Anesthesia in Thrombectomy
Best Practice ?

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No disclosures !

Generel Anesthesia

Pro
- Immobilization
  - Fewer complications ?
  - Improved revacularization ?
- Secure airway

CON
- Unstable Hemodynamics
- Time delay ?
- Ressources (additional workforce)

Procedural sedation

Pro
- Stable hemodynamics
- Neurological monitoring
- Reduced time delay before initiation of EVT ?

CON
- Unstable airway
- movements
  - risc of EVT complications ?
  - Increased EVT procedure time ?
  - Increased X-ray dosage ?
  - Increased contrast dosage ?

Anesthetic strategy: Retrospective studies

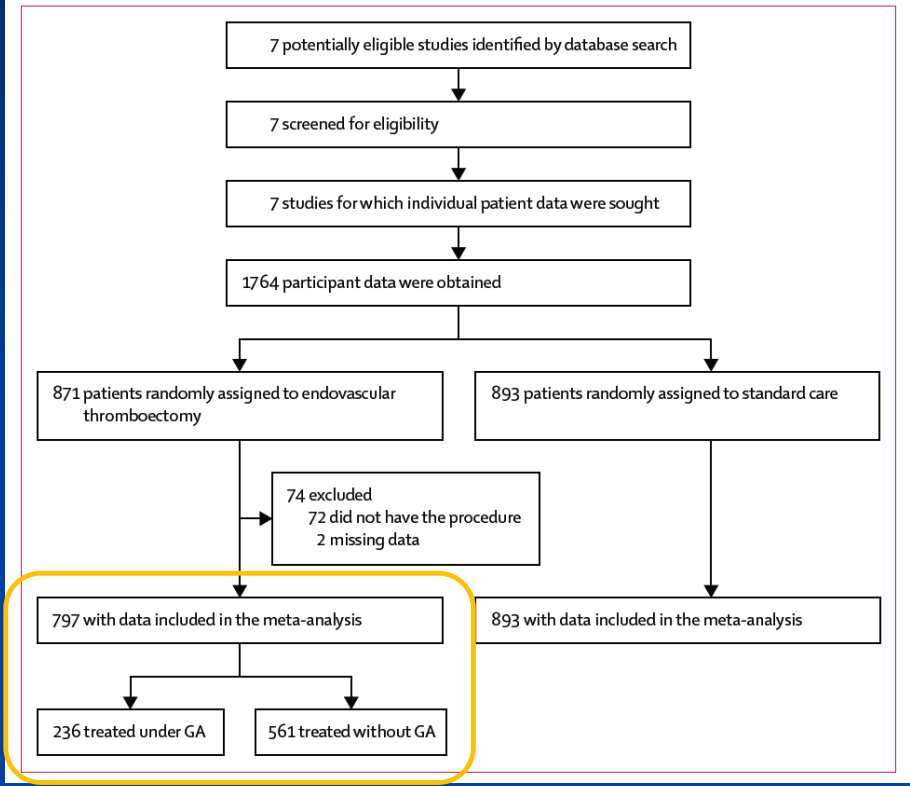
Rasmussen L et al. Curr Anesth Rep 2018(Review)

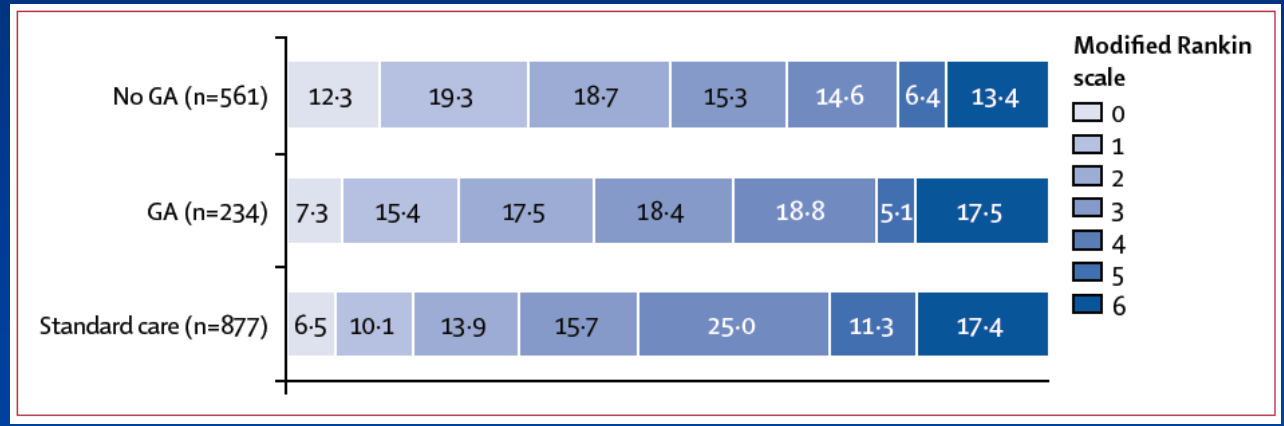
Study	Patients	No. with non-GA	No. with GA	Anesthetic data	Hemodynamic data	Outcome
Langner et al. 2013[22]	Retrospective, single centre, 124 patients with AIS	105	19			No significant difference for recanalization rate and complications between the two groups
John et al. 2014[25]	Retrospective, single centre, 190 patients with AIS	99	91	Yes	Yes	Higher mortality in the GA group
Abou-Chebl et al. 2014[23]	Retrospective, multi centre, 281 patients with AIS	85	196	No	No	Clinical outcome (mRS) and survival significantly better in the LA group
Li F et al. 2014[18]	Retrospective, single centre, 109 patients with AIS	74	35	No	Admission MAP Procedure MAP	Duration of procedure and time-to-revascularization were longer in the GA group. Mortality was higher in the GA group
Abou-Chebl et al. 2015 [20]	Retrospective, 416 patients with AIS from the Interventional Management of Stroke III trial	269	147	No	No	GA was associated with worse outcome and increased mortality in the EVT arm; this was primarily true for patients with medical indications for GA
van den Berg et al. 2015[21]	Retrospective, multi centre, 348 patients with AIS	278	70	No	No	Non-GA was associated with good clinical outcome. When adjusting for prespecified prognostic factors statistical significance was lost
Jagani et al. 2016[26]	Retrospective, single centre, 99 patients with AIS	61	38	Yes	Yes	Conscious sedation associated with favorable outcome
Just et al. 2016[27]	Retrospective, single centre, 109 patients	67	42	No	No	GA associated with higher in-hospital and 3 months mortality and poorer neurological outcome at hospital discharge
Berkhemer et al. 2016[19•]	Post hoc analysis of 216 patients in the MR CLEAN trial (multi centre)	137	79	No	Baseline systolic BP only. No peri-procedural hemodynamic data	Only treatment without GA was associated with a significant treatment benefit in MR CLEAN
Bekelis et al. 2017[24•]	Retrospective analysis from New York State database, 1174 patients	33	441	No	No	GA associated with increased case-fatality rate and hospital length of stay
Brinjikji et al. 2015[5•]	Meta-analysis, 9 observational studies, 1956 patients with AIS	1142	814	No	No	GA group had higher odds of death and respiratory complications and lower odds of good functional outcome and successful angiographic outcome
Brinjikji et al. 2017[30]	Meta-analysis, 22 studies (19 observational and 3 RCT´s), 4716 patients with AIS	2897	1819	No	No	GA was associated with lower odds of good functional outcome
Campbell et al. 2018[31]	Meta-analysis, 7 RCT´s comparing EVT for AIS with standard care. 871 out of 1764 patients received EVT (but 74 excluded)	236	561	No	No	EVT improved functional outcome in both groups but outcomes were significantly better in the non-GA group.

Meta-analyses

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

HERMES meta-analysis, Lancet Neurol 2018





OR (95% CI) for improved outcome using non-GA vs. GA: 1.53 (1.14-2.04, P= 0.0044)

Completed Randomized Trials

AnSTROKE
Gothenburg, Sweeden

Löwhagen Hendén et al. Stroke 2017

GOLIATH
Aarhus, Denmark

Simonsen et al. JAMA Neurol 2018

SIESTA
Heidelberg, Germany

Schönenberger et al. JAMA 2016

Inclusion criteria:

Anterior circulation stroke
NIHSS ≥ 10
Groin ≤ 6h-8 (AnStroke)

Premorbid mRS 0-2 (GOLIATH)
DWI infarct ≤ 70ml: (GOLIATH)

Rasmussen L et al. Curr Anesth Rep 2018(Review)

Inclusion and baseline data	SIESTA		AnSTROKE		GOLIATH	
	Single-centre RCT (April 2014-Feb 2016)		Single-centre RCT (Nov 2013-sept 2016)		Single-centre RCT (Mar 2015-feb 2017)	
	GA	CS	GA	CS	GA	CS
Randomized and included in primary analysis (n)	73	77	45	45	65	63
Baseline NIHSS (median)	17	17	20	17	18	17
Converted to GA, n (%)		11(14)		7(13)		4(6)

Primary outcomes

Trial	Anesthetics	N	Primary outcome	GA	CS	Diff	P-value
SIESTA *Schönenberger et al. JAMA 2016*	GA: Prop/Remi CS : Prop/Remi	150	Change in 24-hour NIHSS, mean (95% CI)	-3.2 (-5.6 to -0.8)	-3.6(-5.5 to -1.7)	-0.4	0.82
AnStroke *Löwhagen Hendén et al. Stroke 2017*	GA: Remi/Sevo CS : Remi	90	mRS at 90 days, median (IQR)	3(1-4)	3(1-5.5)	0	0.5
GOLIATH *Simonsen et al. JAMA Neurol 2018*	GA: Prop/Remi CS : Prop/Fent	128	Infarct growth on MRI, median (IQR), ml	8.2(2.2-38.6)	19.4(2.4-79)	11.2	0.1

Rasmussen L et al. Curr Anesth Rep 2018(Review)

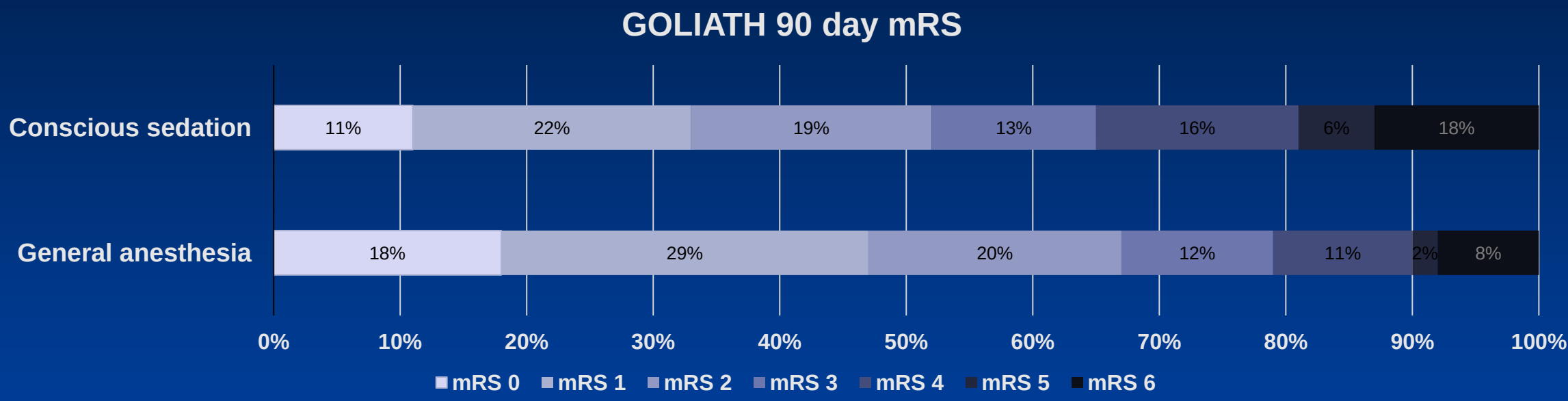
Secondary outcomes

Outcomes	SIESTA		AnSTROKE		GOLIATH	
	GA	CS	GA	CS	GA	CS
NIHSS score (24 hours)	14	14	8	9	6	10
Mortality at 3 months, n (%)	18(25)	19(25)	6(13)	11(24)	5(8)	8(13)
mRS score at 3 months, median(IQR)	4(2-5)	4(3-5)	3(1-4)	3(1-5.5)	2(1-3)*	2(1-4)
mRS score 0-2 at 3 months, n (%)	27(37) *	14(18)	19(42)	18(40)	44(68)	33(52)

* P< 0.05

Rasmussen L et al. Curr Anesth Rep 2018(Review)

Simonsen et al. JAMA Neurol 2018



Ordinal logistic regression:

OR of lower 90 day mRS for patients treated with GA = **1.91 (95%CI: 1.03-3.56)**

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

JAMA. 2019;322(13):1283-1293.

- IPD meta-analysis
  - N = 368
  - Primary outcome: 90-day modified Rankin Score

Table 3. Non-Time-Related Outcomes in a Study of the Association of General Anesthesia vs Procedural Sedation With Functional Outcome Among Patients With Acute Ischemic Stroke Undergoing Thrombectomy

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
Delayed extubation, No./total (%)[k,l]	35/108 (32.4)	5/55 (9.1)	23.3 (11.7 to 35.0)		
Total intervention-associated complications, No./total (%)[l]	10/118 (8.5)	17/122 (13.9)	−5.5 (−13.4 to 2.5)		
Selected intervention-associated complications[l,m,n]					
ICH/SAH	1 (0.8)	5 (4.1)			
Groin	3 (2.5)	1 (0.8)			

AHA/ASA Guideline

Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke

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

3.7.4. Technique (Continued)	COR	LOE	New, Revised, or Unchanged
6. It is reasonable to select an anesthetic technique during EVT for AIS on the basis of individualized assessment of patient risk factors, technical performance of the procedure, and other clinical characteristics.	IIa	B-R	Recommendation revised from 2015 Endovascular.

AJNR Am J Neuroradiol ●:● ● 2019

Emergency Conversion to General Anesthesia Is a Tolerable Risk in Patients Undergoing Mechanical Thrombectomy

F. Flottmann, H. Leischner, G. Broocks, T.D. Faizy, A. Aigner, M. Deb-Chatterji, G. Thomalla, J. Krauel, M. Issleib, J. Fiehler, and C. Brekenfeld

N = 254

Converted = 25

(from LA or PS to GA)

Table 3: Clinical outcomes

	Local Anesthesia	CS	Emergency Conversion to GA	GA
Symptomatic intracranial hemorrhage (No.) (%)	3 (3.19%)	5 (6.58%)	1 (4.00%)	3 (5.08%)
NIHSS at 24 hr (median) (Q1–Q3)	9 (4–16.8)	12.5 (6–20.0)	19.0 (14.5–42.0)	21.0 (15.0–42.0)
Change in NIHSS at 24 hr (median) (Q1–Q3)	−3 (−9.75–0.00)	−1 (−8.00–4.00)	0 (−2.50–21.5)	3 (−1.00–9.50)
mRS at 24 hr (median) (Q1–Q3)	4 (3–5)	5 (3–5)	5 (5–5)	5 (5-5)
NIHSS at discharge (median) (Q1–Q3)	6 (2–11.0)	6 (2–13.0)	10.5 (6.50–18.2)	13.0 (10.0–18.0)
mRS at discharge (median) (Q1–Q3)	4 (2–5)	4 (2–5)	5 (3–5)	5 (4–5)
mRS at 90 days (median) (Q1–Q3)[a]	4 (1.50–5)	4 (2–6)	5 (2–5)	5 (4–6)
mRS 0–2 at 90 days (No.) (%)[a]	28 (32.2%)	21 (29.2%)	7 (28.0%)	4 (7.41%)

[a] Data were available for 87/94 patients (local anesthesia),72/76 patients (CS), 25/25 patients (emergency conversion), and 54/59 patients (GA).

CONCLUSIONS: Patients with emergency conversion did not have lower chances of successful reperfusion or functional independence compared those with primary general anesthesia, and time to flow restoration was also similar. We found no evidence supporting the primary induction of general anesthesia in patients at risk for emergency conversion.

- Retrospective studies: GA associated with worse outcomes
- 3 RCT's: equal outcomes in patients undergoing EVT in GA and CS
- IPD meta-analysis (of the 3 RCT's): GA associated with improved functional outcome
- Whether conversion from LA/PS to GA is tolerable ?...further studies are needed

Best Practice (personal suggestion): When there are no contraindications to GA (severe co-morbidity, difficult airway, etc), GA may be considered the preferred anesthetic strategy of choice

- Specialist neuroanesthesia care is advocated
- Important with strict blood pressure control

The optimal blood pressure targets during EVT are unknown !!

AHA/ASA Guideline

Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke

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

3.7.5. Blood Pressure Management	COR	LOE	New, Revised, or Unchanged
1. In patients who undergo mechanical thrombectomy, it is reasonable to maintain the BP at ≤180/105 mm Hg during and for 24 hours after the procedure.	IIa	B-NR	New recommendation.
2. In patients who undergo mechanical thrombectomy with successful reperfusion, it might be reasonable to maintain BP at a level <180/105 mm Hg.	IIb	B-NR	New recommendation.

Stroke. 2019;50:2805-2812

Association of Blood Pressure During Thrombectomy for Acute Ischemic Stroke With Functional Outcome

A Systematic Review

Benjamin Maïer, MD, MSc; Robert Fahed, MD, MSc; Naim Khoury, MD; Adrien Guenego, MD, MSc; Julien Labreuche, BST; Guillaume Taylor, MD; Jacques Blacher, MD, PhD; Mathieu Zuber, MD, PhD; Bertrand Lapergue, MD, PhD; Raphaël Blanc, MD; Michel Piotin, MD, PhD; Mikael Mazighi, MD, PhD

- 9 retrospective studies included = 1037 patients
- 5 studies without pre-defined procedural BP targets
  - All studies reported association between BP drops and poor outcome
- 4 studies with pre-defined strict procedural BP targets (SBP between 140–160 mm Hg, SBP ≥140 mm Hg and MAP ≥70 mmHg)
  - 3 of these studies reported no association between BP parameters and poor outcome

Stroke. 2019;50:2805-2812

Table 2. Statistically Significant Hemodynamic Parameter During MT Associated With Poor Functional Outcome (Univariate and Multivariate Analysis)

Definition of HD Parameter	Results	*P* Value	Type of Analysis	No. of Patients	Citation Number*
BP drops compared with baseline					
>40% fall in MAP compared with baseline[12]	OR=2.8 (1.09–7.19)	*P*=0.032	Multivariate analysis	108	56
ΔMAP†[17]	OR=0.95 (0.92–0.99)	*P*=0.01	Multivariate analysis	60	20
Absolute MAP drop >15 mm Hg[18]	OR=2.33 (1.11–18.6)	*P*=0.03	Multivariate analysis	256	24
MAP drop >10%[18]	OR=4.38 (1.53–12.6)	*P*<0.01	Multivariate analysis	256	24
ΔLMAP‡[17]	OR=0.97 (0.95–1.00)	*P*=0.03	Univariate analysis	60	20
BP drops under a threshold					
Lowest MAP before recanalization (per 10 mm Hg drop below 100 mm Hg)[18]	OR=1.28 (1.01–1.62)	*P*=0.04	Multivariate analysis	256	24
Lowest MAP <85 mm Hg[18]	OR=2.23 (1.09–17.7)	*P*=0.03	Multivariate analysis	256	24
Lowest MAP <80 mm Hg[18]	OR=2.21 (1.12–4.19)	*P*=0.02	Multivariate analysis	256	24
Lowest MAP <70 mm Hg[18]	OR=2.15 (1.02–4.56)	*P*=0.04	Multivariate analysis	256	24
Lowest SBP before recanalization, mm Hg[18]	mRS ≤2: 118 (105–135) vs mRS ≥3: 115 (99–124)	*P*=0.047	Univariate analysis	256	24
SBP absolute drop[18]	mRS ≤2: 30 (11–51) vs mRS ≥3: 41.5 (24–63)	*P*=0.004	Univariate analysis	256	24
% SBP drop[18]	mRS ≤2: 21.4% (9–32) vs mRS ≥3: 27.6% (16–37)	*P*=0.002	Univariate analysis	256	24
Number of patients with SBP <100 mm Hg[8] (n,%)	mRS ≤2: 9 (47) vs mRS ≥3: 54 (79)	*P*=0.008	Univariate analysis	88	3
Minimum DBP, mm Hg[10]	mRS ≤2: 64 (15) vs mRS ≥3: 56 (14)	*P*=0.03	Univariate analysis	99	34
BP variability during the procedure					
Maximum SBP variability,§ mm Hg[10]	mRS ≤2: 42 (20) vs mRS ≥3: 55 (29)	*P*=0.01	Univariate analysis	99	34
Maximum MAP variability,§ [10]	mRS ≤2: 31 (13) vs mRS ≥3: 39 (20)	*P*=0.03	Univariate analysis	99	34
Time with BP under a threshold					
Duration of SBP <100 mm Hg (median, IQR, min)[8]	mRS ≤2: 0 (0–4) vs mRS ≥3: 4 (1–11)	*P*=0.02	Univariate analysis	88	3

Original Contribution

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

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

Stroke. 2019;50:00-00.

Results—Three hundred ninety patients (mean age 71±14 years, mean National Institutes of Health Stroke Scale score of 17) were included in the study; of these, 280 (72%) achieved thrombolysis in cerebral infarction 2B/3 reperfusion. Eighty-seven percent of patients experienced MAP reductions during endovascular thrombectomy (mean 31±20 mm Hg). ΔMAP was associated with greater infarct growth (P=0.036) and final infarct volume (P=0.035). Mean ΔMAP among patients with favorable outcomes (modified Rankin Scale, 0–2) was 20±21 mm Hg compared with 30±24 mm Hg among patients with poor outcome (P=0.002). In the multivariable analysis, ΔMAP was independently associated with higher (worse) modified Rankin Scale scores at discharge (adjusted odds ratio per 10 mm Hg, 1.17; 95% CI, 1.04–1.32; P=0.009) and at 90 days (adjusted odds ratio per 10 mm Hg, 1.22; 95% CI, 1.07–1.38; P=0.003). The association between aMAP and outcome was also significant at discharge (P=0.002) and 90 days (P=0.001).

Original Article

JCBFM

Journal of Cerebral Blood Flow & Metabolism
0(0) 1–10

DOI: 10.1177/0271678X19865219
journals.sagepub.com/home/jcbfm
SAGE

Physiologic predictors of collateral circulation and infarct growth during anesthesia – Detailed analyses of the GOLIATH trial

Radoslav Raychev[1], David S Liebeskind[1], Albert J Yoo[2], Mads Rasmussen[3], Dimiter Arnaudov[4], Scott Brown[5], Jeffrey Saver[1] and Claus Z Simonsen[6]

Table 1. Modified ASITN collateral grading scale.

Grade	Angiographic assessment
0	No visible collaterals to the ischemic site
1	Slow collaterals to the periphery of the ischemic site with persistence of some defect
2−	Rapid collaterals to the periphery of the ischemic site with collateral filling in <50% of the territory
2+	Rapid collaterals to the periphery of the ischemic site with collateral filling >50% of the territory
3	Collaterals with slow but complete angiographic blood flow of the ischemic bed by the venous phase
4	Complete and rapid collateral blood flow to the vascular bed in the entire ischemic territory by retrograde perfusion

Table 2. Continued

Variables included in the analysis	% (*N*); Mean ± SD (Median)
Modified ASITN grade	
1	11% (9/80)
2−	24% (19/80)
2+	39% (31/80)
3	26% (21/80)
4	0

Table 3. Results from multivariable analysis.

Predictor	Estimate (beta)	LCL	UCL	*p*-value
A. Predictors of infarct growth				
Age (per year)	0.80	−0.54	2.13	0.245
NIHSS at baseline (per point)	3.23	−0.26	6.72	0.072
Baseline infarct volume (per ml)	0.93	0.10	1.75	0.030
Time to groin puncture (per min)	0.12	−0.08	0.33	0.233
Propofol dose (per mg)	0.02	−0.05	0.10	0.509
Phenylephrine dose (per mg)	6.78	1.46	12.11	0.014
MAP < 70 (yes vs. no)	−21.38	−55.84	13.08	0.226
	Odds ratio	LCL	UCL	*p*-value
B. Predictors of collateral grade.				
Age (per year)	0.99	0.96	1.03	0.627
NIHSS at baseline (per point)	0.96	0.94	1.06	0.410
Baseline infarct volume (per ml)	0.96	1.00	0.99	0.003
Time to groin puncture (per min)	1.00	1.00	1.01	0.224
Propofol dose (per mg)	1.00	1.00	1.00	0.580
Phenylephrine dose (per mg)	0.98	0.84	1.14	0.778
MAP < 70 (yes vs. no)	0.35	0.12	0.99	0.048

Hypotension during sedation for EVT for LVO negatively impacts collateral circulation, while higher pressor dose is a strong predictor of infarct growth. Avoidance of anesthesia-induced hypotension and consequent need for pressor therapy may prevent collateral failure and minimize infarct growth.

CLINICAL INVESTIGATION

The influence of blood pressure management on neurological outcome in endovascular therapy for acute ischaemic stroke

M. Rasmussen[1,*], U. S. Espelund[1], N. Juul[1], A. J. Yoo[2], L. H. Sørensen[3], K. E. Sørensen[4], S. P. Johnsen[5], G. Andersen[4] and C. Z. Simonsen[4]

[1]Department of Anaesthesia and Intensive Care, Section of Neuroanaesthesia, Aarhus University Hospital, Denmark, [2]Texas Stroke Institute, Dallas-Fort Worth, TX, USA, [3]Department of Neuroradiology, Aarhus University Hospital, Denmark, [4]Department of Neurology, Aarhus University Hospital, Denmark and [5]Department Clinical Epidemiology, Aarhus University Hospital, Denmark

British Journal of Anaesthesia, ■ (■): 1–8 (2018)

Conclusion: We found no statistically significant association between blood pressure related parameters during endovascular therapy and neurological outcome.

AUH thrombectomy BP protocol:

Syst BP > 140 mmHg

MABP > 70 mmHg

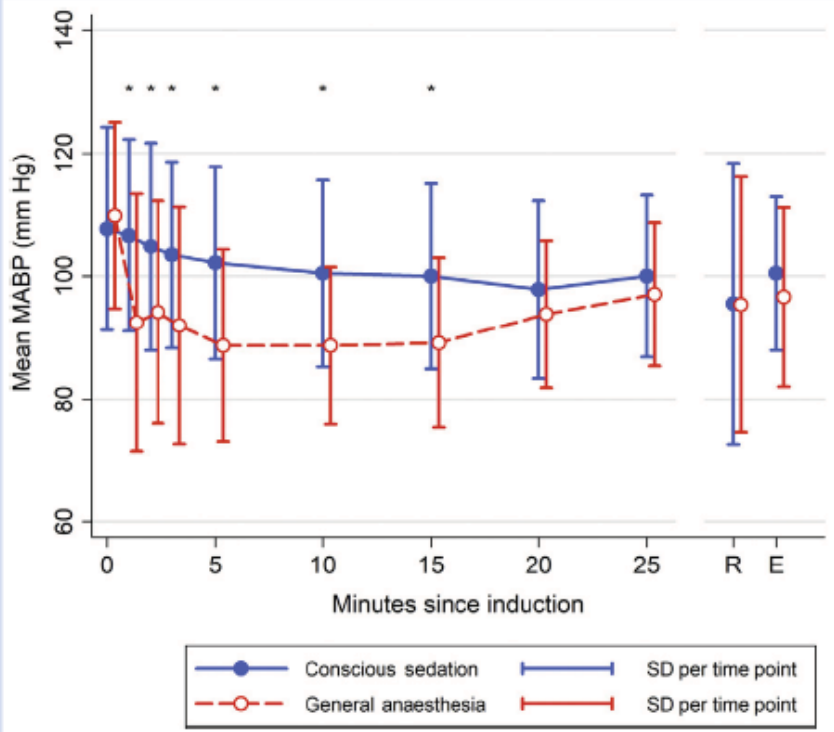


Fig 1. Periprocedural mean arterial blood pressure (MABP) stratified by anaesthetic management in 128 patients undergoing endovascular therapy after an acute ischaemic stroke. Time 0 is baseline values measured just before induction of anaesthesia. R, reperfusion; E, end of procedure. *P<0.05. Unpaired t-tests were used to compare between-group MABP differences at each time point.

Sørensen LH, *et al*. *J NeuroIntervent Surg* 2019;

ORIGINAL RESEARCH

Safety and quality of endovascular therapy under general anesthesia and conscious sedation are comparable: results from the GOLIATH trial

Leif H Sørensen,[1] Lasse Speiser,[1] Sanja Karabegovic,[1] Albert J Yoo,[2] Mads Rasmussen,[3] Kristina E Sørensen,[4] Claus Z Simonsen[4]

- No difference between the GA and CS arms regarding:
  - Procedure times (34min *vs.* 29 min)
  - Use of contrast media (75 ml *vs*. 85 ml)
  - Radiation dose (98 Gy/cm^2 *vs.* 101 Gy/cm^2)
  - Reperfusion rates between direct aspiration technique and stent retriver (86 % vs. 79%)

Conclusion Safety and quality of EVT under either GA and CS are comparable.

Original Contribution

Magnetic Resonance Imaging Selection for Endovascular Stroke Therapy

Workflow in the GOLIATH Trial

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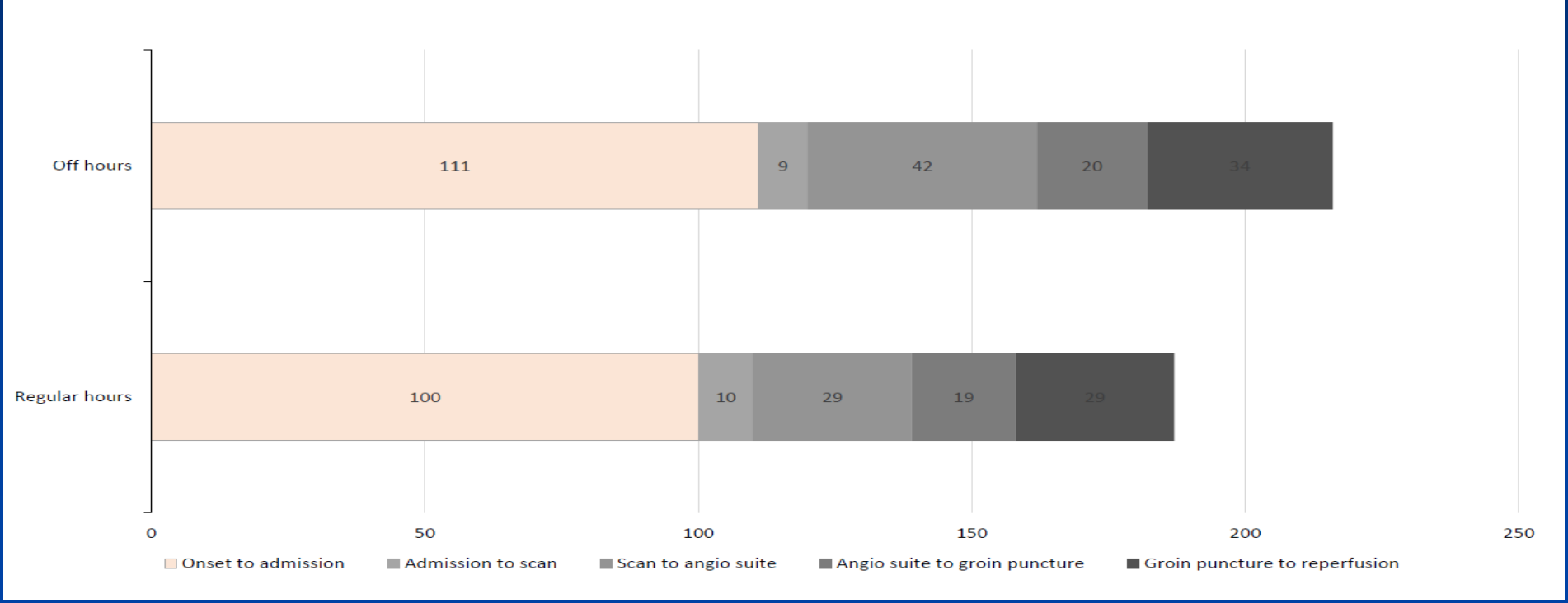
Stroke. 2018;49:00-00.



Symptom onset-reperfusion

Regular hours (187 min) *vs.* off hours (217 min):

No influence on outcome

- When there are no contraindications to GA (severe co-morbidity, difficult airway, etc), GA may be considered the preferred anesthetic strategy of choice

- Management of anesthesia for EVT is preferably performed by a dedicated anesthesia team in order to meticulously maintain blood sufficient pressure and minimize time delay.

- The optimal blood pressure targets during EVT have not been defined. It is suggested to simultaneously maintain MABP > 70 mmHG and SBP >140mmHg

Anesthetic Strategy

- **Ongoing Multicenter RCT's**
  - AMETIS (France)
  - CANVAS (China)
  - CANVAS-II (China)
  - SEGA (USA)
- **Does the type of anesthetic influence outcome ? (neuroprotection ?)**
- **Does conversion from CS to GA influence outcome ?**
- **Ventilation and influence on outcome ?**

Hemodynamic management

- **RCT's to define optimal targets during EVT**
  - Fixed or individualized BP thresholds ?
  - MABP or SBP targets ?