Acute Stroke Management Conference 2019: Stroke Clinical Vignettes

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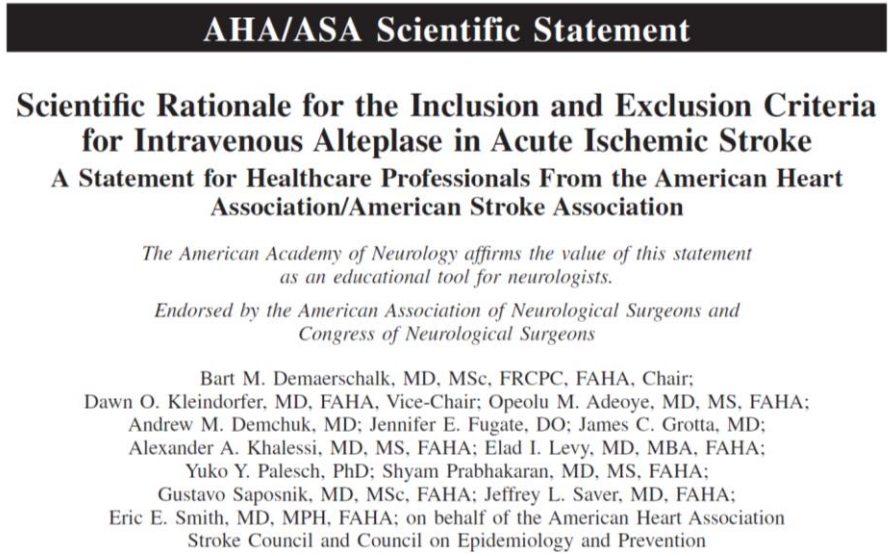
2015 Guideline for IV tPA



AHA/ASA Scientific Statement

Scientific Rationale for the Inclusion and Exclusion Criteria for Intravenous Alteplase in Acute Ischemic Stroke

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

The American Academy of Neurology affirms the value of this statement as an educational tool for neurologists.

Endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons

Bart M. Demaerschalk, MD, MSc, FRCPC, FAHA, Chair; Dawn O. Kleindorfer, MD, FAHA, Vice-Chair; Opeolu M. Adeoye, MD, MS, FAHA; Andrew M. Demchuk, MD; Jennifer E. Fugate, DO; James C. Grotta, MD; Alexander A. Khalessi, MD, MS, FAHA; Elad I. Levy, MD, MBA, FAHA; Yuko Y. Palesch, PhD; Shyam Prabhakaran, MD, MS, FAHA; Gustavo Saposnik, MD, MSc, FAHA; Jeffrey L. Saver, MD, FAHA; Eric E. Smith, MD, MPH, FAHA; on behalf of the American Heart Association Stroke Council and Council on Epidemiology and Prevention

- Within 4.5 hrs of last well
- CTH to r/o bleed
- BP <180/110

- No concern for systemic bleeding (suspected bleeding diathesis or therapeutic anticoagulation, recent major surgery)
- Use with caution: >77yo, recent ICH, glucose <50 or >400, GI or GU bleeding

Stroke 2015;47:581-641.

TIME IS BRAIN

2 million neurons die every minute

- IV tpa to prevent 1 death from MI: NNT 23
- PCI to prevent 1 death from MI: NNT 35
- CABG to prevent future MI: NNT 18.5

- **IV tpa (3-4.5h) to prevent major stroke: NNT 14**
- **IV tpa (0-3h) to prevent major stroke: NNT 8**
- **IV tpa (0-1.5h) to prevent major stroke: NNT 4.6**

Arora R et al, 2006
Ribichini et al, 2013
Lancet Neurol. 2014; 13: 567–74
Goyal M et al, 2016

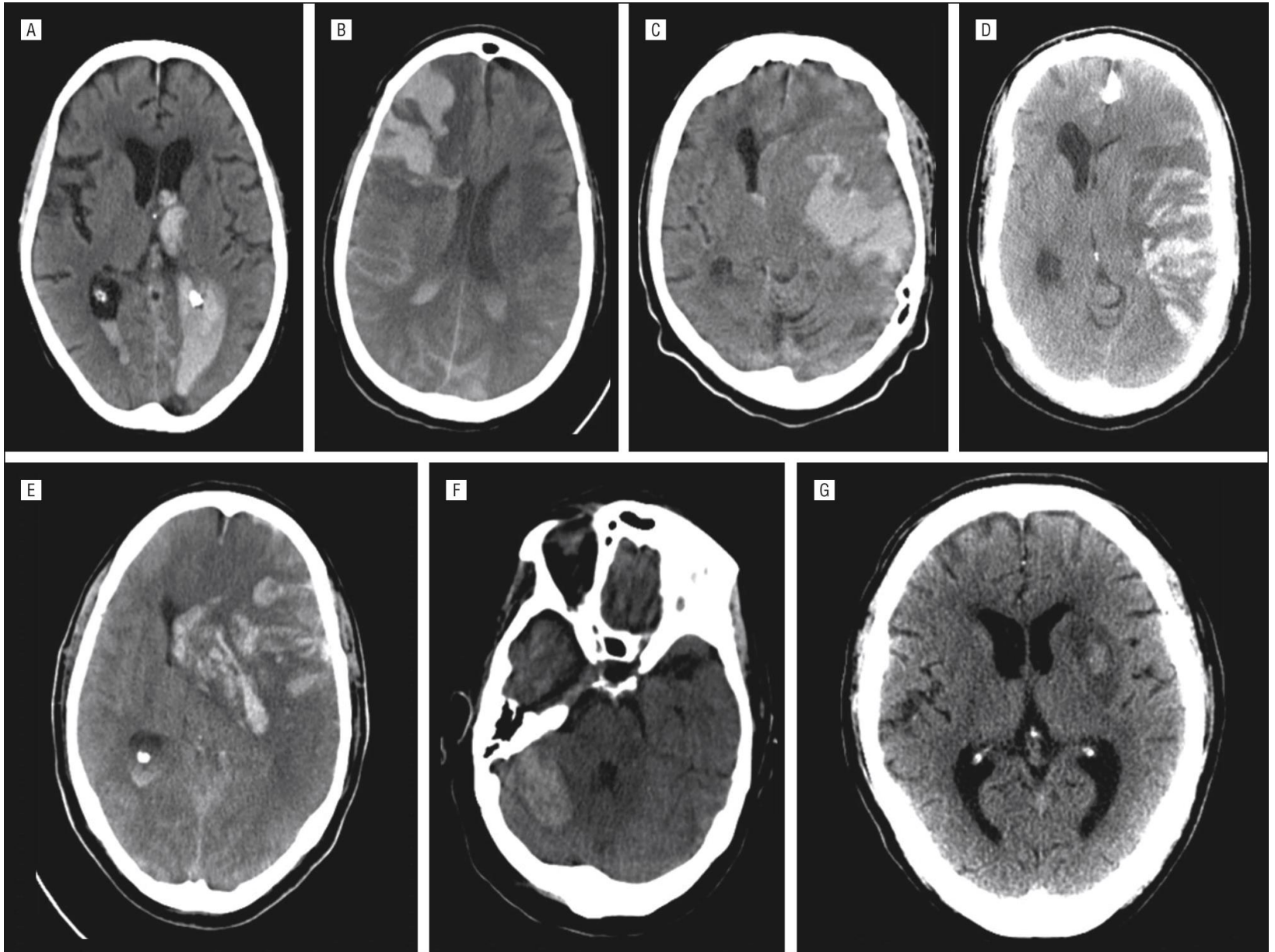
Risks with IV-tPA

- Hemorrhage 1.7-8%
  - Increased with age, NIHSS, hypodensity, glucose
  - sICH in mimics: <1%
  - extracranial: 0.4-1.5%

- Angioedema 1-5%
  - Increased with ACEi

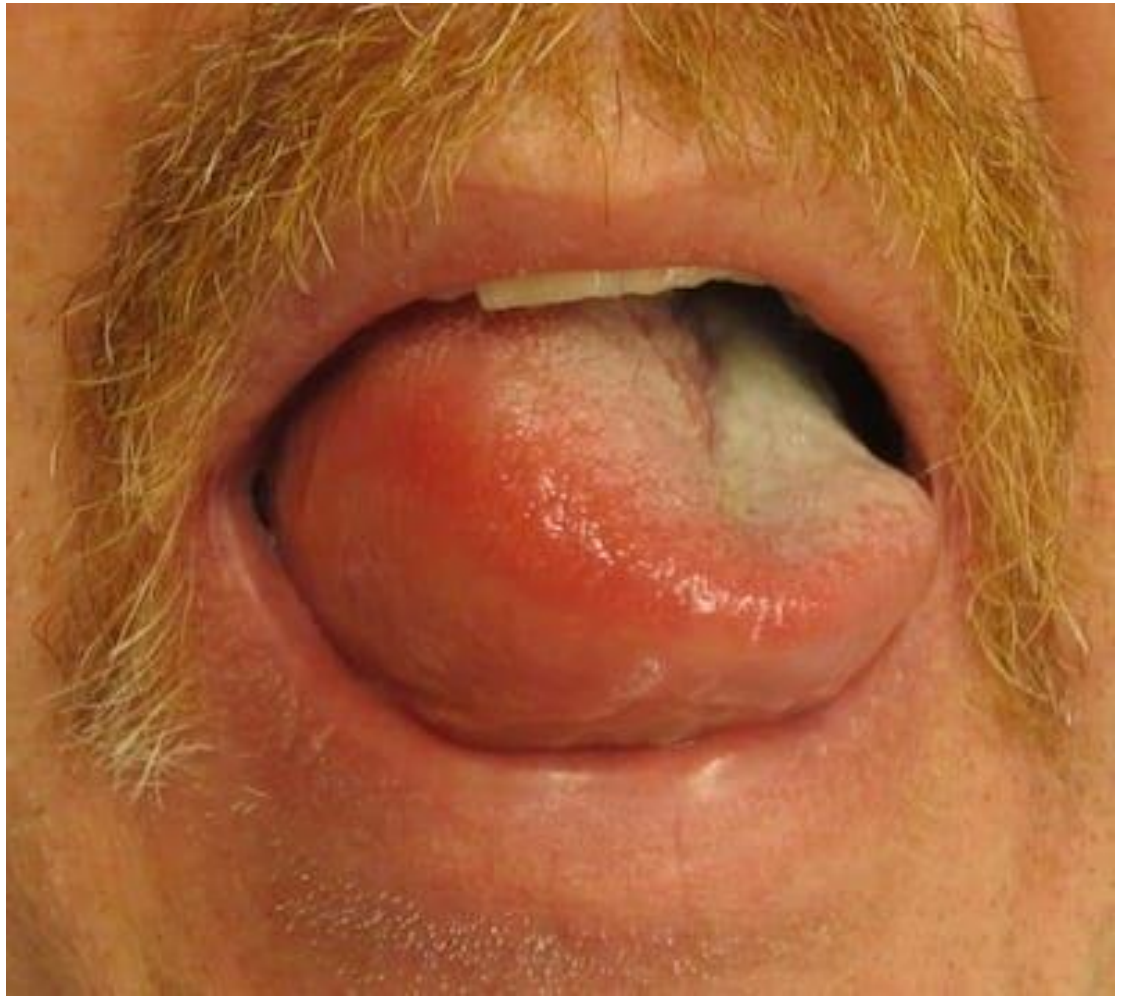
NEJM 2011; 364:2138-46.

Alteplase Hemorrhages

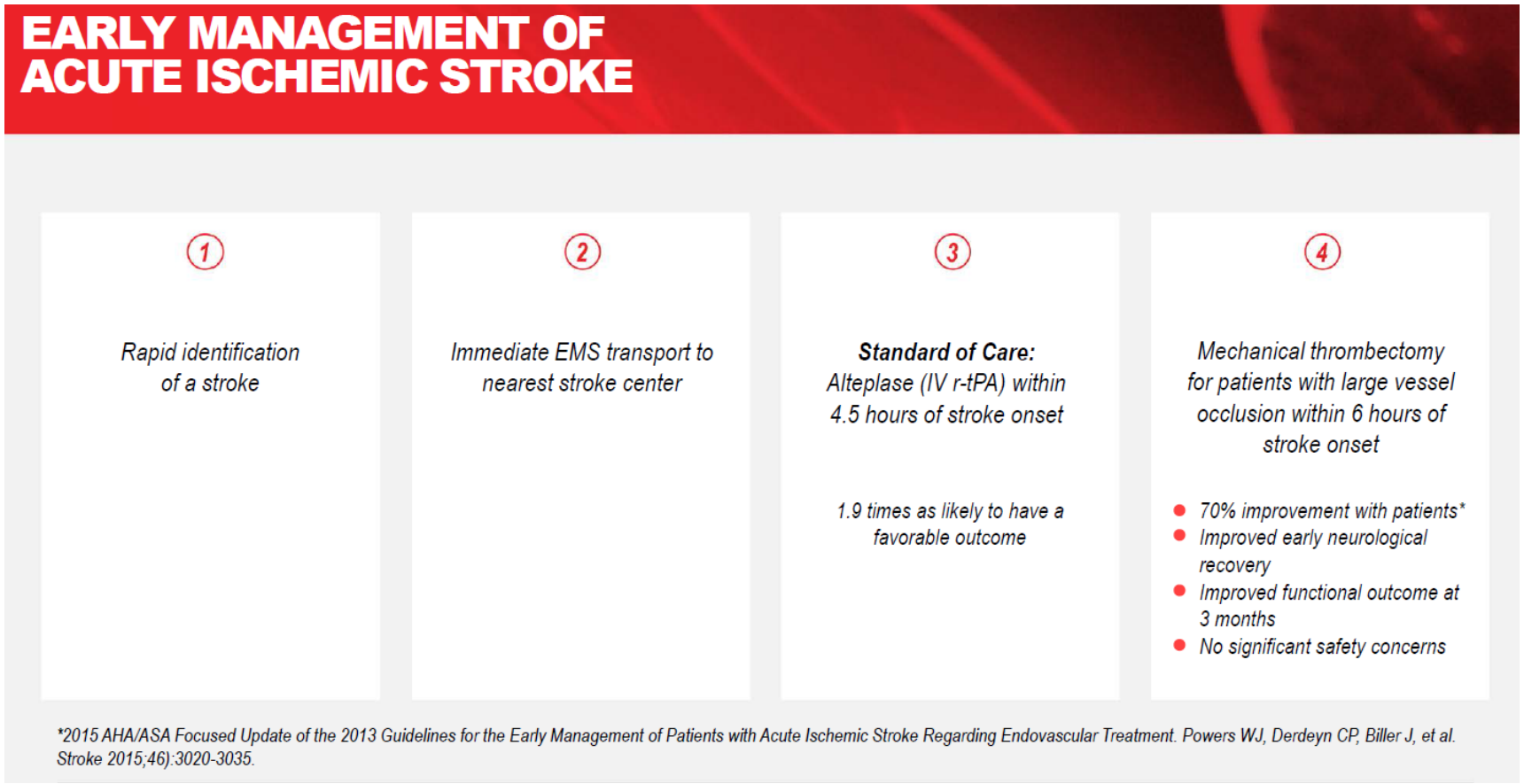


JAMA Neuro 2010;67:559-563.

Alteplase Angioedema



2015 AHA/ASA Guideline: IA Thrombectomy within 6hrs of LSW (NIHSS ≥6, ASPECT ≥6)



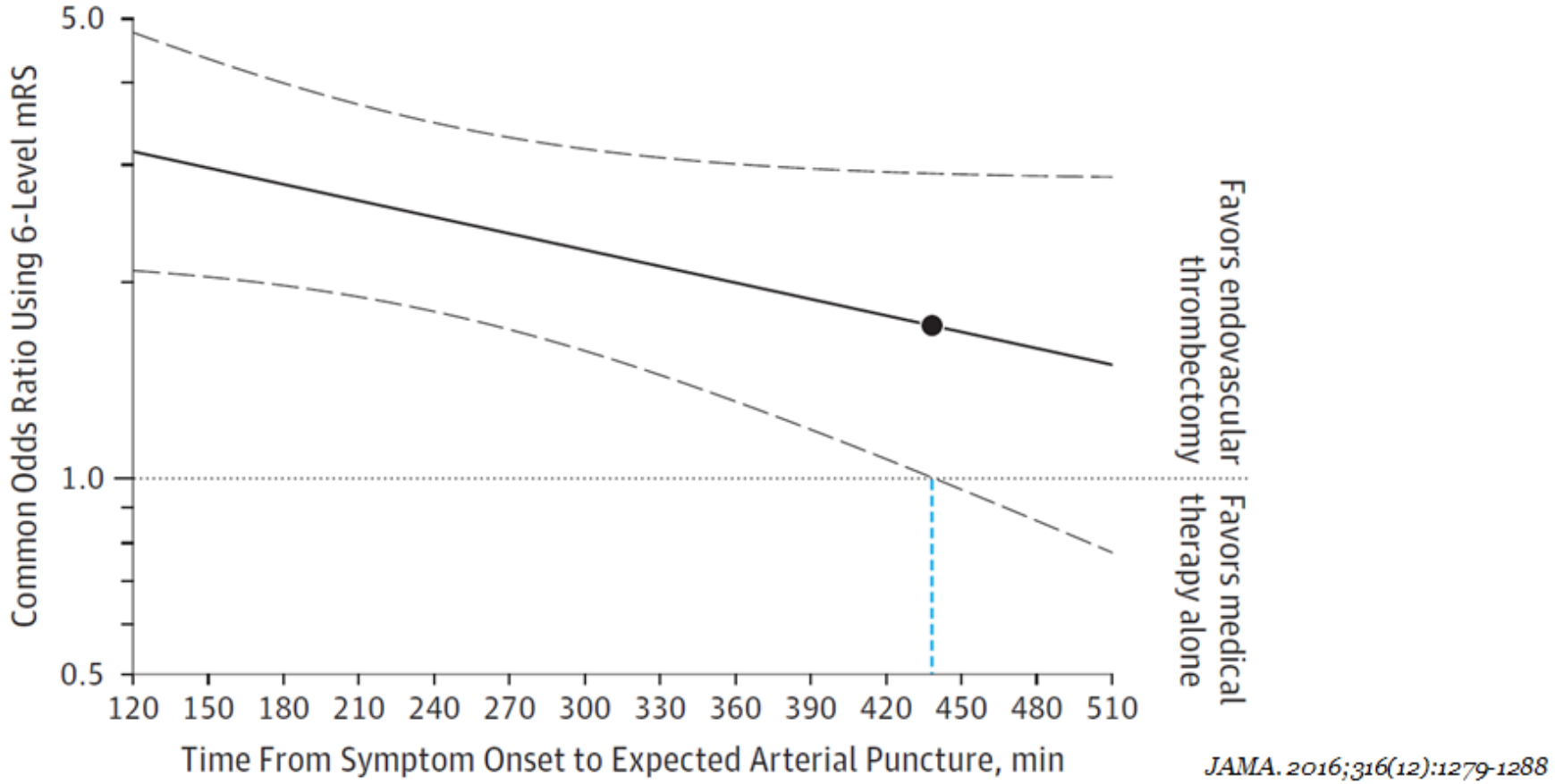
TIME IS BRAIN

2 million neurons die every minute

- IV tpa & PCI to prevent 1 death from MI: NNT 23 - 35
- IV tpa (0-4.5h) to prevent major stroke: NNT 4.6 – 14
- **IA Thrombectomy for Ischemic Stroke: NNT 5.1**

Arora R et al, 2006
Ribichini et al, 2013
Lancet Neurol. 2014; 13: 567–74
Goyal M et al, 2016

Time is Brain: every 4-minute delay in ED door–to-reperfusion time, 1 out of 100 patients have more-disabled outcome at 3 months



JAMA. 2016;316(12):1279-1288

Case 1: IAT within 6 hours

- 45yo woman at the gym with sudden onset dense Right weakness and difficulty speaking
- NIHSS 18

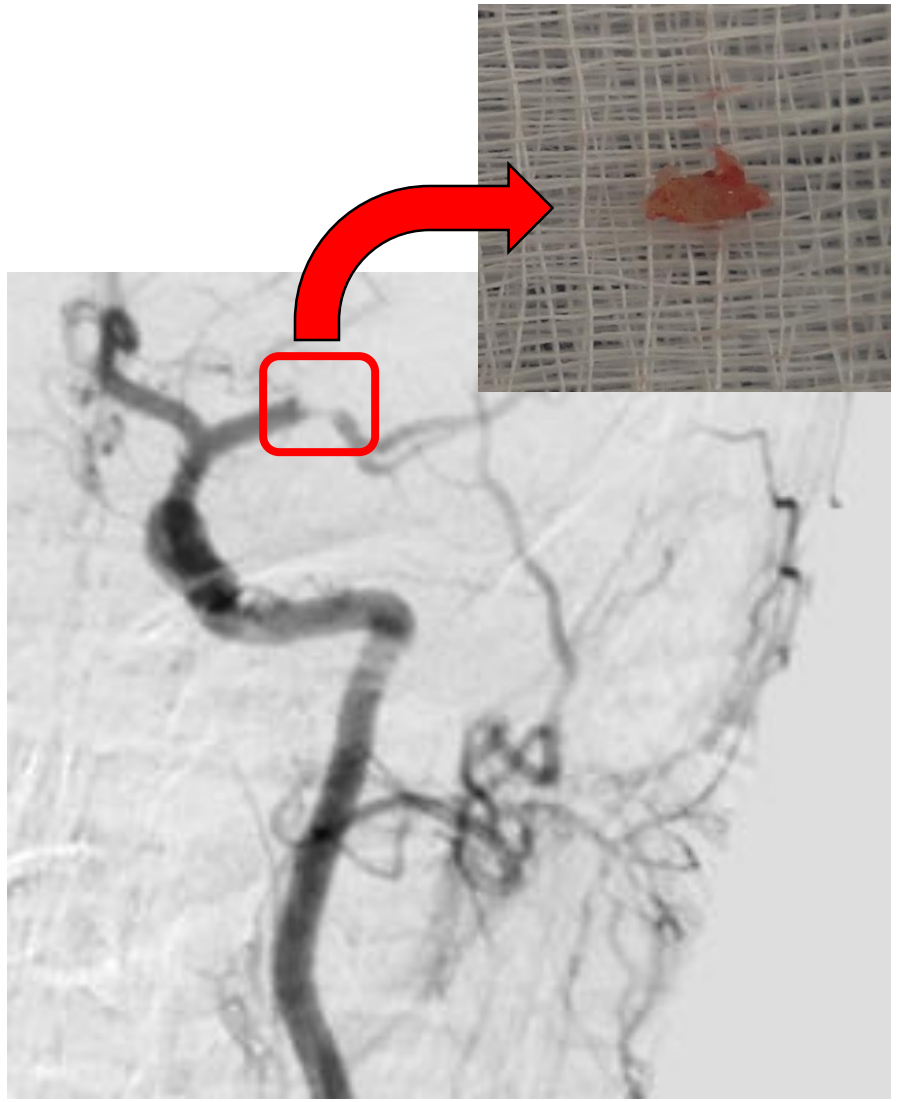
- WV hospital, we advised IV tPA – given at 2h 5min from LSW

- Flew directly to NeuroAngiosuite

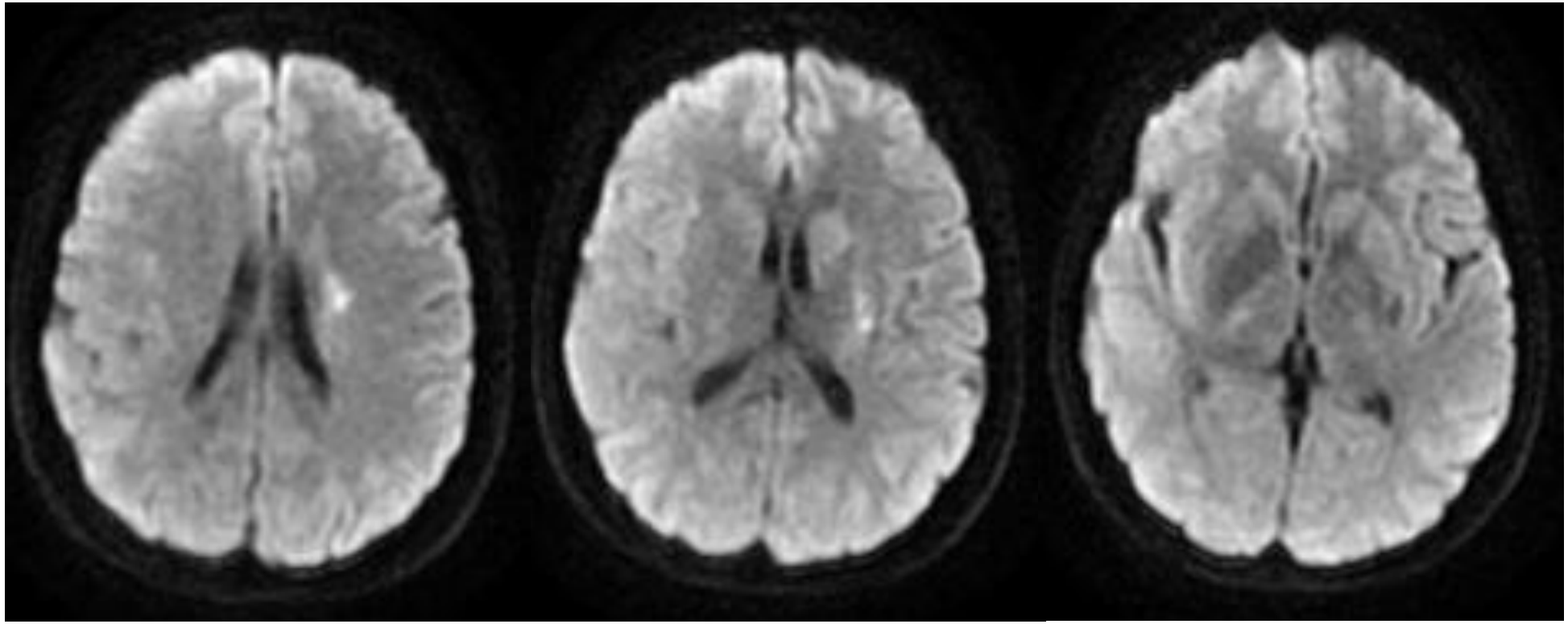
Case 1: 45yo woman, LMCA

- LSW 7am
- IV tPA at OSH 9:05am
- Helipad 955am
  - NIHSS 23: still dense Right weak, dense aphasia
- Angiosuite 10:01am
- Manual aspiration with Recanalization 10:22am
  - LSW to recanalization 3h22min
  - NIHSS on table improved to 5
  - NIHSS at discharge 2 days later = 0

45yo woman, LM1 occlusion flown to angiosuite, recan at 3h22min



45yo woman, LM1 occlusion flown to angiosuite, recan at 3h22min



- NIHSS 23: still dense Right weak, dense aphasia
- NIHSS on table improved to 5
- NIHSS at discharge 2 days later 0 (90 day mRS 0)

2018 Guideline: IA Thrombectomy within 24hrs of LSW if mismatch

3.7. Mechanical Thrombectomy (Continued)	COR	LOE	New, Revised, or Unchanged
7. In selected patients with AIS within 6 to 16 hours of last known normal who have LVO in the anterior circulation and meet other DAWN or DEFUSE 3 eligibility criteria, mechanical thrombectomy is recommended.	**I**	**A**	New recommendation.
8. In selected patients with AIS within 6 to 24 hours of last known normal who have LVO in the anterior circulation and meet other DAWN eligibility criteria, mechanical thrombectomy is reasonable.	**IIa**	**B-R**	New recommendation.

Powers et al. Stroke 2018

TIME IS BRAIN

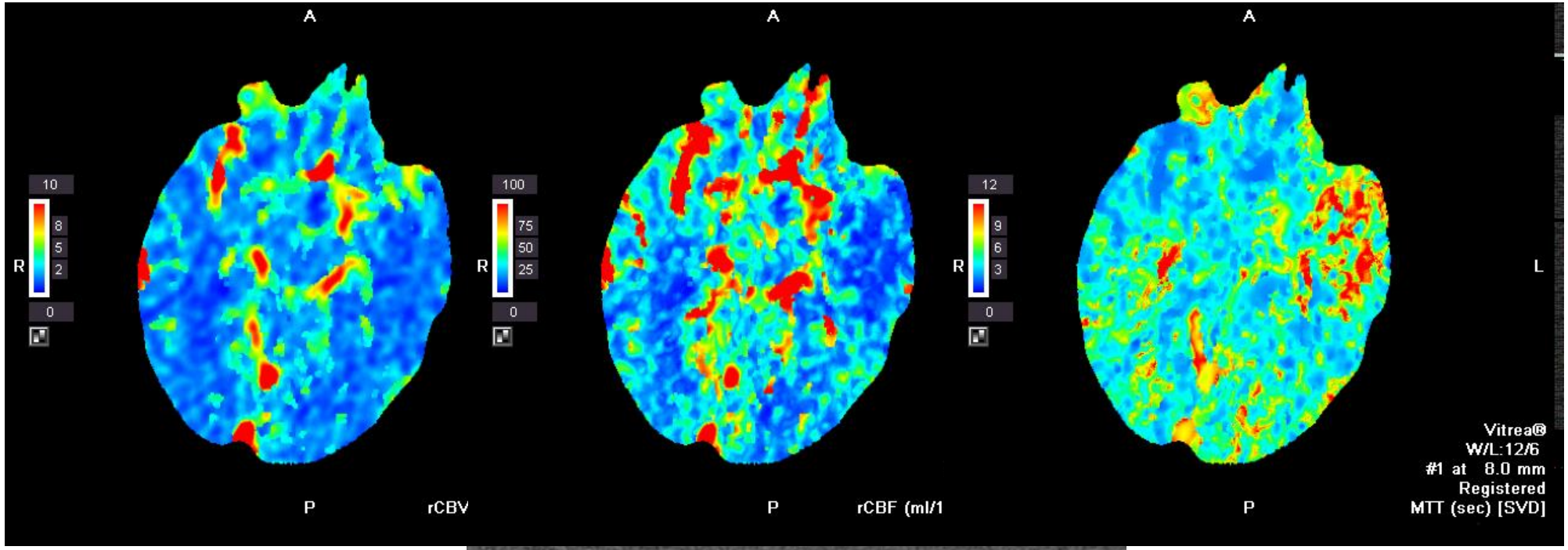
2 million neurons die every minute

- IV tpa & PCI to prevent 1 death from MI: NNT 23 - 35
- IV tpa (0-4.5h) to prevent major stroke: NNT 4.6 – 14
- IA Thrombectomy for Stroke (HERMES): NNT 5.1
- **IA Thrombectomy up to 24hrs from LSW (DAWN): NNT 2.8**
- **IA Thrombectomy up to 16hrs from LSW (DEFUSE3): NNT 3.6**

Arora R et al, 2006
Ribichini et al, 2013
Lancet Neurol. 2014; 13: 567–74
Goyal M et al, 2016

Case 2: IAT 6-24 hrs. from LSW

- 89 yo man with Right sided weakness and confusion, NIHSS 18
- LSW >6 hrs. prior
- CTH no hemorrhage or large stroke
- CTA LM1 occlusion
- CTP large area at risk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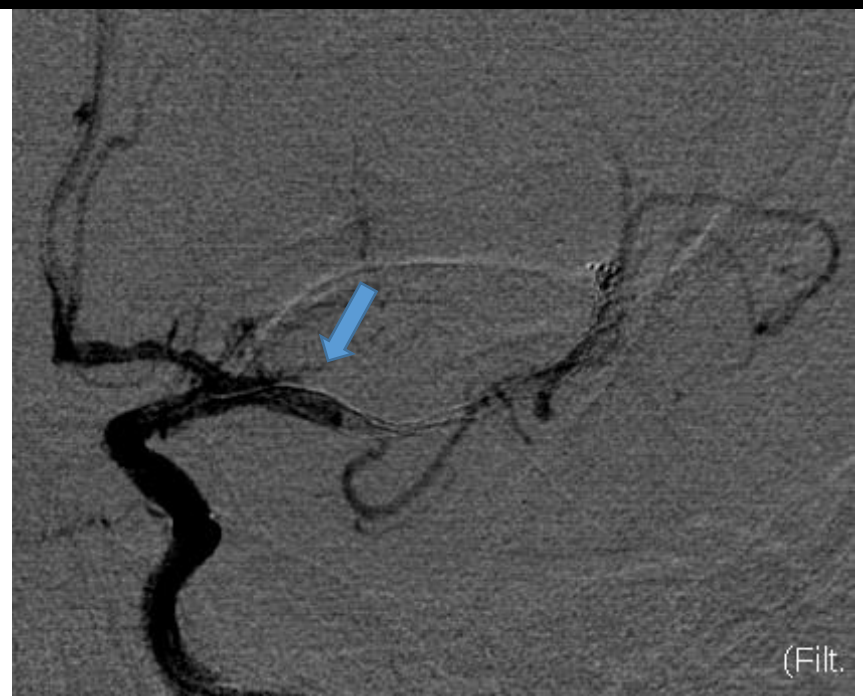
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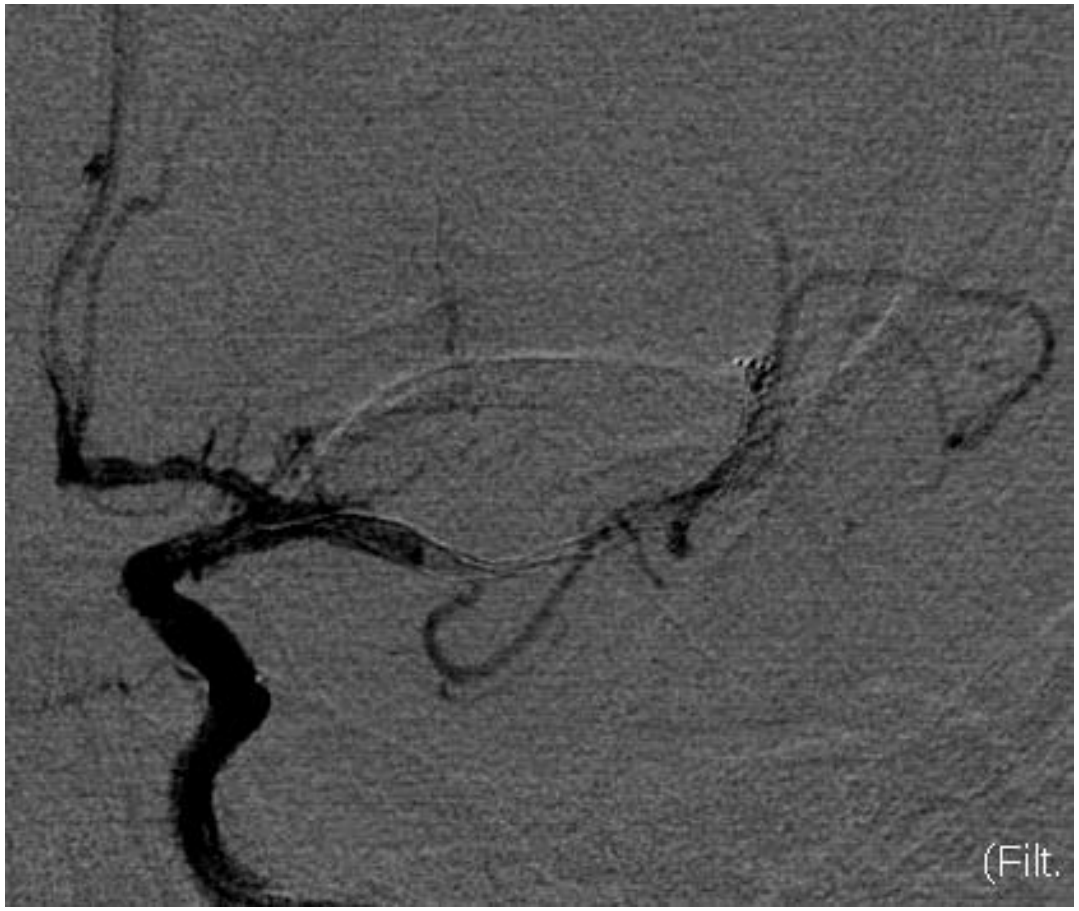
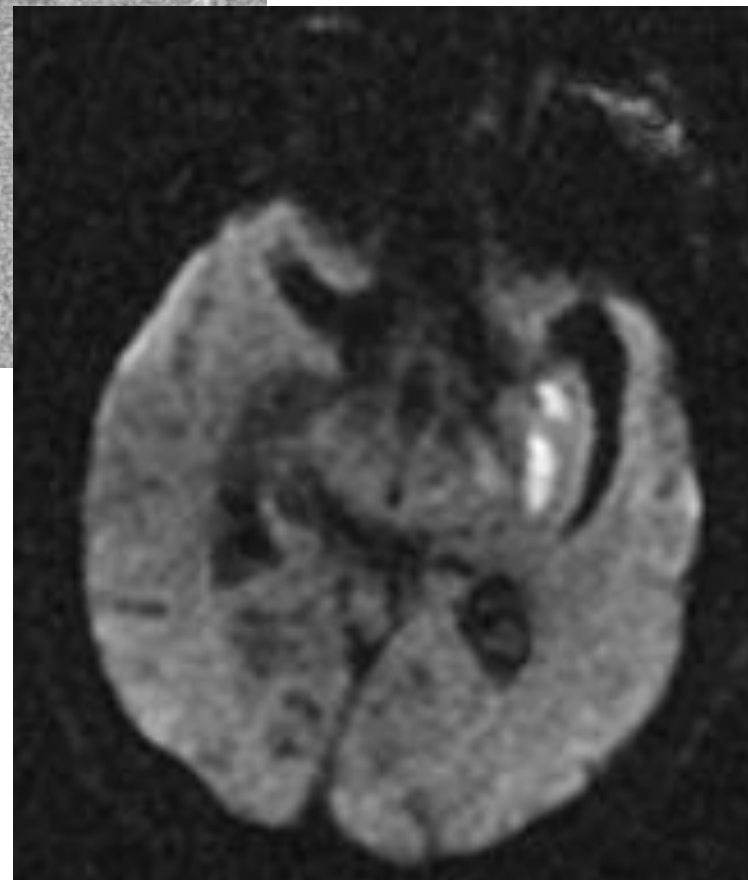




Above Left: LM1 occlusion

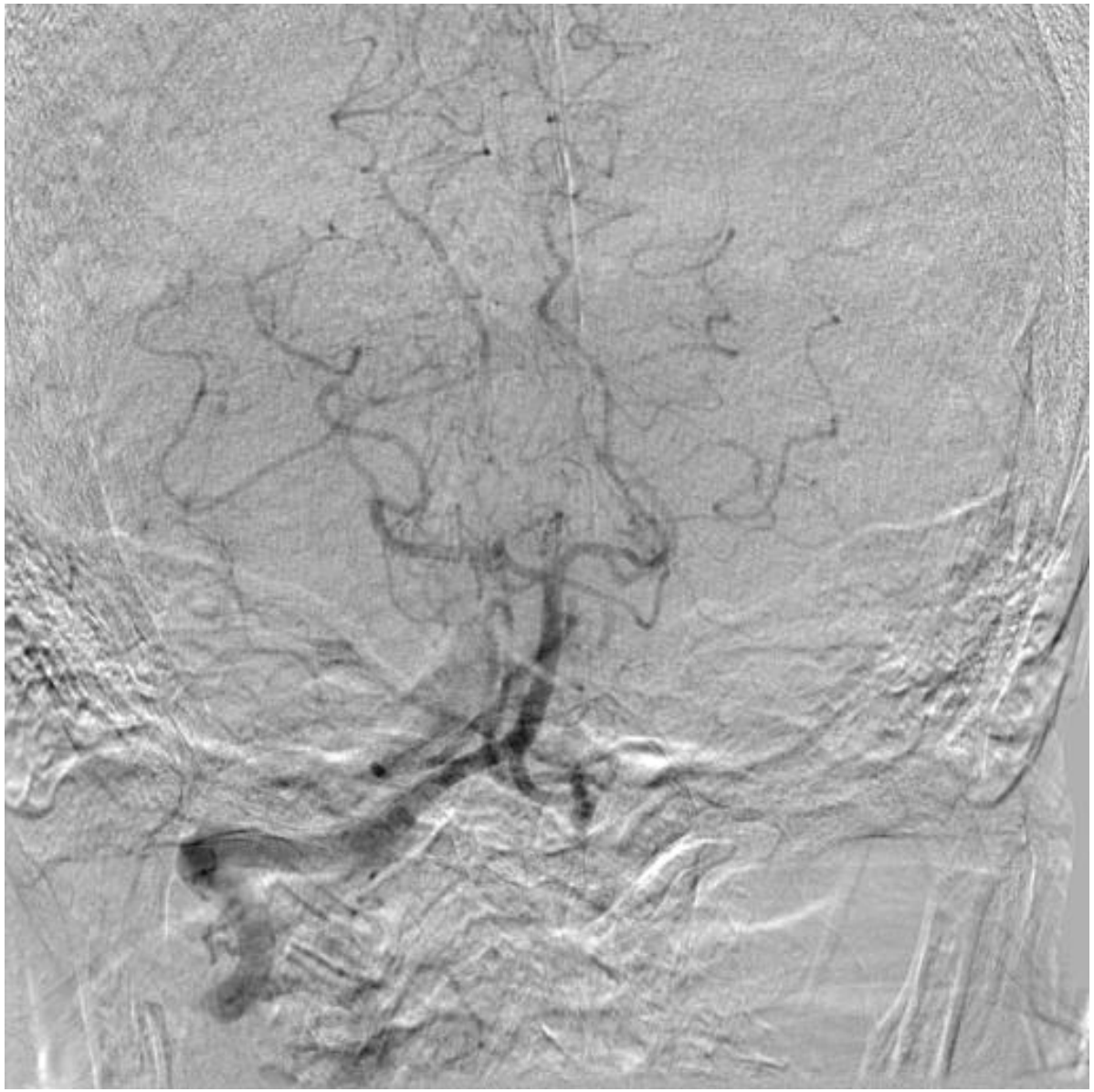
Above Right: LM1 thrombectomy with good recanalization

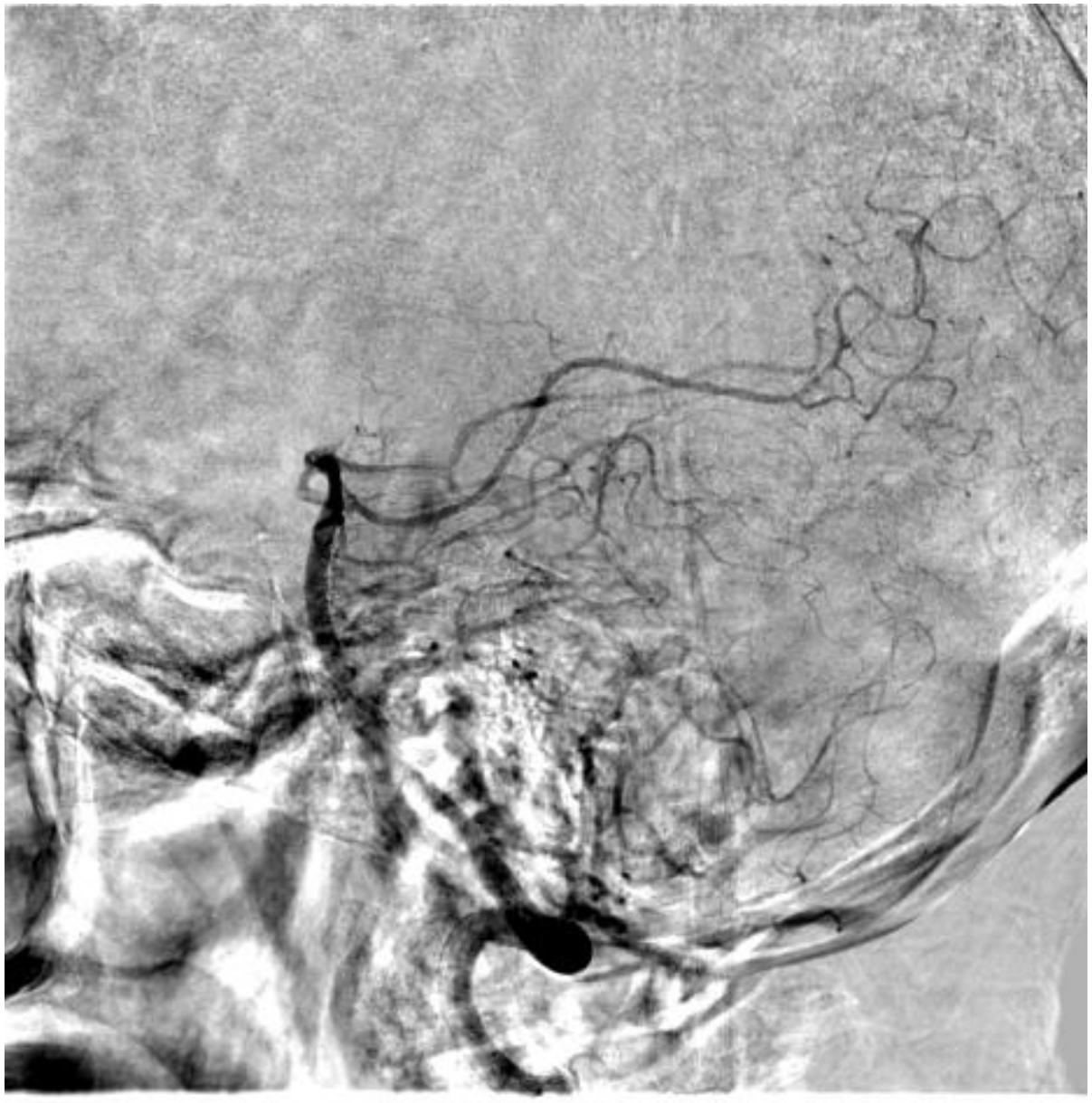
Lower Right: Post-op MRI with small stroke

Case 3: IAT with unclear onset

- 101 yo woman found at home confused, LSW day prior
- By time of arrival, obtunded
- CTH no hemorrhage or large stroke

101 yo Basilar Occlusion





Improved to NIHSS 1 dysarthria on table

Discharged home the following day (with her insistence)

Case 4: Hemorrhagic Stroke

- 46 yo man with h/o heavy daily alcohol use, no other known risk factors

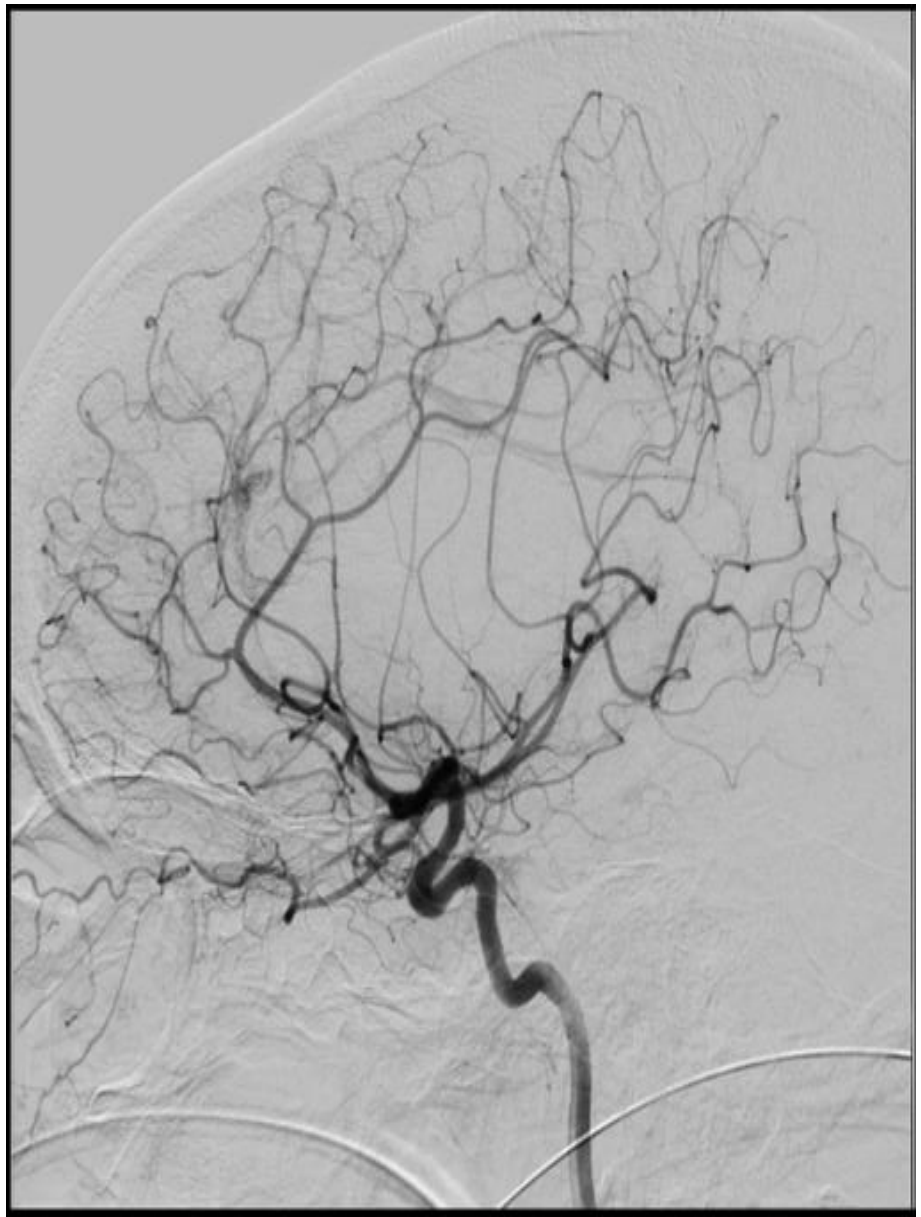
- p/w sudden headache and mild Left weakness/neglect

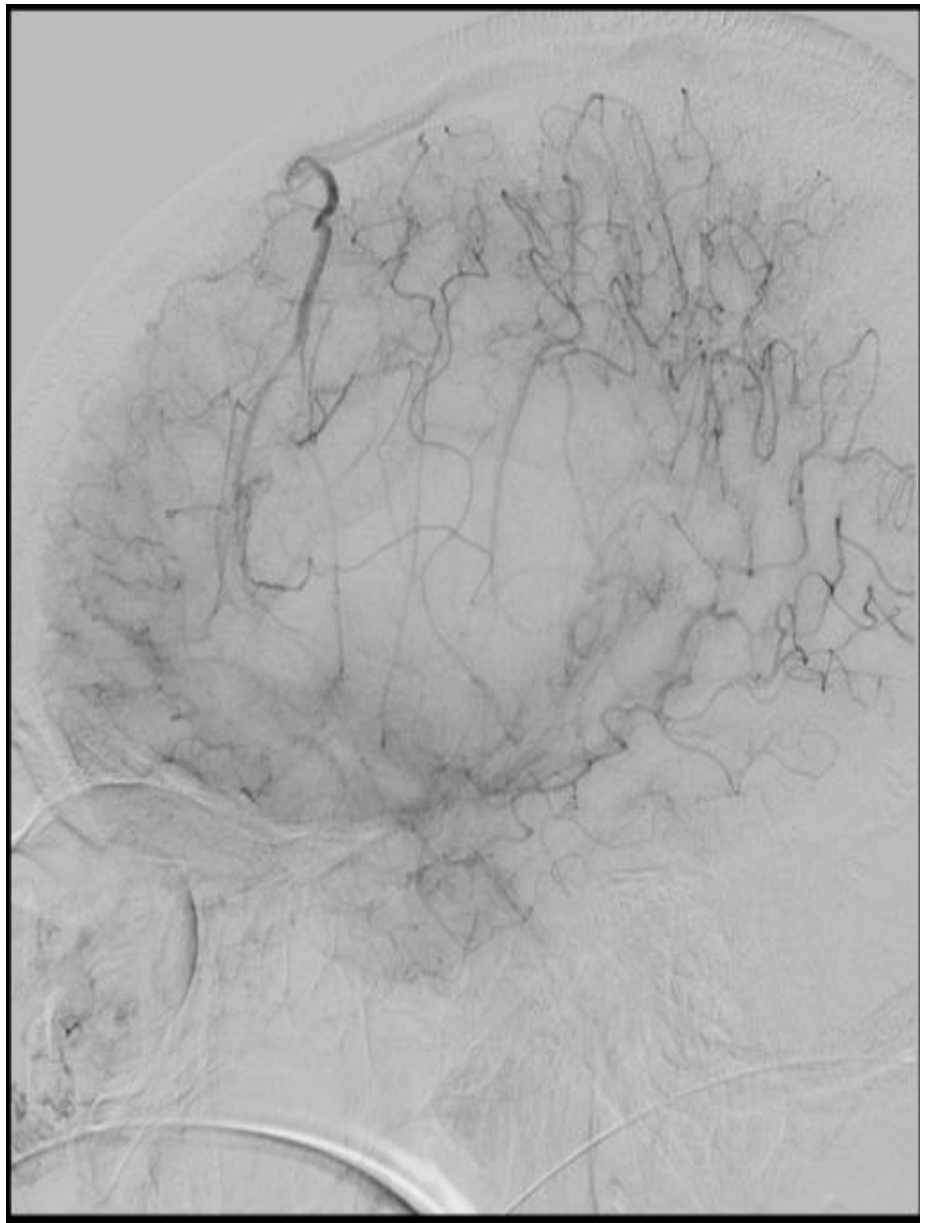
Case 4: 46 yo alcoholic p/w headache

Causes of Hemorrhagic Stroke

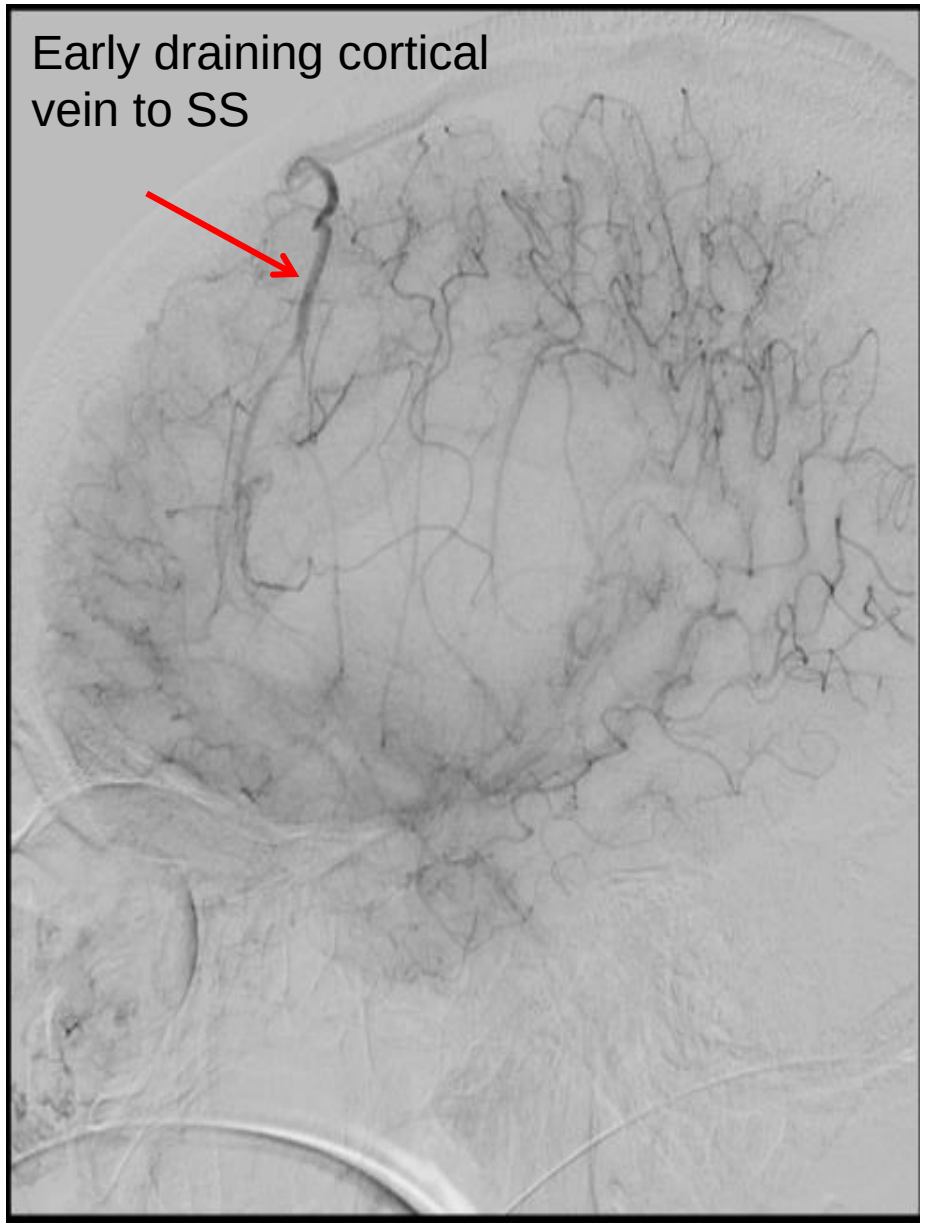
- Trauma (often multi-compartmental)
- Hemorrhagic Conversion of Ischemic Stroke
- Hypertensive (thalamus, putamen, pons, cerebellum)
- Amyloid (lobar, age)
- Vascular Malformations

Right ICA injection

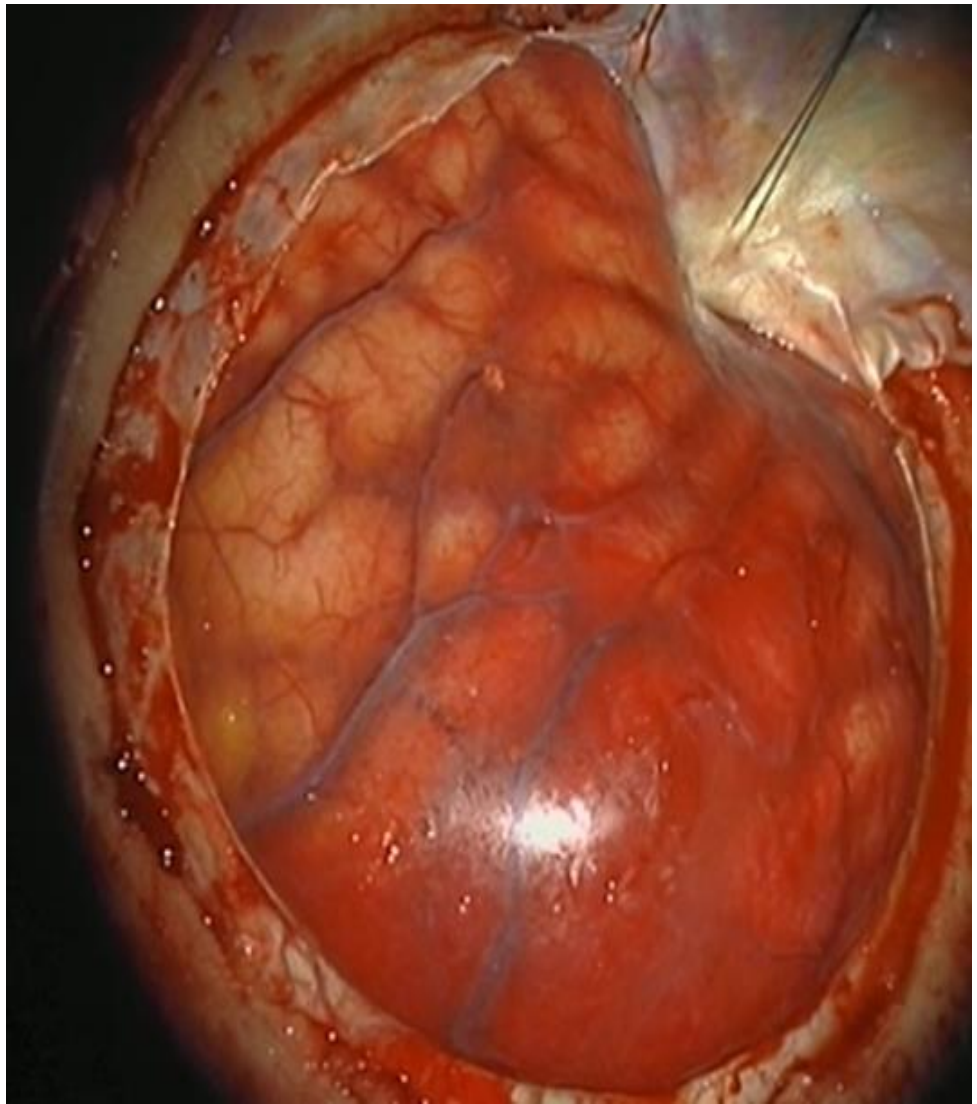


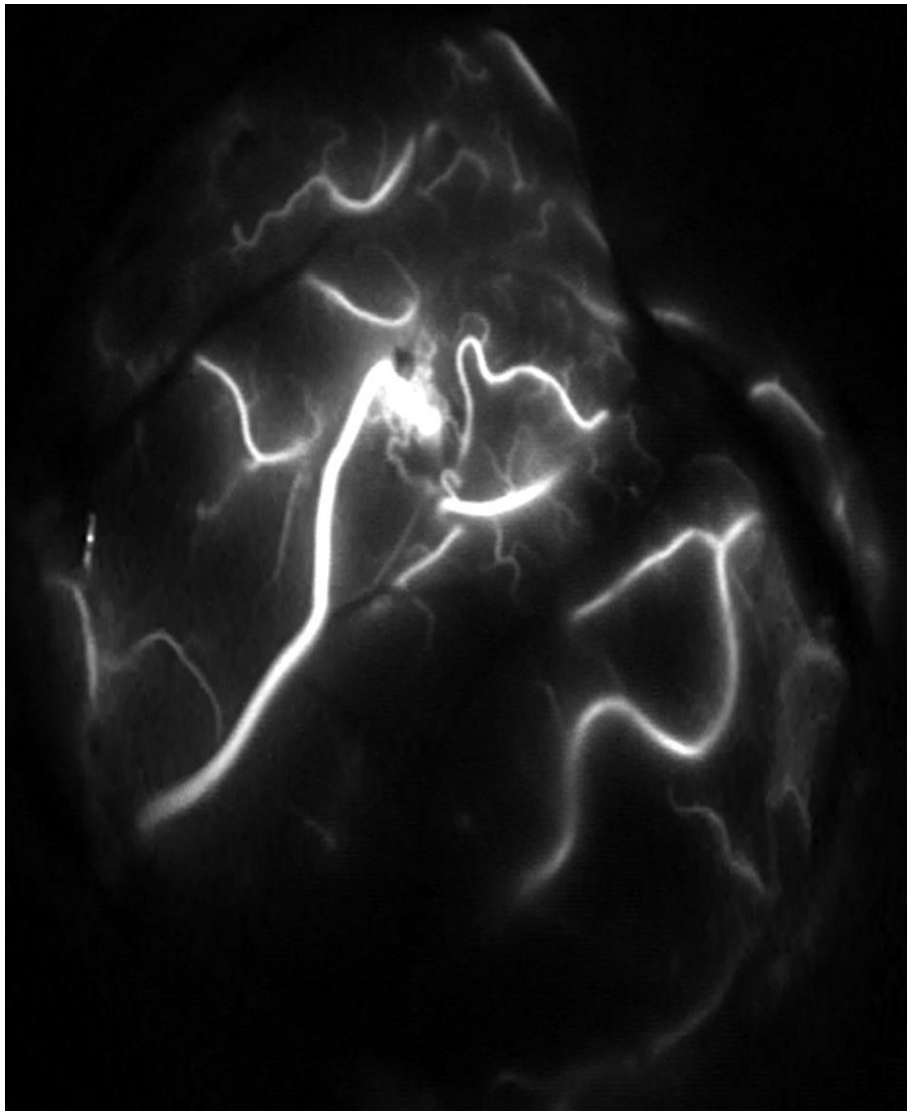


Right ICA injection



Intra-op ICG run showing AVM nidus, early draining vein, and feeding arteries





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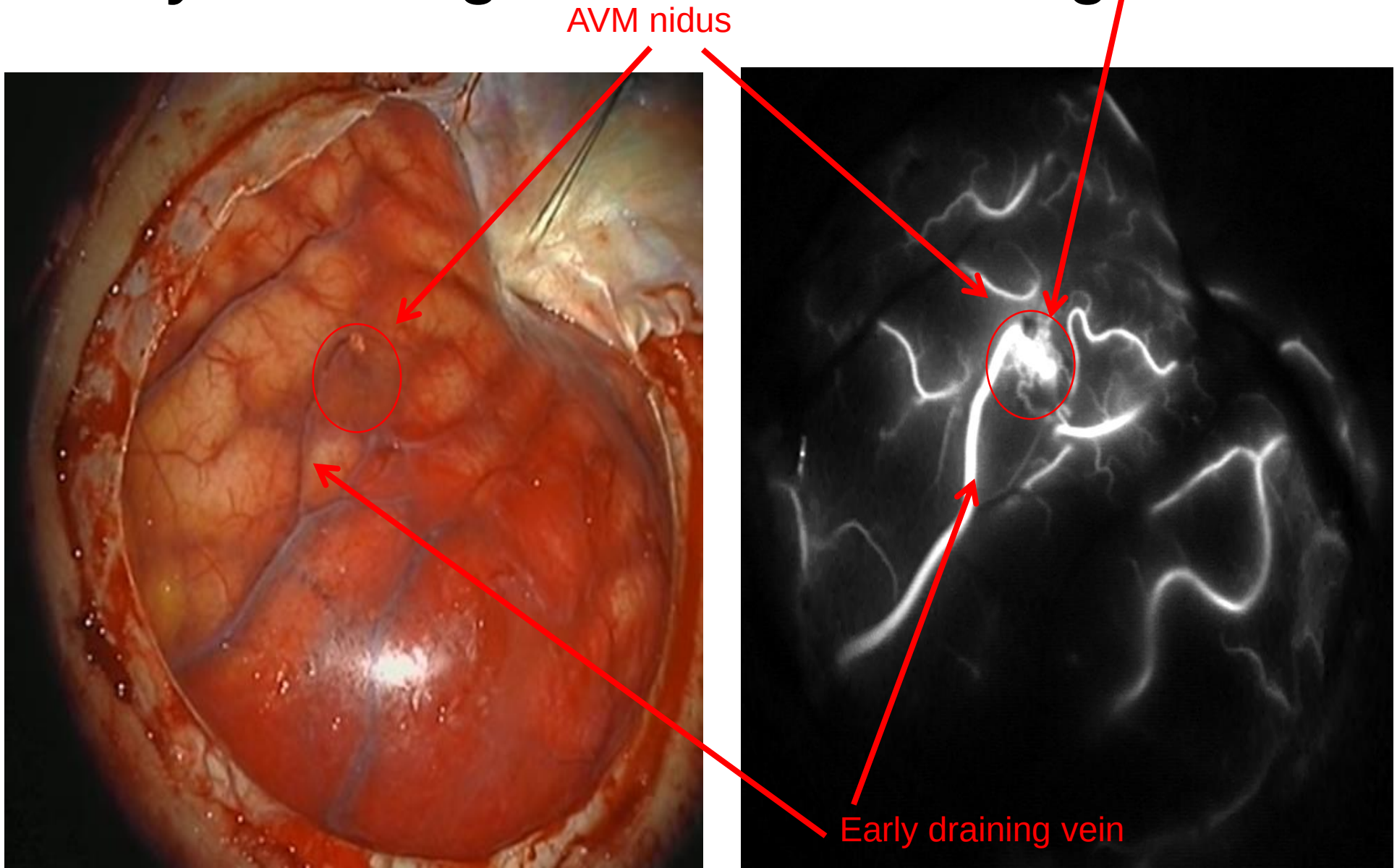
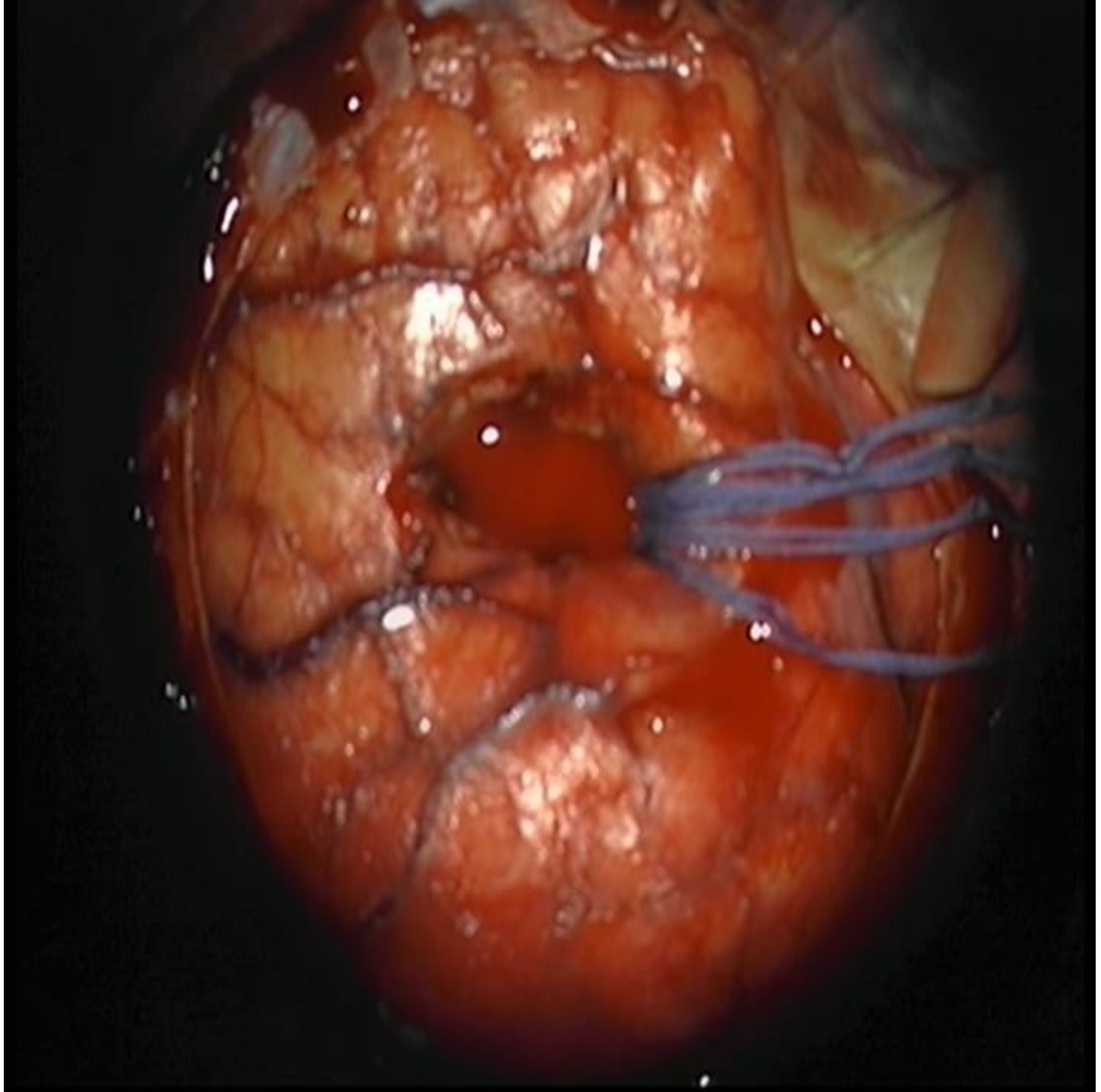
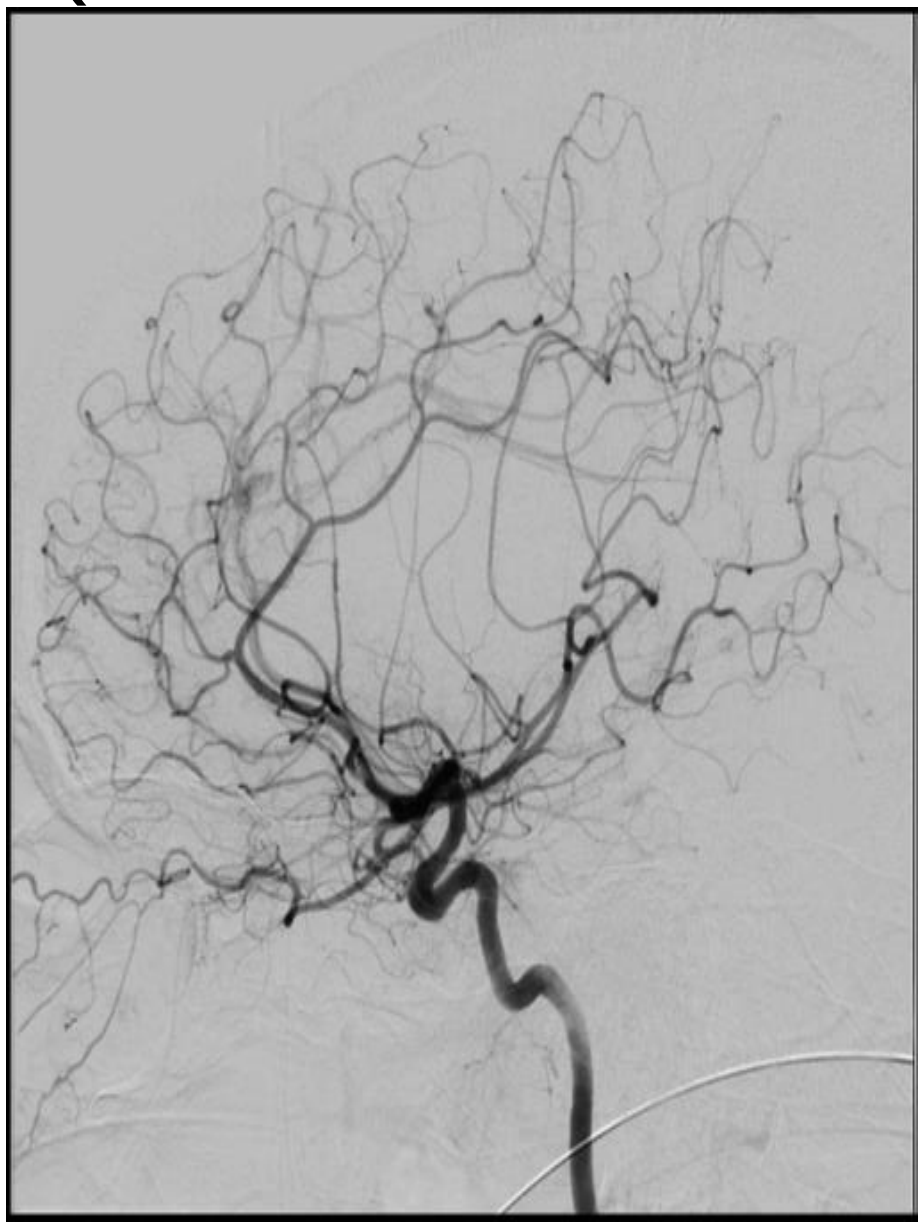
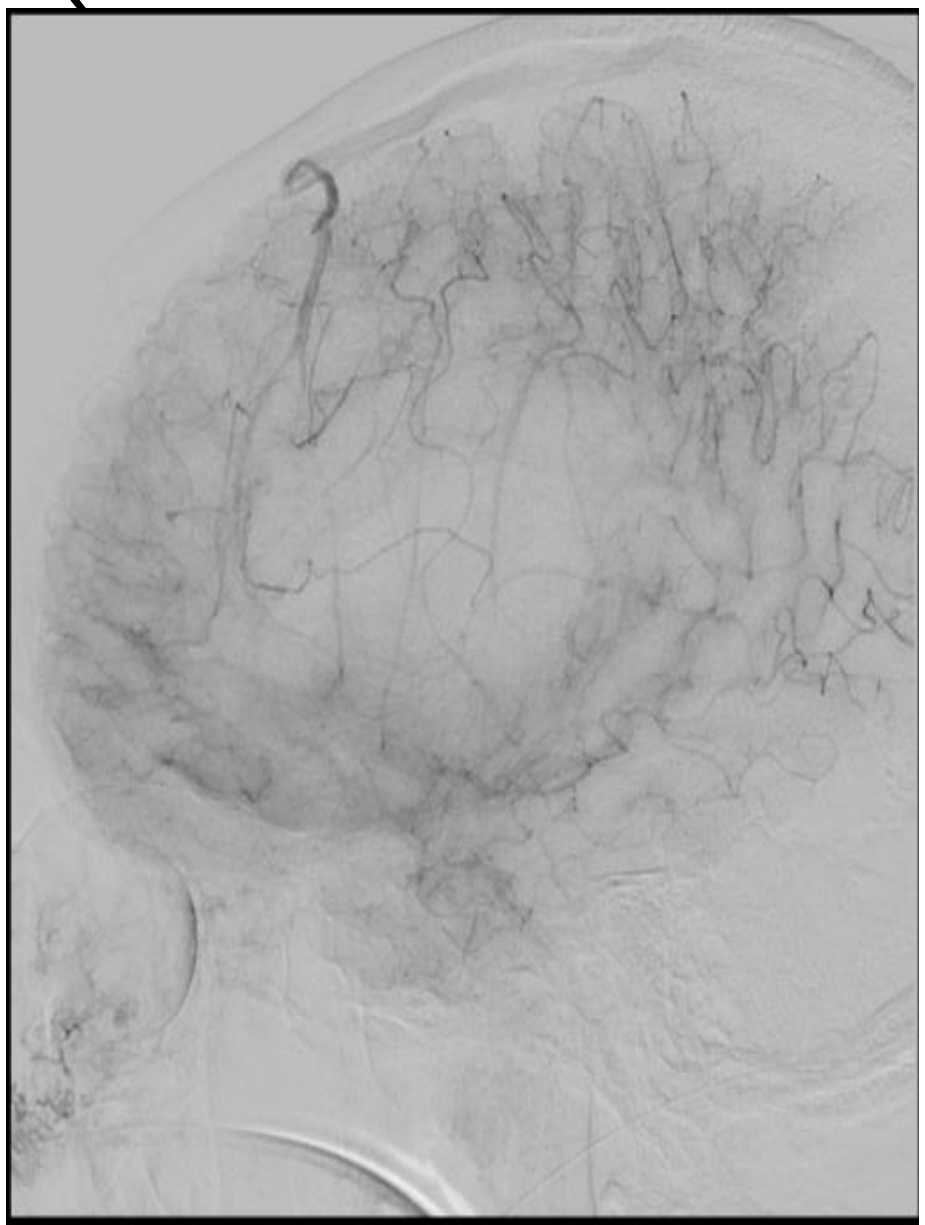




Pre/Post DSA Early Arterial Phase (Note absence of nidus)



Pre/Post DSA Late Arterial Phase (note absence of early draining vein)



Case 5: Stroke in the setting of giant aneurysm

Best approach to clot retrieval?

- Intra-arterial alteplase
- Aspiration
- Stent retriever thrombectomy

Slide courtesy of Dr Jadhav

ORIGINAL RESEARCH

Aneurysms in the target vessels of stroke patients subjected to mechanical thrombectomy: prevalence and impact on treatment

Felix Zibold,[1] Justus F Kleine,[1] Claus Zimmer,[1] Holger Poppert,[2] Tobias Boeckh-Behrens[1]

Table 2 Summary of relevant aneurysm- and procedure-related data

			Aneurysm							
Patient	Age (years)	LVO location	Location	Size (mm)	Known	Distal to occlusion	Related complication	Modification of strategy	Number of stent retriever passes across aneurysm	TICI score
1	40s	MCA proximal M1	ICA paraophthalmic	7					0*	2a
			ICA C4 (extradural)	2						
2	60s	MCA proximal M1	MCA trifurcation	3	Yes	Yes		Yes	0	2a
3	60s	Proximal ICA+ICA-T	Proximal M1	2		Yes			0†	3
4	60s	MCA proximal M1	MCA trifurcation	3		Yes	Yes		1	0
5	50s	MCA proximal M1	MCA trifurcation (coiled)	4	Yes	Yes		Yes	0	0
			ICA C5	5						
			PcomA	3						
6	50s	Proximal ICA+M1	MCA bifurcation	3					2	2a
7	70s	ICA-T	ICA C7	7		Yes			6	3
8	80s	MCA proximal M1	ICA C5	4					2	2b
9	80s	MCA distal M1	MCA trifurcation	3					2	2b
10	60s	MCA distal M1	MCA bifurcation	4					6	2a
11	70s	PCA proximal P1	Basilar tip	3					2	3

Empty cells correspond to 'no'.
*Aspiration catheter distal to aneurysms.
†TICI3 achieved with aspiration alone.
ICA, internal carotid artery; LVO, large vessel occlusion; MCA, middle cerebral artery; PCA, posterior cerebral artery; PcomA, posterior communicating artery; TICI, Thrombolysis In Cerebral Infarction.

ABSTRACT

Background and purpose Coincidental aneurysms in the target vessels of stroke patients with large vessel occlusions (LVO) may pose risks during endovascular mechanical thrombectomy (MTE), but there are almost no data on this subject. Motivated by an incident of rupture of a hidden aneurysm induced by withdrawal of a stent retriever during a MTE procedure, this study examines the prevalence of aneurysms, associated complications, and implications for treatment strategies in patients with LVO stroke.

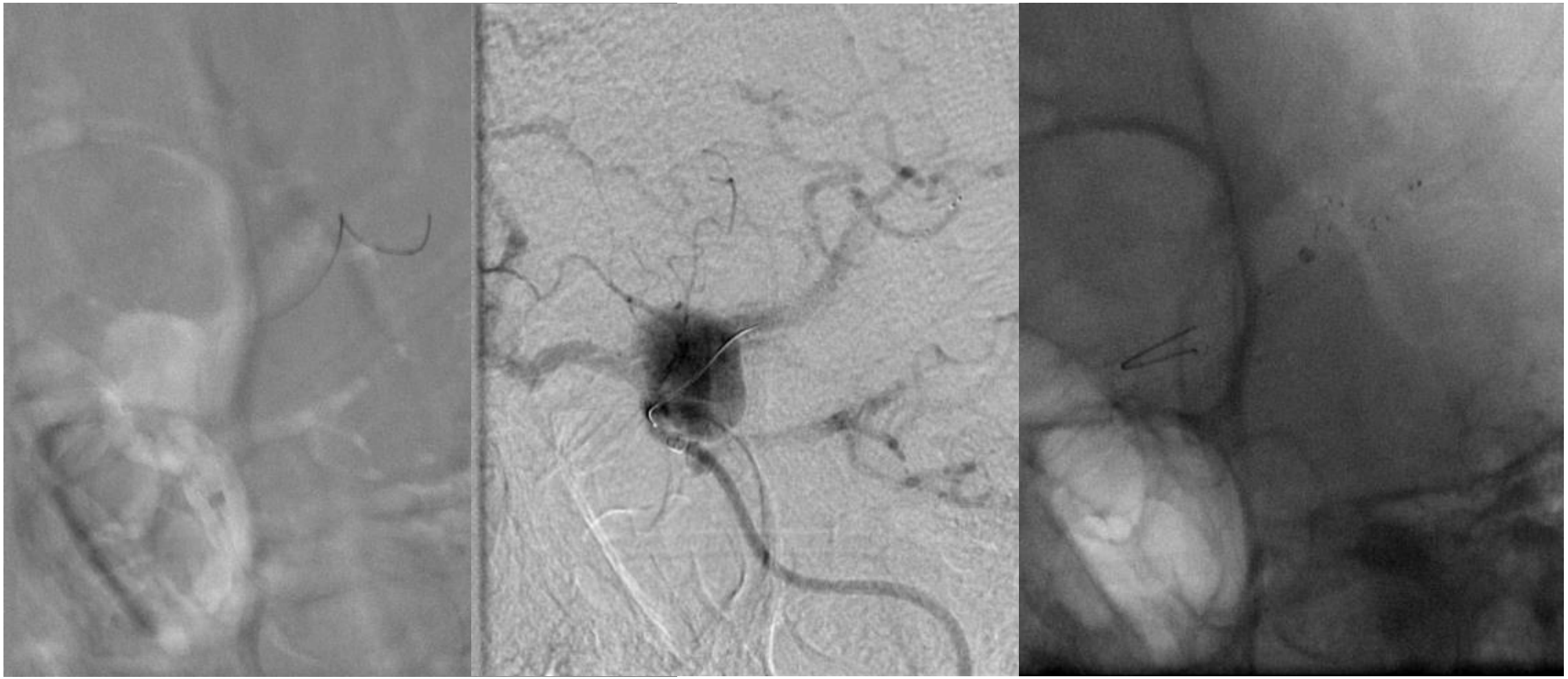
Methods A single-center retrospective analysis of angiographic and CT/MRI images and case records of 300 consecutive patients with LVO stroke treated with MTE was performed.

Results Aneurysms related to target vessels were detected in 11/300 patients, in 10/11 in the anterior circulation. In 9/11 patients the aneurysms were unknown prior to the stroke. The observed prevalence was >2-fold higher than expected for a healthy reference population. There was one complication (aneurysm rupture), as described above. In two subsequent patients with known aneurysms, MTE was conducted mainly with aspiration techniques which failed, contributing to a low recanalization rate in patients with aneurysm (45%).

Conclusions The prevalence of aneurysms is relatively high in patients with LVO stroke, particularly in older, female, hypertensive patients, presumably reflecting overlapping risk factors. MTE should not be withheld from patients with LVO stroke with aneurysms, but particularly cautious approaches may be warranted. Further research in larger samples is required to obtain precise data on the prevalence and associated complication rates in MTE procedures. This is necessary to estimate the true risk and to tailor endovascular strategies in these patients.

Slide courtesy of Dr. Jadhav

Case 2: Stroke in the setting of giant aneurysm



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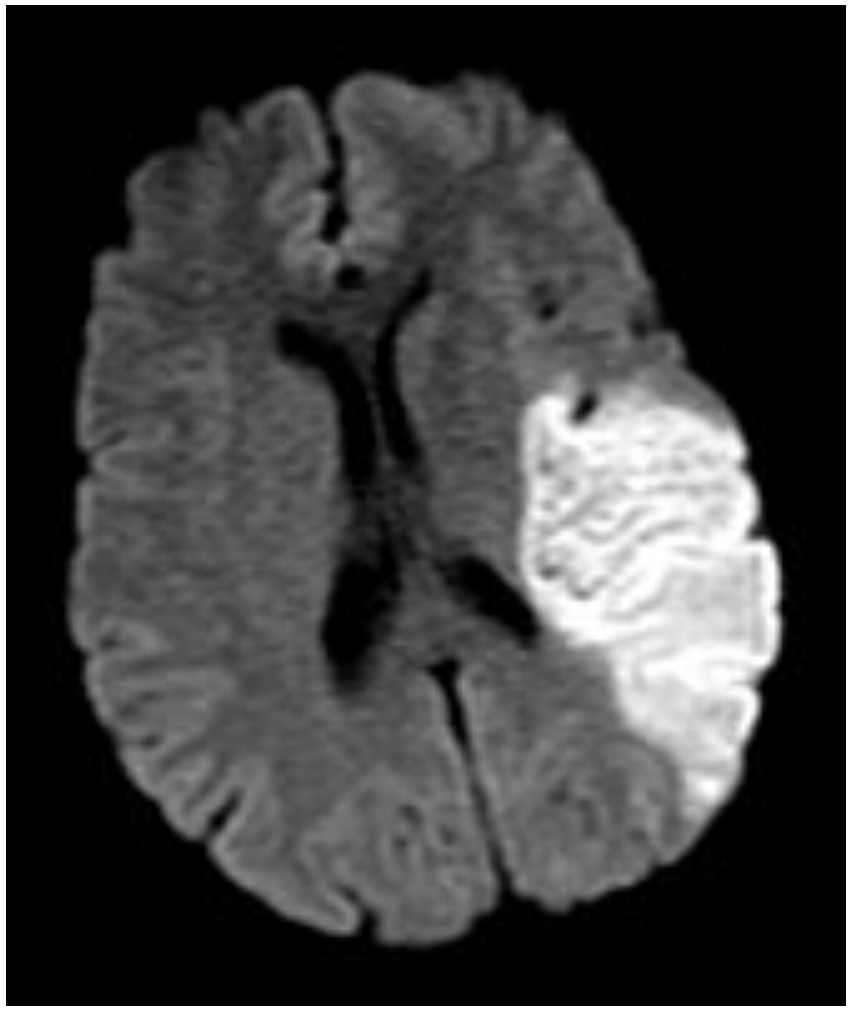

TICI 2b flow

NIHSS 10, mRS 3 at 1 month

Questions for discussion:

1. Should we have treated sooner?
2. Was the aneurysm related to the stroke mechanism?
3. Should the aneurysm be treated at this point and how?

Slide courtesy of Dr. Jadhav

Thank you for all you do to care for our Stroke Patients!