A few lessons we learnt in stroke

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Coimbatore

Disclosure statement of financial interest

Within the past 12 months, I or my spouse/partner have had no financial interest/arrangement or affiliation with any organization(s) .

Disclosure statement of financial interest

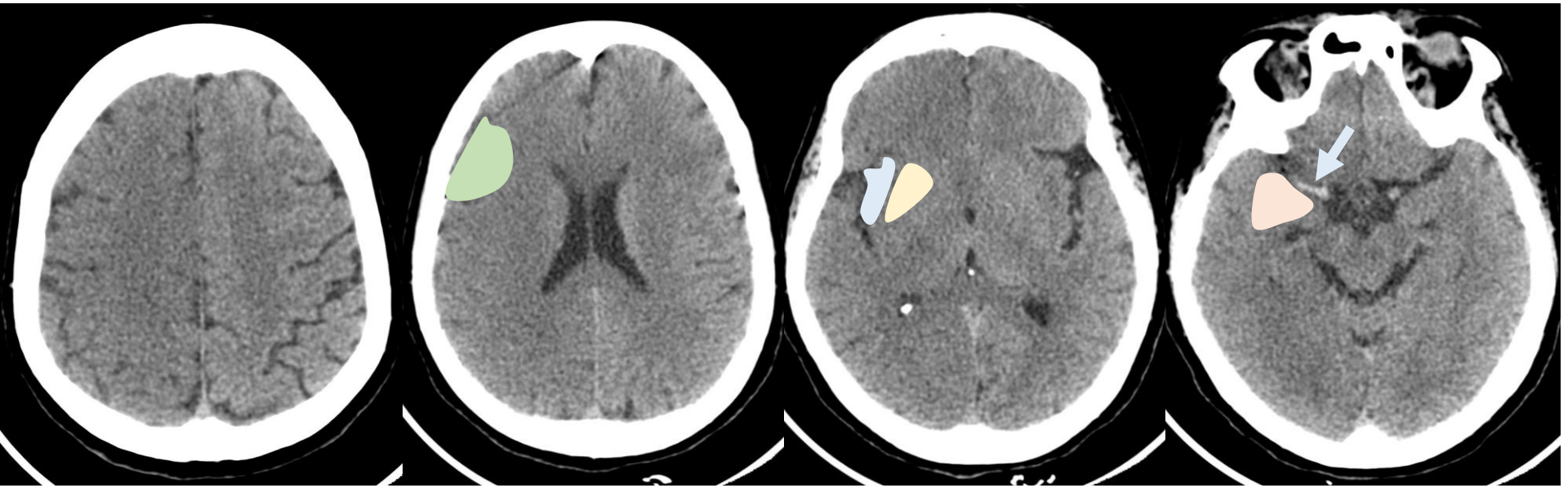
I, Dr. Mathew Cherian DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.

To treat or not when money counts

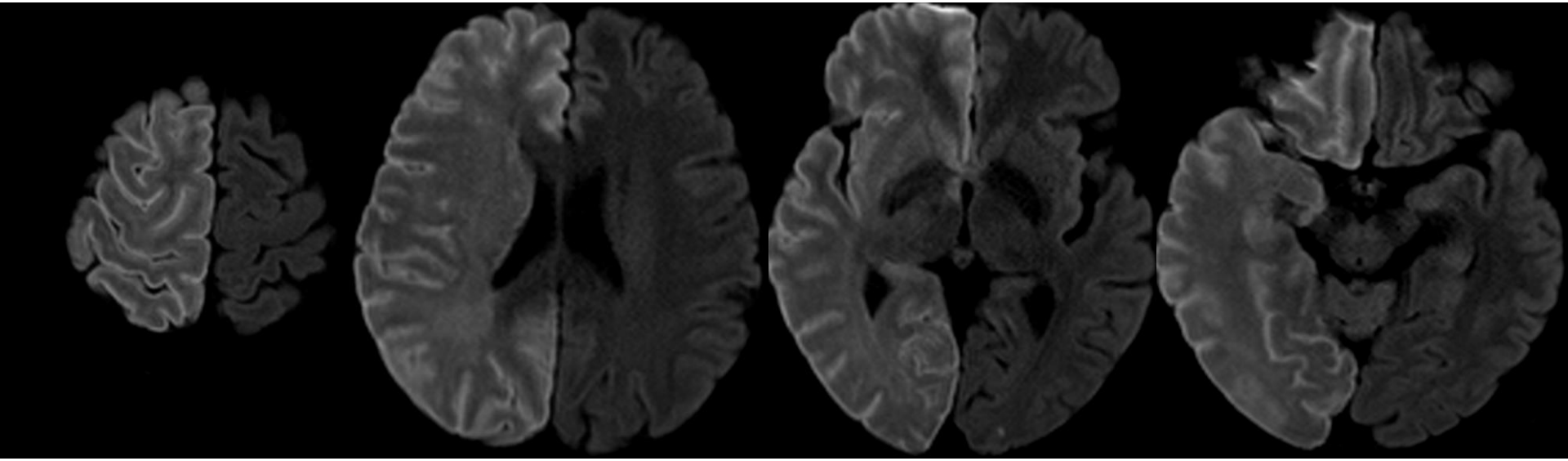
Case - 1

- 64 years old male
- Acute onset left side hemiplegia
- Left UL/LL-0/5
- Slurring of speech
- Left lower facial weakness

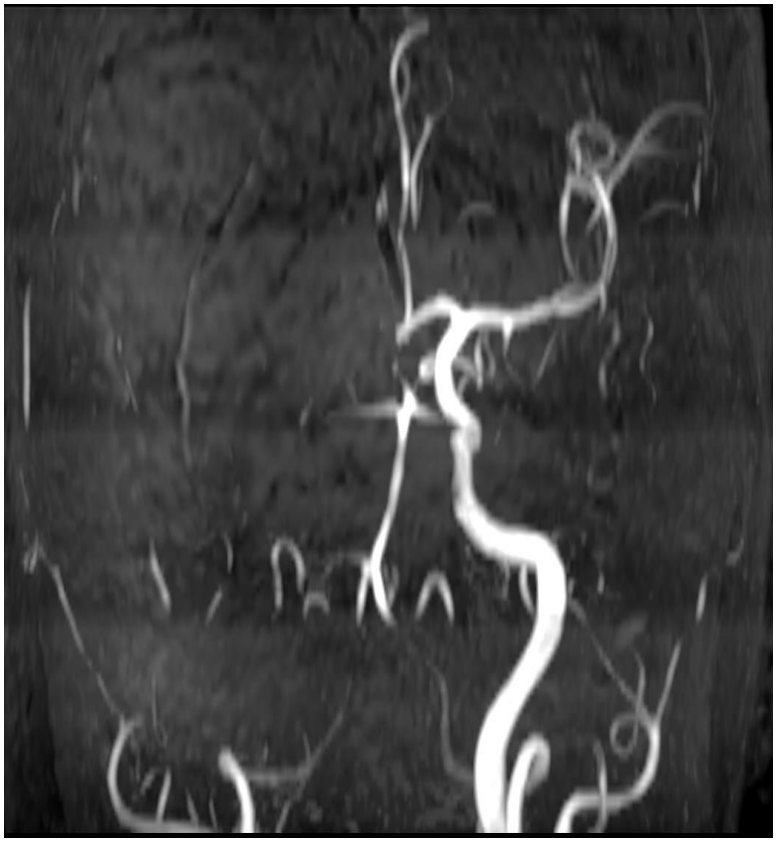
CT Aspect - 7



MR Aspect – 0 , time difference between CT and DWI- 5 min



Major vessel occlusion



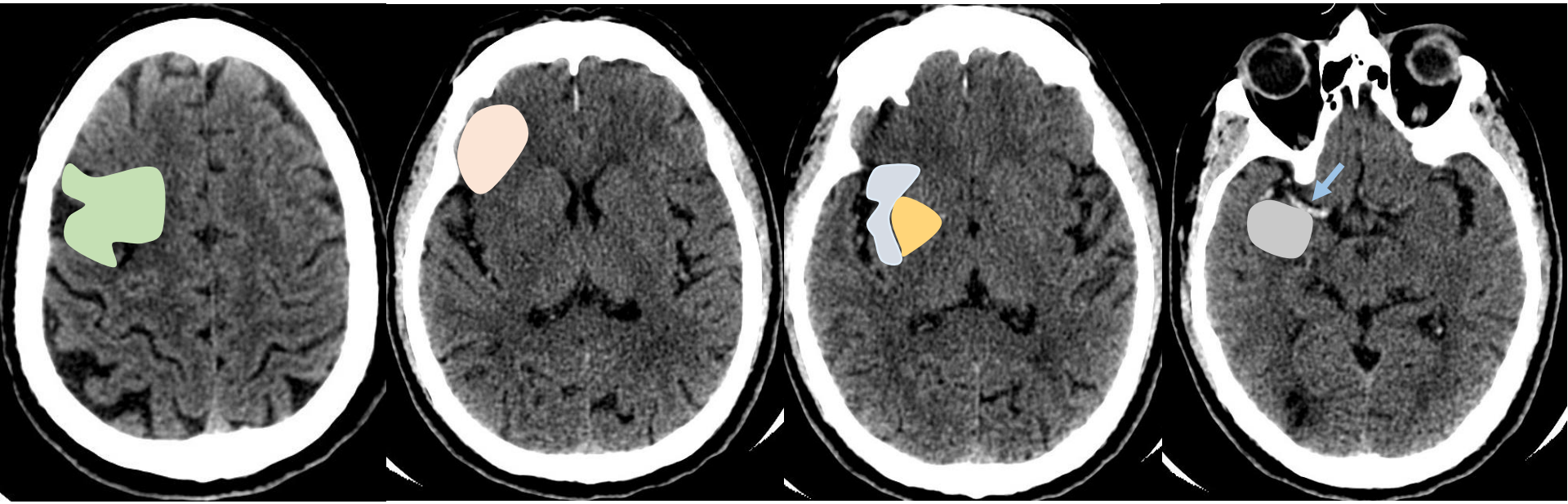
Further management

- We decided not to intervene and explained guarded prognosis for the patient.

Case - 2

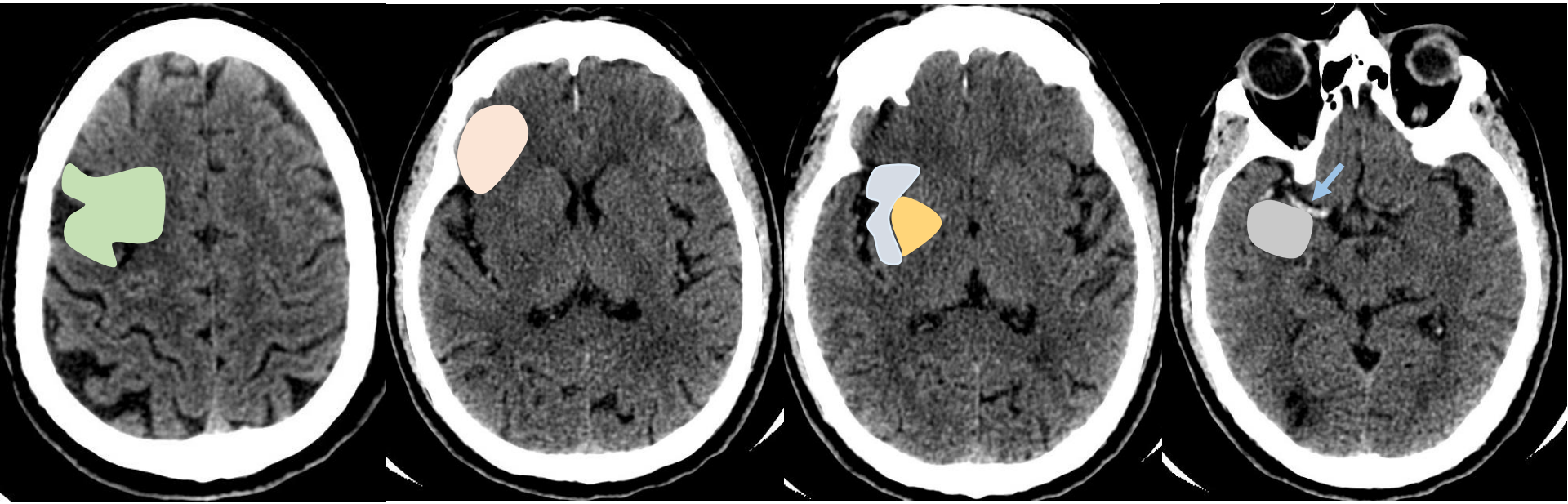
- 68 years old male,
- Acute onset left hemiplegia for 2 and half hour duration
- Power in left UL-2/5, left LL-2/5
- Drowsy
- Left facial weakness and aphasia

CT Aspect - 6

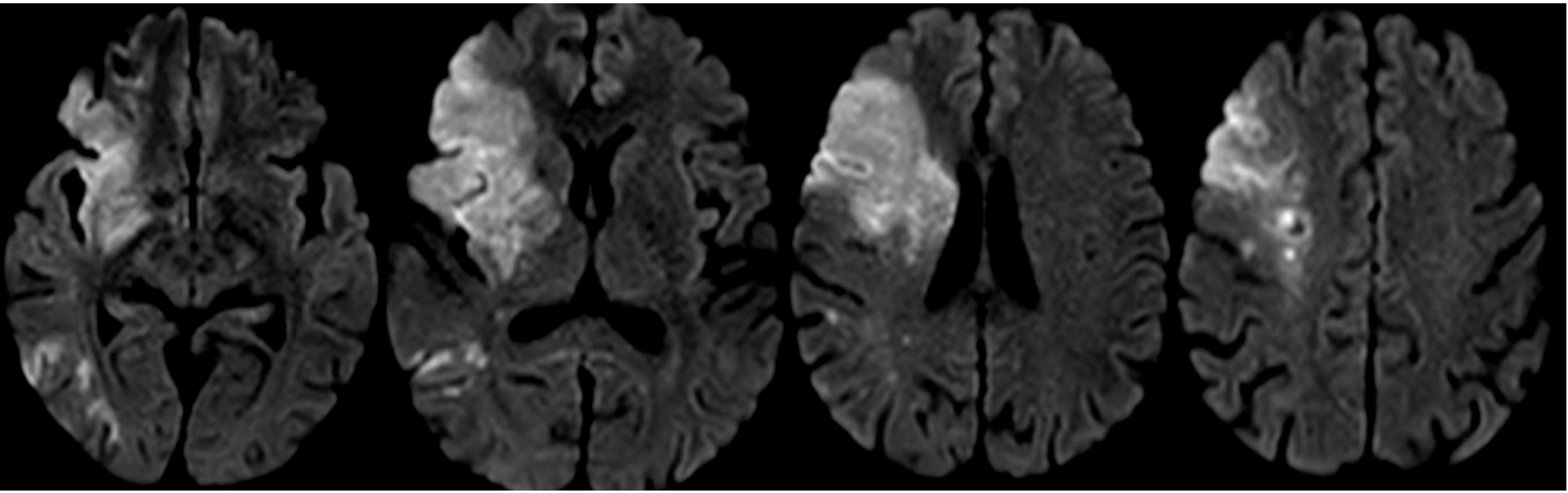


Major vessel occlusion

CT Aspect - 6



MR Aspect - 4



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Stroke. 2015 Feb;46(2):407-12. doi: 1

Alberta stroke progra
undergoing computer
prediction.

McTaggart RA[1], Jovin TG[2], Lansb

Author information

Abstract

BACKGROUND AND PURPOS
Tomographic scoring (ASPEC

METHODS: Prospectively enr
stroke onset. Inclusion criteria
Rankin Scale scores. Two ex
analyzed with the full scale or
outcome was defined as a 90

RESULTS: Seventy-four patie
0.579 and 0.867, respectively
Both DWI-ASPECTS and CT-
ASPECTS outperformed both
functional outcome (modified

CONCLUSION: Inter-rater agr
ASPECTS for predicting func

KEYWORDS: brain ischemia; diff

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J Stroke Cerebrovasc Dis. 2014 Jan;23(1):37-4

Comparison of CT and DWI

Mitomi M[1], Kimura K[2], Aoki J[2], Iguchi Y[2].

Author information

Abstract

This study compared the detection ra
magnetic resonance imaging (DWI). T
stroke who underwent CT and DWI w
Stroke Program Early CT Score (ASP
detection rate of ischemic lesions was
correlated with the CT-ASPECTS sco
P < .001), lentiform nucleus (43.8% v
3.1%; P = .006), M4 (32.3% v 6.9%; P
cerebral artery. DWI detected ischem
and internal capsule.

KEYWORDS: Neuroimaging; detectable ra

PMID: 23040956 DOI: 10.1016/j.jstrokecerebr

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Stroke. 2011 Aug;42(8):2196-200. doi: 10.1161/STROKEAHA.111.614404. Epub 2011 Jun 30.

Early ischemic change on CT versus diffusion-weighted imaging for patients with stroke receiving intravenous recombinant tissue-type plasminogen activator therapy: stroke acute management with urgent risk-factor assessment and improvement (SAMURAI) rt-PA registry.

Nezu T[1], Koga M, Nakagawara J, Shiokawa Y, Yamagami H, Furui E, Kimura K, Hasegawa Y, Okada Y, Okuda S, Kario K, Naganuma M, Maeda K, Minematsu K, Toyoda K.

Author information

Abstract

BACKGROUND AND PURPOSE: Alberta Stroke Programme Early CT Score (ASPECTS) is a quantitative topographical score to evaluate early ischemic change in the middle cerebral arterial territory on CT as well as on diffusion-weighted imaging (DWI). The aim of the present study was to elucidate the relationship between CT-ASPECTS and DWI-ASPECTS for patients with hyperacute stroke and their associations with outcomes after recombinant tissue-type plasminogen activator therapy based on a multicenter registry.

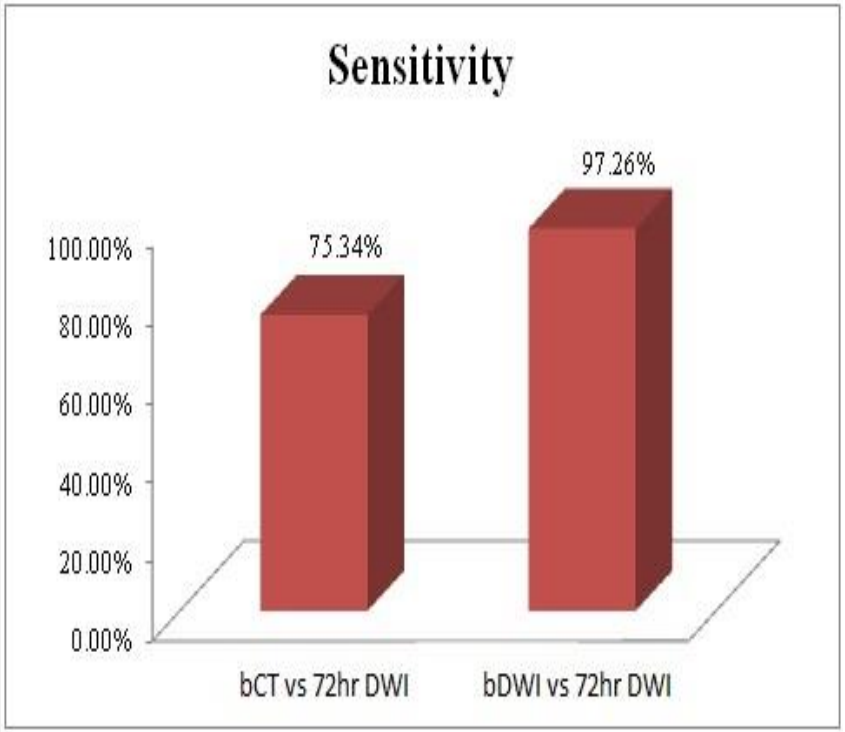
METHODS: ASPECTS was assessed on both CT and DWI before intravenous 0.6 mg/kg alteplase in 360 patients with stroke (119 women, 71 ± 11 years old). The outcomes were symptomatic intracerebral hemorrhage within 36 hours and independence at 3 months defined by a modified Rankin Scale score of 0 to 2.

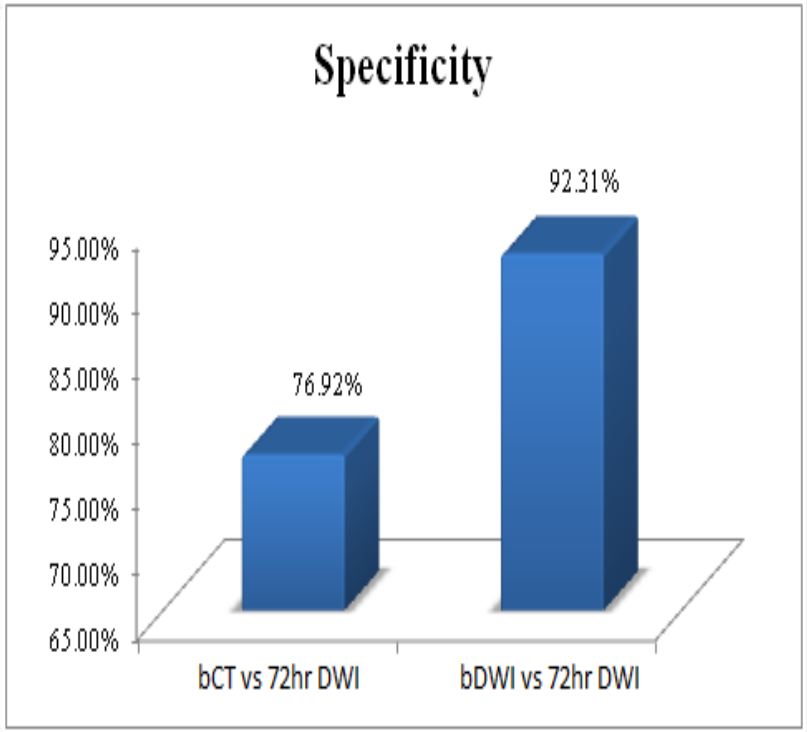
RESULTS: DWI-ASPECTS was positively correlated with CT-ASPECTS (ρ=0.511, P<0.001) and was lower than CT-ASPECTS (median 8 [interquartile range, 6 to 9] versus 9 [8 to 10], P<0.001). Higher baseline National Institutes of Health Stroke Scale score (standardized partial regression coefficient [β] 0.061, P<0.001) and cardioembolic stroke (β 0.35, P<0.001) were related to this discrepancy. The area under the receiver operating characteristic curve for predicting sICH (12 patients) using ASPECTS was 0.673 (95% CI, 0.503 to 0.807) by CT and 0.764 (95% CI, 0.635 to 0.858) by DWI (P=0.275). The area for predicting independence at 3 months (192 patients) was 0.621 (0.564 to 0.674) by CT and 0.639 (0.580 to 0.694) by DWI (P=0.535).

CONCLUSIONS: For patients with hyperacute stroke, DWI-ASPECTS scored approximately 1 point lower than CT-ASPECTS. Both CT-ASPECTS and DWI-ASPECTS were useful predictors of symptomatic intracerebral hemorrhage and independence at 3 months after recombinant tissue-type plasminogen activator.

Prediction of final infarct size after successful reperfusion therapy- comparison of CT and DWI MRI- KMCH experience

Comparison between CT and DWI Aspect and 72 hour DWI Aspect





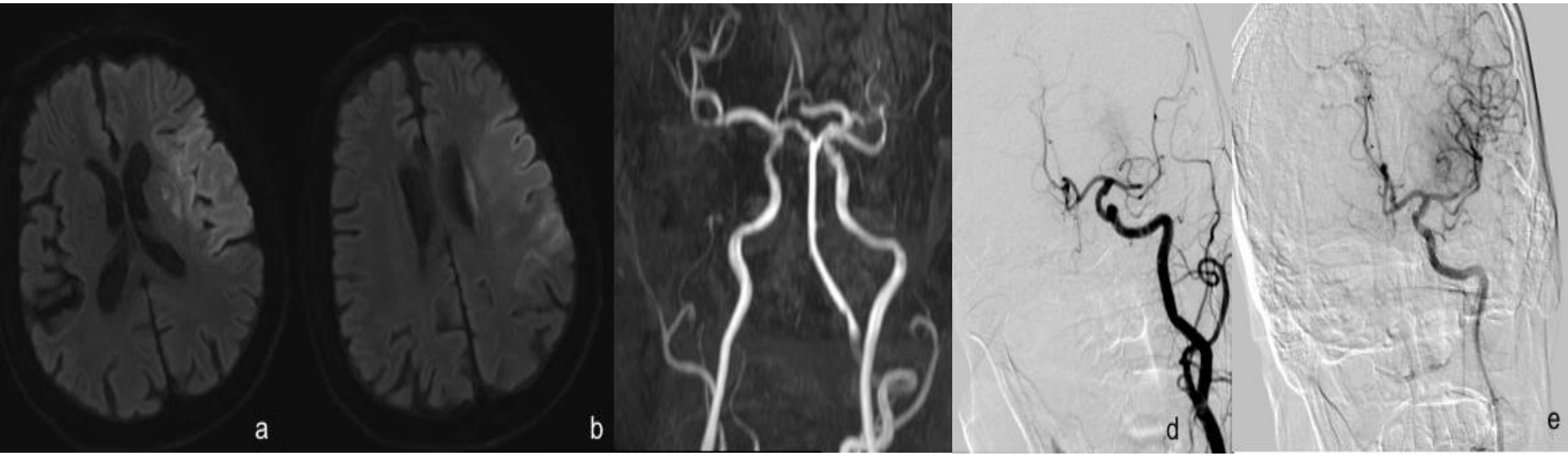
Lession 1: MRI can prognostic better

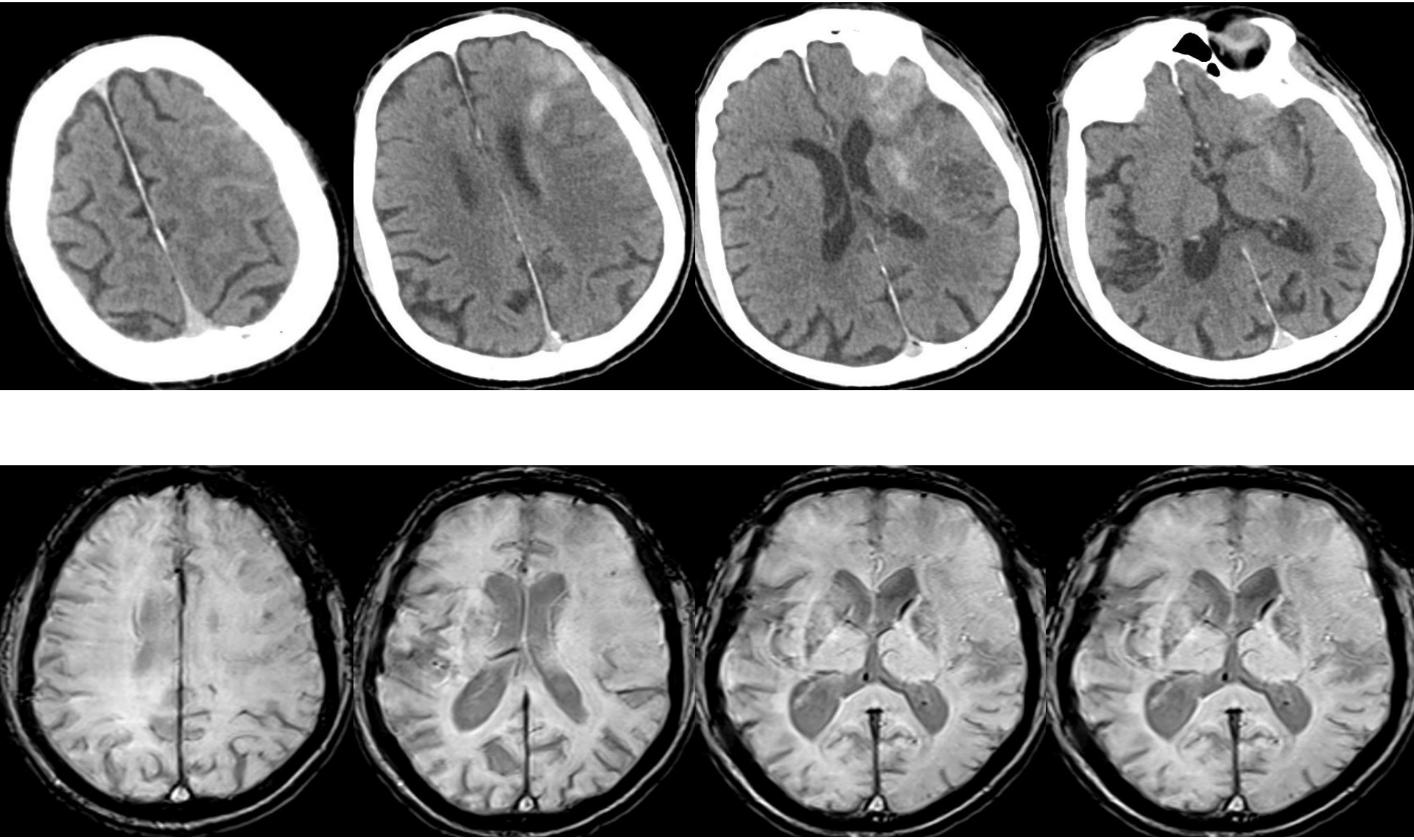
Post-procedure imaging dilemma of contrast staining versus reperfusion hemorrhage

Case - 1

- 78 years old male
- Right hemiplegia and aphasia for 3 hours
- DM, HTN

DWI Aspect – 5, Left M1 occlusion, Mechanical thrombectomy TICI flow 3





Further medical management

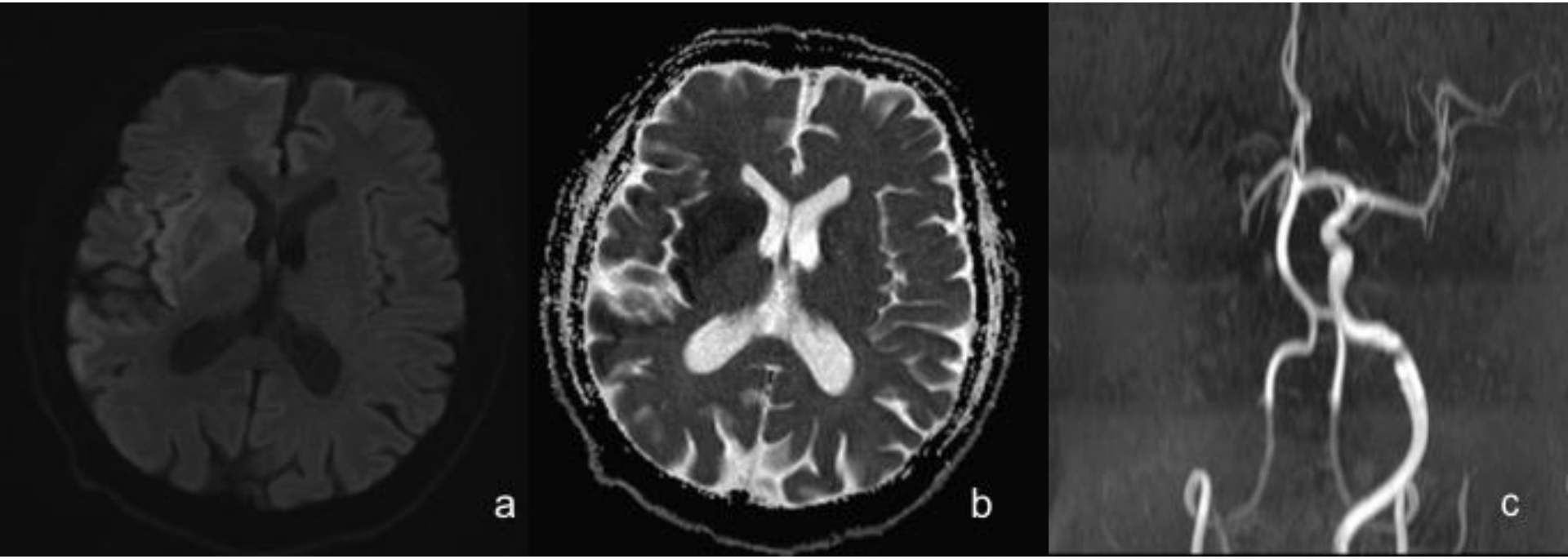
- Repeat imaging after 12 hours to rule out any further bleed.
- If there is no bleed :
  - 12 hours: a). Tab Ecospirin 300 mg stat followed by 75 mg Ecospirin OD

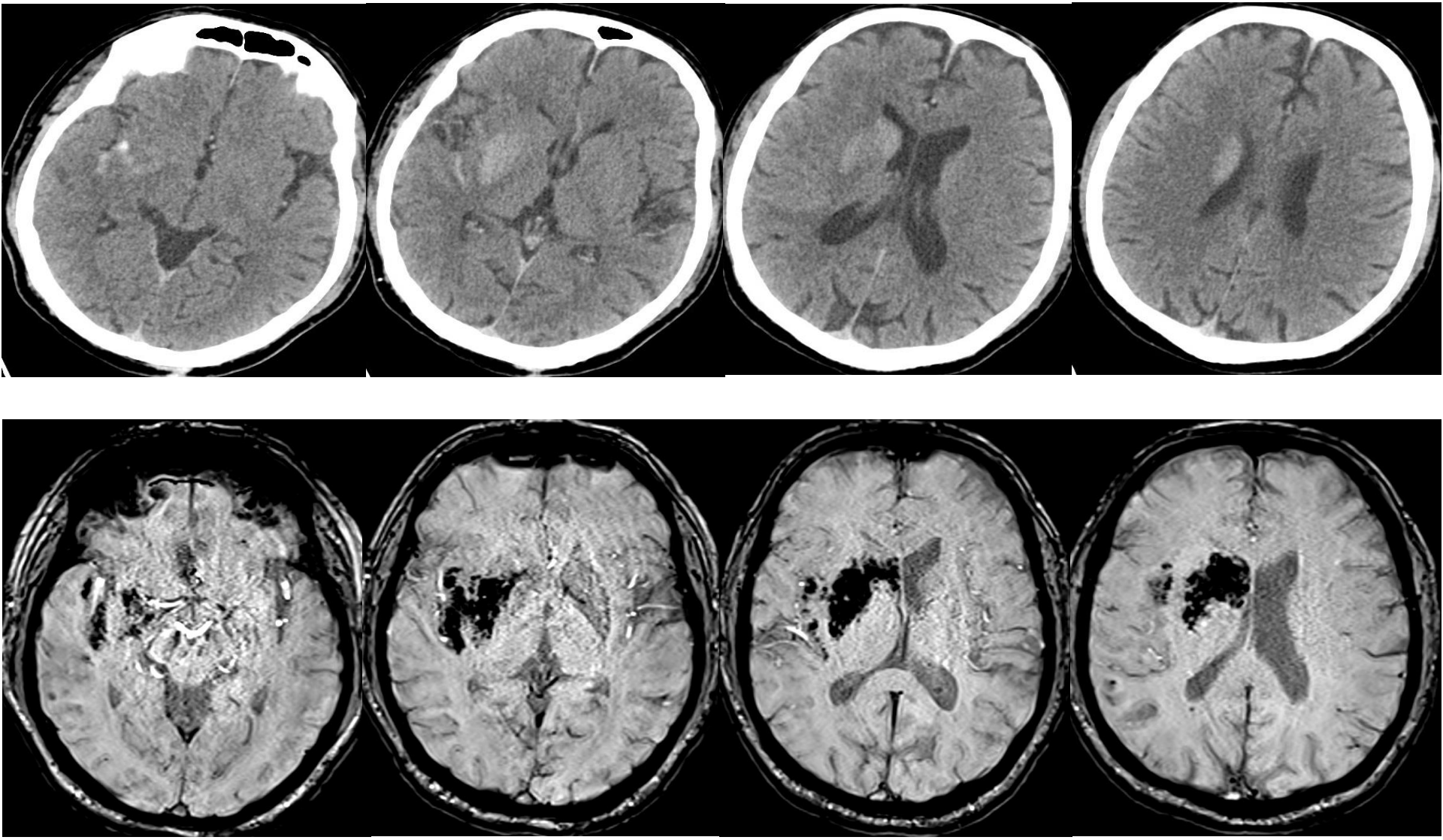
    b). Injection Heparin 5000 IU S.C. BD
  - 48 hours: 75 mg Clopidogrel OD

Case 2

- 57 years old male
- Previous CABG, on dual antiplatelets
- Left hemiplegia and dysarthria for 4 hours

DWI Aspect – 6, Right ICA occlusion, post MT with suction aspiration, TICI flow-3





Initial 72 hours management

- Heparin and dual antiplatelets were avoided.
- Patient had gradual recovery of neurological function with left upper limb power of 2/5 and lower limb power of 3/5 at 72 hrs.

Crux

- One of the most common findings seen in immediate post-intervention period in NCCT brain is- hyper-attenuated areas.
- It is seen upto 85% cases.
- It can be due to contrast staining in infarcted brain parenchyma or can be due to reperfusion hemorrhage.
- It is difficult to differentiate between two on NCCT.
- It is paramount importance to differentiate between two following intervention for further management in form of antiplatelet and anti-coagulants.
- SWI is problem solving tool.

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ORIGINAL RESEARCH
ADULT BRAIN

MRI Appearance of Intracerebral Iodinated Contrast Agents: Is It Possible to Distinguish Extravasated Contrast Agent from Hemorrhage?

O. Nikoubashman, F. Jablawi, S. Dekeyzer, A.M. Oros-Peusquens, Z. Abbas, J. Lindemeyer, A.E. Othman, N.J. Shah, and M. Wiesmann

ABSTRACT

BACKGROUND AND PURPOSE: Hyperattenuated cerebral areas on postinterventional CT are a common finding after endovascular stroke treatment. There is uncertainty about the extent to which these hyperattenuated areas correspond to hemorrhage or contrast agent that extravasated into infarcted parenchyma during angiography. We evaluated whether it is possible to distinguish contrast extravasation from blood on MR imaging.

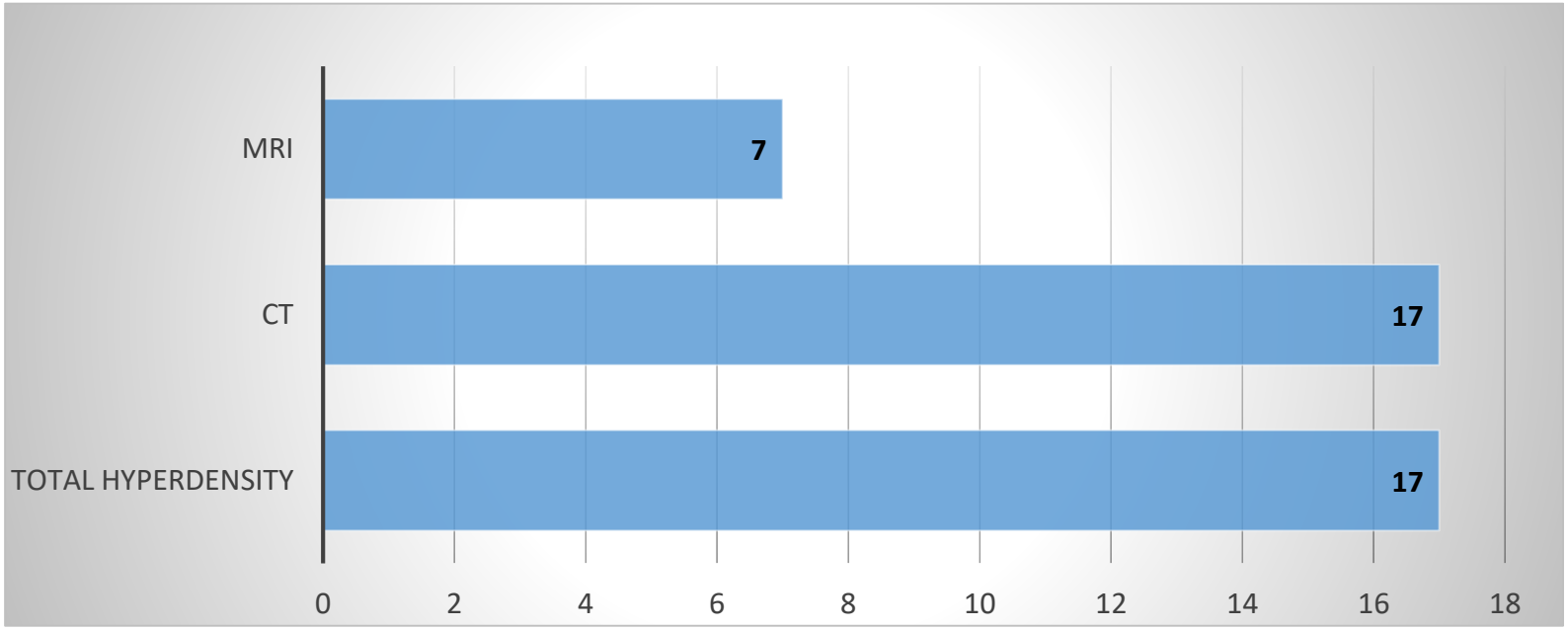
MATERIALS AND METHODS: We examined the influence of iodinated contrast agents on T1, T2, and T2* and magnetic susceptibility in a phantom model and an ex vivo animal model. We determined T1, T2, and T2* relaxation times and magnetic susceptibility of iopamidol and iopromide in dilutions of 1:1; 1:2; 1:4; 1:10; and 1:100 with physiologic saline solution. We then examined the appearance of intracerebral iopamidol on MR imaging in an ex vivo animal model. To this end, we injected iopamidol into the brain of a deceased swine.

RESULTS: Iopamidol and iopromide cause a negative susceptibility shift and T1, T2, and T2* shortening. The effects, however, become very small in dilutions of 1:10 and higher. Undiluted iopamidol, injected directly into the brain parenchyma, did not cause visually distinctive signal changes on T1-weighted spin-echo, T2-weighted turbo spin-echo, and T2*-weighted gradient recalled-echo imaging.

CONCLUSIONS: It is unlikely that iodinated contrast agents extravasated into infarcted brain parenchyma cause signal changes that mimic hemorrhage on T1WI, T2WI, and T2*WI. Our results imply that extravasated contrast agents can be distinguished from hemorrhage on MR imaging.

Problem solving by susceptibility weighted MRI after mechanical thrombectomy in acute stroke "Contrast versus acute bleed"- KMCH experience

Comparison of CT vs SWI in immediate stroke period- KMCH stroke study



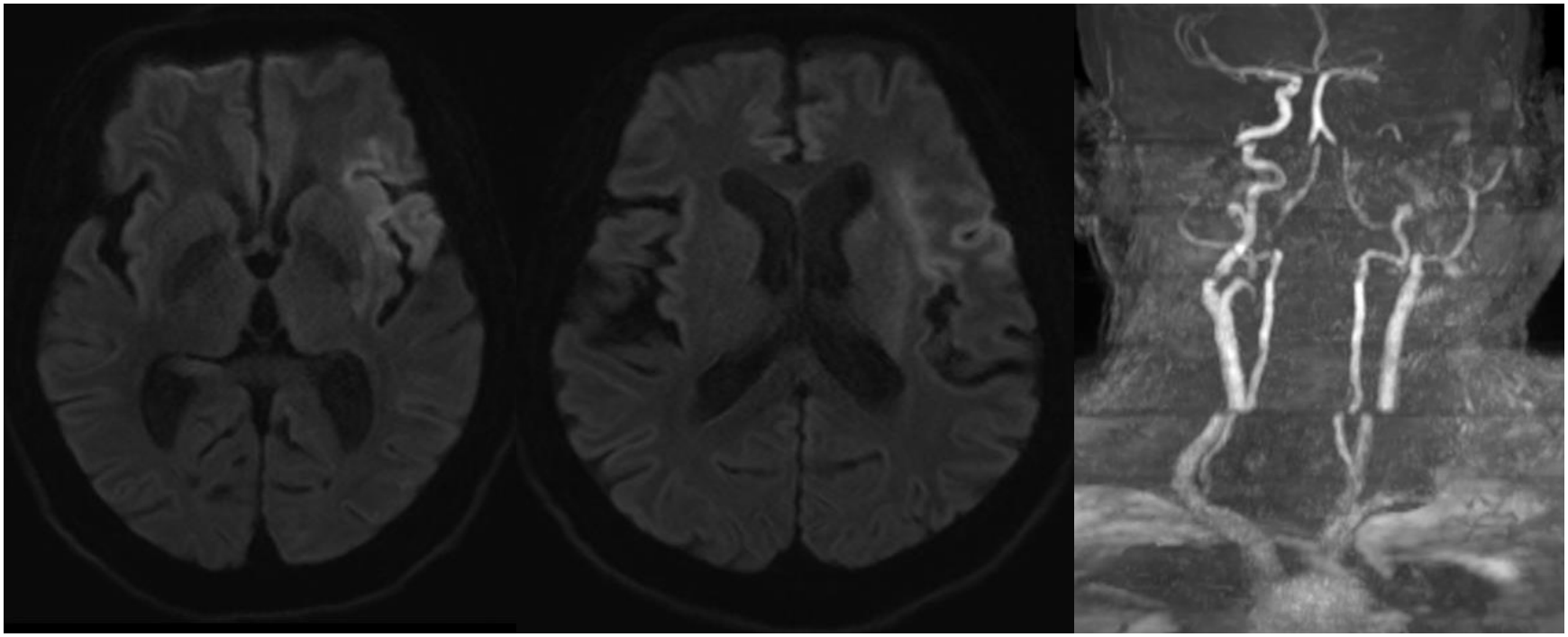
Lession 2: SWI can differentiate contrast staining from reperfusion hemorrhage

When there is ICA stenosis/occlusion

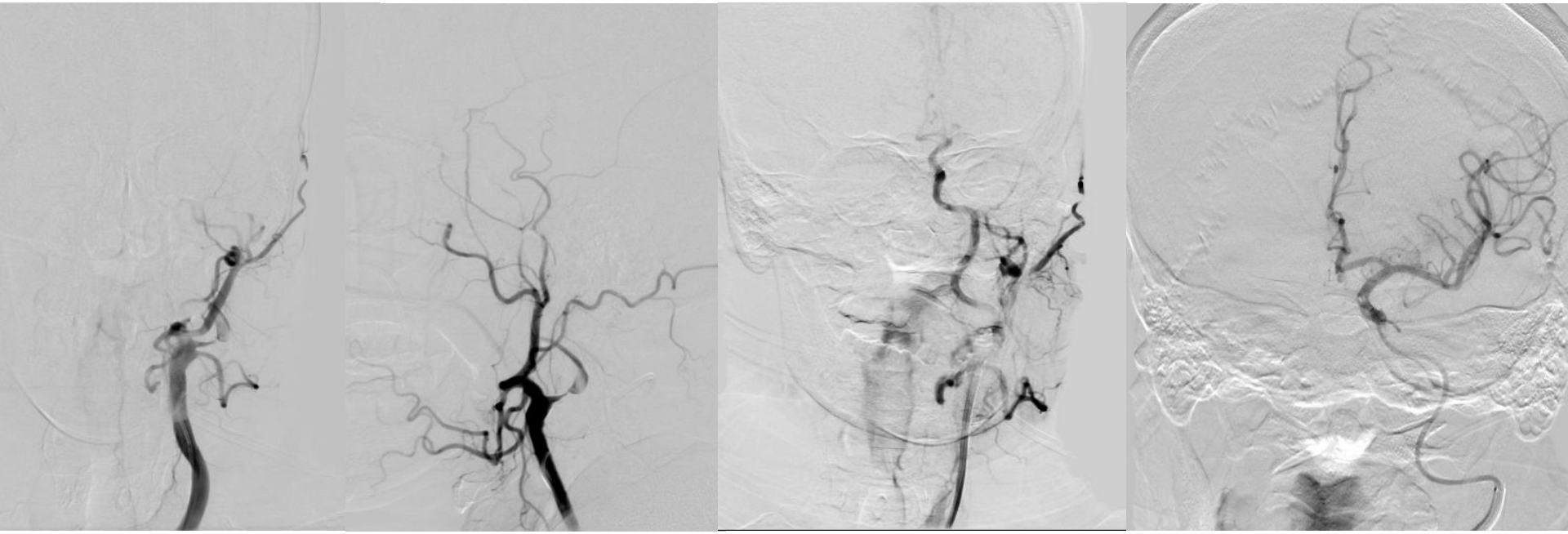
Case - 1

- 68 years old male
- Acute onset right upper and lower limb weakness and right facial weakness since 1 and half hour.
- Power in right UL-0 and right LL-0
- Facial deviation to right side
- Slurring of speech
- NIHSS score 17

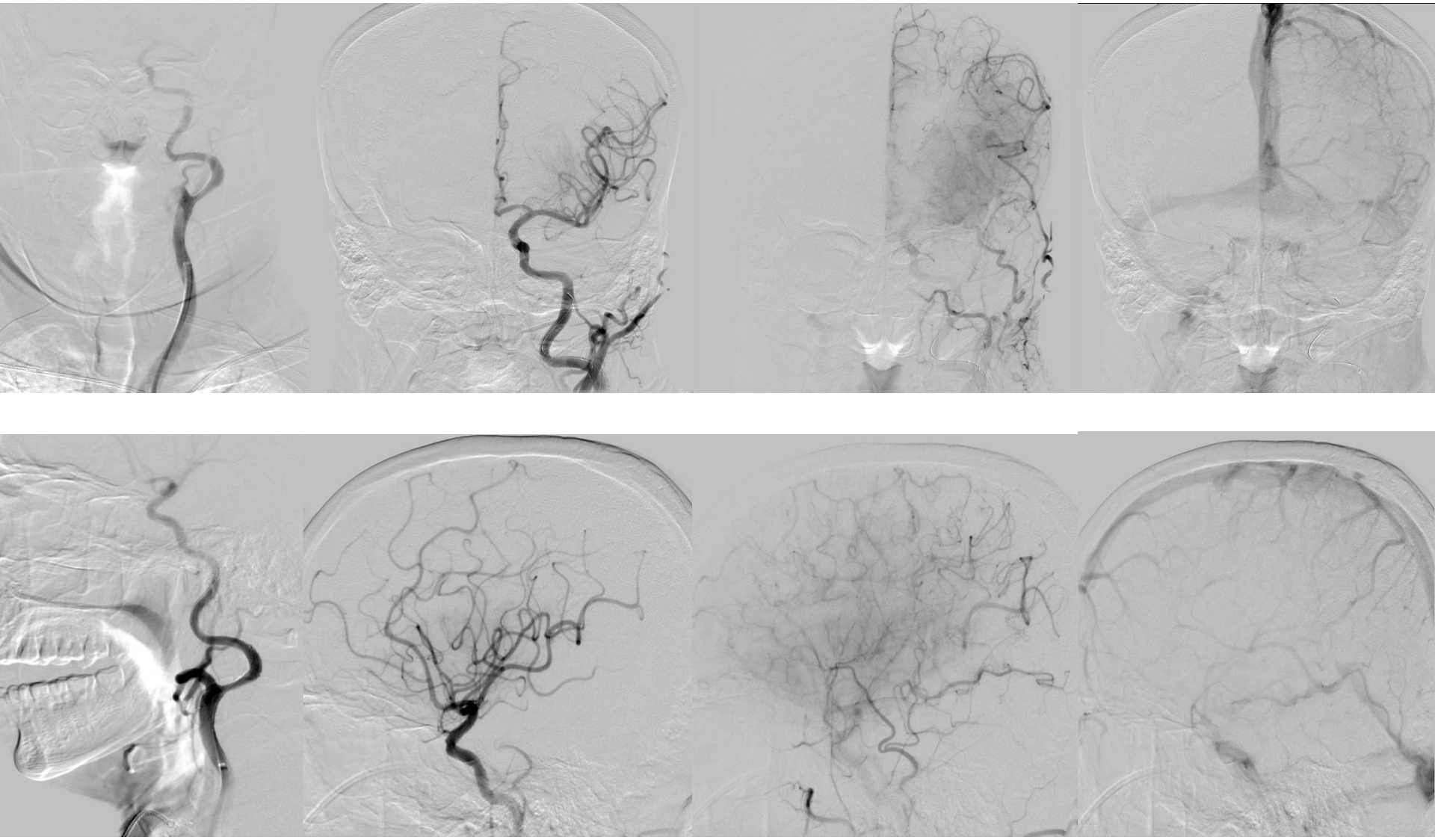
DWI Aspect – 7



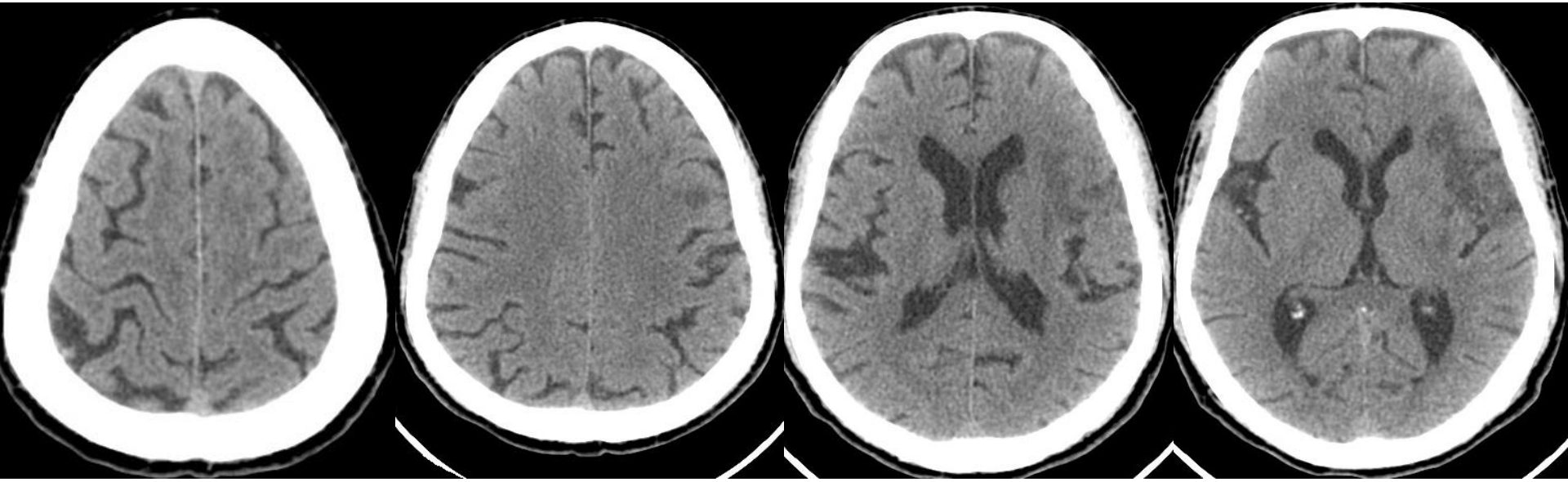
Suction aspiration with Neuron Max and ACE- 68



ICA stenting was done in last



Post – procedure 24 hr CT



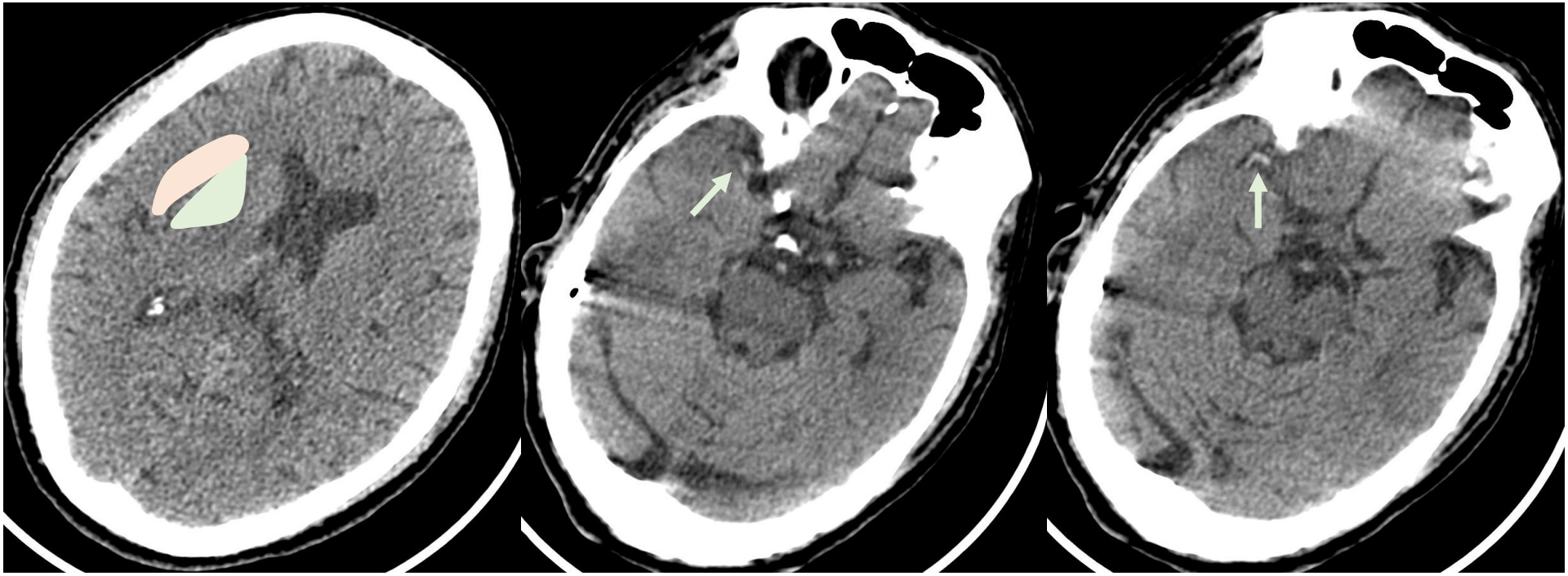
Follow up

- Patient NIHSS score dropped from 17 to 8 at 24 hours
- 1 MONTHS mRS was 1.
- 3 MONTHS mRS was 0.

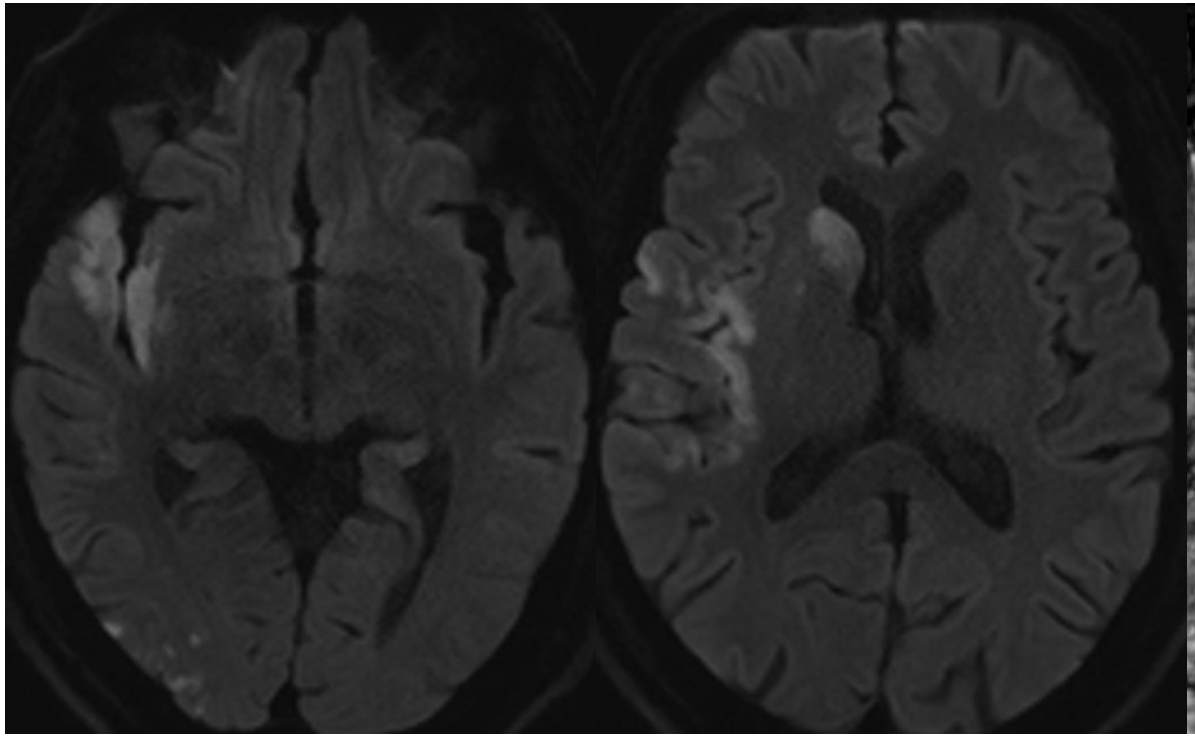
Case-2

- 75 years old male,
- Acute onset left upper and lower limb weakness and left side facial weakness since 1 and half hour.
- Power in left UL-0 and left LL-0
- Facial deviation to right side
- Slurring of speech
- NIHSS score 16

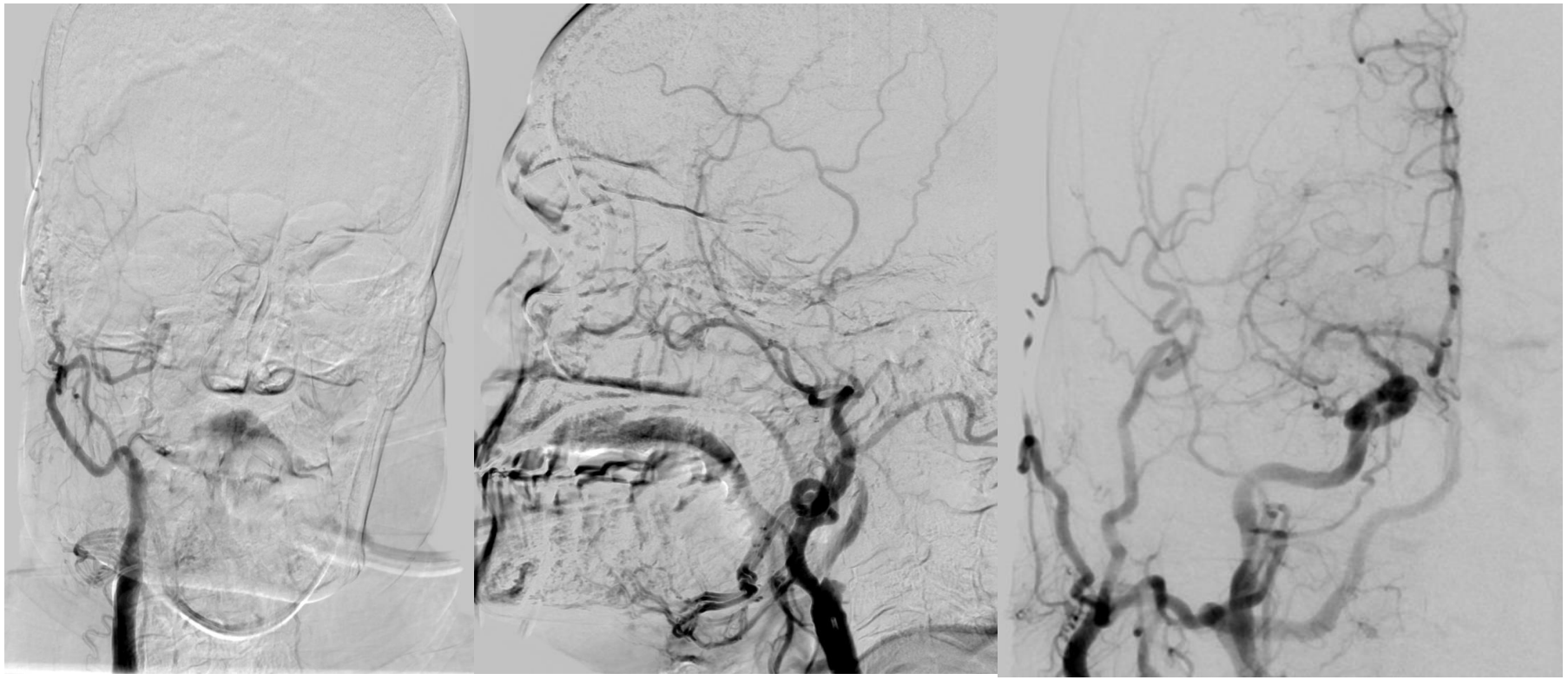
CT Aspect - 8



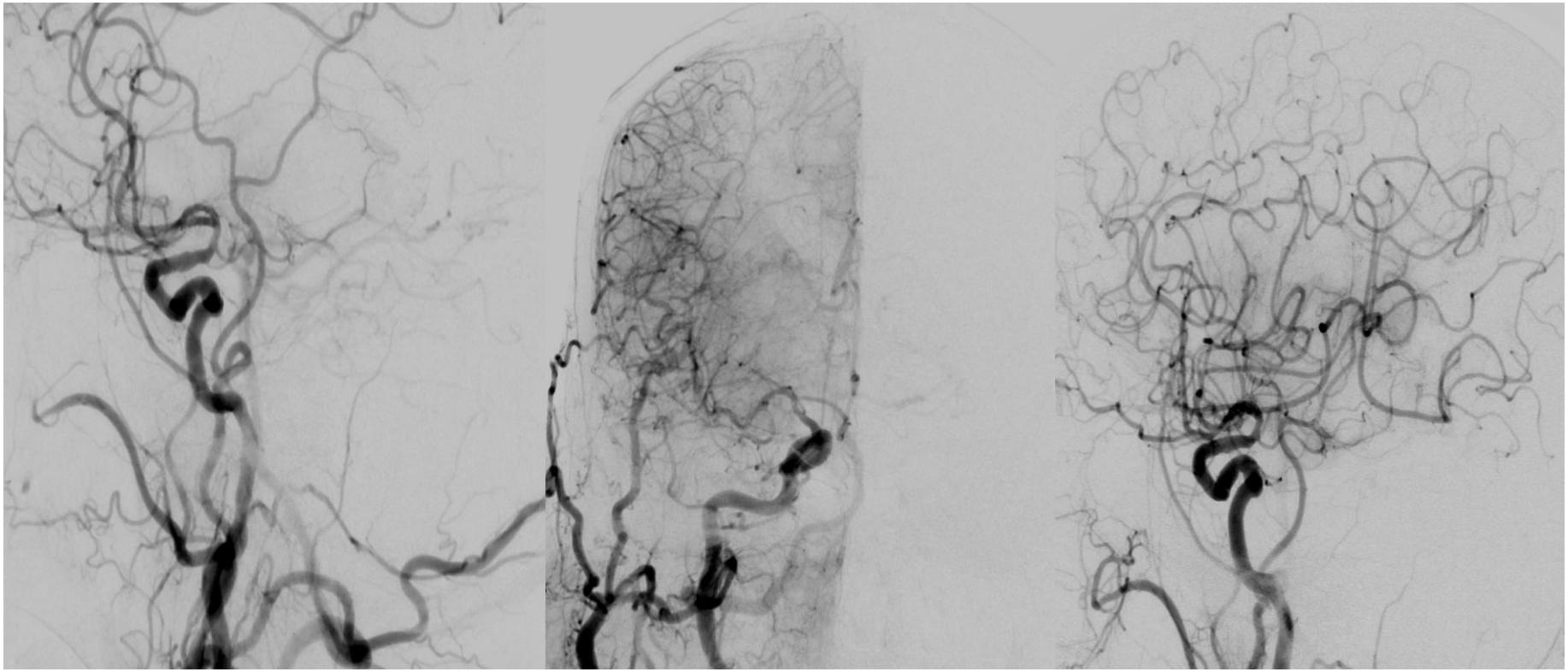
MR Aspect - 7



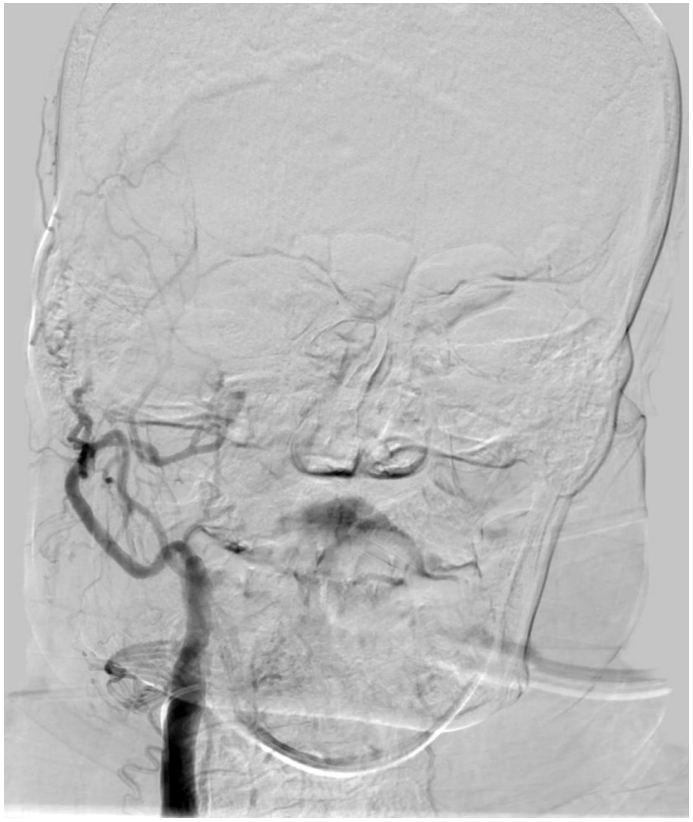
Tandem occlusion- right ICA occlusion with MCA occlusion

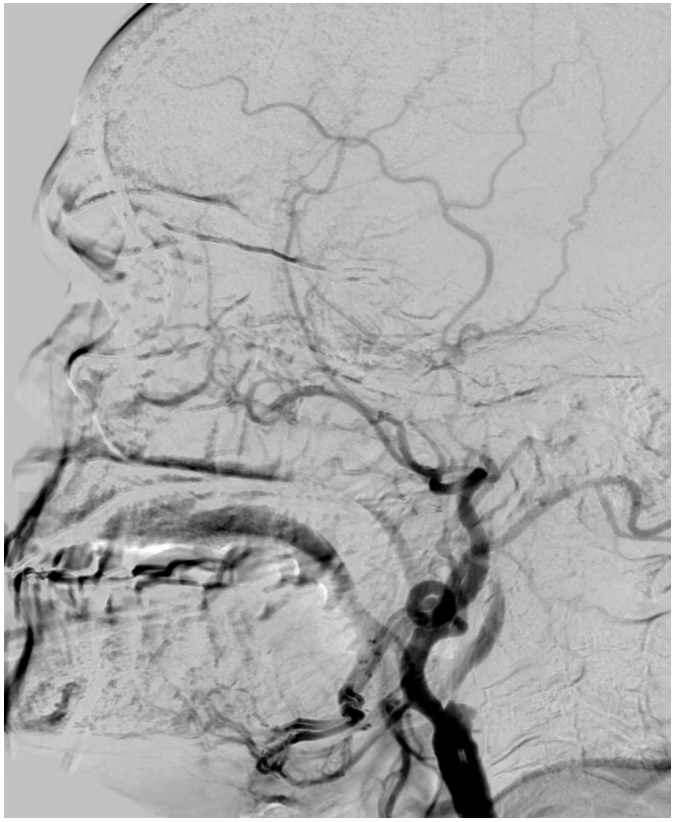


Suction aspiration with Neuron max followed by stent- retriever : TICI flow 3



10 mins check angiogram : ICA re-occlusion



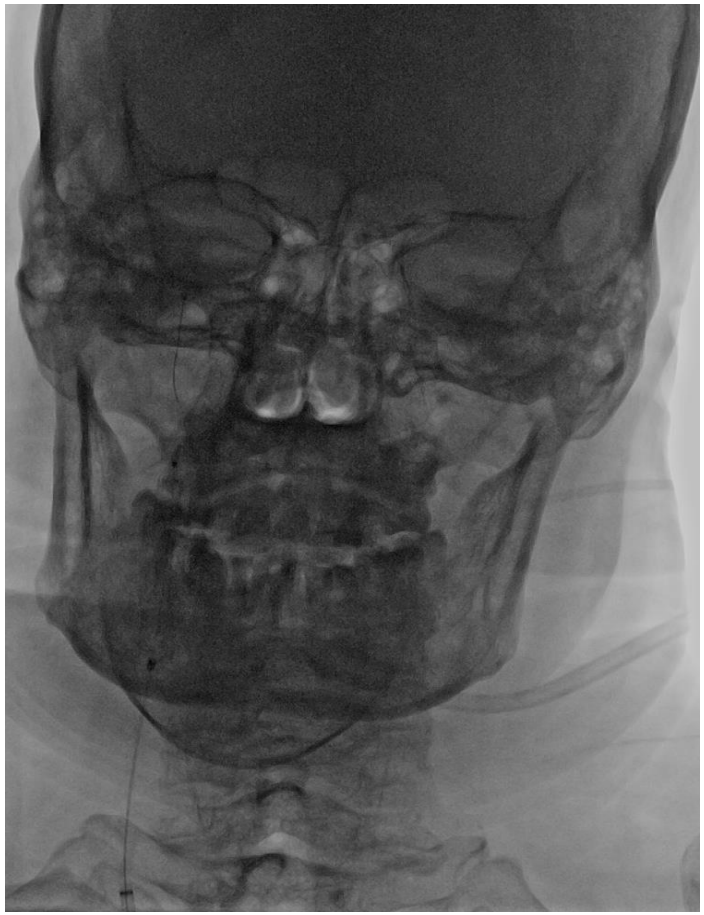


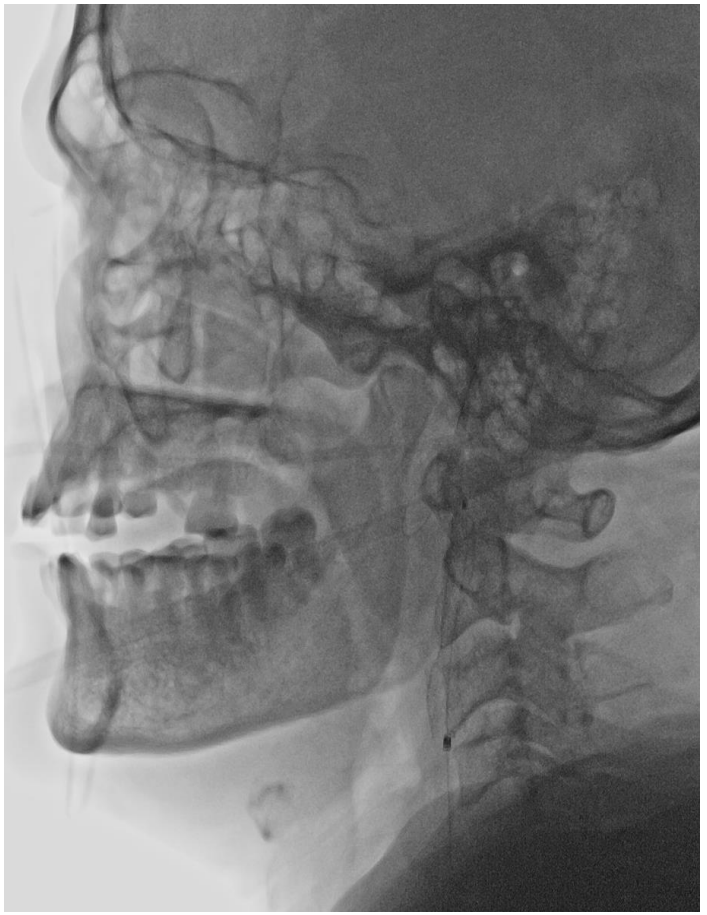
Antiplatelet

Loaded with antiplatelet

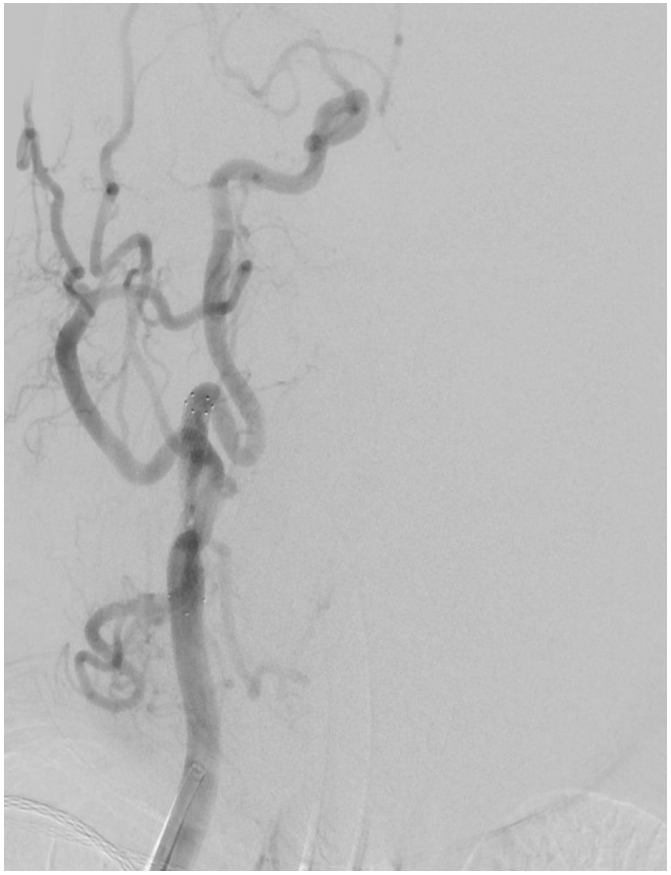
Tab Ecospirin- 300 mg

Right carotid stenting : As bailout procedure





10 min check angiogram : In-stent thrombosis

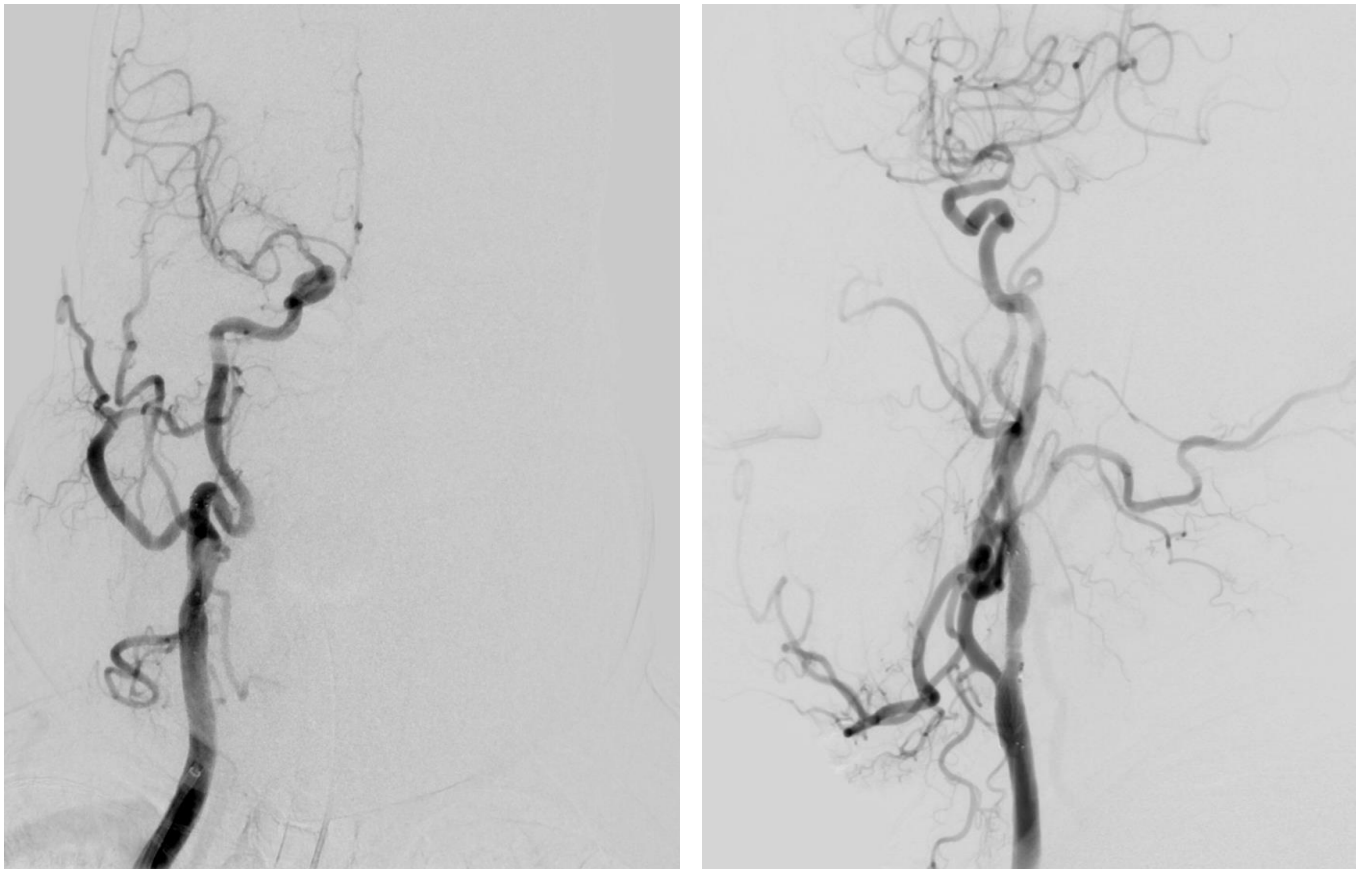


Gp-IIb/IIIa Inhibitor

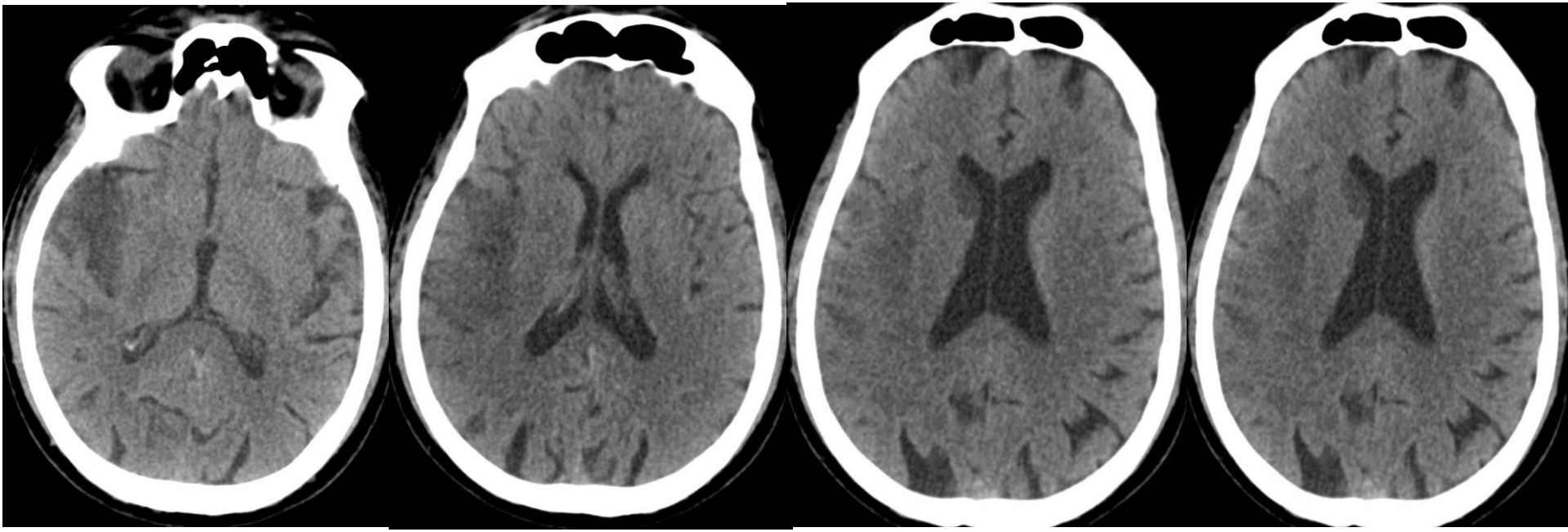
Tirofiban 13 ml intra-arterial bolus

7 ml/hr for 4 hours

30 min check angiogram



Follow up CT at 24 hours – post endovascular treatment



Follow up

At 24 hours, NHISS score dropped from 16 to 10

At discharge NHISS score 5, mRS is 3

At 3 months NHISS score 2, mRS is 1

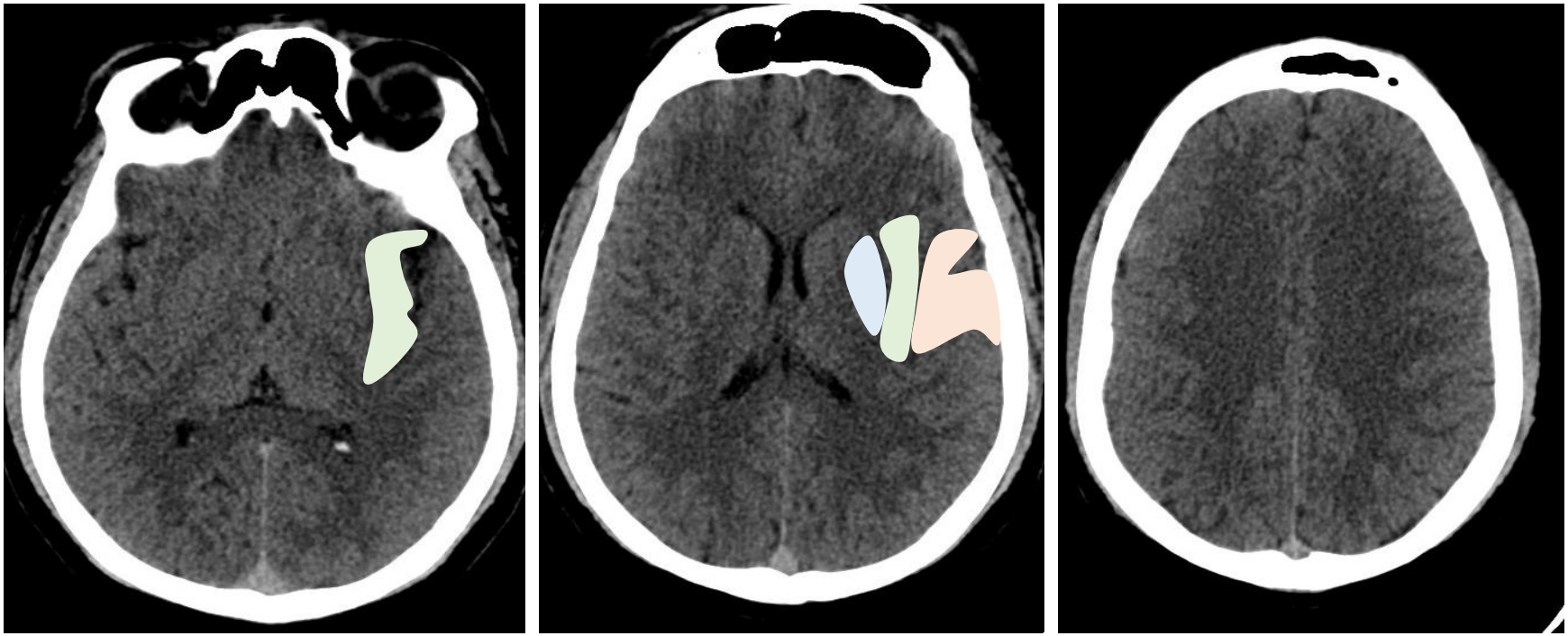
Lession 3:Carotid stenting should be done only if its must and at the end of procedure

Stroke cases: Where suction aspiration is not a choice

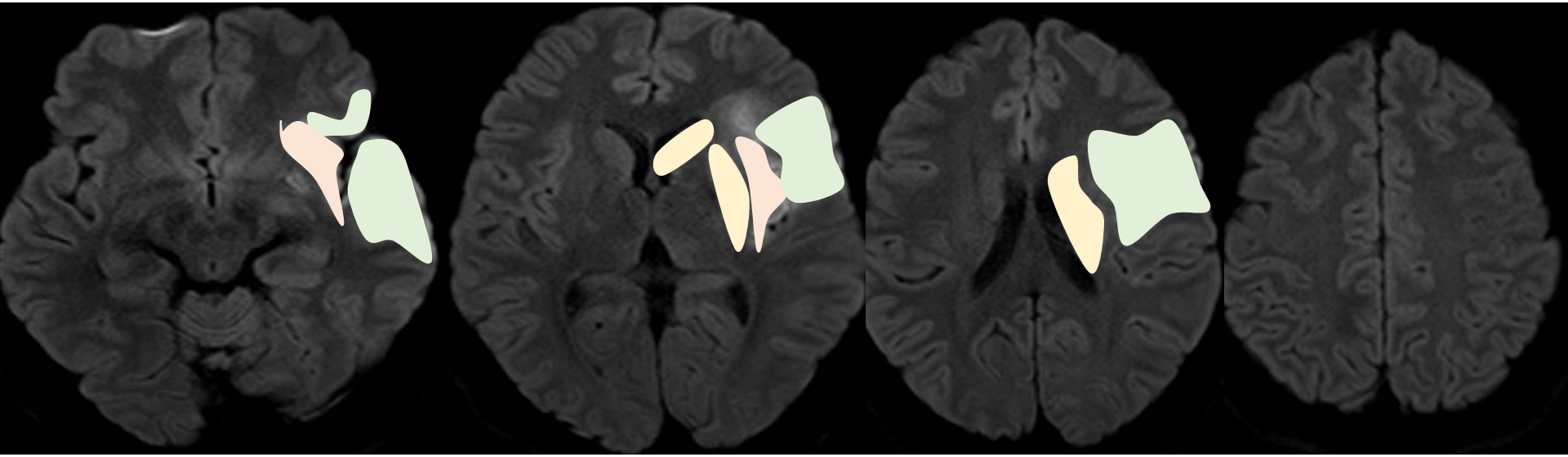
Case - 1

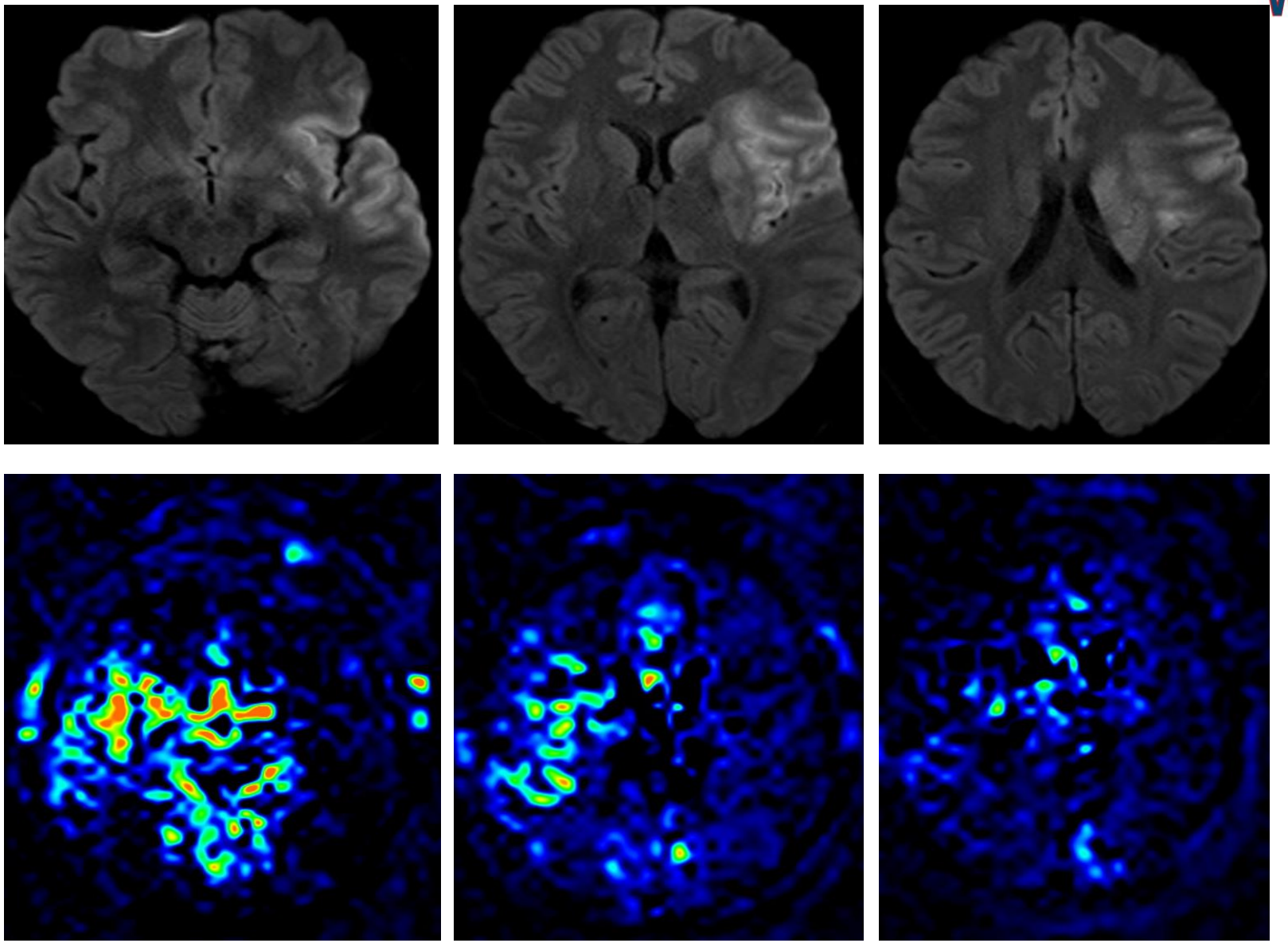
- 27 Yrs old male
- Right hemiplegia and aphasia
- 3 hours
- Post alcoholic binge
- NIHSS score 15

CT Aspect - 7

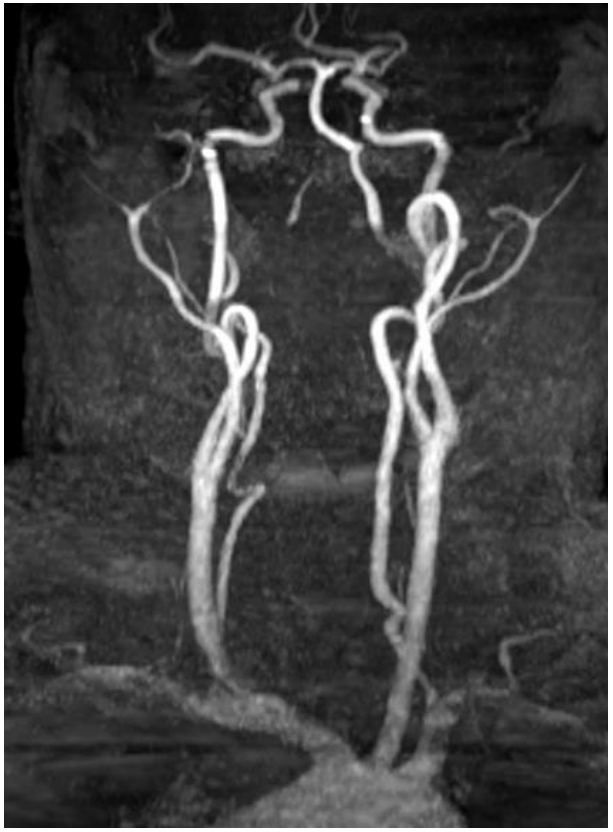


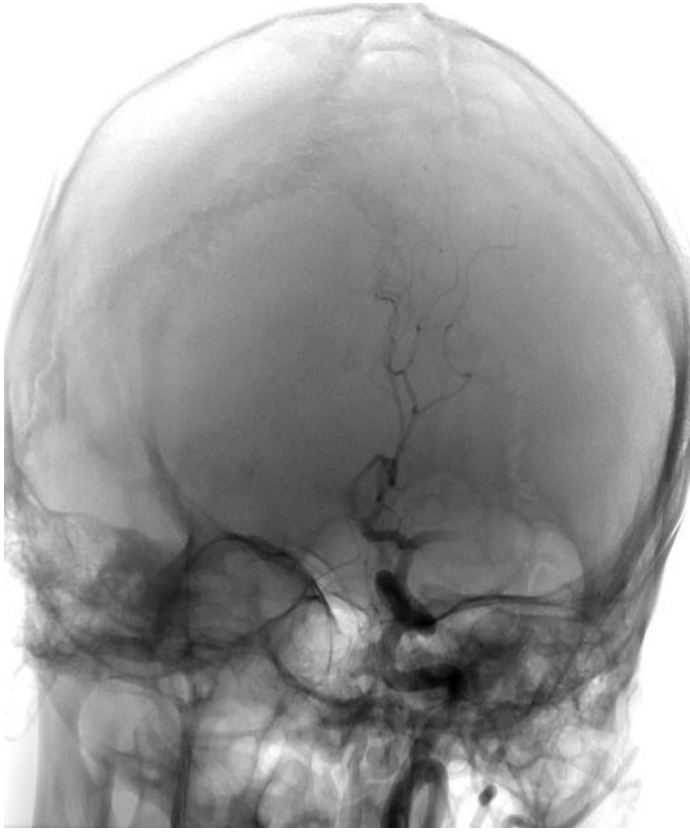
MR Aspect - 6





Tortous left ICA loop

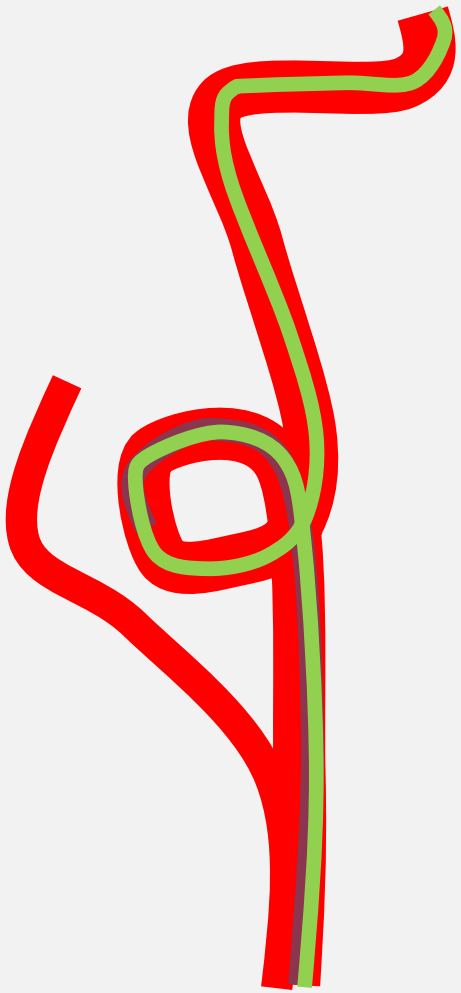




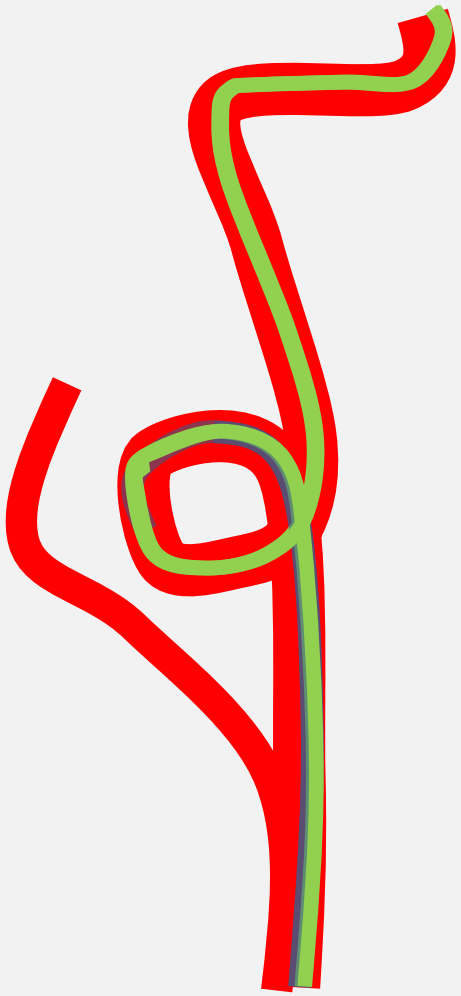
Devices

Neuron max guide catheter/ sheath was positioned in the left CCA.

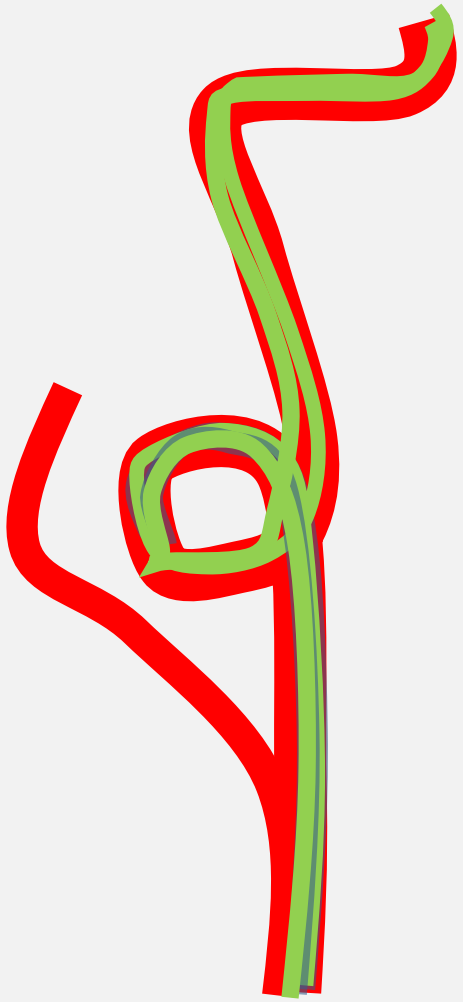
Attempt to take 5max across the tonsillar loop



Neuron max & Aspiration catheter



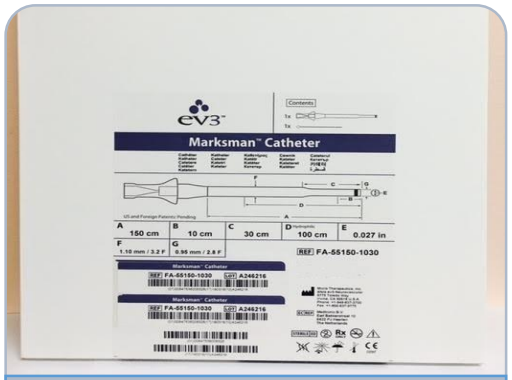
When we tried to push aspiration catheter…



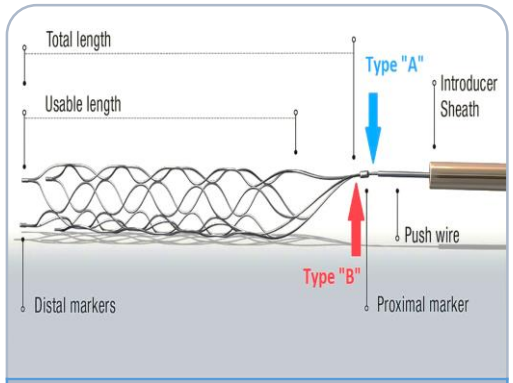
When we tried to aspirate and pull back

Changed devices and switched to stent retriever

Balloon guide catheter

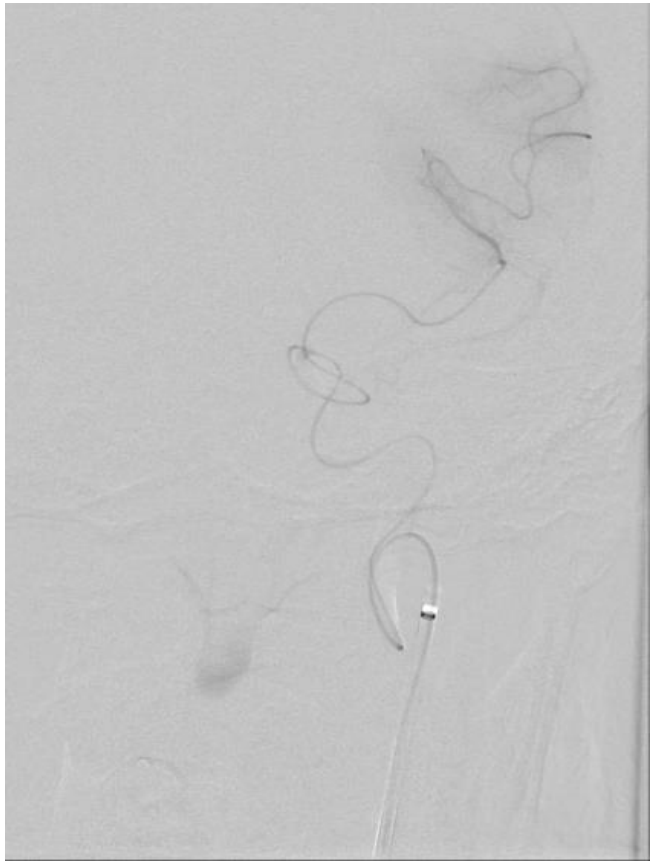


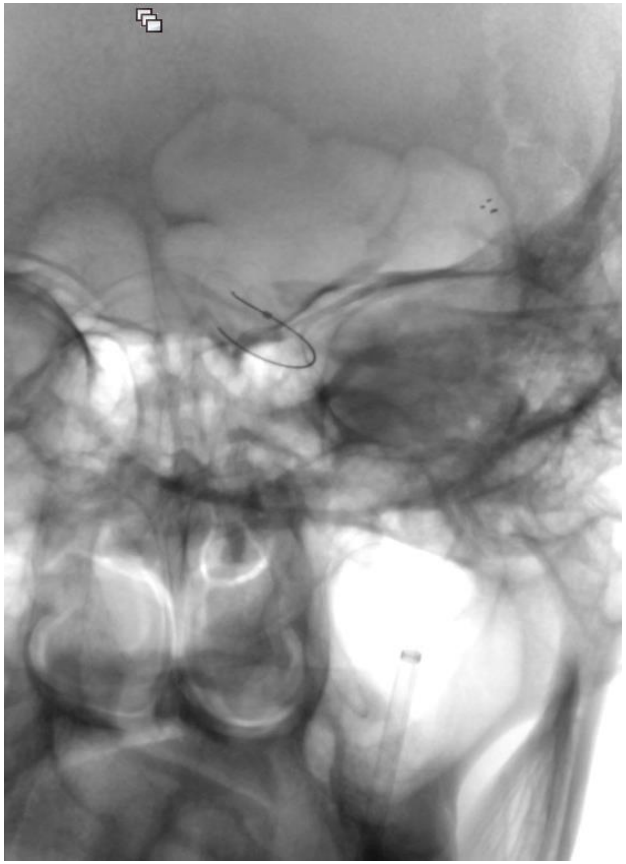
Marksman microcatheter and Avigo wire

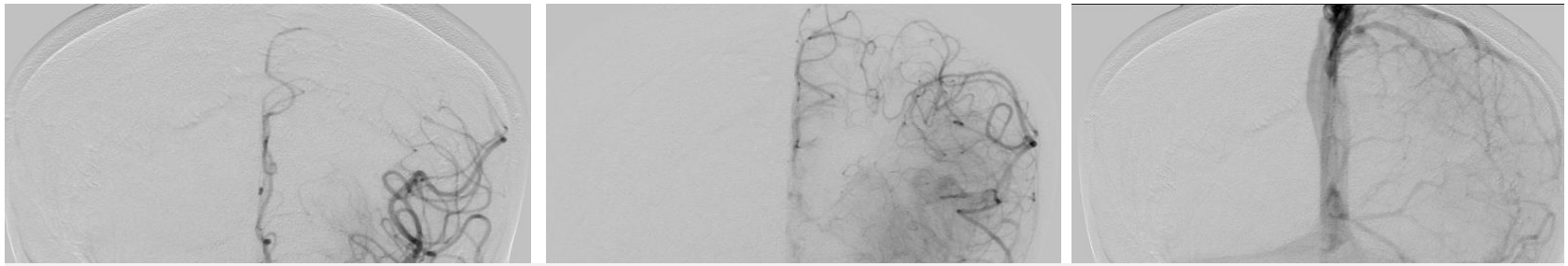


Solitaire-2 stent retriever

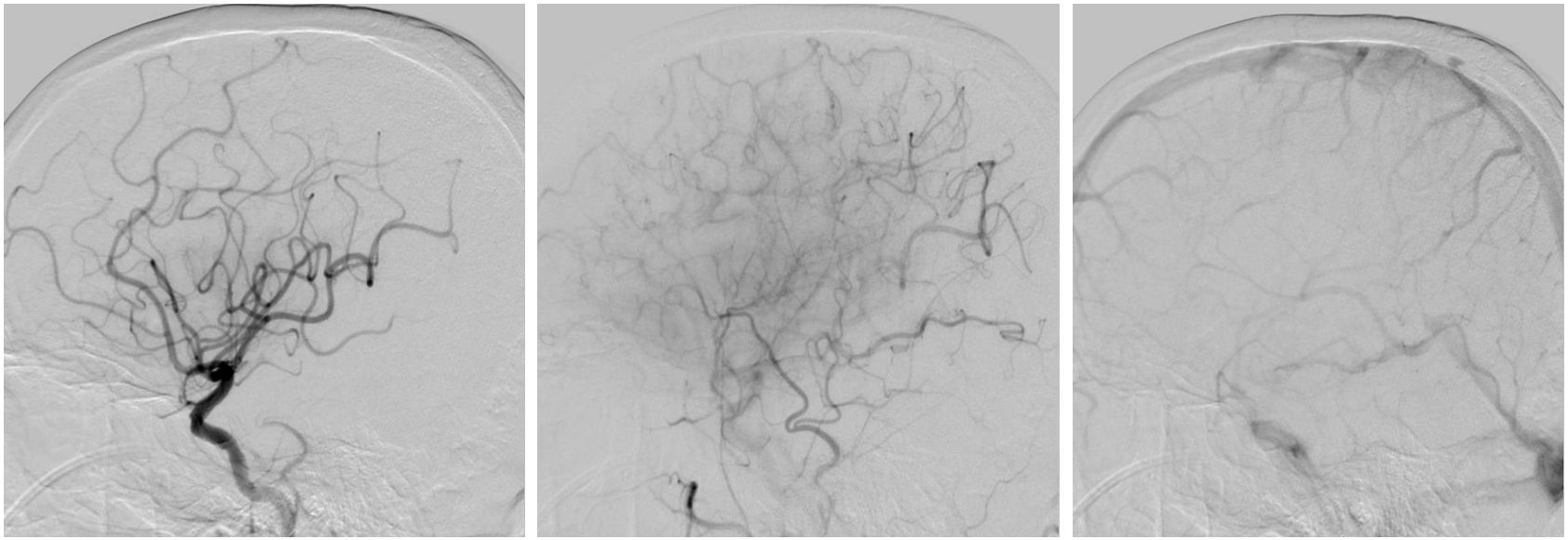
Tortous left ICA – loops and loops







TICI FLOW - 3



Lession 4: Avoid suction catheter when there is a tight loop

Platelet rich clot-when multiple attempts of suction aspiration and stent retrieval fails: Resistant clot

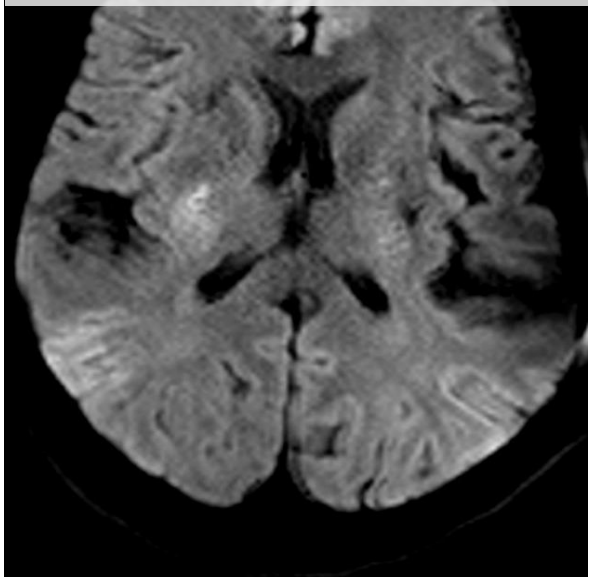
Case - 1

- 60 year old male
- Left side hemiplegia for the past 3 hour duration
- Power 0/5 in left upper and lower limbs
- Aphasia
- NIHSS score 17.

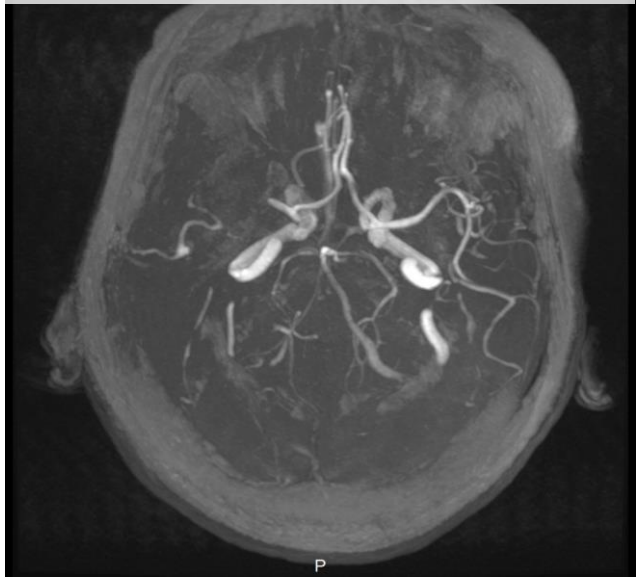
Imaging

CT ASPECT-8

MR ASPECT-7



RIGHT M1 OCCLUSION



RE-THROMBOSIS

Partial recanalization with tapering with distal M1 and sluggish forward flow.

What can be the pathophysiology ?

- CT showed no hyperdense artery- can it be the platelet rich clot?
- Underlying stenosis with acute plaque rupture?
- Microdissection and intimal damage during multiple attempts of mechanical thrombectomy- in situ platelet aggregation?

What should we do further?

- Give up
- Keep trying with same maneuver
- Deployed the stent retriever
- Balloon angioplasty +/- stenting
- GP-IIb/IIIa inhibitor

GP-IIb/IIIa Inhibitor

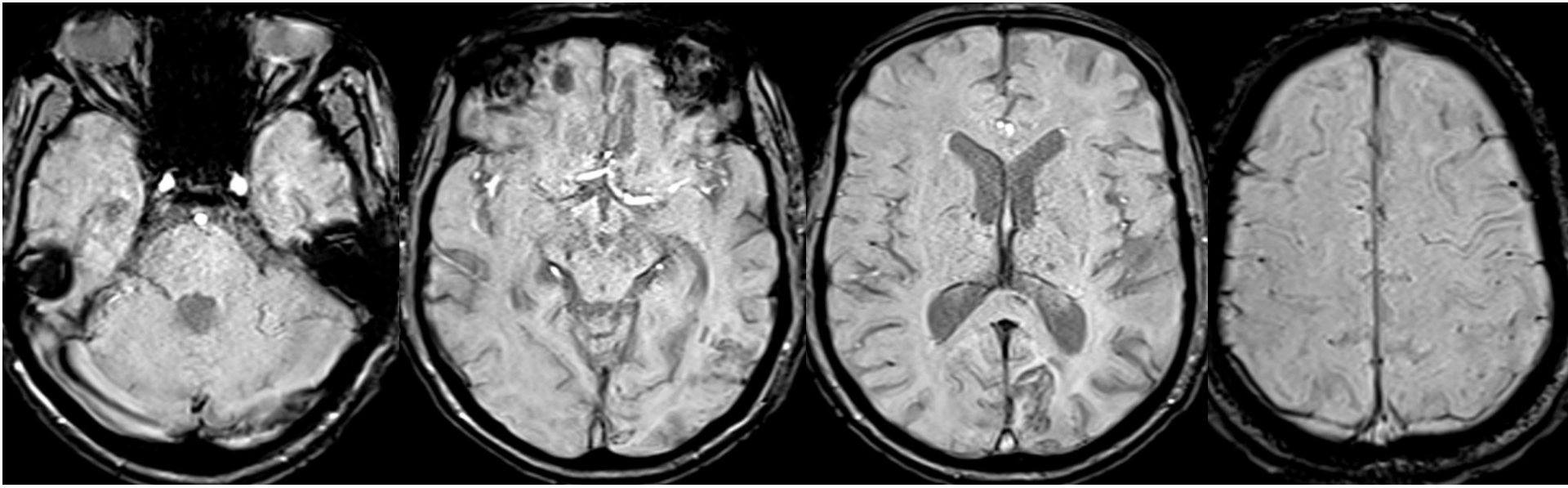
- Tiro-fiban 13 ml intra-arterial bolus.
- Followed by 7 ml/hour infusion.
- Check angiogram was taken at 45 min.

Check angiogram at 30 min and 45 min interval

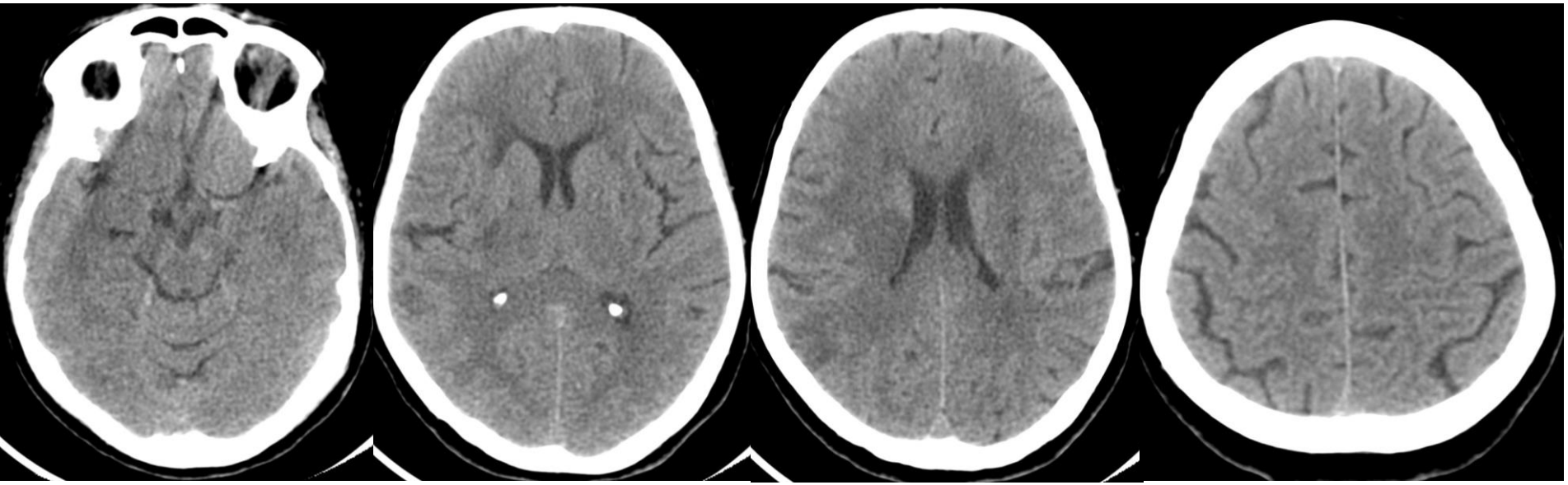
GP-IIb/IIIa Inhibitor

- Tiro-fiban 13 ml intra-arterial bolus.
- Followed by 7 ml/hour infusion.
- Check angiogram was taken at 45 min.

MRI SWI – Immediate post- procedure



CT – 24 Hours



Follow up

At 24 hours, NHISS score dropped from 17 to 9,

Left UL/LL- 2/5

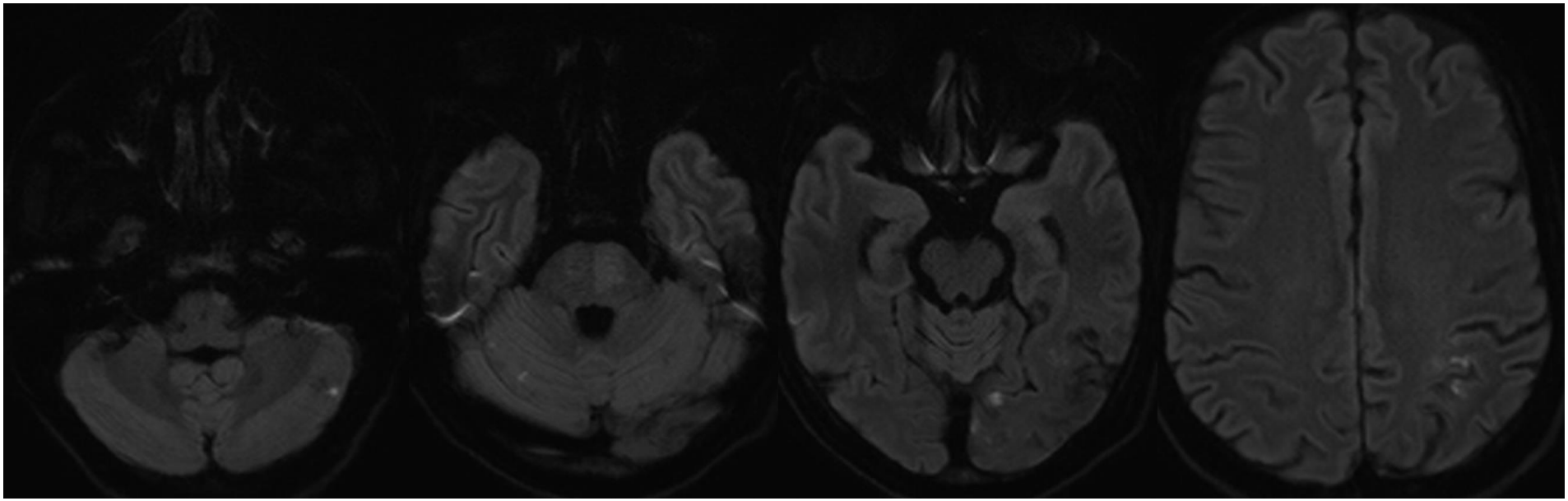
At discharge NHISS score 4, mRS is 3

At 3 months NHISS score 1, mRS is 0

Case -2

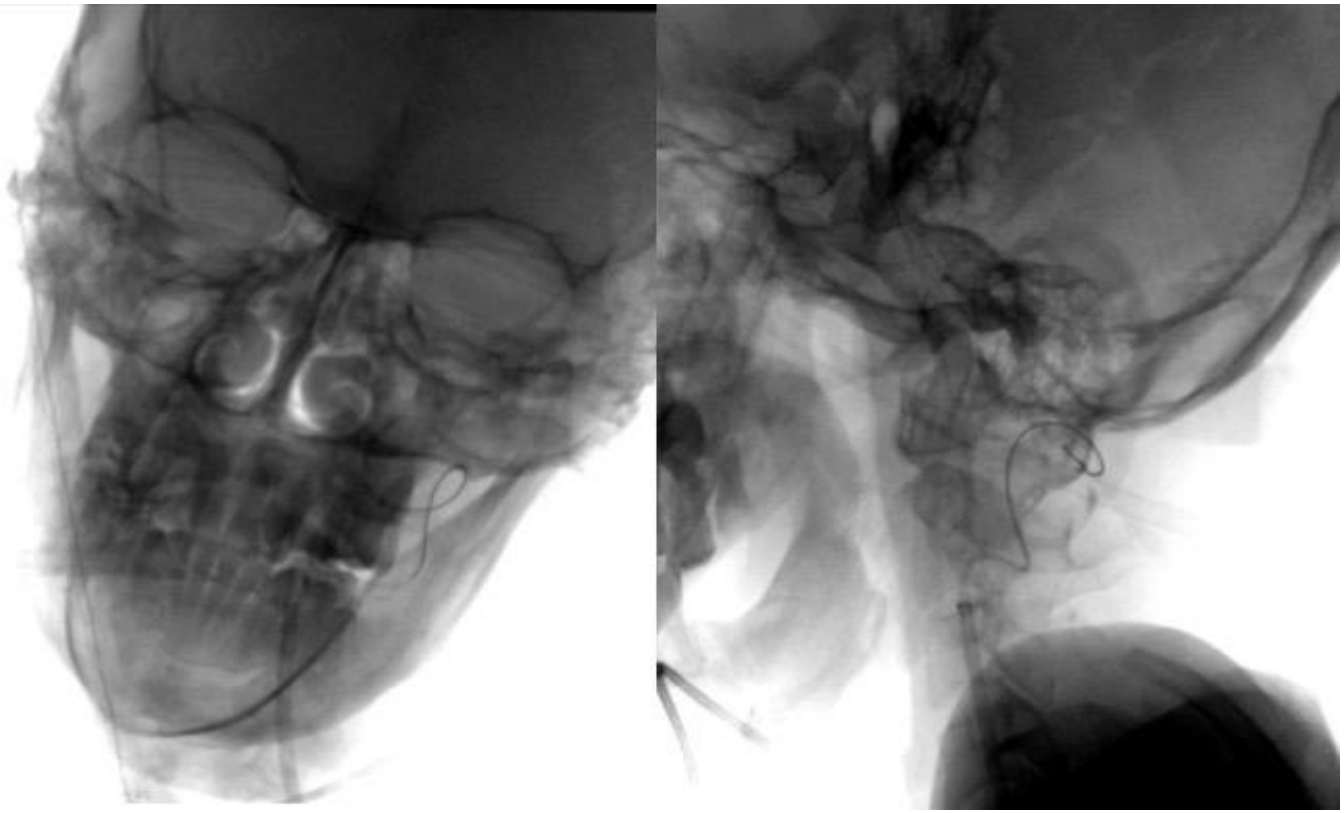
- 45 years old male,
- Vomiting, drowsy for past 3 hours followed by loss of consciousness.
- Power in all four limbs- flexion response to pain.
- NIHSS score was 21
- IV Thrombolysis was given

MRI



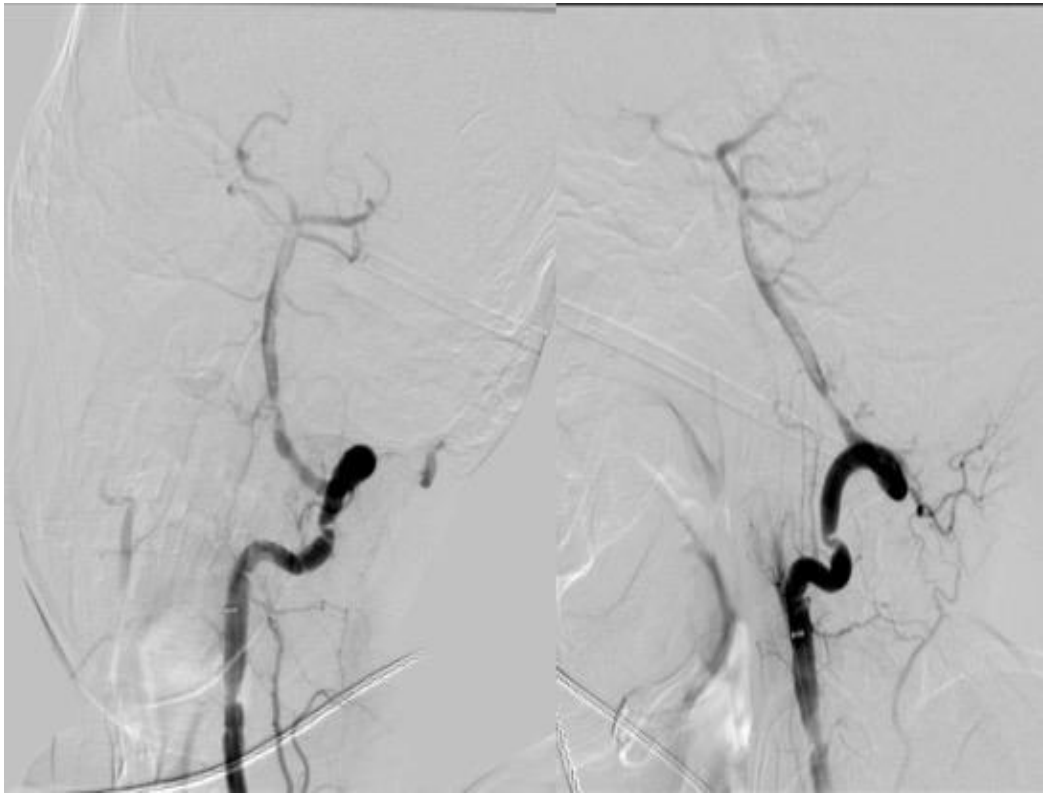
Occlusion of left V3 and beyond

Suction aspiration with 5 Max



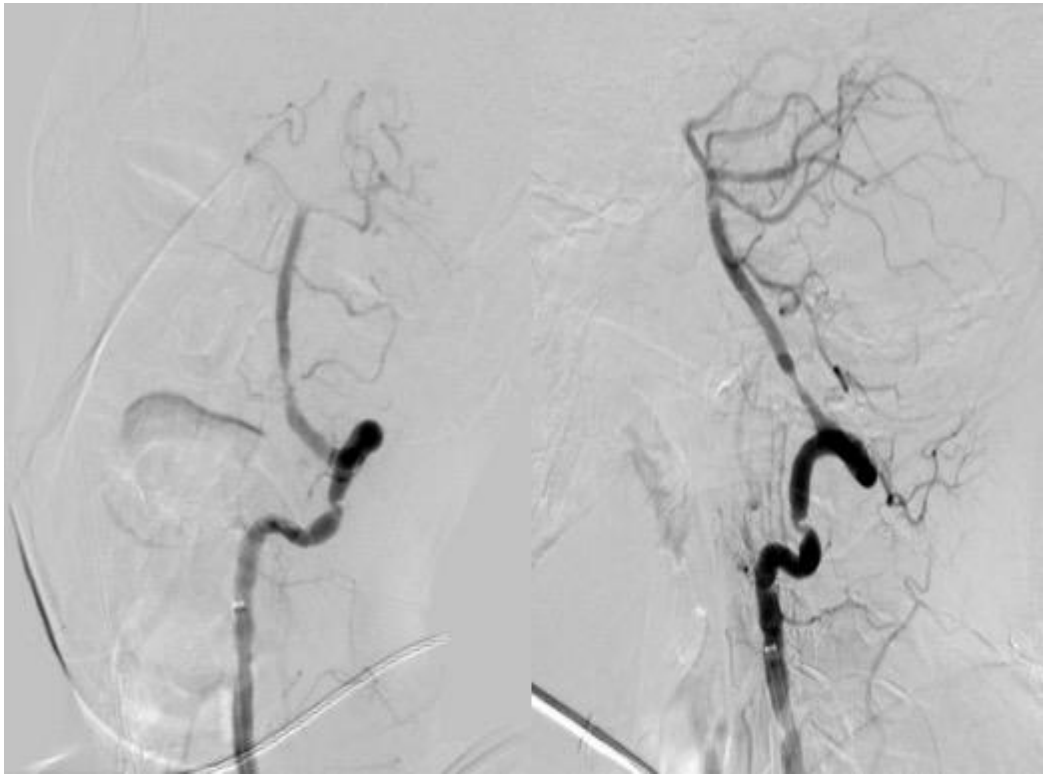
1st pass Suction aspiration

- Narrowing of v4 segment of left vertebral artery with partial filling defect.
- Partial recanalization of basilar artery



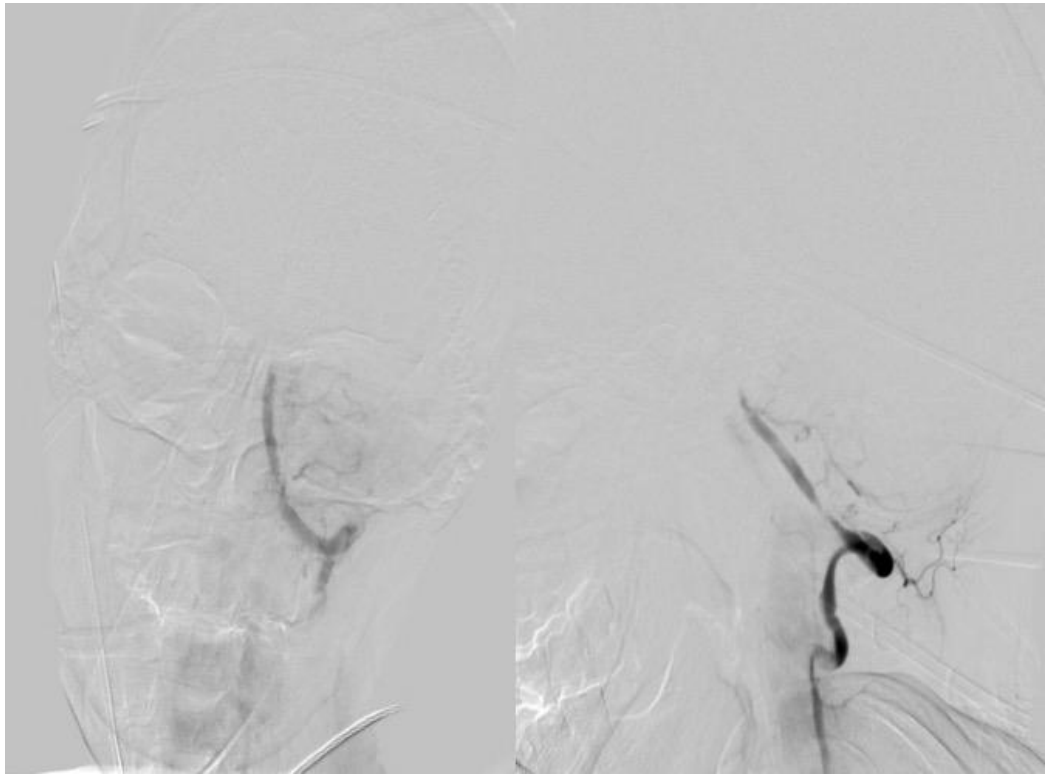
2nd pass Suction aspiration

- Persistent narrowing of V4 segment of left vertebral artery.
- Partial filling defect in basilar top.



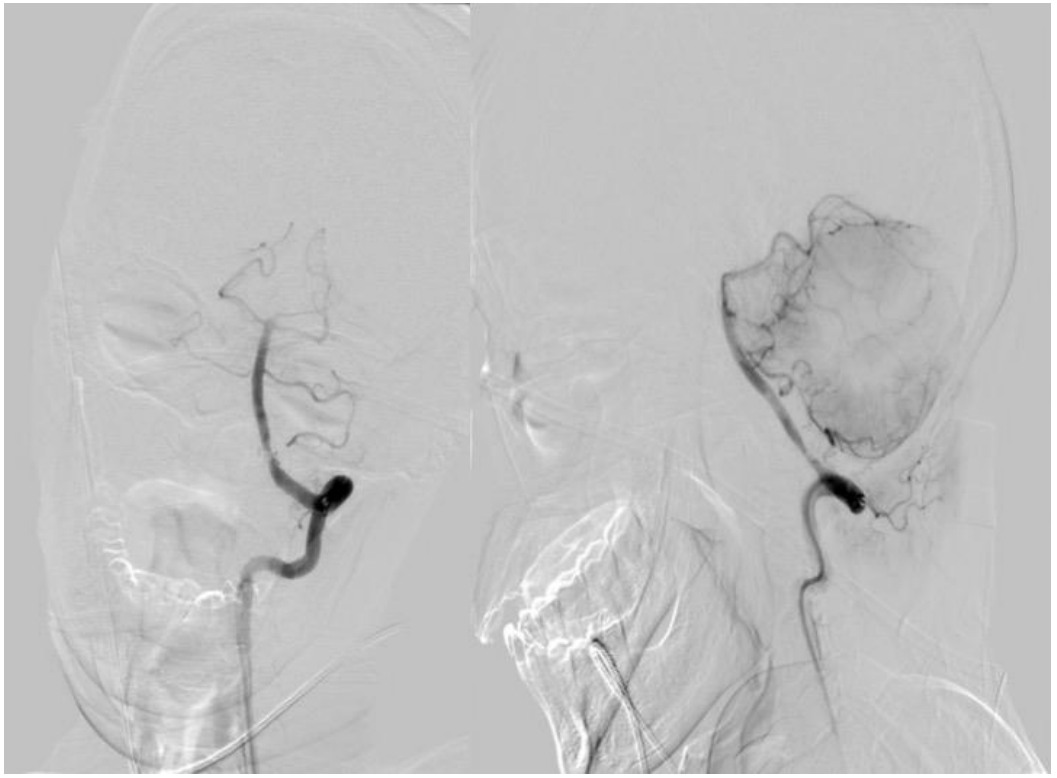
5 min following 2nd pass suction aspiration

- Rethrombosis



3rd pass Suction aspiration

- Partial filling defect in v4 segment of left vertebral artery



What's next?

- Stent-retriever
- GP-IIb/IIIa Inhibitor

Gp-IIb/IIIa Inhibitor

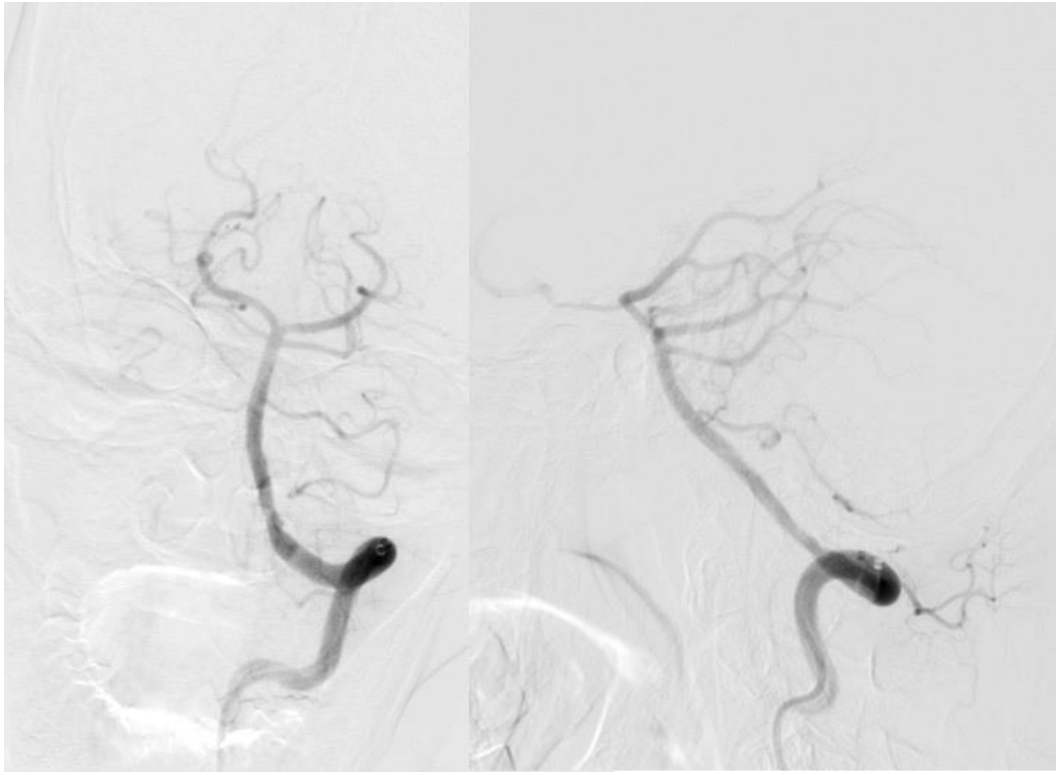
TIRO-FIBAN 13 ML INTRA-ARTERIAL BOLUS.

FOLLOWED BY 7 ML/HOUR INFUSION.

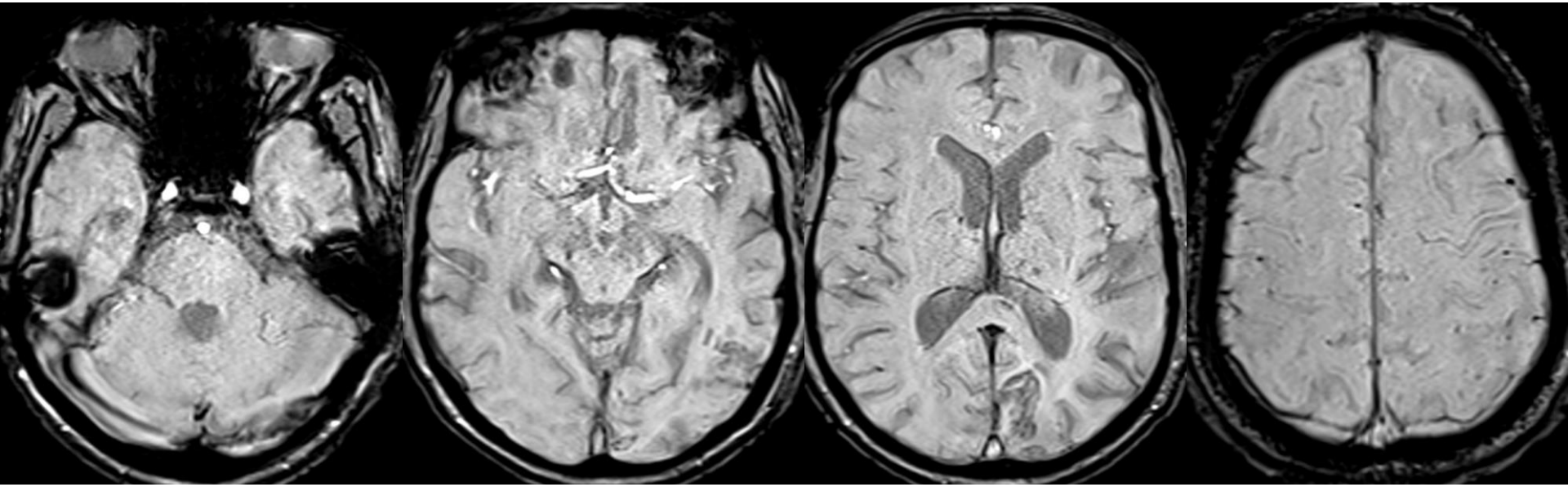
CHECK ANGIOGRAM WAS TAKEN AT 45 MIN.

Check angiogram

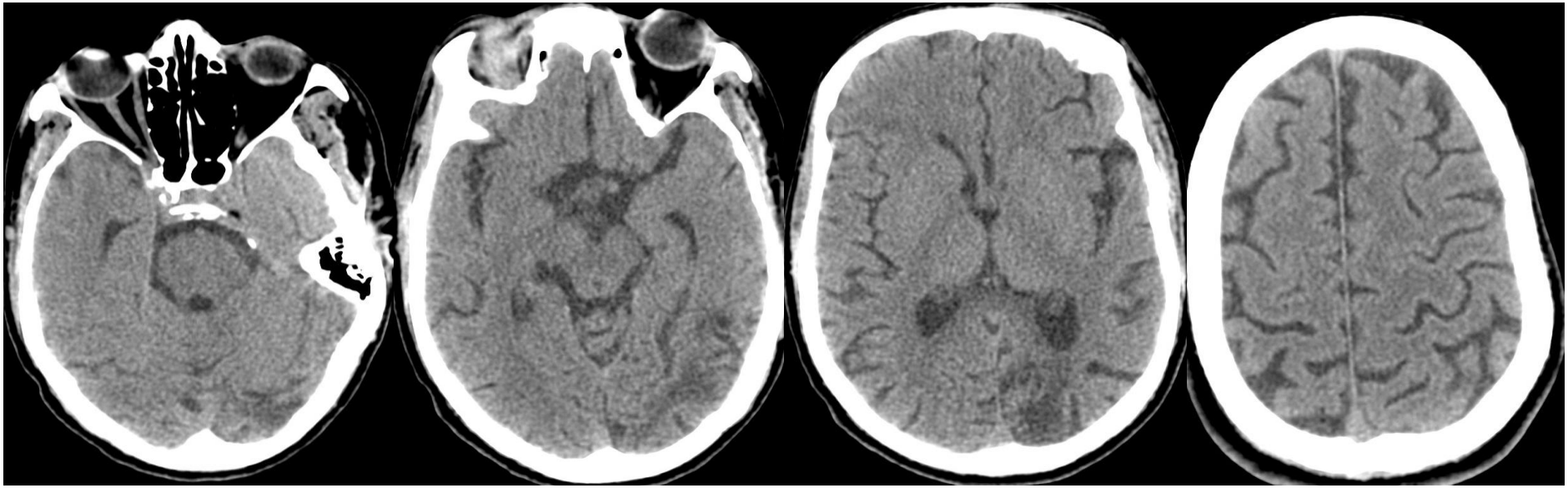
- TICI flow - 3



SWI MRI – Immediate post-procedure



CT – 24 hours



Follow up

NIHSS score at 24 hour - 9, mRS was 4.

NIHSS score at discharge - 1, mRS was 3.

3 months mRS was 1.

Cerebrovasc Dis Extra. 2018;8(1):39-49. doi: 10.1159/000486042. Epub 2018 Jan 15.

Erythrocyte-Rich Thrombus Is Associated with Reduced Number of Maneuvers and Proc in Patients with Acute Ischemic Stroke Undergoing Mechanical Thrombectomy.

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Original Paper

Erythrocyte-Rich Thrombus Is Associated with Reduced Number of Maneuvers and Procedure Time in Patients with Acute Ischemic Stroke Undergoing Mechanical Thrombectomy

Kota Maekawa[a] Masunari Shibata[a] Hideki Nakajima[b] Akane Mizutani[c] Yotaro Kitano[b] Masaru Seguchi[a] Masayoshi Yamasaki[c] Kazuto Kobayashi[a] Takanori Sano[b] Genshin Mori[b] Tadashi Yabana[d] Yutaka Naito[c] Shigetoshi Shimizu[b] Fumitaka Miya[b]

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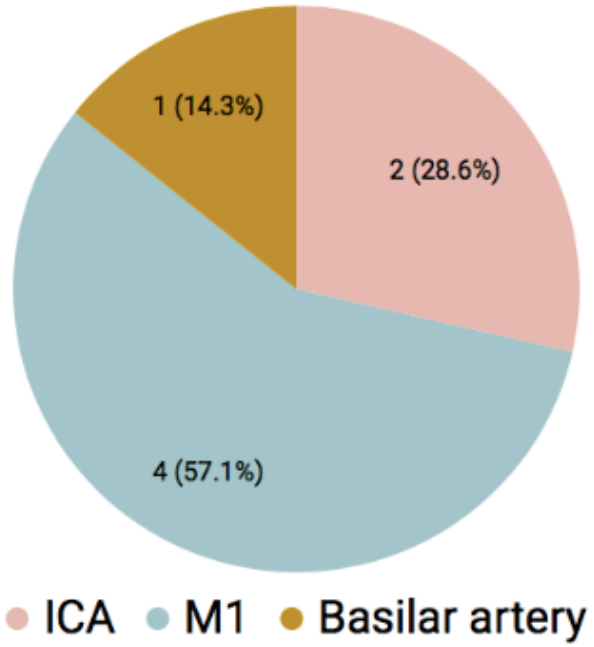
Keywords
Acute ischemic stroke · Computed tomography · Endovascular revascularization · Pathology · Thrombus formation

Abstract
Background: Only few studies have investigated the relationship between the histopathology of retrieved thrombi and clinical outcomes. This study aimed to evaluate thrombus composition and its association with clinical, laboratory, and neurointerventional findings in patients treated by mechanical thrombectomy due to acute large vessel occlusion. ***Methods:*** At our institution, 79 patients were treated by mechanical thrombectomy using a stent retriever and/or aspiration catheter between August 2015 and August 2016. The retrieved thrombi were quantitatively analyzed to quantify red blood cells, white blood cells, and fibrin by area. We divided the patients into two groups – a fibrin-rich group and an erythrocyte-rich group – based on the predominant composition in the thrombus. The groups were compared for imaging, clinical, and neurointerventional data. ***Results:*** The retrieved thrombi from 43 patients with acute stroke from internal carotid artery, middle cerebral artery, or basilar artery occlusion were histologically analyzed. Erythrocyte-rich thrombi were present in 18 cases, while fibrin-rich thrombi were present in 25 cases. A cardioembolic etiology was significantly more

2018 guidelines for the early management of patients with acute ischemic stroke antiplatelet treatment

Antiplatelet treatment	COR	LOE	New, revised or unchanged
1. The efficacy of iv tiro-fiban and eptifibatide is not well established. Further clinical trials are needed.	**II-b**	B-R	Recommendation revised from 2013 AIS guidelines.

Statistics and Outcome



Outcomes:

- Angiographic: 6 patients (86%) had good outcome (TICI 3)
- Symptomatic ICH was observed in 1 patients (14.2%)

Clinical:

- Immediate 24 hour: NIHSS shift of ≥ 5 in 5 patients (71.4%)
- Long term: mRS of 0 or 1 at 90 days in 4 patients (57%)

Conclusion

- GP-IIb/IIIa works when there is platelet rich clot and multiple attempts of suction aspiration/stent retriever fails.
- Select the patient meticulously.

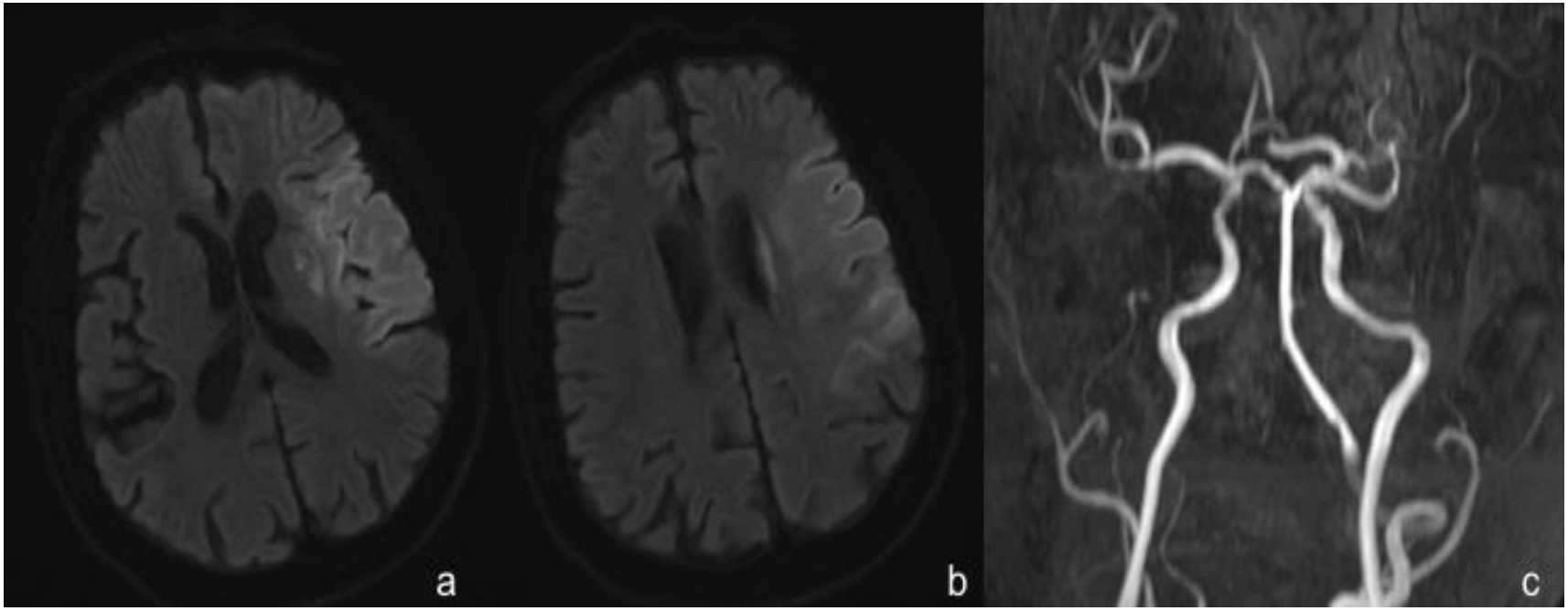
Lession 5: Platelet rich clot is difficult to retrieve … GP IIb/IIIa inhibitor may do the trick

Can we prognosticate 90 days outcome with neuroimaging ??

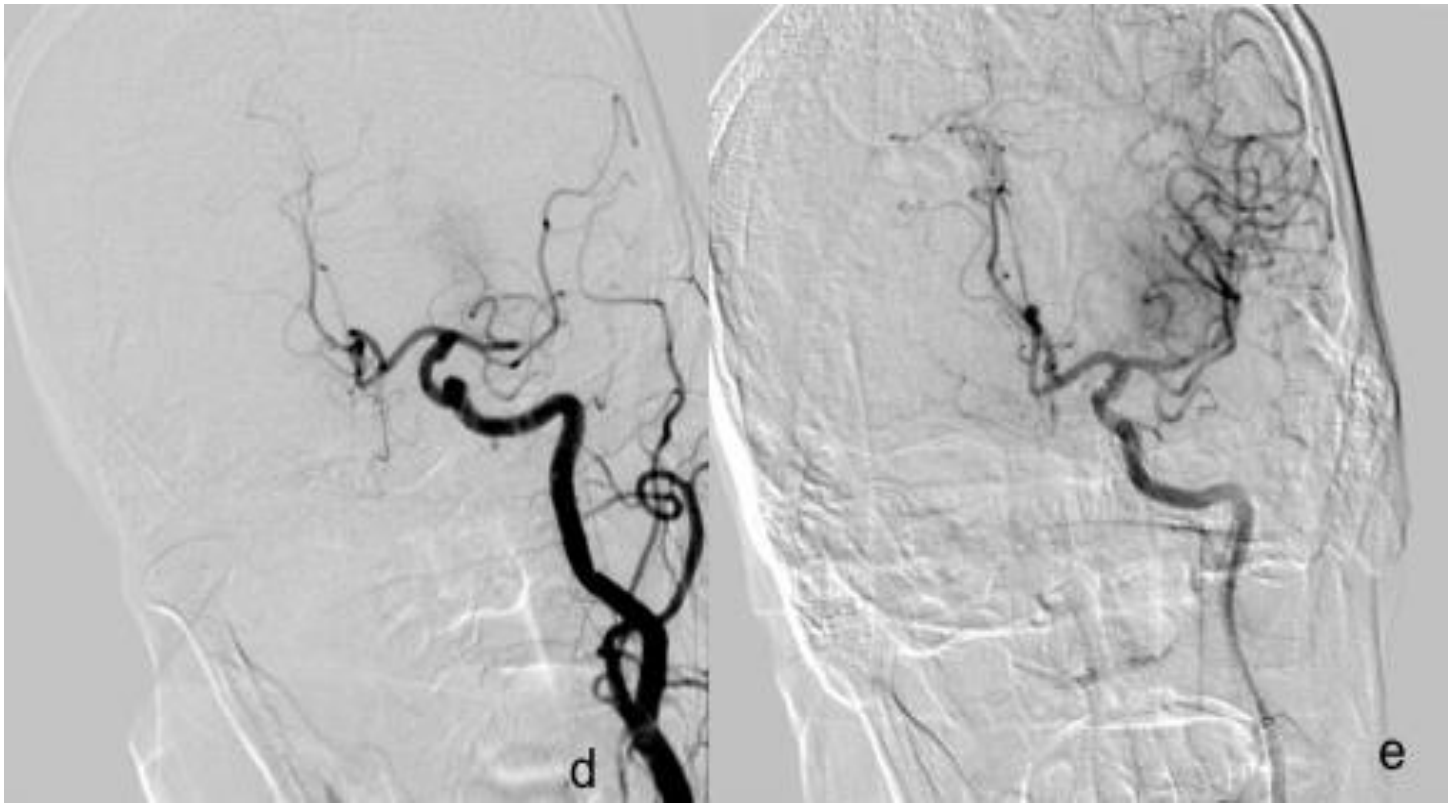
Case - 1

- 78 years old male
- Right hemiplegia and aphasia for 3 hours
- DWI ASPECT score 5
- Left M1 occlusion

MRI



Endovascular treatment – Mechanical thrombectomy Solumbra technique – TICI flow 3

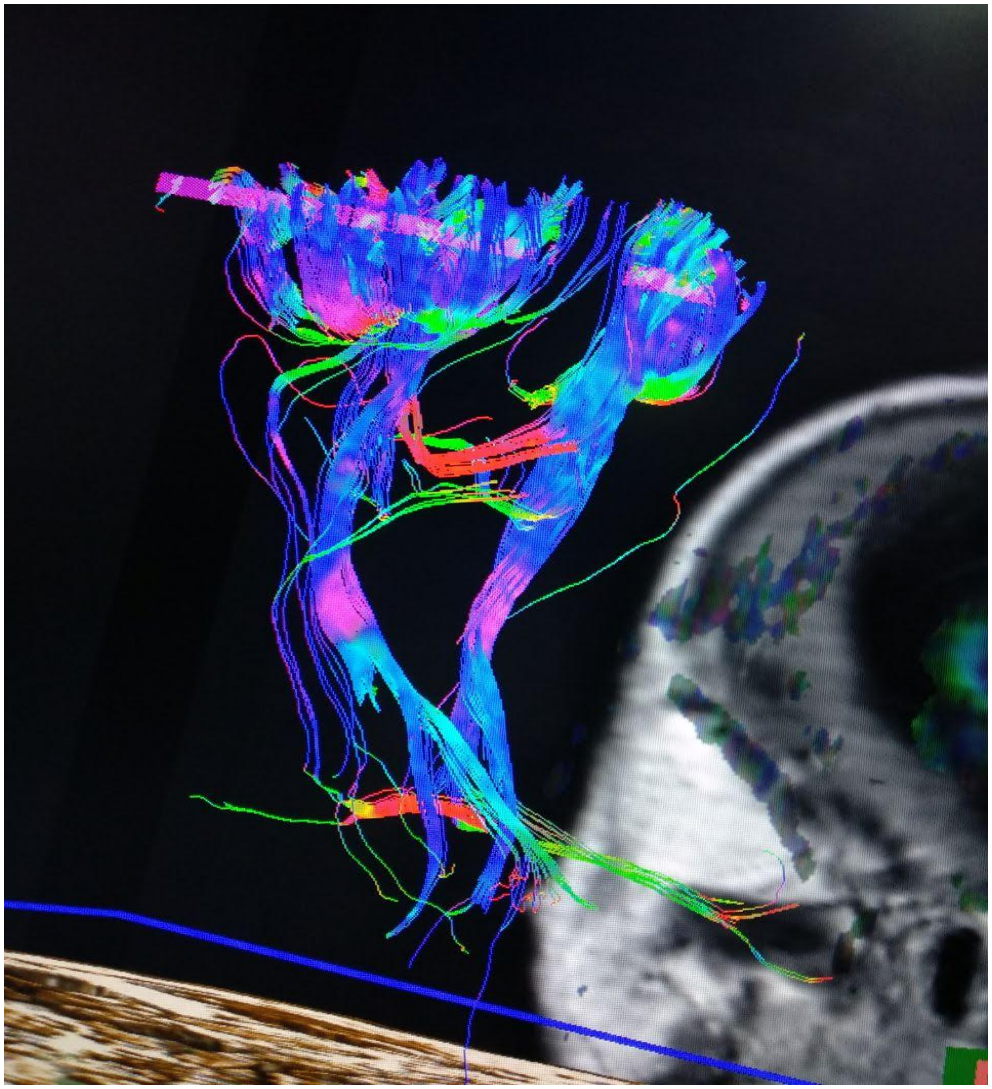


Post-procedure

- Patient's power was 2/5 in UL/LL

DTI

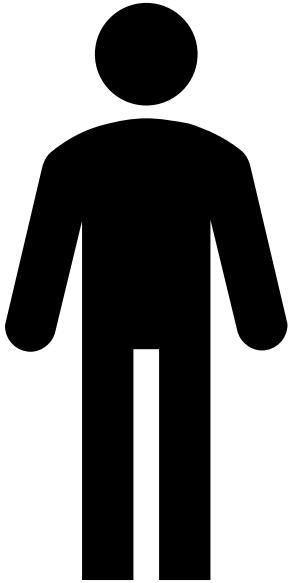
Separation of corticospinal tract but no disruption



Intensive dedicated team for stroke physiotherapy and occupational therapy

Patient recovery at 3 months

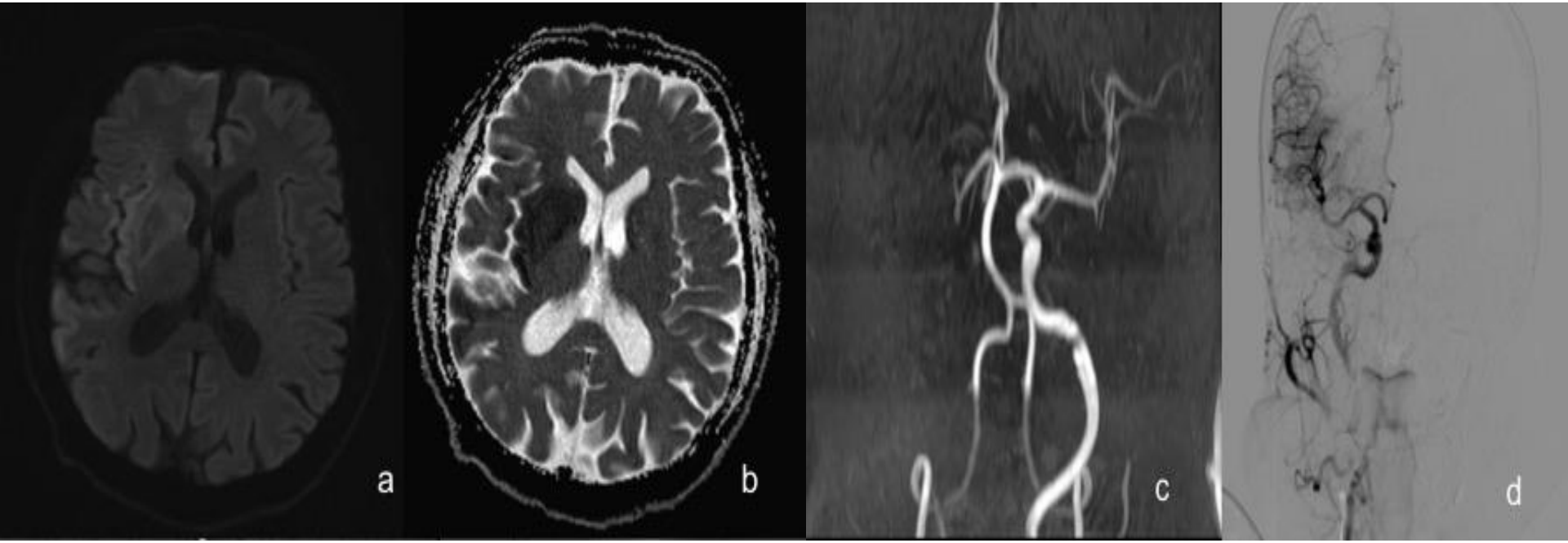
- Patient's power was 5/5 in UL/LL.
- mRS is 1.



Case - 2

- 57 years old male
- Previous CABG, on dual antiplatelets.
- Left hemiplegia and dysarthria for 4 hours
- ASPECT 6 on DWI
- Right ICA occlusion on MRA
- Mechanical thrombectomy done with Penumbra 5 max; TICI 3 flow achieved.

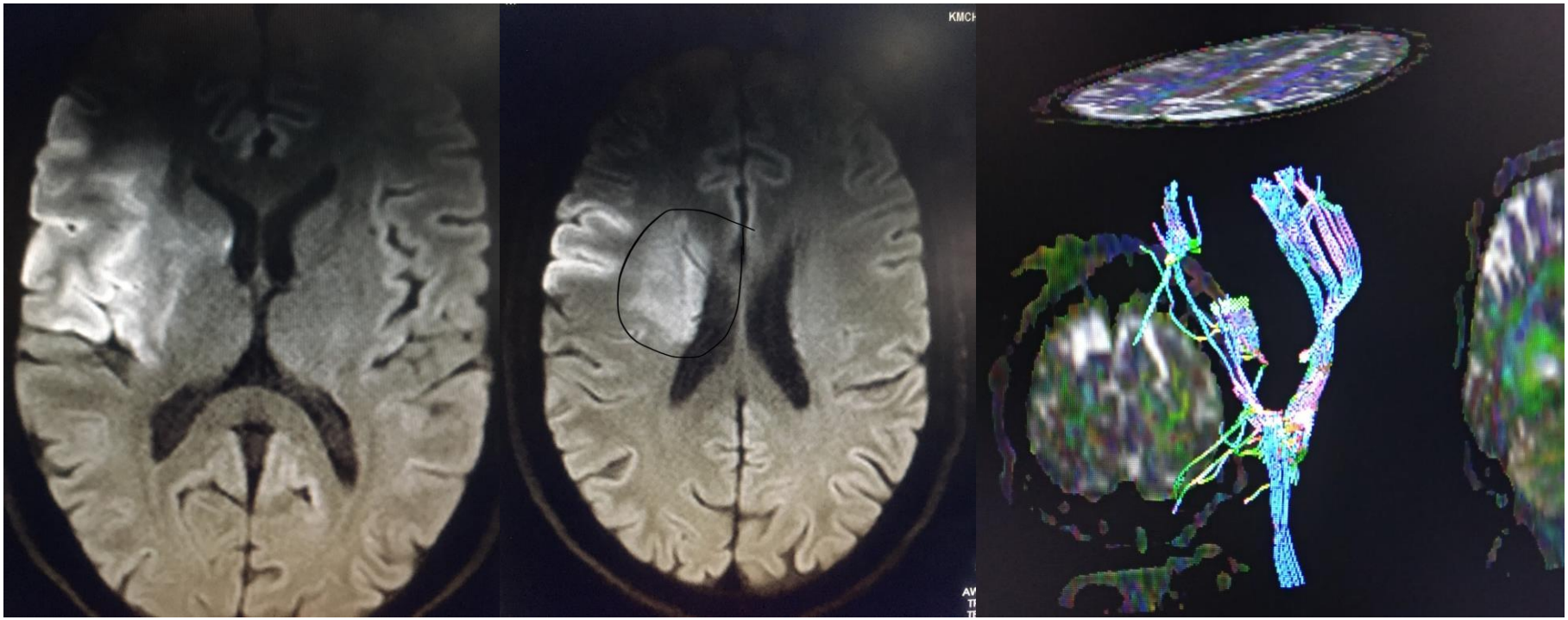
MR Aspect – 6, major vessel occlusion, TICI - 3



Post-procedure

- Patient’s power was 0/5 in left UL/LL

Post-procedure MRI, DTI



Patient recovery at 3 months

- Patient's power was 2/5 in UL/LL.
- mRS is 4.

Lession 6: DTI can predict long term outcome in an immediate post-procedure period.


TEAM
T TOGETHER
E EVERYONE
A ACHIEVES
M MORE