



(all lectures based on clinical cases with questions for the panel and audience)

Role of thrombectomy for ischemic stroke during IE

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Medical history

65yo male

- Hypertension, dyslipidemia, diabetes mellitus
- Coronary heart disease
- Biological aortic valve
- Infectious sacroileitis (2018): S. aureus

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Current history:

Presented to a community hospital because his wife found him unresponsive and with shortness of breath.

- Had had fever during the previous week
- Had a tooth extraction weeks before

Medical history

Exam:

- Unresponsive
- Hypoperfused
- Oligoanuric
- Secretions in the upper respiratory tract

Which would have been the least relevant emergent action for this patient?

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- Administering fluids, antibiotics, and vasopressors if needed.
- Orotracheal intubation
- Non-contrast CT and CT-angiogram of the head and neck
- CRP for COVID-19

Which intervention do you think this patients was least likely to receive in the first 48h?

- Administering fluids, antibiotics, and vasopressors if needed.
- Orotracheal intubation
- Non-contrast CT and CT-angiogram of the head and neck
- CRP for COVID-19

Neurologial complications are frequent in IE

1/4 to 1/3

Complication	Approximate Proportion	Reference
Ischemic stroke		Snygg-Martin et al14
		Cooper et al ¹³
	70%	Barsic et al15
		Thuny et al ¹⁶
		Ting et al ¹⁷
Intracerebral hemorrhage		Derex et al ¹⁸
	1.09/	Diab et al19
	10%	Garcia-Cabrera et al11
		Okita et al ¹⁰
Subarachnoid hemorrhage	5%	-
Meningoencephalitis		Sonneville et al ²⁰
	5%	Garcia-Cabrera et al11
		Lucas et al ²¹
Intracerebral abscess	5%	Garcia-Cabrera et al11
	5%	Sonneville et al ²⁰
Infectious intracranial aneurysm	5%	Peters et al ²²
Encephalopathy	-	Garcia-Cabrera et al11

Yanagawa et al. Circulation 2016

71% MRI lesions 37% ischemic 57% microbleeds





Hess et al. Am J Neuroradiol 2013

Decreased consciousness as a result of stroke?



Decreased consciousness as a result of stroke?



Diagnostic algorithm: decreased counsciousness



Follow-up history

- 1- Bloot tests: elevated CRP and PCT, Cr 4.1. Hb 16, platelets 52000, DD 12000, Quick 56%.
- 2- Thoracoabdominal CT: atelectasis.
- 3- ETT: aortic bioprosthesis without dysfunction, no vegetation.
- 4-TEE: thickened aortic bioprosthesis, filamentous 14 mm vegetation.
- 5- Lumbar puncture: negative.
- 6-Antibiotics: meropenem + daptomycin + anidalofungin. HDF. Corticosteroids.
- 7-Blood cultures: MS S. aureus. Cloxacillin + gentamine + daptomycin.
- 8- Transferred to our center.
- 9- Vasopressor support. Antibiotics: daptomycin + cloxacillin + clindamycin.10- Brain CT for prognosis.

Follow-up history



Which is TRUE regarding revascularization in acute stroke:

Which is TRUE regarding revascularization in acute stroke:

- Acute revascularization is an option only within 4.5h from stroke onset
- IE is a contraindication for any revascularization procedure due to the high hemorrhagic risk
- MT achieves successful recanalization in 80% of patients with IE-related stroke (like in the general stroke population)
- Endovascular procedures should be avoided because of possible infection of the devices

Revascularization in IE: IV vs. endovascular

IV Mechanical thrombolysis Thrombectomy

Revascularization in IE: IV vs. endovascular

Mechanical IV thrombolysis | Thrombectomy Bleeding

Revascularization in IE: IV vs. endovascular

N/	Machanical	Clinical trial	IE allowed	IE included
IV	WECHAIICA	REVASCAT	Yes	No
thromholysis	Thromhectomy	ESCAPE	Yes	No
th on boly 313	inonactiony	MR CLEAN	Yes	No
Bleedina		SWIFT PRIME	No	No
		EXTEND-IA	No	No
		THERAPY	No	No
		THRACE	No	No

Patients excluded from trials do benefit from MT



59yo female, IE, pending cardiac transplant In-hospital stroke: sudden unresponsiveness, tetraparesis







Streptococcus oralis on CRP of the extracted thrombus and in the native heart

MT seems to be equally effective and safe in IE

Acute revascularization



North		IE Cohort (n=50)	Control Cohort (n=200)	P value
FERRY	mTICI ≥ 2b, no. (%)	38 (76)	166 (83)	.2532
a.	mTICI 3, no. (%)	28 (56)	8 (59)	.7003

24h outcomes

	IE Cohort (n=50)	Control Cohort (n=200)	P value	
24h NIHSS, median (IQR)	10 (3-14)	9 (3-17)	.9076	
Neurological improvement, no. (%)	39 (78)	156 (78)	1.0000	
Early Dramatic Recovery, no. (%)	24 (48)	93 (47)	.8492	
ICH, no. (%)	14 (28)	38 (19)	.1608	Co
sICH, no.(%)	5 (10)	15 (8)	.5600	-
				-

3mo outcomes



La Peña et al, Unpublished

Patients (%)

Follow-up history

Favorable course:

- Good hemodynamic course
- Follow-up cultures pending, negative for now
- Weaning from ventilator

Cardiac surgery: timing?

What would be the best timing of cardiac surgery:

What would be the best timing of cardiac surgery:

- The risk could have been reduced with timely thrombectomy
- It doesn't matter; why should a brain issue impact a surgeon's schedule?
- Should be done after 4 weeks
- Forget it, just make him CMO if his relatives agree

What is this patient's neurological prognosis?



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What is this patient's neurological prognosis?



Risk of surgery after ischemic stroke?

Early

Year (reference) of study	No. of patients	Design	Timing of surgery (no. of patients)	Post-op. NRL complication rate (NC-r)	In-hospital mortality (In-M)	Statistical analyses
2006 ¹⁰	65	Retrospective Single-center	(NA) Late >4 d (NA)	3.2% 0%	NA NA	NC-r: p=0.32
2010 ³³	10	Retrospective Single-center	(8) Late >14d (2)	25% 0%	12.5% 0%	NC-r: p=0.43 In-M: p=0.59
2012 ³⁶	64	Retrospective Multi-center	(34) Late >14d (30)	5.9% 3.3%	17.7% 10%	NC-r: p=1.000 In-M: p=0.483
2013 ³⁴	198	Retrospective analysis of prospectively collected data Multi-center	(58) Late >7d (140)	NA NA	22.4% 12.1%	In-M: OR=2.308 (0.942-5.652)
2015 ³⁵	253	Retrospective Multi-center	(105) Late >7d (148)	42.9% 37.8%	8.5% 9.5%	NC-r: OR=1.11 (0.63- 1.97) In-M: OR=0.95 (0.35- 2.54)
2016 37	118	Retrospective Multi-center	1-7d (36) 8-14 (20) 15-28 (22) >28 (40)	14%† 0%† 10%† 5%†	5% 5% 13.6% 7%	15-28d vs. 1-7d: - NC-r: OR 2.23 (0.53-943, P = 0.274) - In-M: OR 18.7 (1.4-249.12, P = 0.027) >28d vs. 1-7d: - NC-r: OR 1.41 (0.36-5.55, P = 0.62) - In-M: OR 10.39 (0.77- 140.26, P = 0.078)
2017 ³⁸	80 [‡]	Retrospective Single-center	>14d (40)	NA NA	5% 25%	In-M: OR 0.16 (0.03- 0.78, P = 0.01)
2019 ³⁹	90	Retrospective Multi-center	>3d (45)	2% 4%	2% 16%	NC-r: P > 0.999 In-M: P = 0.058
2021 ⁴¹	54	Retrospective Single-center	(27) 2-6 weeks (15) >6 weeks (12)	3.7% 0% 8.3%	11.1% ^{\$} 6.7% 8.3%	NC-r: P = 0.472 In-M: P > 0.999

Late

Year (reference) of study	No. of patients	Design	Timing of surgery (no. of patients)	Post-op. NRL complication rate (NC-r)	In-hospital mortality (In-M)	Statistical analyses
1995 ³¹	111	Retrospective Multi-center	<24 h (11) 2-7 d (16) 8-14 d (12) 15-21 d (10) 21-28 d (19) >28 d (43)	8-15d: 16.7% 15-28d: 10.3% >28d: 2.3%	66.3% 31.3% 16.7% 10% 26.3% 7%	NC- vs. 15-28d): p=0.02 In-M (<28d vs. >28d): p=0.009
2004 ³²	187*	Retrospective Single-center + patients from the literature*	<3 d (53) 4-14 d (35) 15-28 d (29) >28 d (70)	19% 29% 7% 0%	NA NA NA	NC-r (<14d vs. >14d): p<0.001

Cuervo et al, Unpublished

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Cuervo et al, Unpublished

Cardiac surgery may be performed without delay in cases of ischemic stroke, provided brain damage is not severe

Guidelines: timing of surgery

		Timing of Surgery				
Guideline	Year	Silent Embolism/TIA	Ischemic Stroke	Hemorrhagic Stroke		
AHA	2015	No delay (class Ilb; LOE B)	No delay if neurological damage is not severe (class IIb; LOE B) At least 4 wk for major ischemic stroke (class IIa; LOE B)	At least 4 wk (class lla; LOE B)		
ESC	2015	No delay (class I; LOE B)	No delay for heart failure, uncontrolled infection, abscess, persistent high embolic risk in absence of coma (class IIa; LOE B)	>1 mo (class Ila; LOE B)		
STS	2011	-	Delay of <4 wk for cardiac dysfunction, recurrent stroke or systemic embolism or uncontrolled infection despite adequate antibiotic therapy (class IIb; LOE C) At least 4 wk from the stroke if possible, for major ischemic stroke (class IIa, LOE C)	At least 4 wk from the stroke, if possible (class lla, LOE C)		

Yanagawa et al. Circulation 2016 Habib et al. EHJ 2015 Baddour et al. Circulation 2015

72yo male, mechanical aortic valve Stroke at home: aphasia, hemianopia, right hemiplegia



72yo male, mechanical aortic valve Stroke at home: aphasia, hemianopia, right hemiplegia



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Take home messages

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In patients with IE-related large vessel stroke, **mechanical thrombectomy seems to be safe and effective**. Healthcare systems should be organized to offer it promptly

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Neurovascular events, mostly **ischemic**, are **frequent** in IE patients, complicating the management and worsening the overall prognosis

In patients with IE-related large vessel stroke, **mechanical thrombectomy seems to be safe and effective**. Healthcare systems should be organized to offer it promptly

In addition to increasing the chances of **full functional recovery**, thrombectomy may **help further care** of complex IE patients



Order more cranial CTs! And do it soon!





Thank you

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