



# Endovascular Stroke Intervention in 2024

## Pushing the Boundaries

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January 18, 2024



# Disclosures

- Balt: consultant
- Phenox: consultant
- Penumbra: consultant
- Q'Apel: consultant

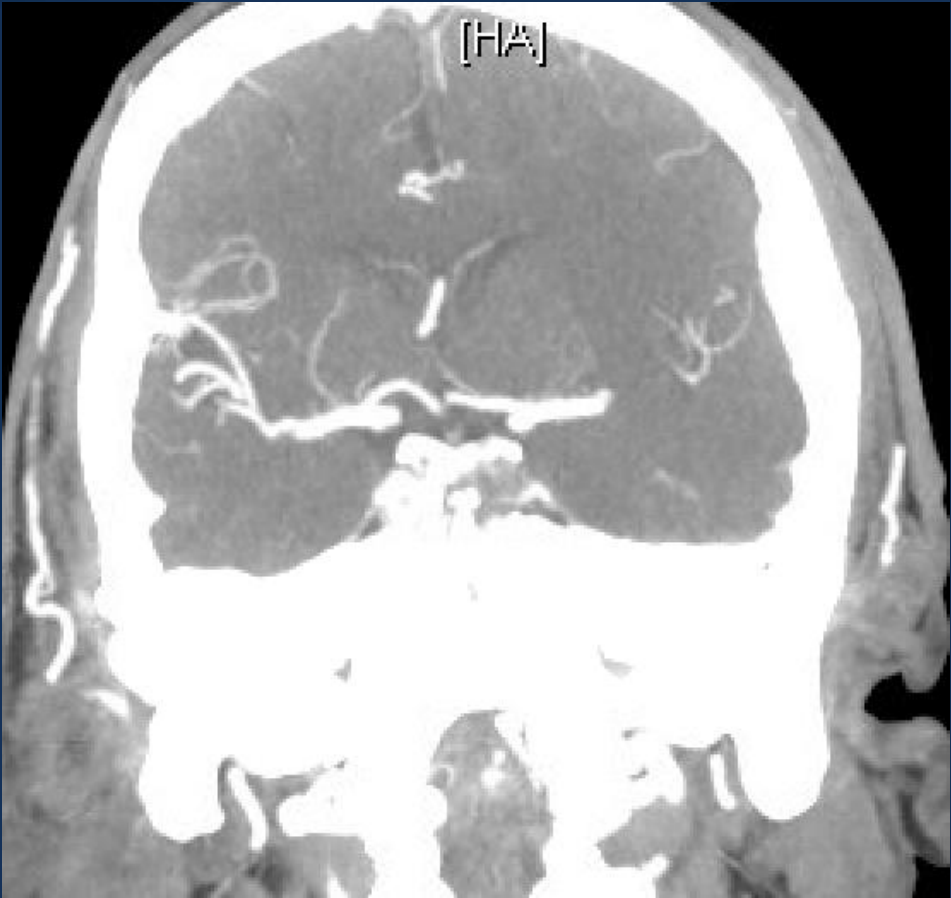
# Case 1

- 69 year old man found by family to have aphasia, right-sided weakness, neglect and left gaze preference
  - Reportedly stumbling in house around 3:00am but LKW the prior evening
- PMH: DM Type 2, HTN, HLD
- Labs: WNL
- NKDA
- Exam: Flaccid R sided weakness, L gaze preference, aphasia
- NIHSS 18

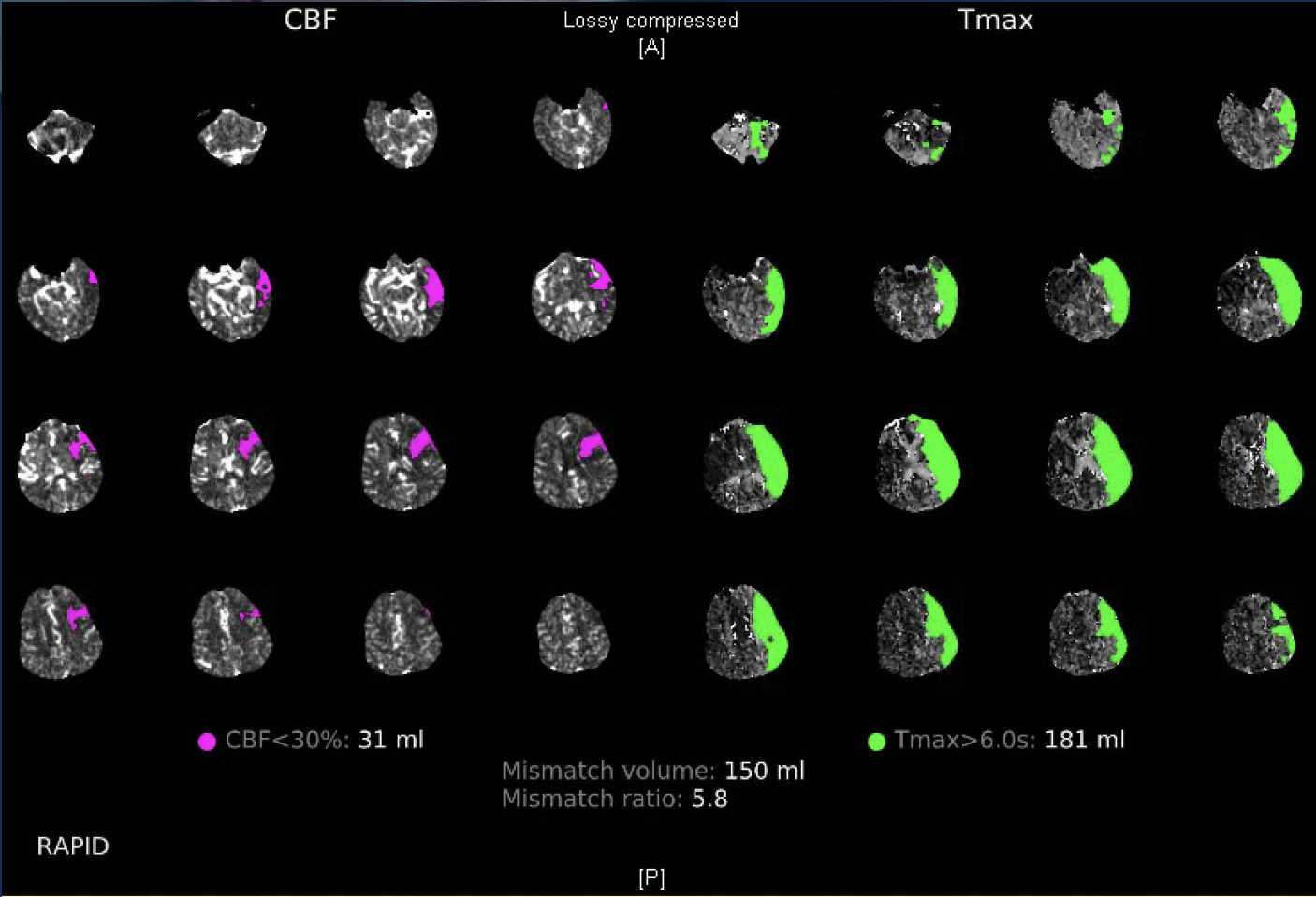
# Non-contrast CTH



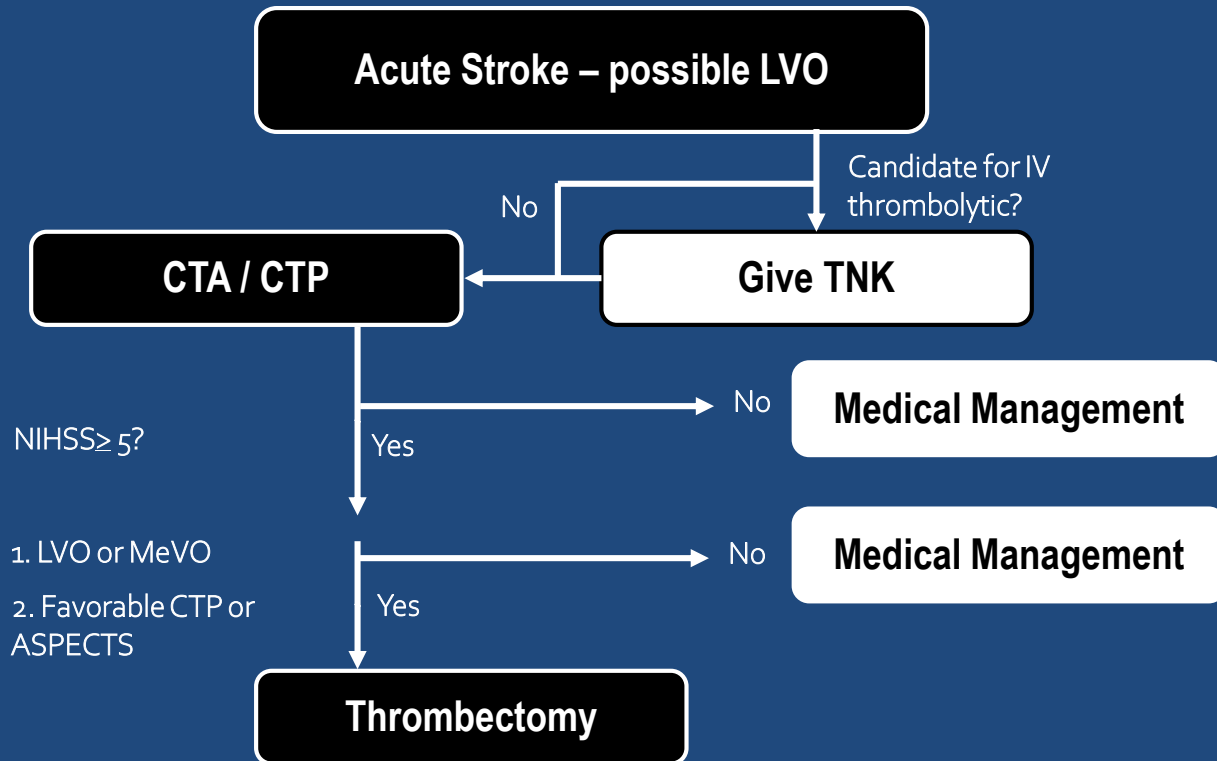
# CTA Head



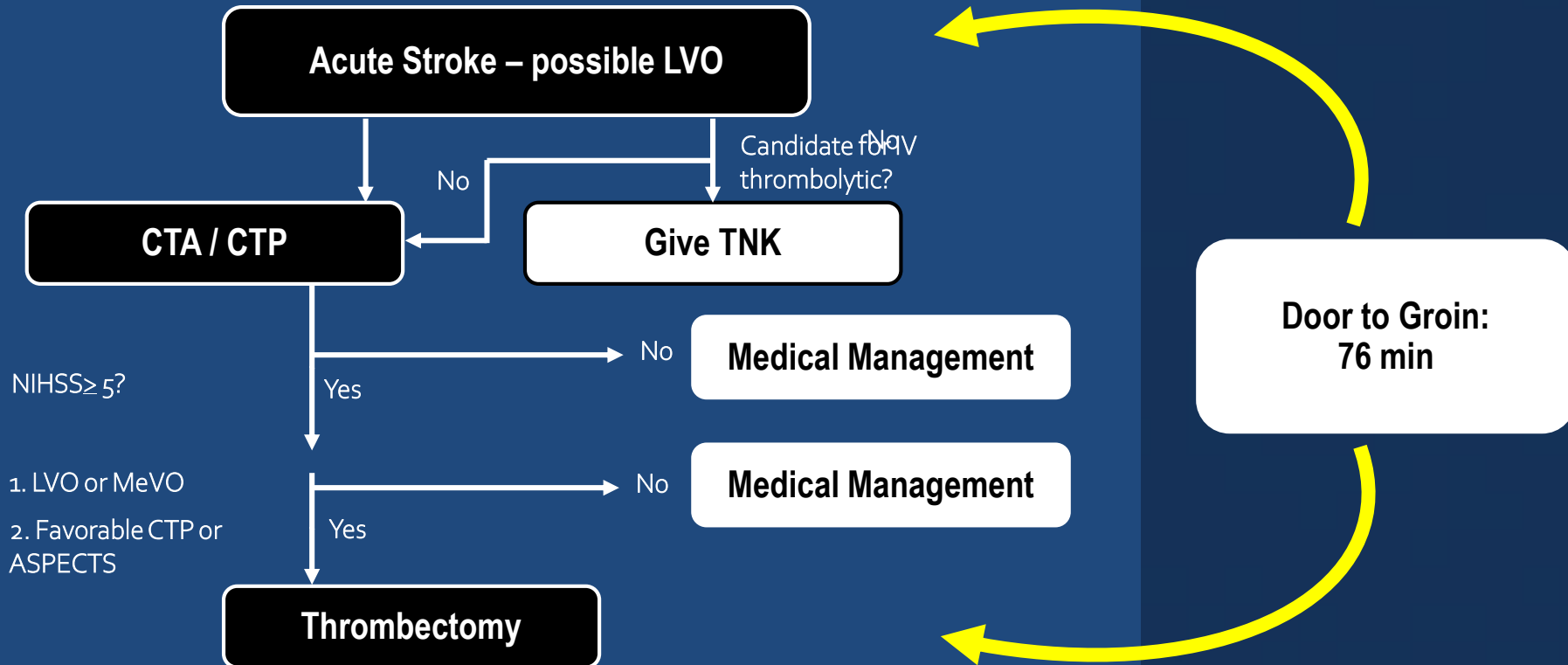
# CT Perfusion



# Interventional Stroke Protocol

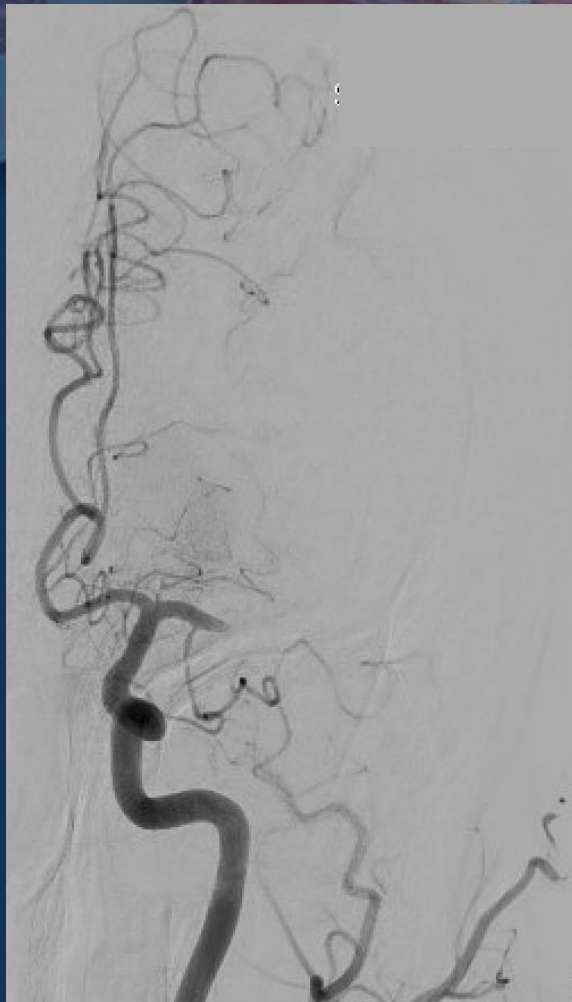


# Interventional Stroke Protocol





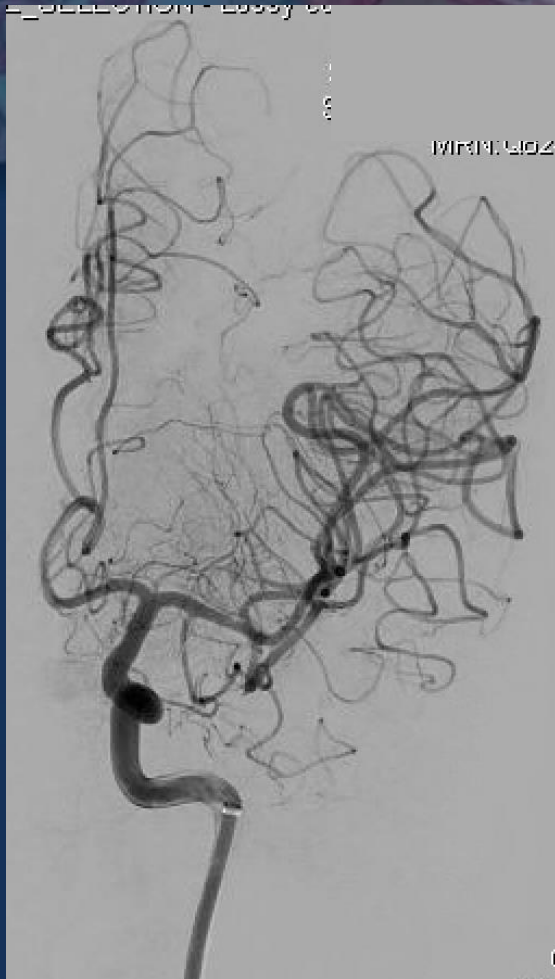
# Thrombectomy



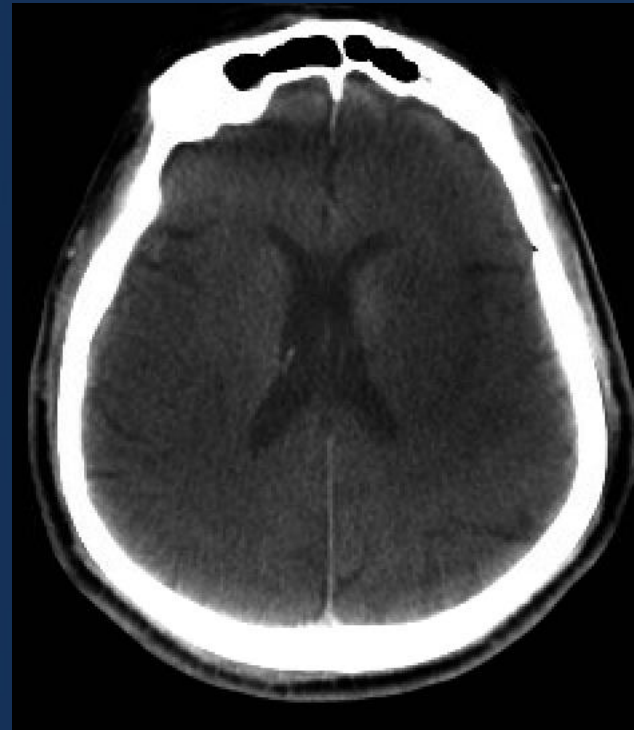
# Thrombectomy



# Thrombectomy



# Thrombectomy



# Post-Thrombectomy care

- NICU care
- SBP 100-160
- ASA, atorvastatin on PPD1
- Passed swallow evaluation

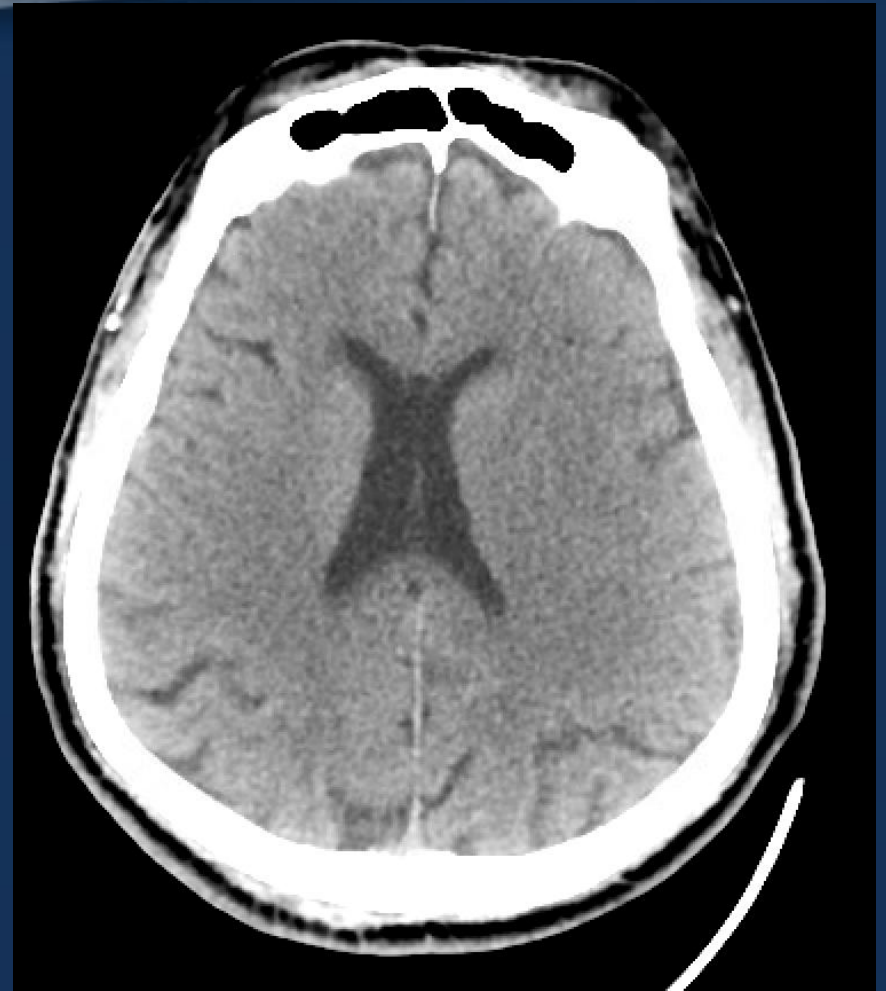
- Day 0: NIHSS 18
- Day 1: NIHSS 12
- Day 2: NIHSS 8
- Day 3: NIHSS 7 (D/C)



# Post-procedure Course

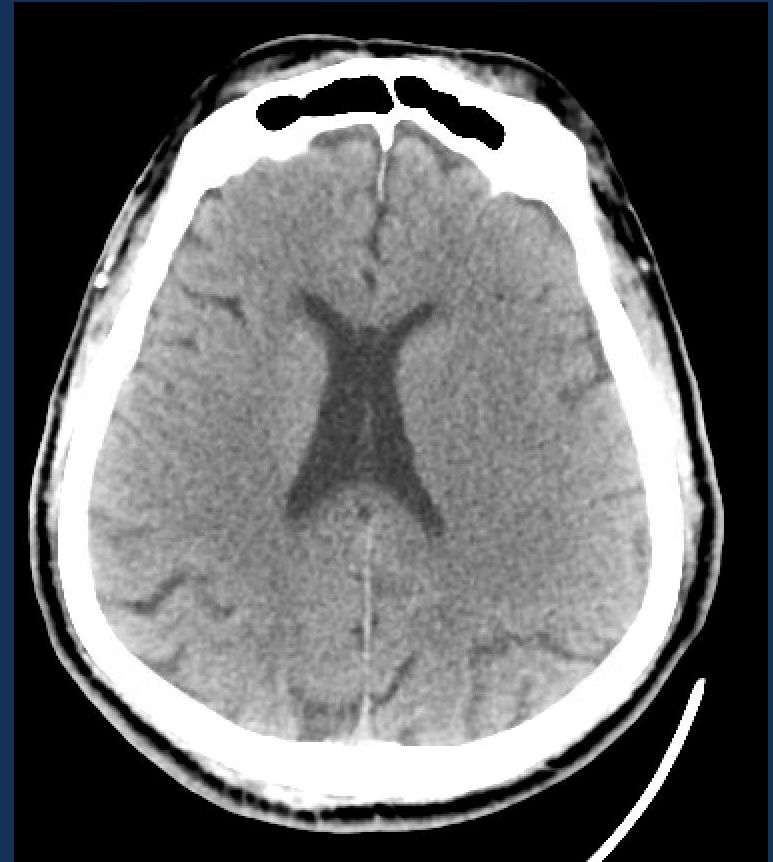
- Improved daily
- Unable to get MRI (shrapnel)
- ECG, tele for AF
- PT, OT and SW evaluation
- Stroke education

- Day 0: NIHSS 18
- Day 1: NIHSS 12
- Day 2: NIHSS 8
- Day 3: NIHSS 7 (D/C)



# Post-procedure Course

- Final exam: Partial receptive aphasia, some gaze limitation (improving), facial droop, very mild right sided weakness (4+/5) without drift
- NIHSS 7



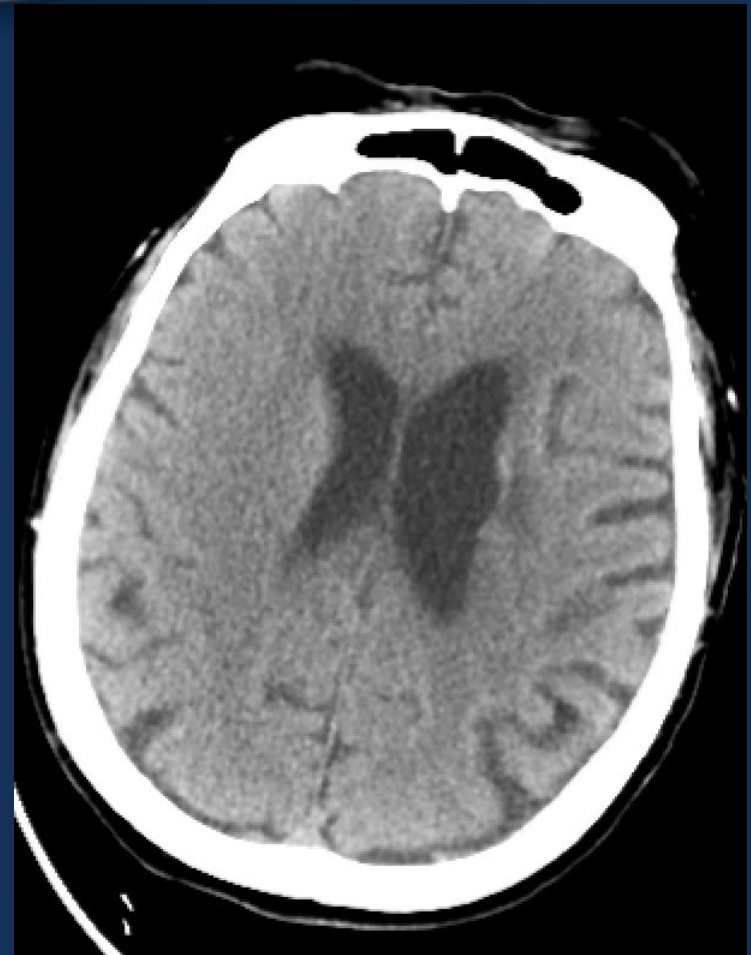
# So where is there room for improvement?

Patients were eligible if they had an initial infarct volume (ischemic core) of less than 70 ml, a ratio of volume of ischemic tissue to initial infarct volume of 1.8 or more, and an absolute volume of potentially reversible ischemia (penumbra) of 15 ml or more. Estimates of the volume of the ischemic core and penumbral regions from CT perfusion or MRI diffusion and perfusion scans were calculated with the use of RAPID software (iSchemaView), an automated image postprocessing system. The size of the penumbra was estimated from the volume of tissue for which there was delayed arrival of an injected tracer agent (time to maximum of the residue function [Tmax]) exceeding 6 seconds.<sup>8</sup>

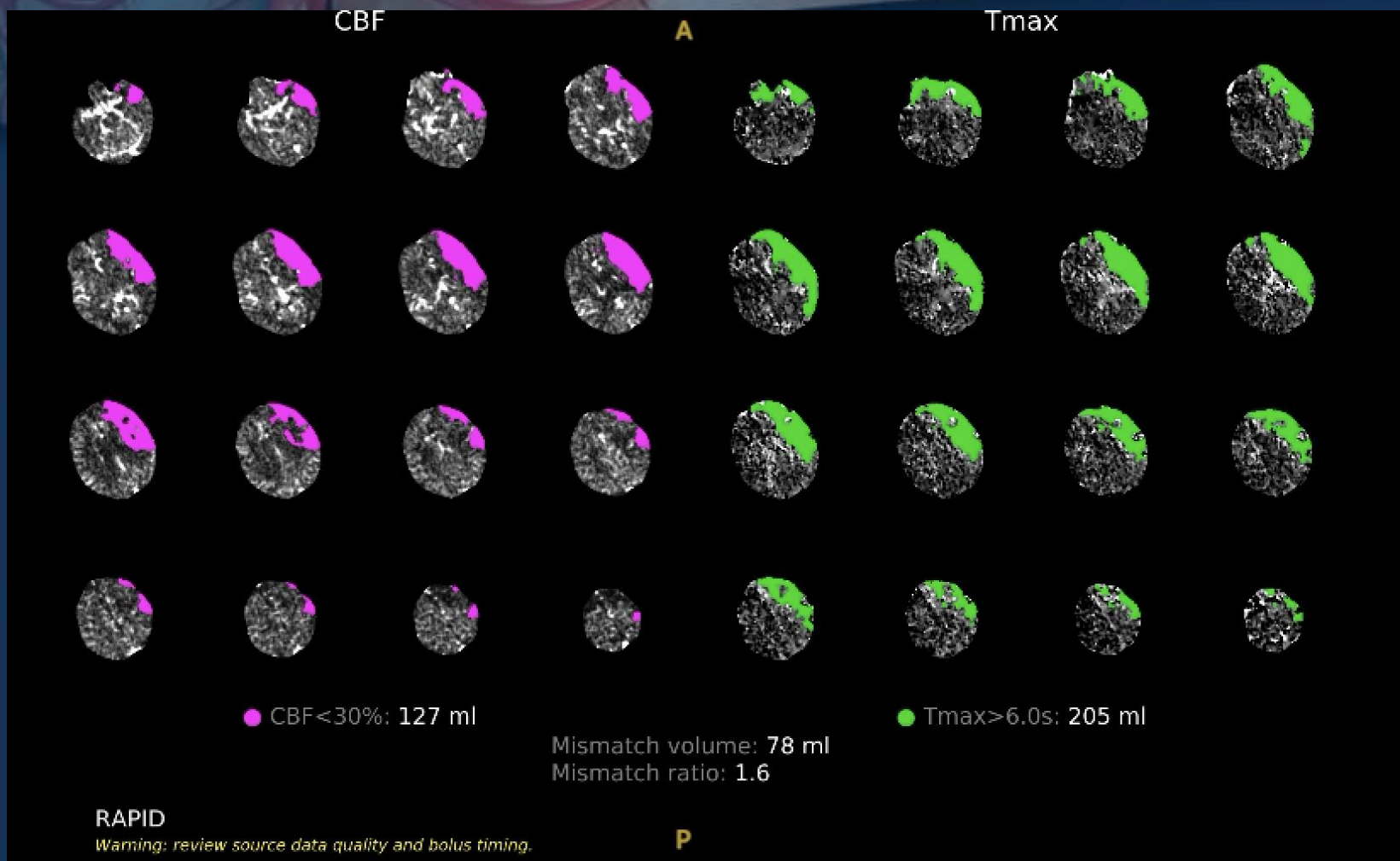


## Case 2

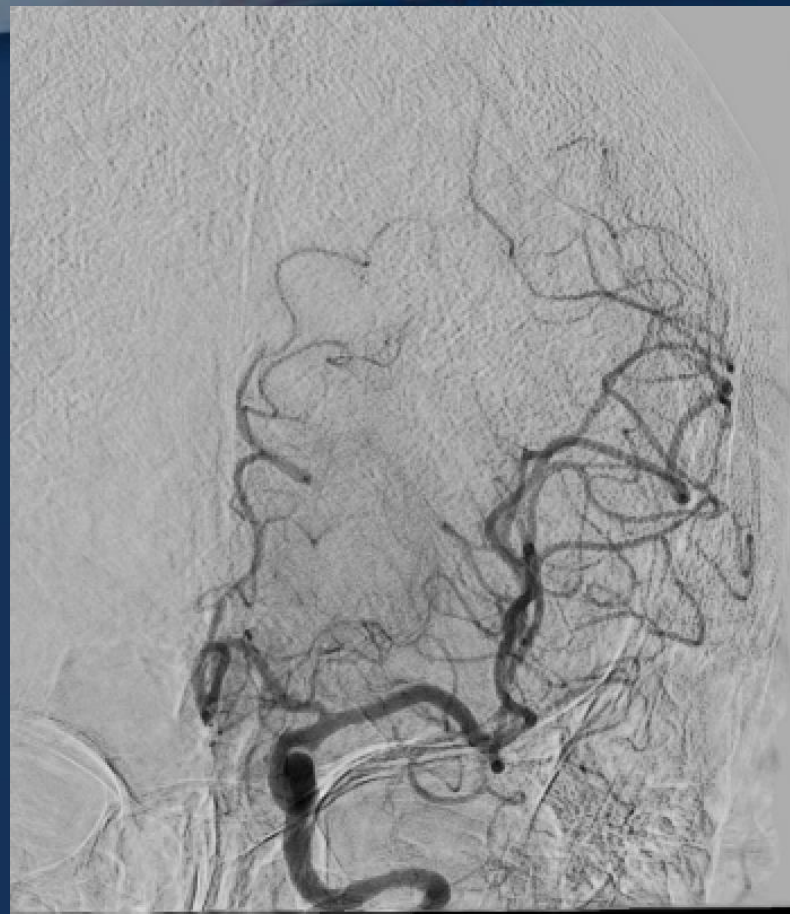
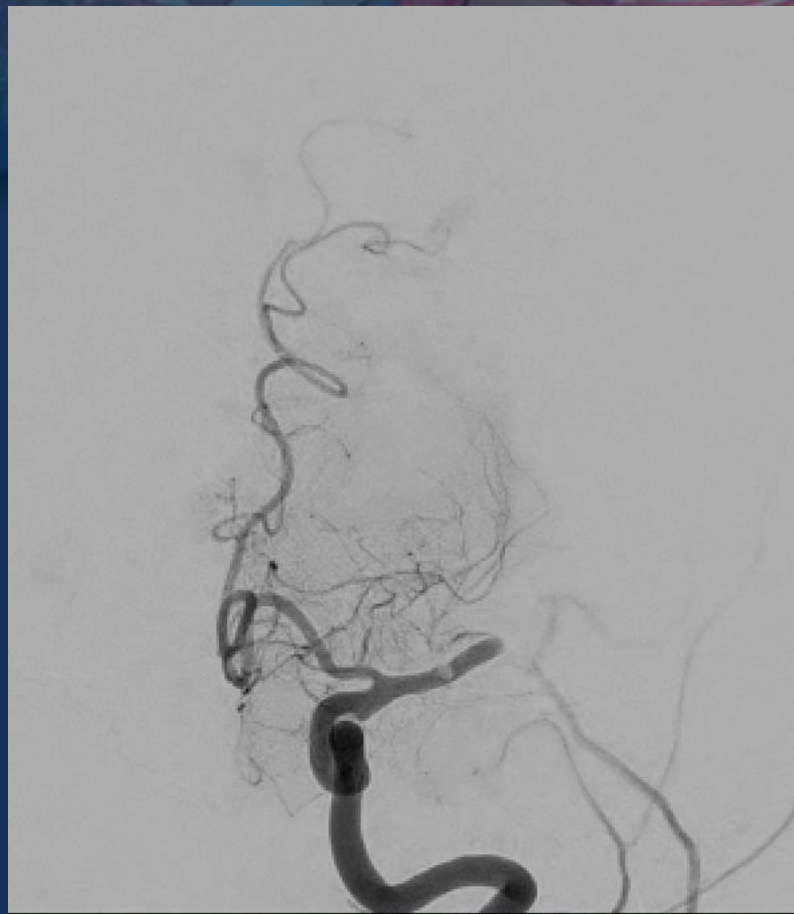
- 79 y/o F p/w 1 hour h/o right sided weakness, dysarthria, aphasia, facial droop
- PMH: A-Fib on pradaxa, HTN, prior CVA with no residual deficits
- NIHSS 21



# Case 2



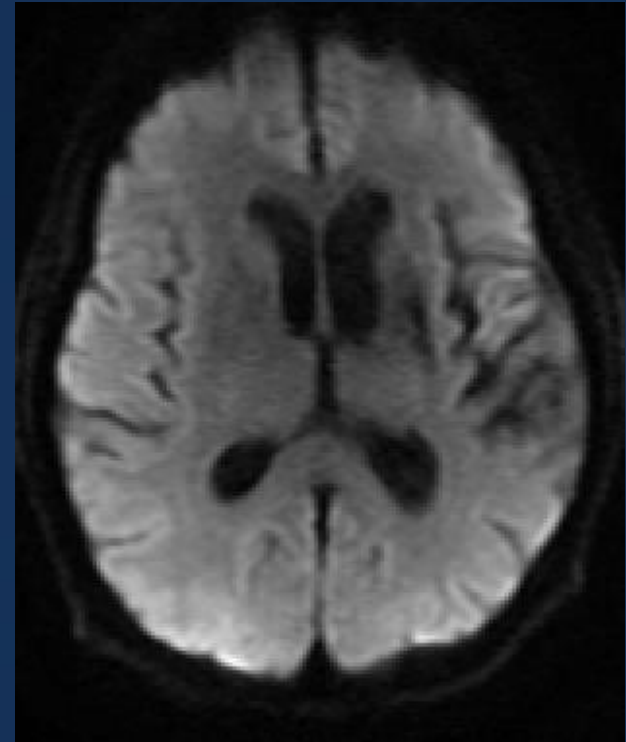
# Case 2



2 passes aspiration + stentriever  
TICI 2c

## Case 2

- Immediate post-procedure NIHSS improved to 8
- R hemiparesis improved to 4+/5 RUE with mild drift, aphasia improving
- D/C to rehab



# Mechanical Thrombectomy for Large Ischemic Stroke

A Systematic Review and Meta-analysis

**INR** INTERVENTIONAL  
NEURORADIOLOGY

Neurology®

## Endovascular thrombectomy for ischemic stroke with large core volume: An updated, post-TESLA systematic review and meta-analysis of the randomized trials

Published

RESCUE-Japan LIMIT  
NEJM 2022

SELECT2  
NEJM 2023

ANGEL-ASPECT  
NEJM 2023

Ongoing

TESLA\*

LASTE

TENSION

### The Bottom Line

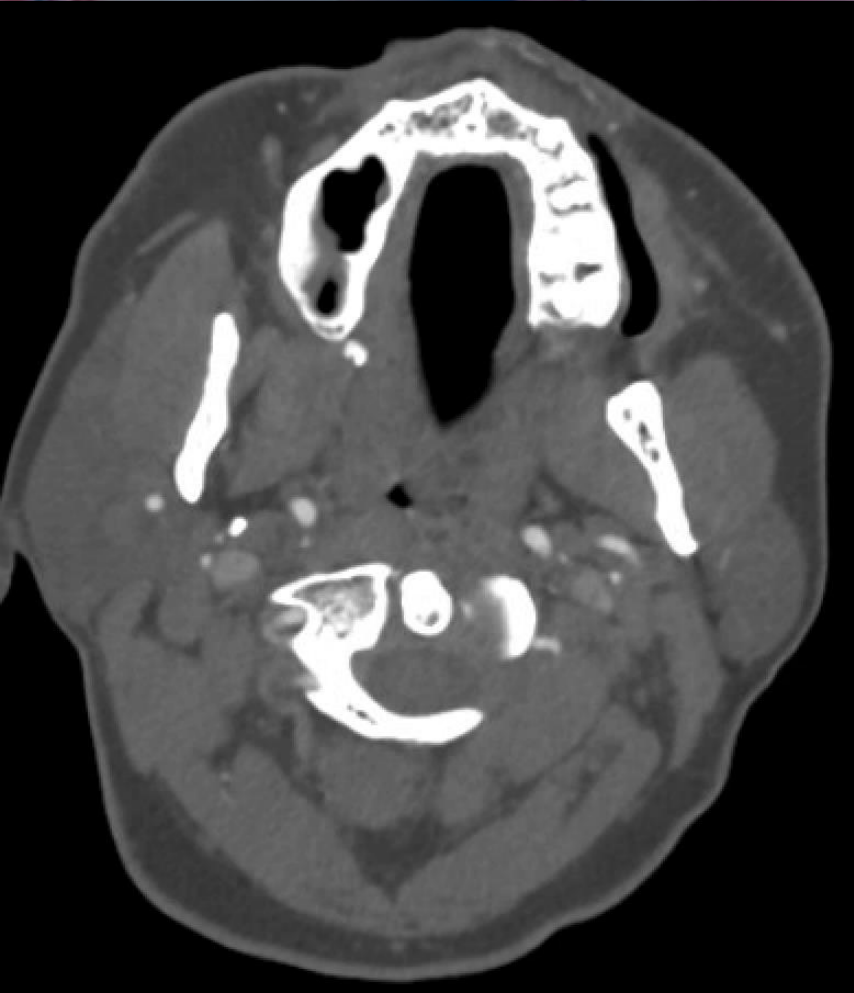
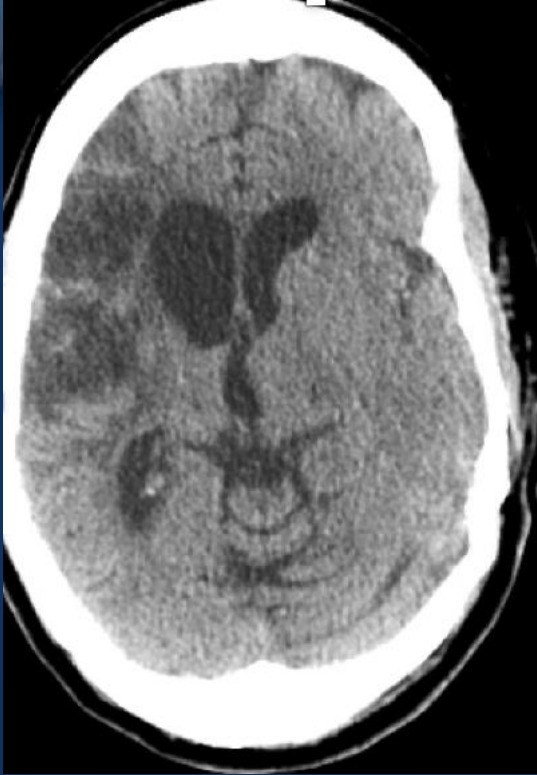
- Endovascular therapy offers improved functional outcomes for patients with large core strokes without increase in sICH compared with medical management

Kobeissi H, et al. Interv Neuroradiol. 2023 Jun 28;15910199231185738; Li Q, et al. Neurology. 2023 Aug 29;101(9):e922-e932.

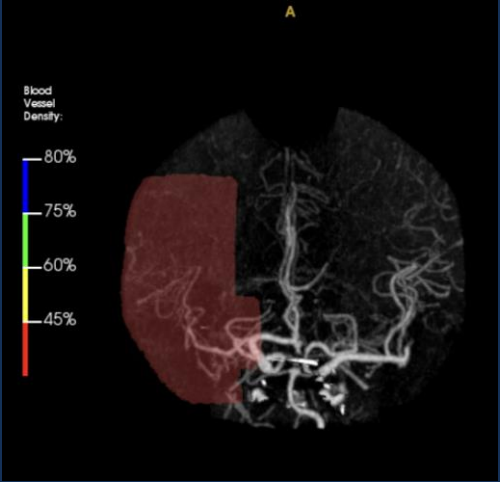
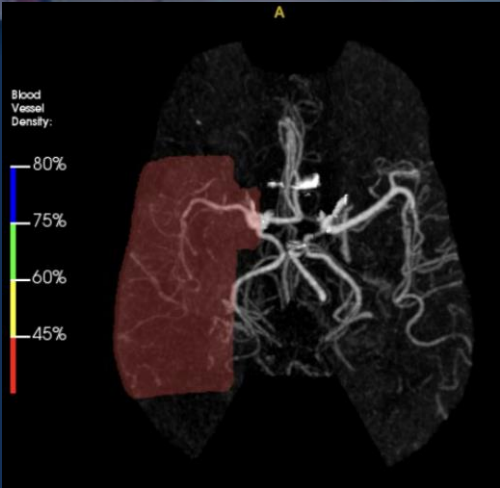
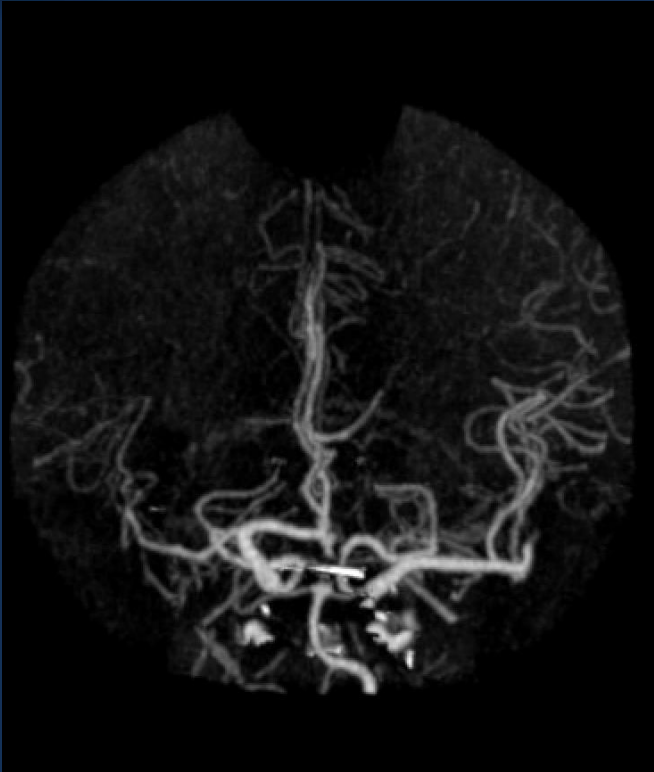
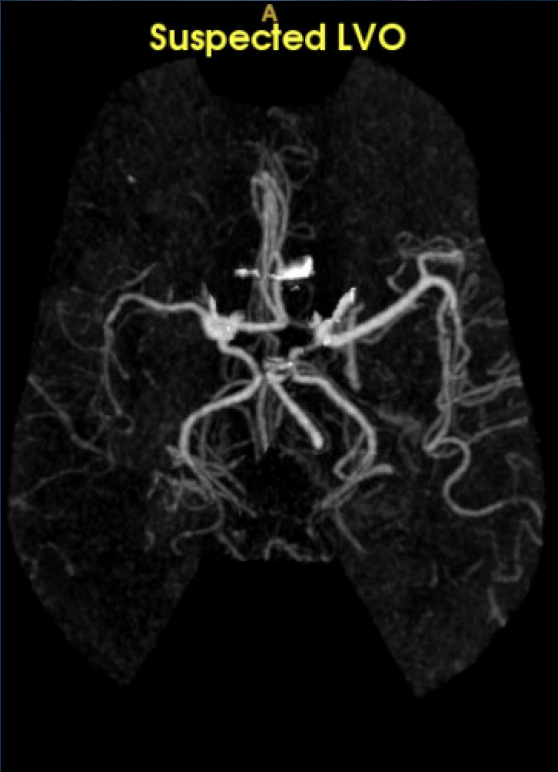
# Case 3

- 59F p/w seizure, aphasic. LKN 8h prior
- PMH: Seizure disorder (non-compliant with medications), A fib, HTN, hyperlipidemia, prior DVT
- Prior R MCA stroke with residual L sided hemiplegia, bedbound at baseline (mRS 4)
- Current smoker
- Meds: Eliquis, atorvastatin, diltiazem, Lasix, Keppra, lisinopril, metoprolol, Topamax
- O/E: Grimace to pain, globally aphasic, LUE/LLE 0/5, RUE/RLE 4/5  
NIHSS 21

# Case 3

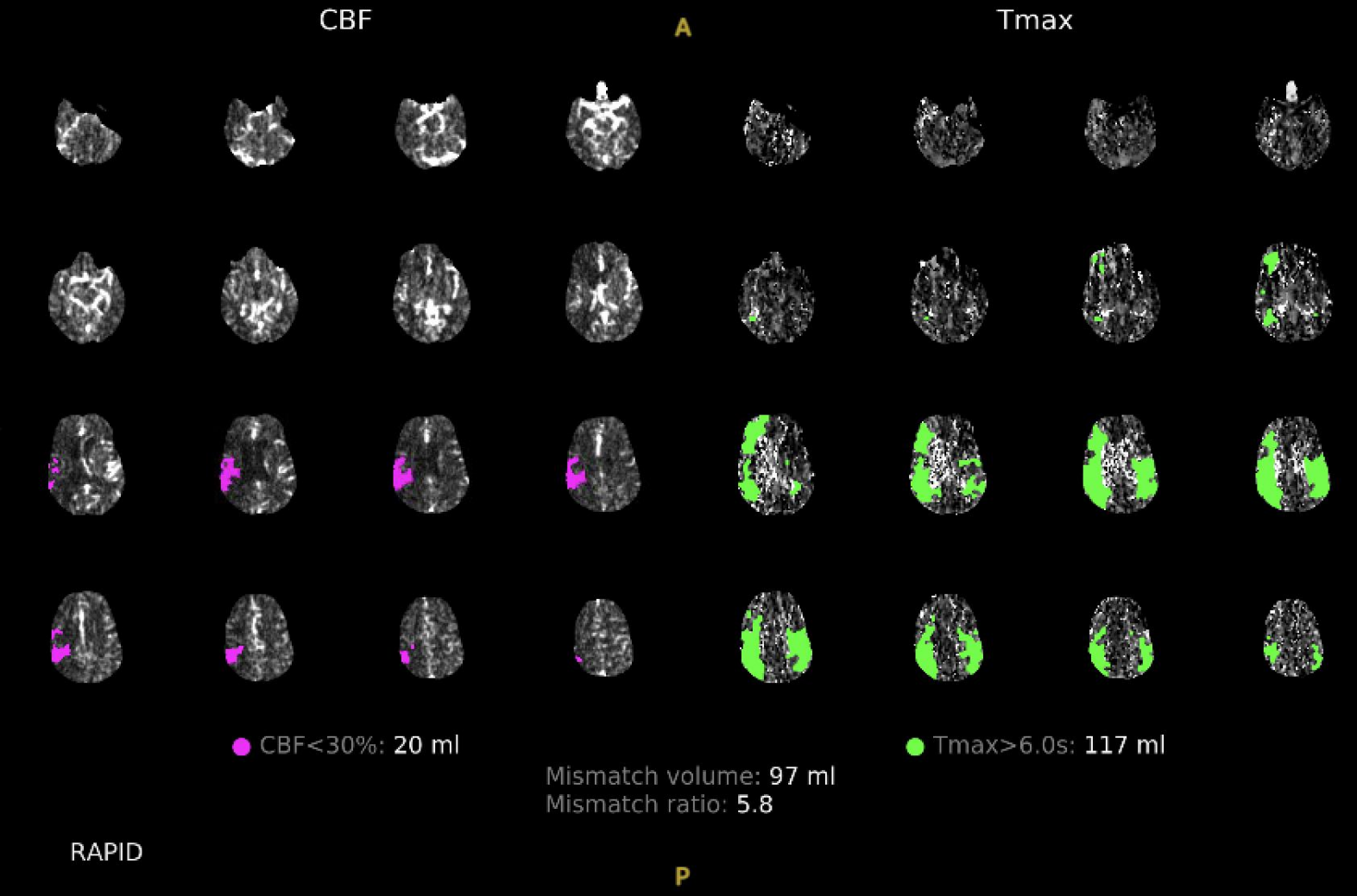


# Case 2

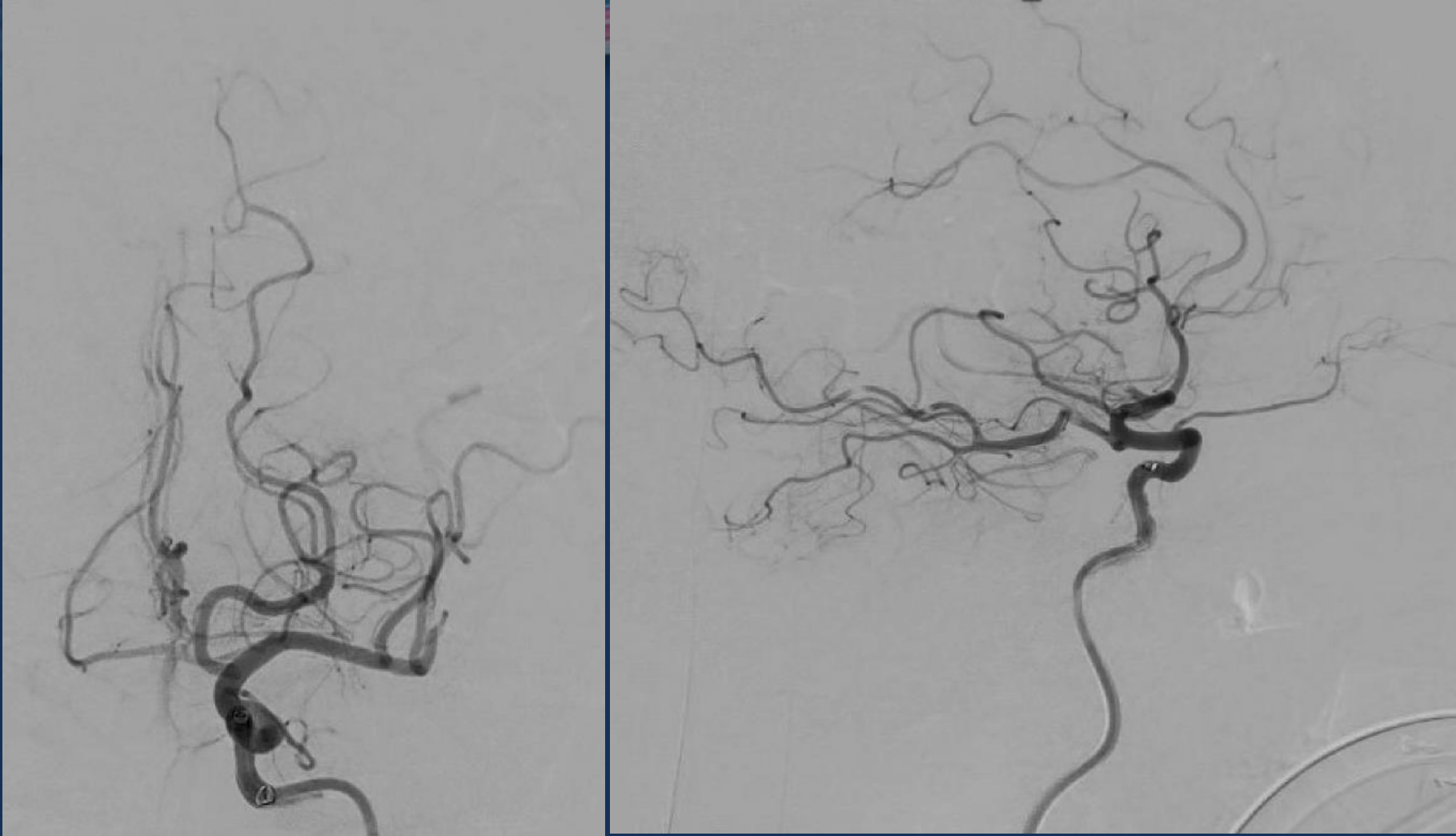




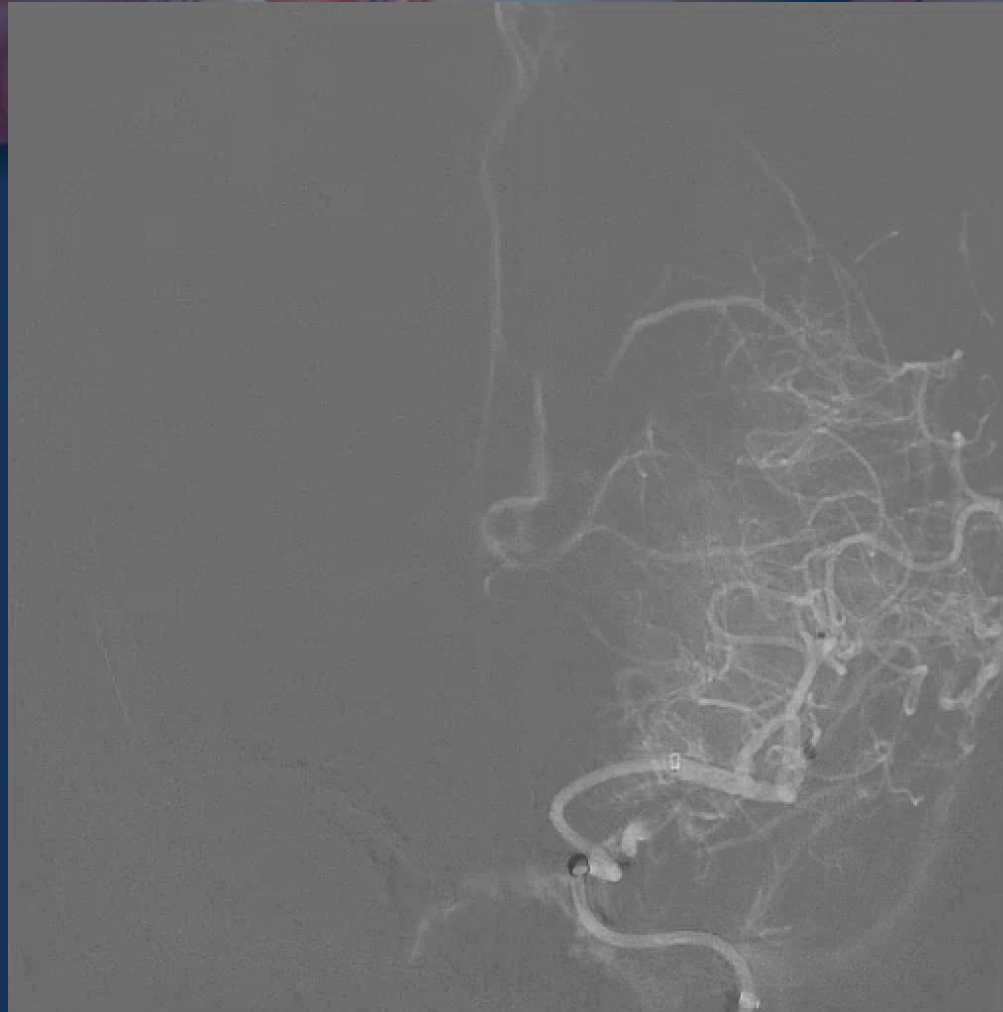
# Case 3



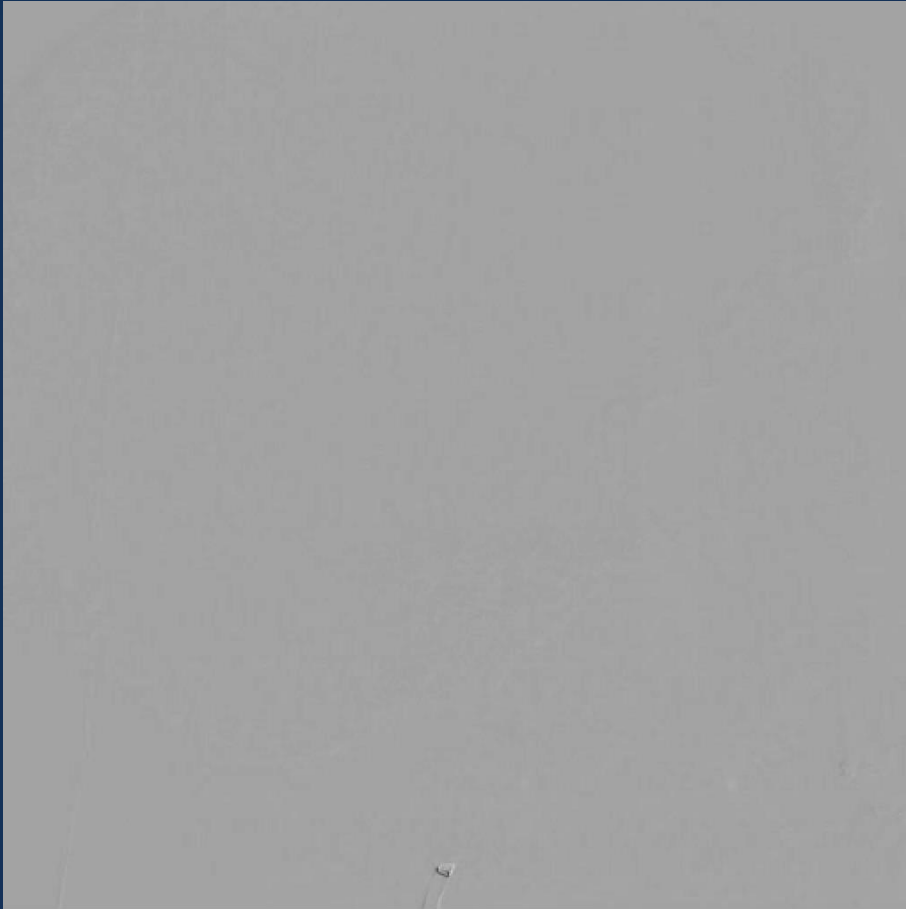
# Case 3



# Case 3

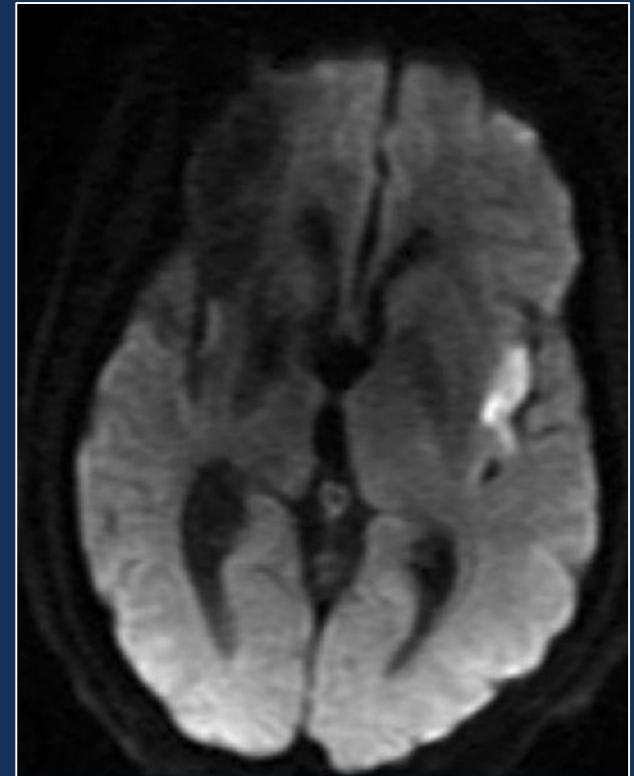


# Case 3



# Case 3

- Started on ASA, transitioned to Plavix + restarted Eliquis
- NIHSS improved to 9
  - R sided weakness resolved
  - Aphasia improved
- Discharged home PPD7



# Some evidence for thrombectomy in patients with pre-existing disabilities

Original research

**Toward a more inclusive paradigm: thrombectomy for stroke patients with pre-existing disabilities**

Robert W Regenhardt <sup>1,2</sup> Michael J Young,<sup>1</sup> Mark R Etherton,<sup>1</sup> Alvin S Das <sup>1</sup>  
Christopher J Stapleton,<sup>2</sup> Aman B Patel,<sup>2</sup> Michael H Lev,<sup>3</sup> Joshua A Hirsch <sup>3</sup>  
Natalia S Rost,<sup>1</sup> Thabele M Leslie-Mazwi <sup>1,2</sup>

**Outcome of Endovascular Thrombectomy in Pre-stroke Dependent Patients With Acute Ischemic Stroke: A Systematic Review and Meta-Analysis**

**Clinical Outcomes and Safety of Mechanical Thrombectomy for Acute Ischaemic Stroke in Patients with Pre-Existing Dependency**

El Grabli Florent, MD,\* Casolla Barbara, MD, PhD,<sup>†</sup> Ferrigno Marc, MD,\*  
Kyheng Maeva,<sup>††</sup> Bala Fouzi, MD,<sup>§</sup> Della Schiava Lucie, MD,\*  
Cordonnier Charlotte, MD, PhD,<sup>†</sup> Bricout Nicolas, MD,<sup>§</sup> and  
Henon Hilde, MD, PhD\*

**Benefit of successful reperfusion achieved by endovascular thrombectomy for patients with ischemic stroke and moderate pre-stroke disability (mRS 3): results from the MR CLEAN Registry**

**BMJ** Journals

Journal of  
**NeuroInterventional Surgery**

 **frontiers** | Frontiers in **Neurology**

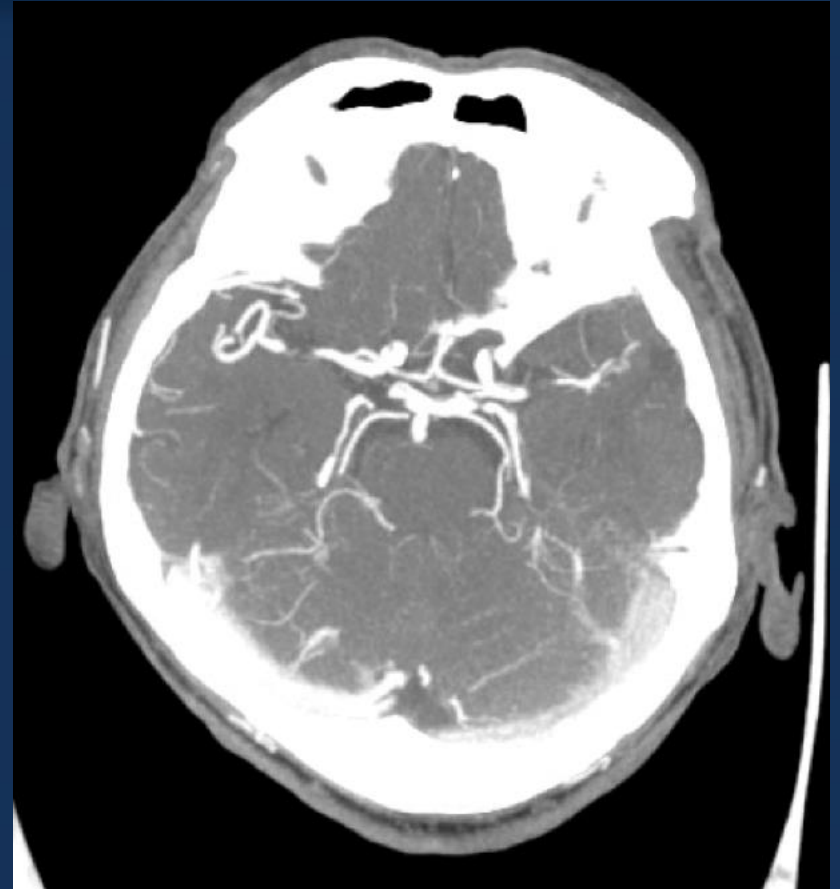
## The Bottom Line

- Similar rates of TICI 2b-3 and sICH
- 1 in 4 pt with prior dependency who had MT achieved good functional outcome
- Higher mortality (possibly)

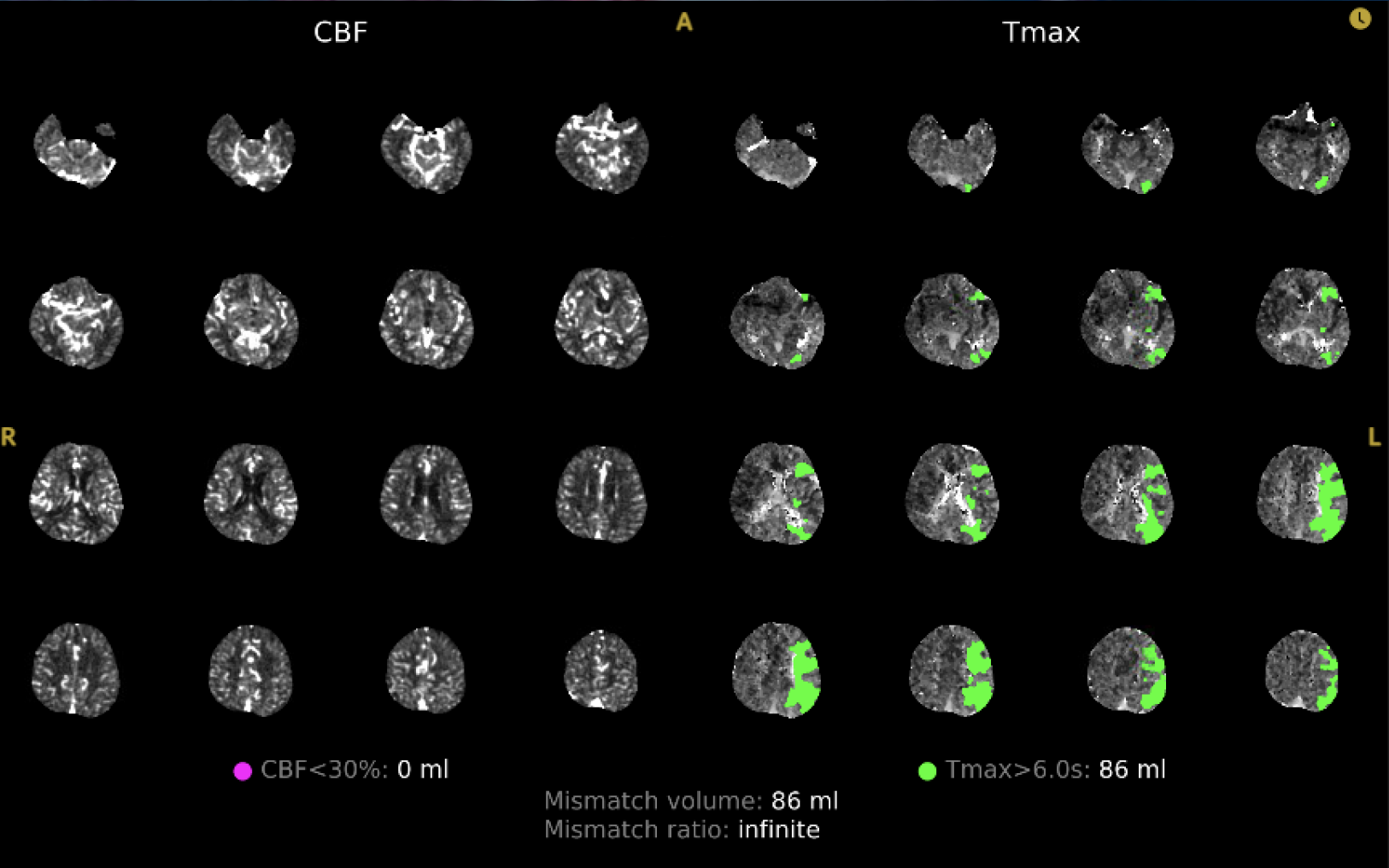
Regenhardt RW, et al. J Neurointerv Surg 2021;13:865; Florent EG, et al. J Stroke Cerebrovasc Dis 2021;30:105848; Adamou A, et al. Front Neurol 2022;13:880046; Benali F, et al. J Neurointerv Surg 2023;15:433.

# Case 4

- 82M p/w R sided weakness, facial droop
- LKW 1h prior
- Initial NIHSS 2: mild facial droop, dysarthria (weakness improved)
- After CTH: re-examined, NIHSS 5 with aphasia, dysarthria, worsening facial droop, and R arm ataxia
- TNK administered
- PMH: DM, pre-morbid mRS 2

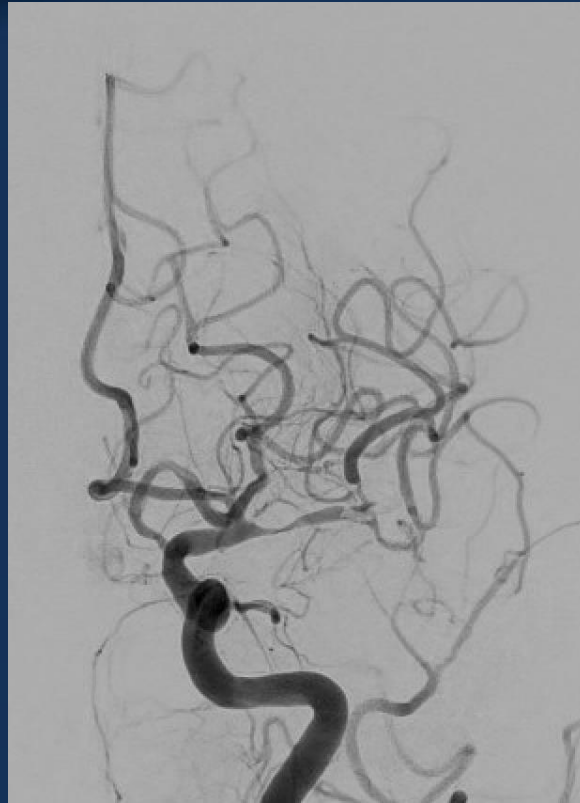
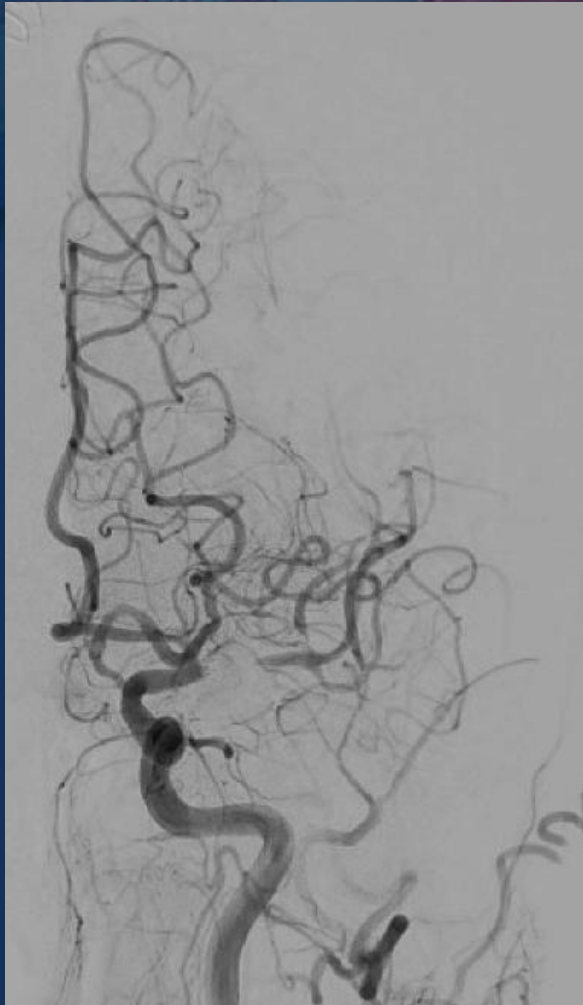


# Case 4





# Case 4

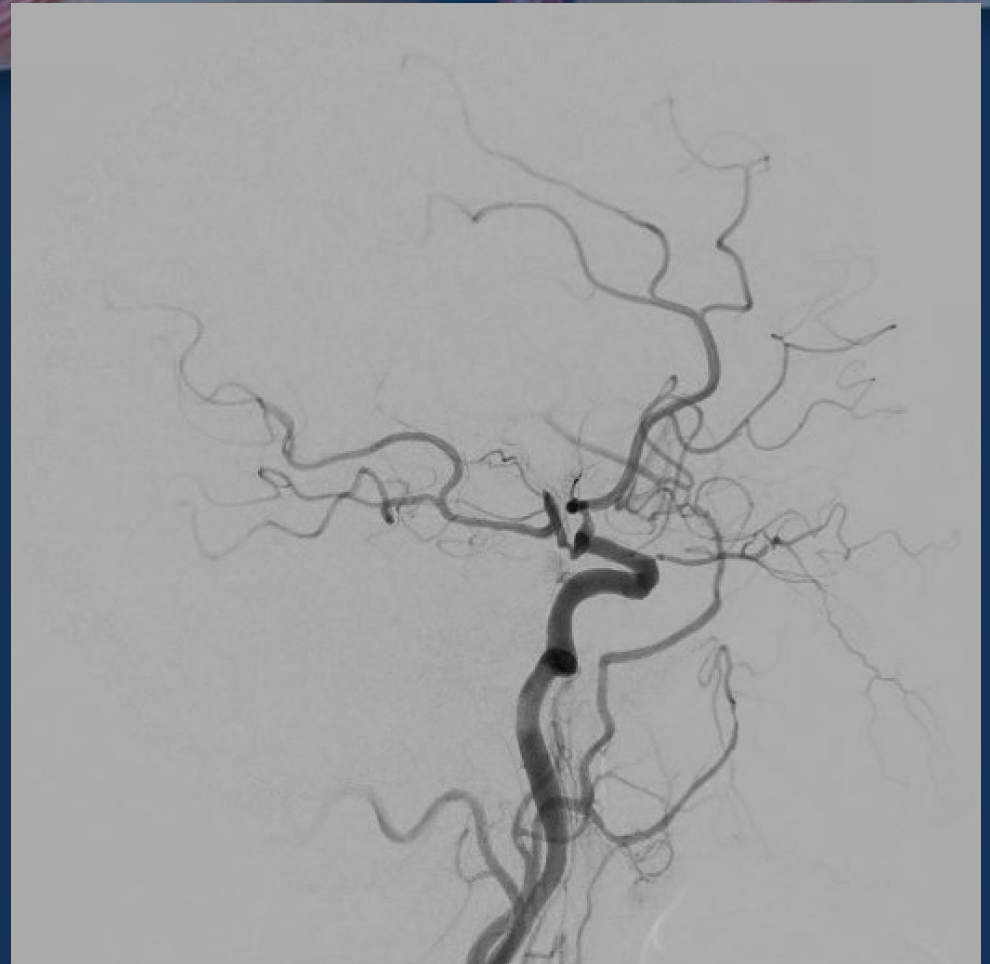
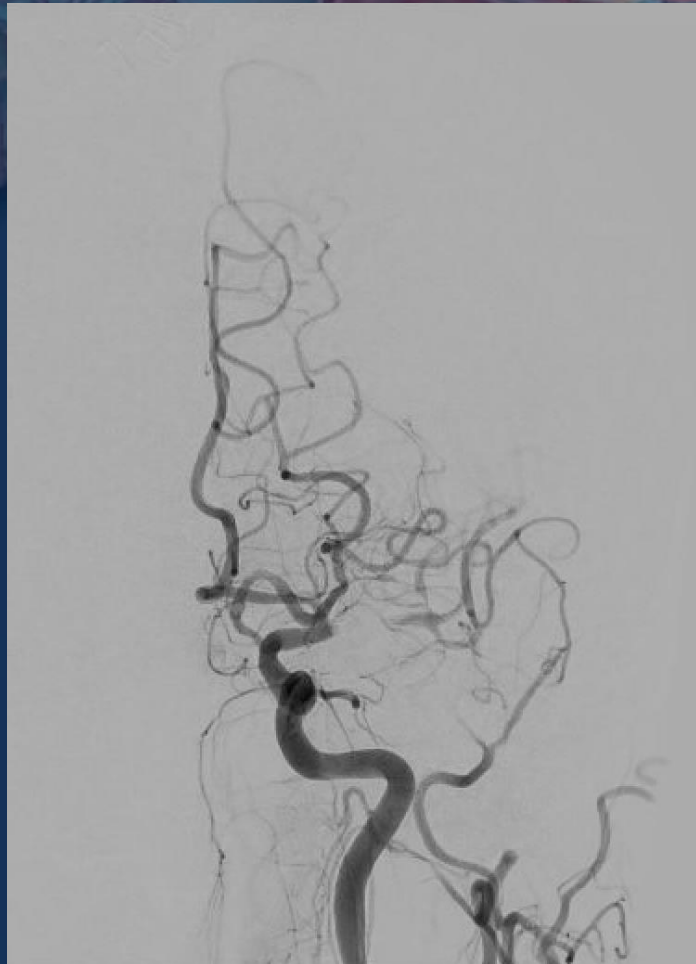


Post P1 (aspiration)



Post P2 (aspiration +  
stentriever)

# Case 4



Repeat DSA after 5 minutes

# Case 4



Post balloon angioplasty



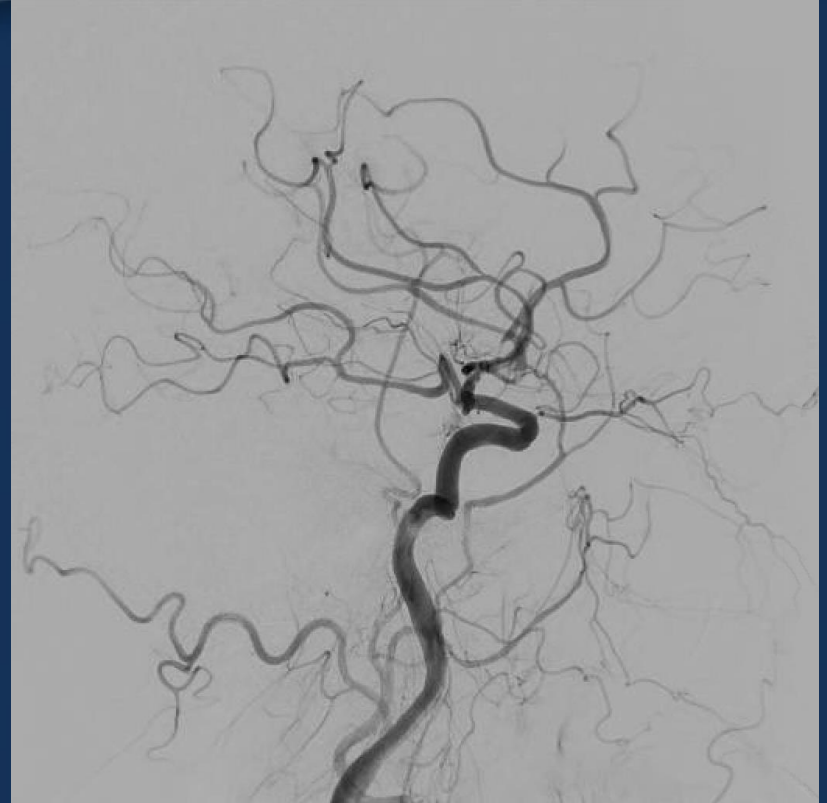
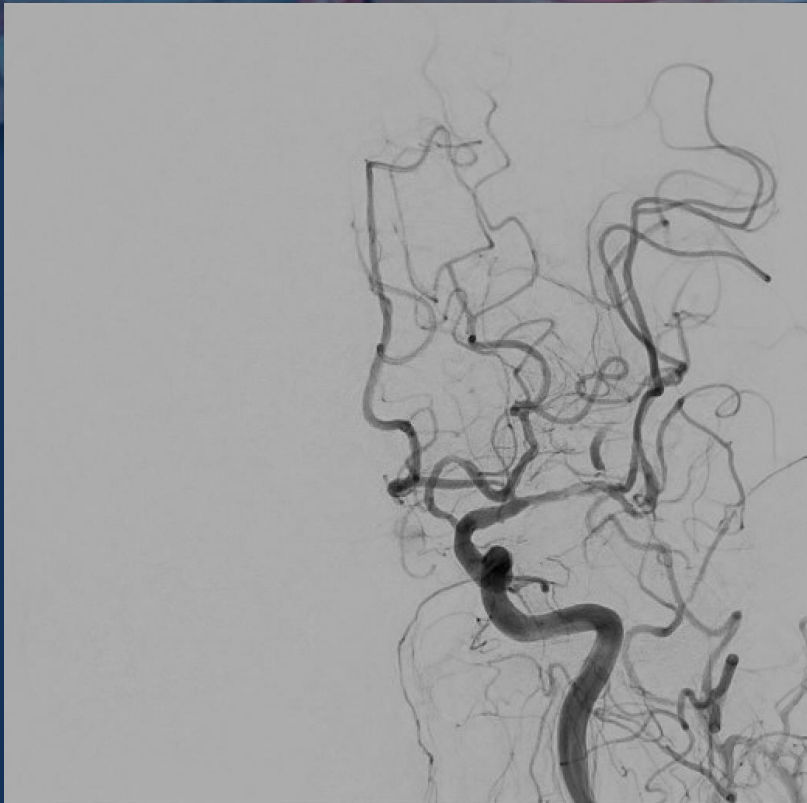
Compared with initial revascularization

# Case 4



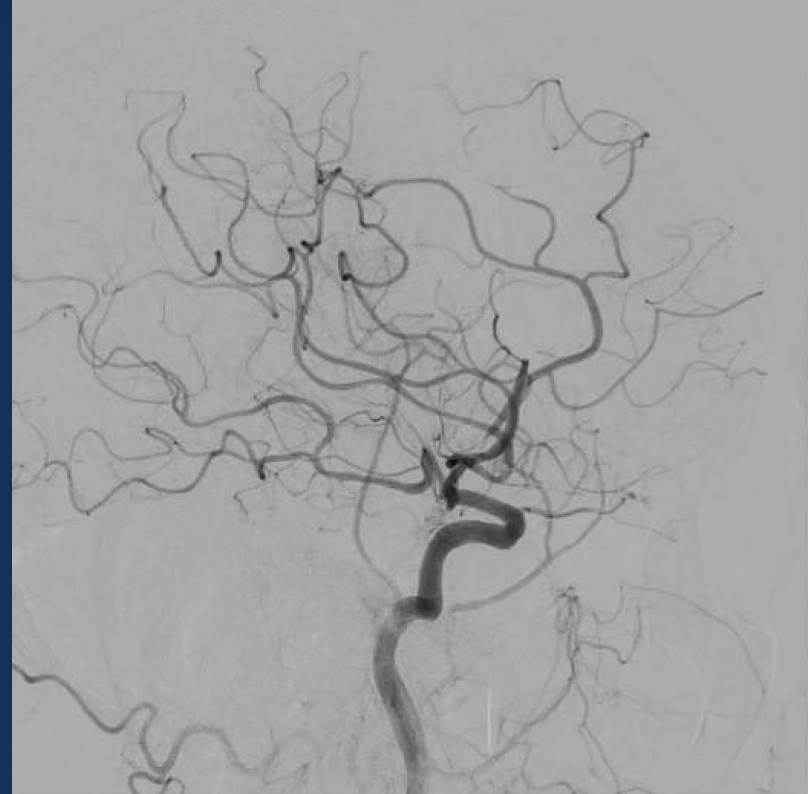
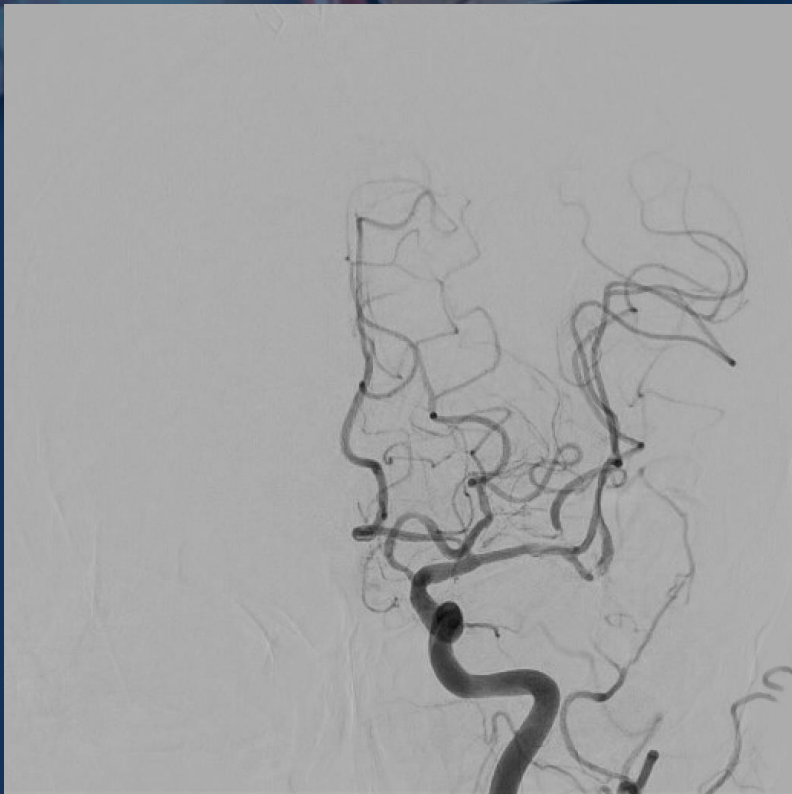
Dual stentriever technique (2x stentriever) plus aspiration

# Case 4



... But after another 5 minutes' wait, the vessel starts to re-occlude

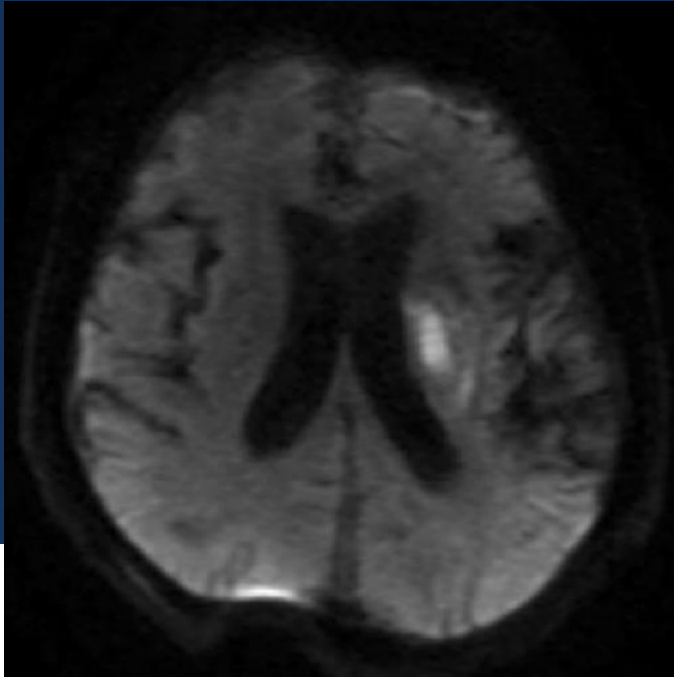
# Case 4



2.5 x 8 mm zanolimus-eluting balloon-mounted stent

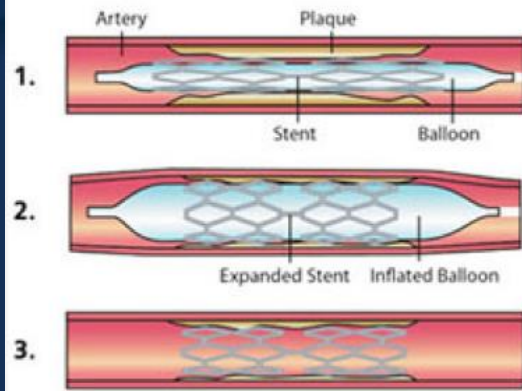
# Case 4

- Immediate post-procedure NIHSS 28, improved back to pre-procedure level of NIHSS 5
- R hemiparesis
- D/C to rehab

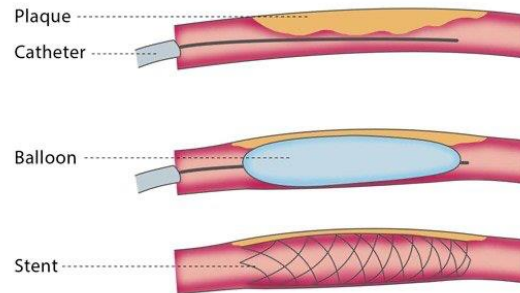


# Despite SAMMPRIS, intracranial stenting still has a role to play

## Stent with Balloon Angioplasty



## Angioplasty and stenting



Journal of  
**NeuroInterventional Surgery**

Balloon-mounted stents for acute intracranial large vessel occlusion secondary to presumed atherosclerotic disease: evolution in an era of supple intermediate catheters

Safety and efficacy of balloon-mounted stent in the treatment of symptomatic intracranial atherosclerotic disease: a multicenter experience

## The Bottom Line

- Very high re-occlusion rate without stent placement
- Higher mortality and hemorrhage rates after endovascular thrombectomy
- Despite SAMMPRIS, many ICAD patients will fail medical management alone
- Balloon-mounted stents offer improved safety compared with prior generation of intracranial stents

Mohammaden MH et al. J NeuroInterv Surg 2022;14:756-861; Guida L, et al. J Neurosurg Sci 2021;5:269-76.



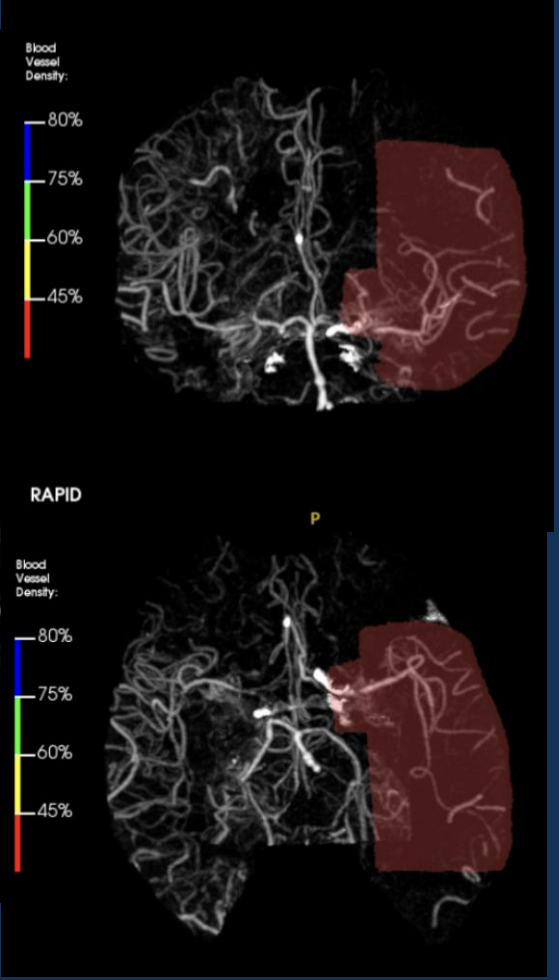
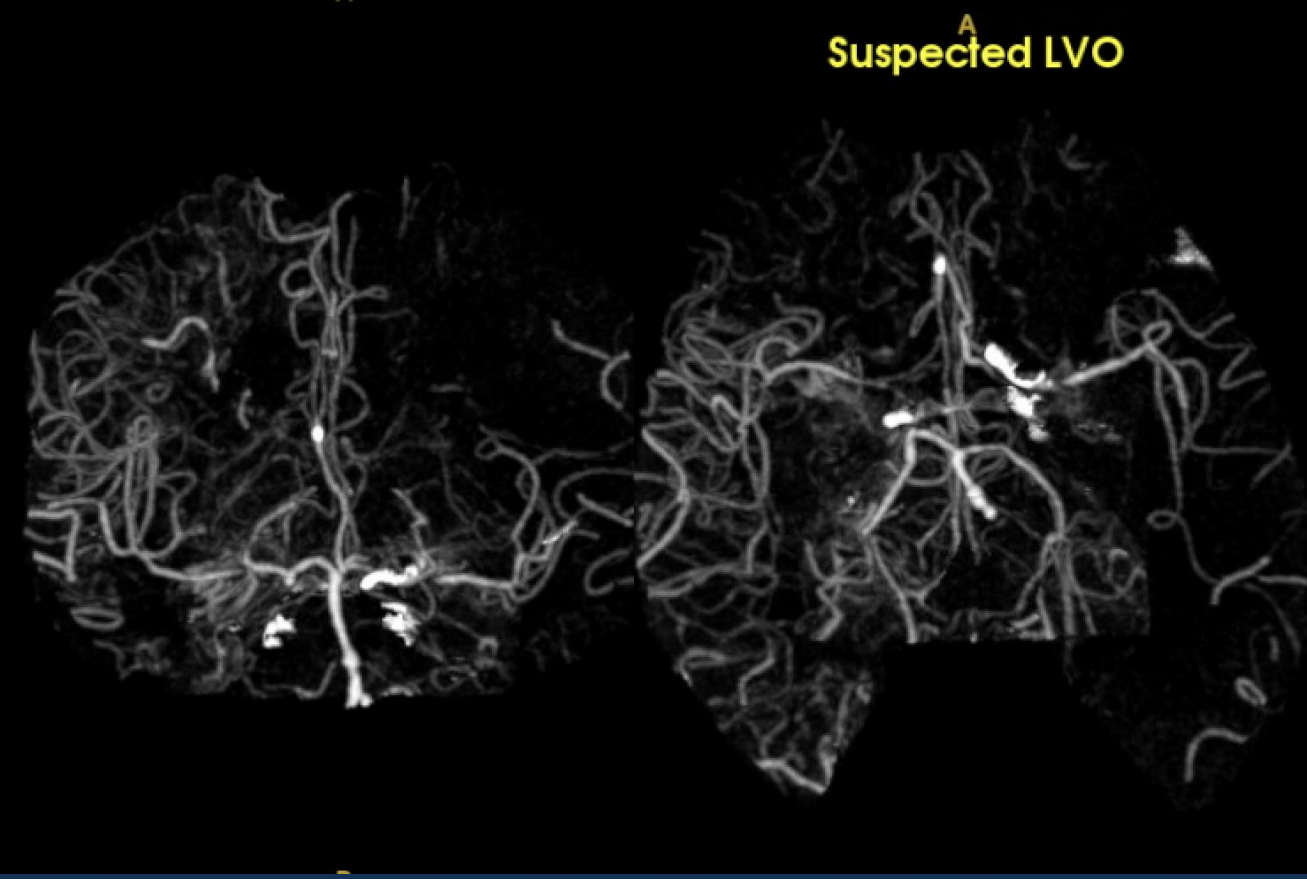
# Case 5

- 67F p/w acute onset R hemiplegia at work
- Possible LKW 3.5h prior
- Vietnamese speaker
- Unknown PMH, unknown medications
- O/E: BP 185/92, L gaze preference, aphasic
- NIHSS 27

# Case 5

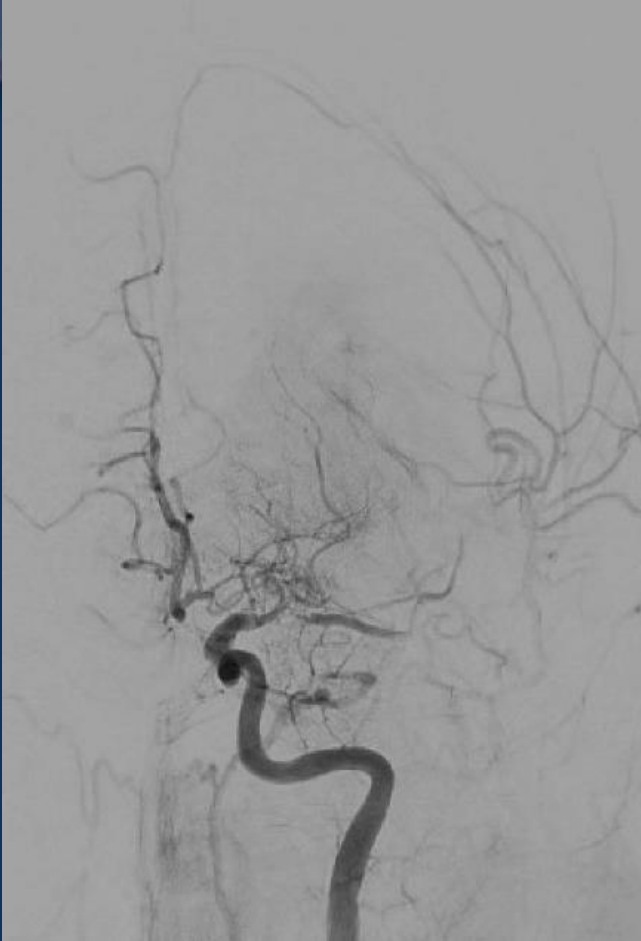


# Case 5





# Case 5



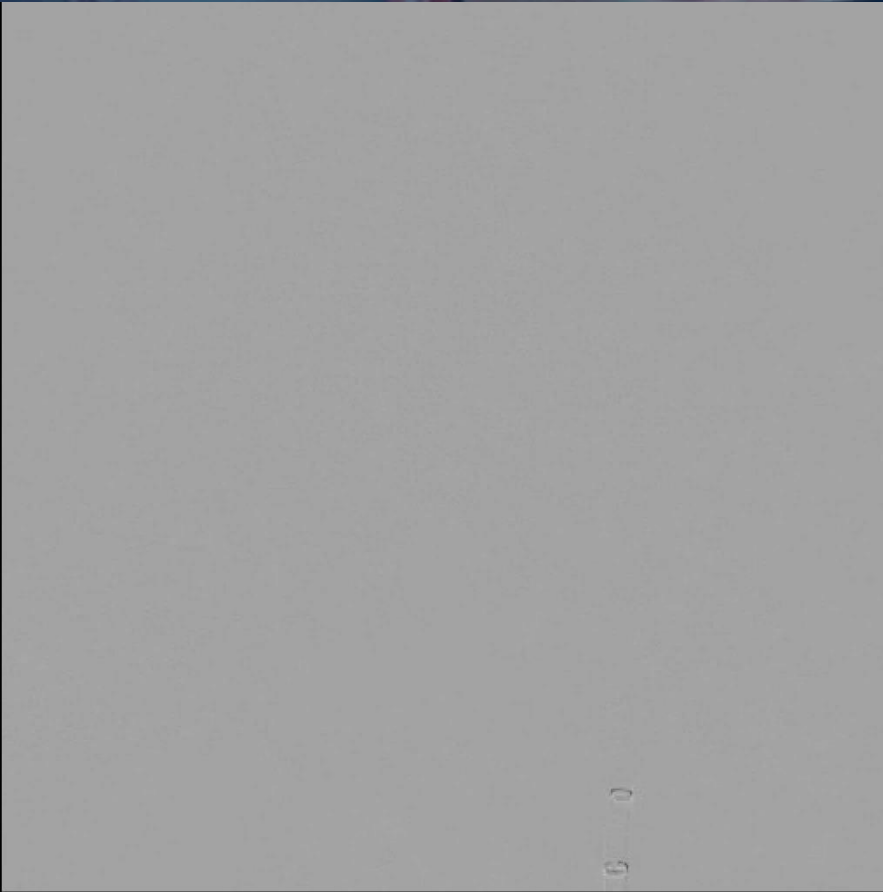
# Case 5



# Case 5

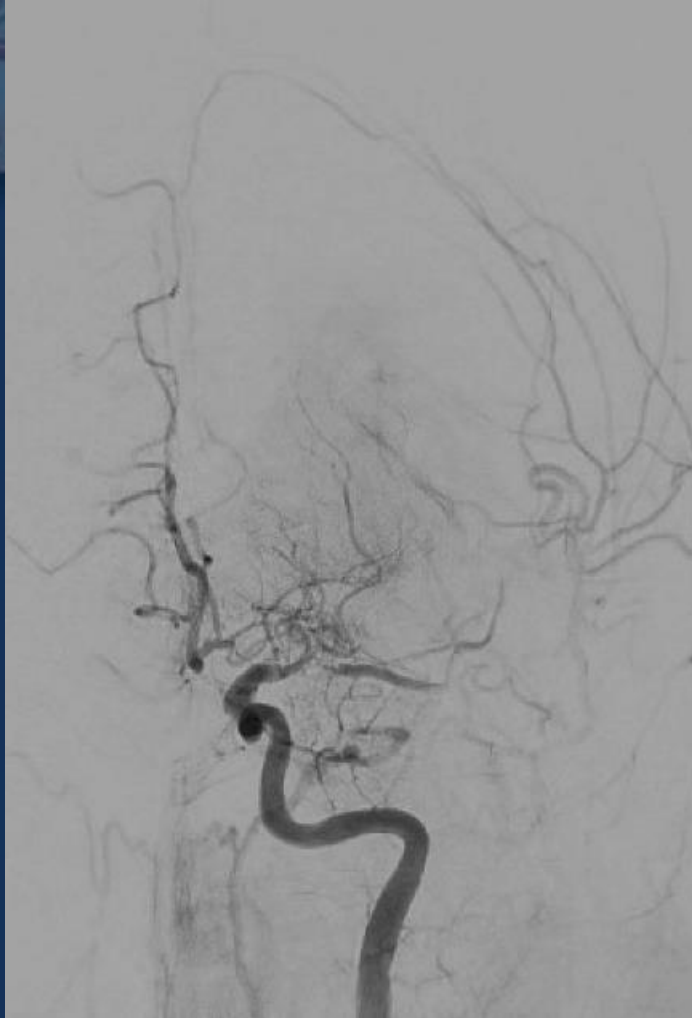


# Case 5

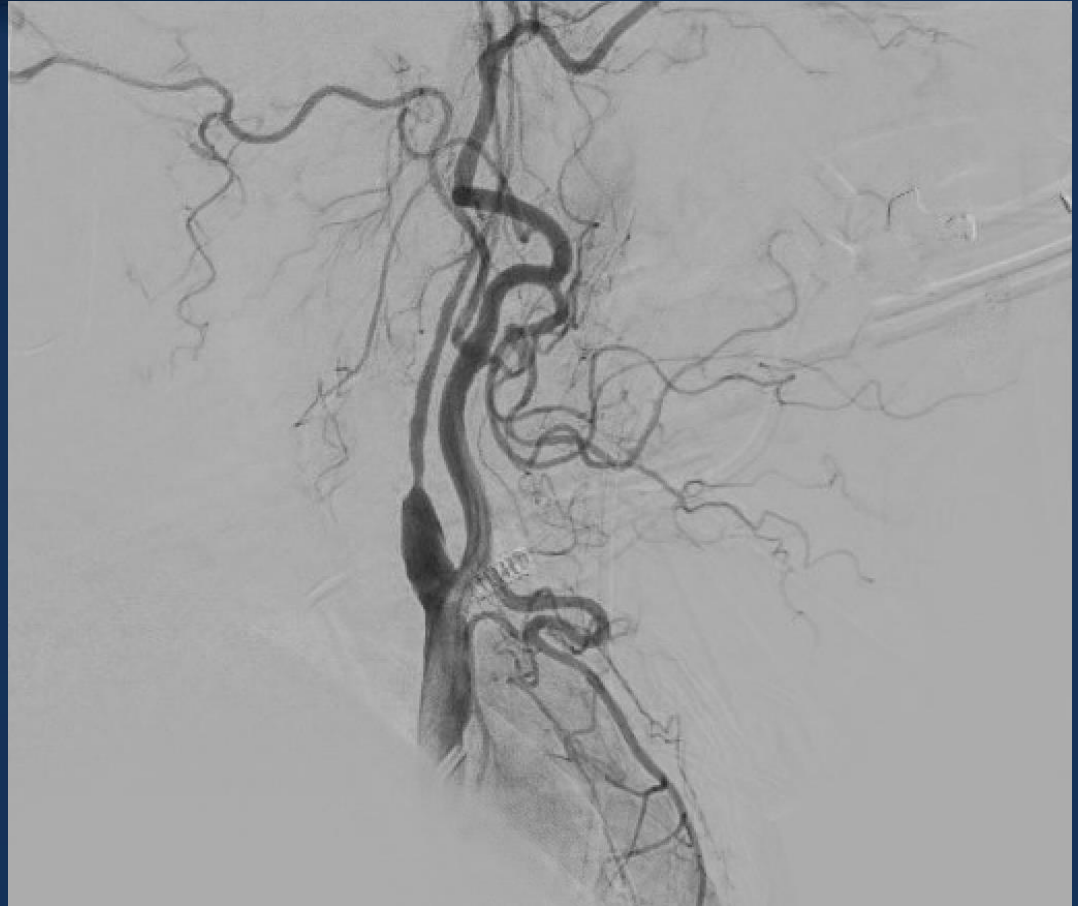




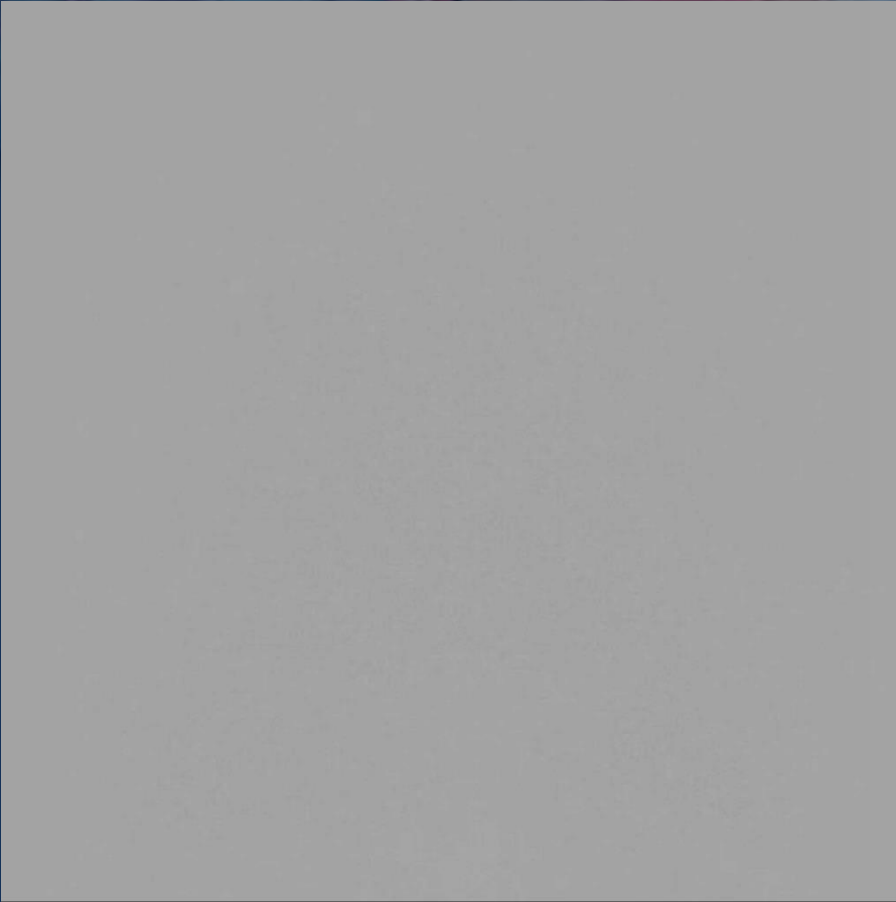
# Case 5



# Case 5



# Case 5



# Case 5

- Persistent R hemiparesis, aphasia
- Hemicrani watch
- Stabilized and discharged to rehab





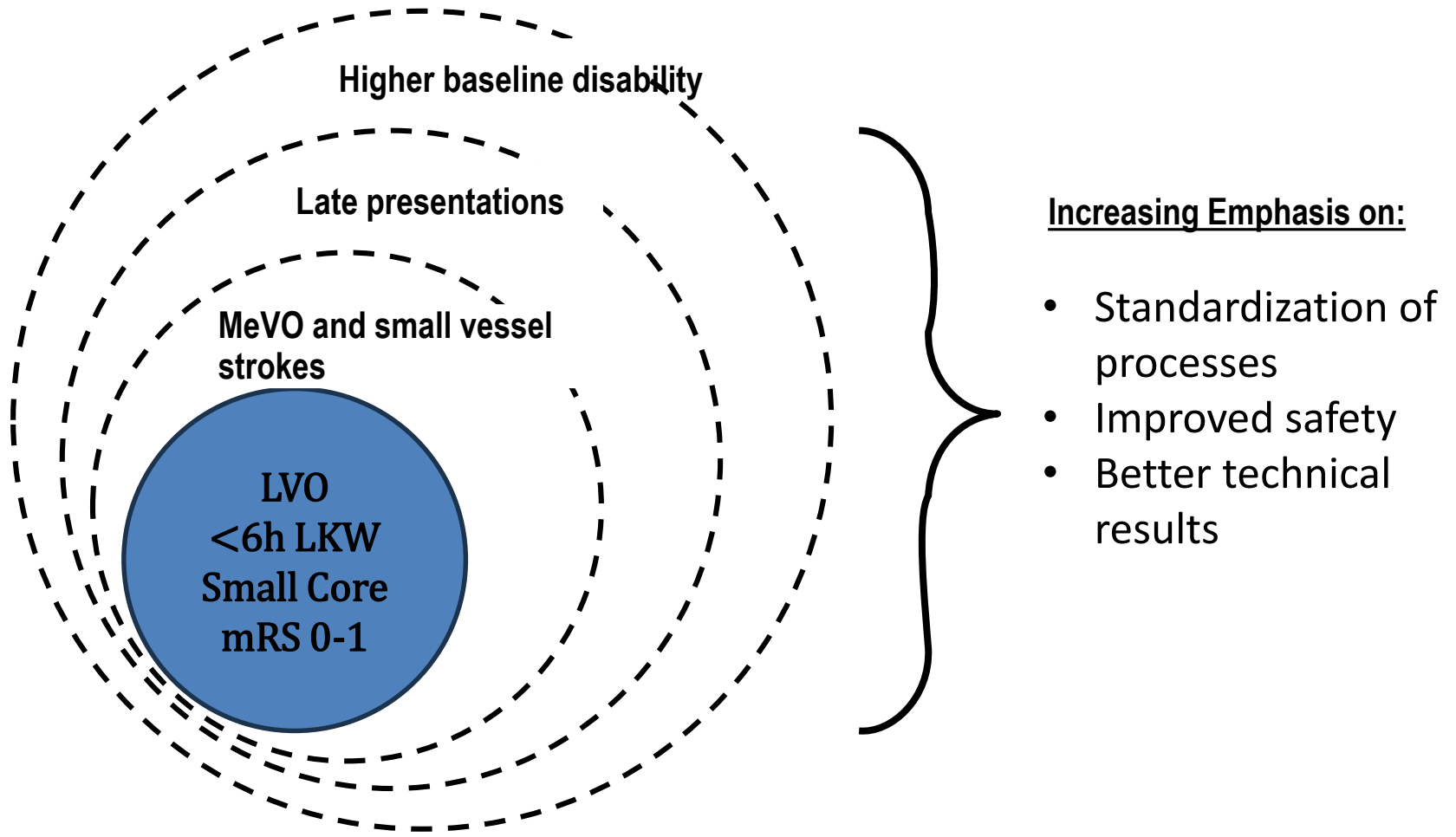
**Intravenous thrombolysis and endovascular thrombectomy for acute ischaemic stroke in patients with Moyamoya disease - a systematic review and meta-summary of case reports**

Journal of  
**THROMBOSIS** and  
**THROMBOLYSIS**

**The Bottom Line**

- 10 case reports in the literature
- Lower success rate than regular LVO patients, higher chance of re-occlusion and need for additional treatment (intracranial angioplasty and/or stenting)

# Conclusions: Pushing the boundaries of interventional stroke treatment



# Thank you!

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