaire cérébrale, que les patients aient bénéficié ou non d'une thrombolyse intraveineuse préalable, afin de ne pas augmenter le risque d'hémorragie intra-parenchymateuse symptomatique.
Avis d'experts (Accord fort)

Question : Chez le patient présentant une occlusion artérielle cérébrale, bénéficiant d'un traitement endovasculaire nécessitant un stenting en urgence, une antiagrégation plaquettaire permet-elle d'améliorer le pronostic neurologique à 3 mois ?

R3.4.1 – Les experts suggèrent d'utiliser une antiagrégation plaquettaire (simple ou double) lors de la pose d'un stent pour éviter sa thrombose et améliorer le pronostic neurologique à 3 mois.
Avis d'experts (Accord fort)
R3.4.2 – Les experts suggèrent de n'initier cette antiagrégation plaquettaire en post-procédure qu'après avoir éliminé une hémorragie cérébrale par imagerie de contrôle au cours des premières 24 heures suivant le geste, afin de ne pas aggraver le pronostic neurologique.
Avis d'experts (Accord fort)

THROMBECTOMIE MECANIQUE INTRACRANIENNE: GESTION DES TRAITEMENTS ANTERIEURS: AAP, AC

- **Fréquents dans cette population**
- **Peu de données dans le contexte de la thrombectomie**
- **Augmente risque hémorragique per et post-procédure**
- **Peuvent faire modifier les indications de thrombolyse**
- **Pas de changement particulier de la stratégie de PEC de la TM**
- **Protocoles en cas d'hémorragie**

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THROMBECTOMIE MECANIQUE INTRACRANIENNE: GESTION DES TRAITEMENTS ADJUVANTS: AAP, AC

Hémorragie per-procédure (cérébrale, scarpa, ORL…)

Sous AAG: Indications à pondérer selon risque thrombotique (stent cérébral +++).

- Acide tranexamique : 1 gramme sur 10 minutes
- Transfusion plaquettaire :

0,5 à 0,75 x 10^{11} plaquettes par 10Kg de poids corporel (=1 dose poids) si Aspirine
1,5 x 10^{11} plaquettes par 10Kg de poids corporel (=2 doses poids) si Prasugrel (Efient®) ou Clopidogrel (Plavix®)
Ticagrelor (Brilique®) :

si prise < 24h : envisager Facteur VII activé (Novoseven®) (plaquettes non efficaces)
si prise >24h : 1,5 x 10^{11} plaquettes par 10Kg de poids corporel.
Le Ticagrelor n'est pas dialysable.

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www.ecolethrombectomie.com

Powers et al. *Stroke*; 2018
RFE GIHP SFAR 2019

THROMBECTOMIE MECANIQUE INTRACRANIENNE: GESTION DES TRAITEMENTS ADJUVANTS: AAP, AC

Hémorragie per-procédure (cérébrale, scarpa, ORL…)

Sous Héparine:

- Arrêter la perfusion
- Sulfate de Protamine IVL 5 à 10 minutes: isodose sur les 4 dernières heures IV ou dose dernière injection sous cutanée fractionnée en 3 injections à 4 heures d'intervalle; si insuffisant: refaire une demi-dose

Sous HBPM:

- Antagonisation partielle par sulfate de protamine, isodose (demi-dose si HBPM>12h) répartie en 3 injections à 4 heures intervalle; si insuffisant: refaire une demi-dose

Sous Fondaparinux (Pentasaccharide):

- Pas d'antidote

THROMBECTOMIE MECANIQUE INTRACRANIENNE: GESTION DES TRAITEMENTS ADJUVANTS: AAP, AC

Hémorragie per-procédure (cérébrale, scarpa, ORL…)

Sous AVK:

- Concentré de complexe prothrombinique (CCP), 25UI/Kg ou selon INR si connu; contrôle INR en fin d'administration pour objectif INR<1.3 si sgt intracranien, <1.6 si extracranien, réinjection si besoin
- Vitamine K 5 mg

Sous AOD:

- CCP non activés 25 à 50 UI/Kg ou activés (Feiba®) 30-50UI/Kg
- Antidotes spécifiques:

Idarucizumab (Praxbind ®): Dabigatran
Andexanet alpha: AOD Anti X, Attente AMM
Dabigatran dialysable
Charbon actif si prise <6h

THROMBECTOMIE MECANIQUE INTRACRANIENNE: GESTION DES TRAITEMENTS ADJUVANTS: AAP, AC

Hémorragie per-procédure (cérébrale, scarpa, ORL…)

Sous thrombolyse intra-veineuse :

- Arrêter la perfusion
- Fibrinogène 1 gramme (objectif >2g/L)
- PFC
- Acide tranexamique : 1 gramme sur 10 minutes puis 1 gramme sur 8 heures
- PSE

Powers et al. *Stroke*; 2018

QUESTIONS ?

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Conscious Sedation Versus General Anesthesia During Endovascular Therapy for Acute Anterior Circulation Stroke

Preliminary Results From a Retrospective, Multicenter Study

Alex Abou-Chebl, MD; Ridwan Lin, MD; Muhammad Shazam Hussain, MD; Tudor G. Jovin, MD; Elad I. Levy, MD; David S. Liebeskind, MD; Albert J. Yoo, MD; Daniel P. Hsu, MD; Marilyn M. Rymer, MD; Ashis H. Tayal, MD; Osama O. Zaidat, MD, MS; Sabareesh K. Natarajan, MD, MS; Raul G. Nogueira, MD; Ashish Nanda, MD; Melissa Tian, RN; Qing Hao, MD, PhD; Junaid S. Kalia, MD; Thanh N. Nguyen, MD; Michael Chen, MD; Rishi Gupta, MD

Background and Purpose—Patients undergoing intra-arterial therapy (IAT) for acute ischemic stroke receive either general anesthesia (GA) or conscious sedation. GA may delay time to treatment, whereas conscious sedation may result in patient movement and compromise the safety of the procedure. We sought to determine whether there were differences in safety and outcomes in GA patients before initiation of IAT.

Methods—A cohort of 980 patients at 12 stroke centers underwent IAT for acute stroke between 2005 and 2009. Only patients with anterior circulation strokes due to large-vessel occlusion were included in the study. A binary logistic-regression model was used to determine independent predictors of good outcome and death.

Conclusions—Patients placed under GA during IAT for anterior circulation stroke appear to have a higher chance of poor neurologic outcome and mortality. There do not appear to be differences in hemorrhagic complications between the 2 groups. Future clinical trials with IAT can help elucidate the etiology of the differences in outcomes. (***Stroke*. 2010; 41:1175-1179.)**

Key Words: acute stroke ■ thrombolysis ■ endovascular therapy ■ intra-arterial therapy ■ sedation

Endovascular therapy (also known as intra-arterial therapy, or IAT) for severe acute ischemic stroke (AIS) has been proven effective for middle cerebral artery occlusion in a randomized trial.[1] The effect of devices and pharmacologic agents on vessel recanalization and clinical outcomes has been reported in several clinical registries.[2–9] Intraprocedural techniques including the use of sedatives have not been rigorously studied. General anesthesia (GA) is often used to (1) sedate and immobilize the patient to prevent wire-induced vessel injury; (2) facilitate blood pressure control; (3) provide adequate patient ventilation and airway protection; and (4) make the procedure tolerable for patients. Conscious sedation (CS) may reduce delays to treatment and allow neurologic assessments during the procedure, which may reveal imminent or developing vascular complications as well as improvement or resolution of symptoms that may influence the rest of the procedure. The optimal modality of sedation during IAT for AIS has not been defined. We sought to determine whether there were safety concerns with the use of CS as well as differences in clinical outcomes between the 2

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Comparison of Safety and Clinical and Radiographic Outcomes in Endovascular Acute Stroke Therapy for Proximal Middle Cerebral Artery Occlusion With Intubation and General Anesthesia Versus the Nonintubated State

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Background and Purpose—There is considerable heterogeneity in practice patterns between sedation in the intubated state vs nonintubated state during endovascular acute stroke therapy. We sought to compare clinical and radiographic outcomes between these 2 sedation modalities.

Methods—Consecutive patients with acute stroke due to middle cerebral artery–M1 segment occlusion treated with endovascular therapy between January 2006 and July 2009 were identified in our interventional acute stroke database. Level of sedation was determined as intubated (IS) vs nonintubated (NIS) state. Final infarct volumes on follow-up imaging and clinical outcomes at 3 to 6 months were obtained.

Owing to the mounting evidence that vessel recanalization is a powerful predictor of outcome in acute ischemic stroke,[1] endovascular acute stroke therapy is being used with increasing frequency. Given the severity of neurologic injury and alterations in the sensorium, patients undergoing acute stroke interventions typically do not cooperate with the procedure. Therefore, conscious sedation or general anesthesia with intubation is typically required in these circumstances. Though important to the eventual procedural outcome, no data regarding intraprocedural sedation or airway management are available for any of the endovascular stroke therapy trials conducted to date.[2–5] Each method has advantages and disadvantages. Conscious sedation is not prone to the time delays necessary for intubation and ventilation that may translate into considerable delays in time to recanalization. Another advantage of conscious sedation is the ability to perform neurologic assessments at different stages during the procedure. In addition, given that extubation of patients with severe neurologic deficit may only be possible days beyond the actual intervention, performing the procedure in the nonintubated state (NIS) may lead to shorter intensive care unit (ICU) stays, which may facilitate earlier mobilization. Withdrawal of care, a significant cause of mortality in patients with large strokes, is more likely to occur in intubated patients. It is therefore not surprising that intubation was found to be associated with mortality rates as high as 60% to 65% in patients with acute stroke.[6,7]

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DOI: 10.1161/STROKEAHA.109.574194

Abou-Chebl et al. *Stroke*; 2010

Jumaa et al. *Stroke*; 2010

Controversies in Stroke

Section Editors: Carlos A. Molina, MD, PhD, and Magdy H. Selim, MD, PhD

The Case:
A patient presents with aphasia and right-sided weakness within 5 hours of onset, and occlusion of the proximal portion of the left middle cerebral artery. Emergent endovascular treatment is indicated.

The Questions:
(1) Should intubation and artificial ventilation be performed before the procedure?
(2) Is local anesthesia safe enough to be used, instead of general anesthesia, during the procedure?

The Controversy:
GENERAL ANESTHESIA IS PREFERABLE TO LOCAL ANESTHESIA DURING CEREBRAL ENDOVASCULAR PROCEDURES.

General Is Better Than Local Anesthesia During Endovascular Procedures

Brekenfeld C, Mattle HP, Schroth G. *Stroke*; 2010

Local Is Better Than General Anesthesia During Endovascular Acute Stroke Interventions

Gupta R. *Stroke*; 2010

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7. La TM doit être réalisée par un neuroradiologue interventionnel entrainé et expérimenté, répondant aux conditions d'autorisation définies par l'arrêté du 15 mars 2010 (art. D.6124-149 du code de Santé Publique). (Grade B, Niveau 2b)
8. Le choix de la technique d'anesthésie est décidé pour chaque patient, conjointement par l'anesthésiste et le neuroradiologue interventionnel. L'objectif est de réaliser la TM dans les meilleures conditions pour le patient et le neuroradiologue, sans réduire le délai de mise en route de la TM. (Grade C, Niveau 2b)
9. La TM doit être réalisée avec des stents retrievers approuvés par les autorités de santé. (Grade A, Niveau 1a)

JAMA | Original Investigation

Effect of Conscious Sedation vs General Anesthesia on Early Neurological Improvement Among Patients With Ischemic Stroke Undergoing Endovascular Thrombectomy
A Randomized Clinical Trial

Silvia Schönenberger, MD; Lorenz Uhlmann, MSc; Werner Hacke, MD, PhD; Simon Schieber, MD; Sibu Mundiyanapurath, MD; Jan C. Purrucker, MD; Simon Nagel, MD; Christina Klose; Johannes Pfaff, MD; Martin Bendszus, MD; Peter A. Ringleb, MD; Meinhard Kieser, PhD; Markus A. Möhlenbruch, MD; Julian Bösel, MD, FNCS

Table 3. Primary and Secondary Outcome Results

Variable	General Anesthesia (n = 73)	Conscious Sedation (n = 77)	Difference (95% CI)	*P* Value[a]
Primary Outcome				
Change in NIHSS[b], mean (95% CI)	−3.2 (−5.6 to −0.8)	−3.6 (−5.5 to −1.7)	−0.4 (−3.4 to 2.7)	.82[c]
Change in NIHSS, median (IQR)	−5.0 (−10.0 to 2.0)	−4.0 (−10 to 2.0)		
NIHSS after 24 h, mean (SD)	13.6 (11.1)	13.6 (9.0)	0.0 (−3.3 to 3.3)	>.99[d]

JAMA. doi:10.1001/jama.2016.16623
Published online October 26, 2016.

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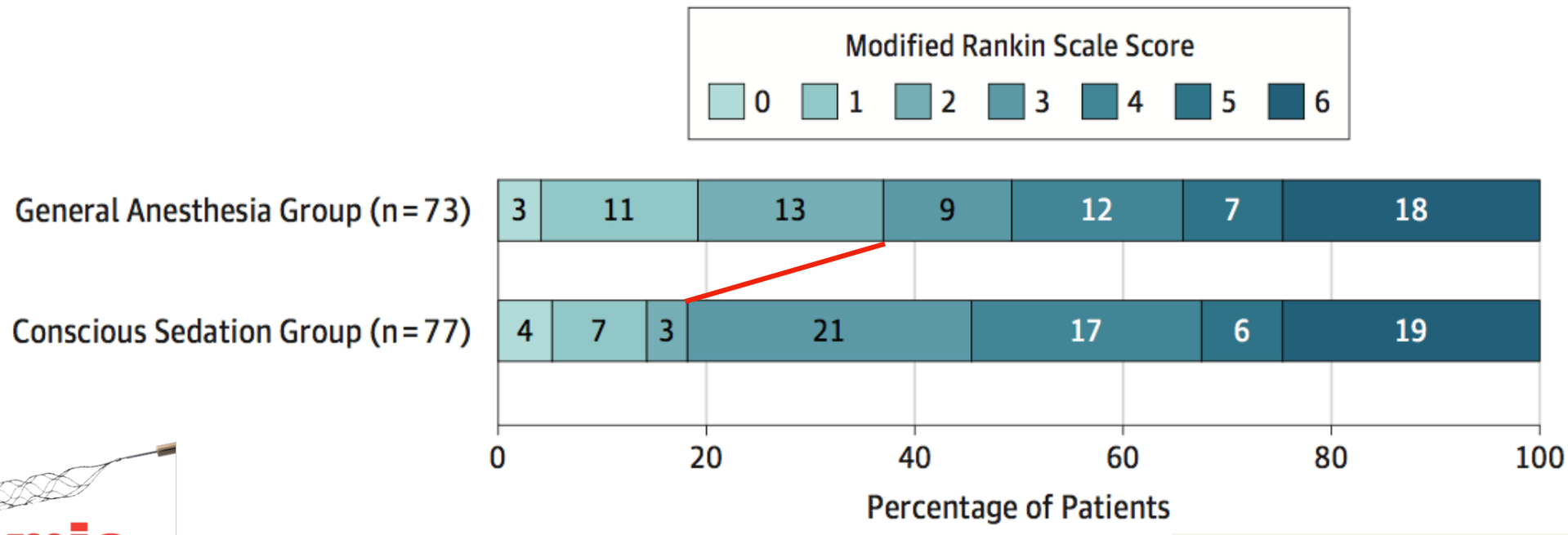
Figure 3. Functional Outcome at 90-Day Follow-up in the Intent-to-Treat Population



JAMA. doi:10.1001/jama.2016.16623
Published online October 26, 2016.

General Anesthesia Versus Conscious Sedation for Endovascular Treatment of Acute Ischemic Stroke

The AnStroke Trial (Anesthesia During Stroke)

Pia Löwhagen Hendén, MD*; Alexandros Rentzos, MD*; Jan-Erik Karlsson, MD, PhD; Lars Rosengren, MD, PhD; Birgitta Leiram, MD; Henrik Sundeman, MD, PhD; Dennis Dunker, MD; Kunigunde Schnabel, MD†; Gunnar Wikholm, MD, PhD; Mikael Hellström, MD, PhD; Sven-Erik Ricksten, MD, PhD

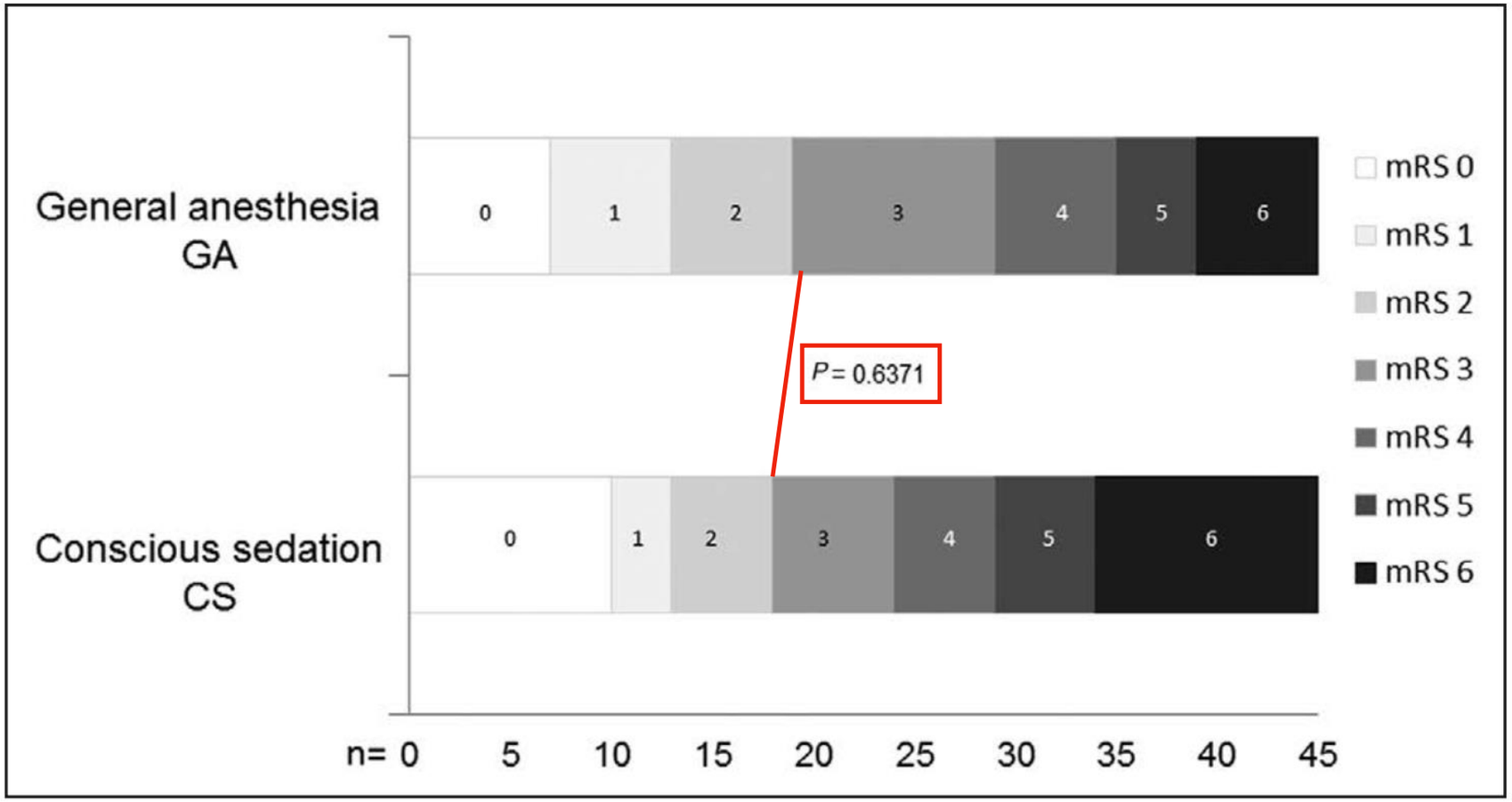


Figure 2. Neurological outcome expressed as modified Rankin Scale (mRS) score. GA indicates general anesthesia.

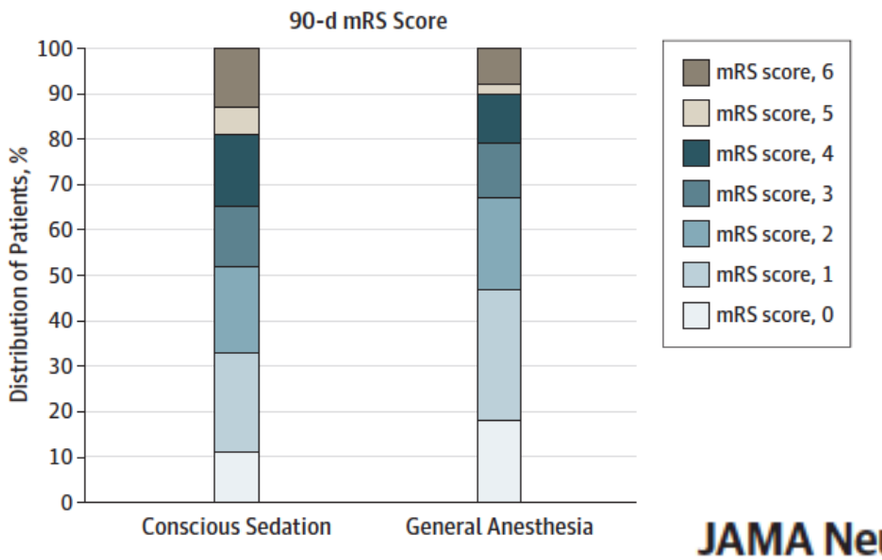
Stroke. 2017;48:00-00. DOI: 10.1161/STROKEAHA.117.016554.

JAMA Neurology | Original Investigation

Effect of General Anesthesia and Conscious Sedation During Endovascular Therapy on Infarct Growth and Clinical Outcomes in Acute Ischemic Stroke
A Randomized Clinical Trial

Claus Z. Simonsen, MD, PhD; Albert J. Yoo, MD, PhD; Leif H. Sørensen, MD; Niels Juul, MD; Søren P. Johnsen, MD, PhD; Grethe Andersen, MD, DMSc; Mads Rasmussen, MD, PhD

Outcome	General Anesthesia (n = 65)	Conscious Sedation (n = 63)	*P* Value
Successful reperfusion (mTICI 2b-3), No. (%)	50 (76.9)	38 (60.3)	.04
Acute infarct volume, median (IQR), mL	10.5 (2.4-23.6)	13.3 (5.2-31.1)	.26
Final infarct volume, median (IQR), mL	22.3 (8.1-64.5)	38.0 (16.7-128.0)	.04
Infarct volume growth, median (IQR), mL	8.2 (2.2-38.6)	19.4 (2.4-79.0)	.10
90-d mRS score, median (IQR)	2 (1-3)	2 (1-4)	.04
NIHSS score in 24 h, median (IQR)	6 (3-14)	10 (2-19)	.19
Change in NIHSS score after 24 h, median (IQR)	−10 (−14 to −5)	−7 (−13 to 0)	.11



What Matters during Endovascular Therapy for Acute Stroke

Anesthesia Technique or Blood Pressure Management?

E.J. Heyer, Z.H. Anastasian, P.M. Meyers. *Anesthesiology*; 2012