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ANARLF
ASSOCIATION DE NEURO-ANESTHÉSIE
RÉANIMATION DE LANGUE FRANÇAISE

THROMBECTOMIE MECANIQUE INTRACRANIENNE:

ANESTHESIE, SEDATION, ANALGESIE

GESTION DES TRAITEMENTS ADJUVANTS

Russell CHABANNE
Neuroréanimation
Anesthésie Neurochirurgie - Neuroradiologie Interventionnelle
Pole Médecine Péri Opératoire
CHU Clermont-Ferrand

Ecole de la Thrombectomie

Clermont-Ferrand
CHU - Faculté de médecine
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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

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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From the University of Louisville Medical Center (A.A.-C.), Louisville, Ky; Stroke Institute (R.L., T.G.J.), University of Pittsburgh Medical Center, Pittsburgh, Pa; Cleveland Clinic Foundation (M.S.H., R.G.), Cleveland, Ohio; State University of New York (E.I.L., S.K.N.), Buffalo, NY; for the UCLA Revascularization Investigators (D.S.L., Q.H.), University of California, Los Angeles, Calif; Massachusetts General Hospital (A.J.Y., R.G.N.), Boston, Mass; University Hospitals–Case Medical Center (D.P.H., A.N.), Cleveland, Ohio; St. Luke's Brain and Stroke Institute (M.M.R.), Kansas City, Mo; Allegheny General Hospital (A.H.T., M.T.), Pittsburgh, Pa; Medical College of Wisconsin (O.Z., J.S.K.), Milwaukee, Wis; Boston University School of Medicine (T.N.N.), Boston, Mass; Rush University Medical Center (M.C.), Chicago, Ill; and Vanderbilt University Medical Center (R.G.), Nashville, Tenn.

Correspondence to Rishi Gupta, MD, Department of Neurology, Vanderbilt Stroke Center, A-0118 Medical Center North, Nashville, TN 37232-2551. E-mail rishi.gupta@vanderbilt.edu

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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

Mouhammad A. Jumaa, MD; Fan Zhang, MD; Gerardo Ruiz-Ares, MD; Theresa Gelzinis, MD; Amer M. Malik, MD; Aitziber Aleu, MD; Jennifer I. Oakley, BS; Brian Jankowitz, MD; Ridwan Lin, MD; Vivek Reddy, MD; Syed F. Zaidi, MD; Maxim D. Hammer, MD; Lawrence R. Wechsler, MD; Michael Horowitz, MD; Tudor G. Jovin, MD

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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From the Stroke Institute (M.A.J., T.G., A.M.M., V.R., R.L., J.I.O., S.Z., L.R.W., T.G.J.) and Department of Neurosurgery (B.J., M.H.), University of Pittsburgh Medical Center, Pittsburgh, Pa; Memorial Hospital (F.Z.), Northwestern University, Chicago, Ill; and Department of Medicine (A.A.), Universitat Autonoma de Barcelona, and Department of Medicine (G.R.-A.) University Hospital La Paz, Madrid, Spain.

Correspondence to Tudor G. Jovin, MD, Center for Neuroendovascular Therapy, UPMC Stroke Institute, Suite C424, 200 Lothrop St, Pittsburgh, PA 15213. E-mail jovintg@upmc.edu

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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

Original Contribution

Anesthesia-Related Outcomes for Endovascular Stroke Revascularization

A Systematic Review and Meta-Analysis

Waleed Brinjikji, MD; Jeffrey Pasternak, MD; Mohammad H. Murad, MD; Harry J. Cloft, MD, PhD; Tasha L. Welch, MD; David F. Kallmes, MD; Alejandro A. Rabinstein, MD

Background and Purpose—There is currently controversy on the ideal anesthesia strategy during mechanical thrombectomy for acute ischemic stroke. We performed a systematic review and meta-analysis of studies comparing clinical and angiographic outcomes of patients undergoing general anesthesia (GA group) and those receiving either local anesthesia or conscious sedation (non-GA group).

Methods—A literature search on anesthesia and endovascular treatment of acute ischemic stroke was performed. Using random-effects meta-analysis, we evaluated the following outcomes: recanalization rate, good functional outcome at 90 days (modified Rankin Scores≤2), symptomatic intracranial hemorrhage, death, vascular complications, respiratory complications, procedure time, and time to groin puncture.

Results—Twenty-two studies (5 randomized controlled trials and 19 observational studies), including 4716 patients (1519 GA and 2897 non-GA) were included. In the nonadjusted analysis, patients in the GA group had higher odds of death (odds ratio [OR], 2.02; 95% confidence interval [CI], 1.66–2.45) and respiratory complications (OR, 1.70; 95% CI, 1.22–2.37) and OR of good functional outcome (OR, 0.58; 95% CI, 0.48–0.64) compared with the non-GA group. There was no difference in procedure time between the 2 primary comparison groups. When adjusting for baseline National Institutes of Health Stroke Scale, GA was still associated with lower odds of good functional outcome (OR, 0.59; 95% CI, 0.29–0.94). When considering studies performed in the stent-retriever/aspiration era, there was no significant difference in good neurological outcomes between GA and non-GA (OR, 0.95; 95% CI, 0.67–1.06).

Conclusions—Acute ischemic stroke patients undergoing intra-arterial therapy may have worse outcomes when treated with GA as compared with conscious sedation. However, major limitations of current evidence (ie, retrospective design, selection bias) dedicated to need for adequately powered, multicenter randomized controlled trials to answer this question. (*Stroke.* 2015;46:2111-2116. DOI: 10.1161/STROKEAHA.115.008699.)

Key Words: anesthesia, local ■ confidence intervals ■ humans ■ retrospective studies ■ stroke

Mechanical thrombectomy for treatment of acute ischemic stroke secondary to large vessel occlusion is standard of care.[1–6] Despite the stimulus the stimulus the randomized trials, a substantial effect demonstrated by recently published ... patients do not perform as well as ... treatment effect demonstrated by ... patient recanalization procedure may have a ... the choice of anesthetic management during the ... intubation or general anesthesia (GA) is associated ... observational studies have suggested that retrospective ... outcomes when compared with conscious sedation (CS).[6–8] ... randomized controlled trials shown no differences in ... recanalization or stroke outcome.[9] Because of the ... limiting debate on anesthesia management during intra-arterial ...

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From the Department of Radiology (W.B., H.J.C., D.F.K.), Department of Neurology (W.B., H.J.C., D.F.K.), Department of Neurosurgery (W.B., H.J.C., D.F.K.), Department of Anesthesiology (J.P., T.L.W.), Department of Quantitative Health Sciences (M.H.M.), Knowledge and Evaluation Research Unit (M.H.M.), and Department of Neurology (A.A.R.), Mayo Clinic, Rochester, MN.

Correspondence to Waleed Brinjikji, MD, Department of Radiology, Mayo Clinic, 200 1st St, SW Rochester, MN 55905. E-mail brinjikji.waleed@mayo.edu

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Mechanical Thrombectomy in Acute Stroke: Prospective Pilot Trial of the Solitaire FR Device while Under Conscious Sedation

S. Spitze, K. Kadziolka, L. Estrade, I. Serre, S. Baischine, and L. Pierot

ORIGINAL RESEARCH INTERVENTIONAL

BACKGROUND AND PURPOSE: The best approach between general anesthesia and conscious sedation to perform mechanical thrombectomy remains unknown. The goal of our study was to evaluate the feasibility, safety, and efficacy of mechanical thrombectomy under conscious sedation in patients with acute ischemic stroke, using the Solitaire FR device, in a prospective, single-center, single-arm study.

MATERIALS AND METHODS: The study included consecutive patients with acute ischemic stroke due to a large artery occlusion within 6 hours of symptom onset for the anterior circulation, and within 24 hours for the posterior circulation. After intravenous thrombolysis (when no contraindications), thrombectomy was performed with the Solitaire device in patients under conscious sedation. Primary efficacy and safety end points were good functional outcome (mRS ≤2) at 3 months and mortality at 3 months. Secondary end points were recanalization (TICI ≥2) and failure rate.

RESULTS: From May 2010 to July 2011, 36 patients were treated. Median baseline NIHSS score was 17.5. The occlusion site was MCA in 21 patients (58.4%), ICA-MCA tandem occlusion in 9 patients (25.0%), terminal ICA in 3 patients (8.3%), and basilar artery in 4 patients (11.1%). Twenty-three patients (63.9%) received intravenous thrombolysis. Superselective catheterization of the occluded vessel was not feasible in 5/36 cases (13.9%). Successful revascularization was achieved in 29/36 patients (77.8%). After 3 months, 22 patients (61.1%) showed good functional outcome (mRS ≤2) and the median NIHSS score was 8.5. Overall mortality rate at 3 months was 22.2% (8/36).

CONCLUSIONS: In acute ischemic stroke, mechanical thrombectomy while under conscious sedation is feasible in a large percentage of cases (86.1%) and is associated with a short procedure delay and a high percentage of good functional outcomes at 3 months (61.1%).

ABBREVIATIONS: ASPECT = Alberta Stroke Program Early CT; IQA = intraqualitative image ratio = modified Rankin Scale; TICI = Thrombolysis in Cerebral Infarction

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From the Service de Radiologie (S.S., K.K., L.E., I.S., L.P.), and Service de Neurologie (S.B.), Hôpital de Maison Blanche, Reims, France.

Patients presenting with acute ischemic stroke can be treated medically, by lysing the clot via intravenous fibrinolysis or endovascularly, by removing the clot through an intra-arterial method to re-establish vascularization in the blocked territory. The therapeutic time reference for acute ischemic stroke is intravenous thrombolysis with rtPA within 4.5 hours of stroke onset.[1–3] When the occluded artery is proximal or large, intravenous fibrinolysis often reaches its limits resulting in low recanalization rates and a high degree of reocclusion.[3,4] Because early recanalization is highly correlated with a patient's prognosis, various endovascular techniques have been developed to improve the recanalization rate as well as the clinical outcome of these patients.[3] The pilot study in Acute Cerebral Thromboembolism (PRACT) [1] study demonstrated the efficacy of intra-arterial fibrinolysis with a high recanalization rate of 66% in the MCA.[4] Then, studies dealing with various mechanical thrombectomy devices demonstrated improved clinical outcome.[5–12]

Intra-arterial thrombectomy was initially performed under general anesthesia, but recent publications have outlined the potential value of conscious sedation with improved clinical outcomes after 3 months and a lower mortality rate.[13–17] However, these studies have several limitations: first, they were retrospective and the feasibility of mechanical thrombectomy under conscious sedation was not analyzable; second, only some occlusion sites were included (anterior circulation or middle cerebral artery);

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From the Departments of Neurology (L.A.v.d.B., D.J.H.L.K., L.A.J.), and Radiology (O.A.B., C.B.L.M.M.), Academic Medical Center, Amsterdam, The Netherlands; Department of Neurology (J.A.v.d.L., D.W.D., A.D.B., Y.B.W.E.M.R., P.J.N.), and Radiology (G.A.L., L.A.N.J.), Medisch Spectrum Twente, Enschede, The Netherlands; Department of Neurology (D.B., R.J.v.O.) and Radiology (W.H.v.Z.), Maastricht University Medical Center, Maastricht, The Netherlands; Department of Neurology (W.J.S.), Stichting Epilepsie Instellingen Nederland, Heemstede, The Netherlands; Department of Neurology (D.F.K., P.J.K.), Leiden University Medical Center, Leiden, The Netherlands; Department of Neurology (J.A.v.d.L., D.W.D., A.D.B., Y.B.W.E.M.R., P.J.N.), and Radiology (G.A.L., L.A.N.J.), Medisch Spectrum Twente, Enschede, The Netherlands; Department of Neurology (D.B., R.J.v.O.) and Radiology (W.H.v.Z.), Maastricht University Medical Center, Maastricht, The Netherlands; Department of Neurology (W.J.S.), Stichting Epilepsie Instellingen Nederland, Heemstede, The Netherlands; Department of Neurology (D.F.K., P.J.K.), Leiden University Medical Center, Leiden, The Netherlands; and Department of Neurology (J.A.v.) and Radiology (C.B.L.M.M.), Academic Medical Center, Amsterdam, The Netherlands.

A full list of the MR CLEAN Investigators can be found in the Appendix.

The online-only Data Supplement is available with this article at http://stroke.ahajournals.org/lookup/suppl/doi:10.1161/STROKEAHA.115.008699/-/DC1.

Correspondence to Y.B.W.E.M. Roos, MD, PhD, Department of Neurology, the Academic Medical Center, Meibergdreef 9, 1100 DD, PO Box 22660, Amsterdam, The Netherlands. E-mail y.b.roos@amc.uva.nl

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

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

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

***Methods*—**All consecutive patients with AIS of the anterior circulation who received IAT between 2002 and 2013 in 16 participating centers were included in the study. Primary outcome was functional outcome on the modified Rankin Scale at 90 days. Univariate and multivariable ordinal regression analysis, adjusting for age, stroke severity, occlusion of the internal carotid artery terminus, previous stroke, atrial fibrillation, and diabetes mellitus, was performed to assess the association between GA and non-GA was estimated using multiple ordinal regression analysis, adjusting for age, stroke severity, occlusion of the internal carotid artery terminus, previous stroke, atrial fibrillation, and diabetes mellitus.

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

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

Key Words: acute stroke ■ anesthesia ■ conscious sedation ■ thrombectomy ■ thrombolytic therapy

Intra-arterial treatment (IAT) has been proven effective and safe for patients with acute ischemic stroke (AIS).[1–3] Numerous studies and devices[4–7] however, less is known about the effect of anesthesia during IAT. During intervention, patients receive either general anesthesia (GA) or no GA (non-GA), referring to local anesthesia at groin puncture site with or without conscious sedation (CS). Recent retrospective studies suggest that non-GA is as feasible as GA and that GA may be associated with a lower rate of successful recanalization and worse clinical outcome.[8–10] Several factors could contribute to these findings. Induction of general anesthesia can cause blood pressure shifts and intravenous anesthetic agents are known to alter blood carbon dioxide (CO_2) and can cause hypotension with that could lead to changes in cerebral autoregulation with decreased cerebral perfusion.[11]

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From the Stroke Institute, Department of Neurology, University of Pittsburgh Medical Center, Pittsburgh, PA; Cerebrovascular Research Laboratory, Department of Neurosurgery, University of Pittsburgh Medical Center, Pittsburgh, PA; Vall d'Hebron Research Institute, Universitat Autonoma de Barcelona, Barcelona, Spain; and Department of Neurology, Allegheny General Hospital, Pittsburgh, PA.

Correspondence to Tudor G. Jovin, MD, Stroke Institute, Department of Neurology, University of Pittsburgh Medical Center, 200 Lothrop St, Pittsburgh, PA 15213. E-mail jovintg@upmc.edu

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ORIGINAL RESEARCH

Conscious sedation versus general anaesthesia during mechanical thrombectomy for stroke: a propensity score analysis

Jennifer S McDonald,[1] Waleed Brinjikji,[1] Alejandro A Rabinstein,[2] Harry J Cloft,[1,3] Giuseppe Lanzino,[1,3] David F Kallmes[1,3]

Background Debate exists as to whether patients with acute ischemic stroke who are undergoing mechanical thrombectomy should receive general anaesthesia or conscious sedation during the procedure. Using a multihospital administrative database, we compared outcomes and complications of patients receiving mechanical thrombectomy, who were receiving general anaesthesia and conscious sedation, and studied trends in usage over time.

Materials and methods Premier database patients who underwent mechanical thrombectomy from 2006 to 2013 for acute ischemic stroke were identified. Using general anaesthesia and 513 (20%) received conscious sedation. Following 1:1 matching by the propensity score matching, 507 general anaesthesia and 507 conscious sedation patients were matched. Patients who received general anaesthesia during their procedure had significantly higher rates of in-hospital mortality (25% vs 12%, OR=2.37 95% CI 1.68 to 3.37, p<0.0001), and pneumonia (17.0% vs 9.3%, OR=2.0, 95% CI 1.35 to 2.96, p=0.0005) compared with patients of thrombectomy who received conscious sedation. ICH/SAH rates were similar between patients receiving general anaesthesia and patients receiving conscious sedation (11% vs 12%, p=0.62). Usage rate of general anaesthesia decreased from 83.8% in 2006 and 74.0% in 2013.

Conclusions In our cohort, thrombectomy patients receiving conscious sedation have decreased in-hospital mortality, decreased rates of pneumonia, and lower hospital costs and lengths of stay when compared with patients who received general anaesthesia. However, most practitioners continue to use general anaesthesia in the setting of acute stroke interventions.

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[1]Department of Radiology, Mayo Clinic, Rochester, Minnesota, USA
[2]Department of Neurology, Mayo Clinic, Rochester, Minnesota, USA
[3]Department of Neurosurgery, Mayo Clinic, Rochester, Minnesota, USA

Correspondence to
Dr Waleed Brinjikji, Department of Radiology, Mayo Clinic, 200 1st Street SW, Rochester, MN 55905, USA;
brinjikji.waleed@mayo.edu

INTRODUCTION

Intra-arterial reperfusion therapies are increasingly being used in the treatment of acute ischemic stroke.[1] Timely reperfusion is essential to decreasing morbidity and mortality, as every minute after acute ischemic stroke has been estimated to result in the loss of approximately two million neurons.[2]

ORIGINAL RESEARCH

Conscious sedation versus general anaesthesia during mechanical thrombectomy for stroke: a propensity score analysis

Jennifer S McDonald,[1] Waleed Brinjikji,[1] Alejandro A Rabinstein,[2] Harry J Cloft,[1,3]

Many factors contribute to outcomes in acute ischemic stroke patients following mechanical thrombectomy.

Moderate conscious sedation and general anaesthesia with intubation are the two most commonly used techniques in anaesthesia for patients of acute ischemic stroke undergoing mechanical thrombectomy.[3] Physicians preferring general anaesthesia over conscious sedation often cite factors such as decreased patient movement, perceived procedural safety, and improved procedural efficacy.[3] Advantages in conscious sedation include the ability to continuously monitor the patient's neurologic status, haemodynamic stability, and decreased procedural time.[4] There exists much debate regarding which anaesthesia strategy, general anaesthesia or conscious sedation, results in improved patient outcomes.[1 4] We evaluated a large inpatient database to study in-hospital outcomes of patients of acute ischemic stroke who are undergoing general anaesthesia or conscious sedation during mechanical thrombectomy.

METHODS

Data source and study population

The Perspective database (Premier, Charlotte, North Carolina, USA) is a voluntary, fee-supported collection of data developed to assess the quality and resource usage of healthcare delivery within the USA. As of 2014, the Perspective database consisted of approximately 20% of hospitalisations nationwide and represented more than 2900 US hospitals. Patient demographics, hospital information, diagnoses, procedures, discharge status, and all billed items are recorded in this database.

Patients who presented with acute ischemic stroke (ICD-9-CM diagnostic codes 433.x1 and 434.x1) from 2006 to 2013 were identified from the Perspective database. Patients were only included if the stroke code was listed as the primary hospitalisation diagnosis to avoid including patients with a previous history of stroke. Patients of acute ischemic stroke who underwent thrombectomy during their hospitalisation were identified using ICD-9 procedural code 39.74. Patients who underwent another invasive surgery on the same day as their thrombectomy were identified using ICD-9 procedural codes and excluded from the subsequent analysis to avoid including patients who received anaesthesia for a procedure other than thrombectomy. The following baseline patient

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From the Departments of Radiology (W.B., H.J.C., G.L., D.F.K.), Neurology (A.A.R.), Health Sciences Research (J.S.M.), and Center for the Science of Healthcare Delivery (M.H.M.), and the Division of Preventive Medicine (M.H.M.), Mayo Clinic, Rochester, Minnesota, USA

Please address correspondence to Waleed Brinjikji, MD, 200 1st St SW, Rochester, MN 55905; e.man.brinjikji.waleed@mayo.edu

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Endovascular Acute Ischemic Stroke Treatment: A Systematic Review and Meta-Analysis

W. Brinjikji, M.H. Murad, A.A. Rabinstein, H.J. Cloft, G. Lanzino, and F

ORIGINAL RESEARCH INTERVENTIONAL

CRITICAL CARE MEDICINE

Anesthetic Management and Outcome in Patients during Endovascular Therapy for Acute Stroke

Melinda J. Davis, B.Med., F.A.N.Z.C.A.,* Bijoy K. Menon, M.D.,† Leyla B. Baghirzada, M.D.,‡ Cynthia R. Campos-Herrera, M.D.,† Mayank Goyal, M.D.,§ Michael D. Hill, M.D.,# David P. Archer, M.D.,‖ The Calgary Stroke Program

What We Already Know about This Topic

- Recent retrospective case series have reported an association between anesthetic management and poor outcomes. But data of neurologic status were not available

What This Article Tells Us That Is New

- Systolic blood pressure less than 140 mmHg and general anesthesia were predictors of poor neurologic outcome in patients requiring endovascular therapy for acute stroke

Background: Studies of endovascular treatment for acute ischemic stroke have identified general anesthesia as a predictor for poor outcome in comparison with local anesthesia/sedation. This retrospective study attempts to identify modifiable factors associated with poor outcome, while adjusting for baseline stroke severity, in patients receiving general anesthesia.

Methods: We reviewed charts of 129 patients treated between January 2003 and September 2009. The primary outcome was the modified Rankin Score of 0–2 for 3 months poststroke. Predictors of neurologic outcome included baseline stroke severity, blood pressure, and age. Additional risk factors evaluated were prolonged anesthesia, hypotension, hyperglycemia, glucose concentration, and age. Choice of local anesthesia or general anesthesia was left to the discretion of the neurointerventionalist.

Results: The study group was 96 out of 129 patients for whom modified Rankin Scale scores were available. Forty-eight patients received general anesthesia and 48 local anesthesia. The proportion of patients with "good" outcomes was 15% and 69% in the general anesthesia group and local anesthesia group, respectively ($P \leq 0.001$). Lower systolic blood pressure and general anesthesia were correlated ($\phi = -0.7$, $P < 0.001$). Independent predictors for good neurologic outcome were local anesthesia, systolic blood pressure greater than 140 mmHg, and low baseline stroke scores.

Conclusions: Adjusted for baseline severity, patients who received general anesthesia for treatment are less likely to have a good outcome than those managed with local anesthesia. This may be due to preintervention risk not included in the stroke severity assessments. Hypotension, more frequent in general anesthesia patients, may also contribute.

ENDOVASCULAR arterial revascularization for acute stroke improves outcome of patients with large vessel occlusion,[1–9] for whom the results of intravenous thrombolysis are poor. At our center, emergency endovascular treatment has been offered to patients with severe disabling stroke due to occlusions of the carotid, middle cerebral, and basilar arteries presenting for treatment during an extended time window. Anesthetic management during an endovascular procedure can include local anesthesia, conscious sedation, and general anesthesia. In addition to patient

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From the Stroke Institute, Department of Neurology, University of Pittsburgh Medical Center, Pittsburgh, PA; Department of Anesthesiology, University of Calgary, Calgary, Alberta, Canada; Department of Clinical Neurosciences, University of Calgary, Calgary, Alberta, Canada; and Calgary Stroke Program, Division of Neurology, Department of Medicine, University of Calgary, Calgary, Alberta, Canada.

Supported by Alberta Innovates Health Solutions Clinician Fellowship (M.J.D.); Canadian Institutes of Health Research Operating Grant (M.D.H.); and Canada Foundation for Innovation/Alberta Innovates Health Solutions Interdisciplinary Capacity Enhancement Grant (M.D.H.). Support was also provided solely from institutional and departmental sources.

Address correspondence to Dr. Davis: Department of Anesthesia, Foothills Medical Centre, 1403 29th Street N.W., Calgary, Alberta, Canada T2N 2T9; melinda.davis@albertahealthservices.ca. Information on purchasing reprints may be accessed at http://www.anesthesiology.org.

Anesthesiology 2013; 118:386–96

ORIGINAL RESEARCH

Conscious sedation versus general anaesthesia during mechanical thrombectomy for stroke: a propensity score analysis

Jennifer S McDonald,[1] Waleed Brinjikji,[1] Alejandro A Rabinstein,[2] Harry J Cloft,[1,3]

Many factors contribute to outcomes in acute ischemic stroke patients following mechanical thrombectomy.

Moderate conscious sedation and general anaesthesia with intubation are the two most commonly used techniques in anaesthesia for patients of acute ischemic stroke undergoing mechanical thrombectomy.[3] Physicians preferring general anaesthesia over conscious sedation often cite factors such as decreased patient movement, perceived procedural safety, and improved procedural efficacy.[3] Advantages in conscious sedation include the ability to continuously monitor the patient's neurologic status, haemodynamic stability, and decreased procedural time.[4] There exists much debate regarding which anaesthesia strategy, general anaesthesia or conscious sedation, results in improved patient outcomes.[1 4] We evaluated a large inpatient database to study in-hospital outcomes of patients of acute ischemic stroke who are undergoing general anaesthesia or conscious sedation during mechanical thrombectomy.

METHODS

Data source and study population

The Perspective database (Premier, Charlotte, North Carolina, USA) is a voluntary, fee-supported collection of data developed to assess the quality and resource usage of healthcare delivery within the USA. As of 2014, the Perspective database consisted of approximately 20% of hospitalisations nationwide and represented more than 2900 US hospitals. Patient demographics, hospital information, diagnoses, procedures, discharge status, and all billed items are recorded in this database.

Patients who presented with acute ischemic stroke (ICD-9-CM diagnostic codes 433.x1 and 434.x1) from 2006 to 2013 were identified from the Perspective database. Patients were only included if the stroke code was listed as the primary hospitalisation diagnosis to avoid including patients with a previous history of stroke. Patients of acute ischemic stroke who underwent thrombectomy during their hospitalisation were identified using ICD-9 procedural code 39.74. Patients who underwent another invasive surgery on the same day as their thrombectomy were identified using ICD-9 procedural codes and excluded from the subsequent analysis to avoid including patients who received anaesthesia for a procedure other than thrombectomy. The following baseline patient

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From the Departments of Radiology (W.B., H.J.C., G.L., D.F.K.), Neurology (A.A.R.), Health Sciences Research (J.S.M.), and Center for the Science of Healthcare Delivery (M.H.M.), and the Division of Preventive Medicine (M.H.M.), Mayo Clinic, Rochester, Minnesota, USA

Please address correspondence to Waleed Brinjikji, MD, 200 1st St SW, Rochester, MN 55905; e.man.brinjikji.waleed@mayo.edu

Evidence-Based Medicine Level 1.

http://dx.doi.org/10.3174/ajnr.A4539

Conscious Sedation versus General Anesthesia during Endovascular Acute Ischemic Stroke Treatment: A Systematic Review and Meta-Analysis

W. Brinjikji, M.H. Murad, A.A. Rabinstein, H.J. Cloft, G. Lanzino, and F

AJNR Am J Neuroradiol 36:525–29 Mar 2015 www.ajnr.org

Owing to the mounting evidence ... zation is a powerful predi... mic stroke,[1] endovasc... ...ith increasi... ...jur...

ORIGINAL RESEARCH INTERVENTIONAL

Is general anaesthesia preferable to conscious sedation in the treatment of acute ischaemic stroke with Intra-arterial mechanical thrombectomy? A review of the literature

...N. John · P. Mitchell · R. Dowling · B. Yan

Received: 4 June 2012 / Accepted: 8 August 2012 / Published online: 26 August 2012

Abstract *Introduction* Intra-arterial mechanical thrombectomy (IAMT) is an endovascular technique that allows for the acute retrieval of intravascular thrombi and is increasingly being used for the treatment of acute ischaemic stroke (AIS). ... currently two anesthetic options during IAMT: ...thesia (GA) and conscious sedation (CS). The ... were currently the source of controversy, ...balance between patient pain, move... whilst minimising time delay ... This review examines and ...GA versus CS in the ... *Conclusion* Intra-arterial mechanical thrombectomy under general anaesthesia is associated with poor outcomes in observational studies. It is reasonable to offer conscious sedation as the preferred option where adverse patient factors such as agitation are lacking.

Keywords Stroke · General anaesthesia · Conscious sedation · Endovascular therapy

Introduction

The management of acute ischaemic stroke (AIS) has evolved rapidly over the last decade with the use of intravenous tissue plasminogen activator (IV TPA) which has shown to improve both morbidity and mortality in patients ...table to receive this proven treatment [1–4]. There are however a ...ort proportion of patients in which IV TPA is contra... ...anisation failure [1, 5–8, 9]. Occlusion of ... as the proximal internal carotid or ... ...ent [1, 5–8, 9]. Patients who ... ...ed [10–13]. Intra-arterial therapy and ... ...ectomy have been shown to increase ... ...es in AIS when used after IV TPA ... ...is contraindicated [5, 9–15]. IAMT involves ...tion of devices in the intra-cranial vasculature ...of angiographic techniques such as roadmapping ...occlusive clots in the parent artery [13, 16–18]. A ...ative and stationary patient is optimal in the preven... ...of intra-procedural and device-related complications

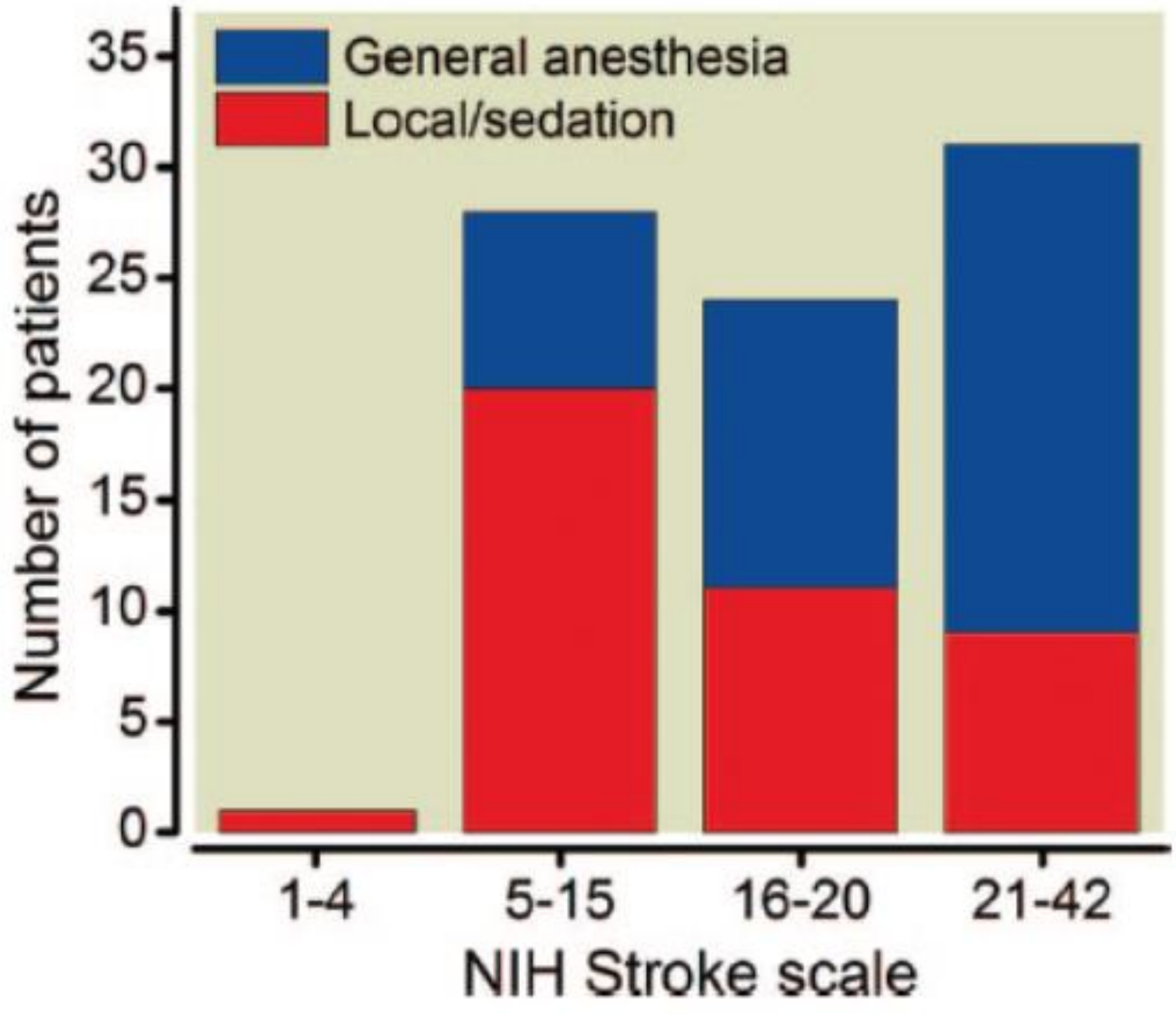
Neuroradiology (2013) 55:93–100
DOI 10.1007/s00234-012-1084-y

INTERVENTIONAL NEURORADIOLOGY

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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www.ecolethrombectomie.com

Davis et al. *Anesthesiology*; 2012

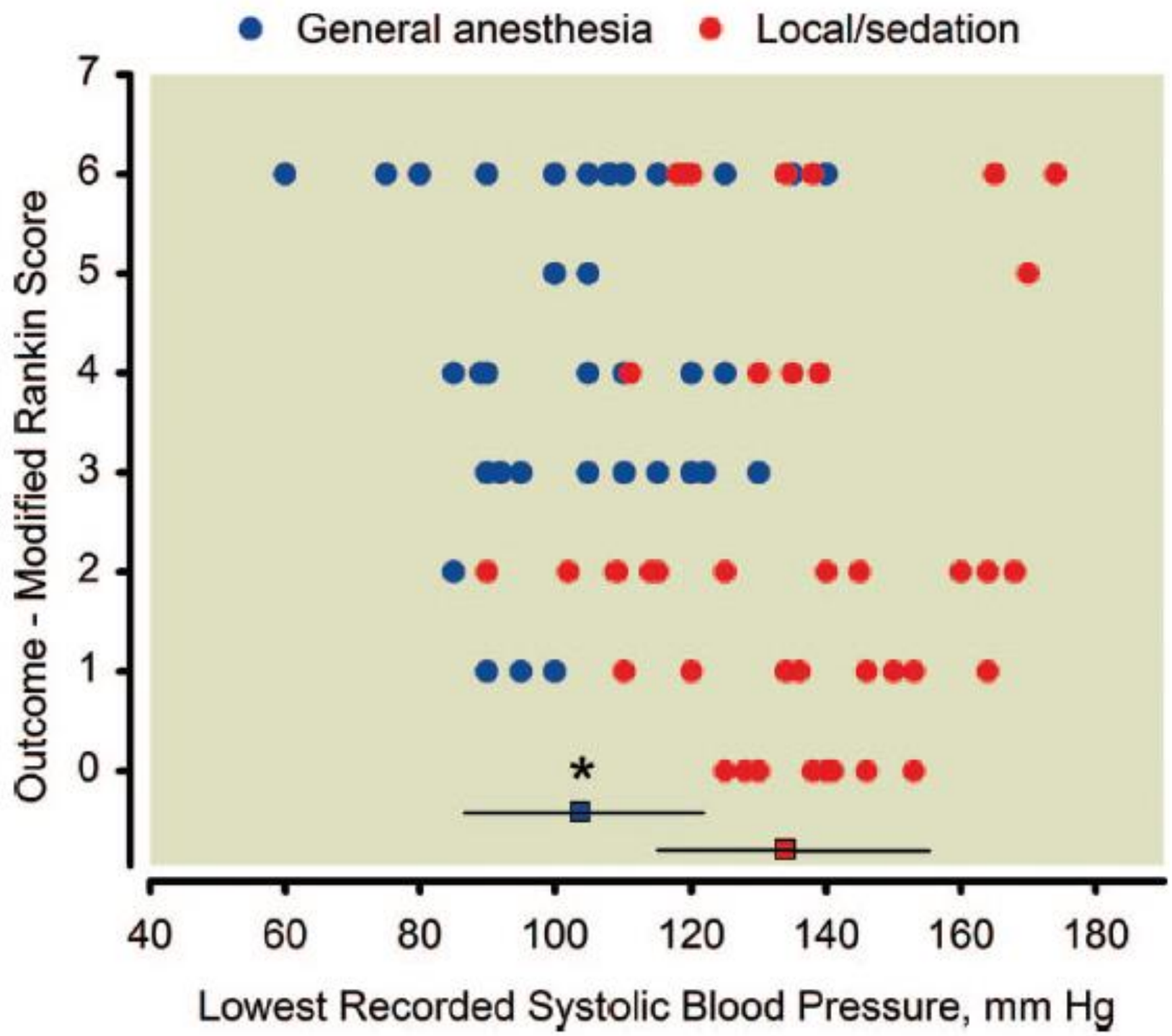
EDITORIAL VIEWS

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

AG: ↘ DSC pénombre ?



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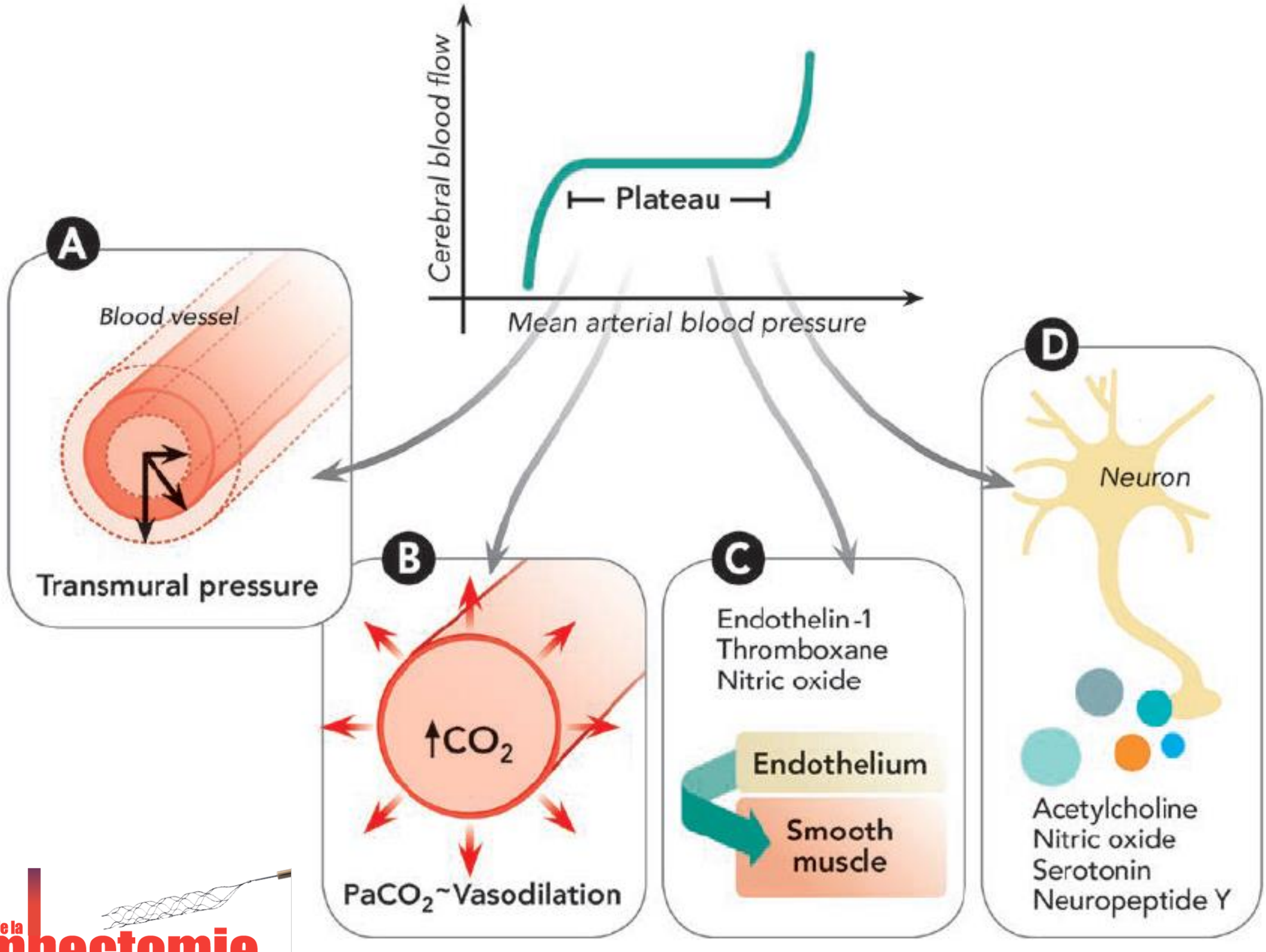
www.ecolethrombectomie.com

Davis et al. *Anesthesiology*; 2012

AUTOREGULATION CEREBRALE



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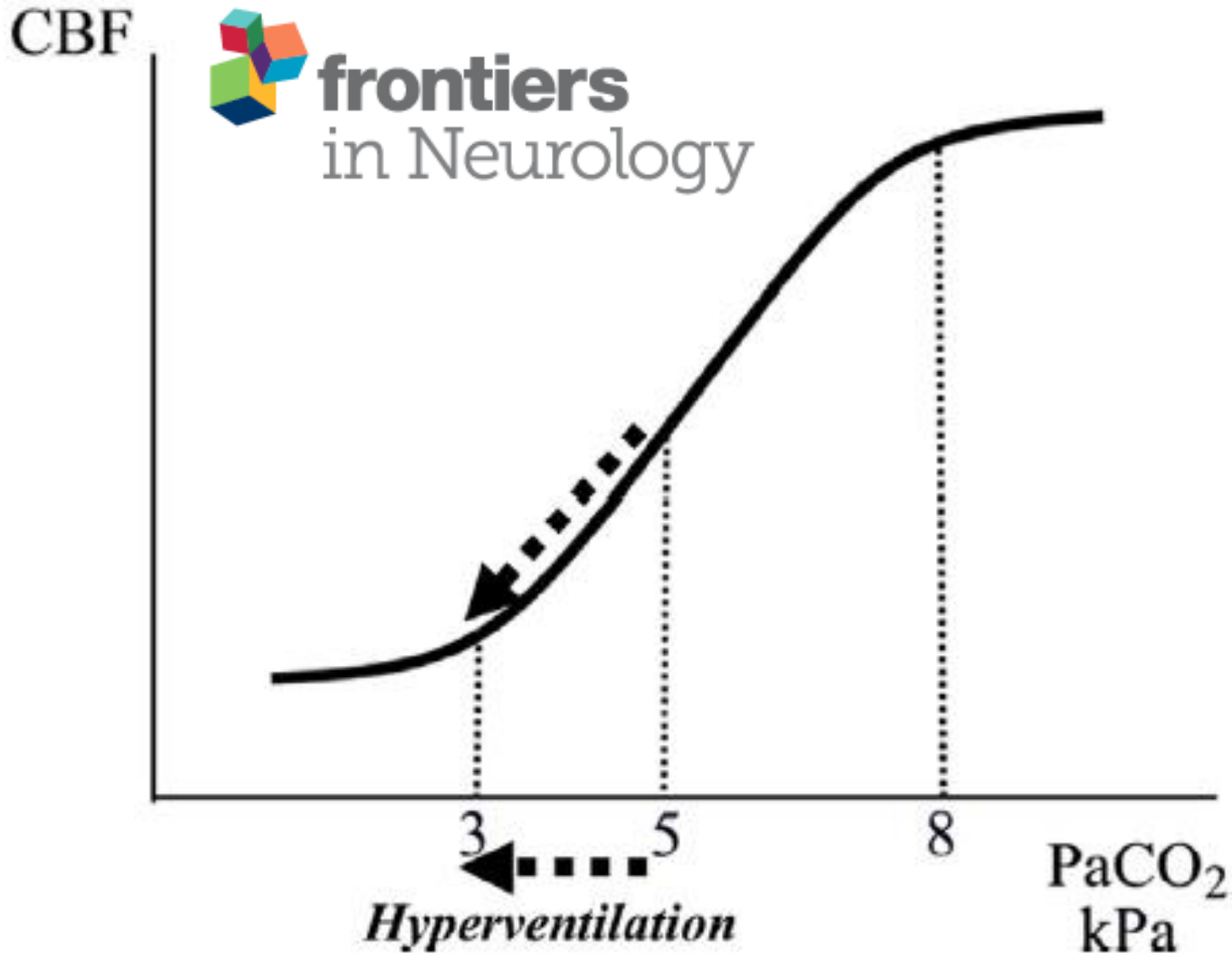
www.ecolethrombectomie.com

Rivera-Lara et al. *Anesthesiology*; 2017

CO2 ☞ Tonus Vasomoteur ☞ DSC



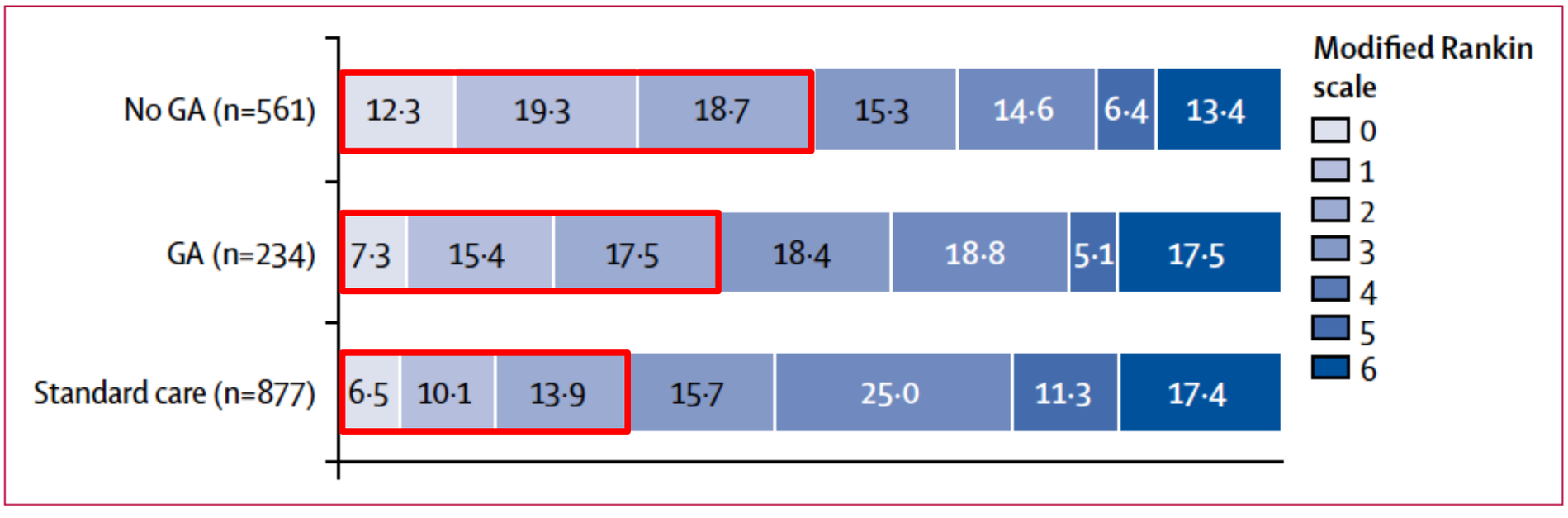
Ecole de la Thrombectomie
www.ecolethrombectomie.com

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

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.

JAMA | Original Investigation

Effect of Conscious Sedation vs General Anesthesia on Early Neurological Improvement Among Patients With Ischemic Stroke Undergoing Endovascular Thrombectomy
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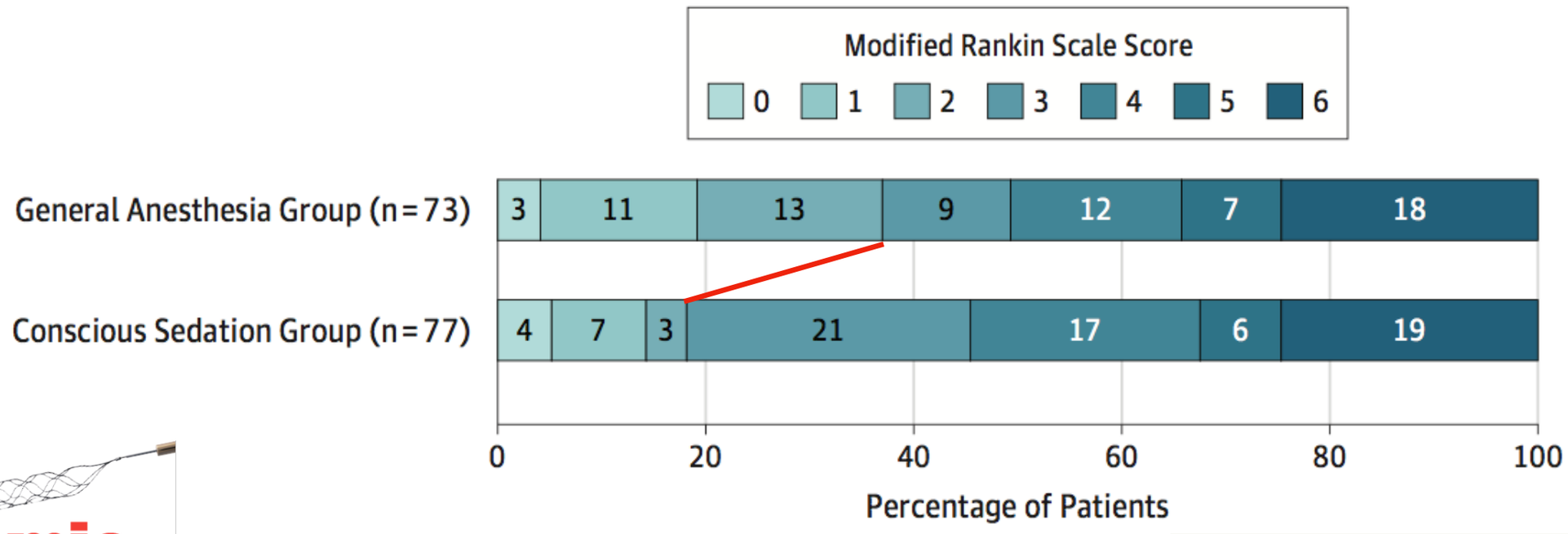
Silvia Schönenberger, MD; Lorenz Uhlmann, MSc; Werner Hacke, MD, PhD; Simon Schieber, MD; Sibu Mundiyanapurath, MD; Jan C. Purrucker, MD; Simon Nagel, MD; Christina Klose; Johannes Pfaff, MD; Martin Bendszus, MD; Peter A. Ringleb, MD; Meinhard Kieser, PhD; Markus A. Möhlenbruch, MD; Julian Bösel, MD, FNCS

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

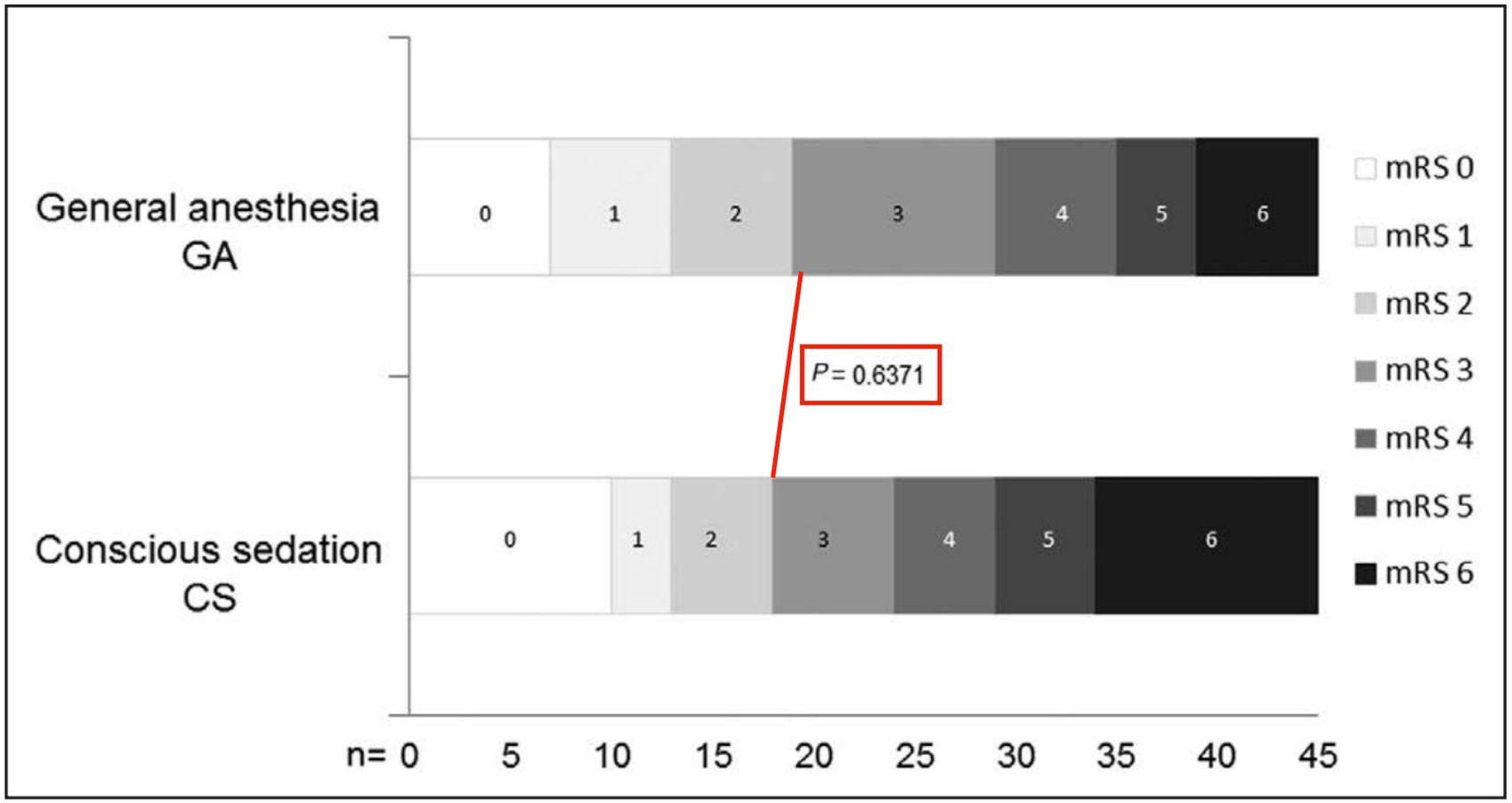


Figure 2. Neurological outcome expressed as modified Rankin Scale (mRS) score. GA indicates general anesthesia.

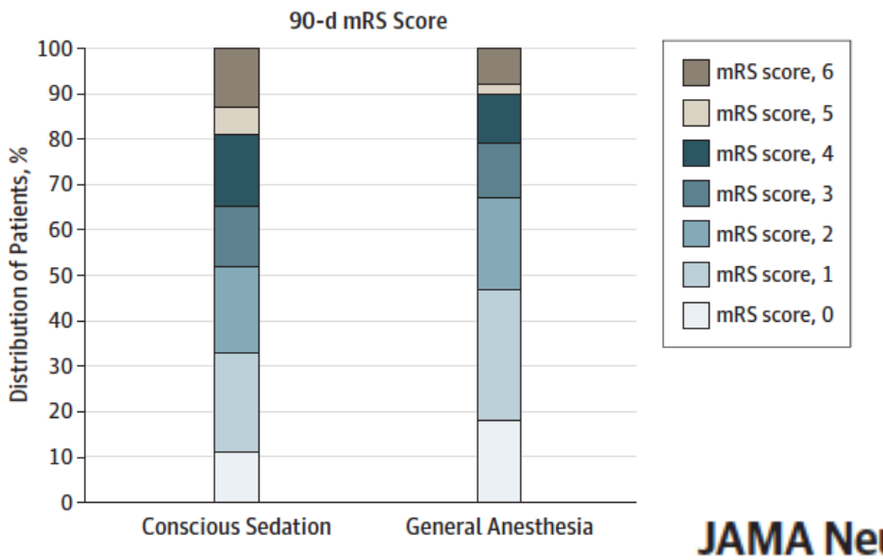
Stroke. 2017;48:00-00. DOI: 10.1161/STROKEAHA.117.016554.

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



JAMA | Original Investigation

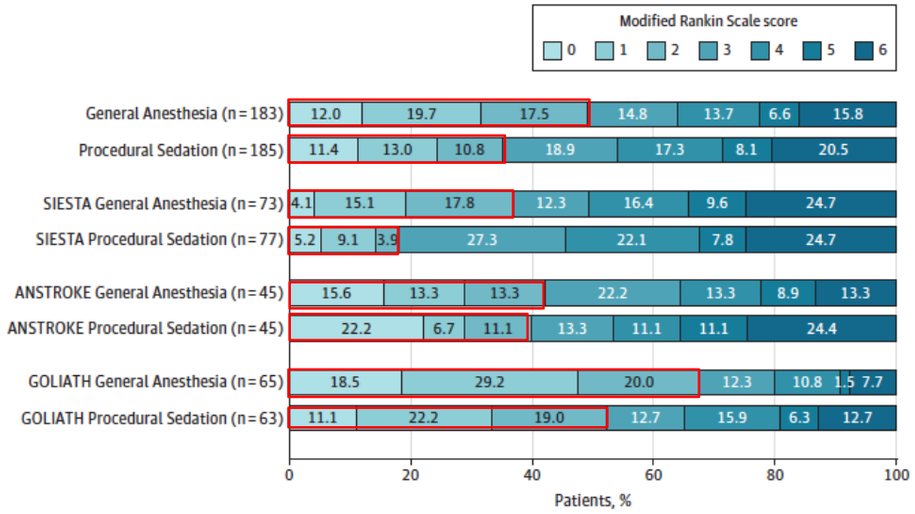
Association of General Anesthesia vs Procedural Sedation With Functional Outcome Among Patients With Acute Ischemic Stroke Undergoing Thrombectomy

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

AVC circulation antérieure,
Données individuelles
CJP: mRS J90
NIHSS≥10
368 patients, Europe

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



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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Open access Protocol

BMJ Open

GASS Trial study protocol: a multicentre, single-blind, randomised clinical trial comparing general anaesthesia and sedation during intra-arterial treatment for stroke

350 patients CJP mRS J90

Axelle Maurice,[1] Jean-Christophe Ferré,[2] Thomas Ronzière,[3] Jean-Michel Devys,[4] Aurelie Subileau,[5] Marc Laffon,[6] Bruno Laviolle,[7] Helene Beloeil,[1] on behalf of the SFAR research network

BMJ Open 2019;**9**:e024249. doi:10.1136/bmjopen-2018-024249

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

270 patients CJP composite: mRS J90 et complications

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

AVC circulation antérieure

Protocol

International Journal of Stroke WSO

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

International Journal of Stroke
0(0) 1–7

DOI: 10.1177/1747493017706243
journals.sagepub.com/home/wso
SAGE

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]

640 patents
Non infériorité
Monocentrique
CJP mRS J90

Letters

COMMENT & RESPONSE

Additional Factors Regarding Clinical Outcomes of General Anesthesia and Conscious Sedation for Acute Ischemic Stroke

It seems that no clinical parameter was used to evaluate the conduction of CS, which could be highly variable between practitioners. One could imagine that some patients undergoing CS were treated with an inadequate sedation level that could affect outcomes, notably via ventilatory parameters, such as oxygenation or carbon dioxide tension.

Chabanne R Futier E. *JAMA Neurol*; 2018

Niveau de sédation (Recommandations ASA 2002)

	Sédation minimale (Anxiolyse)	Sédation modérée (Sédation consciente)	Sédation profonde/Analgésie	Anesthésie Générale
Niveau de conscience	Réponse normale à la stimulation verbale	Réponse orientée à la stimulation verbale ou à la stimulation tactile	Réponse orientée à des stimulations verbales répétées ou à la stimulation douloureuse	Non réveillable même avec stimulis douloureux
Gestion des voies aériennes supérieures	Non affectée	Pas de nécessité d'intervention/traitement	Intervention/traitement possible	Intervention généralement nécessaire
Ventilation spontanée	Non affectée	Adéquate	Peut-être inadéquate	Fréquemment inadéquate
Fonction cardiovasculaire	Non affectée	Habituellement conservée	Habituellement conservée	Peut être dégradée

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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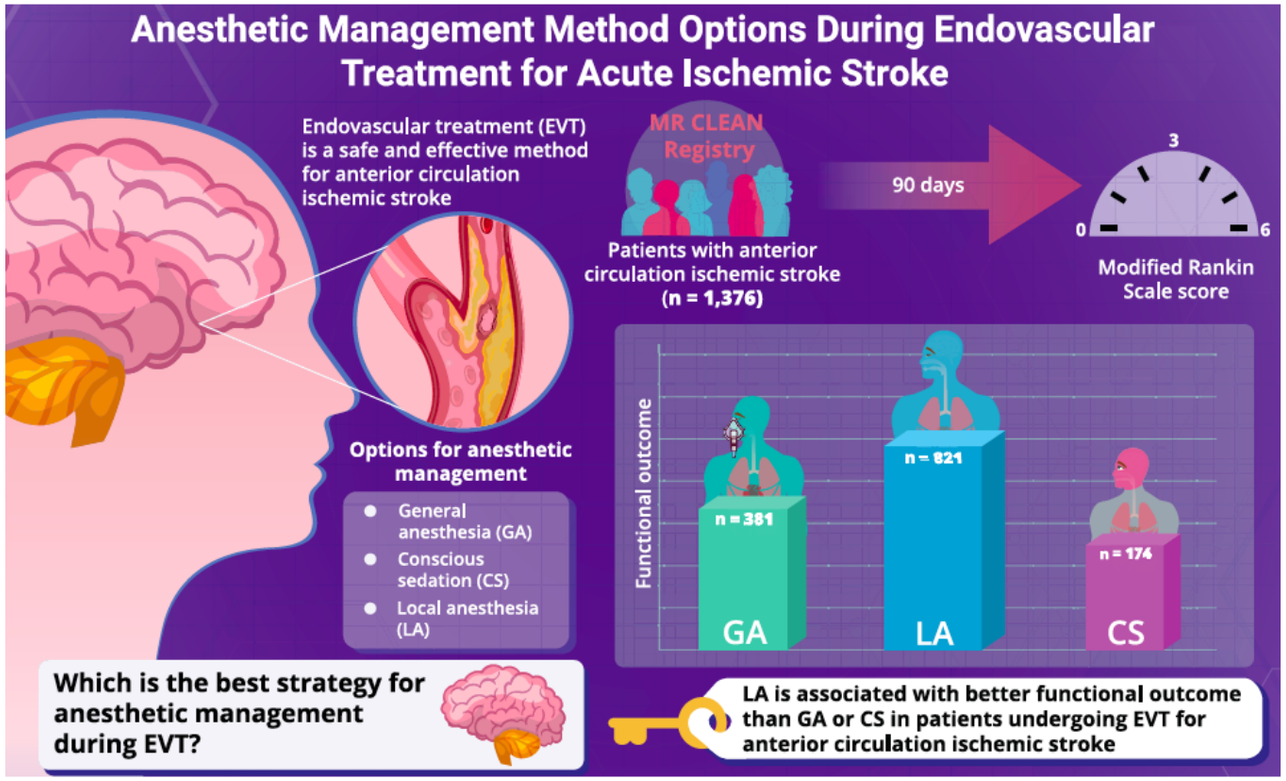
Taylor et al. *JEPU*; 2016

THROMBECTOMIE SOUS ANESTHESIE LOCALE? SANS ANESTHESISTE?



doi:10.1212/WNL.0000000000008674

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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

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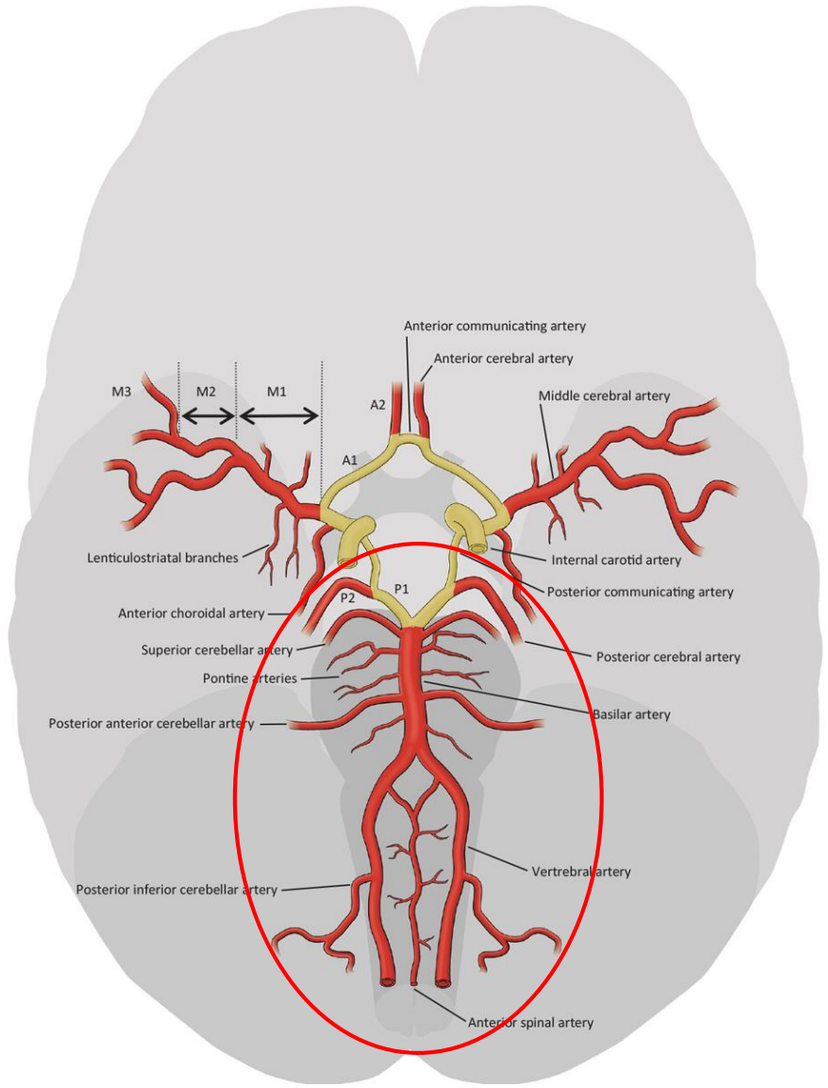
AVC VERTEBRO-BASILAIRE



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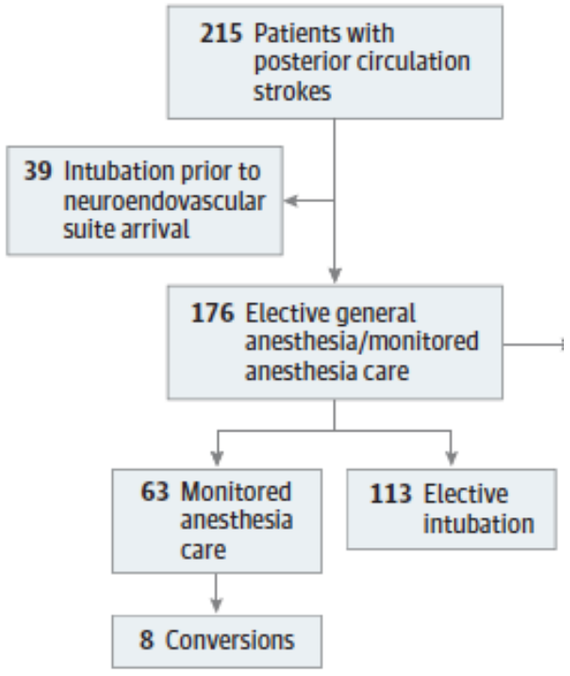
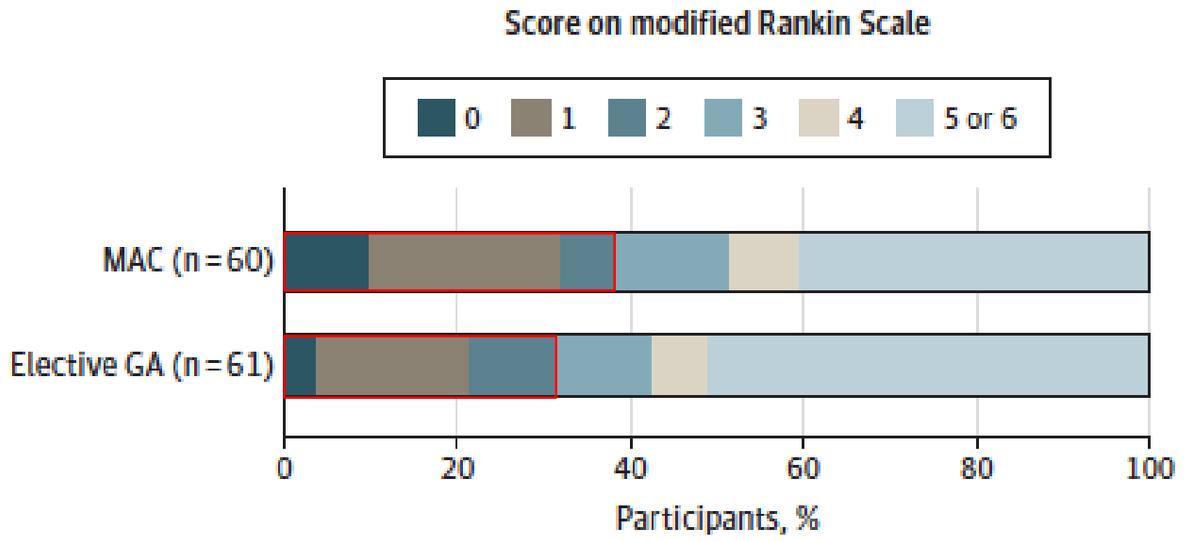
JAMA Neurology | Original Investigation

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

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

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

SOCIETE FRANCAISE
DE NEURORADIOLOGIE

2016

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)

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.

Neuroréanimation

Journée MonoThématique de la SFAR

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? • ATCD, ttt, allergie, jeun? (Aphasie 50%)	• Salle NRI • Nriste, Neurologue, Urgentiste, Manips…	• 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 fémoral) • Objectifs PA 140<PAS<180mmHg (AG et SC)→Vol/Nad • Risque coagulopathie • AL seule? • Molécules ½ vie courte • Normoxie • Normocapnie	• SSPI • Extubation précoce • USINV-USC • PA post procédure: ↘ 140mmHg si TICI ≥ 2B?

DELAI +++

SFAR Société Française d'Anesthésie et de Réanimation

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

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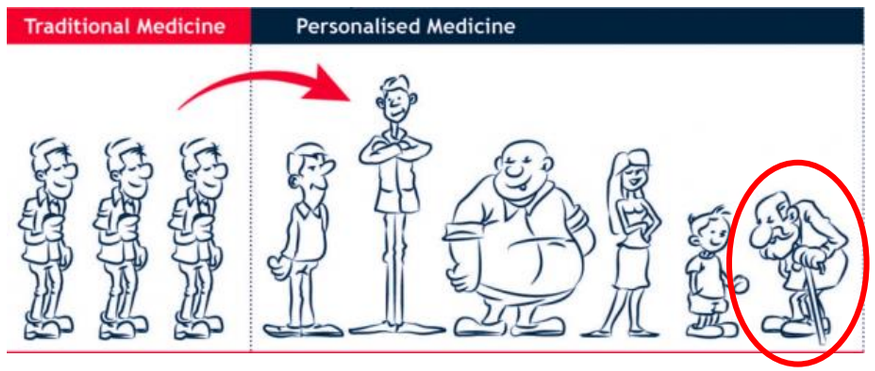
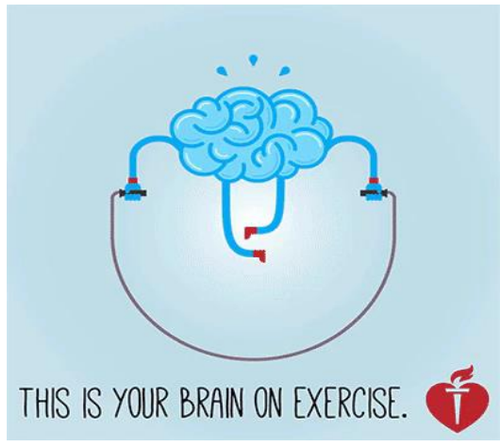
AU FINAL… DU BON SENS





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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THROMBECTOMIE MECANIQUE INTRACRANIENNE: GESTION DES TRAITEMENTS ADJUVANTS: 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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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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REMERCIEMENTS

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- **E Chabert, R Moreno, A Zerroug et toute <u>l'équipe de Neuroradiologie</u>**

- **A Ferrier, N Bourgois et <u>l'équipe de Neurologie vasculaire</u>**

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➢ **médecins anesthésistes bloc central Hôpital Gabriel Montpied**

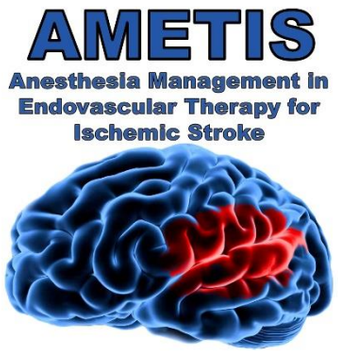
➢ **E Futier, M Begard, C Fernandez Canal**

➢ **Statisticien B Pereira**

➢ **ARCs/TECs Pole Médecine Péri-Opératoire / Neuroréanimation: D Morand, A Masgrau, C Rohlion, E Caumon, J Amat**

➢ **Investigateurs et personnel des 11 centres participants**

➢ **Et les patients +++**



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

The use of IV alteplase in patients taking direct thrombin inhibitors or direct factor Xa inhibitors has not been firmly established but may be harmful.† (*Class III: Harm; LOE C-EO*)‡§ IV alteplase should not be administered to patients taking direct thrombin inhibitors or direct factor Xa inhibitors unless laboratory tests such as aPTT, INR, platelet count, ecarin clotting time, thrombin time, or appropriate direct factor Xa activity assays are normal or the patient has not received a dose of these agents for >48 h (assuming normal renal metabolizing function).

8. IV alteplase should not be administered to patients who have received a treatment dose of low-molecular-weight heparin (LMWH) within the previous 24 hours.

For patients taking warfarin and with an INR ≤1.7 who present in the 3- to 4.5-h window, IV alteplase appears safe and may be beneficial.† (*Class IIb; LOE B-NR*)‡

15. The risk of antithrombotic therapy within the first 24 hours after treatment with IV alteplase (with or without EVT) is uncertain. Use might be considered in the presence of concomitant conditions for which such treatment given in the absence of IV alteplase is known to provide substantial benefit or withholding such treatment is known to cause substantial risk.

Powers et al. *Stroke*; 2018

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

IV alteplase is recommended for patients taking antiplatelet drug monotherapy before stroke on the basis of evidence that the benefit of alteplase outweighs a possible small increased risk of sICH.† (*Class I; LOE A*)

IV alteplase is recommended for patients taking antiplatelet drug combination therapy (eg, aspirin and clopidogrel) before stroke on the basis of evidence that the benefit of alteplase outweighs a probable increased risk of sICH.† (*Class I; LOE B-NR*)‡

Antiplatelet agents that inhibit the glycoprotein IIb/IIIa receptor should not be administered concurrently with IV alteplase outside a clinical trial.† (*Class III: Harm; LOE B-R*)‡§

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Powers et al. *Stroke*; 2018

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

1. Administration of aspirin is recommended in patients with AIS within 24 to 48 hours after onset. For those treated with IV alteplase, aspirin administration is generally delayed until 24 hours later but might be considered in the presence of concomitant conditions for which such treatment given in the absence of IV alteplase is known to provide substantial benefit or withholding such treatment is known to cause substantial risk.

7. For patients with AIS and hemorrhagic transformation, initiation or continuation of antiplatelet or anticoagulation therapy may be considered, depending on the specific clinical scenario and underlying indication.

Powers et al. *Stroke*; 2018

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

Table 8. Management of Symptomatic Intracranial Bleeding Occurring Within 24 Hours After Administration of IV Alteplase for Treatment of AIS

Class IIb, LOE C-EO
Stop alteplase infusion
Emergent nonenhanced head CT
Cryoprecipitate (includes factor VIII): 10 U infused over 10–30 min (onset in 1 h, peaks in 12 h); administer additional dose for fibrinogen level of <200 mg/dL
Tranexamic acid 1000 mg IV infused over 10 min OR ε-aminocaproic acid 4–5 g over 1 h, followed by 1 g IV until bleeding is controlled (peak onset in 3 h)
Hematology and neurosurgery consultations
Supportive therapy, including BP management, ICP, CPP, MAP, temperature, and glucose control

PFC
Fibrinogene
+++

Powers et al. *Stroke*; 2018

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

Héparine ou Antiagrégant per procédure en l’absence de thrombolyse?

Hankey GJ. *Lancet*; 2016

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