# ‘PINCH’ING THE CLOT – SOLUMBRA TECHNIQUE FOR DISTAL THROMBECTOMIES – ARE WE THERE YET?


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# Disclosure

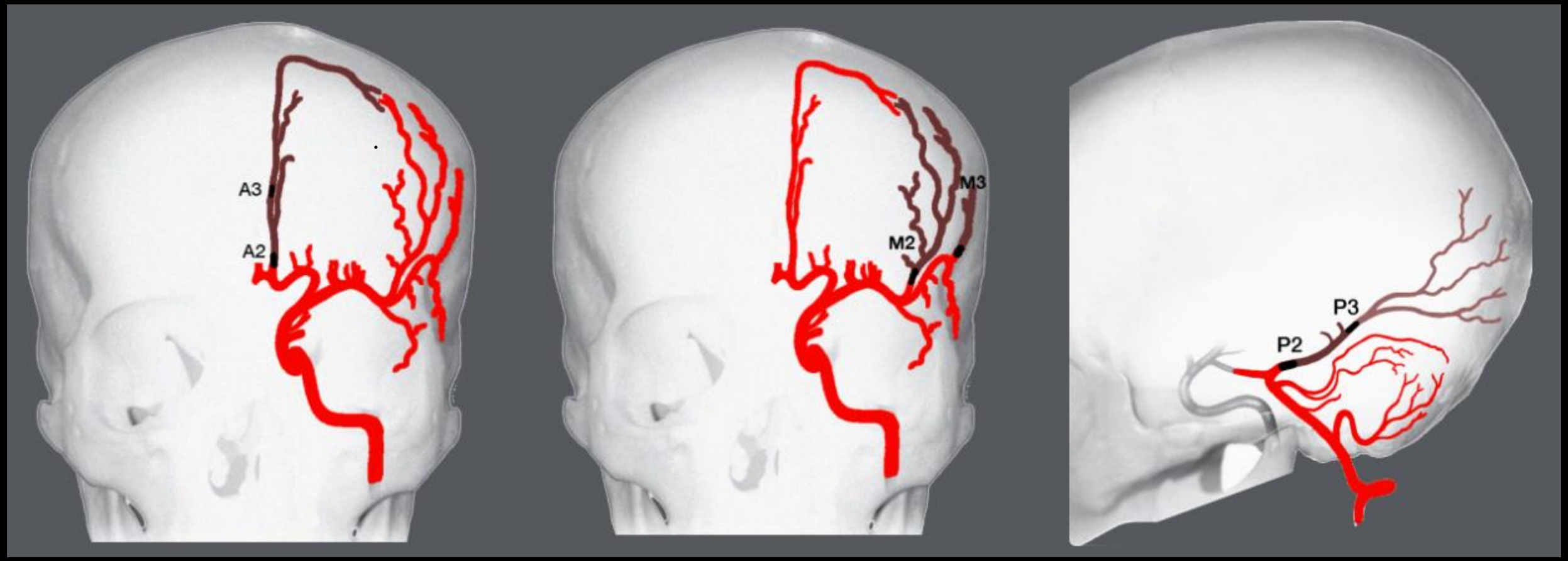
- ❑ I have no disclosure to declare

# DISTAL THROMBECTOMIES

## Medium Vessel Occlusions

**25–40% OF ALL ACUTE ISCHEMIC STROKES**

# Medium Vessel Occlusions



Review

# A review of endovascular treatment for medium vessel occlusion stroke

Johanna Maria Ospel [1,2] Mayank Goyal [2,3]

## Medium Vessel Occlusions (MeVOs)

### Primary MeVOs

- Occur de novo

### Secondary MeVOs

- Occur when clot migration or fragmentation of a LVO happens.
- Spontaneously or iatrogenic (IVT/EVT)
- Either embolization to new territory or distal territory

Ospel JM, Goyal M. *J NeuroIntervent Surg* 2021;**13**:623–630. doi:10.1136/neurintsurg-2021-017321

# HERMES DATA

**LIMITED EVIDENCE FOR THE SAFETY AND EFFICACY OF EVT**

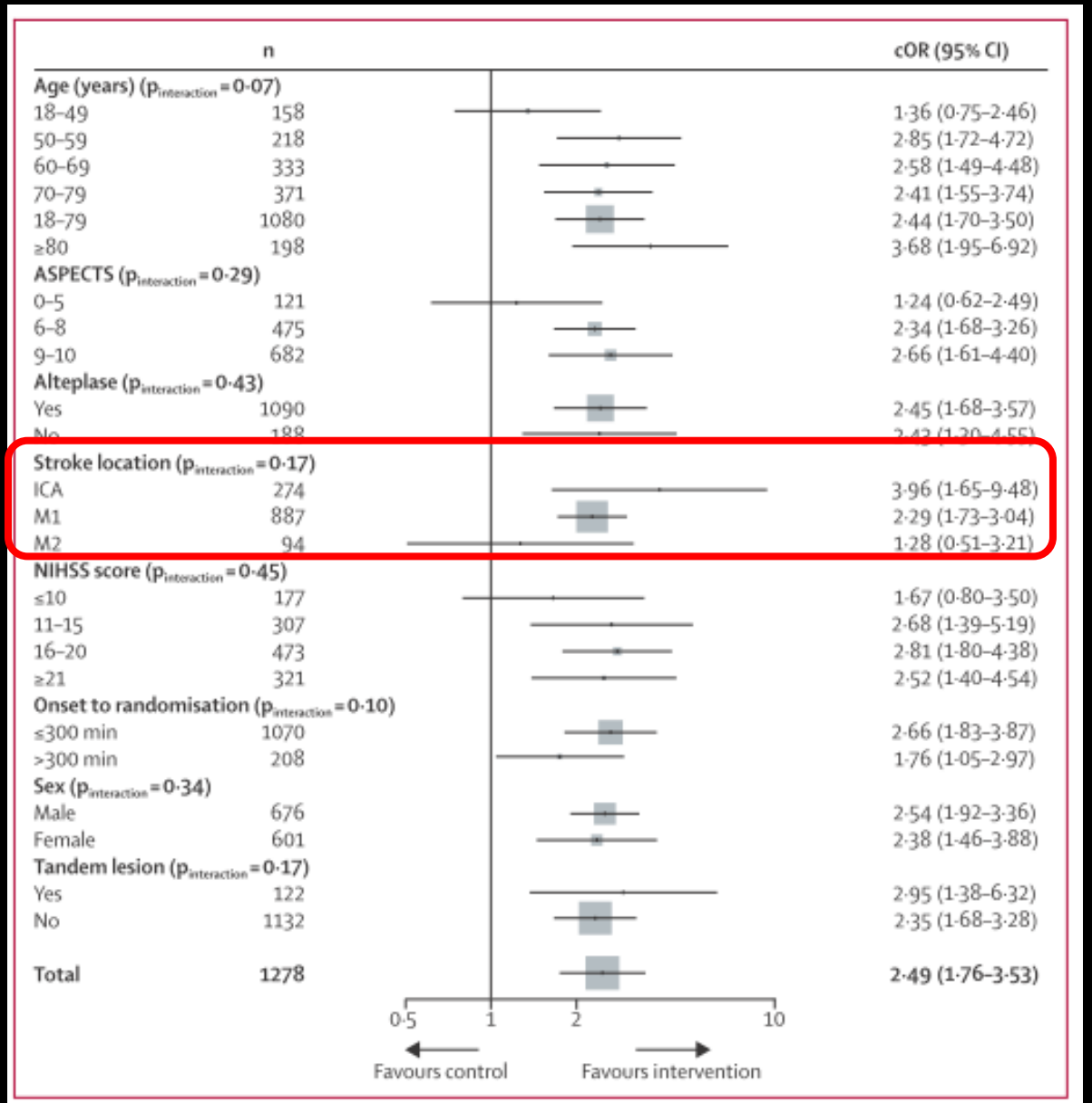
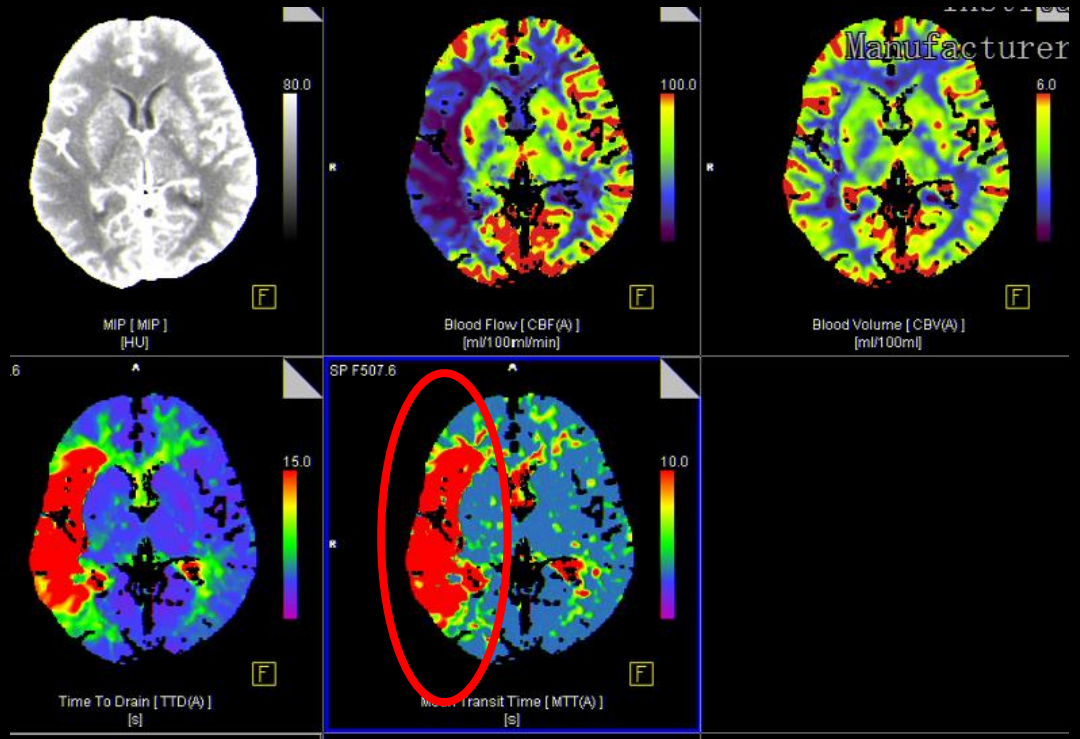
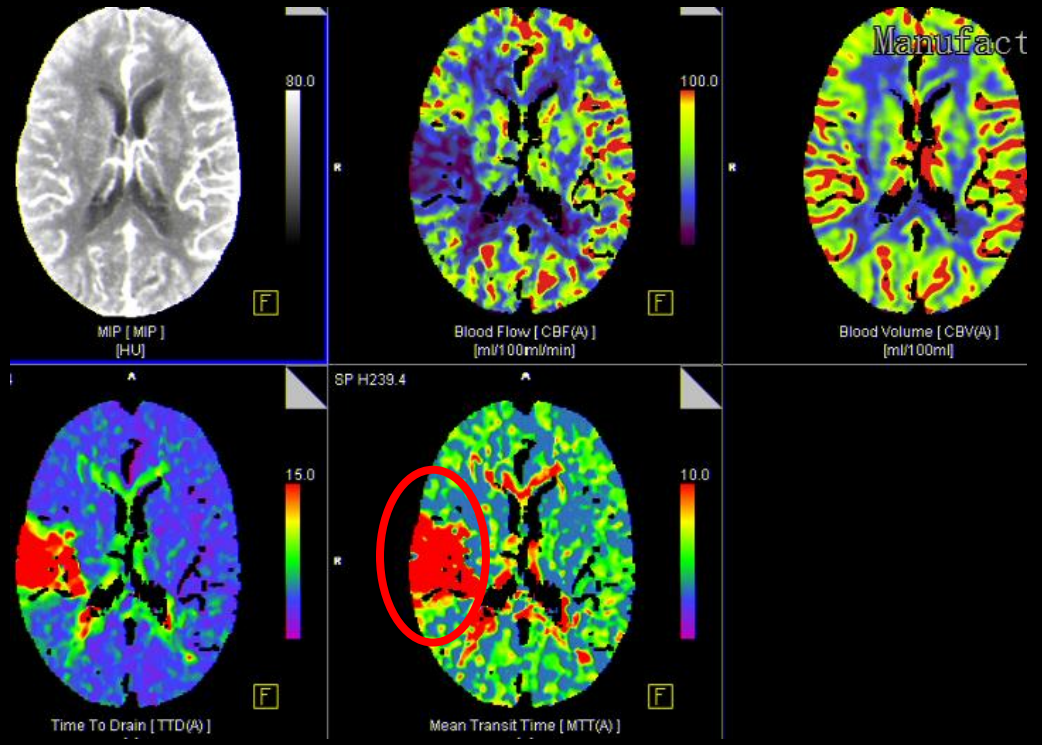



*Figure 2*: Forest plot showing adjusted treatment effect for mRS at 90 days in prespecified subgroups with p values for heterogeneity across subgroups

# LVO


MIP [ MIP ]
[HU]
Blood Flow [ CBF(A) ]
[ml/100ml/min]
Blood Volume [ CBV(A) ]
[ml/100ml]
Time To Drain [ TTD(A) ]
[s]
SP F507.6
Mean Transit Time [ MTT(A) ]
[s]

# MeVO


MIP [ MIP ]
[HU]
Blood Flow [ CBF(A) ]
[ml/100ml/min]
Blood Volume [ CBV(A) ]
[ml/100ml]
Time To Drain [ TTD(A) ]
SP H239.4
Mean Transit Time [ MTT(A) ]

Stroke

CLINICAL AND POPULATION SCIENCES

# Clinical Course of Acute Ischemic Stroke Due to Medium Vessel Occlusion With and Without Intravenous Alteplase Treatment

Johanna M. Ospel, MD; Bijoy K. Menon, MD; Andrew M. Demchuk, MD; Mohammed A. Almekhlafi, MD; Nima Kashani, MD; Arnuv Mayank; Enrico Fainardi, MD; Marta Rubiera, MD; Alexander Khaw, MD; Jai J. Shankar, MD; Dar Dowlatshahi, MD; Josep Puig, MD; Sung-Il Sohn, MD; Seong H. Ahn, MD; Alexandre Poppe, MD; Ana Calleja, MD; Michael D. Hill, MD; Mayank Goyal, MD, PhD

**BACKGROUND AND PURPOSE:** Available data on the clinical course of patients with acute ischemic stroke due to medium vessel occlusion (MeVO) are mostly limited to those with M2 segment occlusions. Outcomes are generally better compared with more proximal occlusions, but many patients will still suffer from severe morbidity. We aimed to determine the clinical course of acute ischemic stroke due to MeVO with and without intravenous alteplase treatment.

**METHODS:** Patients with MeVO (M2/M3/A2/A3/P2/P3 occlusion) from the INTERRSeCT (The Identifying New Approaches to Optimize Thrombus Characterization for Predicting Early Recanalization and Reperfusion With IV Alteplase and Other Treatments

**CONCLUSIONS:** One of every 2 patients with MeVO did not achieve excellent clinical outcome at 90 days with best medical management. Early recanalization was strongly associated with excellent outcome but occurred in <50% of patients despite intravenous alteplase treatment.

# TRIALS UNDERWAY

**EnDovascular Therapy Plus Best Medical Treatment (BMT) Versus BMT Alone for Medium VeSsel Occlusion sTroke (DISTAL)**

**Evaluation of Mechanical Thrombectomy in Acute Ischemic Stroke Related to a Distal Arterial Occlusion (DISCOUNT)**

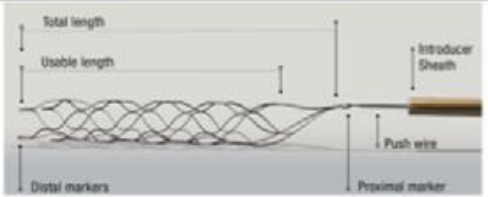
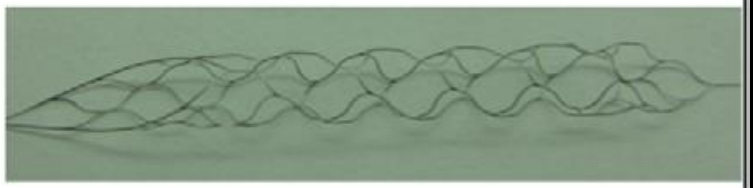
## MeVO - Medium Vessel Occlusion

Project

Endovascular treatment (EVT) of medium vessel occlusion in patients presenting with disabling neurological deficits. A2/A3 M2/M3 P2/P3 occlusions. Recent Trial ESCAPE MeVO examining the effect of endovascular treatment on clinical outcomes.

# CONCERN – EVT FOR ME VO

# EARLIER GENERATIONS OF STENT-RETRIEVERS

| | |
|---|---|
| Solitaire™ FR |   |
| Trevo® pro 4 |  |
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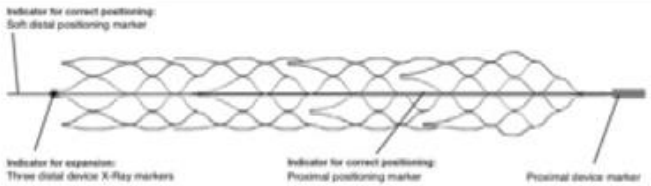
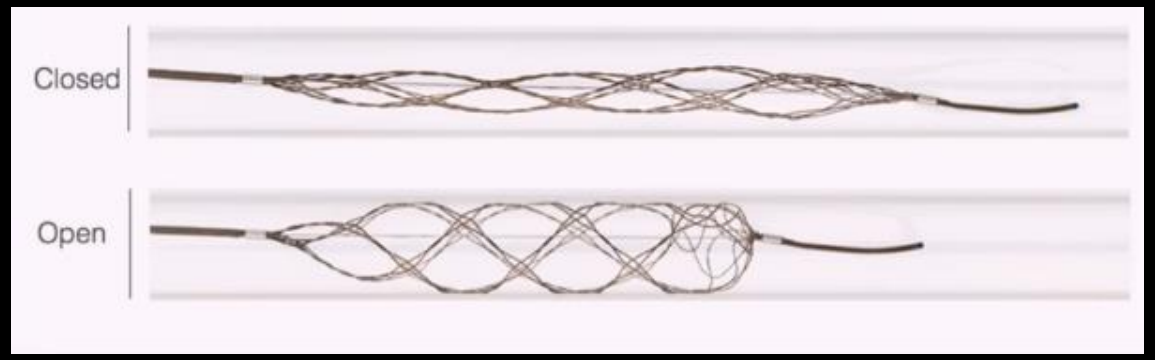
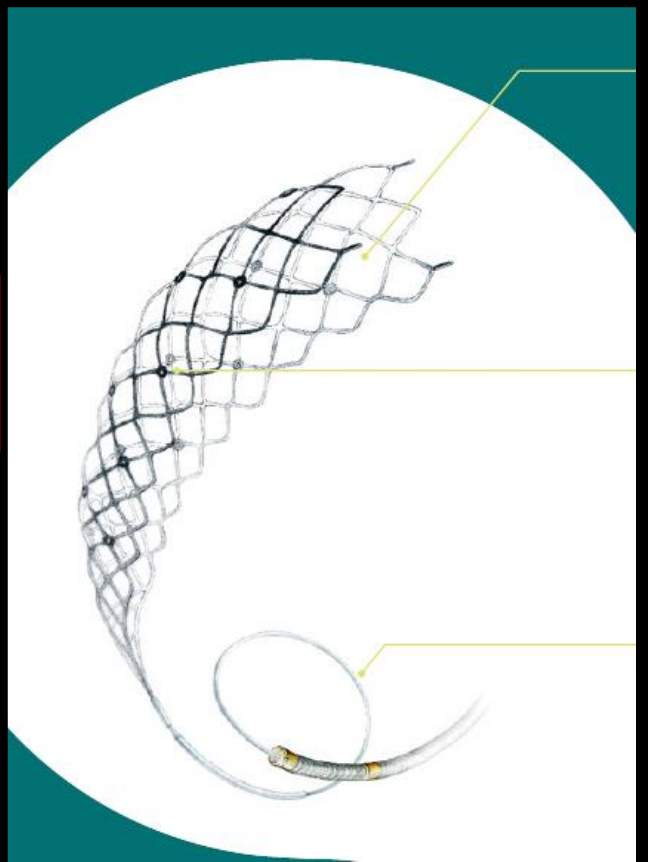
| Aperio® |   |
| Capture™ |  |
| pREset® |  |

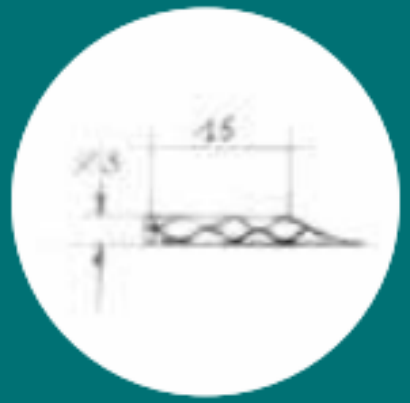



catchview
revascularization device

21 AND 27 CATHETERS



Catch+ mini



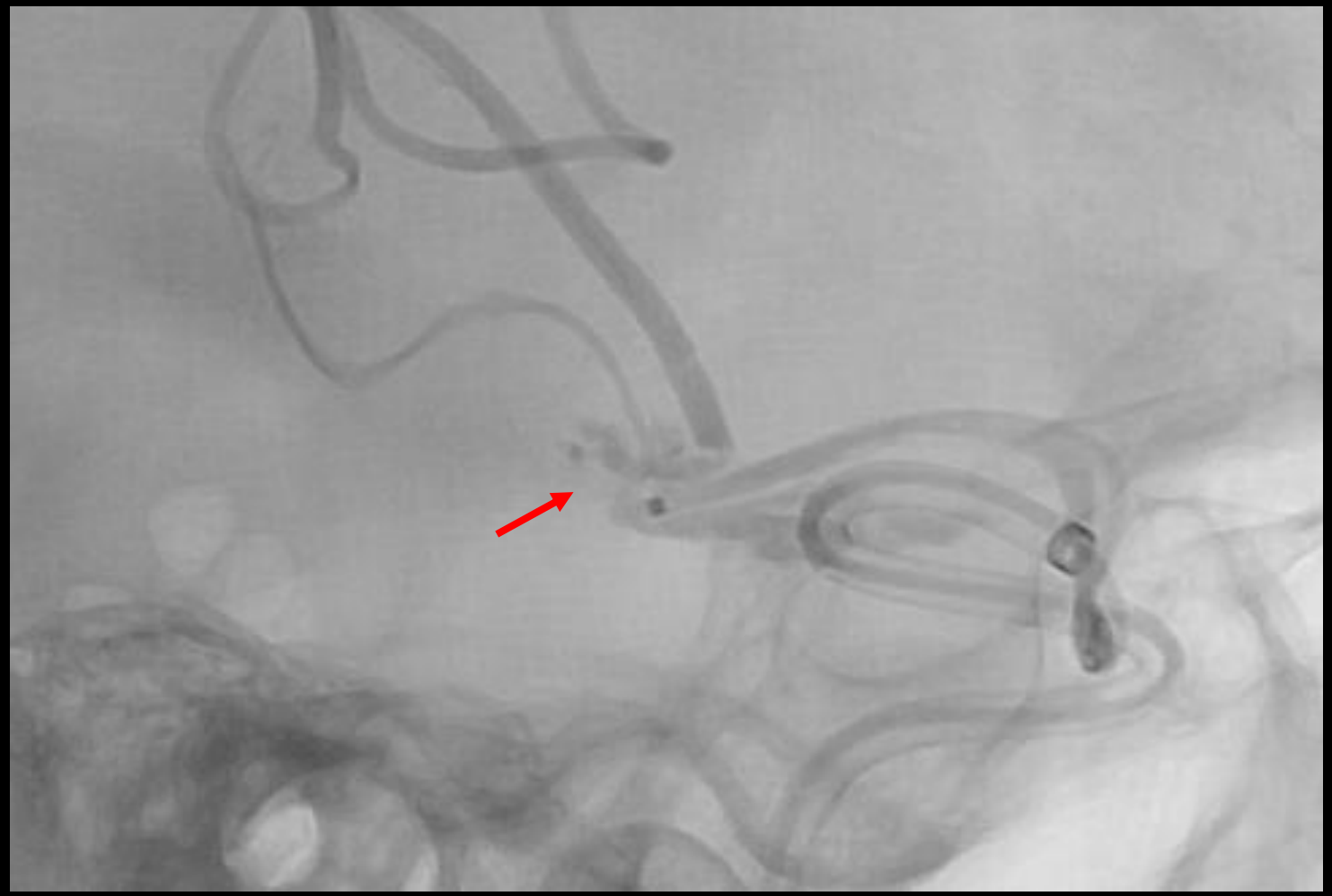
| Reference | Stent Ø | | Characteristics | Unconstrained stent | | Compatible delivery microcatheter |
|---|---|---|---|---|---|---|
| | Ø Nominal (mm) | Length (mm) | | Ø (mm) | Length (mm) | |
| CATCH MINI 3x15 | 3 | 15 | For vessels up to 3 mm | 4 | 15 | VASCO+10 ID min .017" |

pRESET LITE

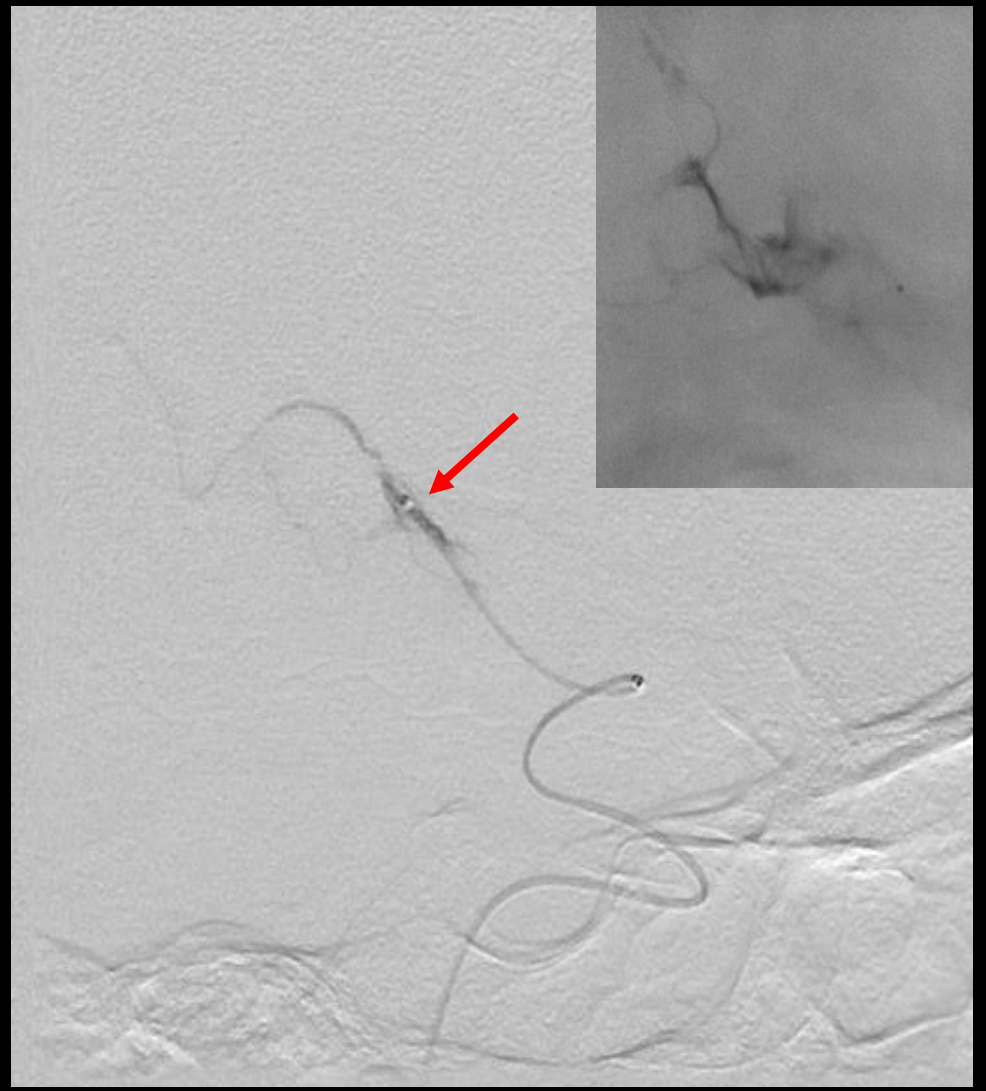
phenox

017 MICROCATHETER

**SIGNIFICANT CURVE (GENU) JUST BEYOND THE M1–M2 JUNCTION - INFLUENCES MICROCATHETER NAVIGATION / RETRACTION – ? COMPLICATIONS**

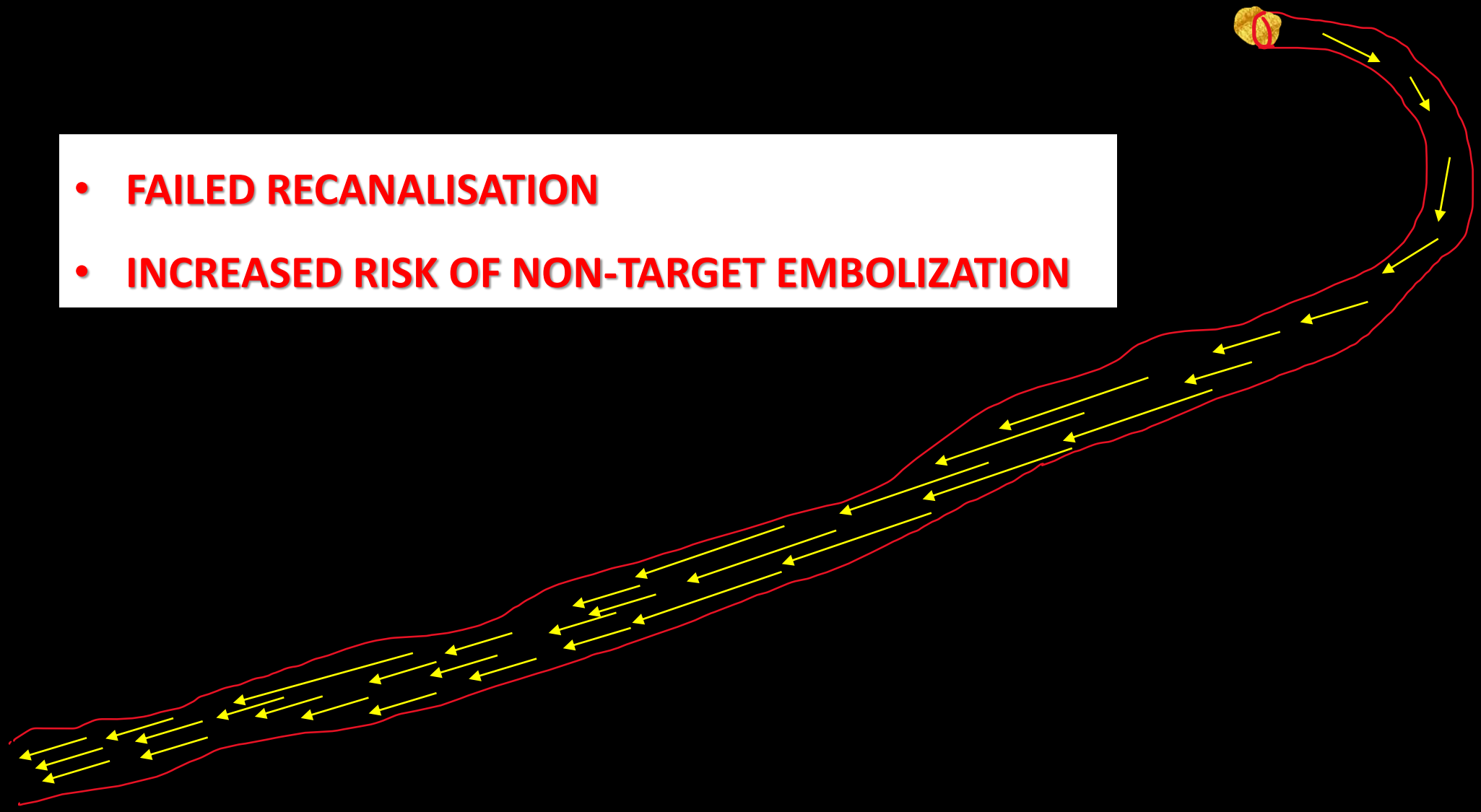


# SMALL CALIBER AND MORE FRAGILE DISTAL VESSELS

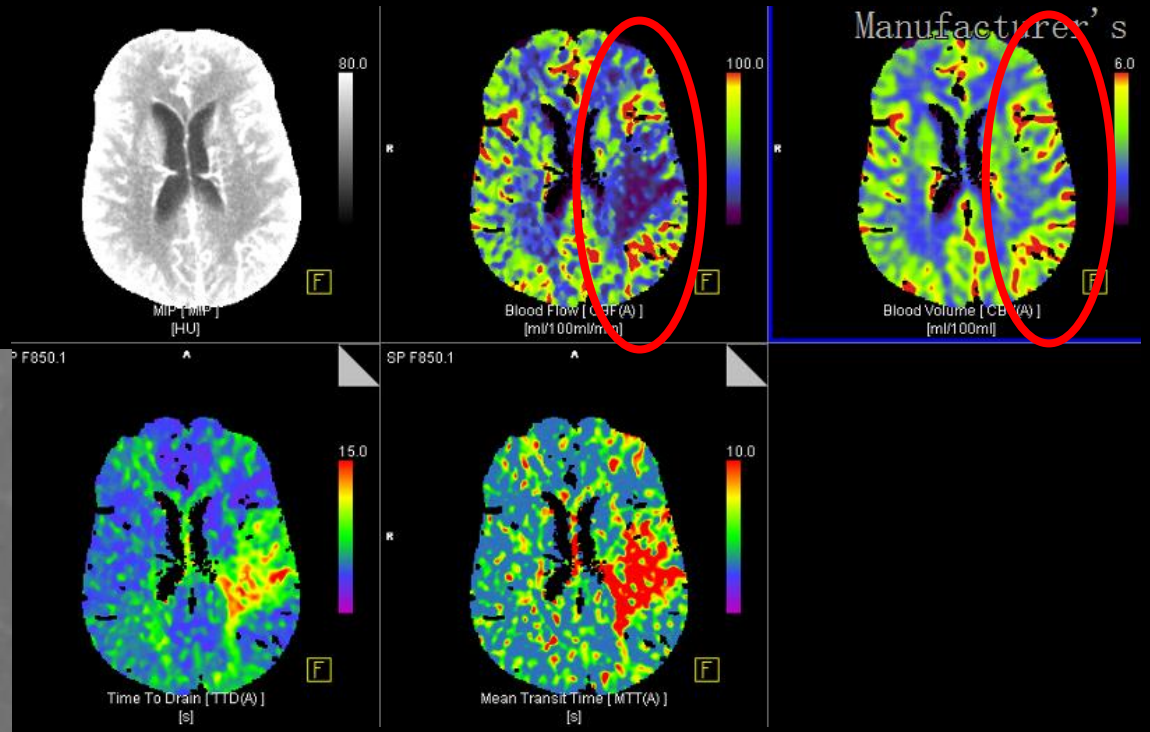


# DIFFICULT TO TRANSMIT THE SUCTION PRESSURE FROM THE ASPIRATION CATHETER IN THE NECK TO THE CLOT

- FAILED RECANALISATION
- INCREASED RISK OF NON-TARGET EMBOLIZATION



# LOCALIZING THE OCCLUSION

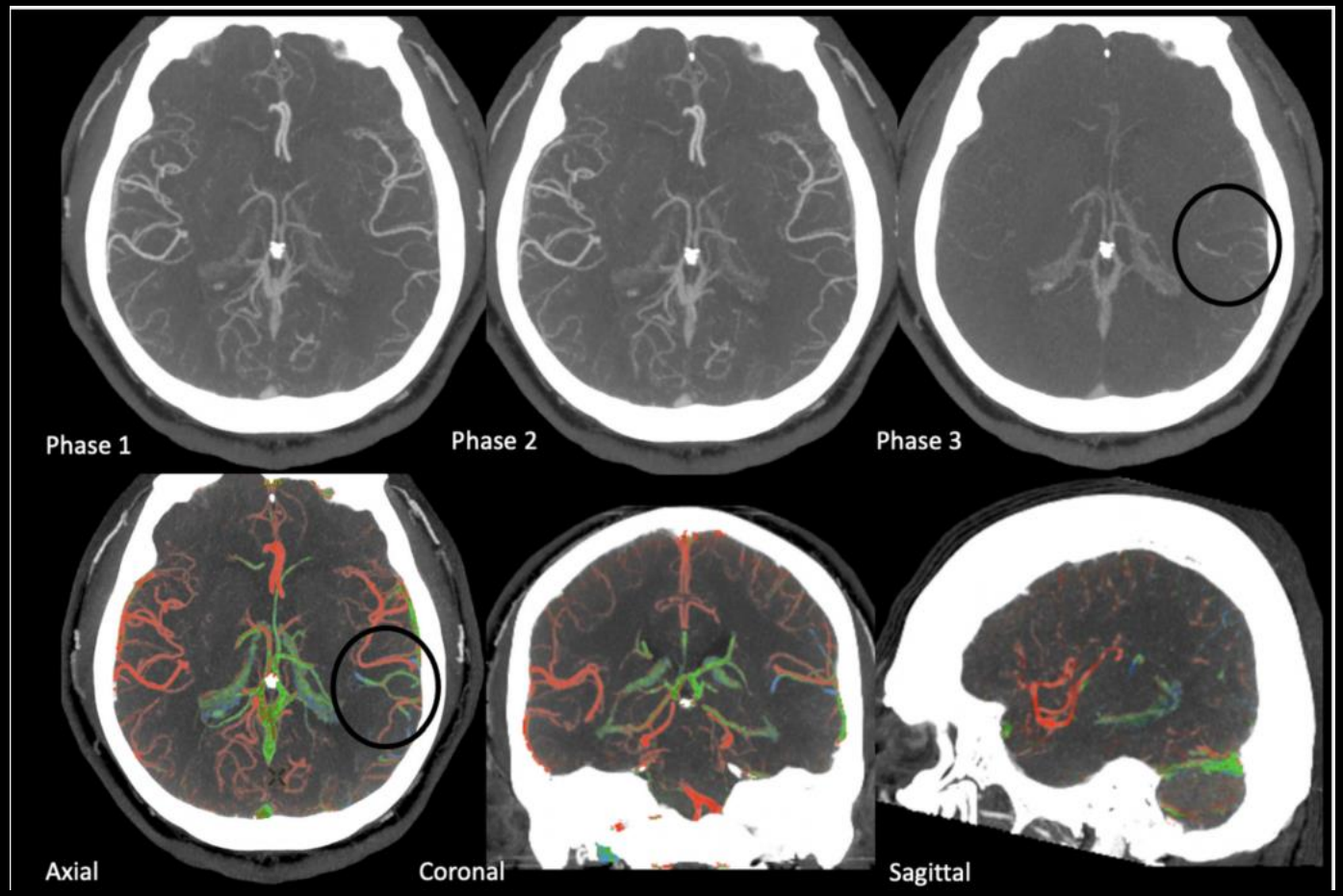


Technical note

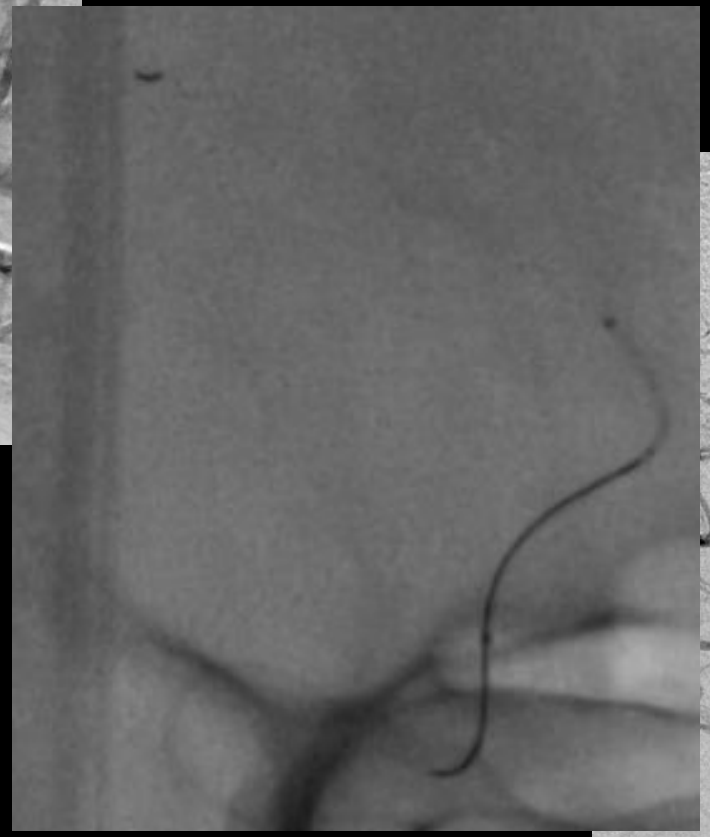
# Improved visualization of medium vessel occlusion stroke with time-variant color-coded multiphase CT angiography maps: A technical note

Johanna M. Ospel [a,b,c], Mayank Goyal [a,c,*]

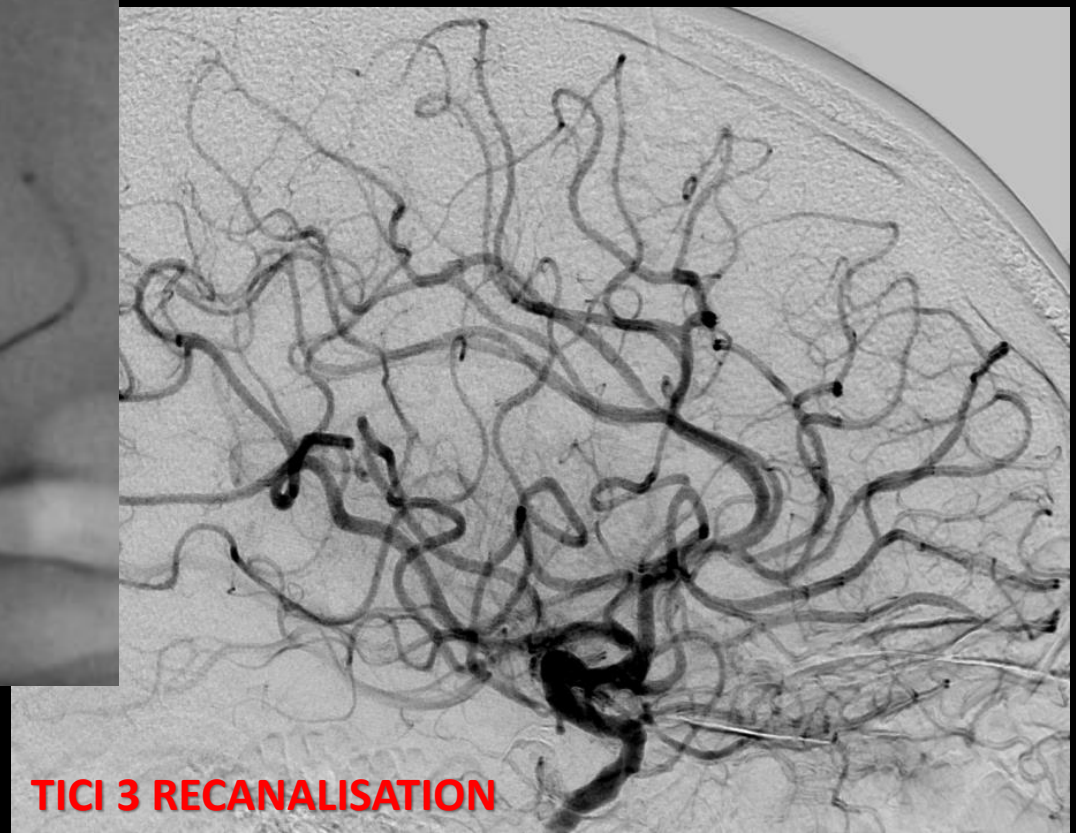
Neuroscience Informatics 1 (2021) 100003



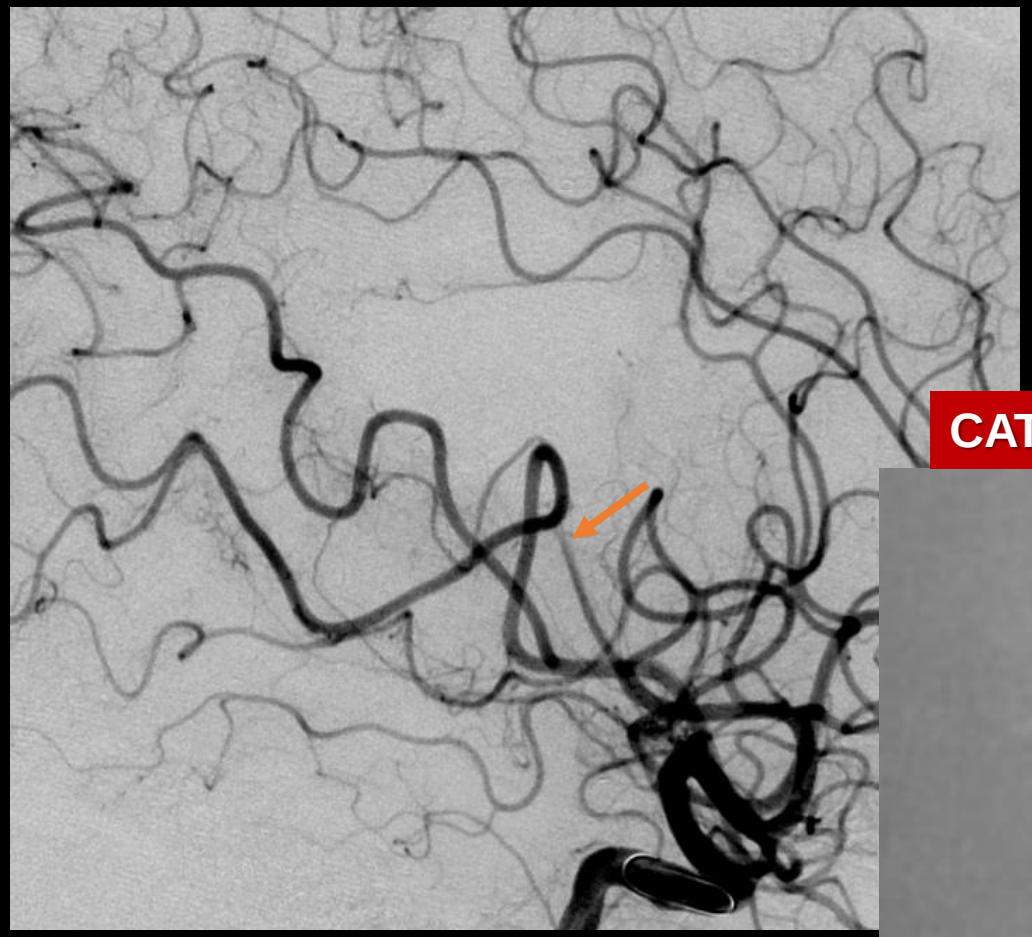
# INITIAL EXPERIENCE



Stent 4x40mm

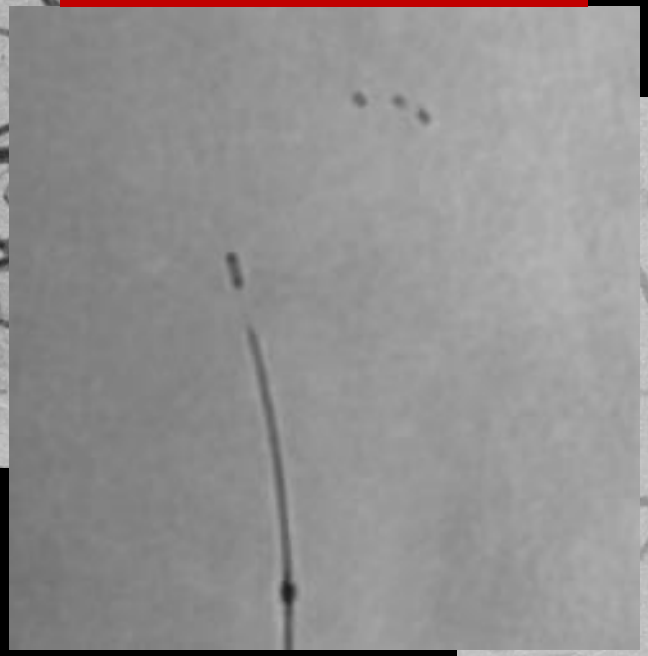


TICI 3 RECANALISATION



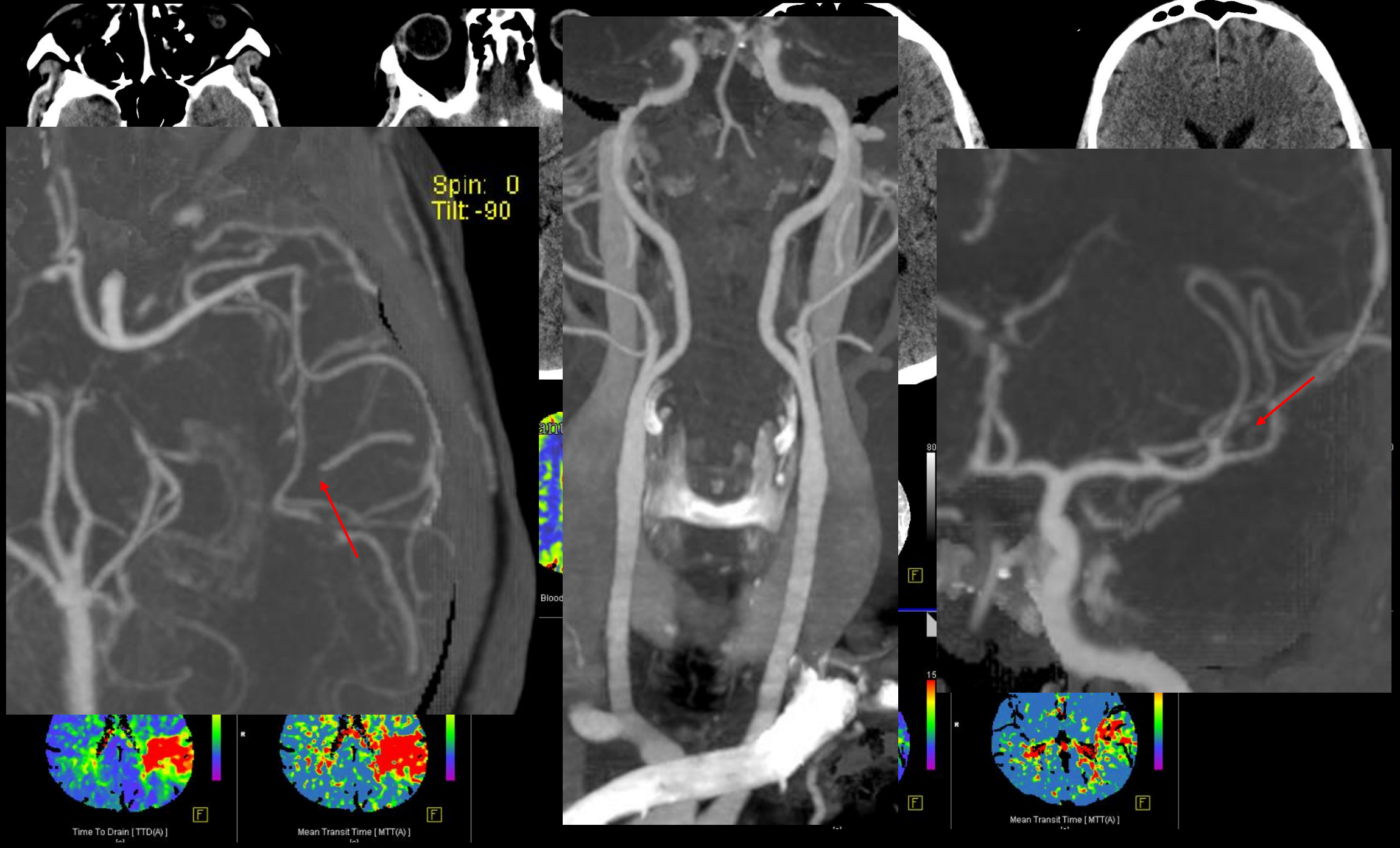
DSA- Distal M2 occlusion

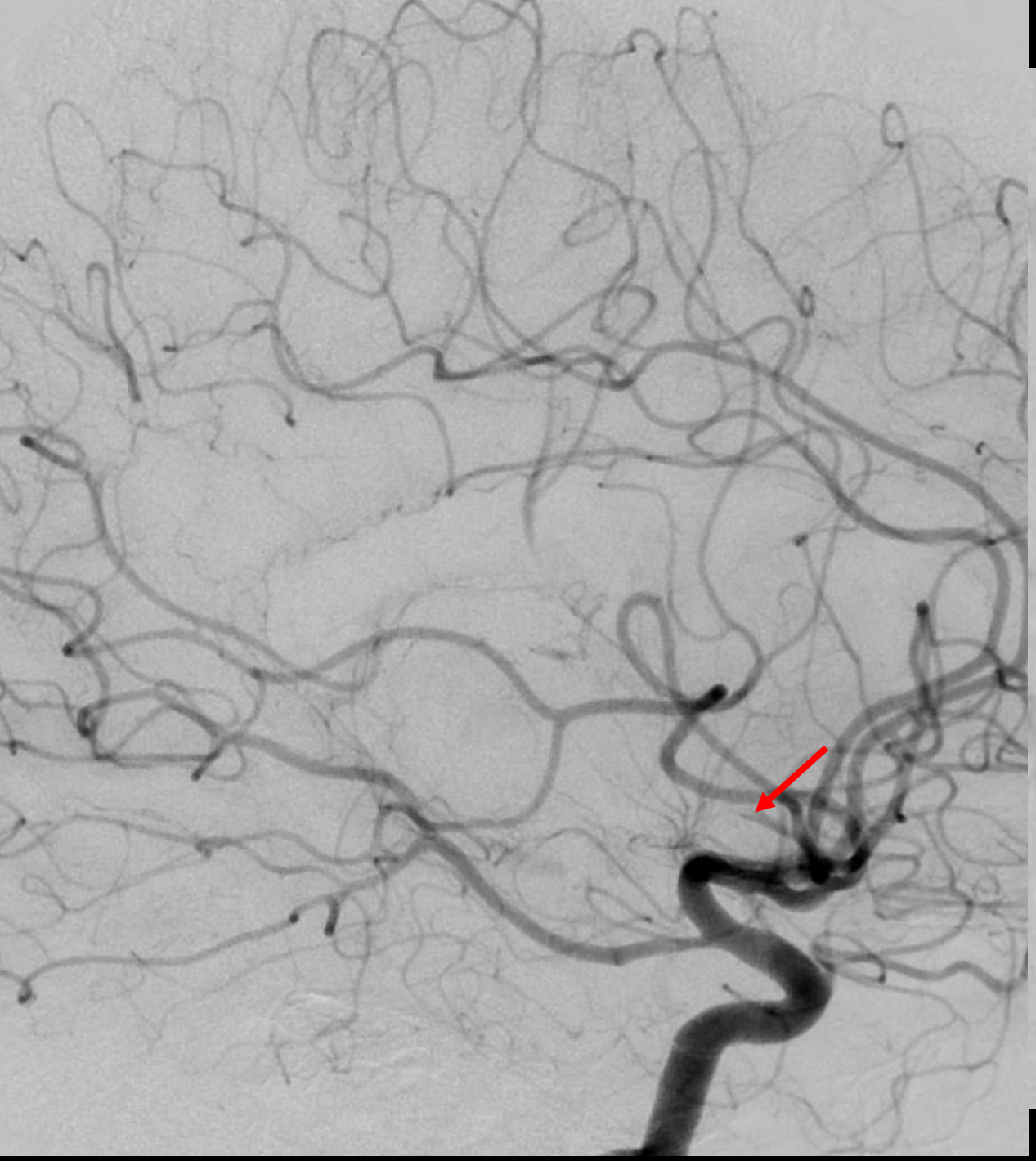
CATCH MINI DEVICE

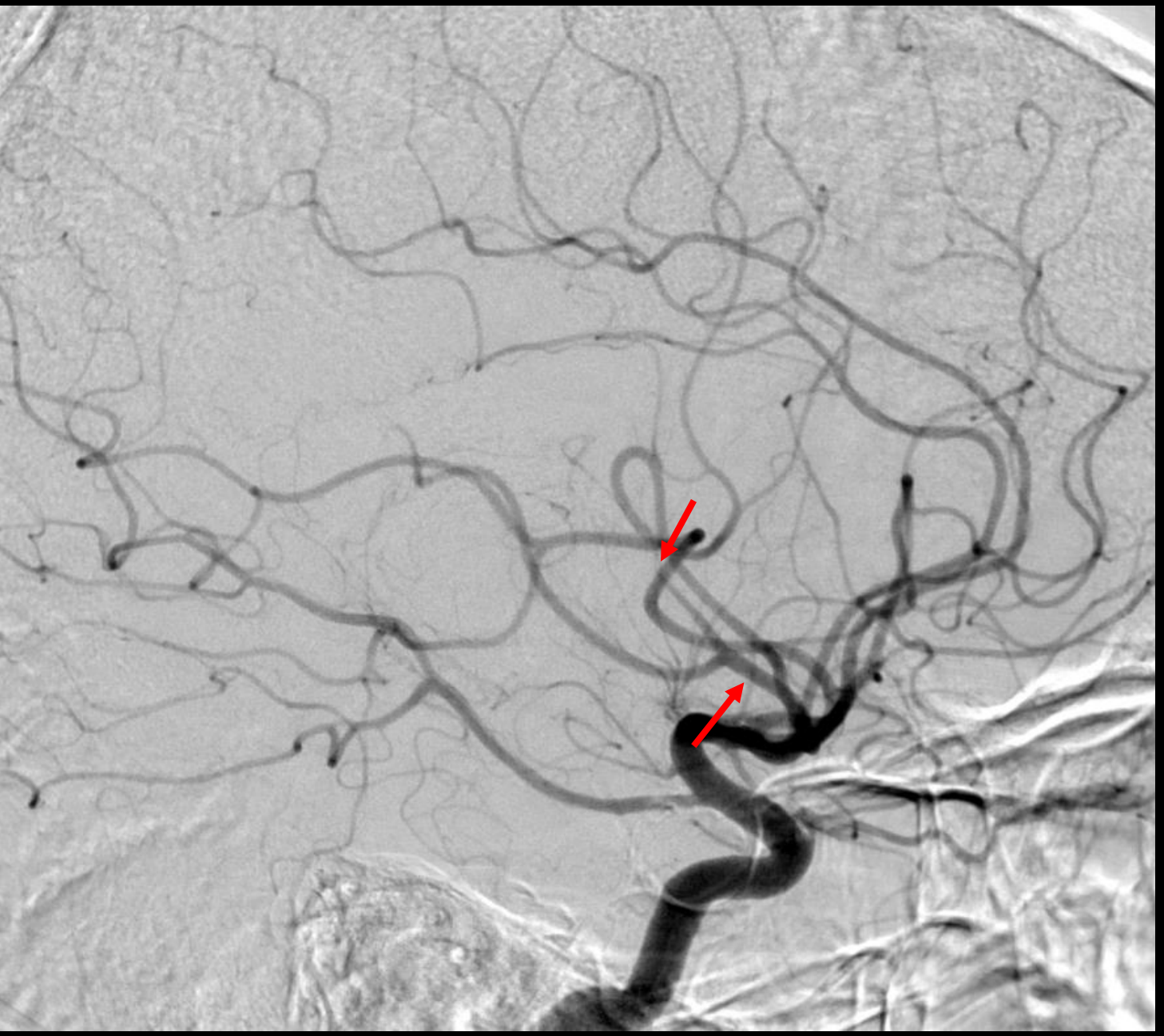


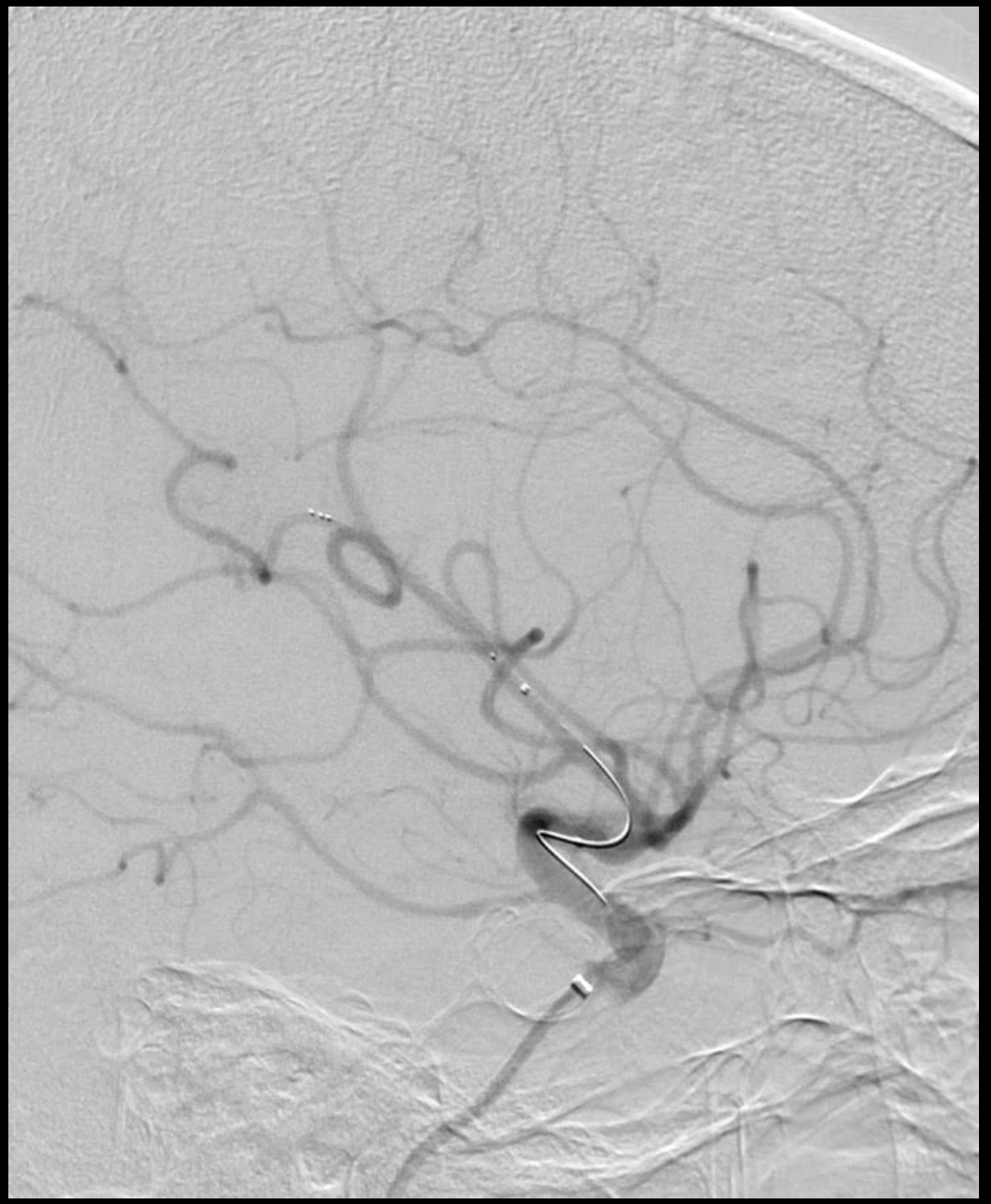
TICI 3

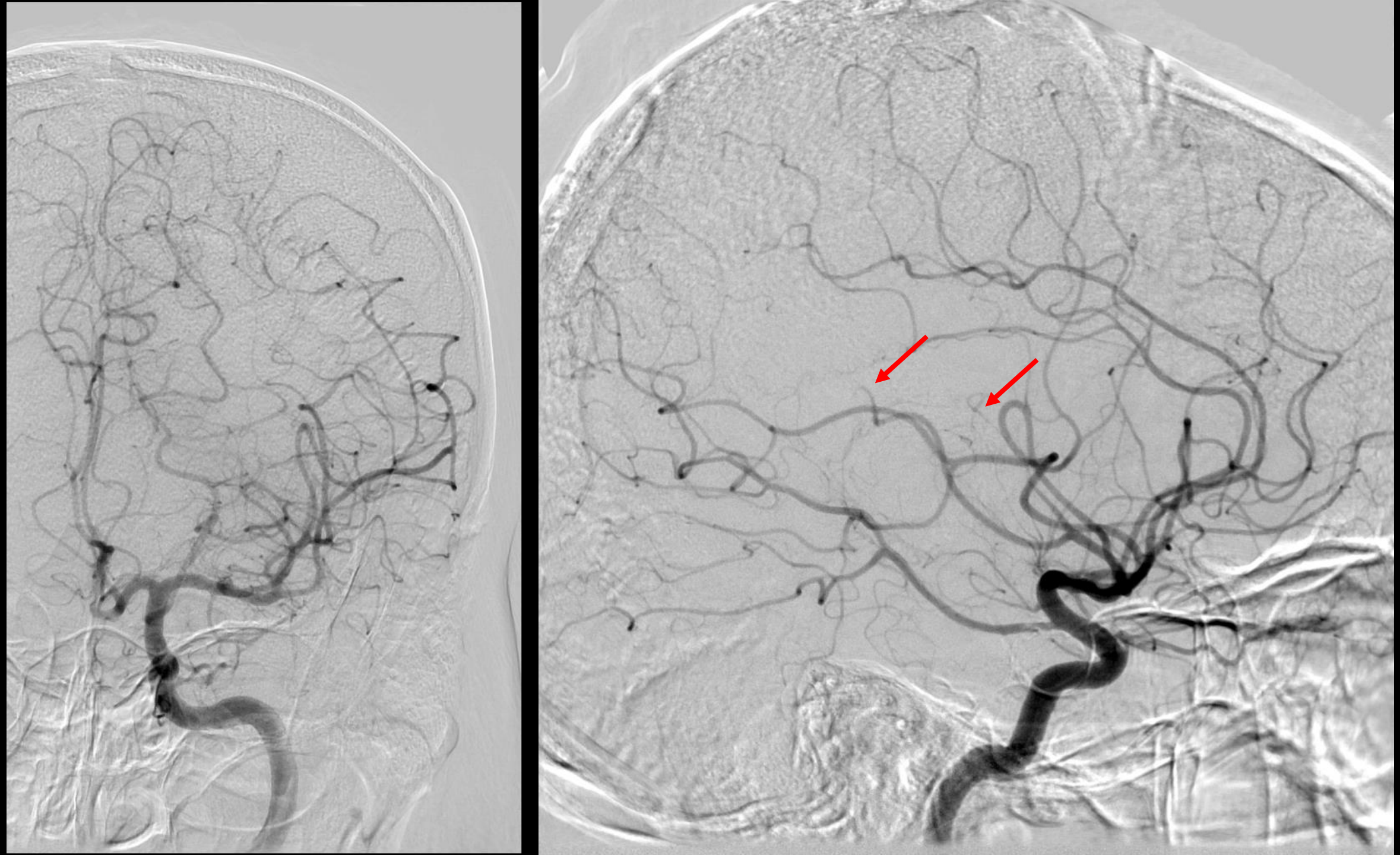
- 40 YR MALE,
- CAME IN WINDOW OF 1 HOUR
- ONLY DYSARTHRIA, REPETITION IMPAIRED / MILD WEAKNESS
- NIHSS 5


Spin: 0
Tilt: -90
Time To Drain [ TTD(A) ]
Mean Transit Time [ MTT(A) ]
Mean Transit Time [ MTT(A) ]





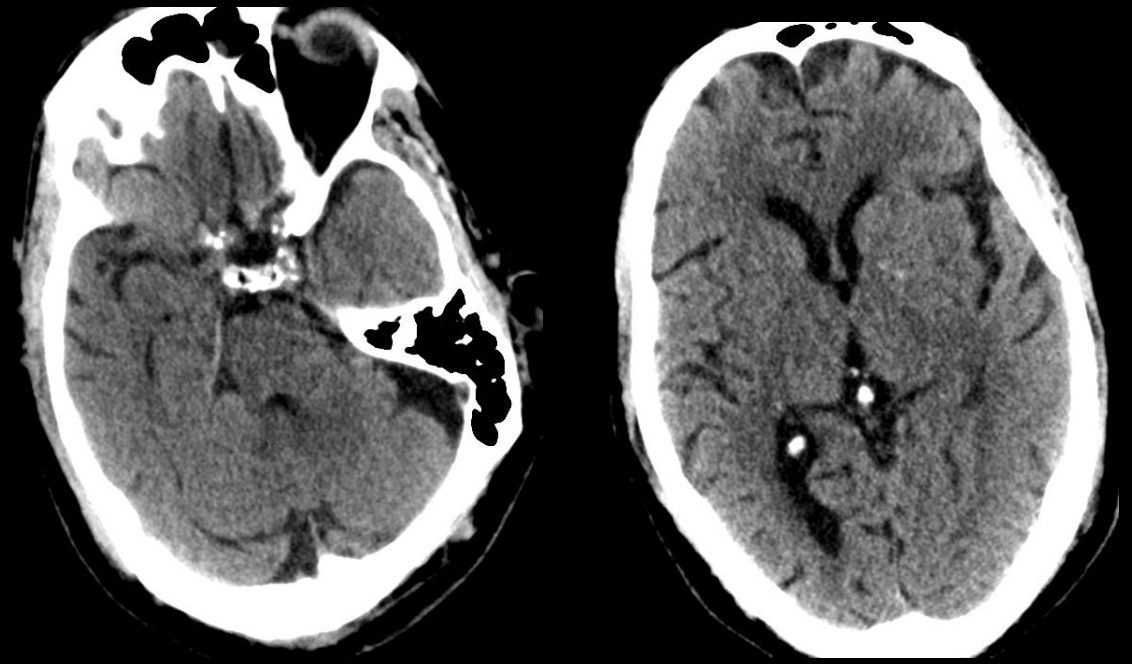


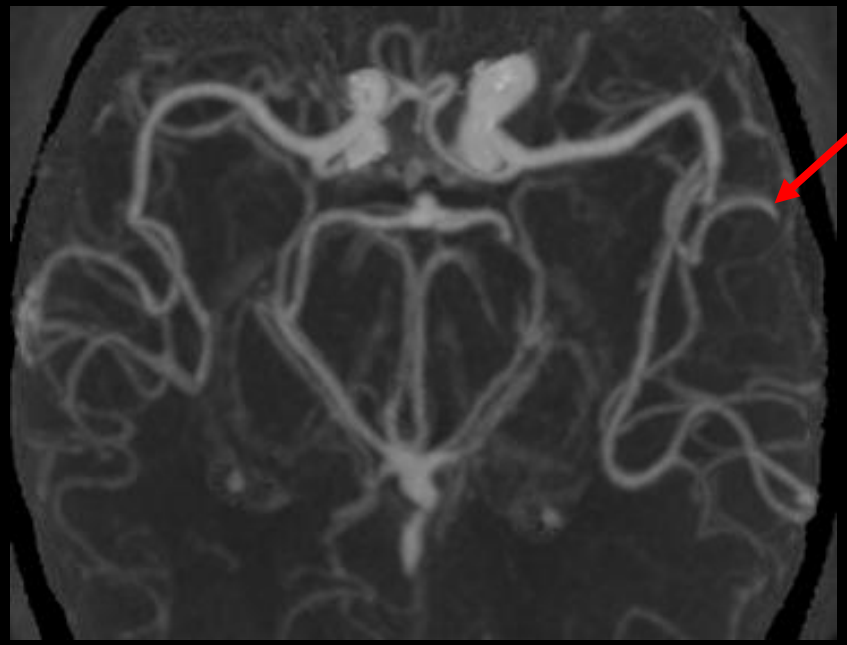


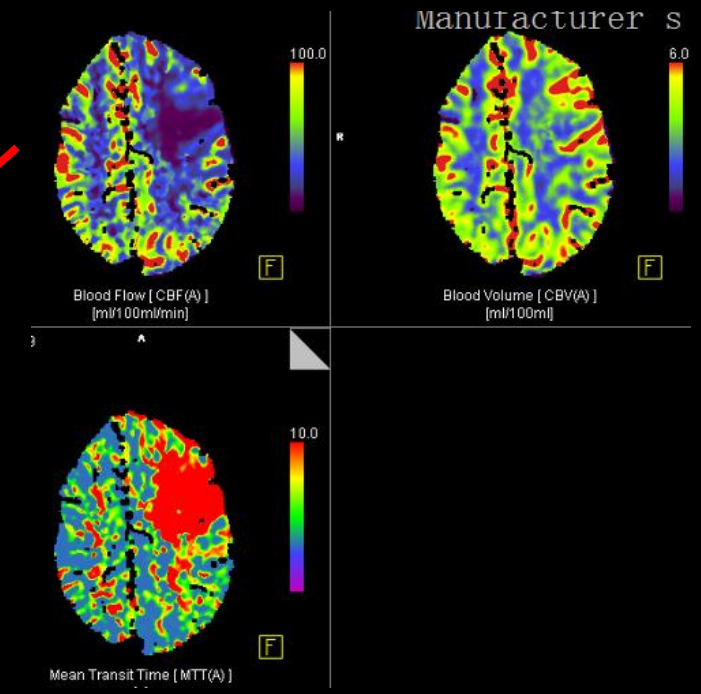
**INCOMPLETE RECANALISATION**

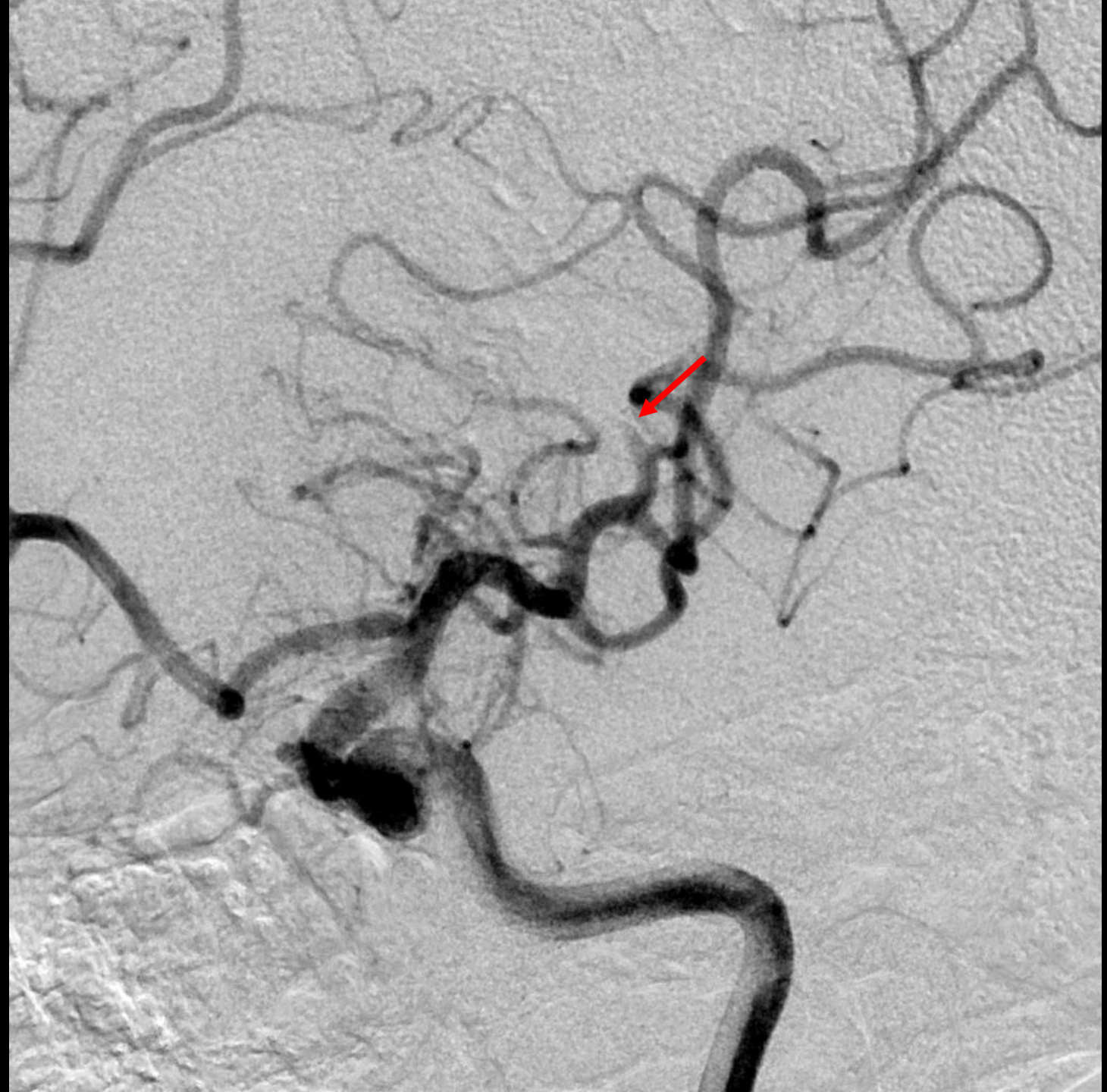
**DISTAL EMBOLISM**

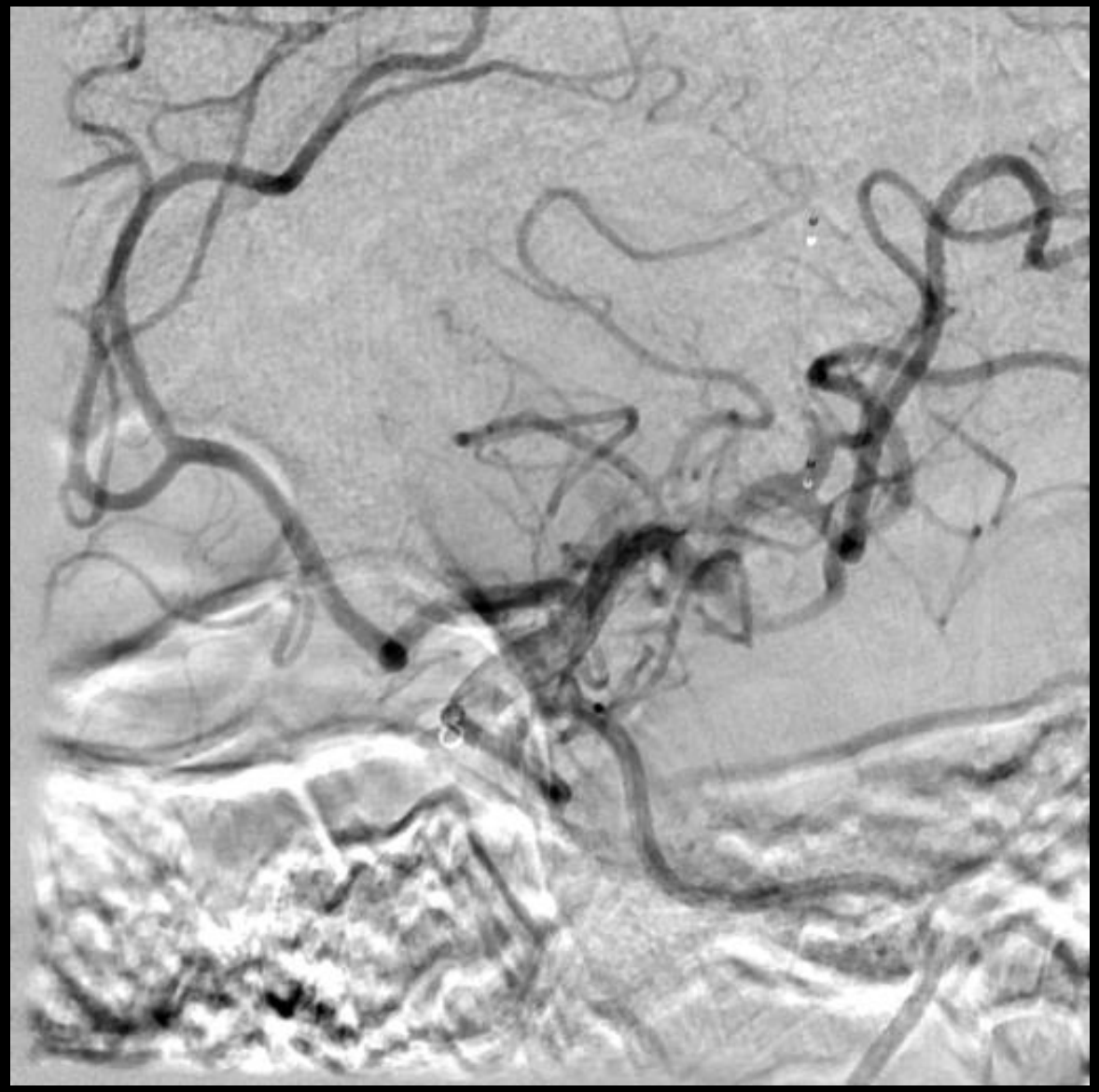
- 65 YR MALE,
- NIHSS 8
- RIGHT HEMIPARESIS WITH APHASIA
- LEFT M3 MCA OCCLUSION

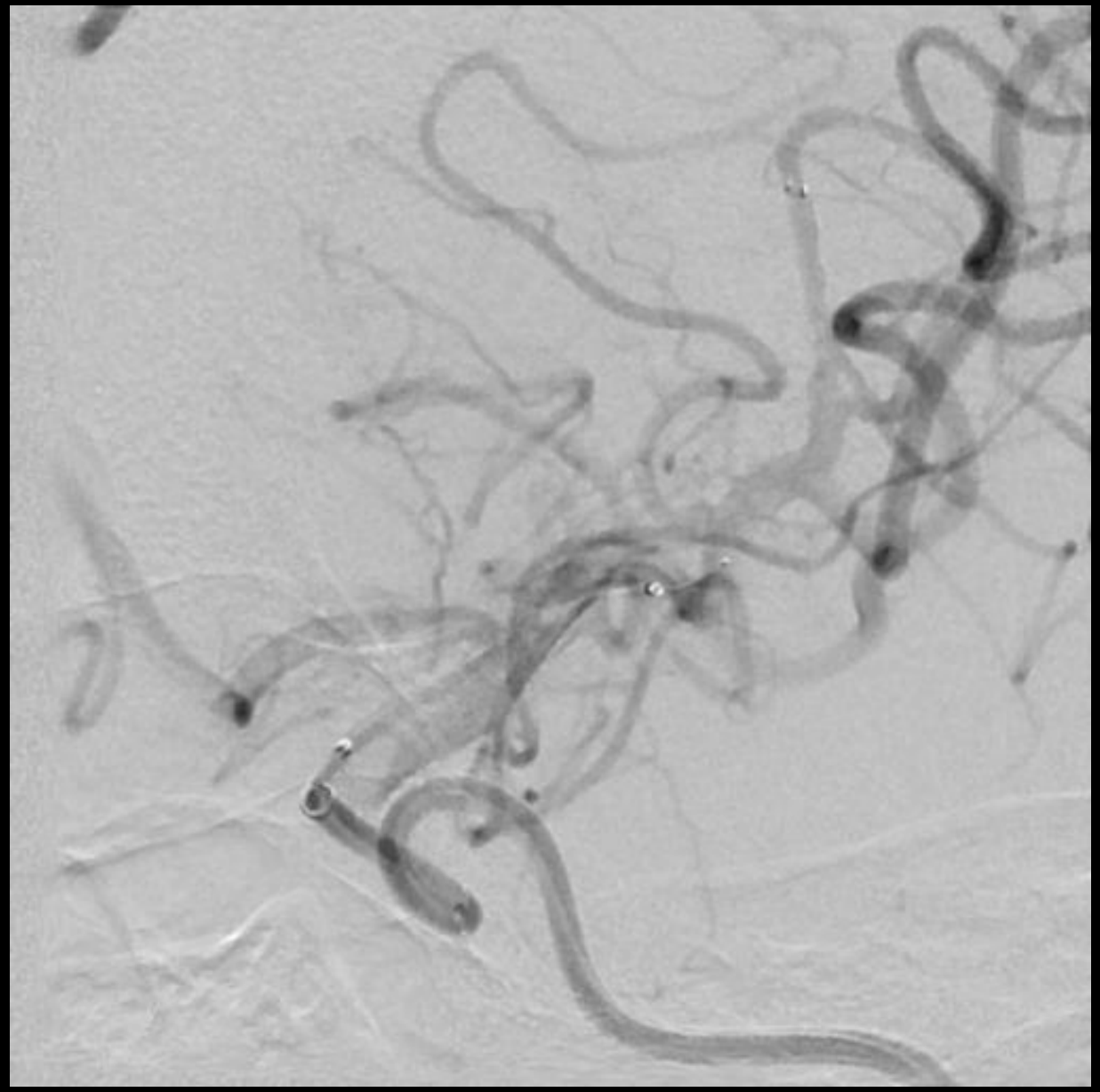


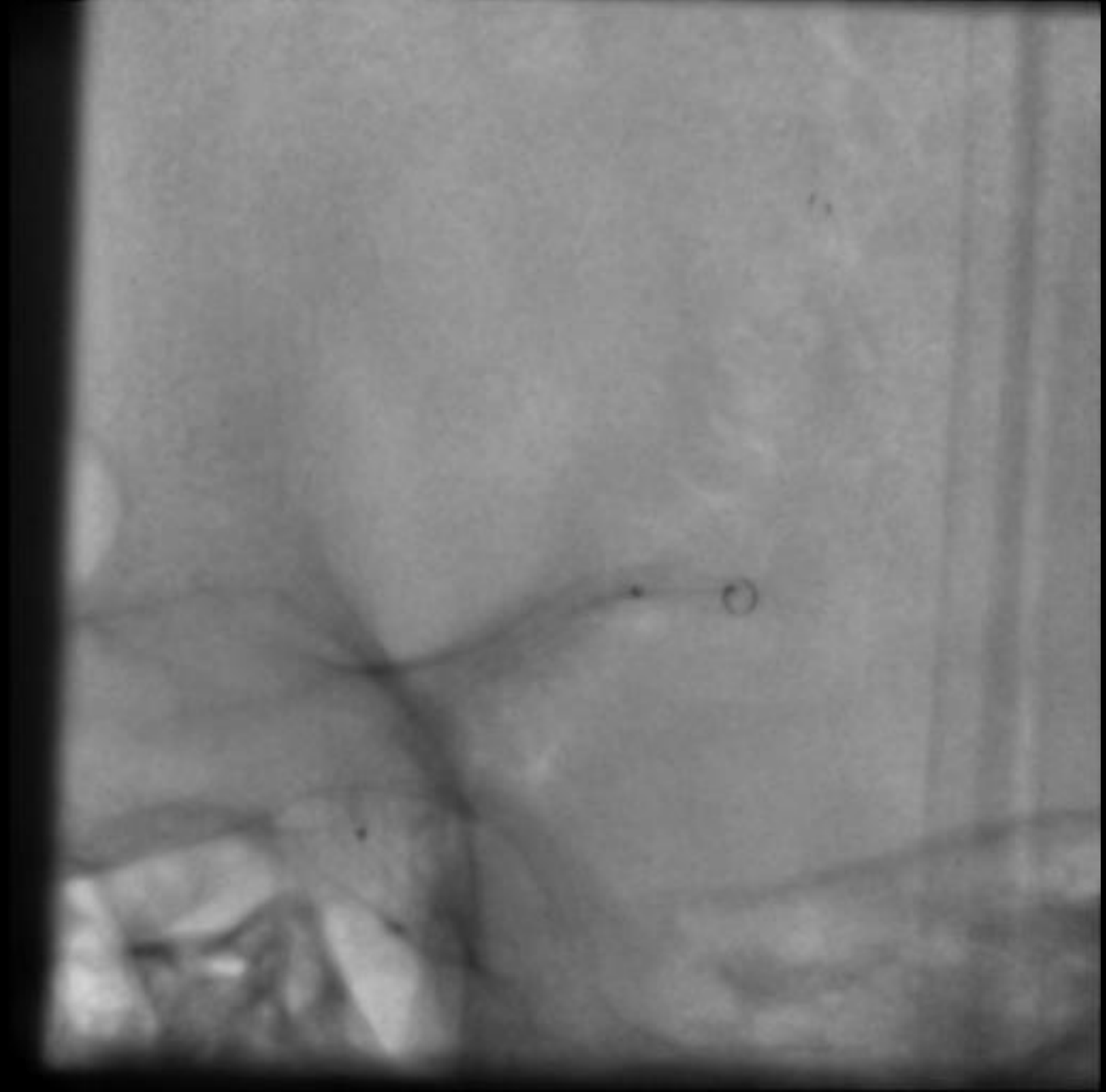


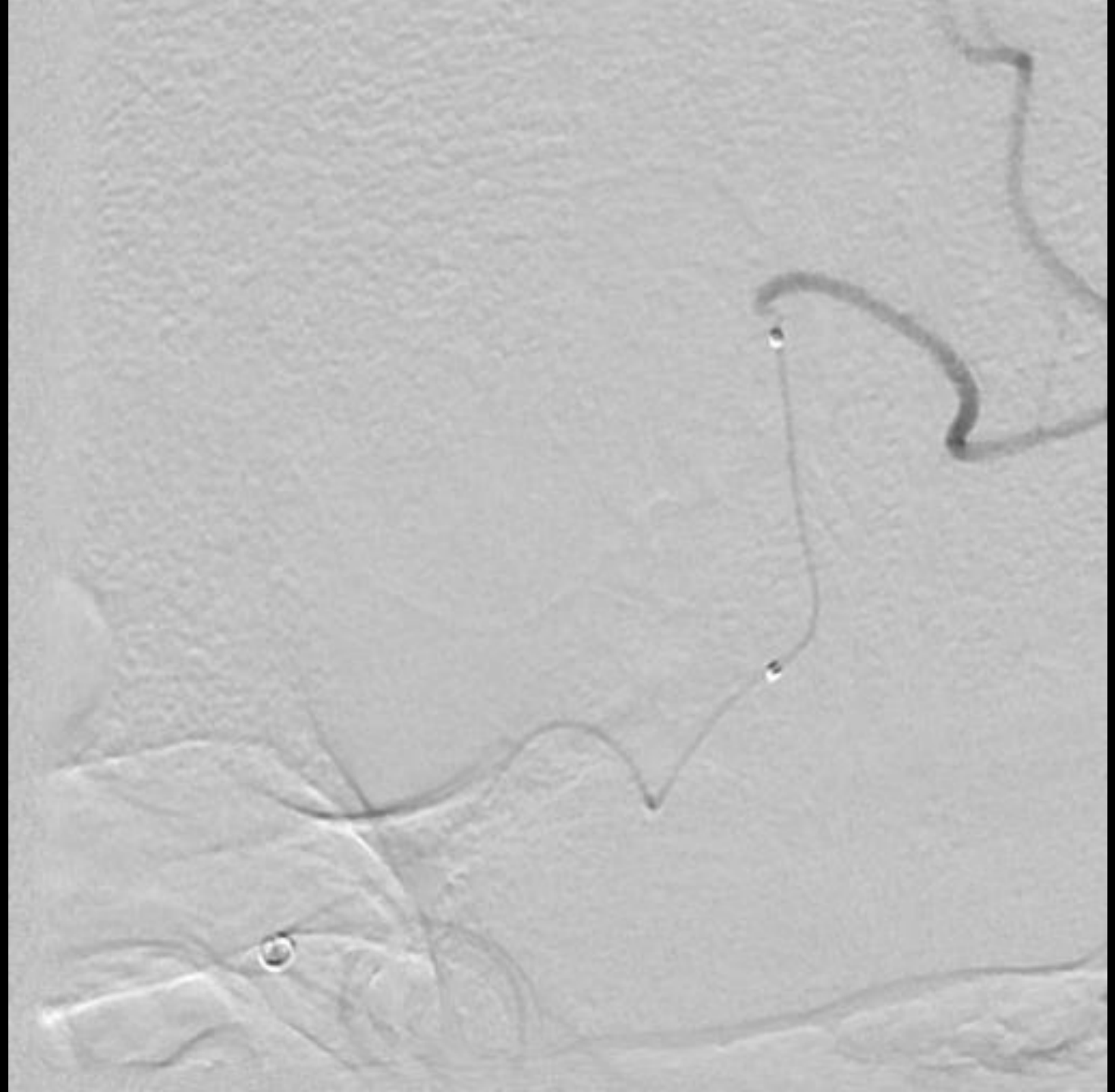


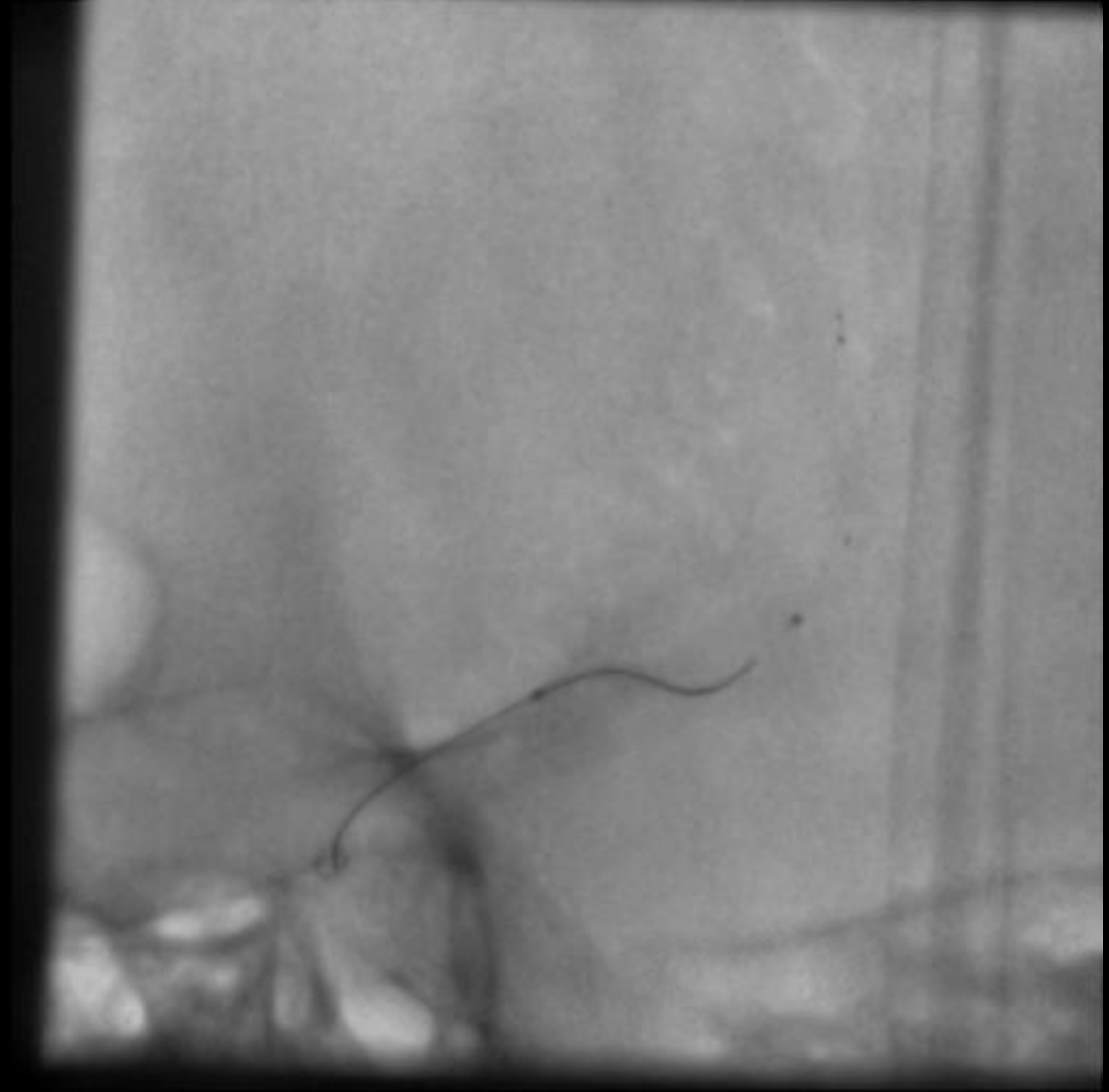


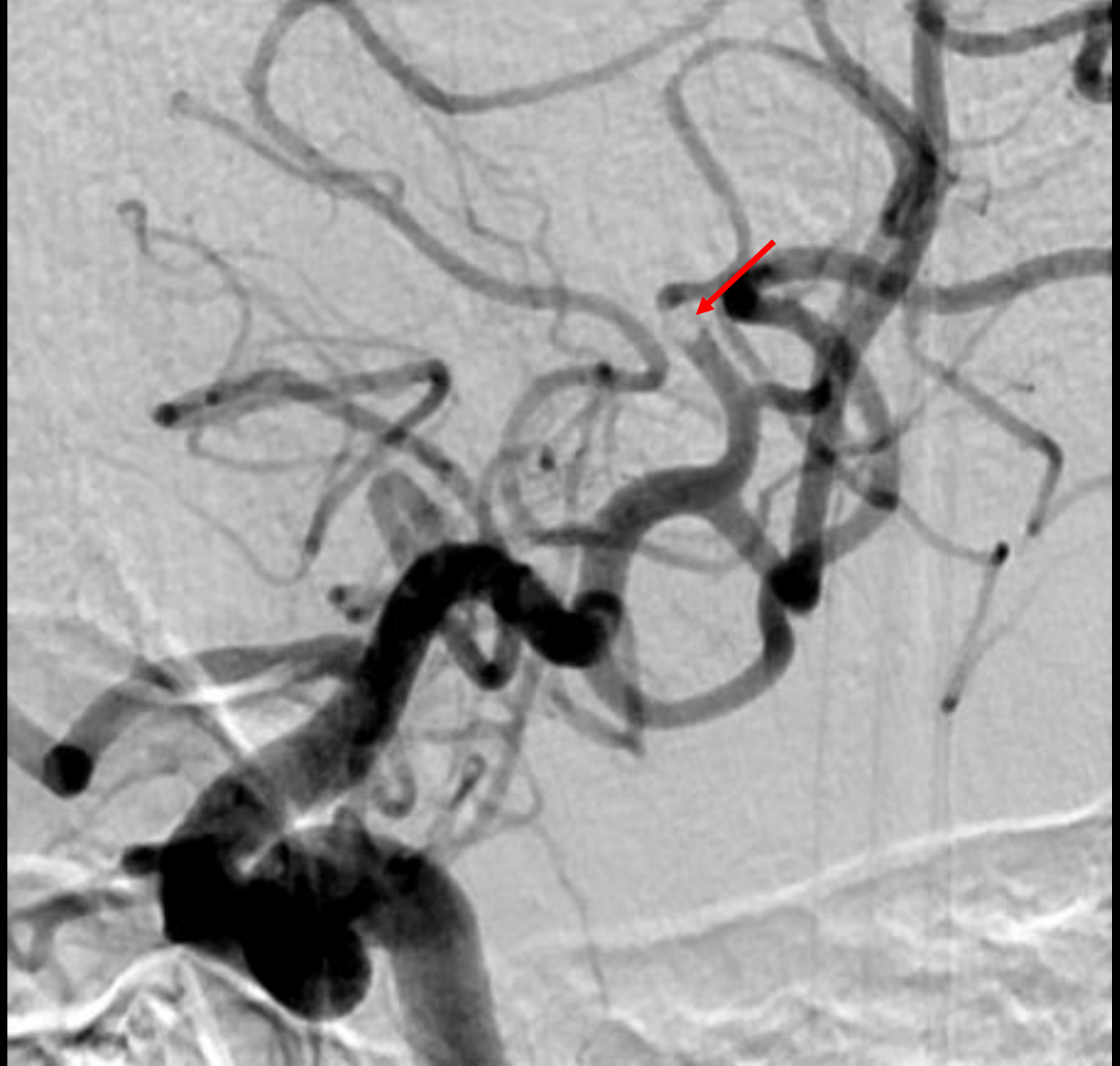












TICI 3 RECANALISATION

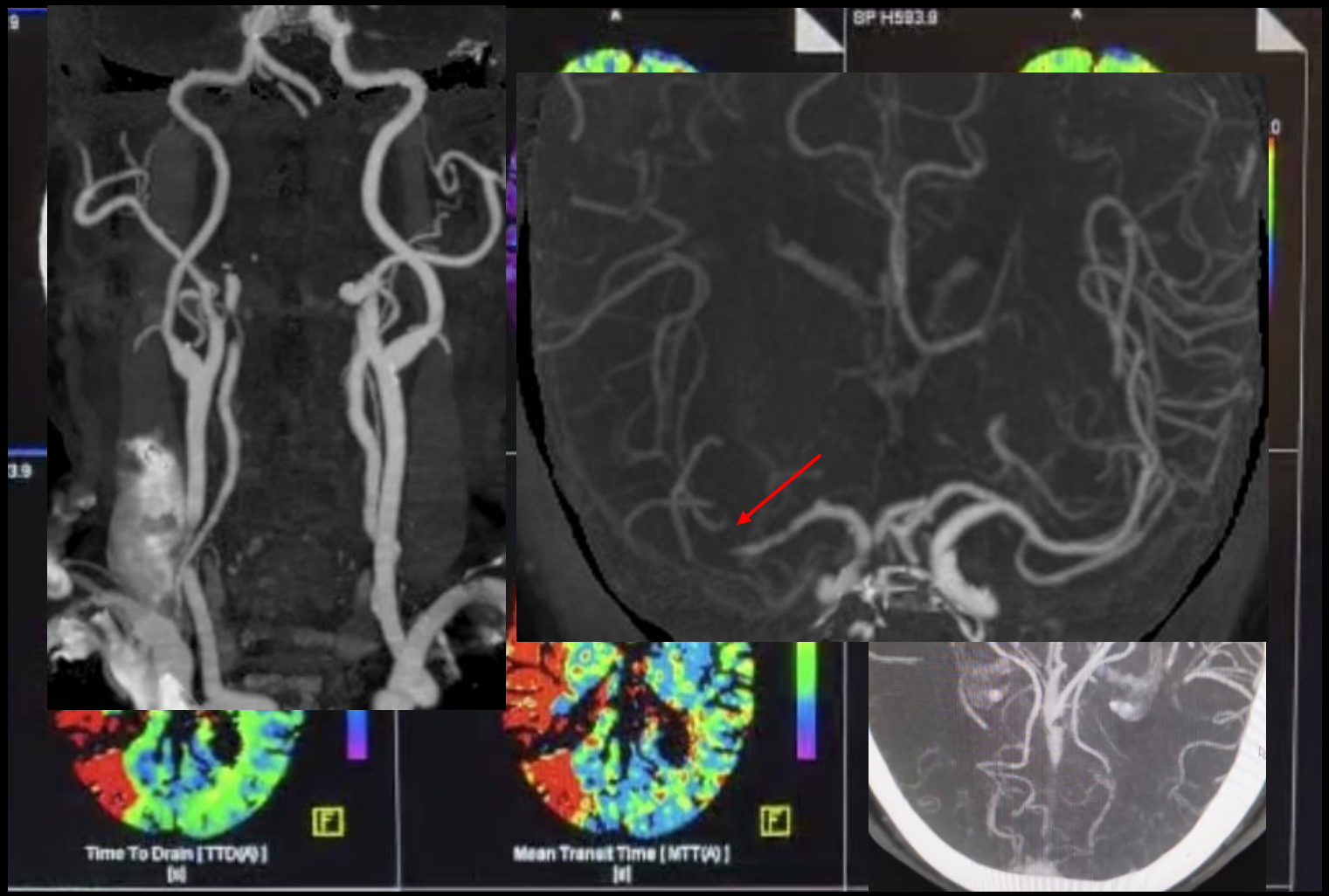
TICI 2 A

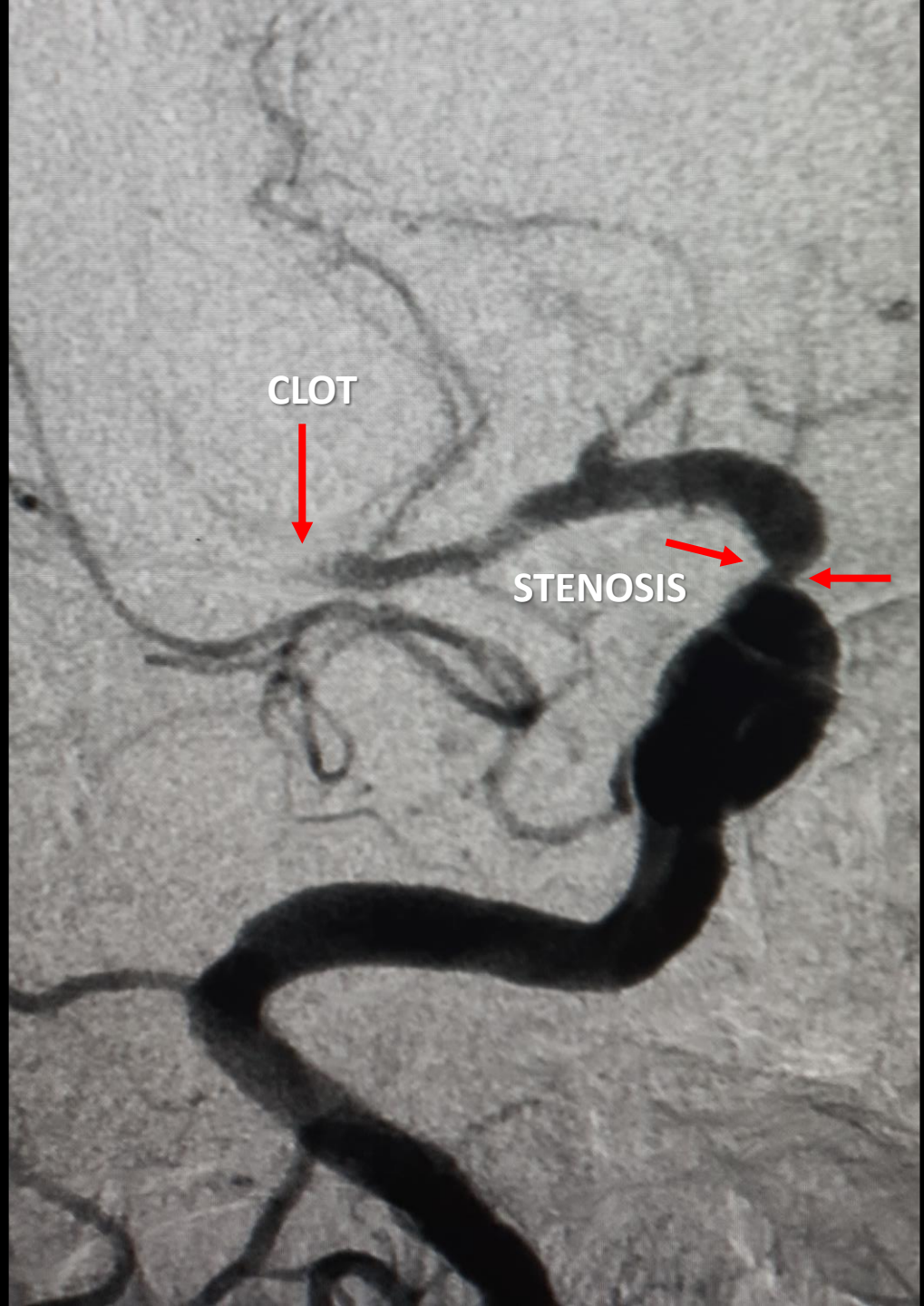
SPASM OF VESSEL

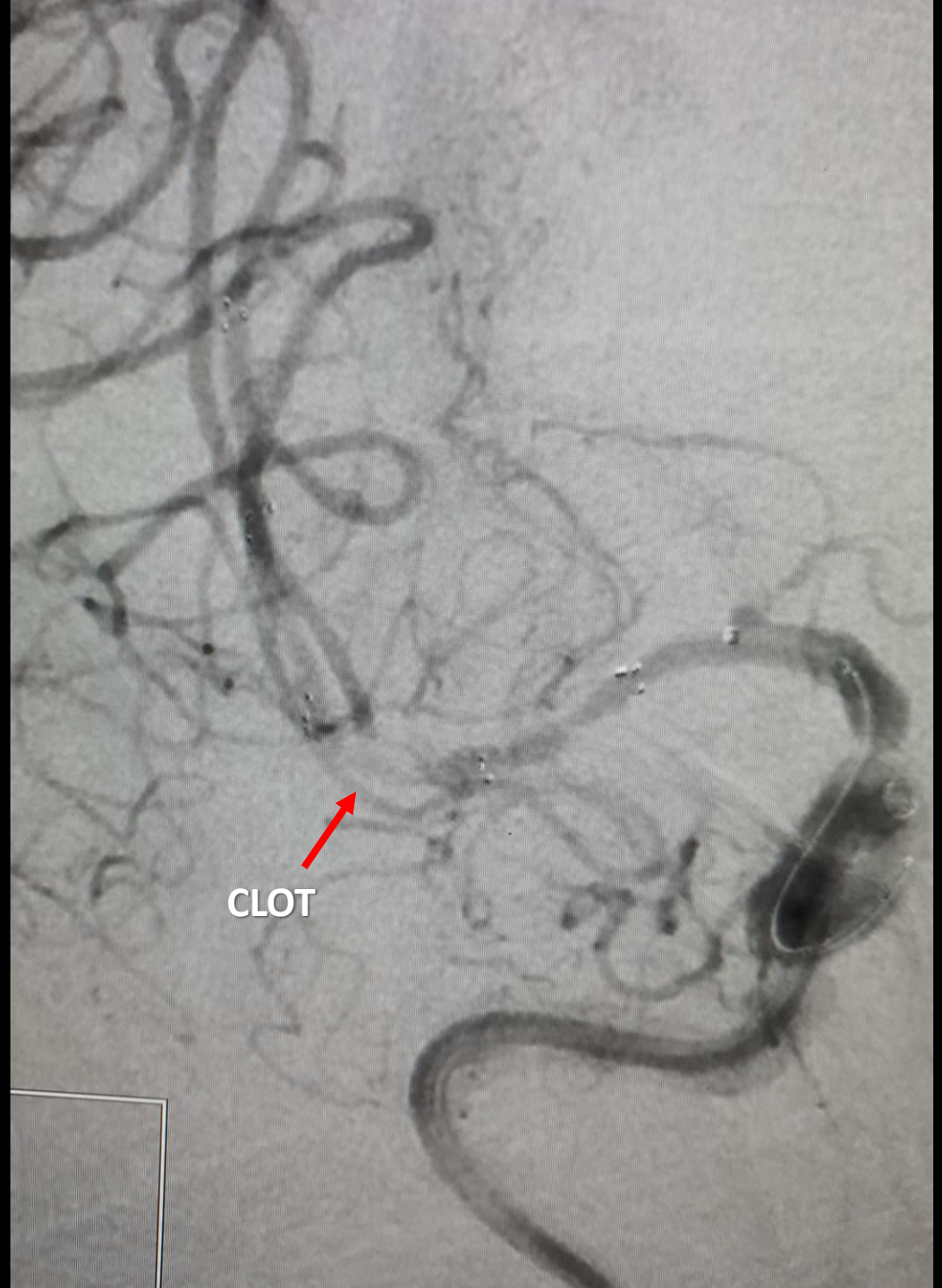
RUPTURE OF VESSEL

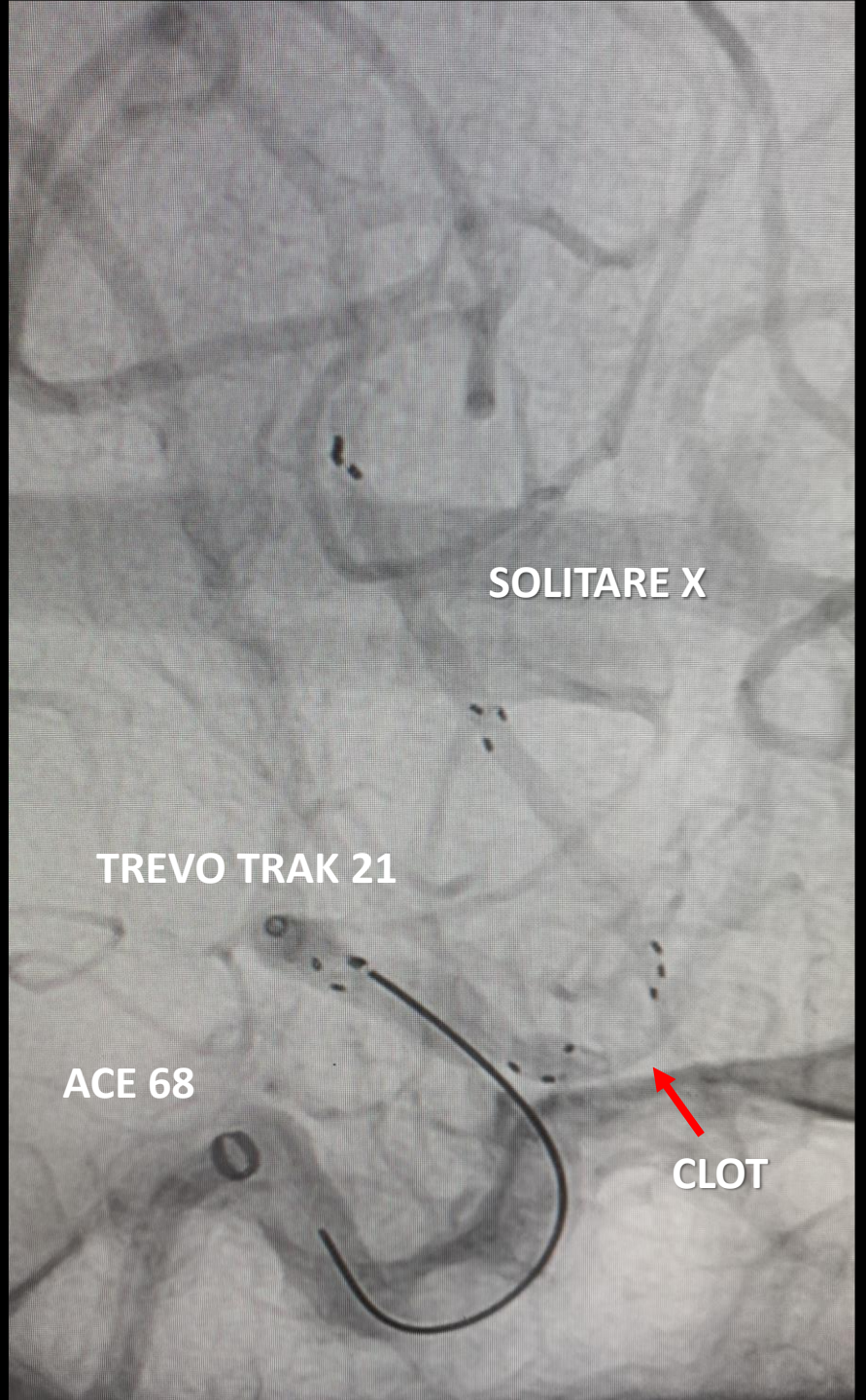
# Neurointervention Surgeon Satisfaction

# SOLUMBRA IN MeVO

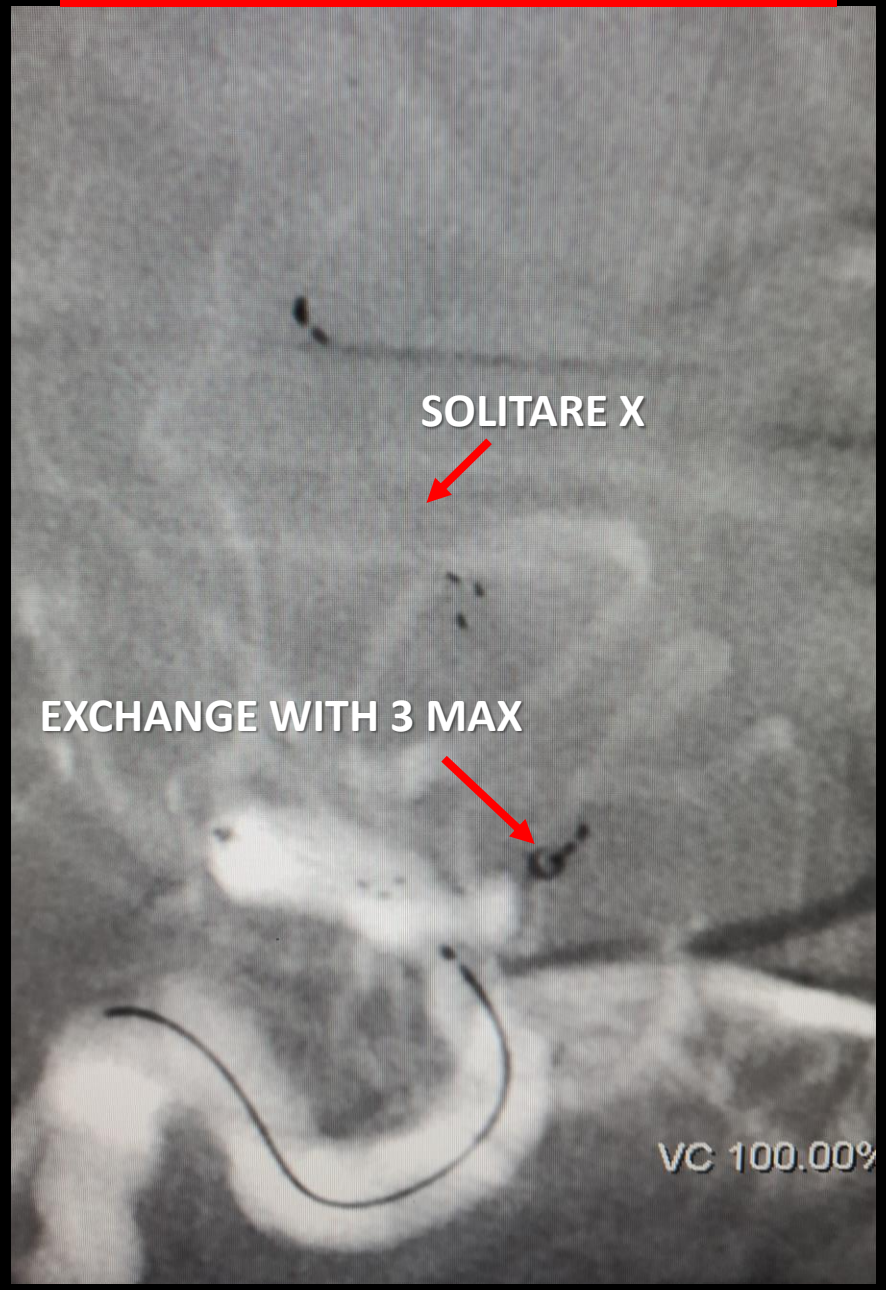

Time To Drain [ TTD(A) ]
Mean Transit Time [ MTT(A) ]

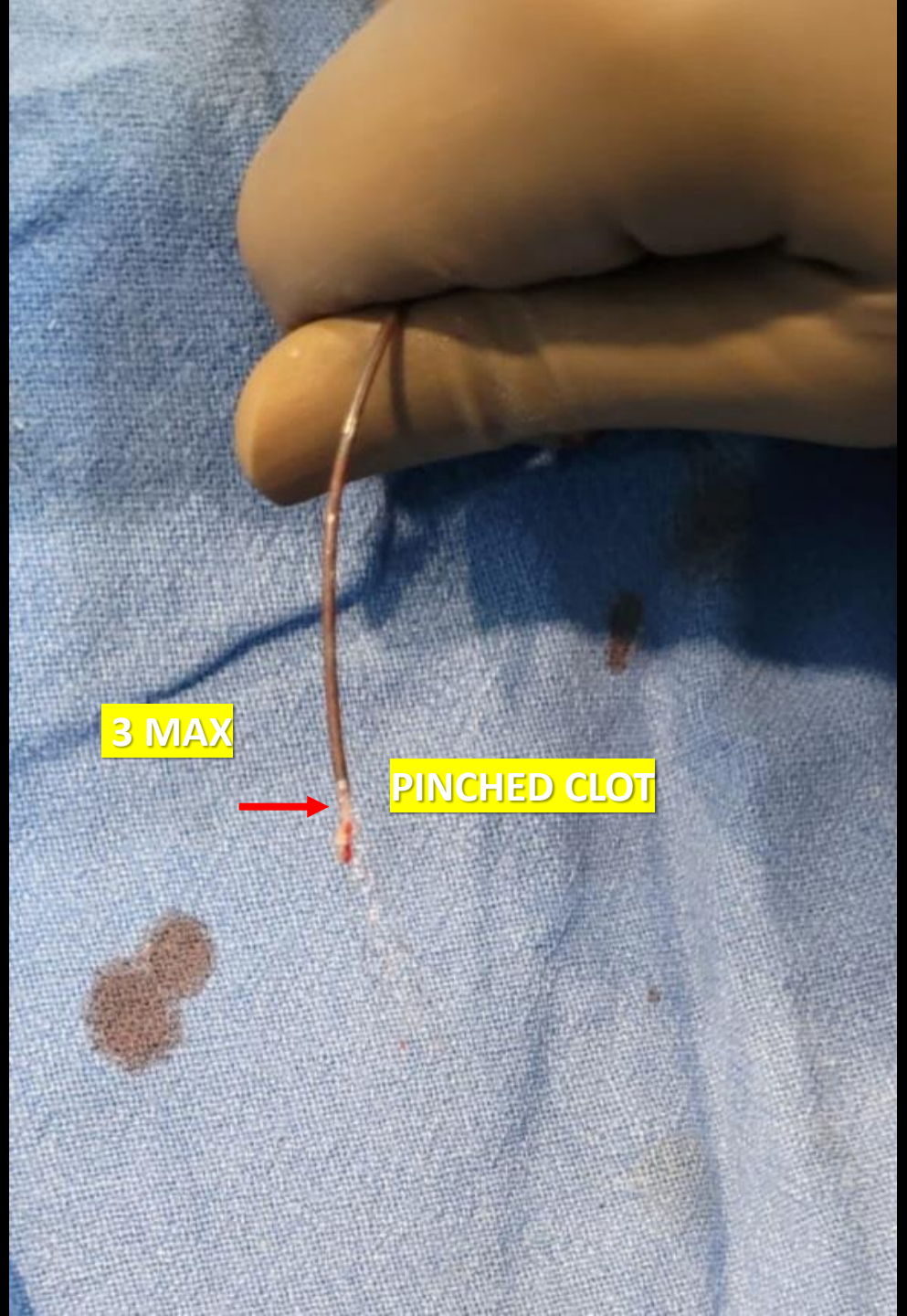

CLOT
STENOSIS


CLOT


SOLITARE X
TREVO TRAK 21
ACE 68
CLOT

# PINCHING THE CLOT



# TICI 3 RECANALISATION

TRANSIENT VASOSPASM – CHEMICAL DILATATION

# Post 24 Hours CT

NIHSS 7

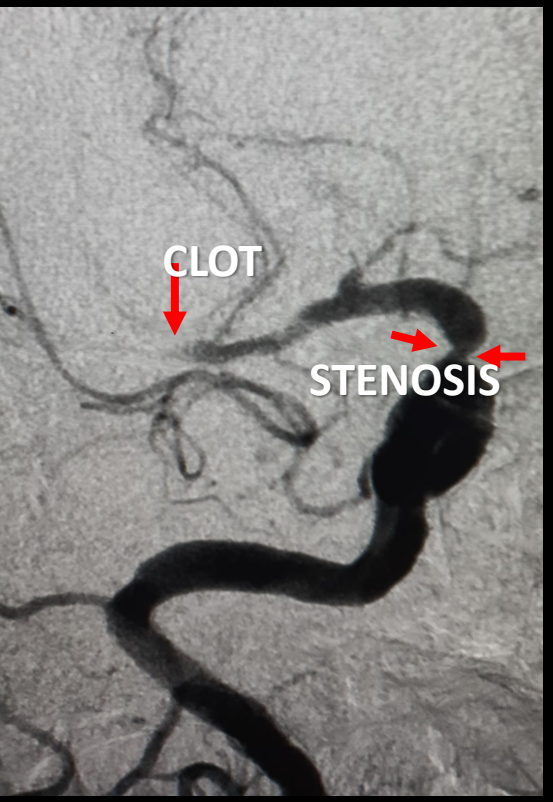
NIHSS 2
MILD FACIAL AND DYSARTHRIA

POST PROCEDURE 48 HOURS

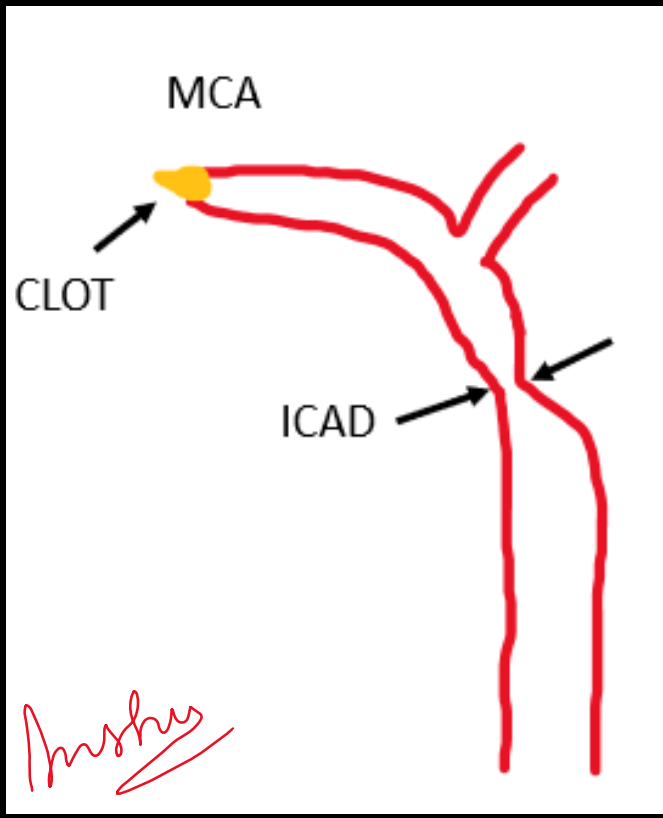
# HOW TO DEAL WITH A DIFFICULT CASE SCENARIO IN STROKE MT

## RESISTANT DISTAL CLOT WITH NARROW EXIT (ICAD)

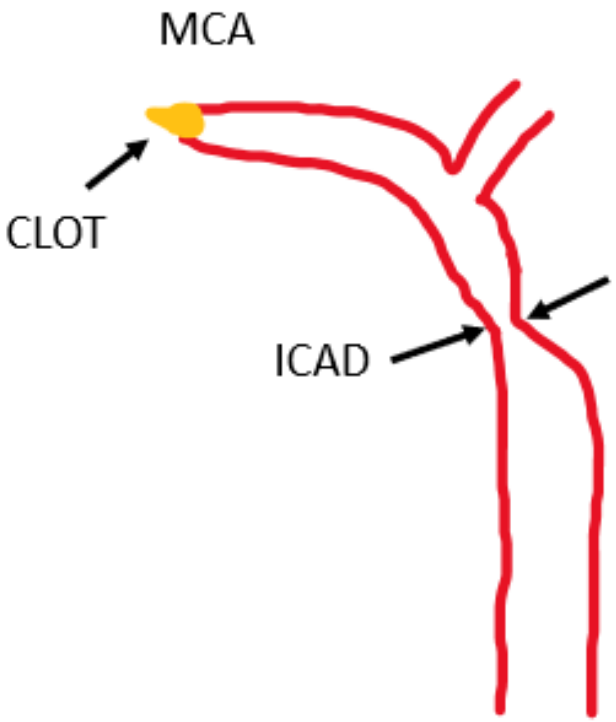
## REVIVING 3 MAX CATHETER WITH SOLUMBRA TECH– A NEW TECH



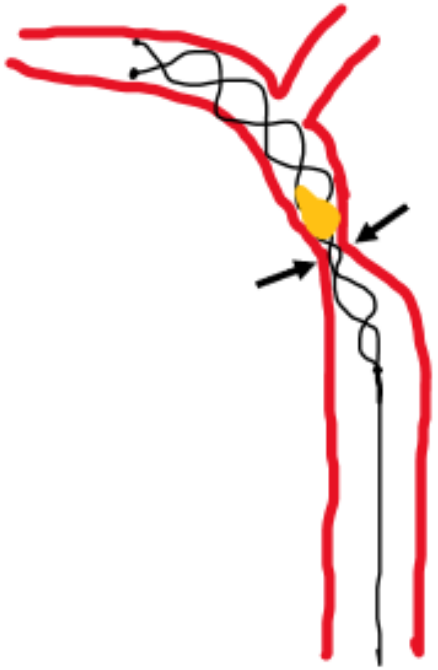

PINCHING THE CLOT AND LOCKING THE SYSTEM



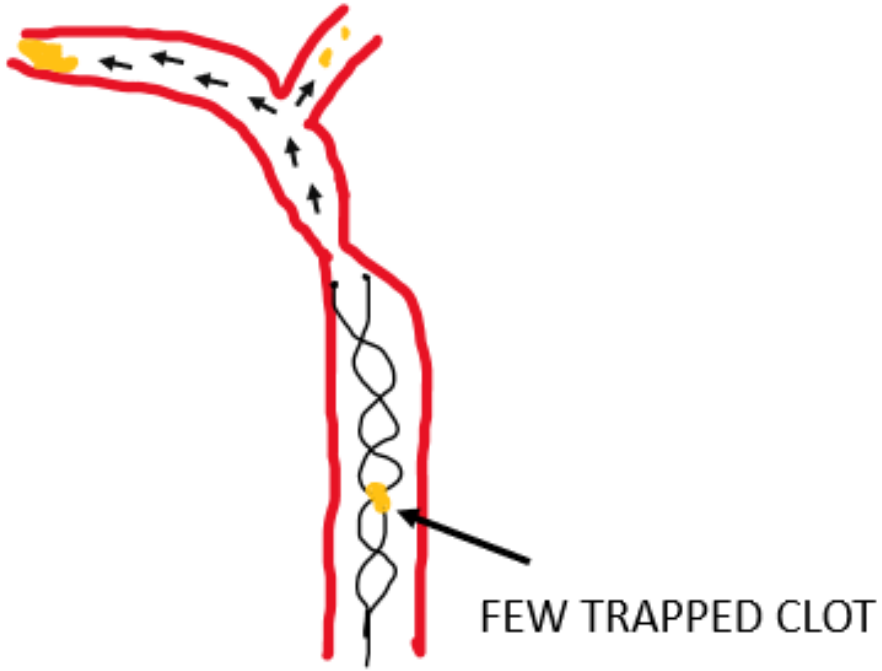
# ASSUMPTION WITH STENT RETRIEVER ONLY TECH




**NARROW EXIT FOR THE CLOT**

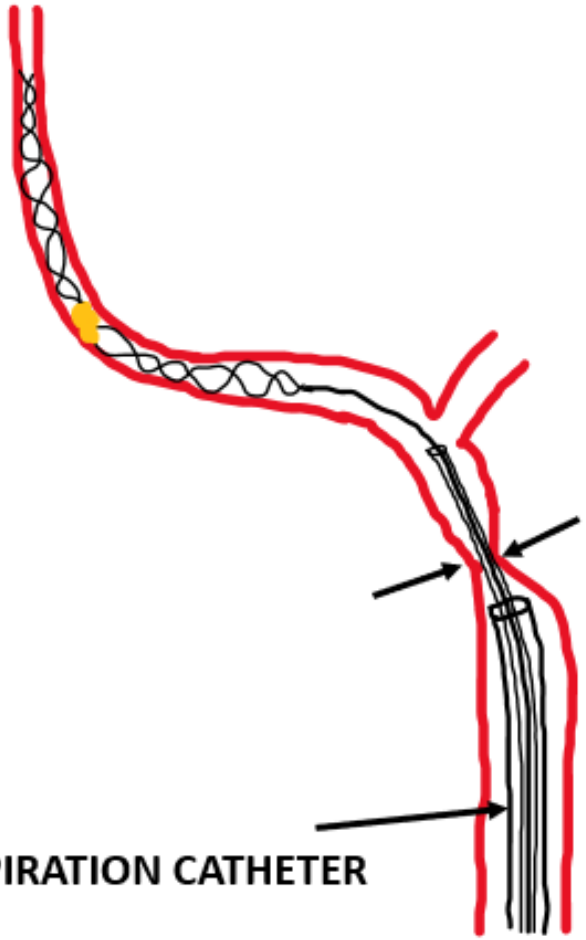


**RE OCCLUSION/MIGRATION INTO NEW TERRITORY**




PROBABLY NOT A RIGHT CHOICE

# ASSUMPTION WITH SOLUMBRA - LARGER SIZE ASPIRATION CATHETER

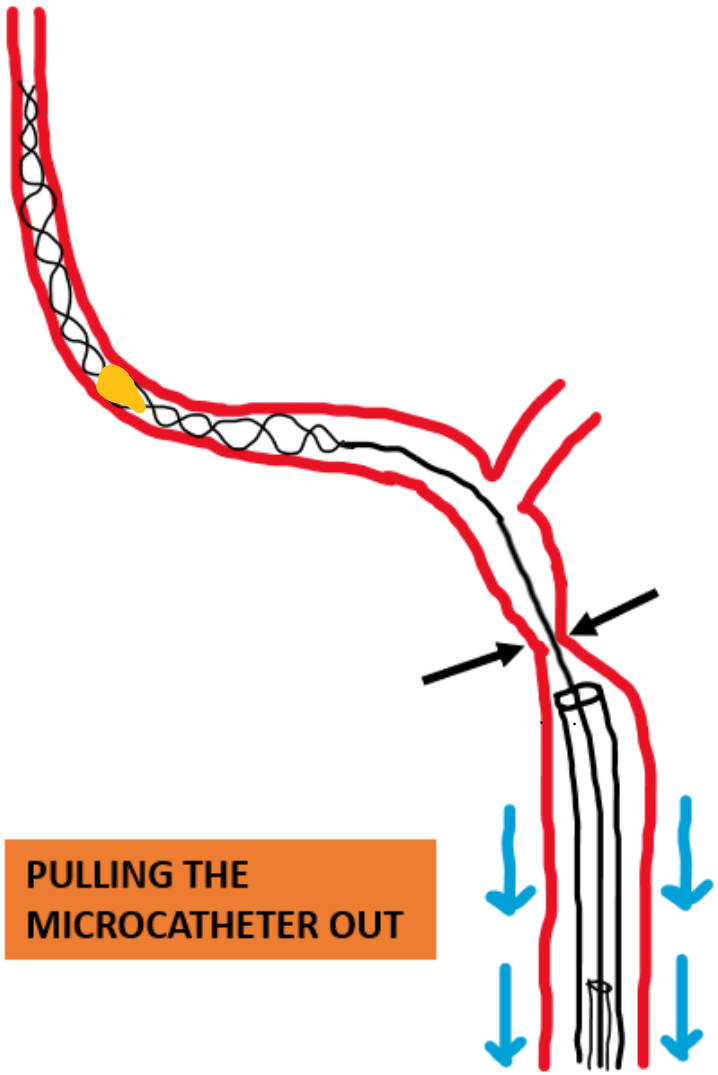


6F ASPIRATION CATHETER

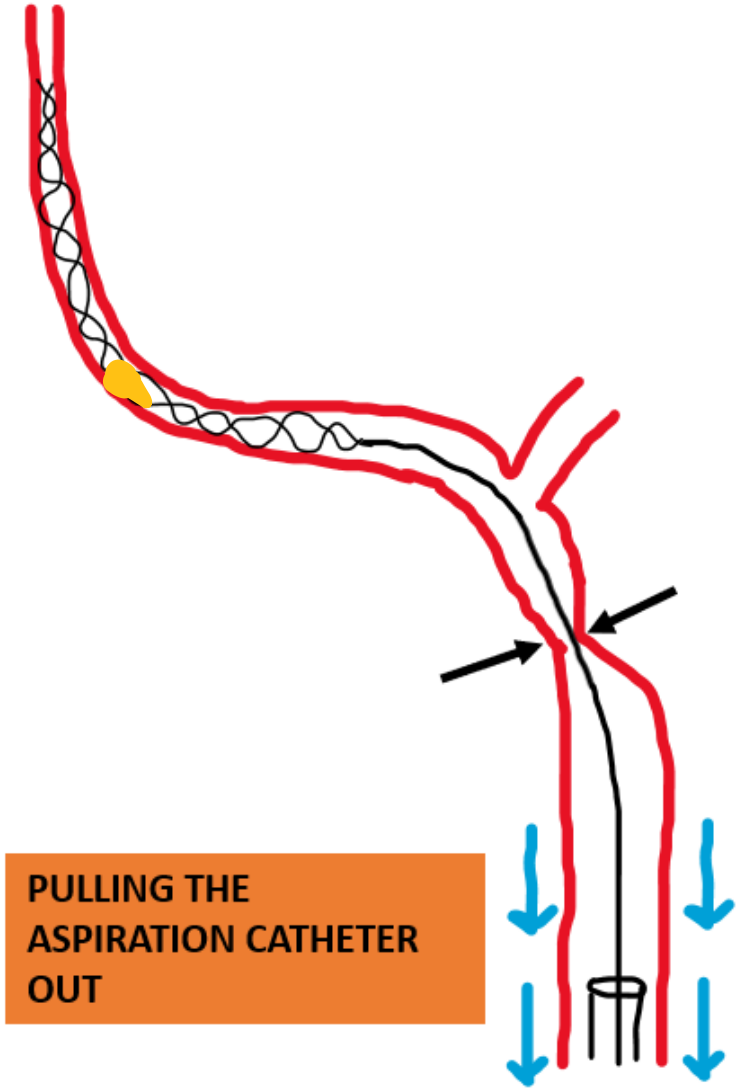
DIFFICULT NEGOTIATION OF ASPIRATION CATHETER (6F) BEYOND STENOSIS

SOLUMBRA WITH AC AT THE MOUTH OF CLOT - NOT POSSIBLE WITH 6F

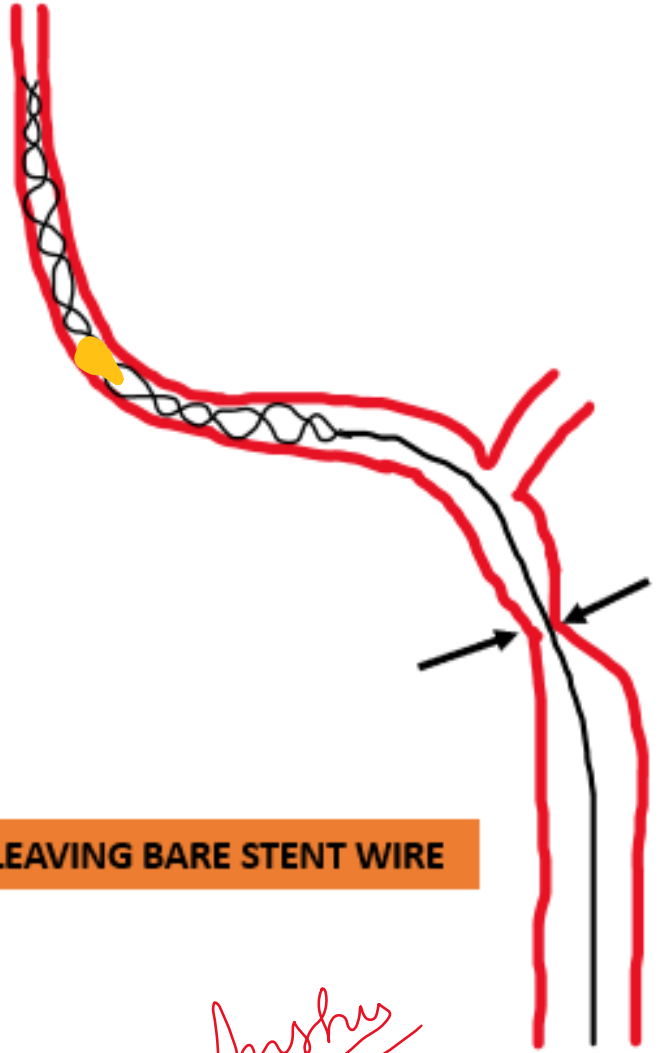
PROBABLY NOT A RIGHT CHOICE



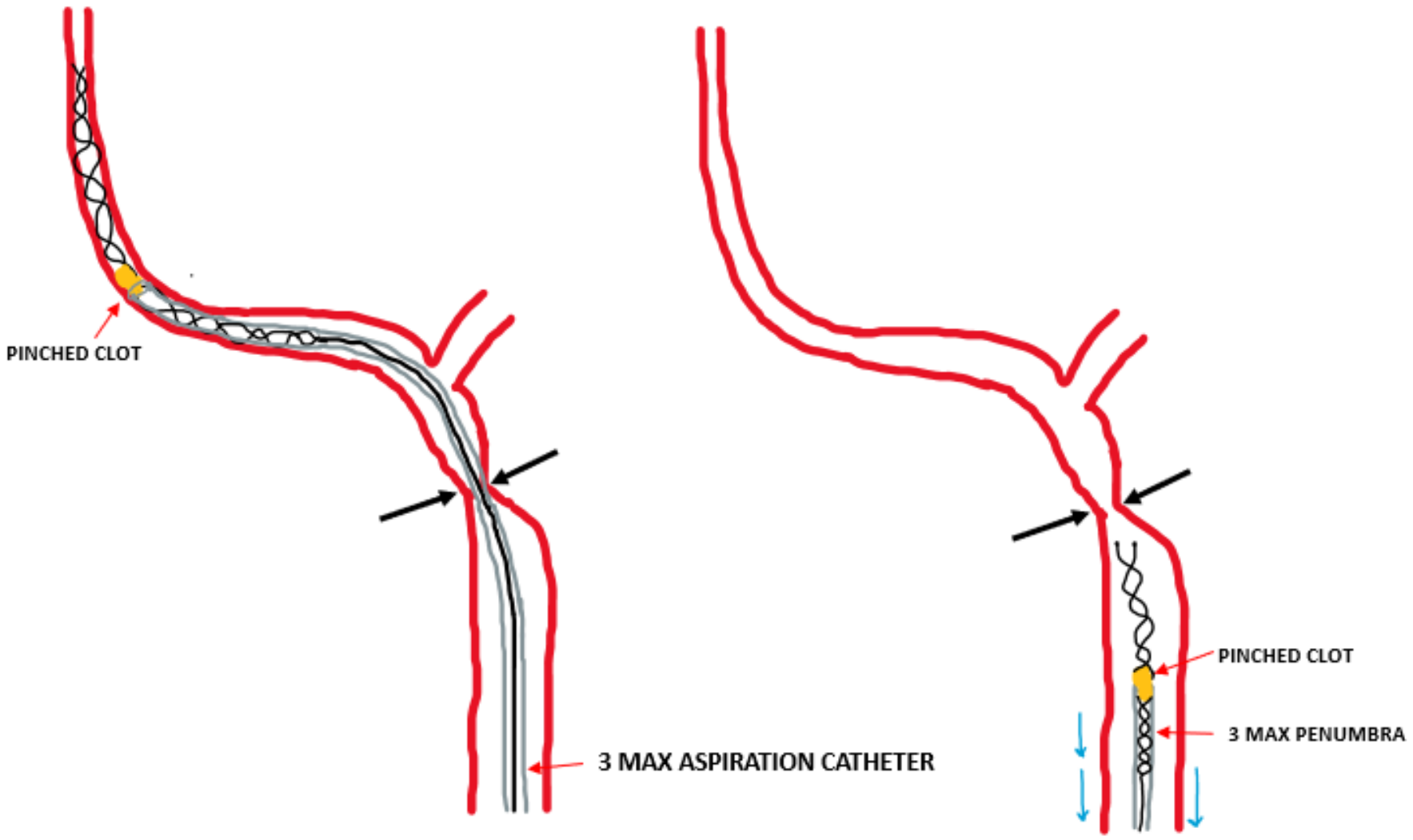
PULLING THE MICROCATHETER OUT



PULLING THE ASPIRATION CATHETER OUT

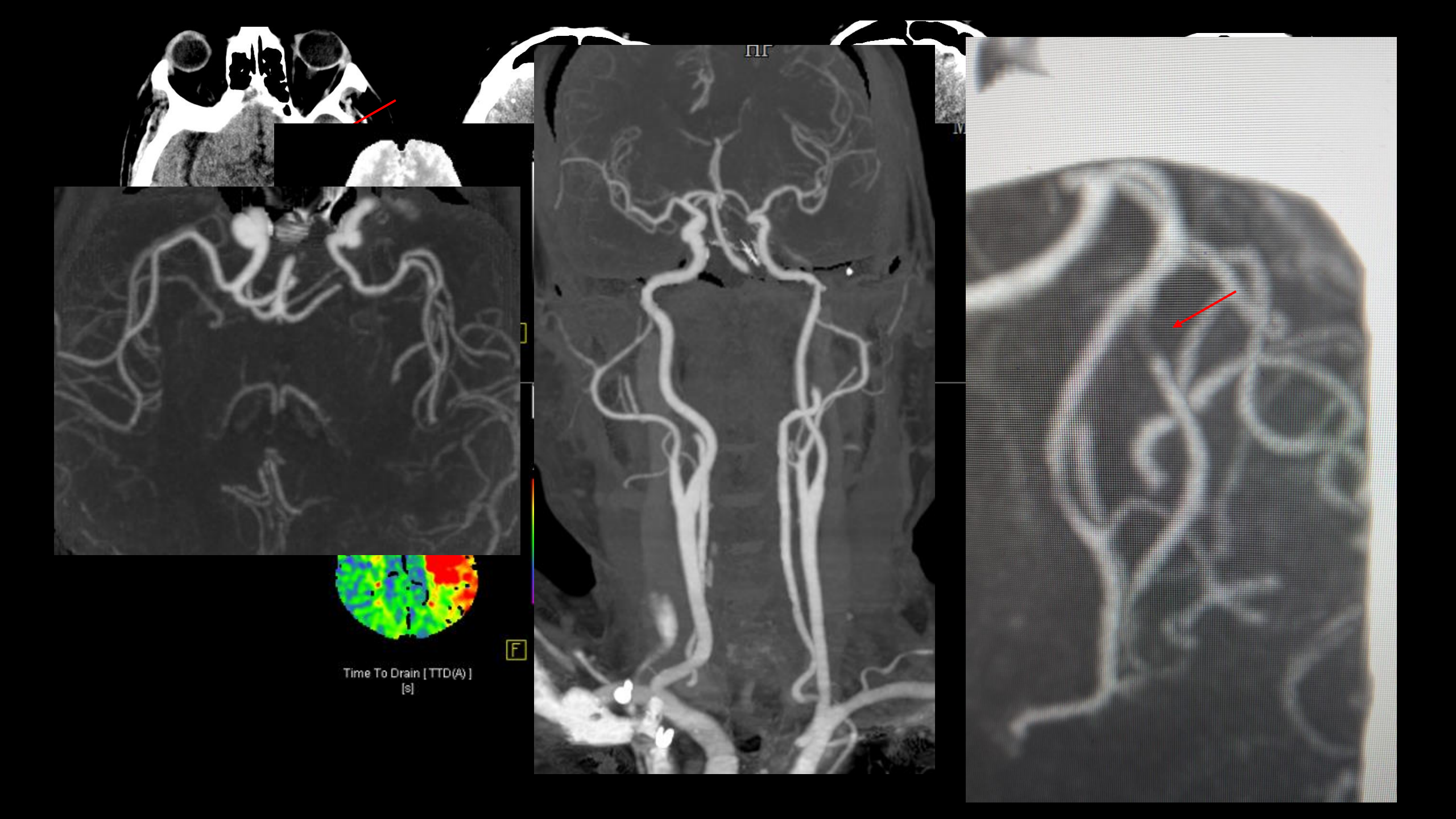


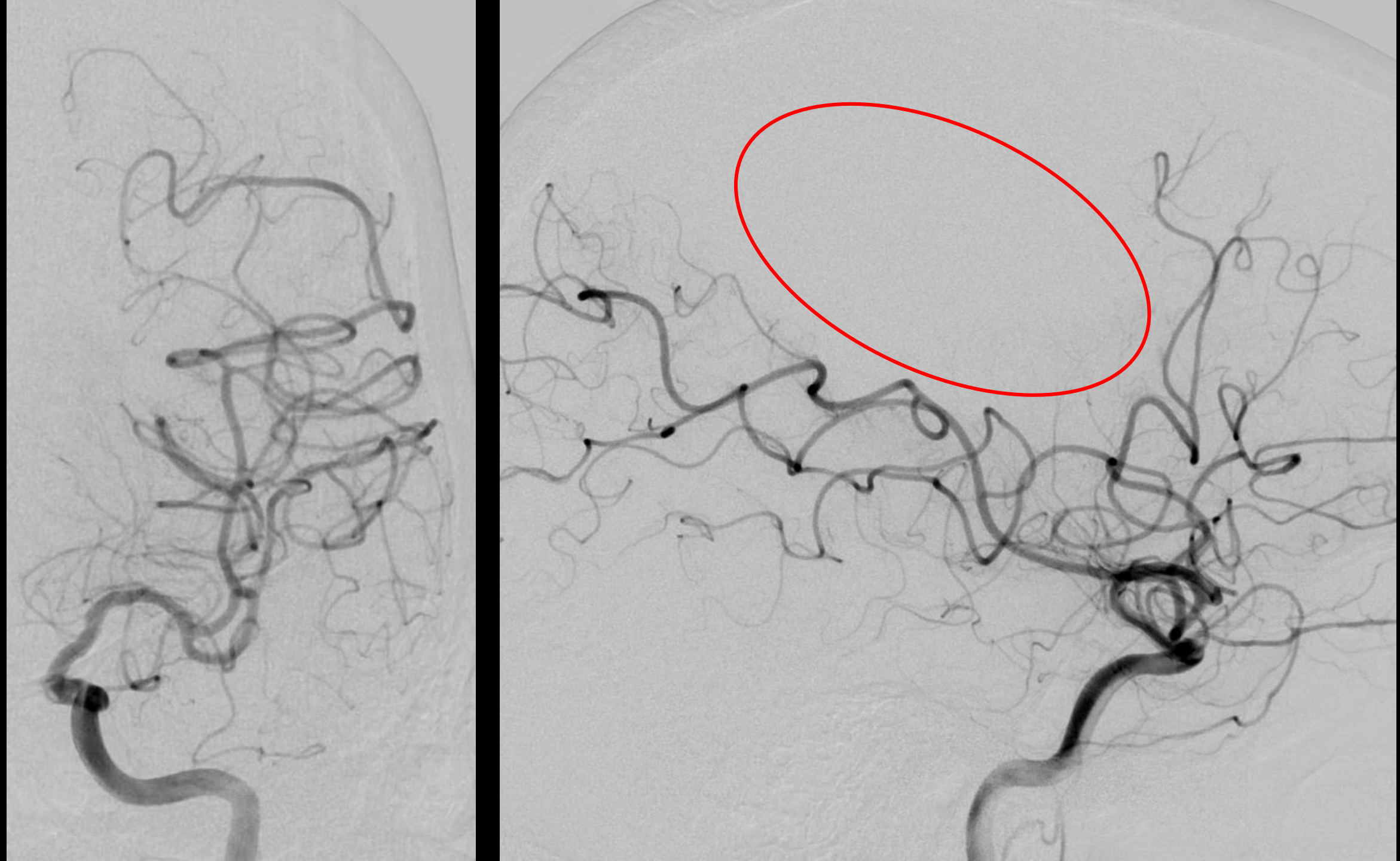
LEAVING BARE STENT WIRE


PINCHED CLOT
3 MAX ASPIRATION CATHETER
PINCHED CLOT
3 MAX PENUMBRA

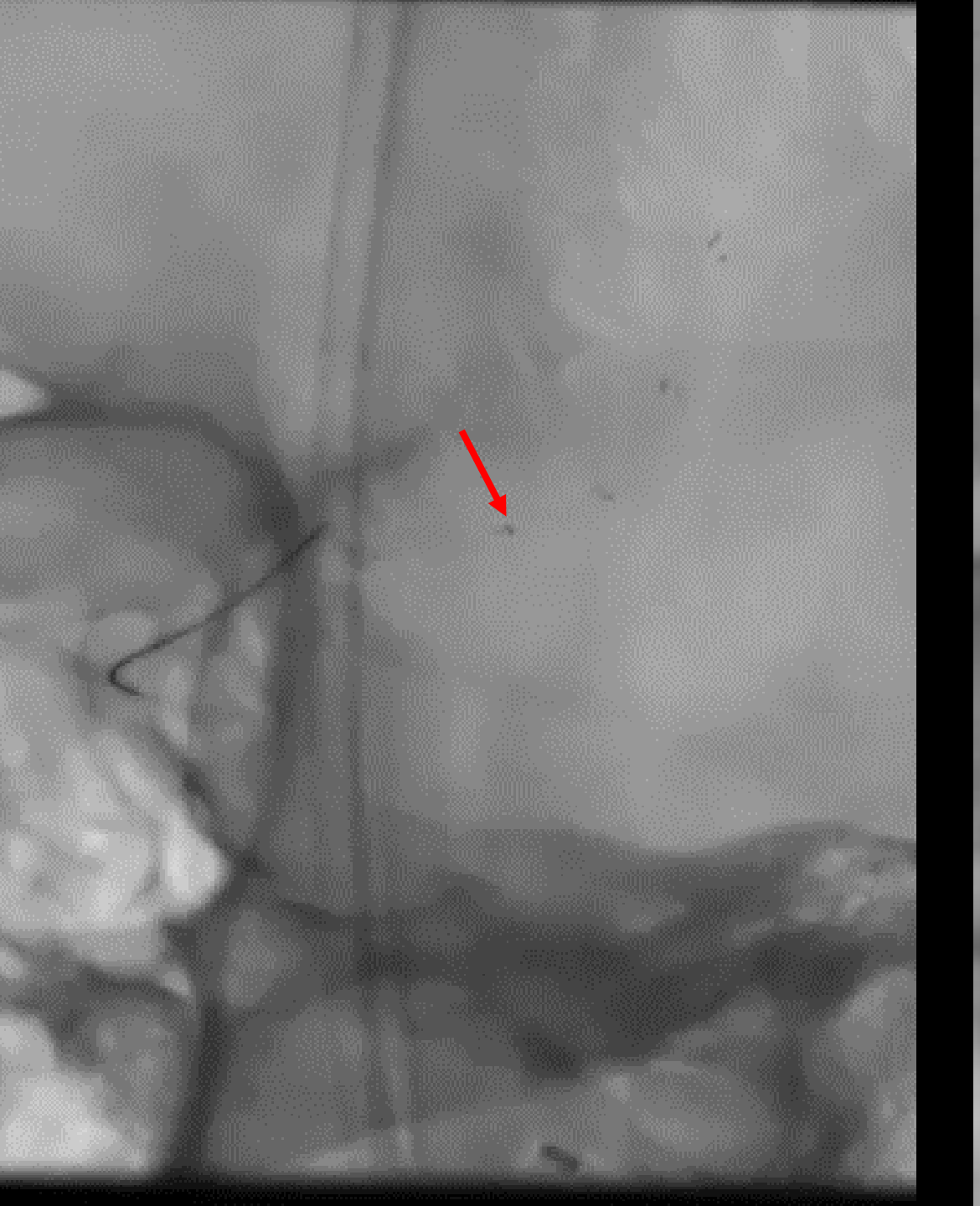
# CASE 2

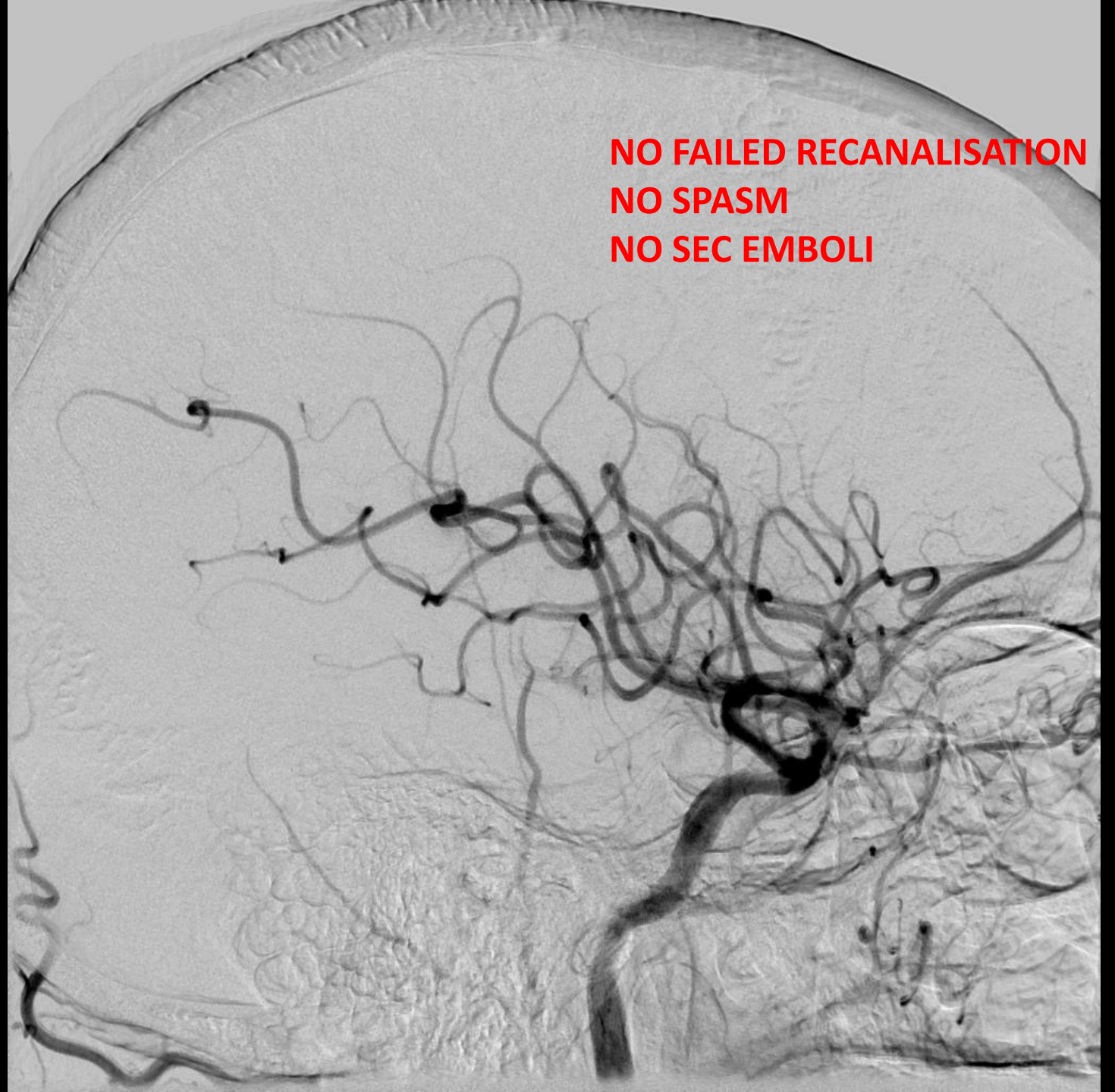
- 67 YR MALE,
- CHRONIC AF ON NOAC
- CAME IN WINDOW OF 9 HOURS
- RIGHT HEMIPARESIS WITH FACIAL AND BROCA'S
- NIHSS 14


Time To Drain [ TTD(A) ]
[s]




LOCALISE THE SITE OF THE CLOT

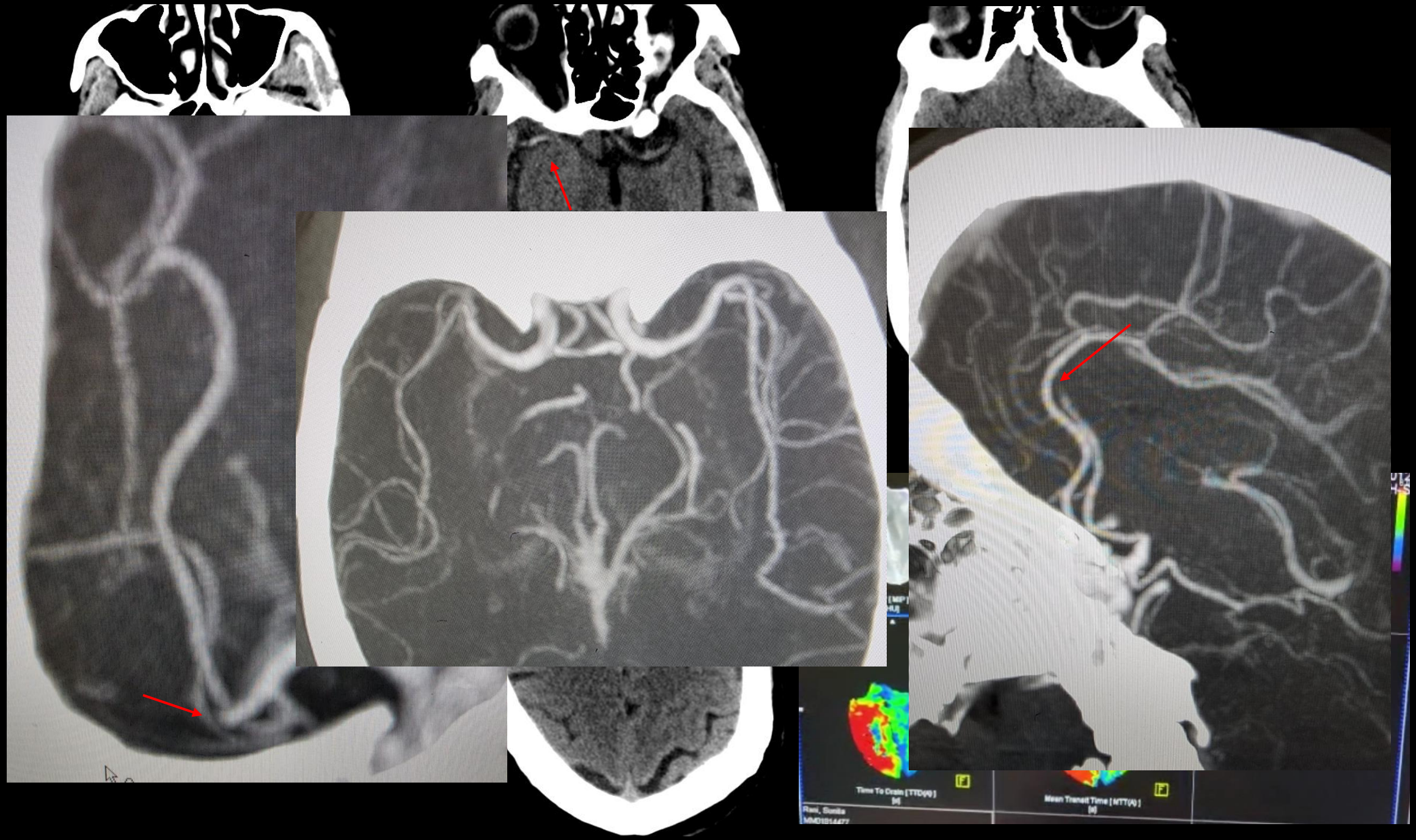


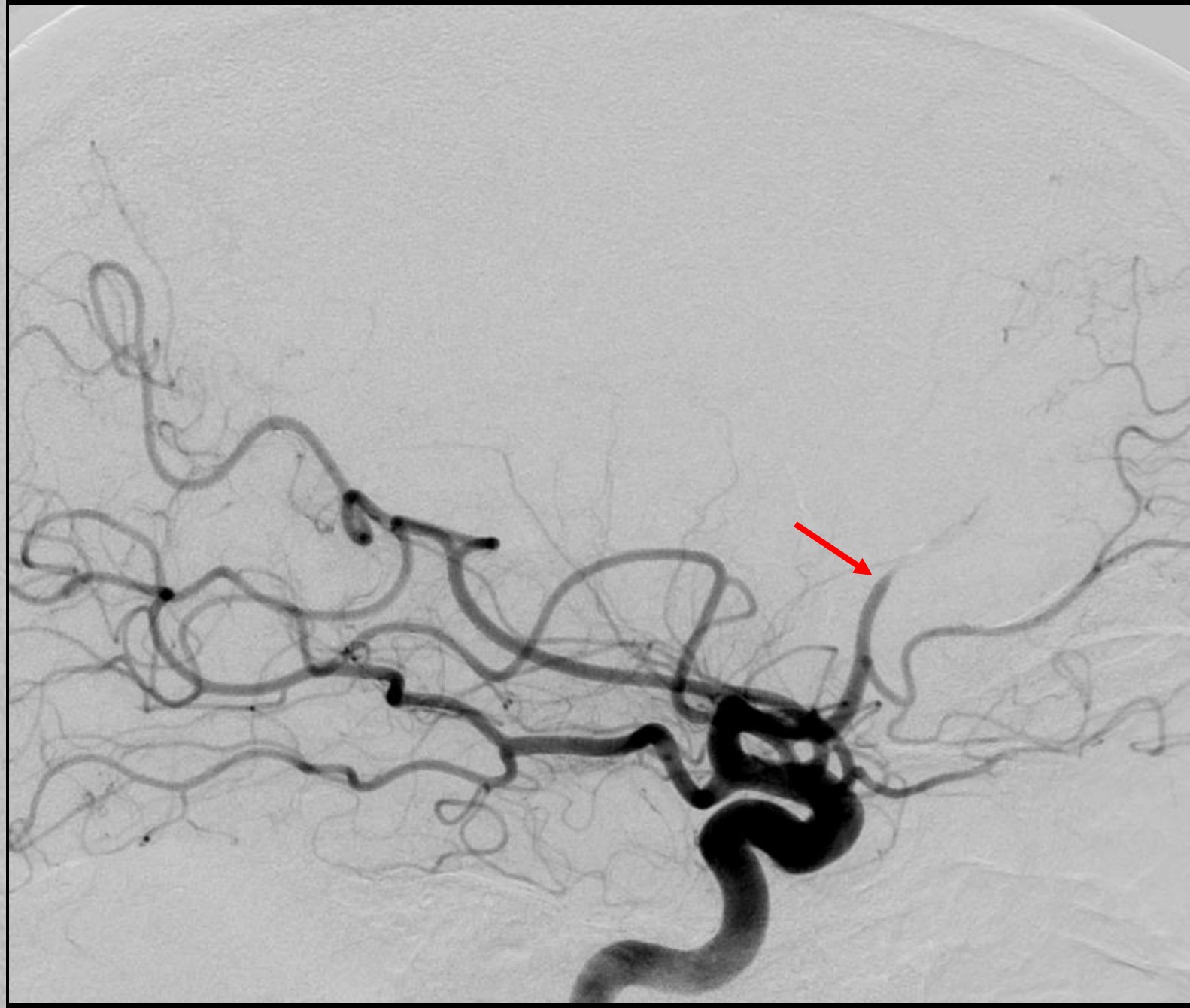

NO FAILED RECANALISATION
NO SPASM
NO SEC EMBOLI

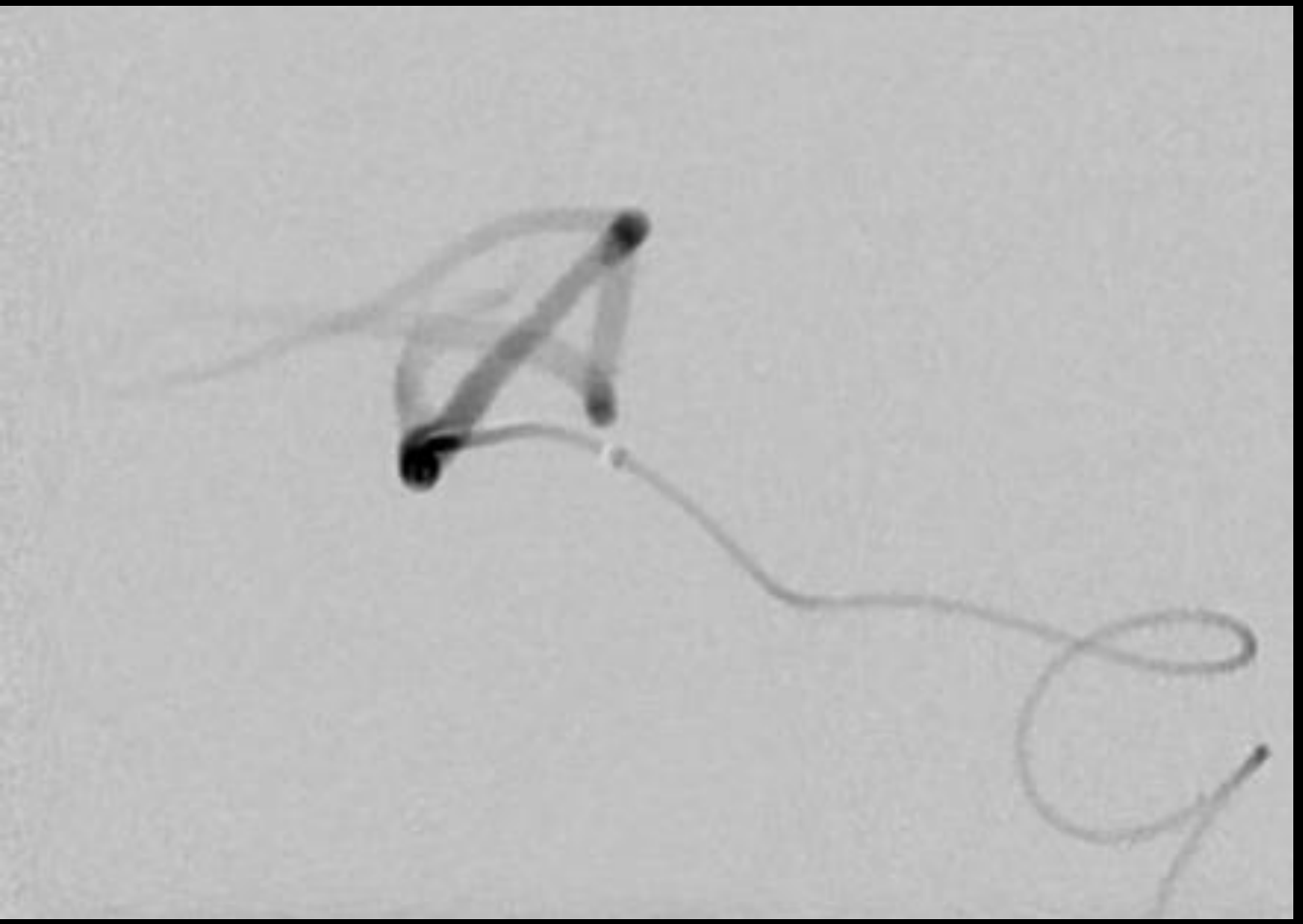
# Post 24 Hours CT

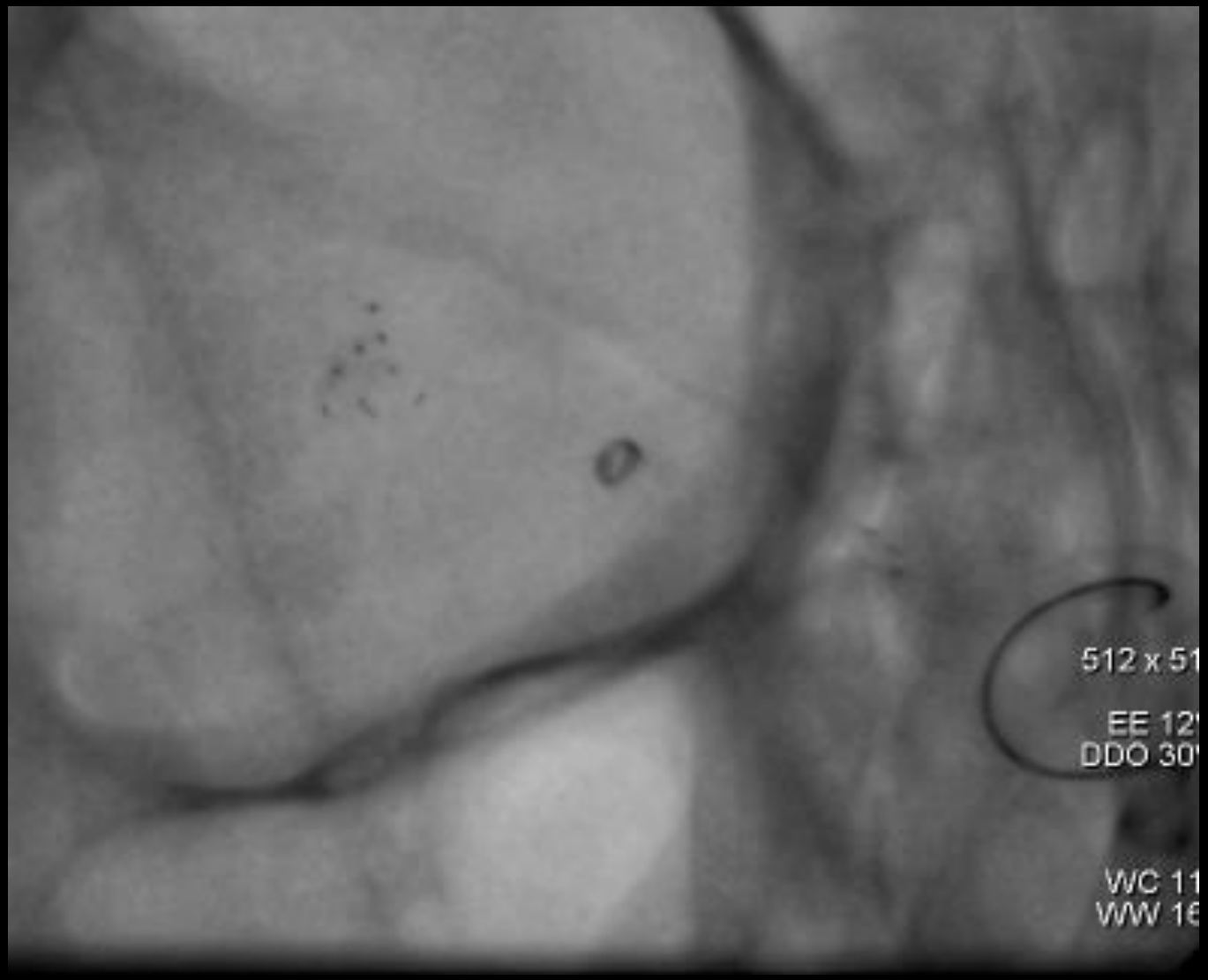
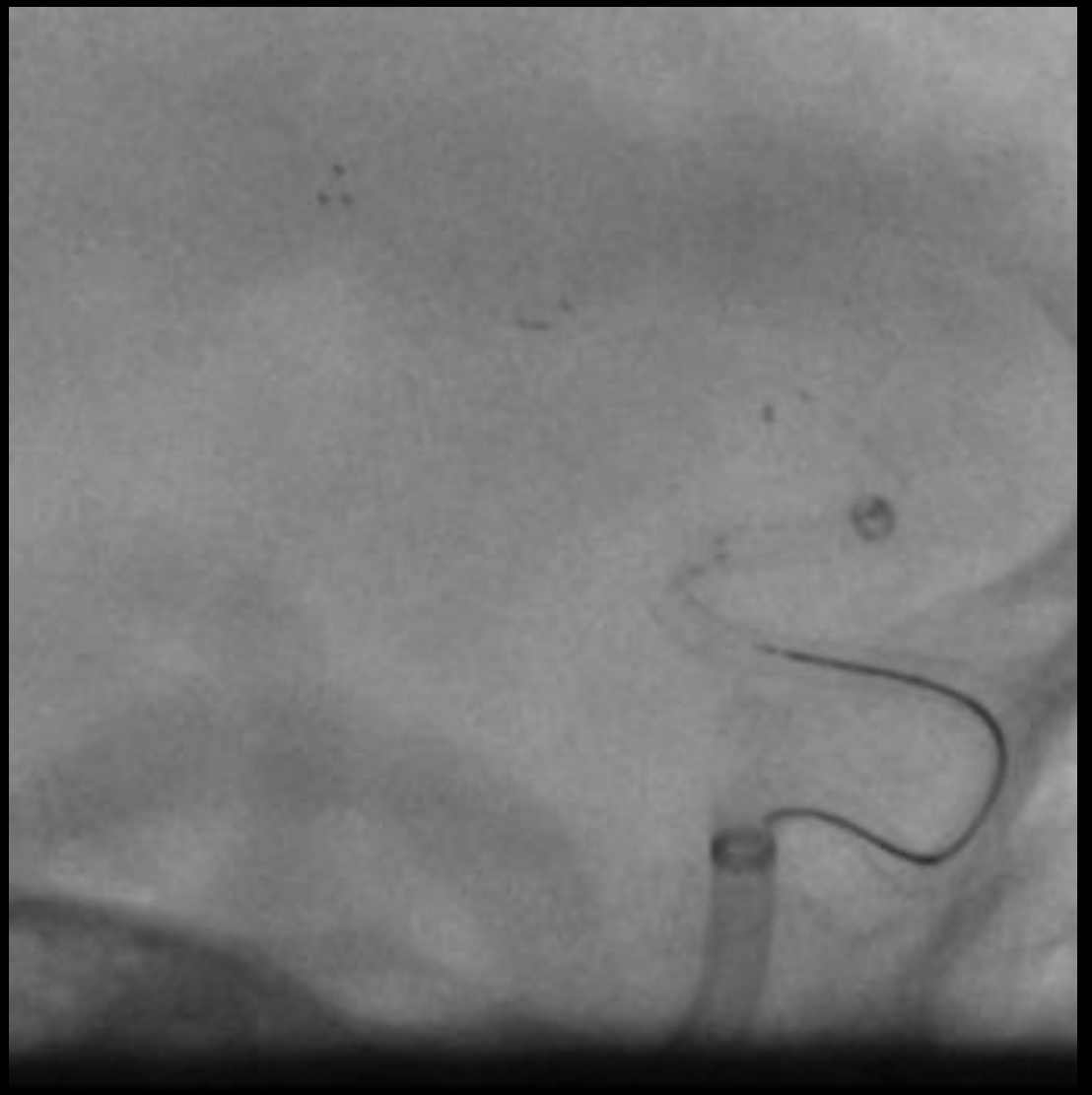
# CASE 3

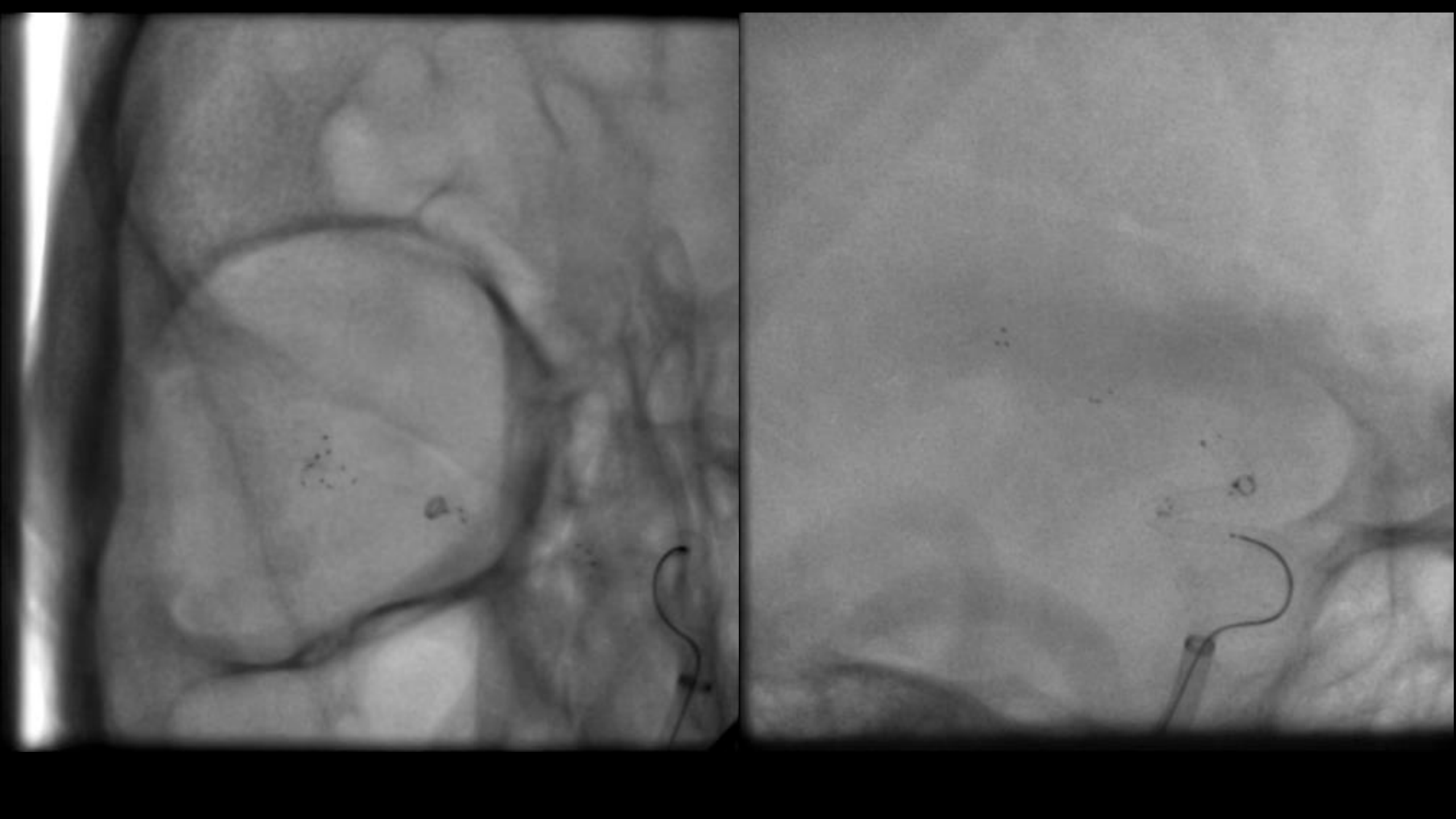
- 64 YR FEMALE,
- CAME IN WINDOW OF 2 HOURS
- LEFT SIDED HEMIPARESIS
- NIHSS 11

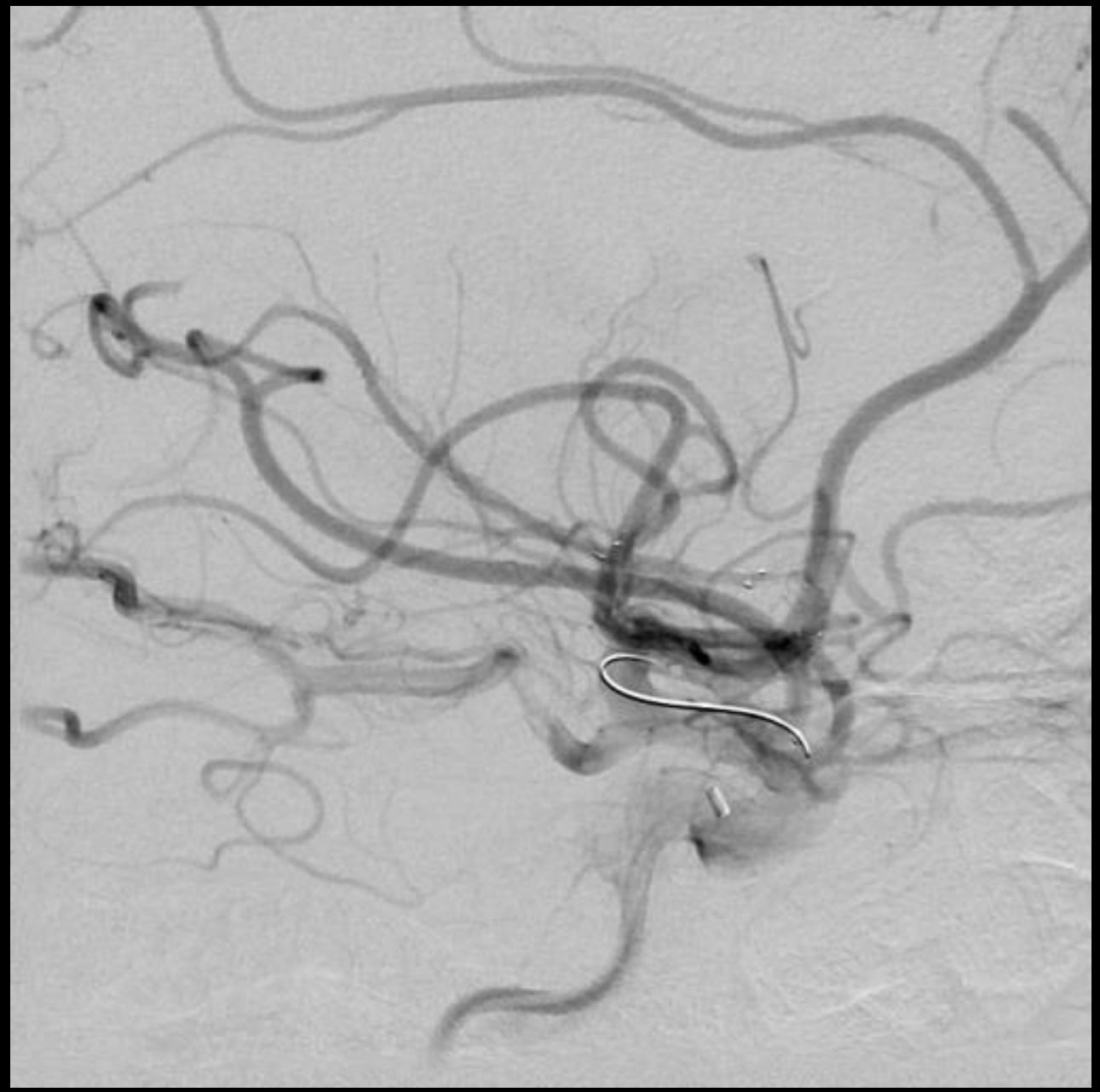

Time To Drain [ TTD(s) ]
Mean Transit Time [ MTT(s) ]

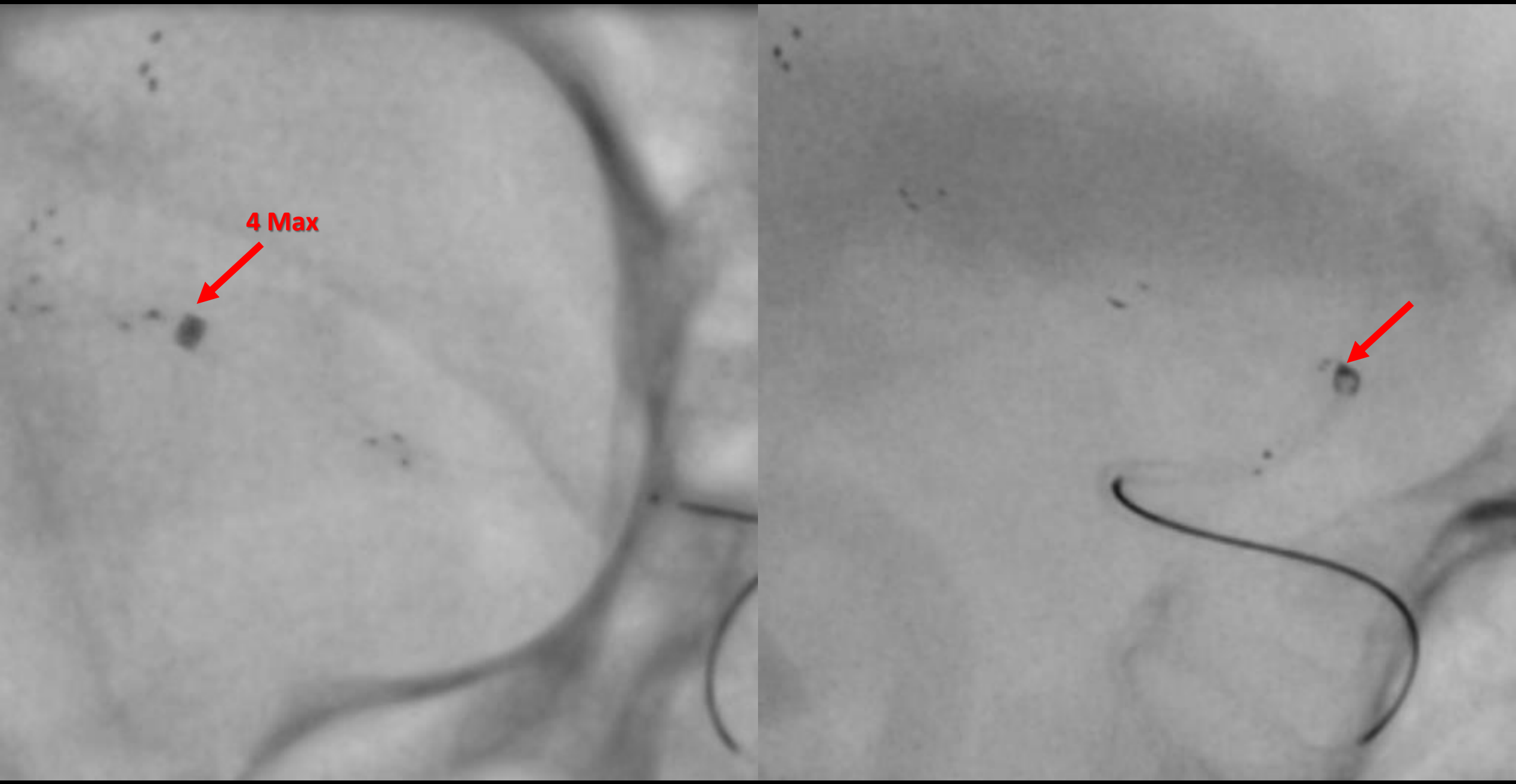


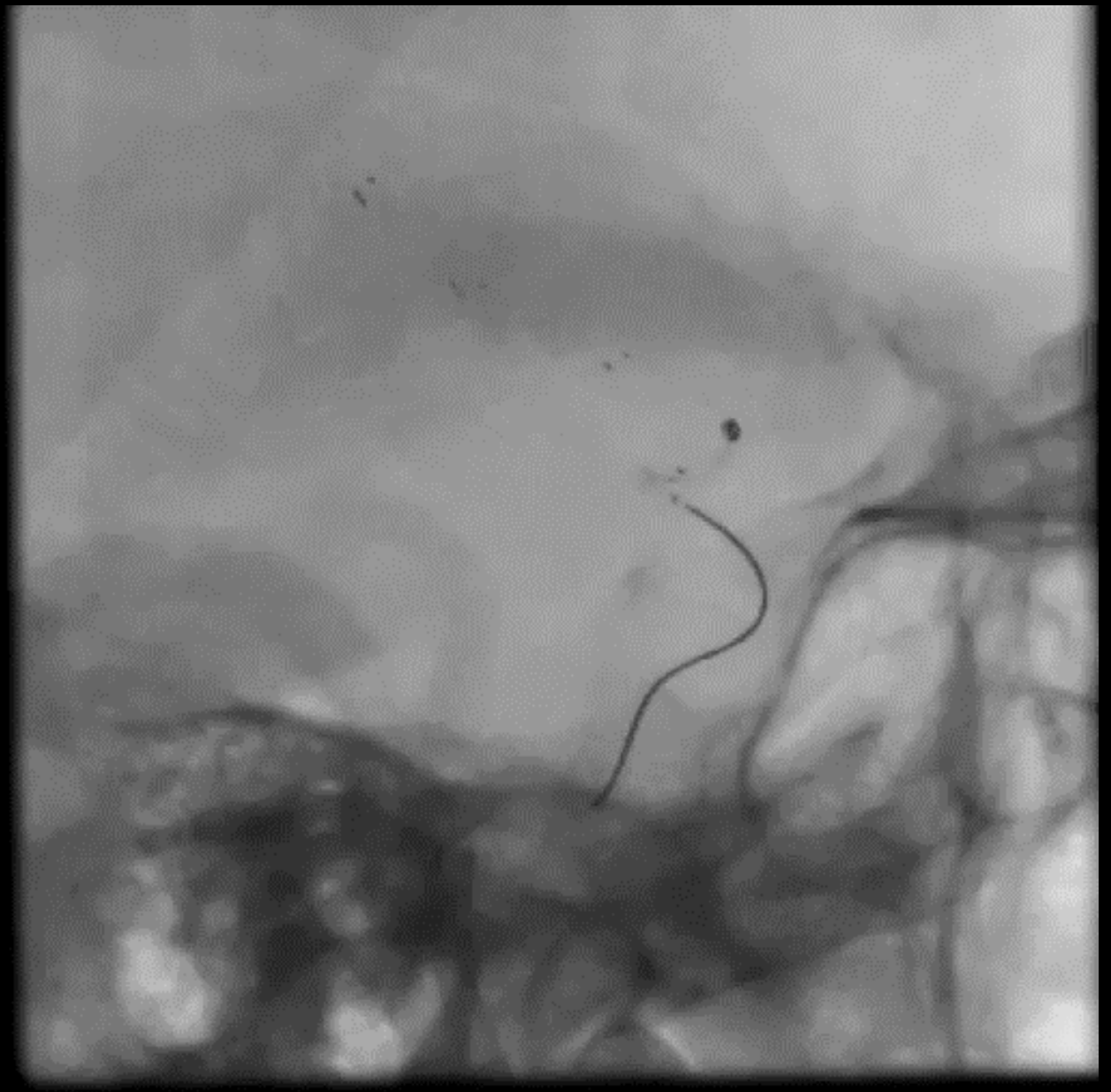



512 x 51
EE 12
DDO 30
WC 11
WW 16


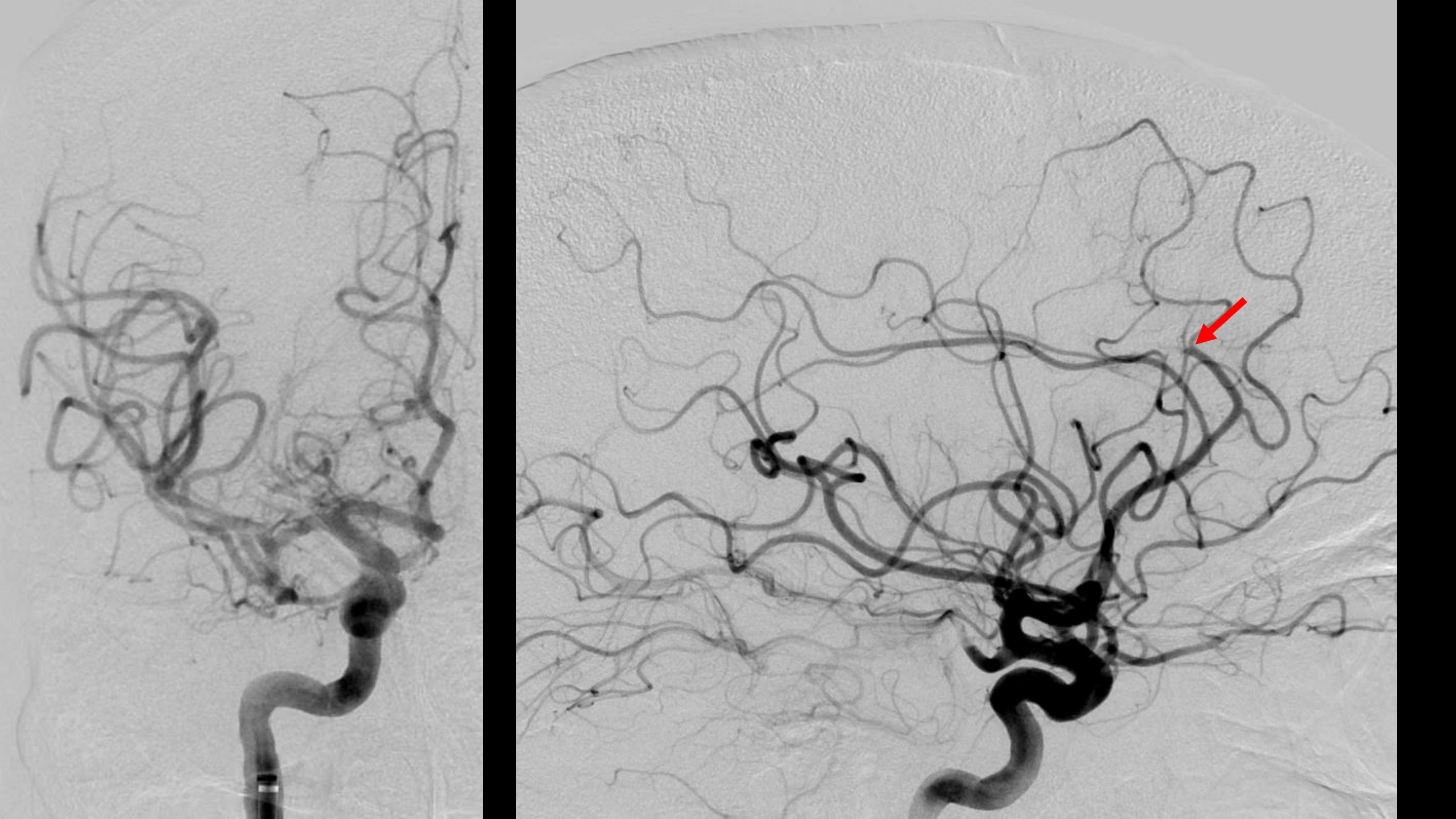


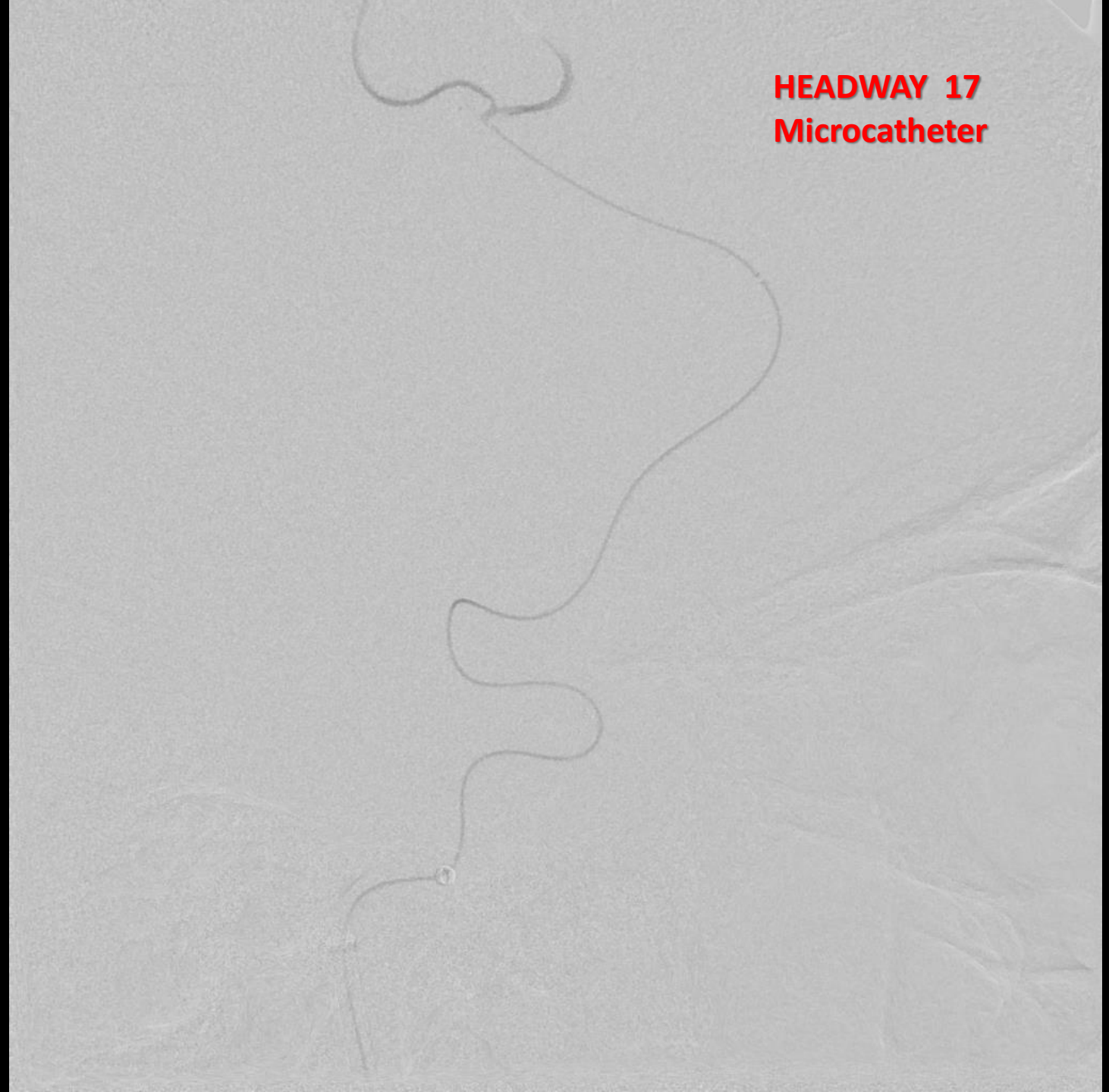


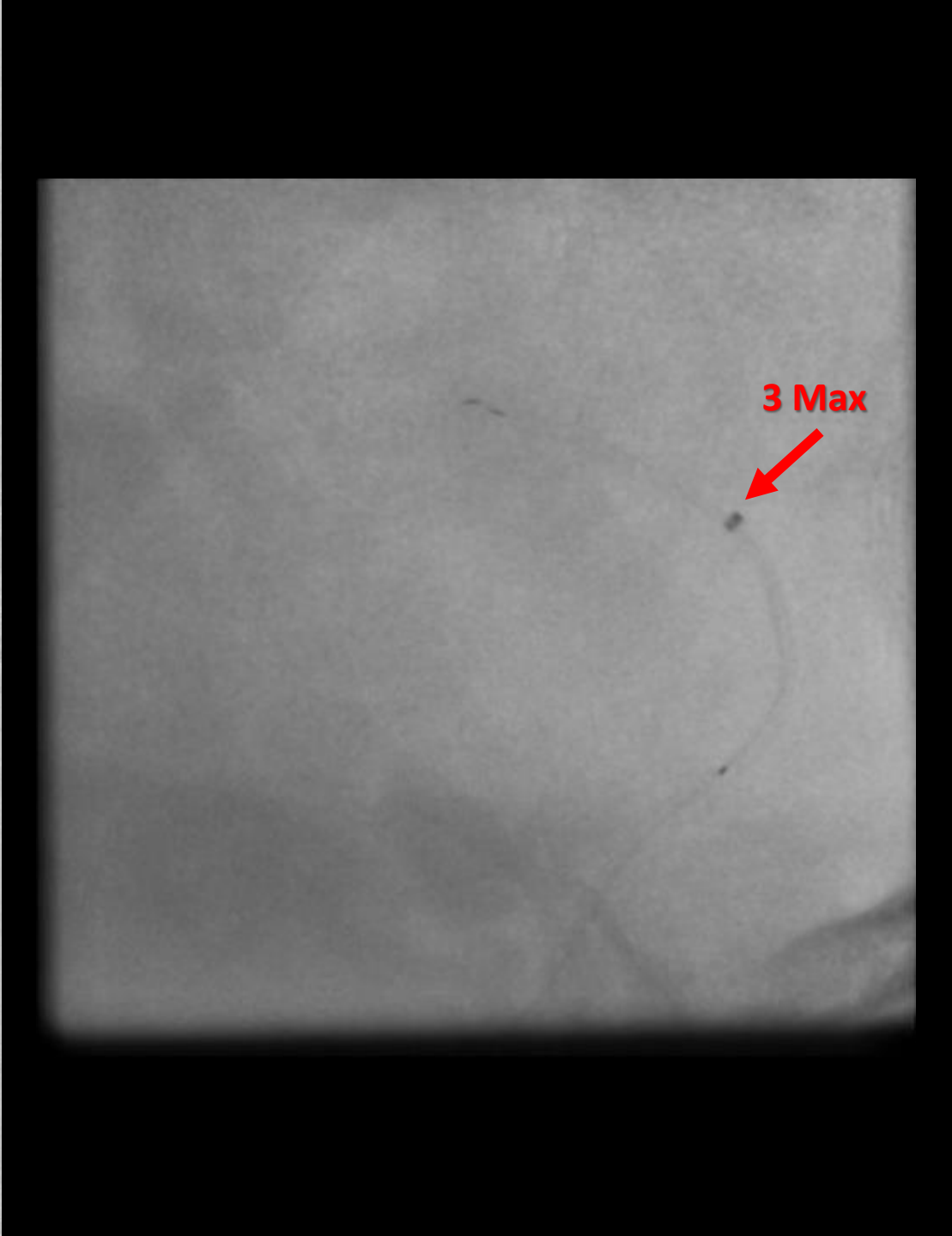

4 Max



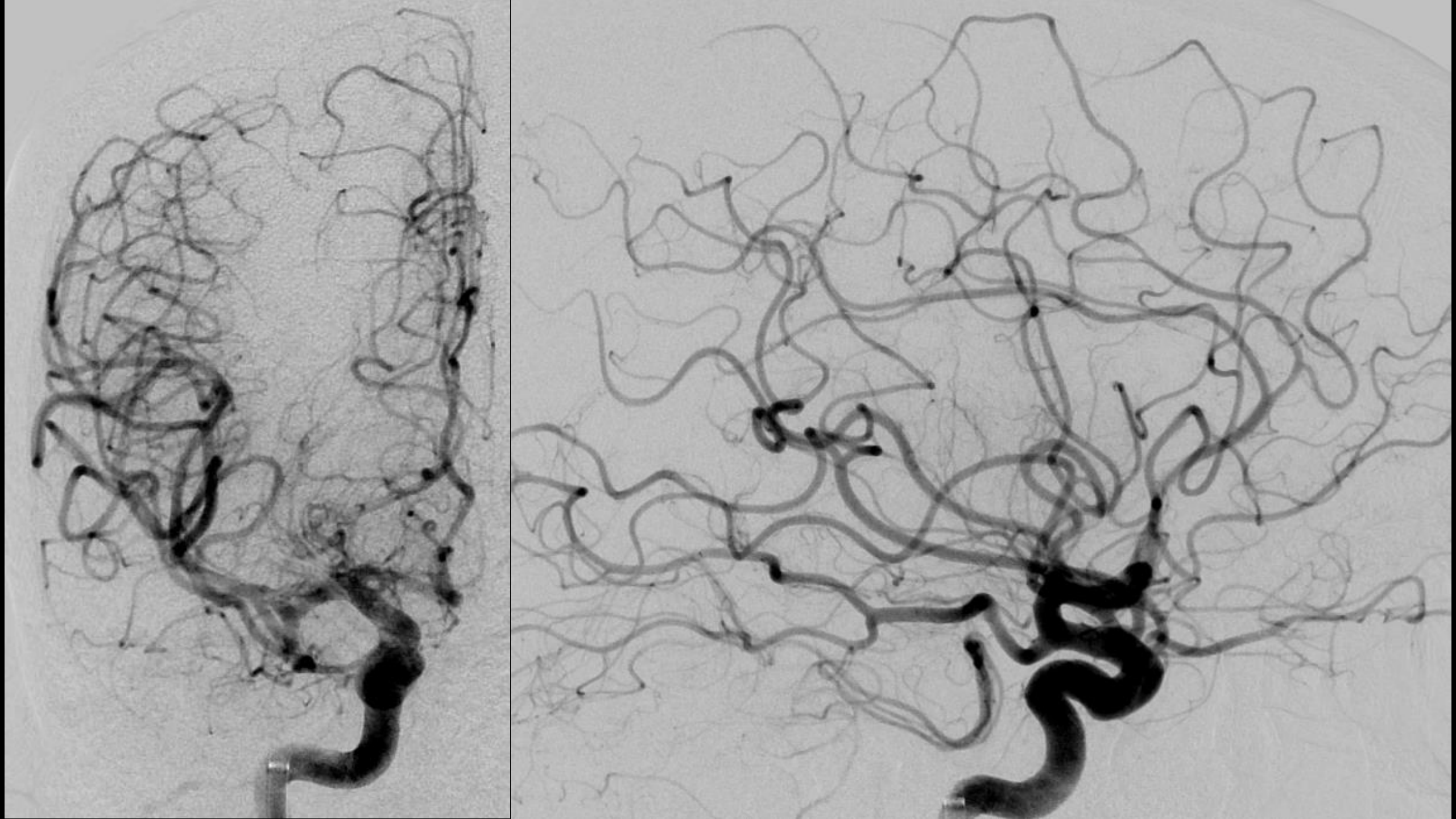

Warning! Prior to
damage that may have
use a catheter that has been
Damaged catheters may rupture
trauma or tip detachment during
steering maneuvers.
1. Remove shaping mandrel from card and
distal tip of the catheter.
2. Carefully bend catheter tip and shaping
desired shape. A slight over exaggerati
shape may be required to accommoda
catheter relaxation.
3. Shape the catheter by holding the sh
approximately 1 inch (2.5 cm not le
from the steam source for about 20
NOT EXCEED 30 SECONDS.)
4. Allow catheter tip to cool in air o
saline prior to removing mandre
5. Remove mandrel from cathet
Multiple shaping is not recom
6. Inspect the tip for any dam
resulted from steam shap
any damage is found, do
SOAW Rev1/2007




HEADWAY 17
Microcatheter


3 Max

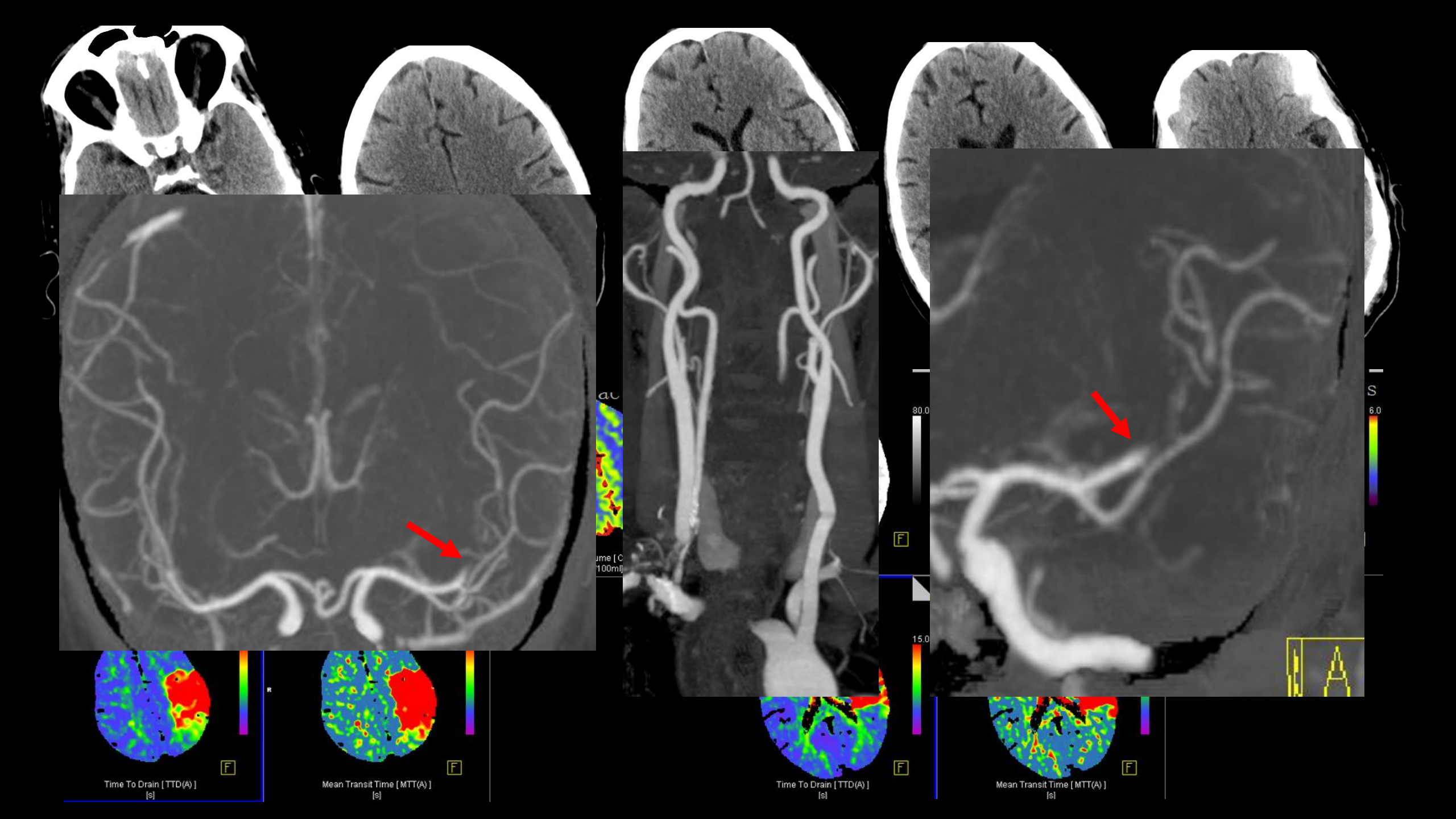
# DSA - MT

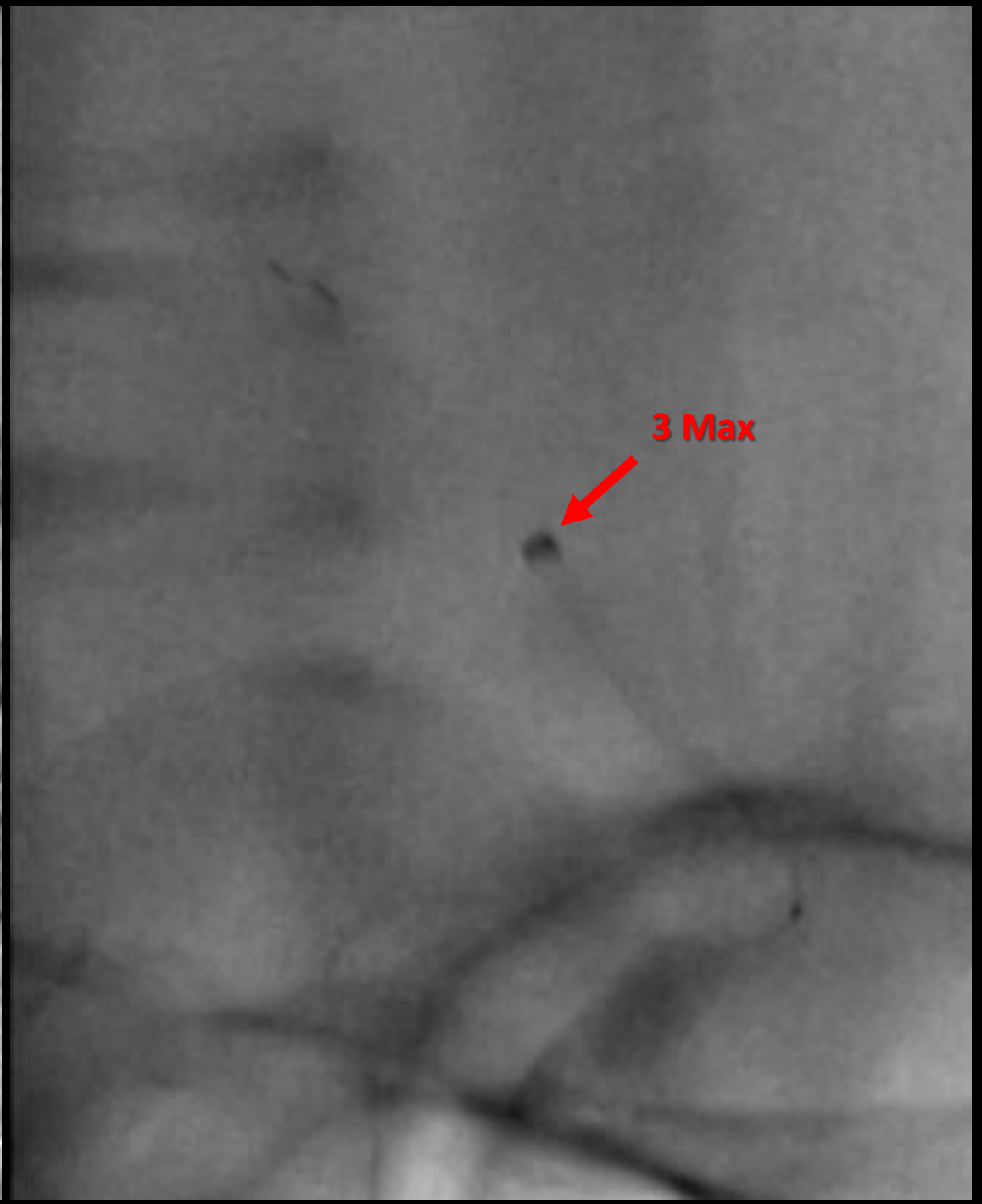


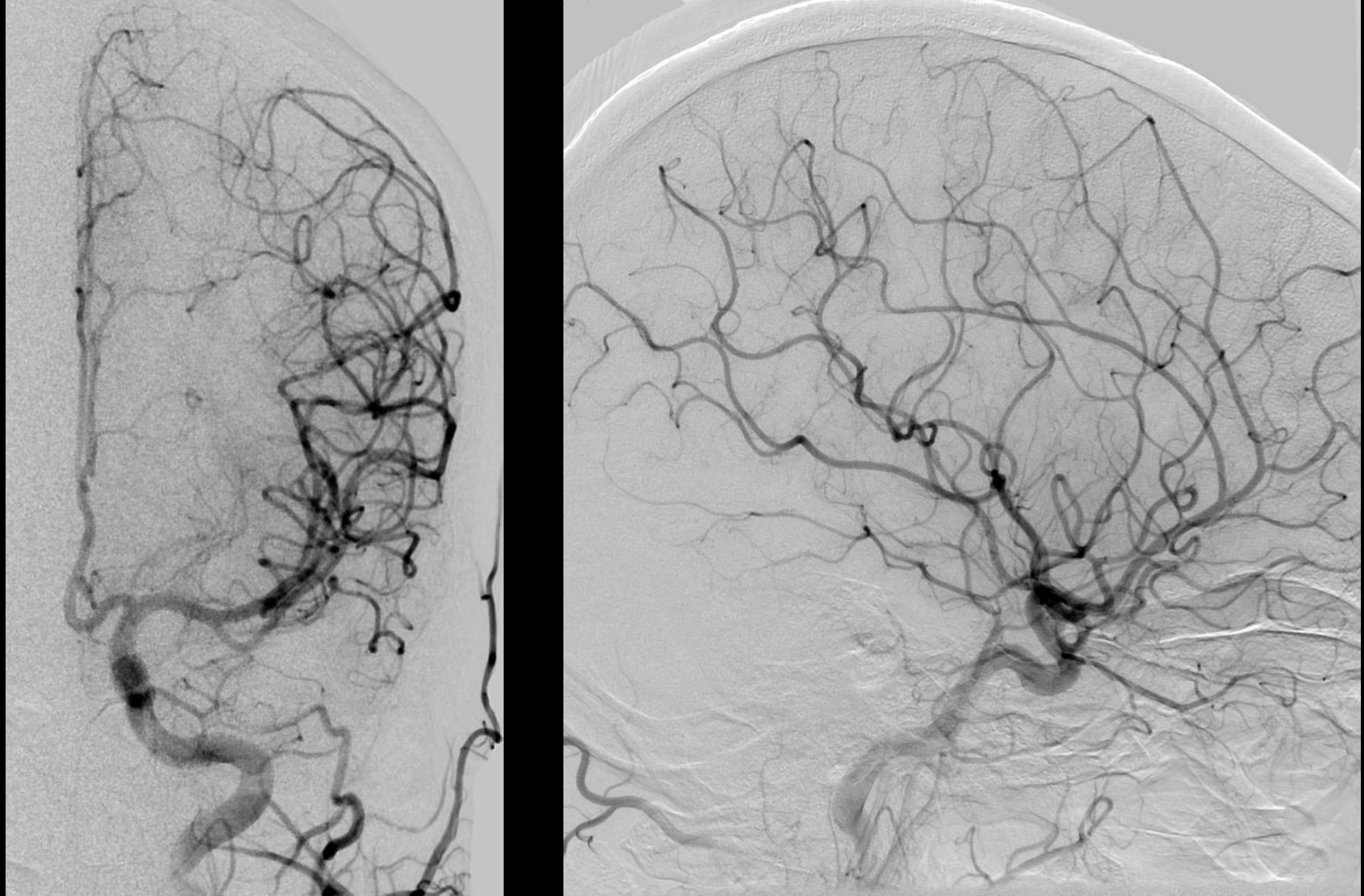
# POST 24 HOURS CT

# CASE 4 I

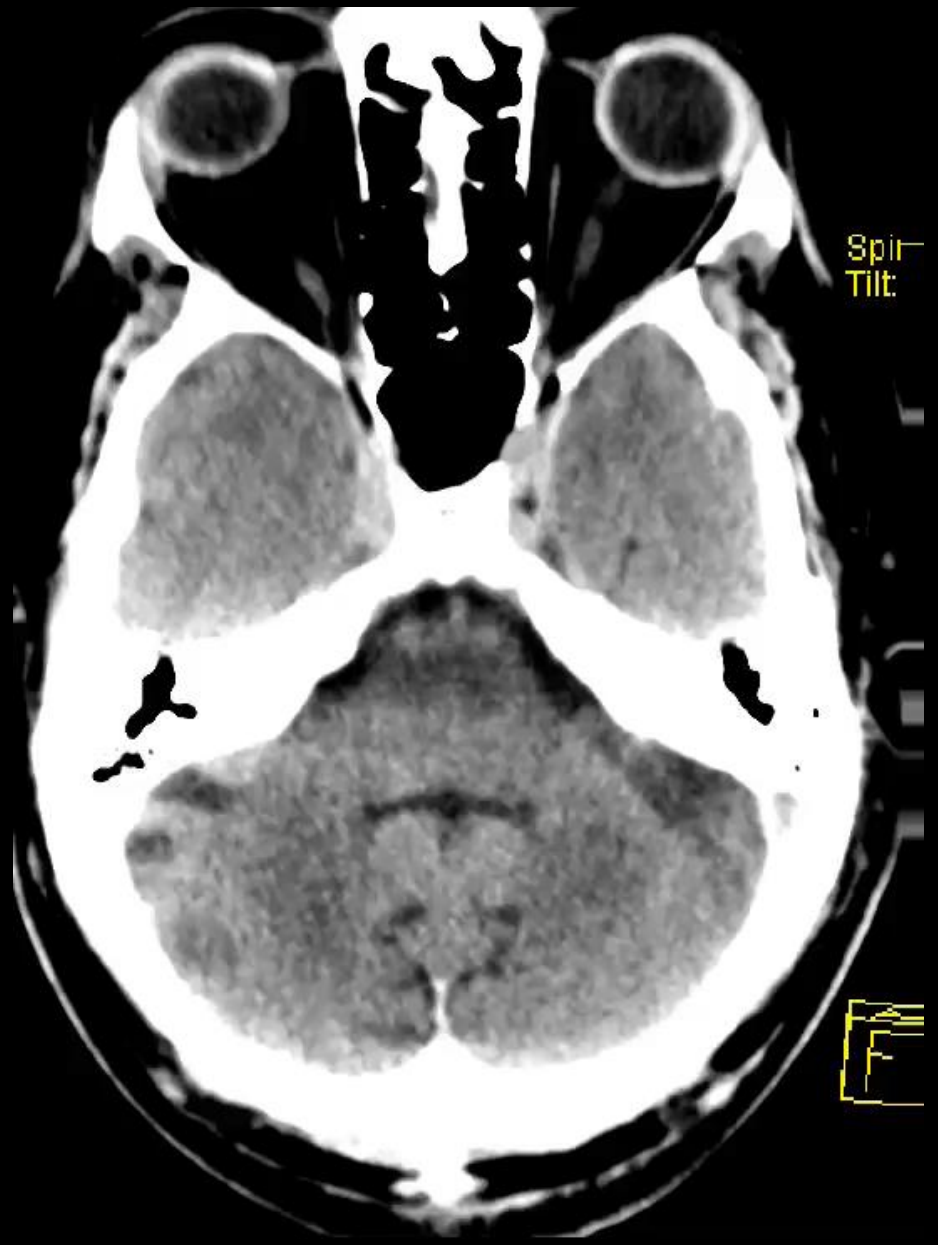
- 53 YR MALE,
- CAME IN WINDOW OF 1.5 HOURS
- RIGHT HEMIPARESIS WITH DYSARTHRIA
- NIHSS 5


80.0
15.0
6.0
Time To Drain [ TTD(A) ]
[s]
Mean Transit Time [ MTT(A) ]
[s]
Time To Drain [ TTD(A) ]
[s]
Mean Transit Time [ MTT(A) ]
[s]


3 Max



# POST 24 HOURS CT



ORIGINAL RESEARCH

## Blind exchange with mini-pinning technique for distal occlusion thrombectomy

Diogo C Haussen, Alhamza R Al-Bayati, Brendan Eby, Krishnan Ravindran, Gabriel Martins Rodrigues, Michael R Frankel, Raul G Nogueira

J NeuroIntervent Surg 2020;**12**:392–395

## Mechanical Thrombectomy in Medium Vessel Occlusions

### Blind Exchange With Mini-Pinning Technique Versus Mini Stent Retriever Alone

Carlos Pérez-García, MD; Manuel Moreu, MD, PhD; Santiago Rosati, MD; Patricia Simal, MD; Jose Antonio Egido, MD; Carlos Gomez-Escalonilla, MD; Juan Arrazola, MD, PhD

Stroke. 2020;51:3224–3231

- Higher rate of first-pass modified Thrombolysis in Cerebral Infarction 2b–3 (80% vs 56%; p=0.03) and a trend towards higher rates of first-pass full reperfusion (60% vs 40%; p=0.07) with BEMP compared with standard techniques
- 3MAX CATHETER
- KEPT THE ASPIRATION ON- INFACT NO NEED

## Blind Exchange With Mini-Pinning Technique Using the Tron Stent Retriever for Middle Cerebral Artery M2 Occlusion Thrombectomy in Acute Ischemic Stroke

*Takeshi Yoshimoto[1*], Kanta Tanaka[2,3], Junpei Koge[3], Masayuki Shiozawa[3], Hiroshi Yamagami[4], Manabu Inoue[2,3], Naruhiko Kamogawa[1,3], Tetsu Satow[5], Hiroharu Kataoka[5], Kazunori Toyoda[3], Masafumi Ihara[1] and Masatoshi Koga[3]*

*Front. Neurol. 12:667835.*
*doi: 10.3389/fneur.2021.667835*

# CASE 5

69 YR M

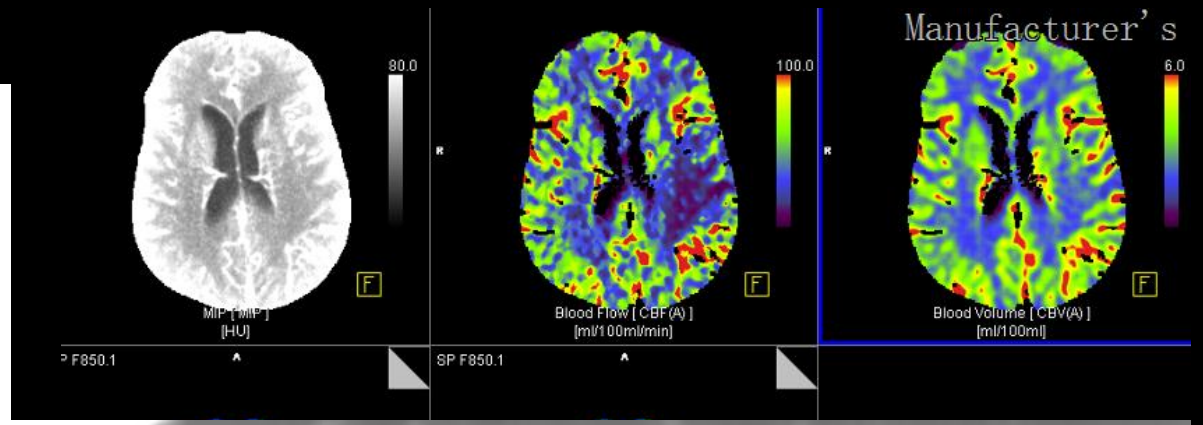
HTN DI

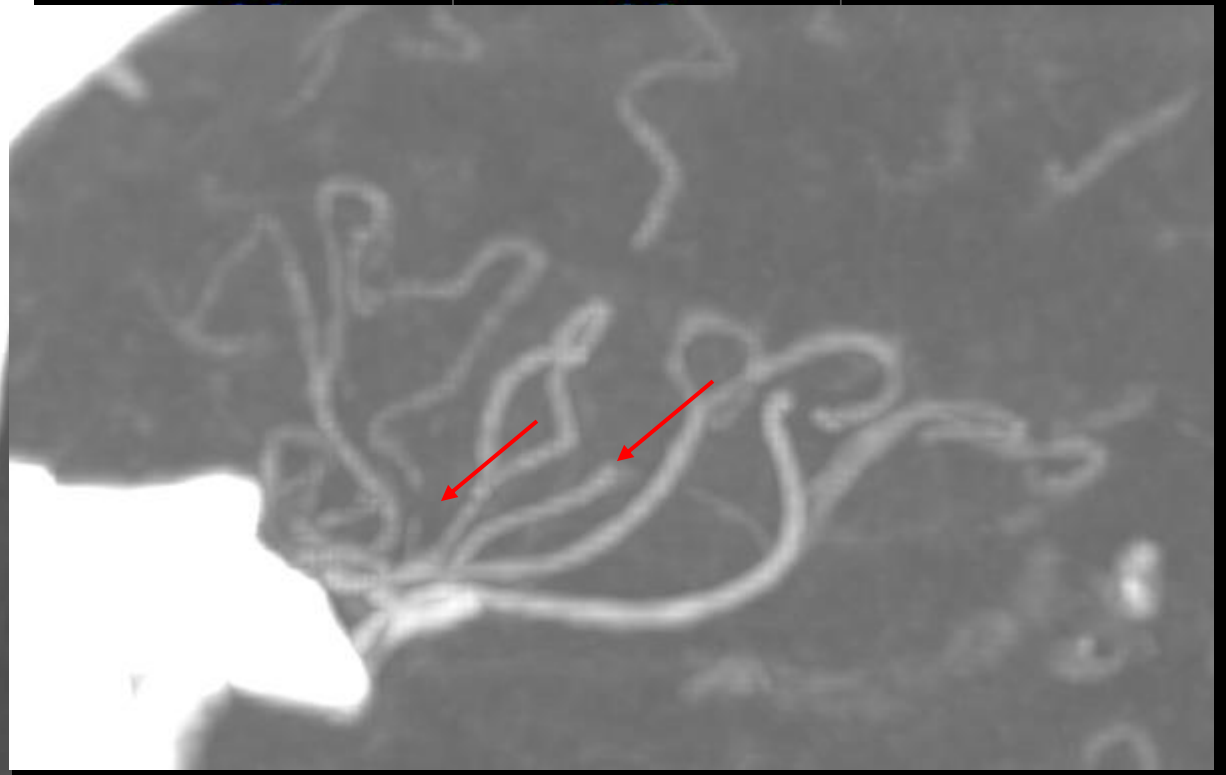
ICTUS

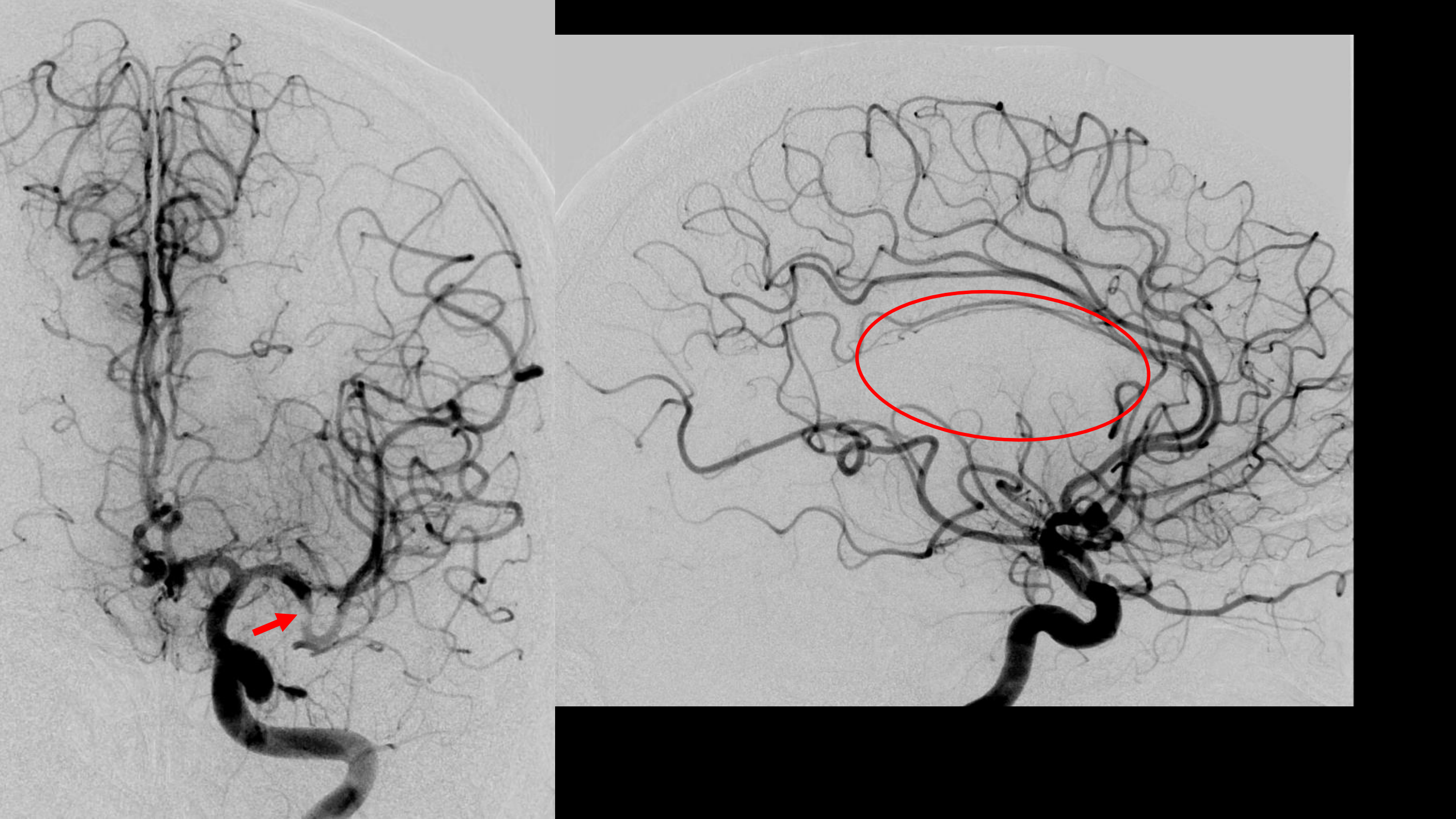
RIGHT

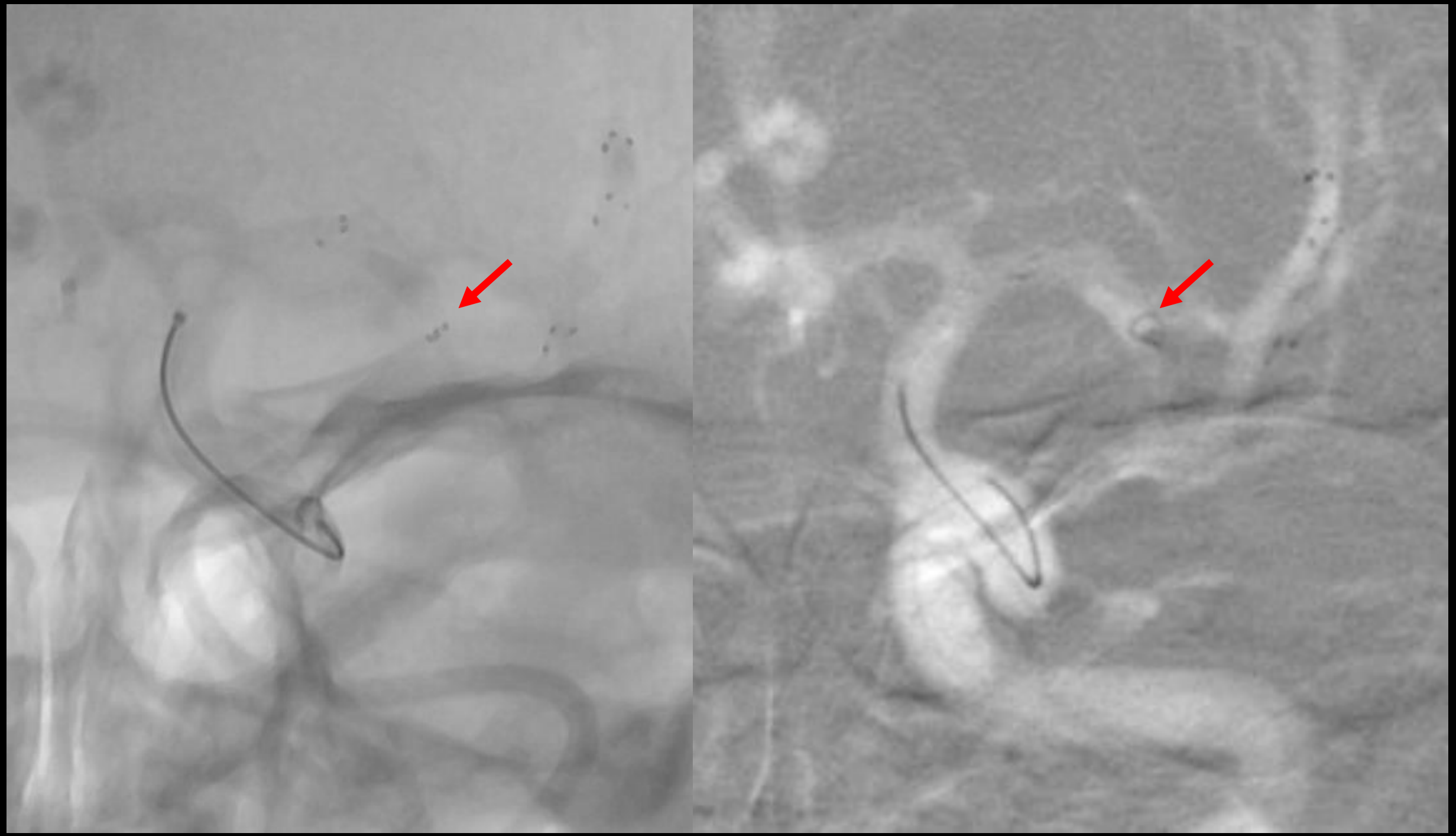
NIHSS

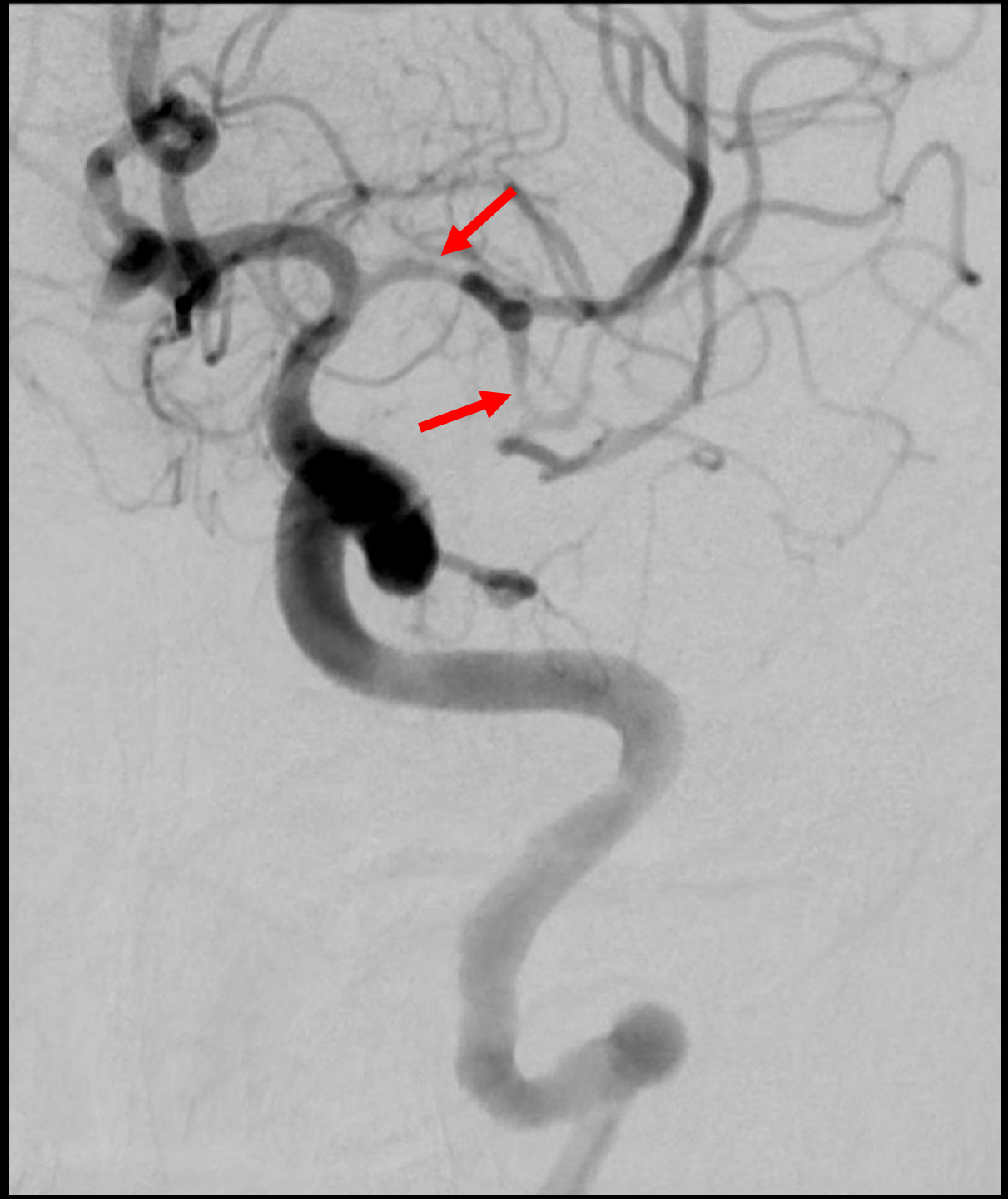
WINDO

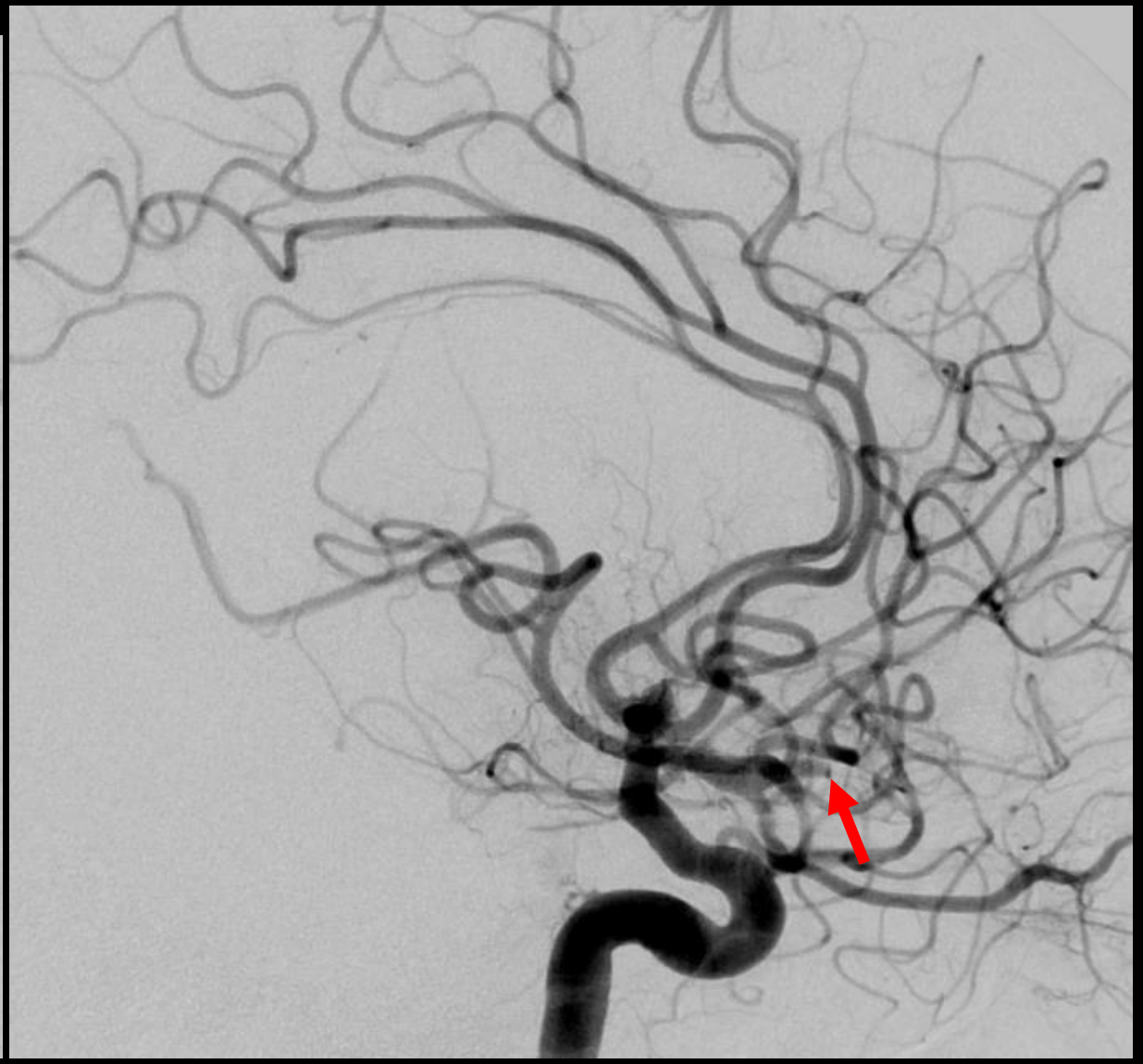


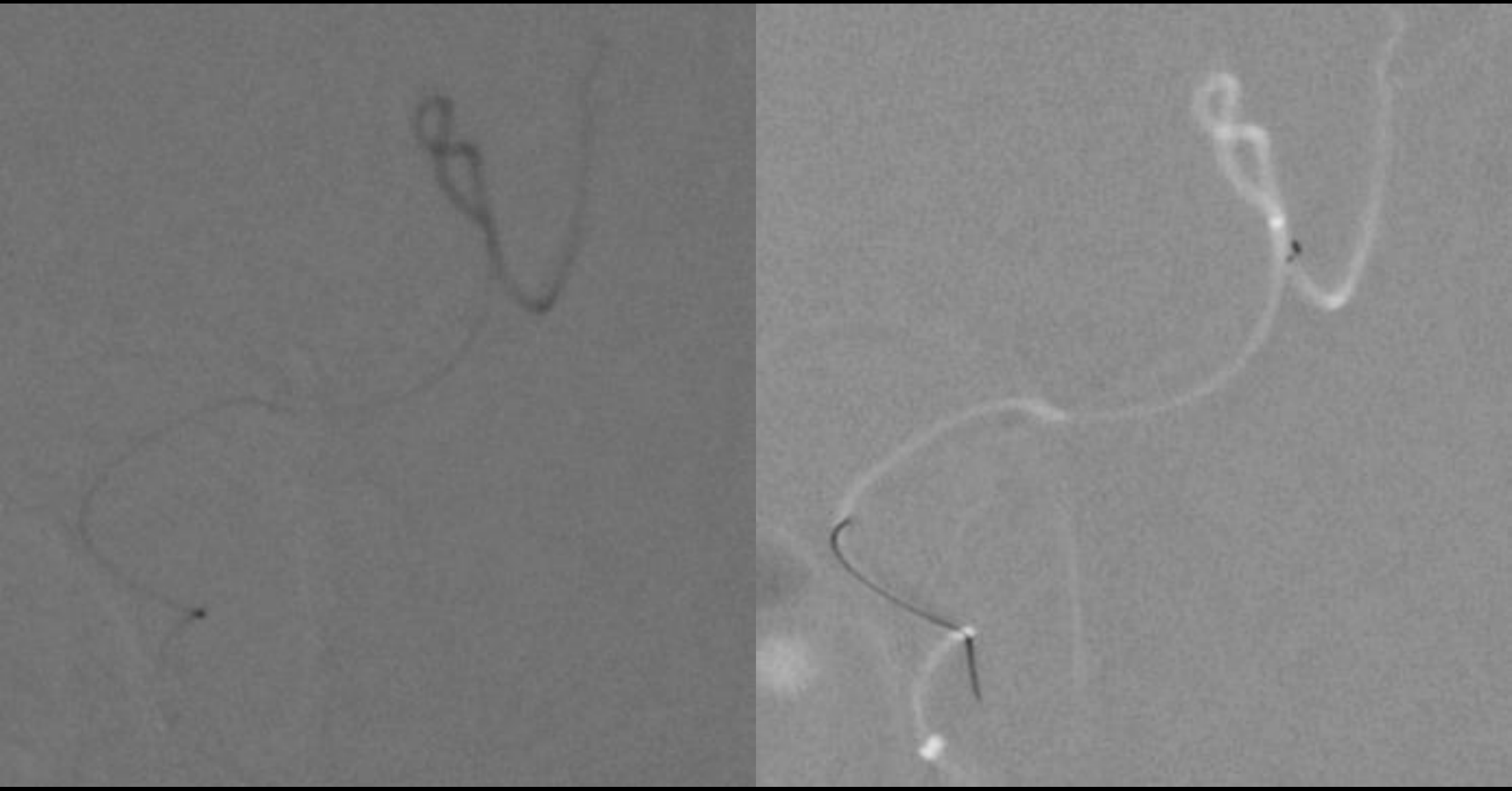



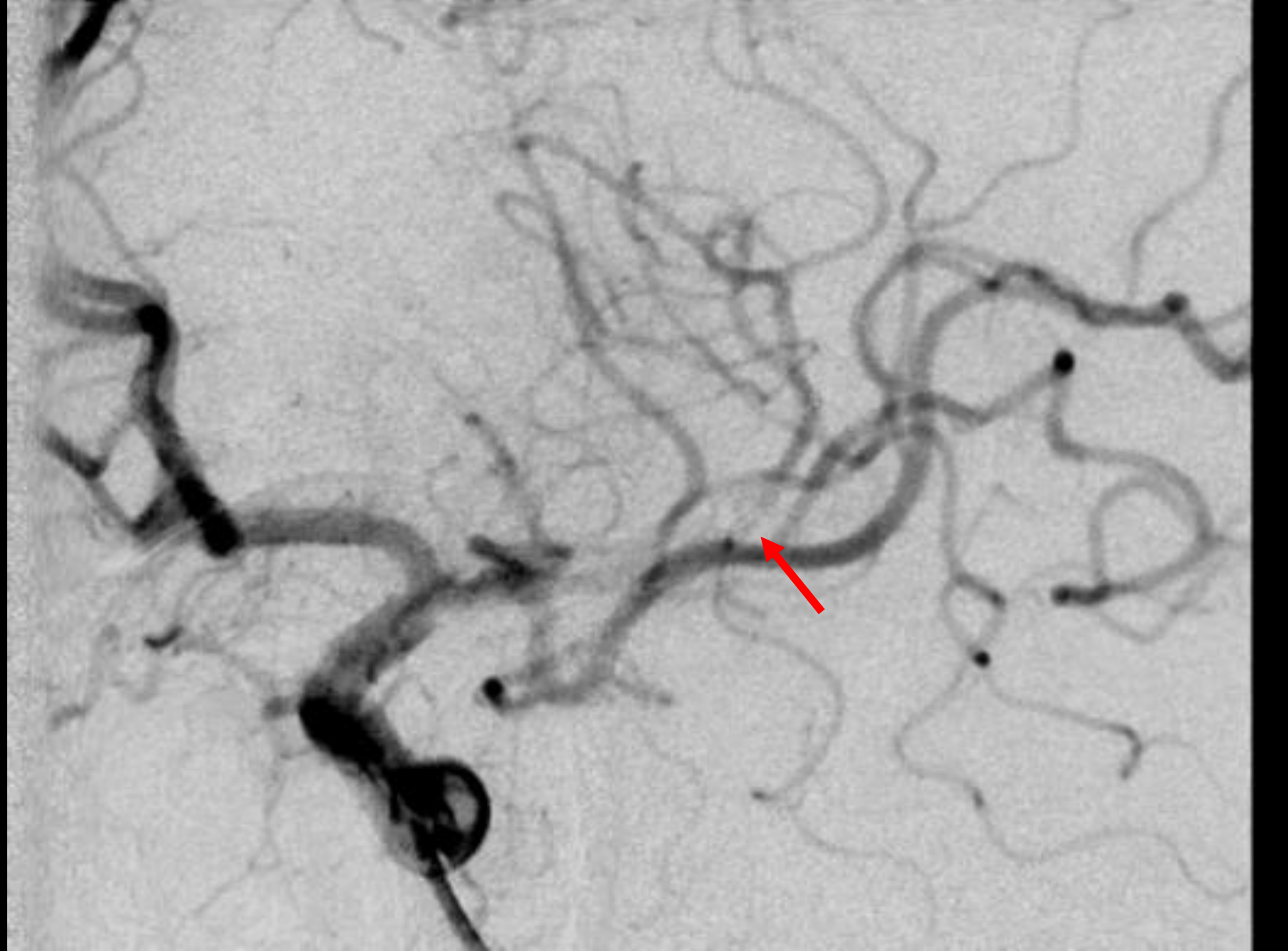


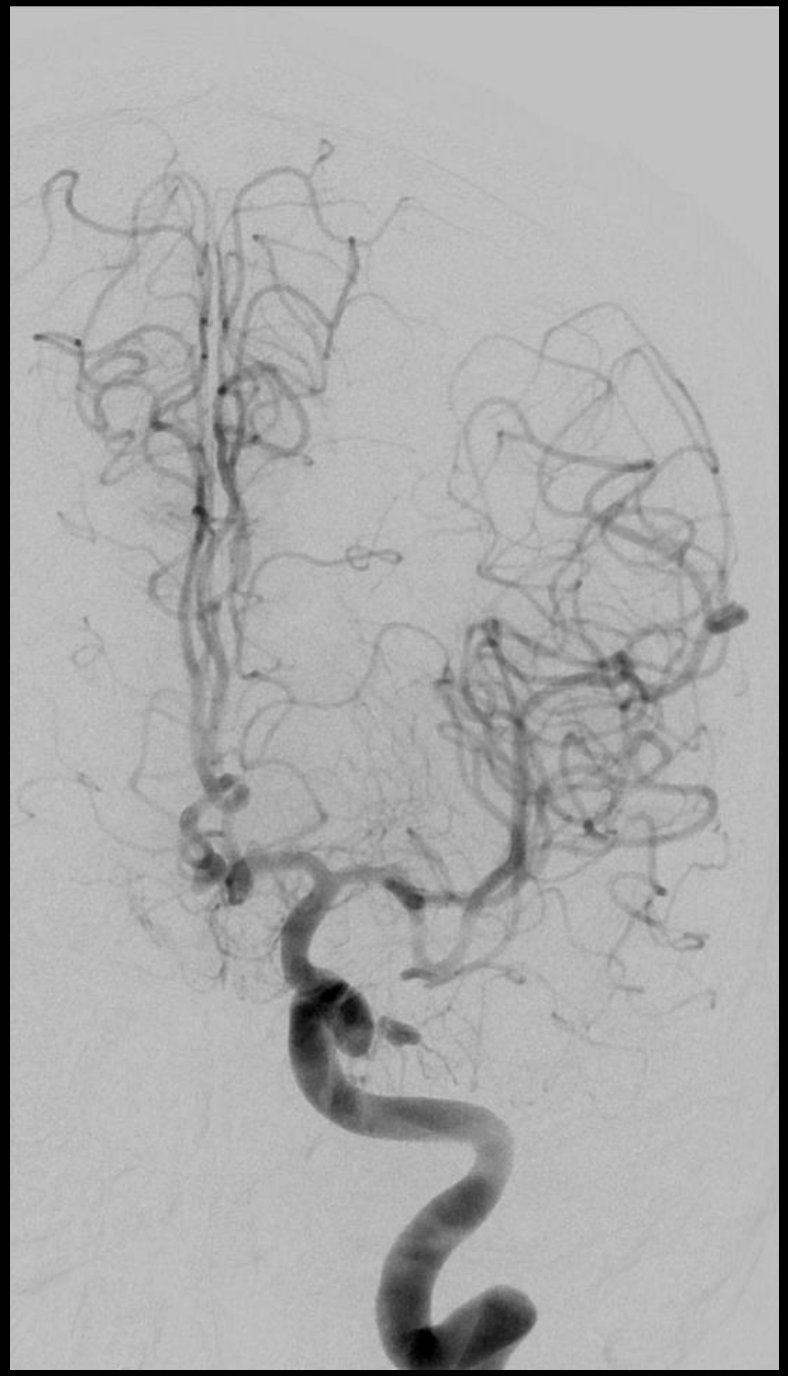


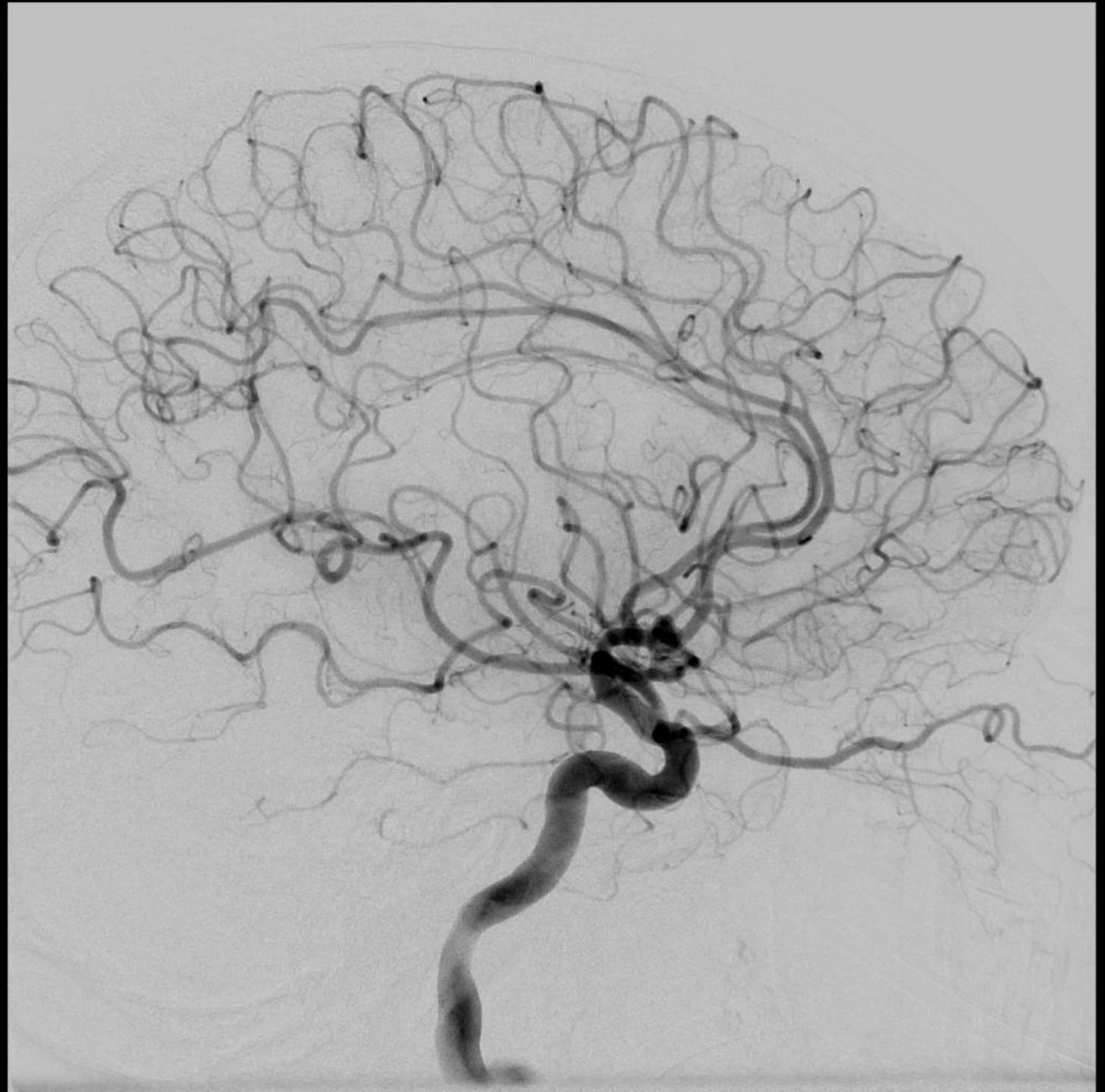












# CASE 6

68 YR MALE,

HTN CAD POST PTCA

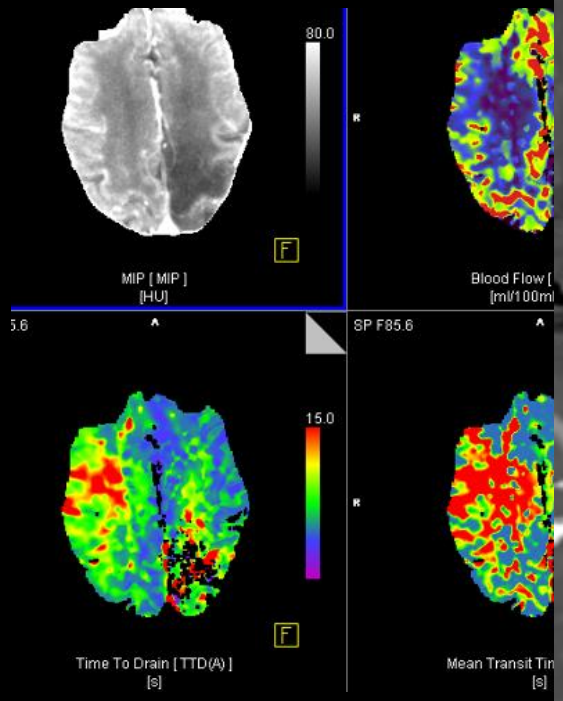
LV APICAL CLOT

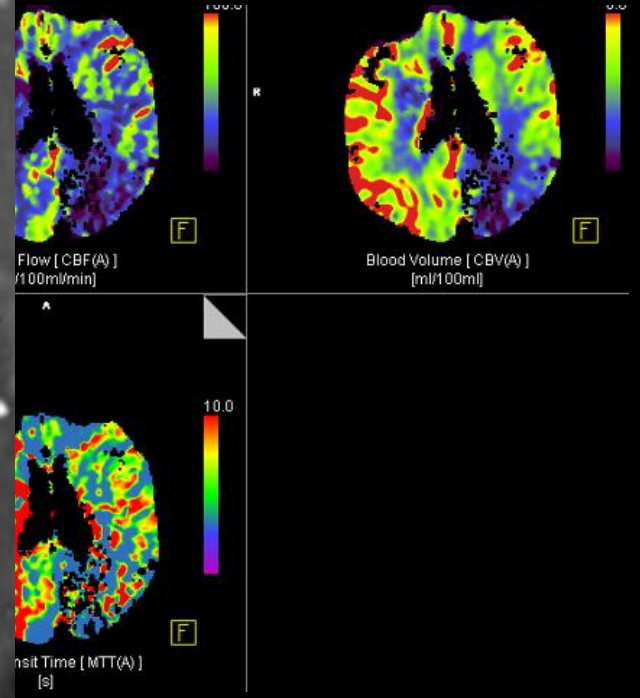
OLD LEFT MCA+PCA STROKE 7 MONTHS BACK (PARTIALLY RECOVERED)

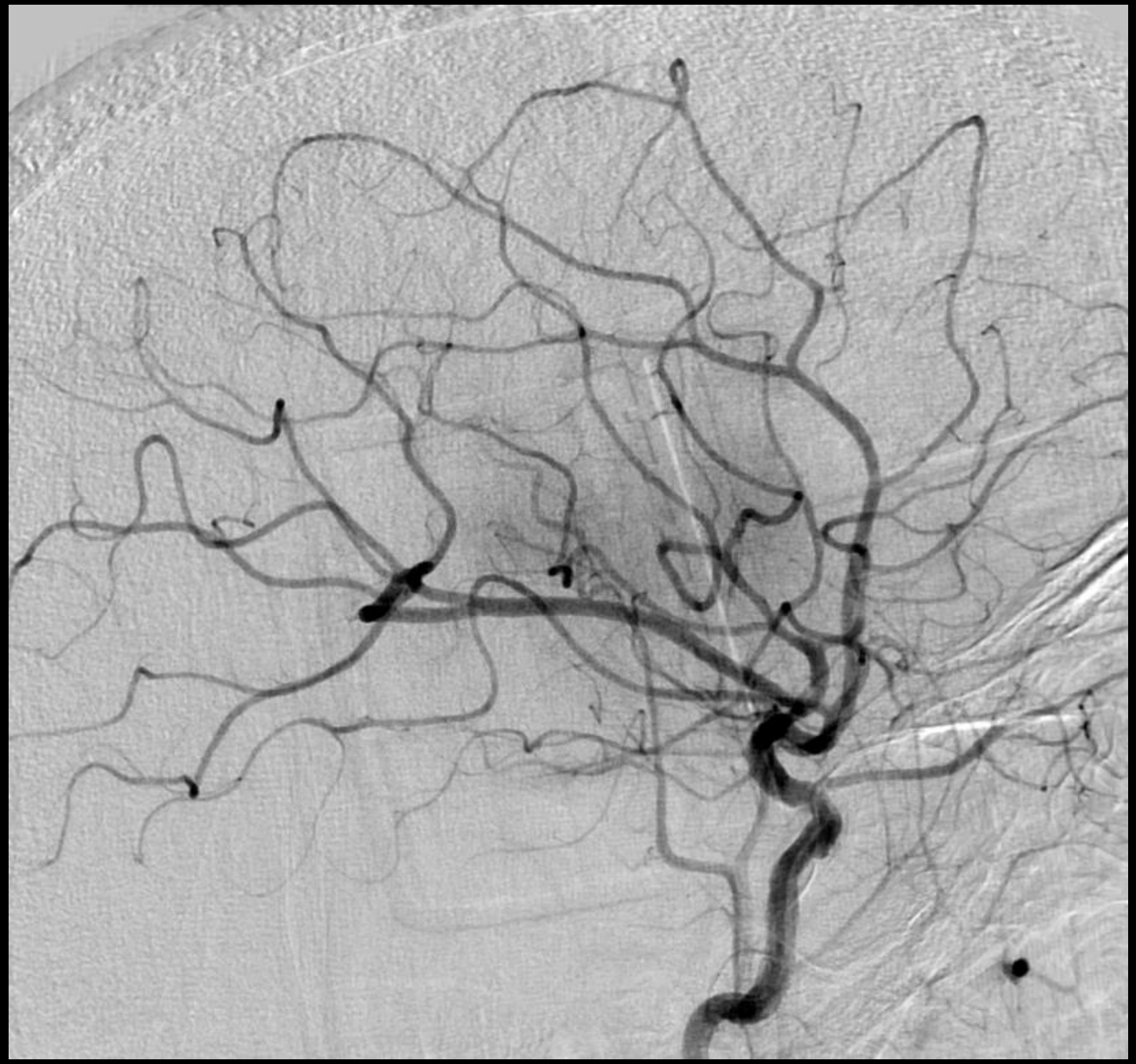
CAME IN WINDOW OF 2.5 HOURS

LEFT HEMIPARESIS WITH FACIAL AND DYSARTHRIA

NIHSS 8

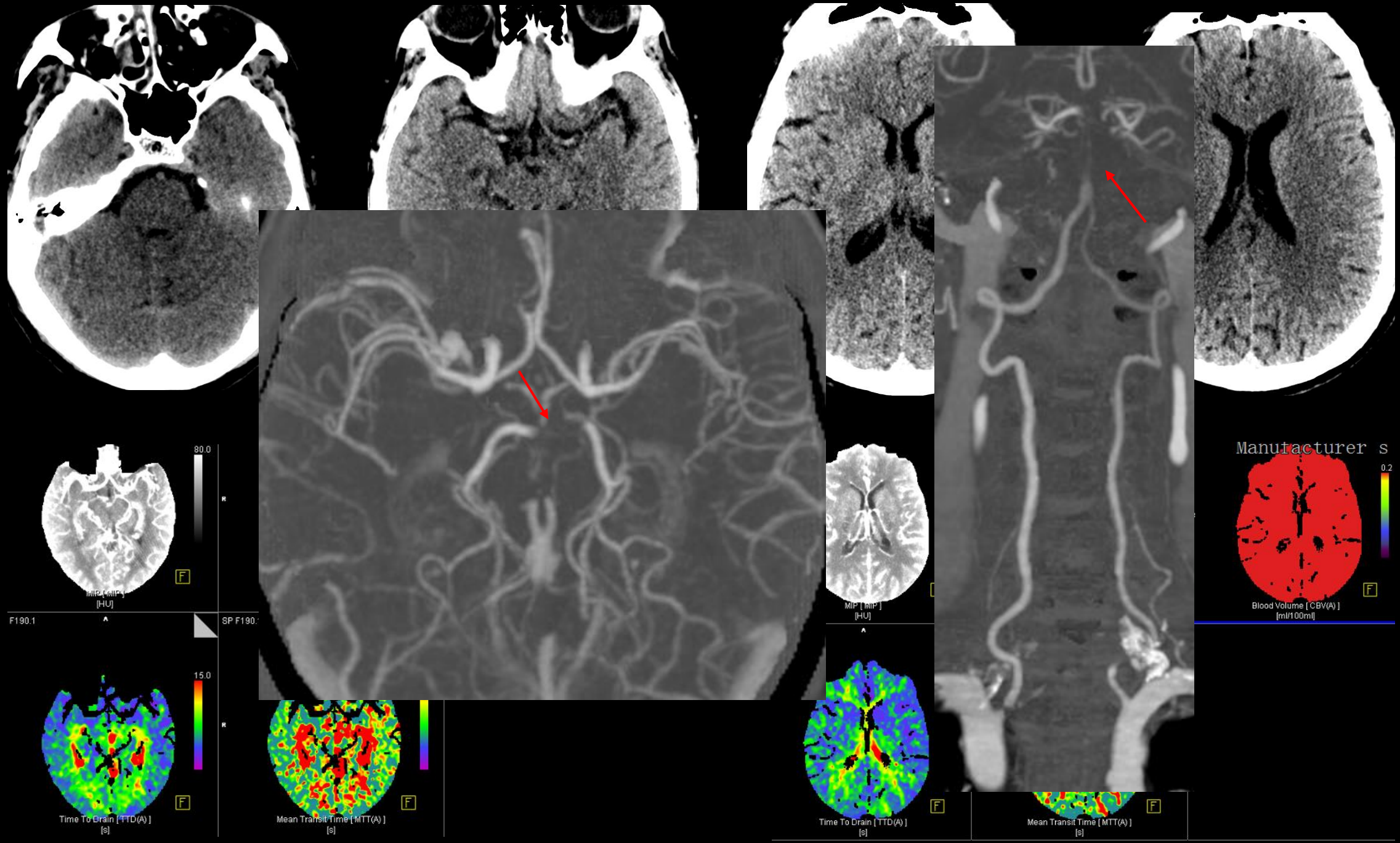

80.0
R
F
MIP [ MIP ]
[HU]
Blood Flow [
[ml/100ml
5.6
SP F85.6
15.0
R
F
Time To Drain [ TTD(A) ]
[s]
Mean Transit Tin
[s]

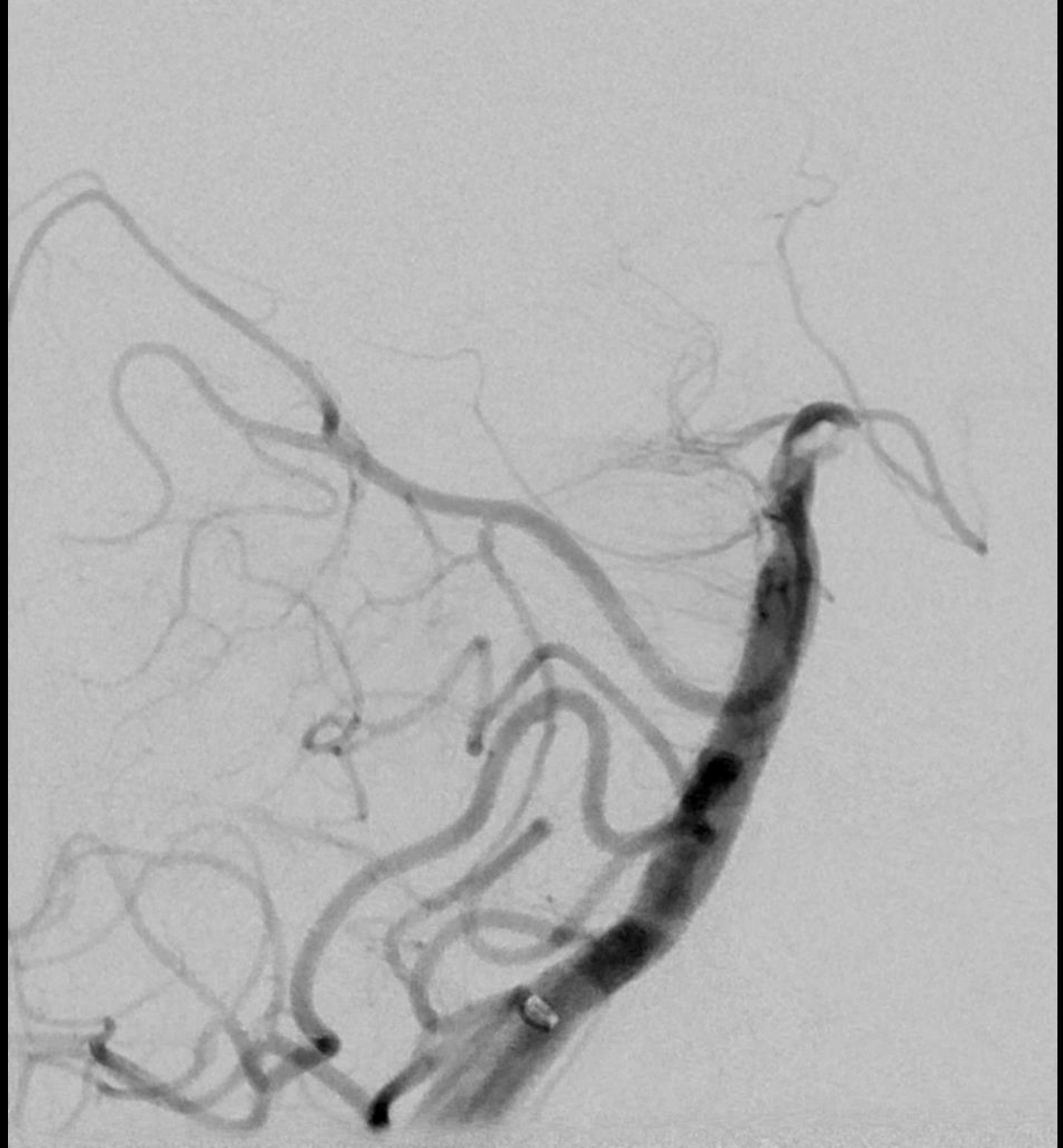

R
F
Flow [ CBF(A) ]
/100ml/min]
Blood Volume [ CBV(A) ]
[ml/100ml]
10.0
F
nsit Time [ MTT(A) ]
[s]

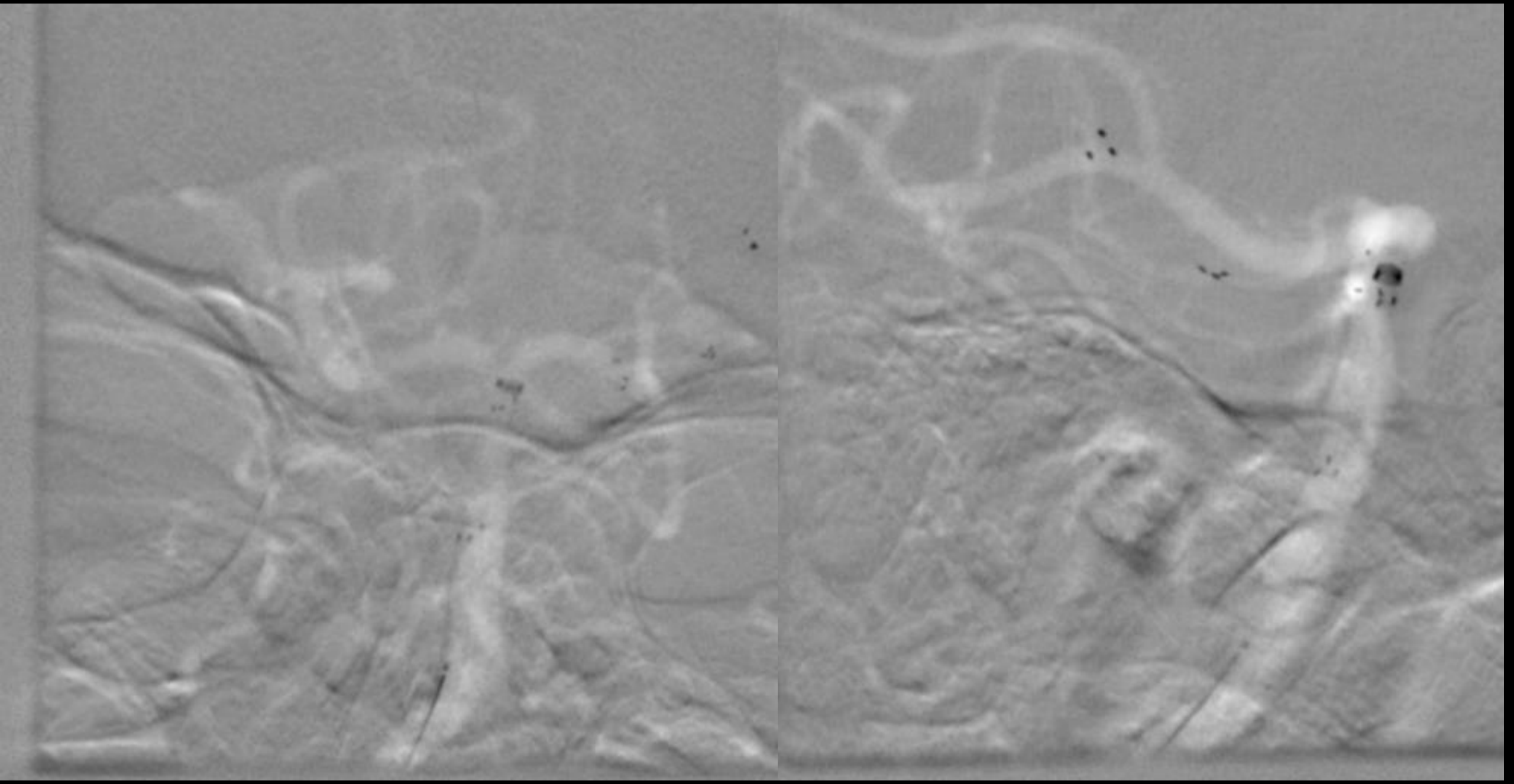


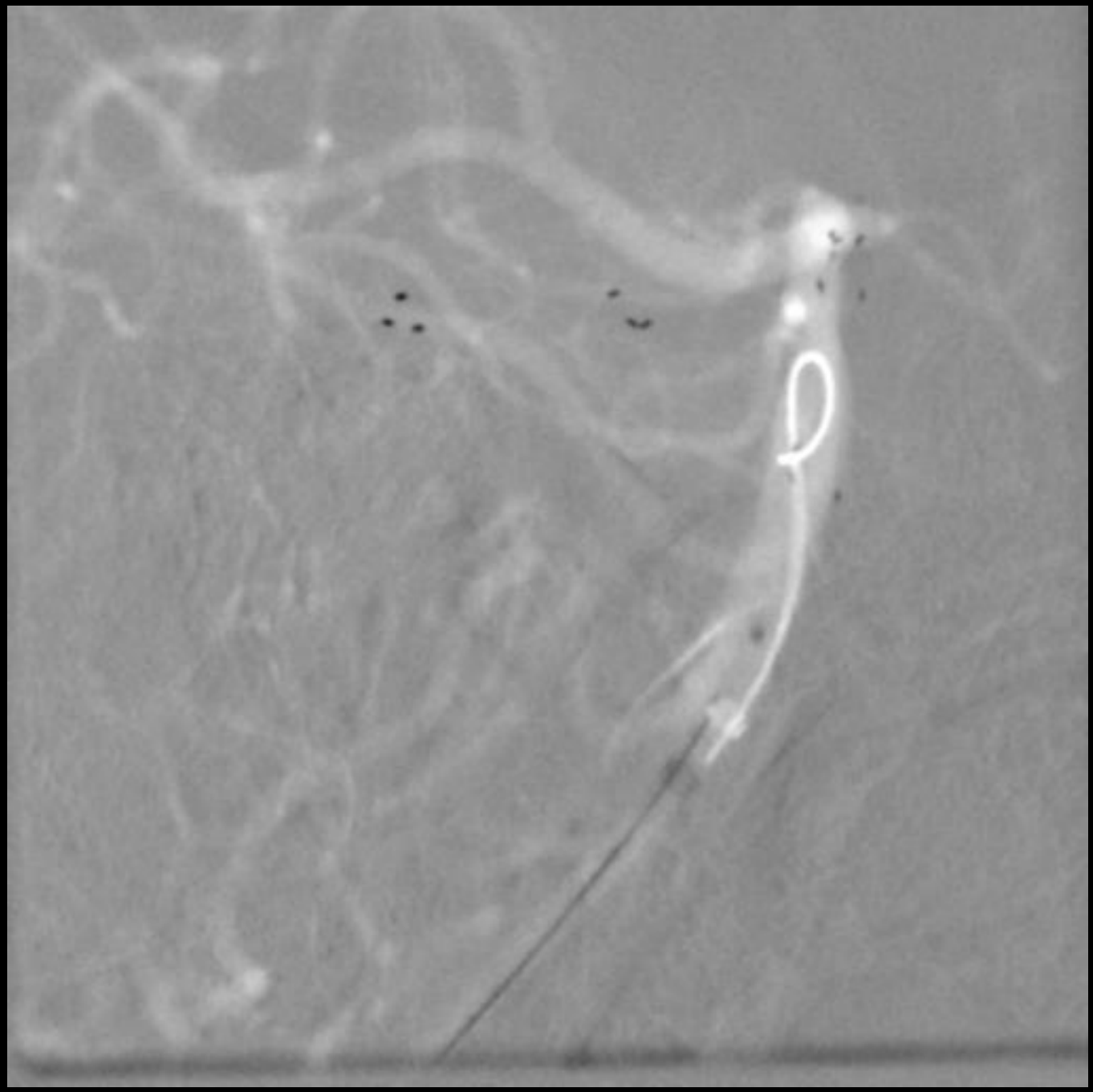
# CASE 7- PC

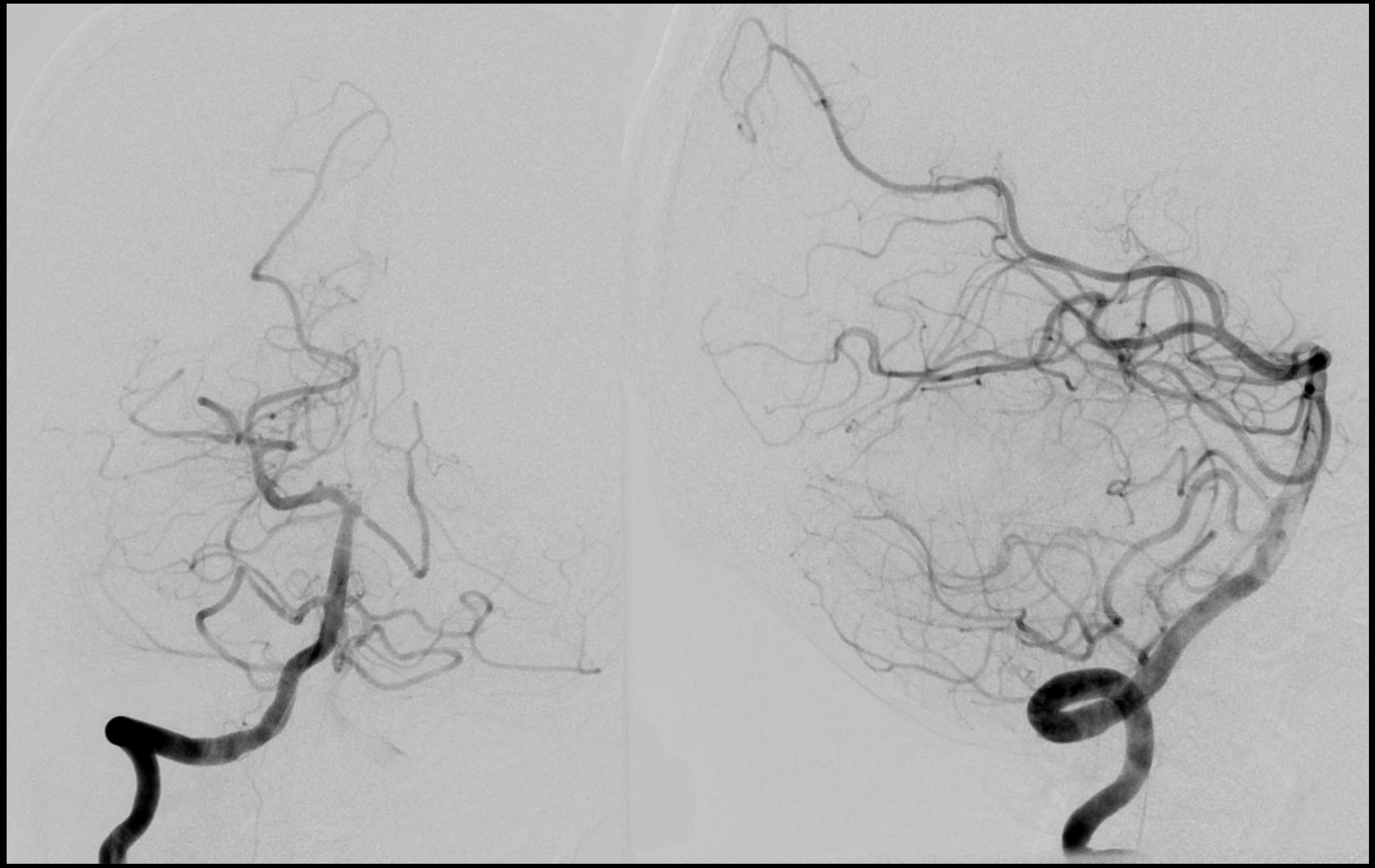
- 51 YR MALE,
- SUDDEN LOC WITH RIGHT HEMIPARESIS
- TIME WINDOW 5 HOURS
- NIHSS 19ish

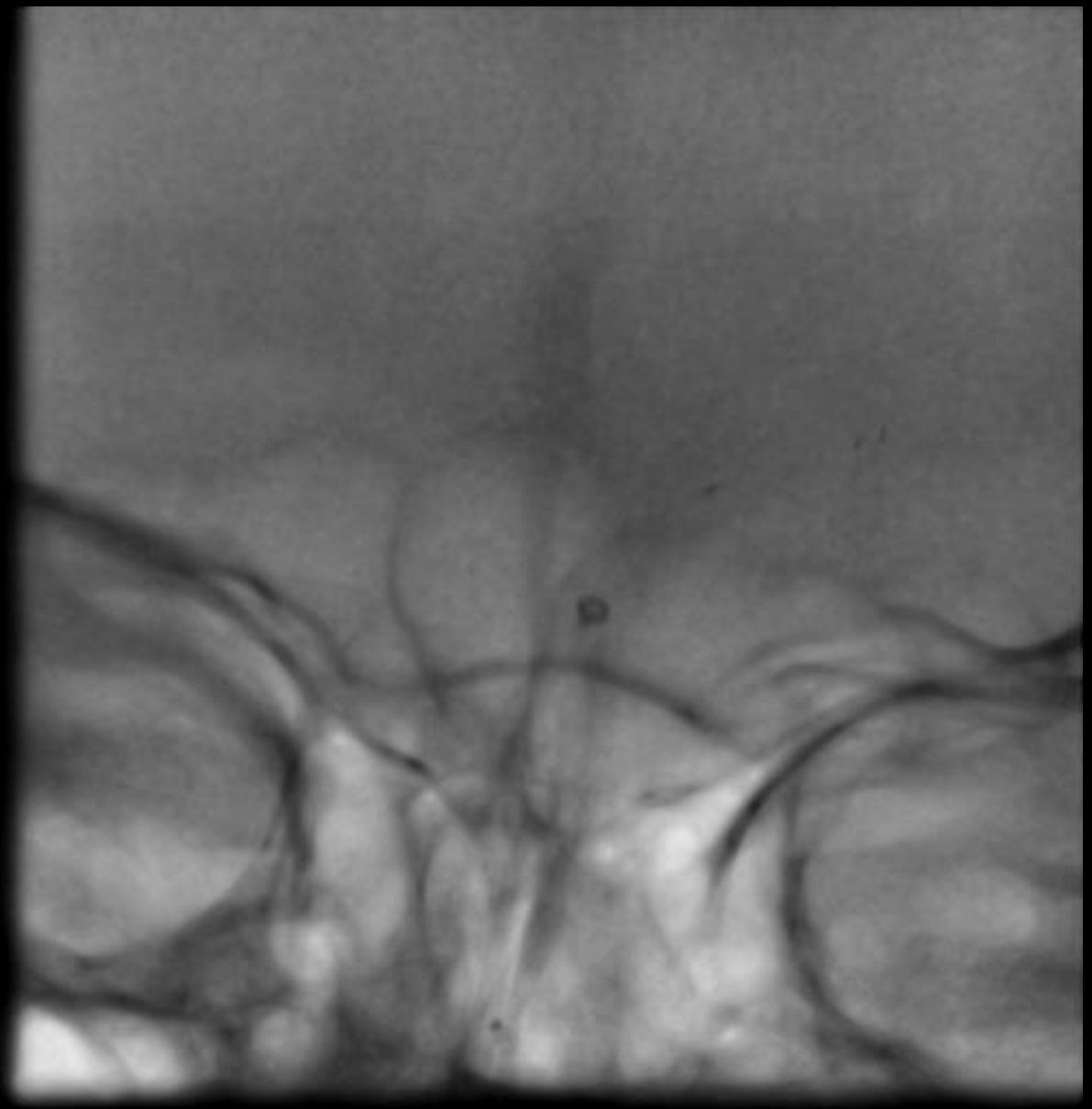

80.0
[HU]
F190.1
15.0
Time To Drain [ TTD(A) ]
[s]
Mean Transit Time [ MTT(A) ]
[s]
MIP [ MIP ]
[HU]
Time To Drain [ TTD(A) ]
[s]
Mean Transit Time [ MTT(A) ]
[s]
Manufacturer s
0.2
Blood Volume [ CBV(A) ]
[ml/100ml]

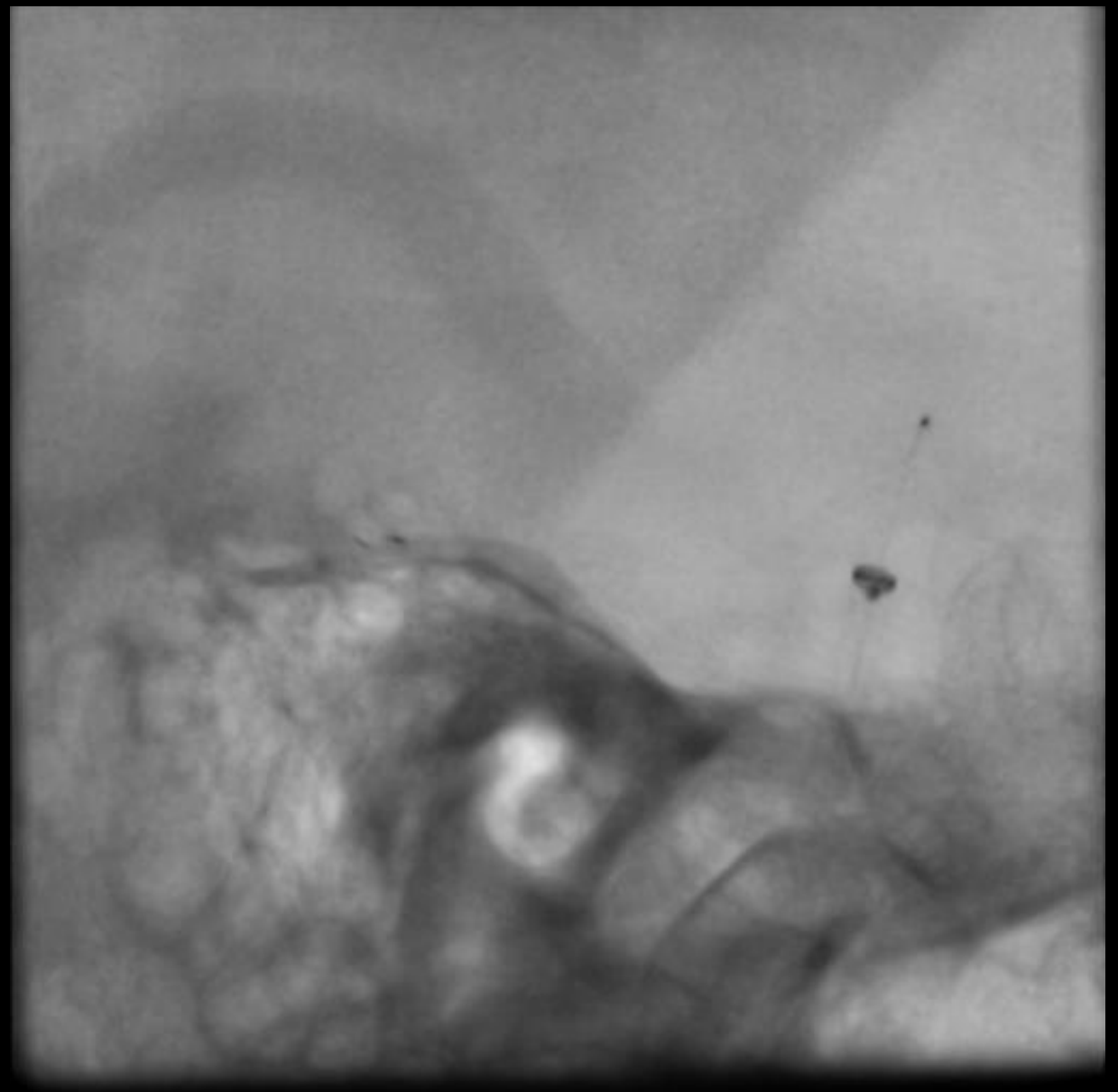



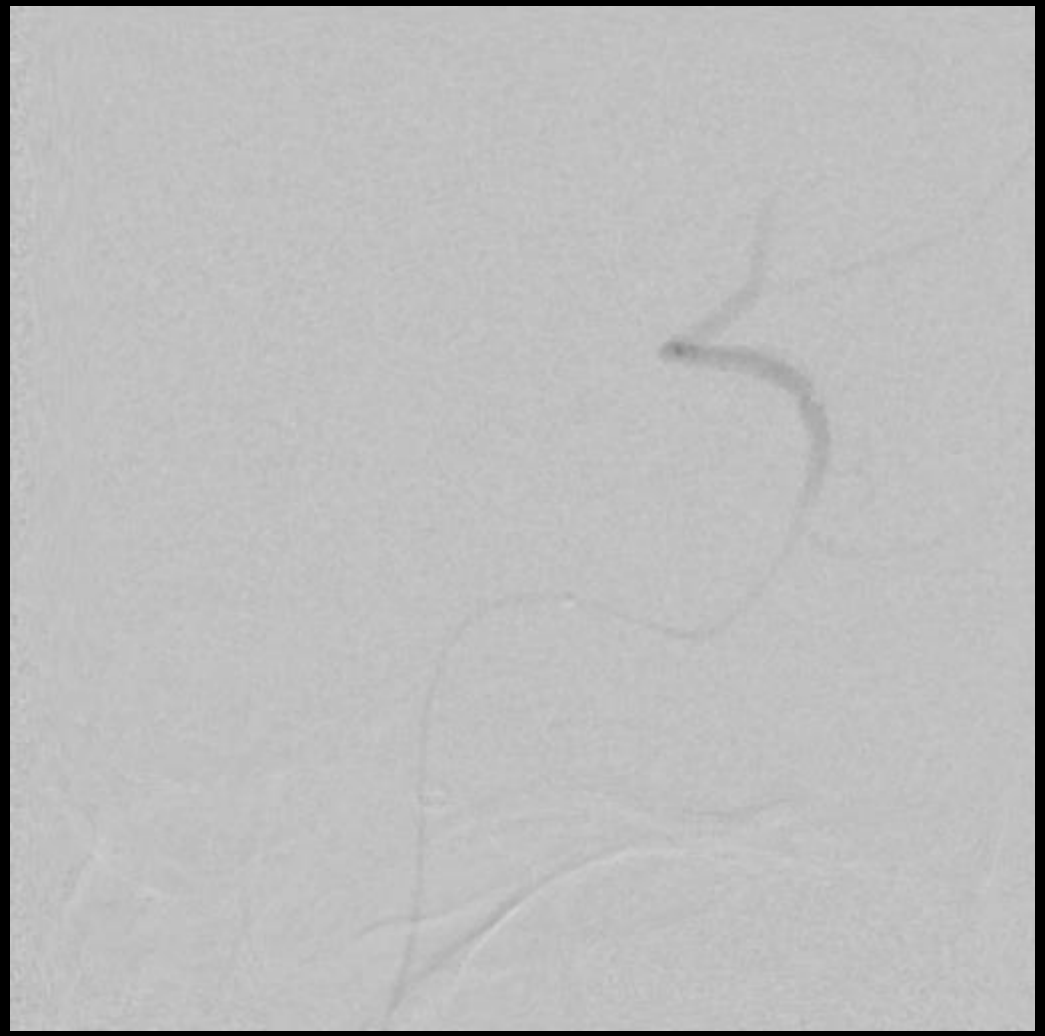


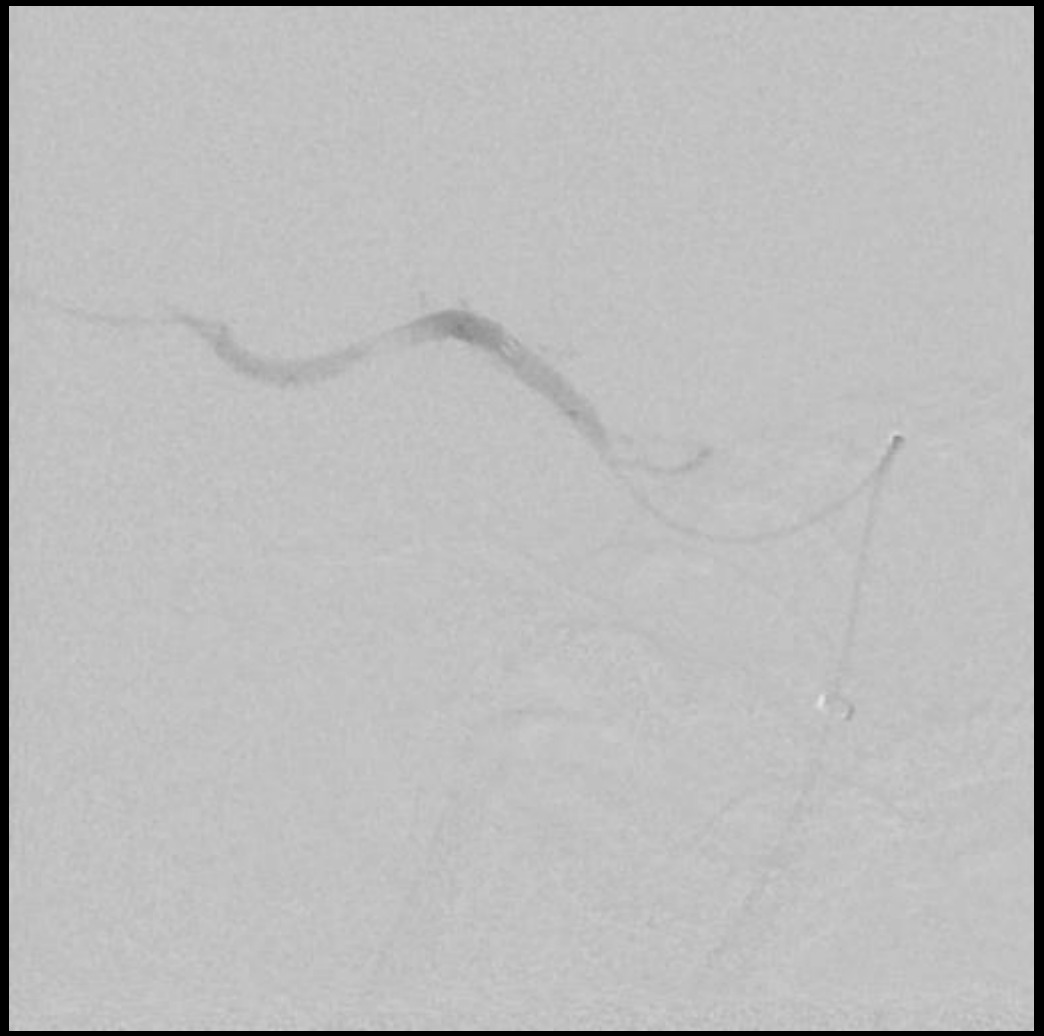



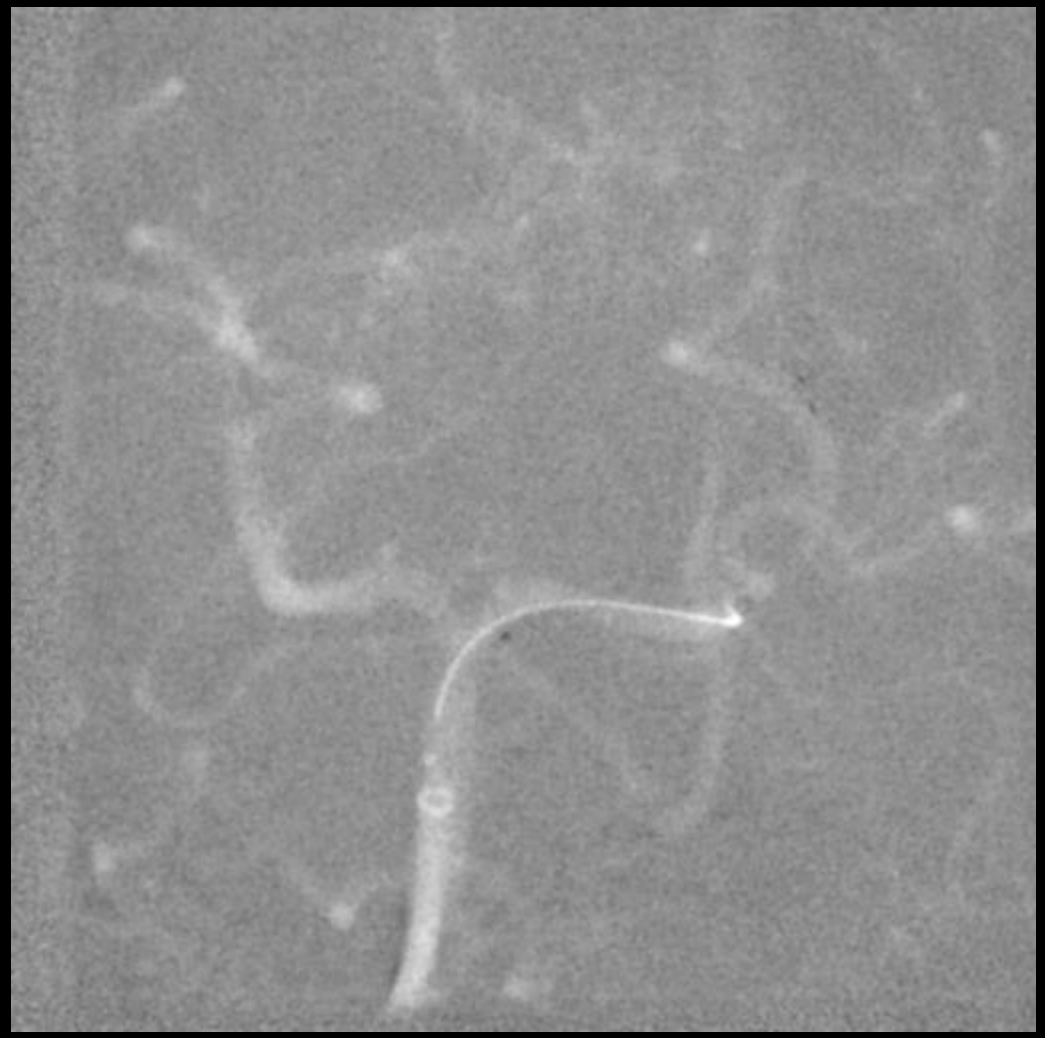


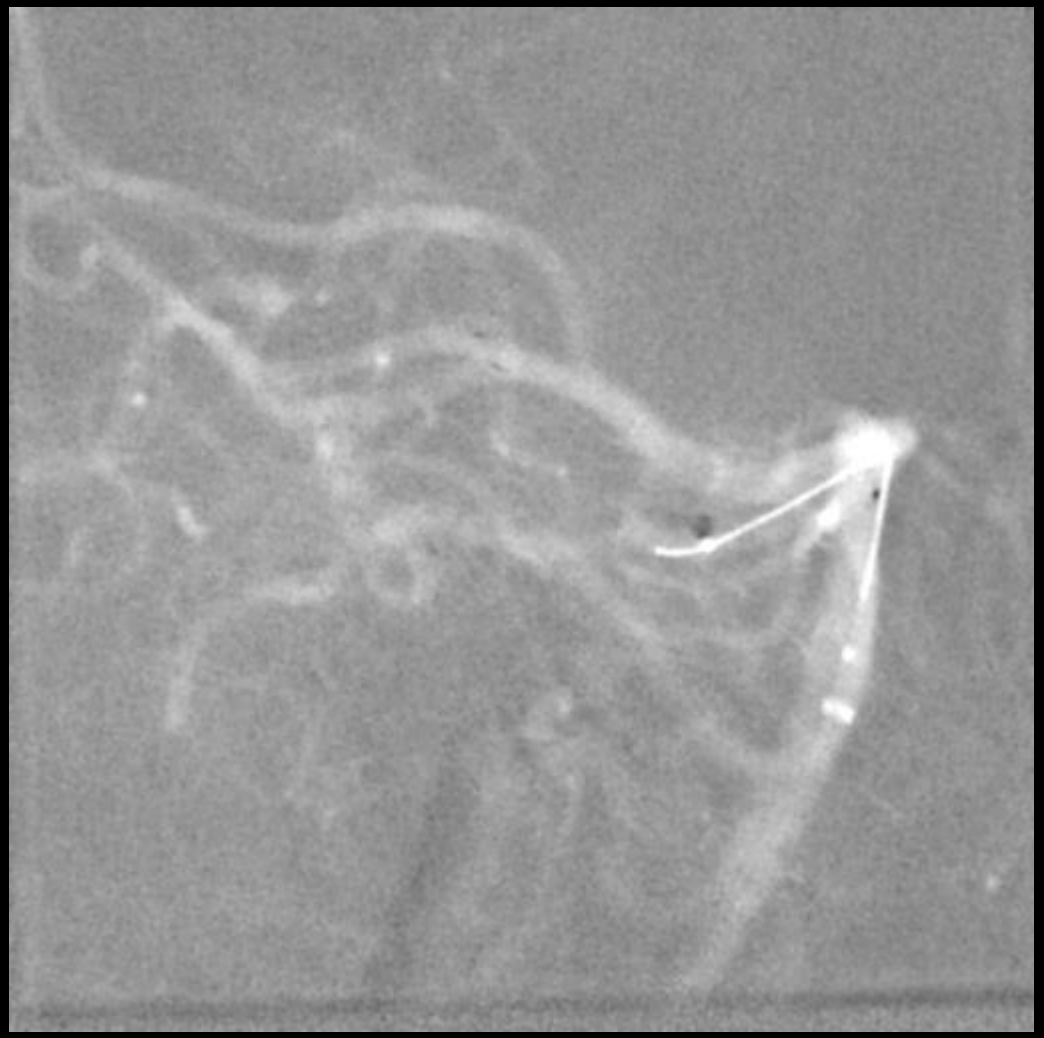


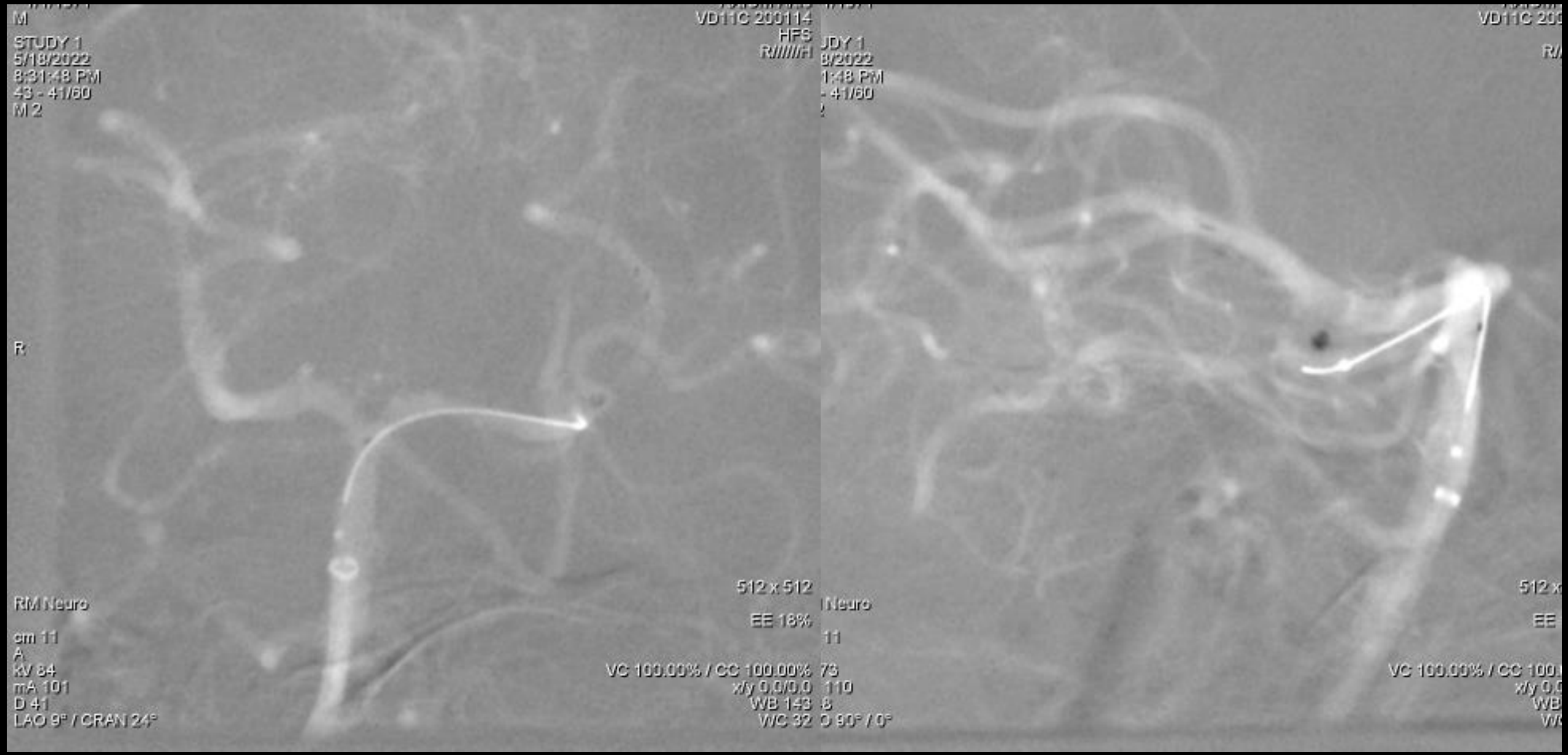


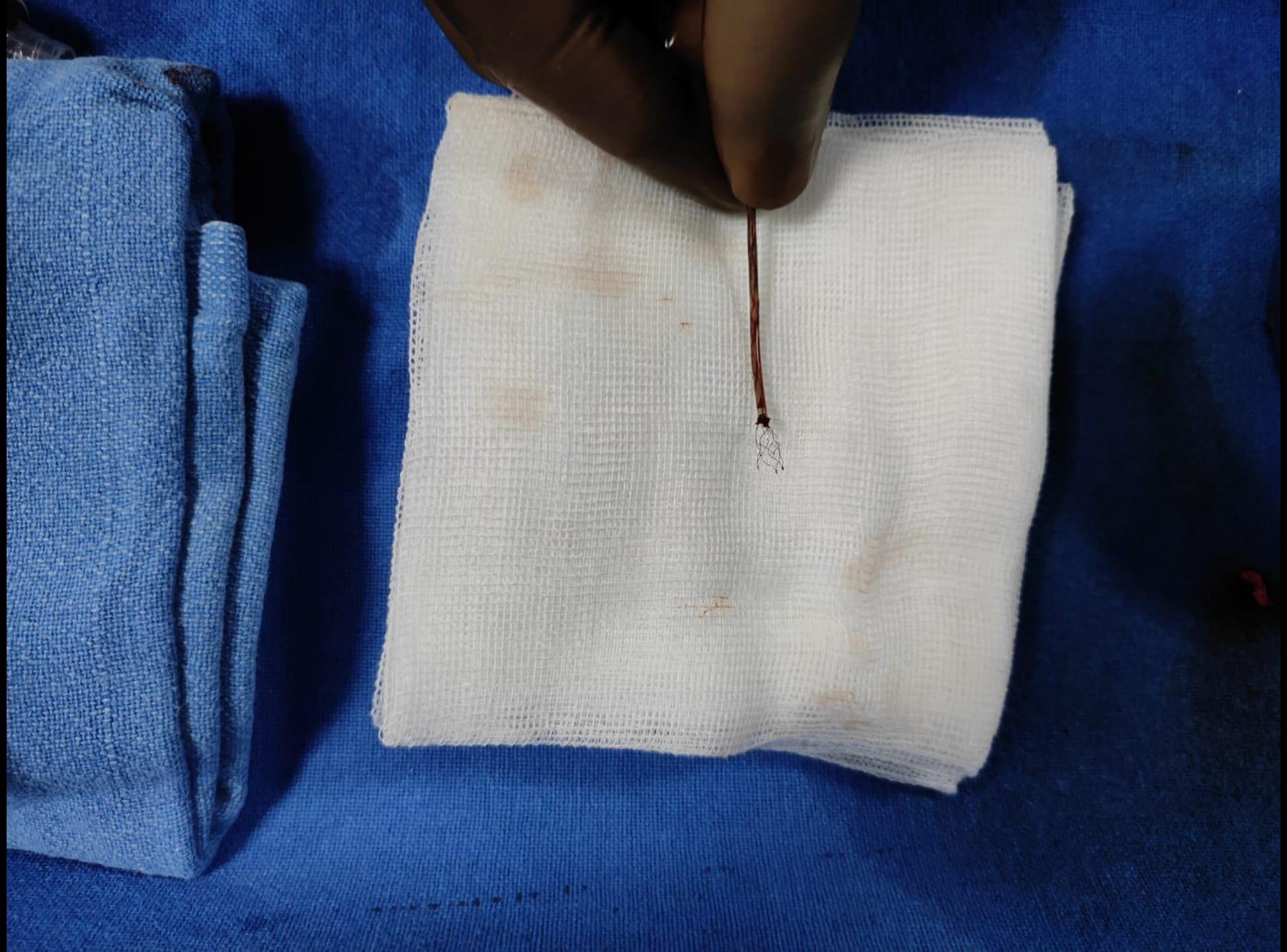


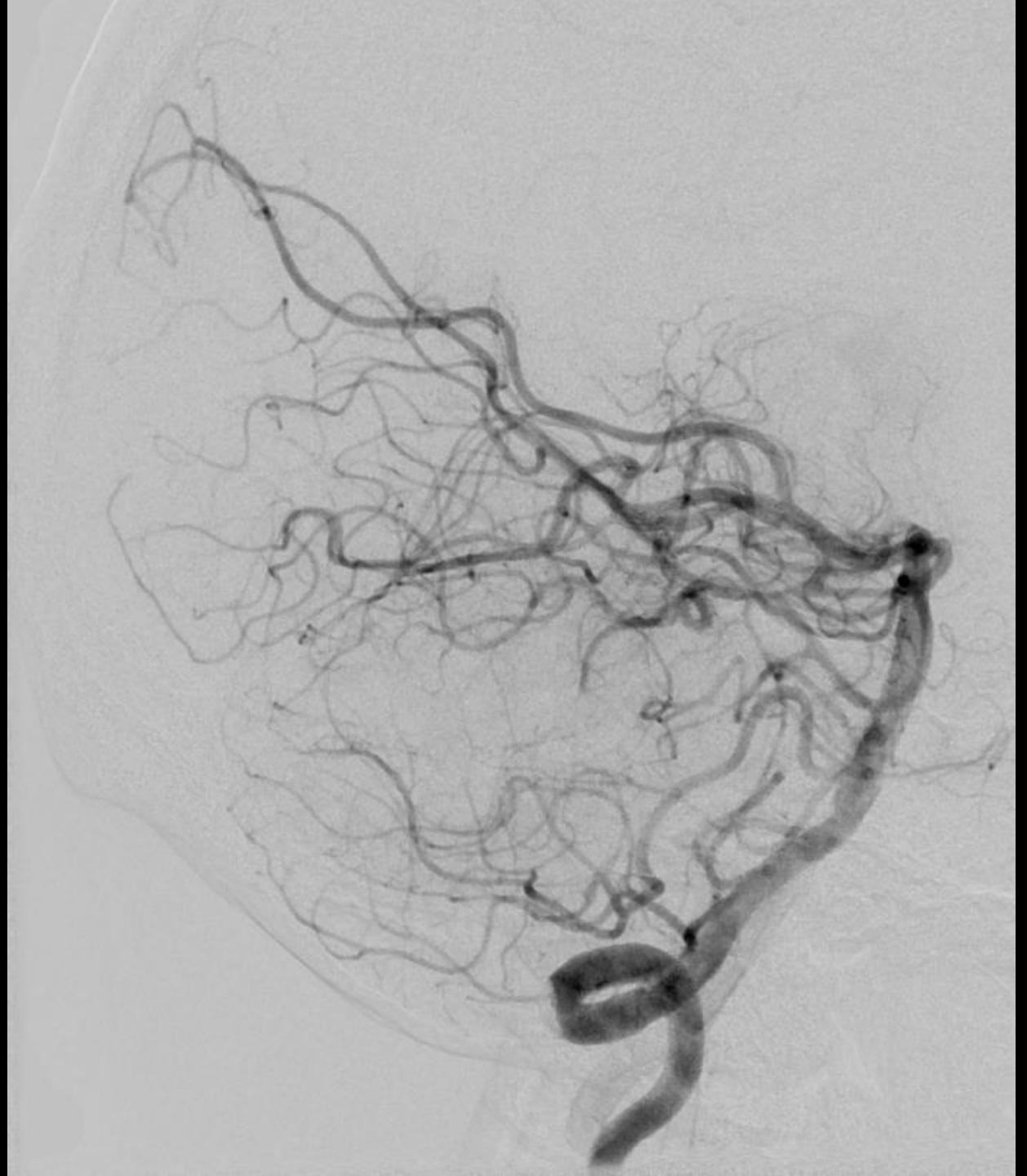






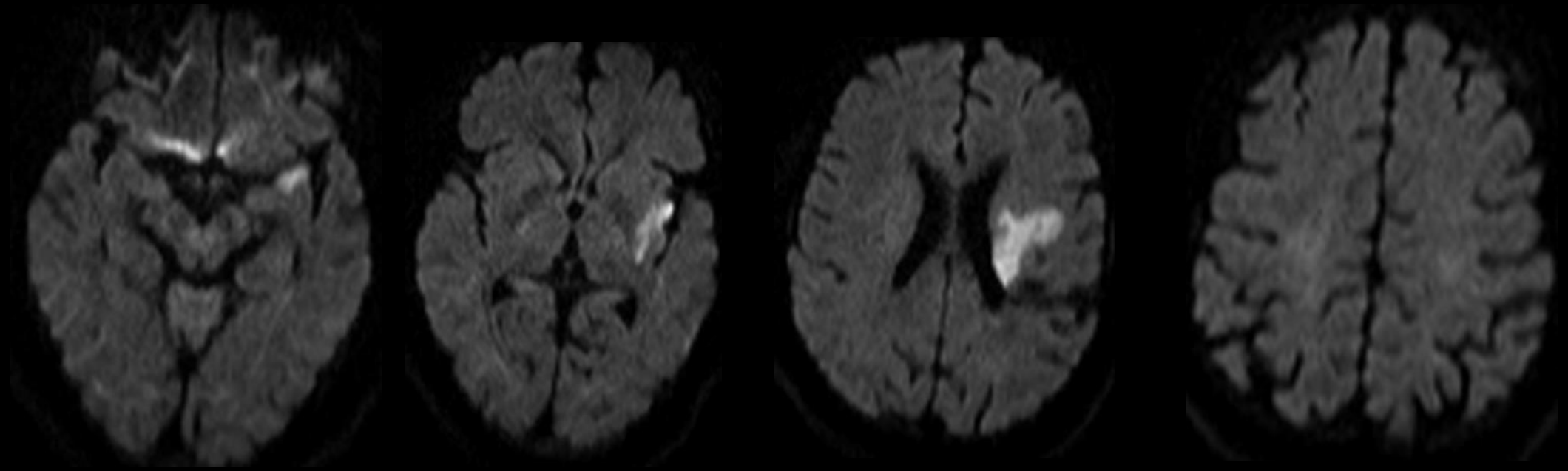

M
STUDY 1
5/18/2022
8:31:48 PM
43 - 41/60
M 2
VD11C 200114
HFS
R
512 x 512
EE 16%
RM Neuro
cm 11
A
kV 84
mA 101
D 41
LAO 9° / CRAN 24°
VC 100.00% / CC 100.00%
x/y 0.0/0.0
WB 143
WC 32

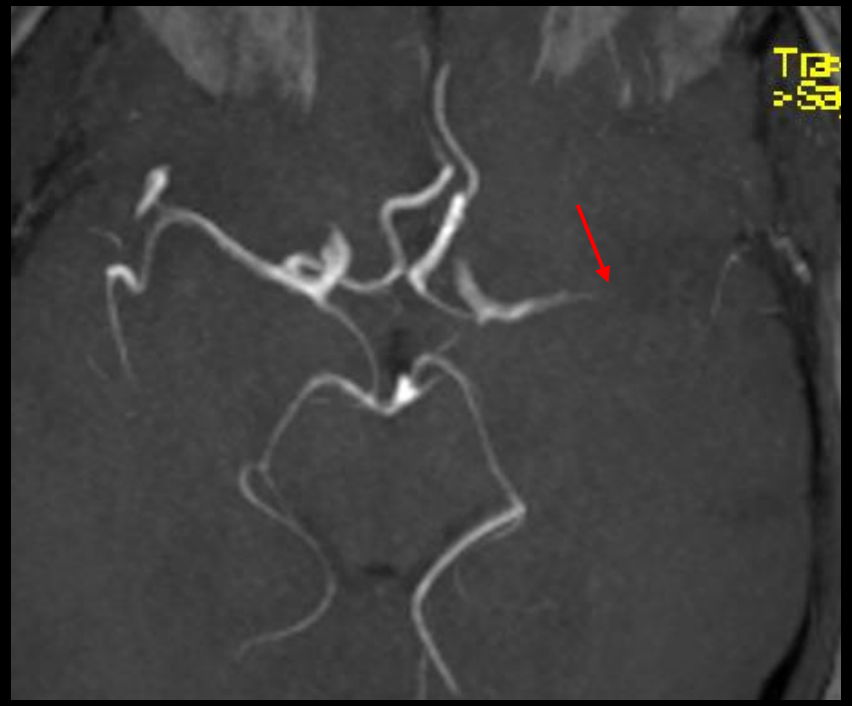


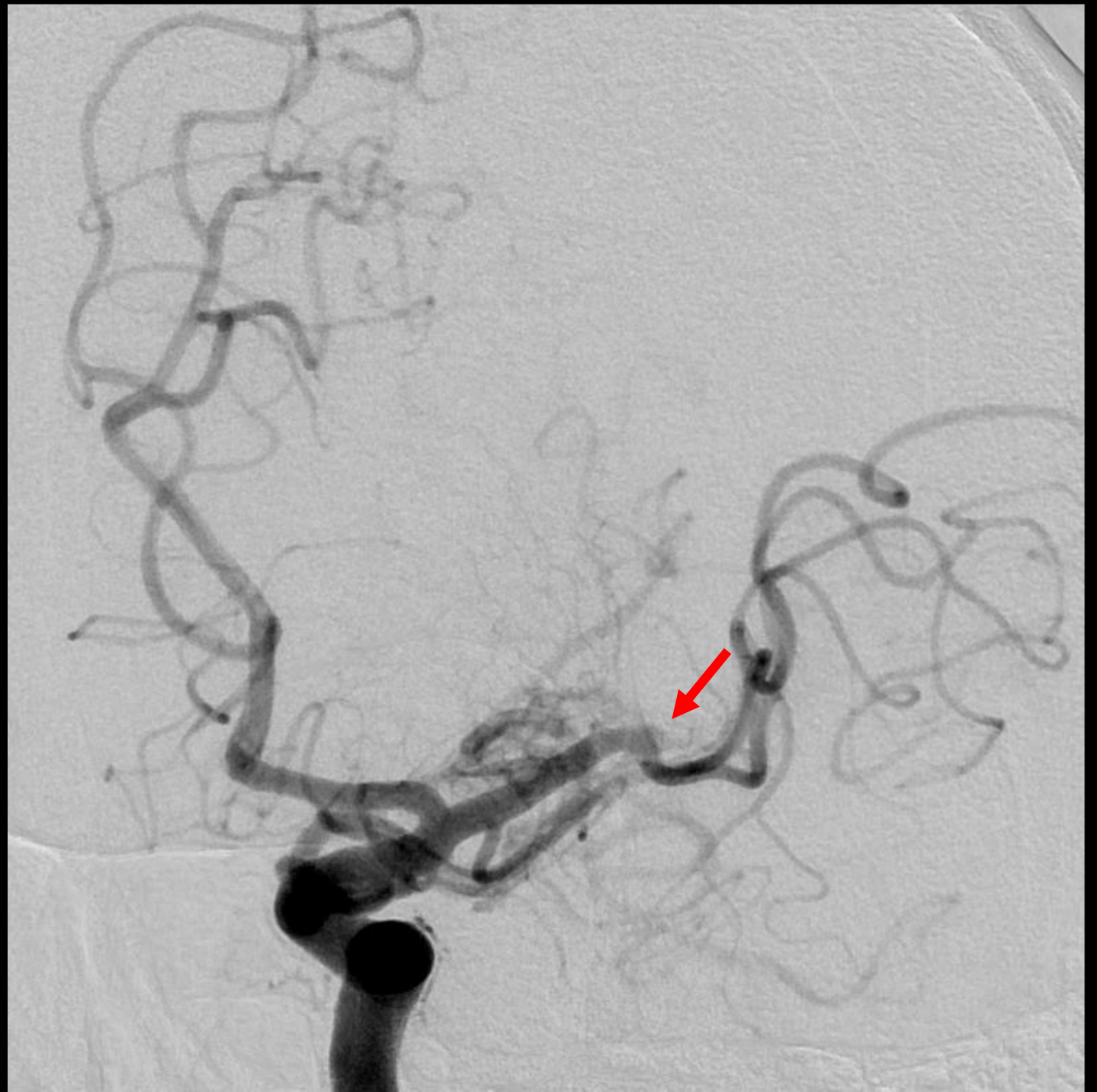



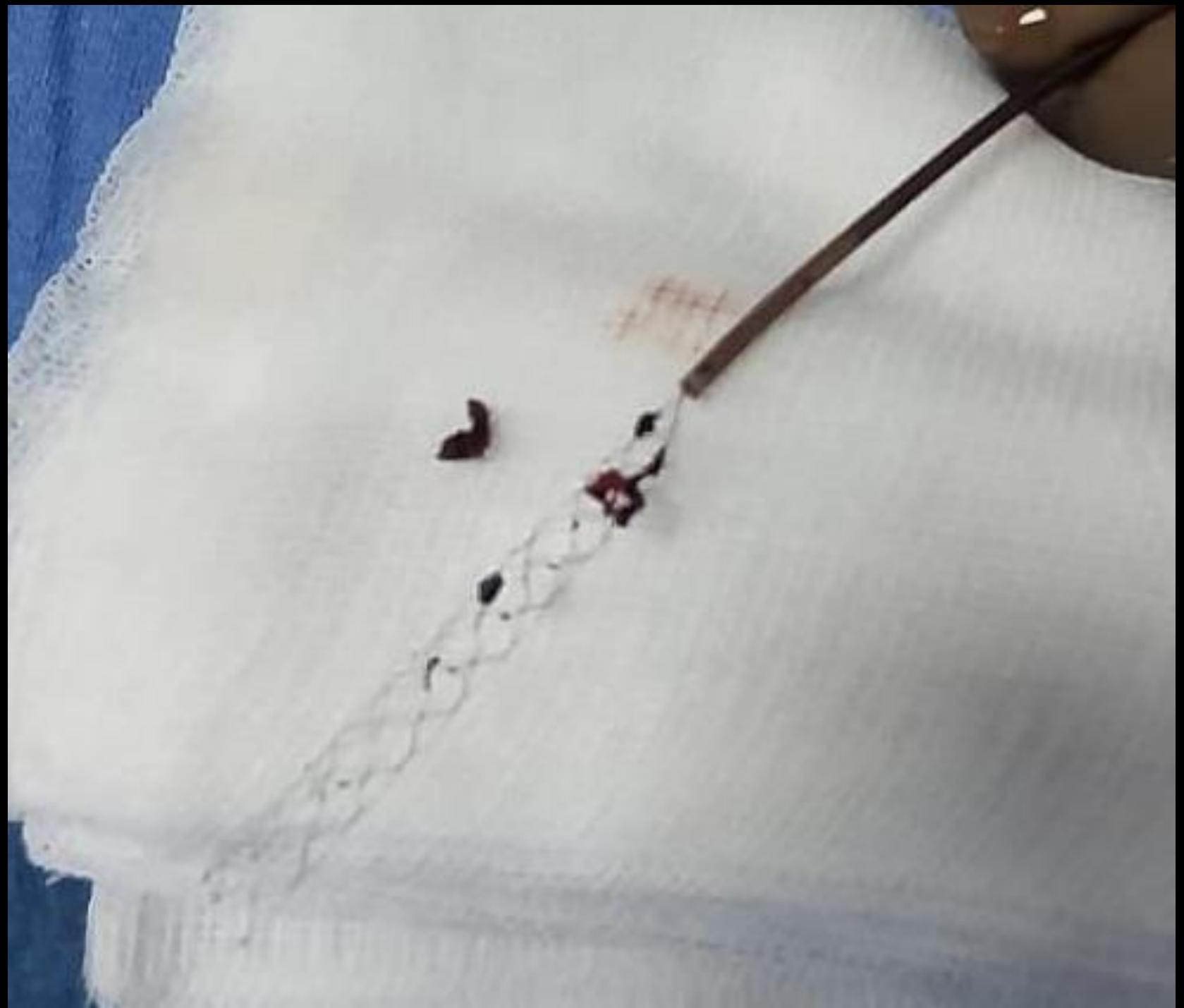
# CASE 8

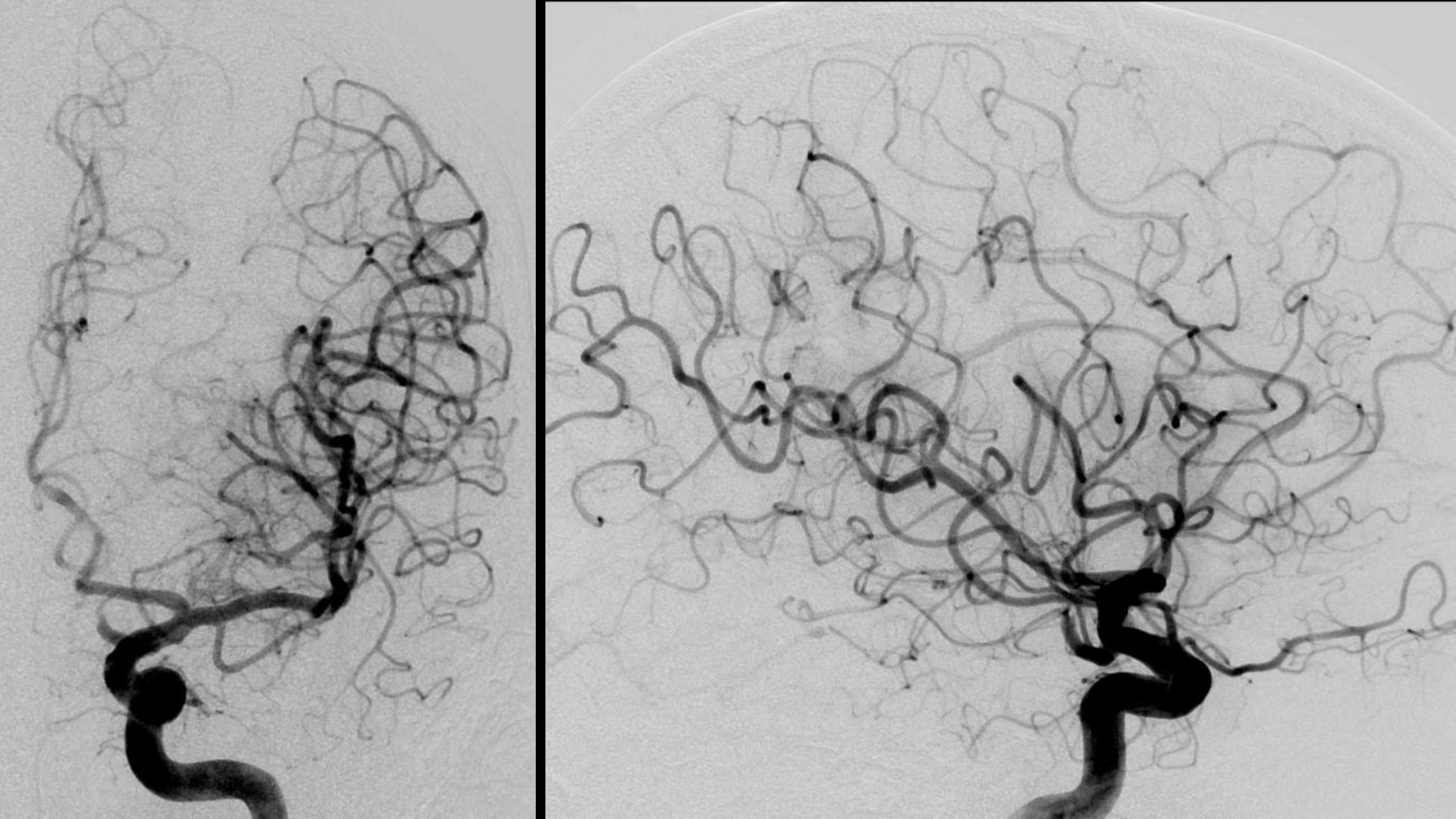
- 55 YR MALE
- CAD AF SMOKER
- RIGHT HEMIPARESIS WITH DYSARTHRIA
- NIHSS 10
- LAST KNOWN WELL – 7.5 HOURS











# CASE 9

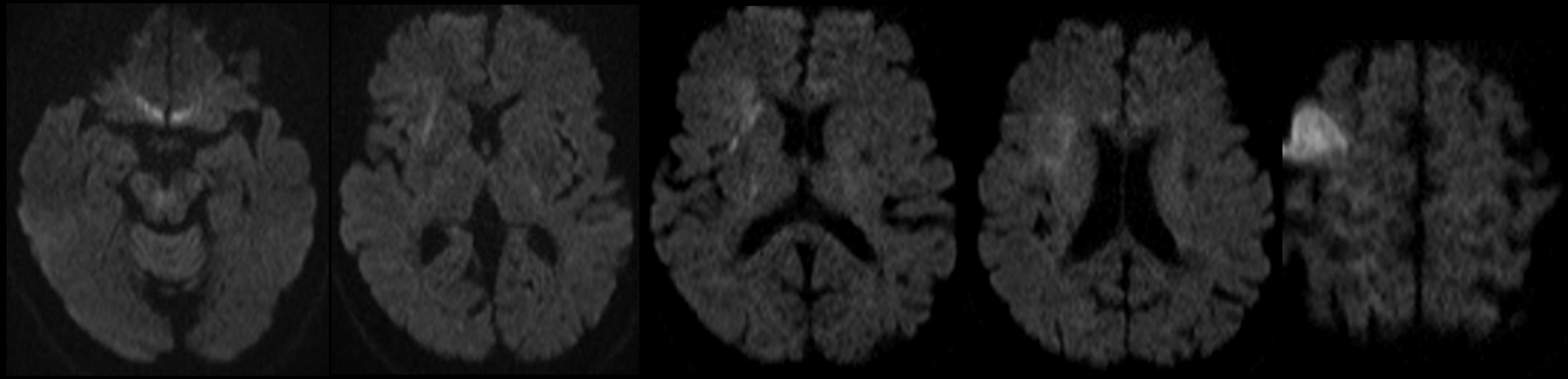
74 YR FEMALE,

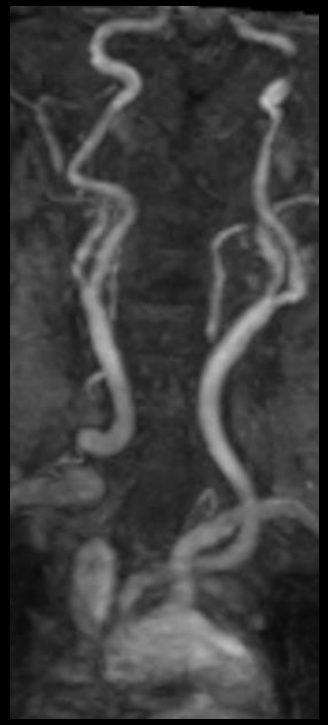
LEFT HEMIPARESIS WITH FACIAL PALSY AND

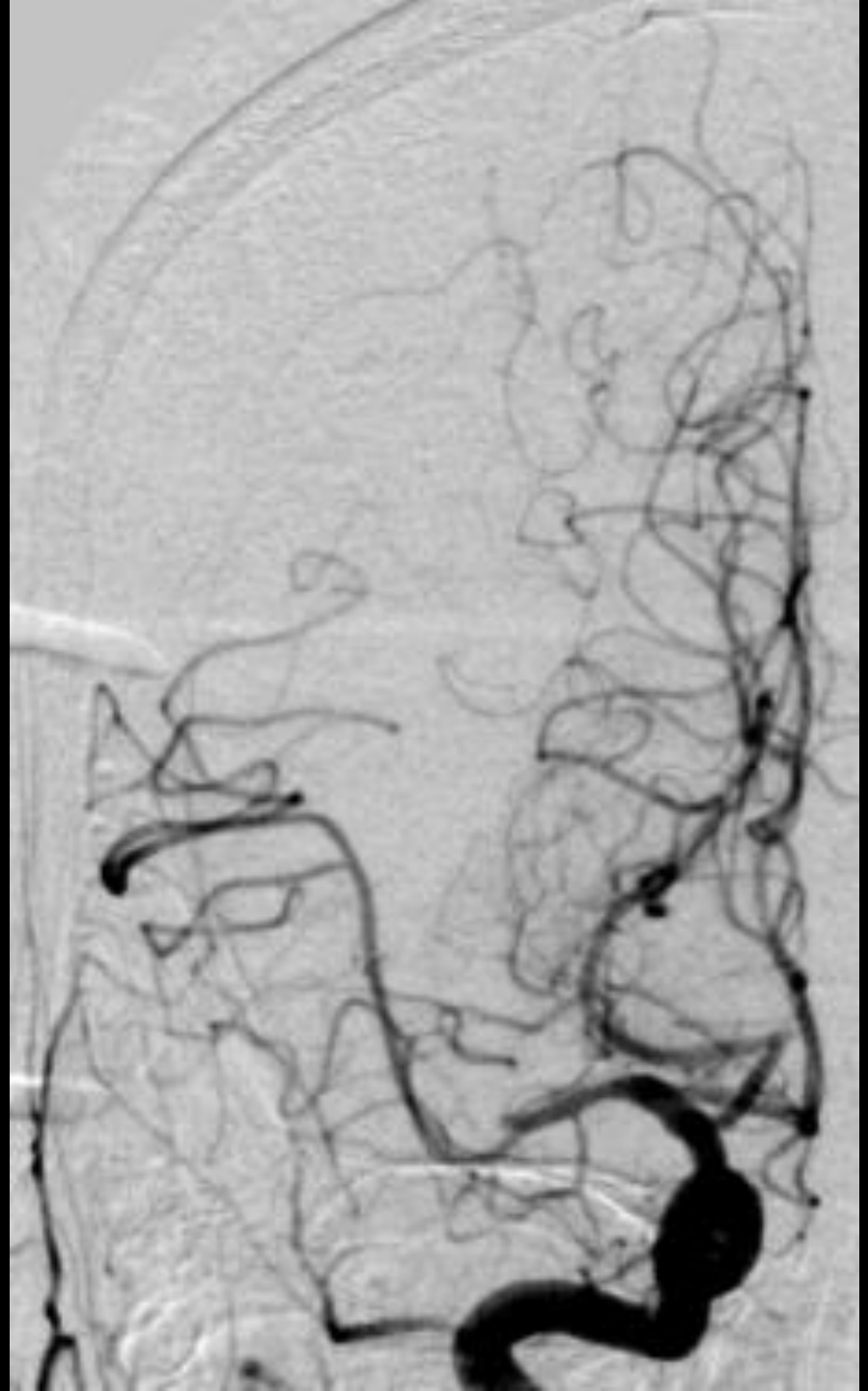
DYSARTHRIA

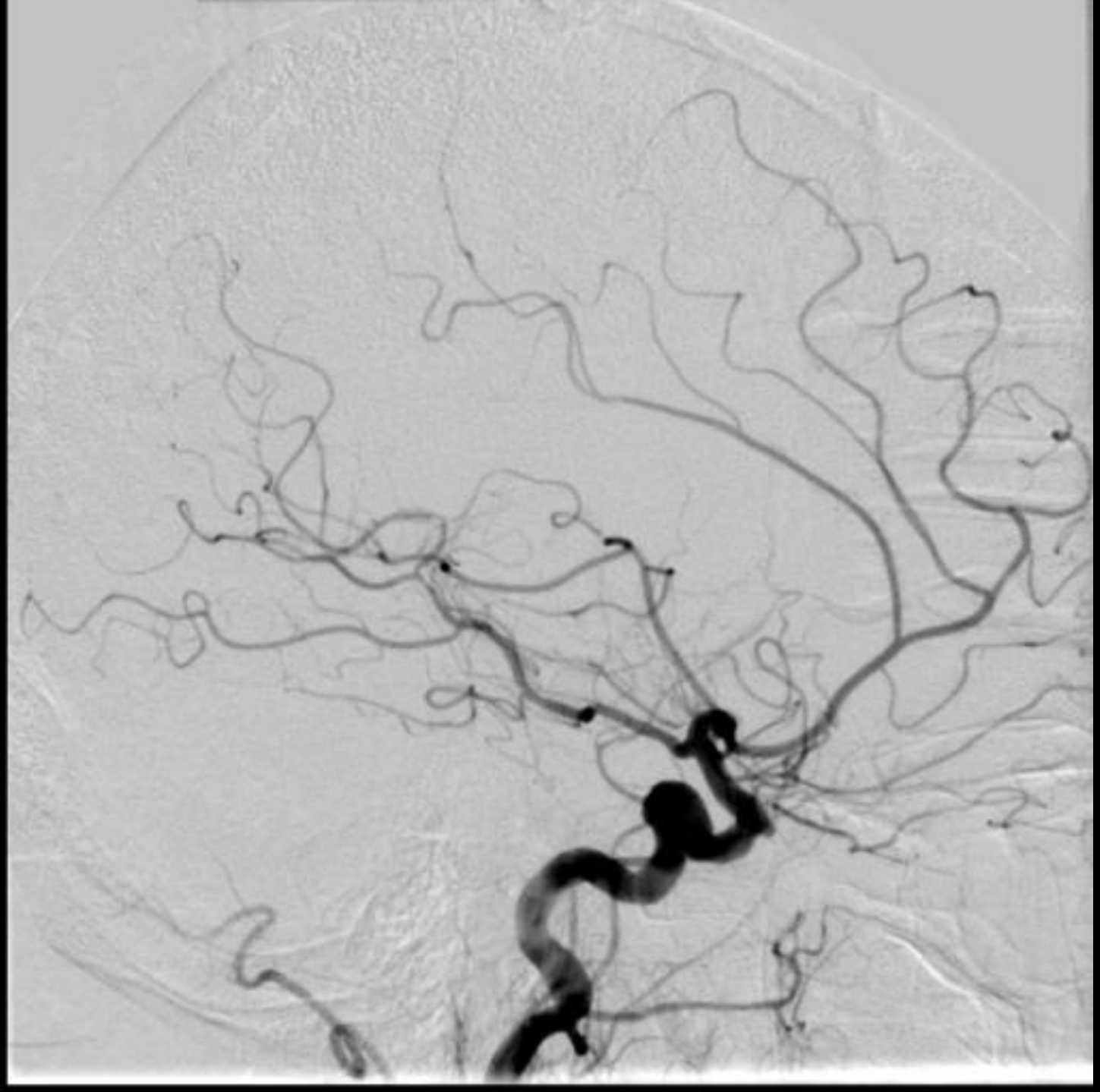
TIME WINDOW TO MT – 4 HOURS

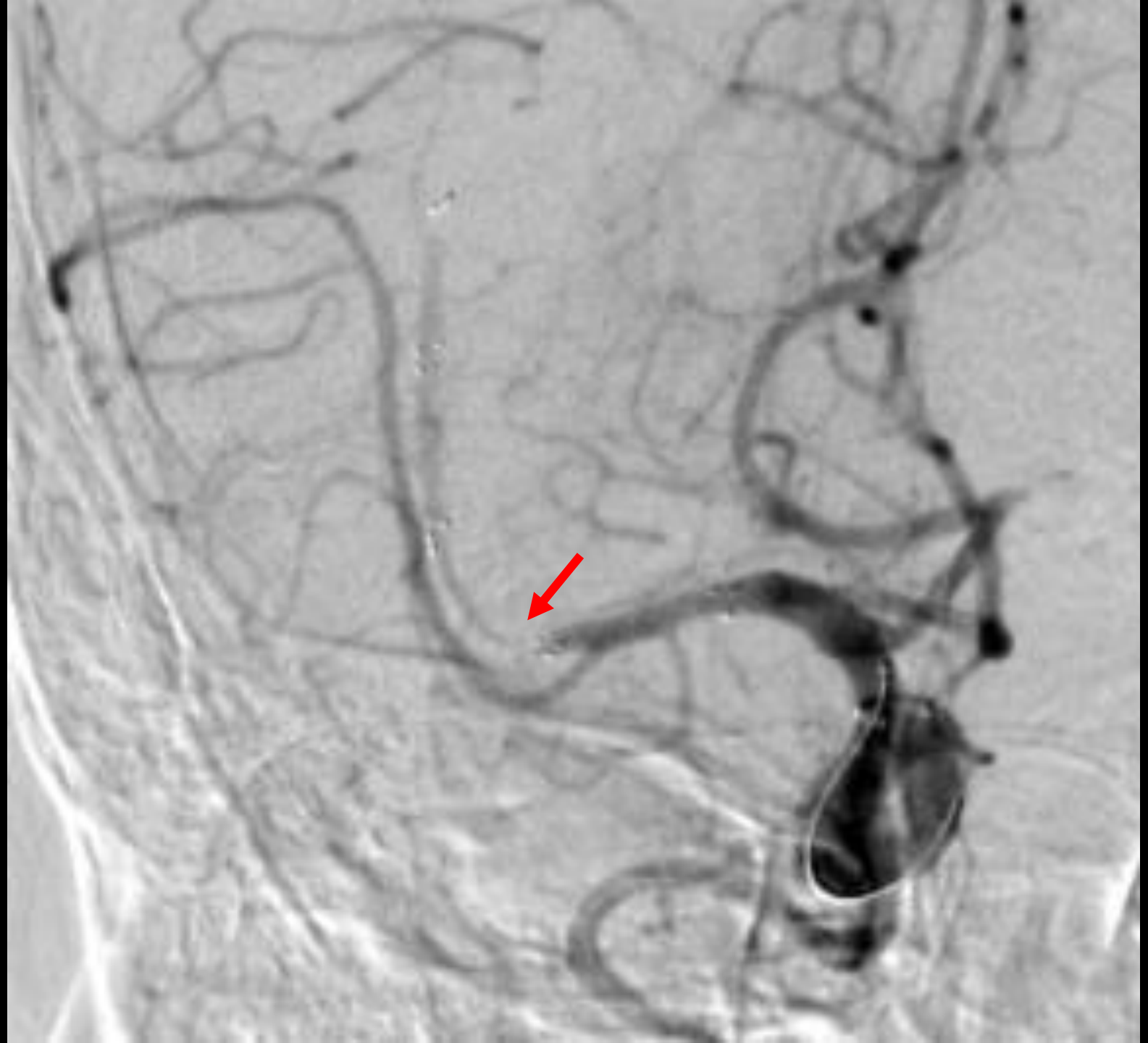
NIHSS 9

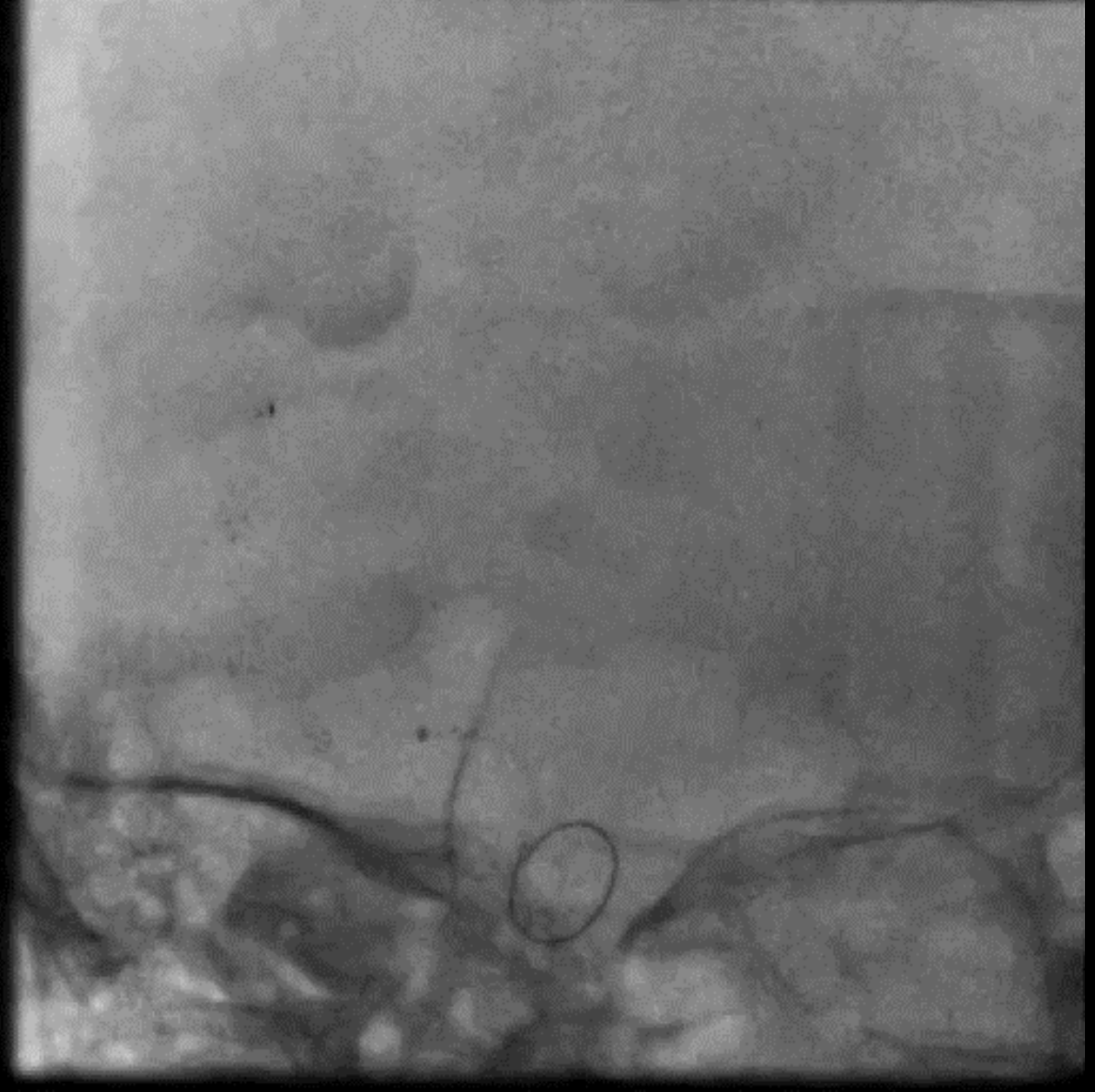


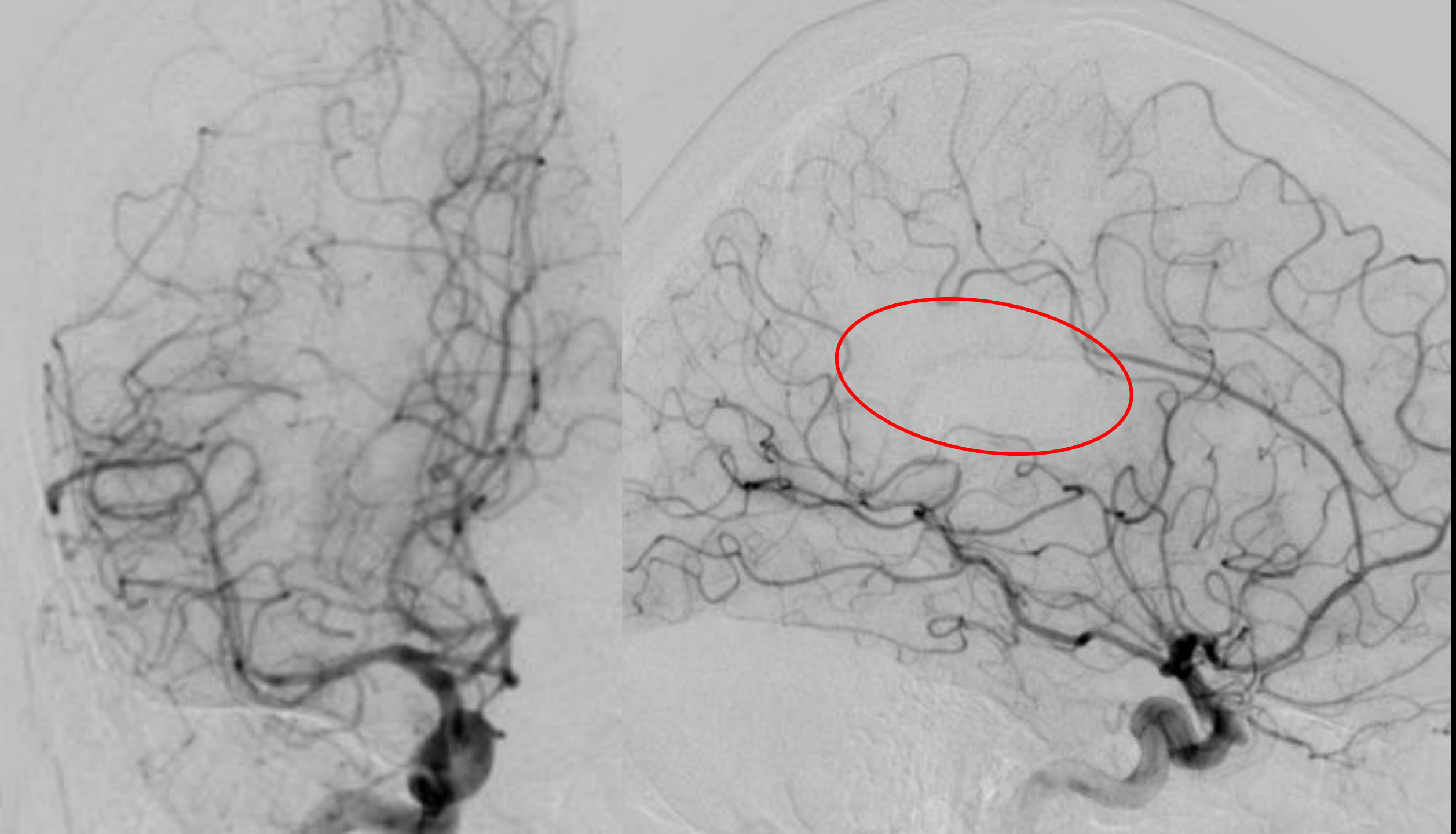


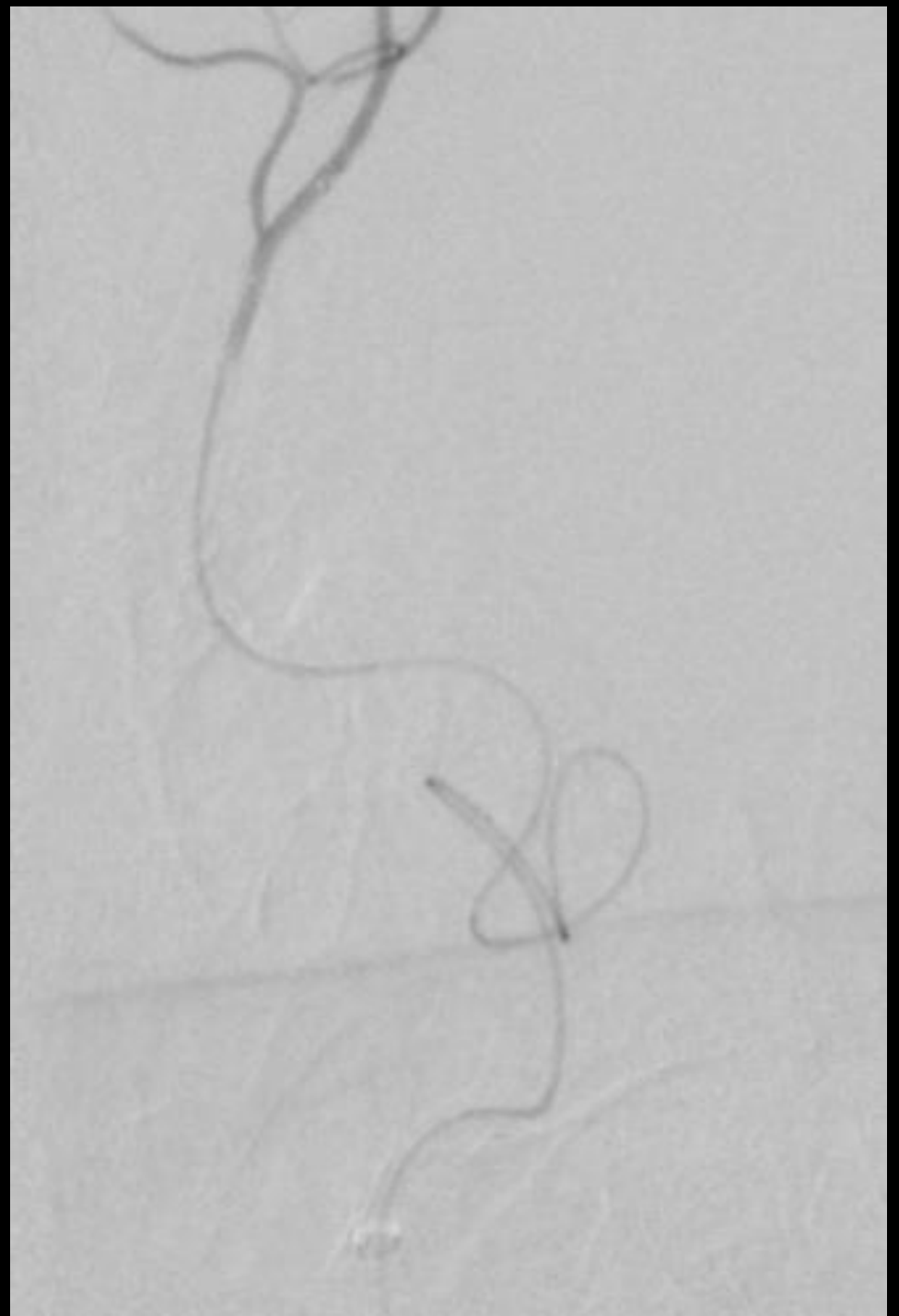


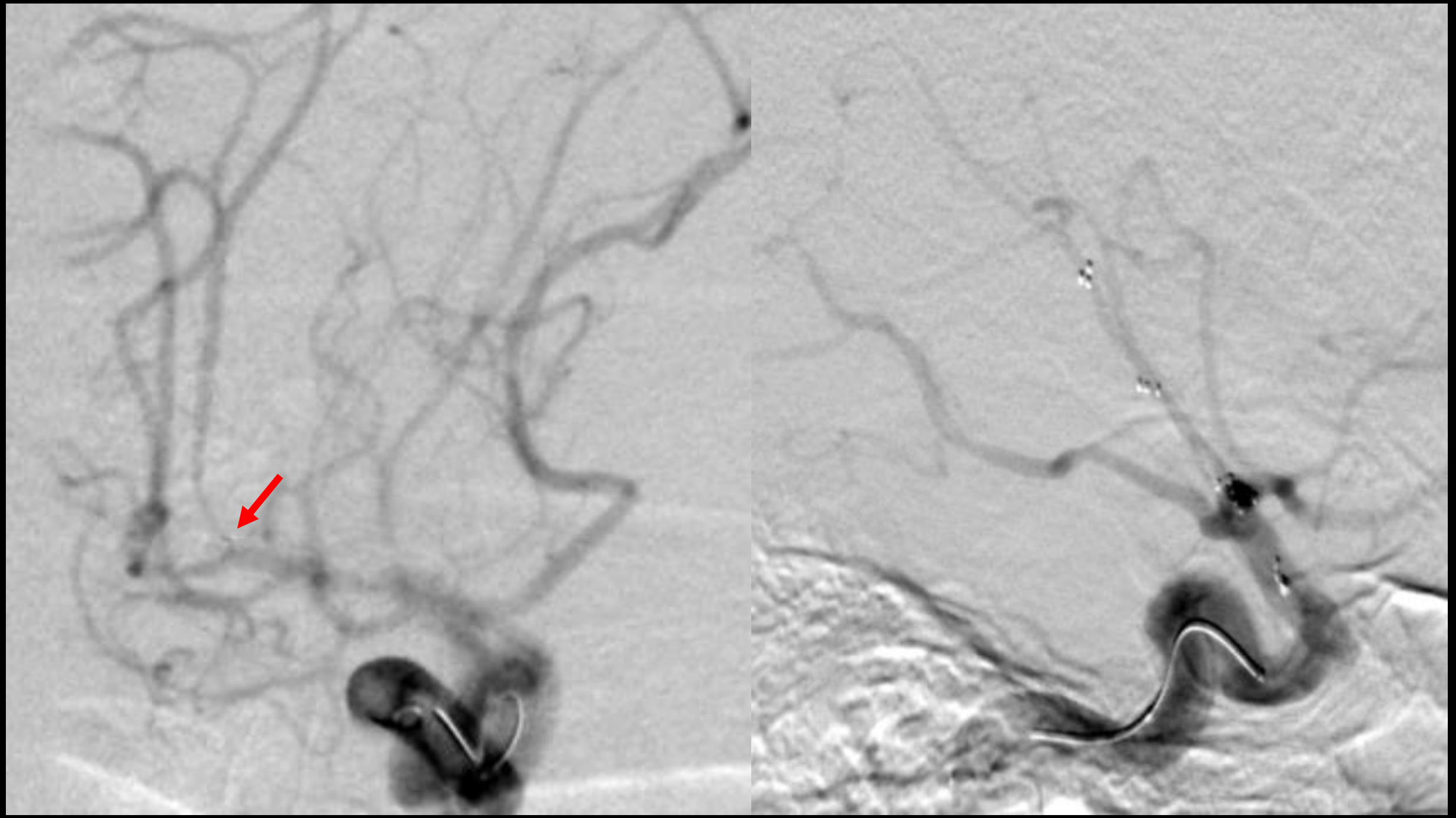


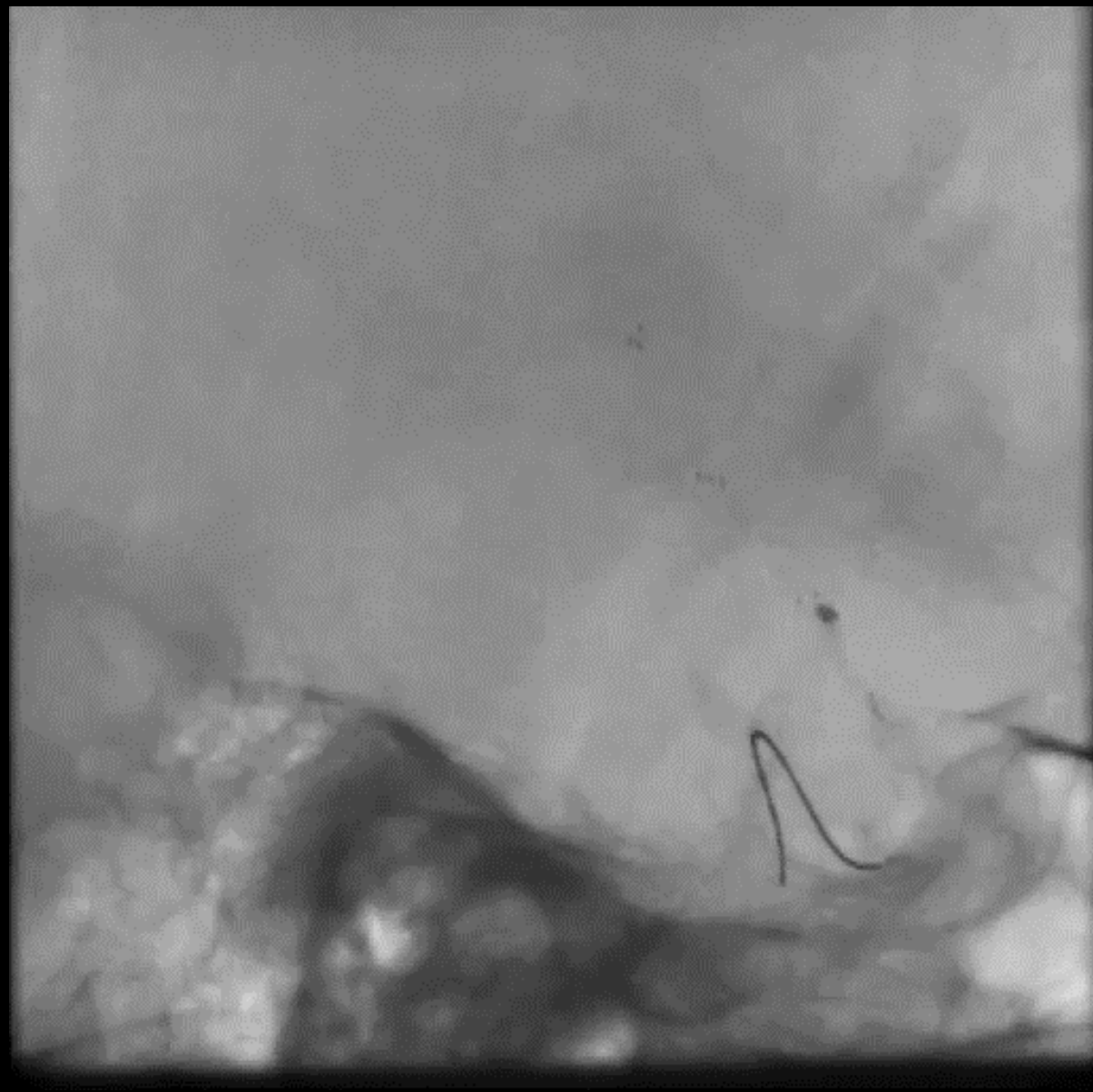


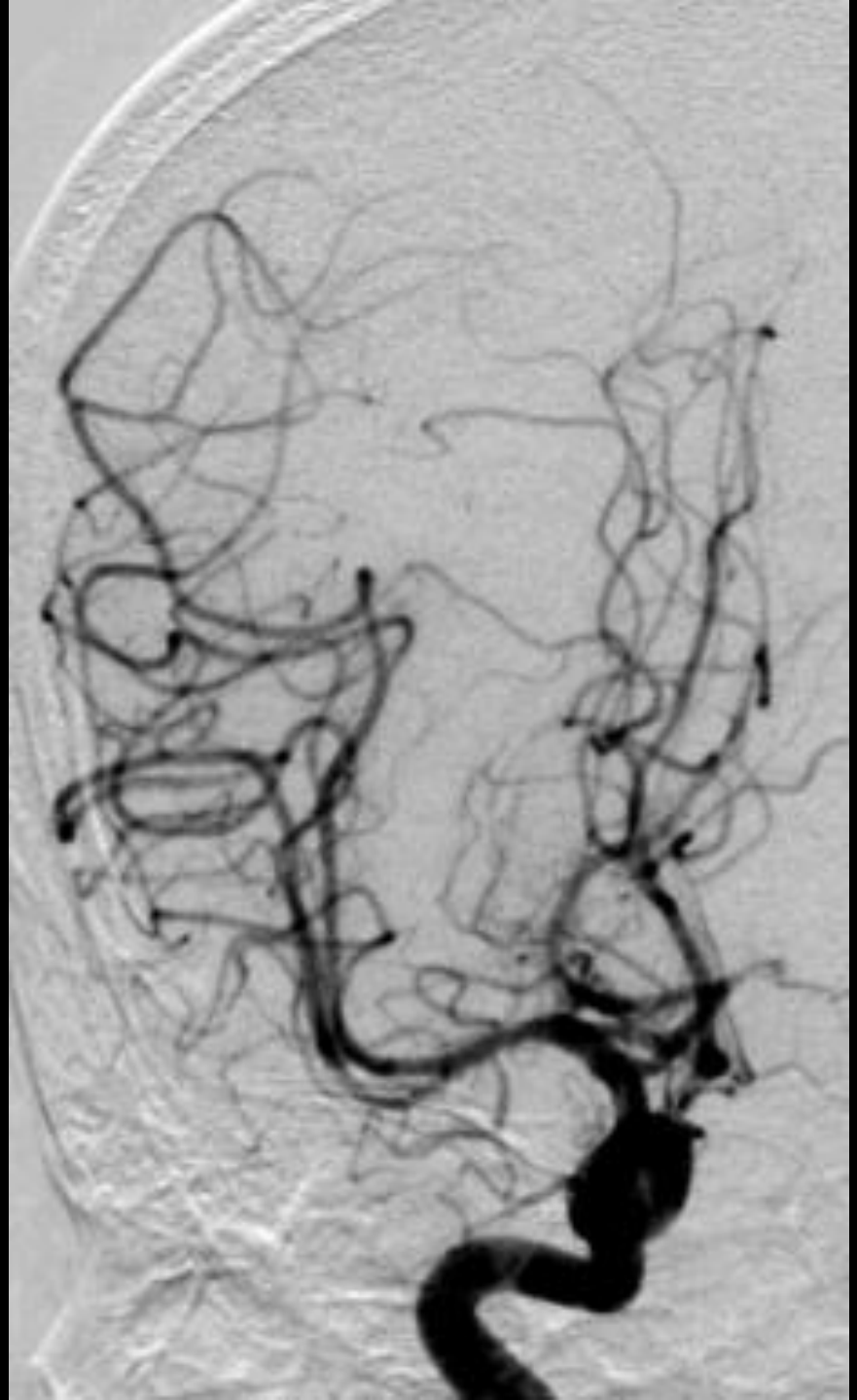
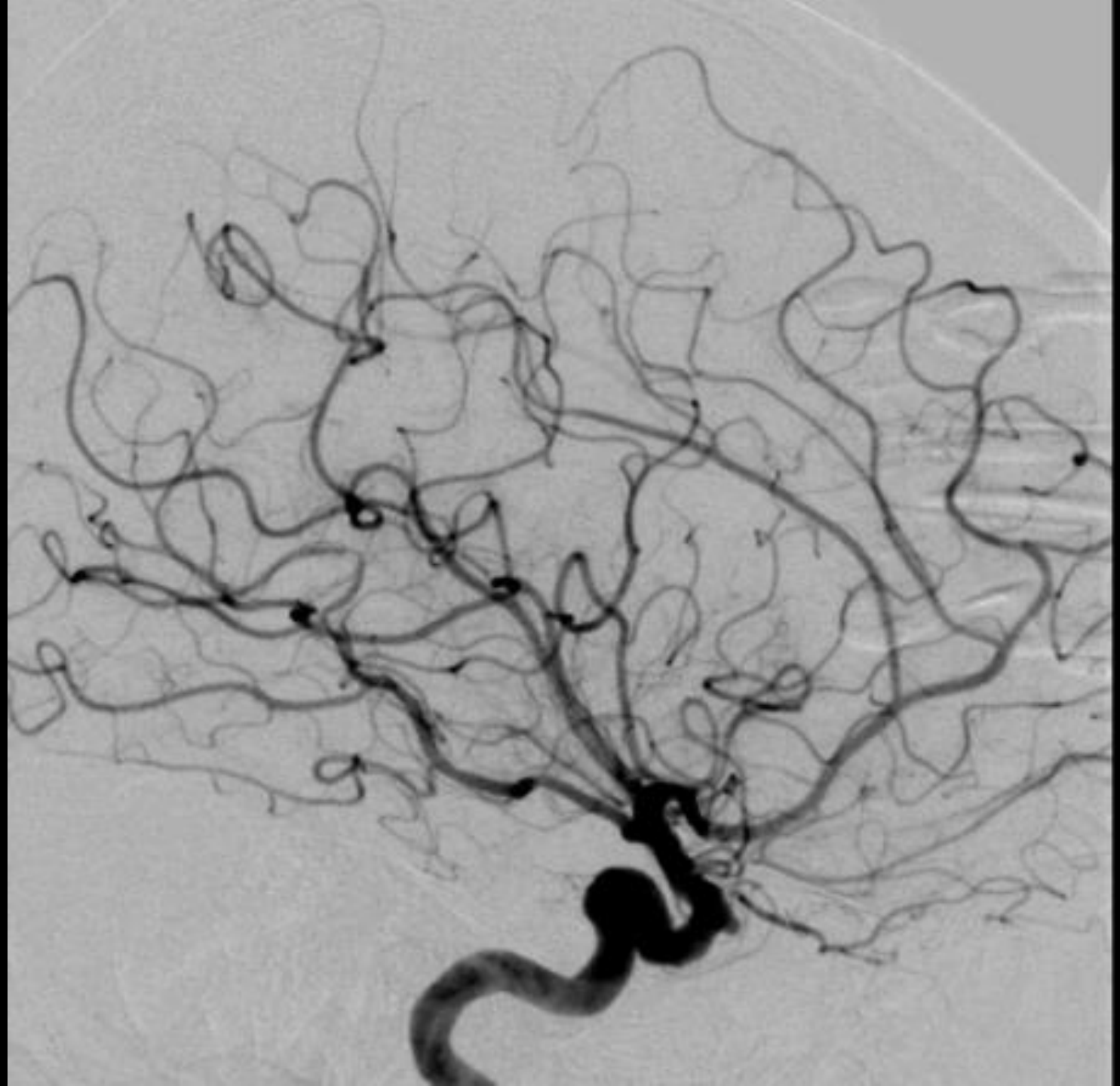










# PIECE MEAL PLUCKING OF CLOT

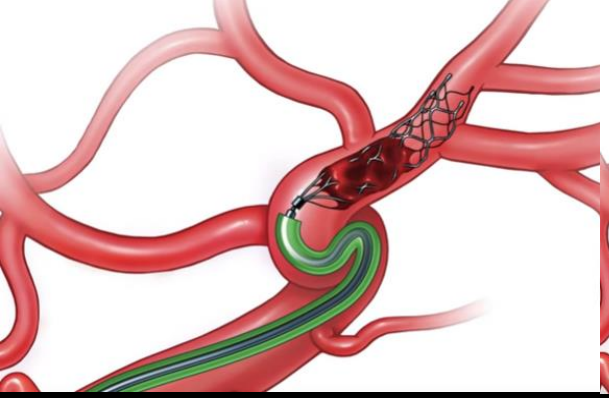
# OUR EXPERIENCE

| | |
|---|---|
| Medium Vessel occlusions treated with Solumbra since January 2022 | 12 |
| | |
| Mean age of the patients | 59.5 |
| Male /Female | 8:3 |
| Mean NIHSS on admission | 10.1 |
| Vessels occluded :<br>M2/M3 segments Middle cerebral artery (MCA)<br>A3 segment Anterior cerebral artery (ACA)<br>P2 segment Posterior cerebral artery (PCA) | <br>10<br>01<br>01 |
| Technique Used :<br>Primary stent retriever (HPC) and switched to solumbra (LPC)<br>Primary Stent retriever + Aspiration (3 max / 4max) | <br>2<br>10 |
| | |
| Final modified TICI 2c/3 recanalization achieved in | 12/12 |
| Intra-procedural complications :<br>Vasospasm<br>ASymptomatic Hemorrhage (SAH)<br>Distal migration of the clot | <br>2/12<br>1/12<br>1/12 |
| Modified Rankin Score (mRS) 0-2 at the end of 7 days / discharge (whichever is earlier) | 09/11 |
| | |

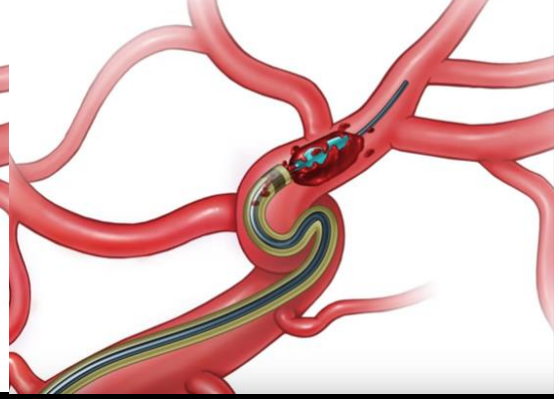
| | Patients Treated (n=11) |
|---|---|
| Age, mean±SD | 59.5 |
| Female sex | 03 (27.2%) |
| Hypertension | 04 (36.3%) |
| Diabetes | 02 (18.18%) |
| Smoker | 04 (36.3%) |
| Atrial fibrillation | 02 (18.1%) |
| Mean NIHSS | 10.1 |
| Use of IV tPA | 5 (45.4%) |

# TAKE HOME MESSAGE

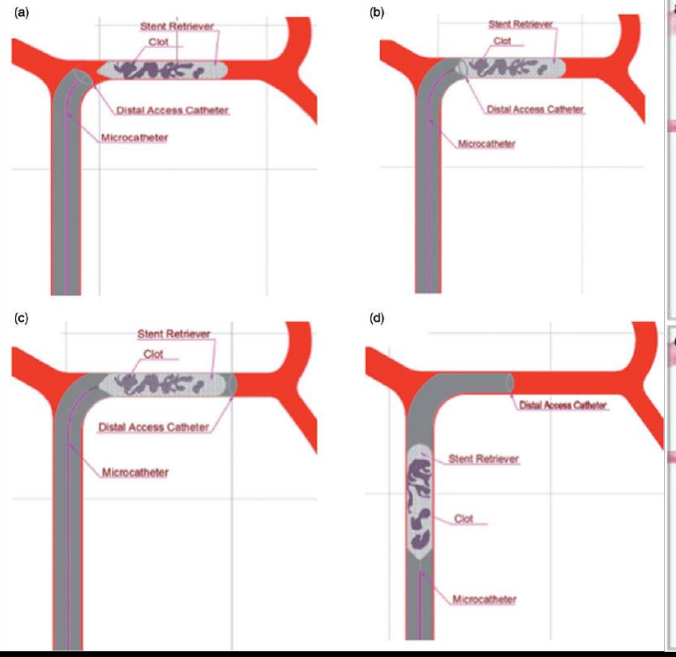
**DO IT IN A RIGHT WAY**

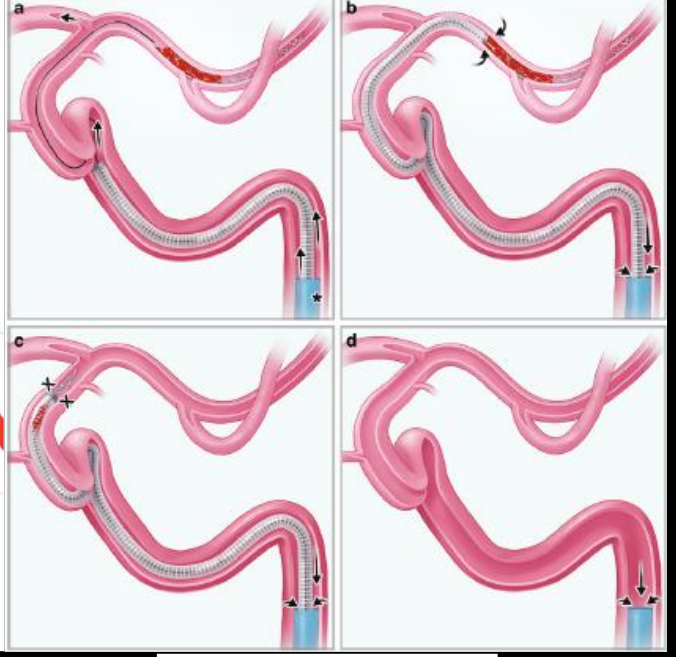


AC AT PROXIMAL ASPECT OF STENT
SOLUMBRA 1



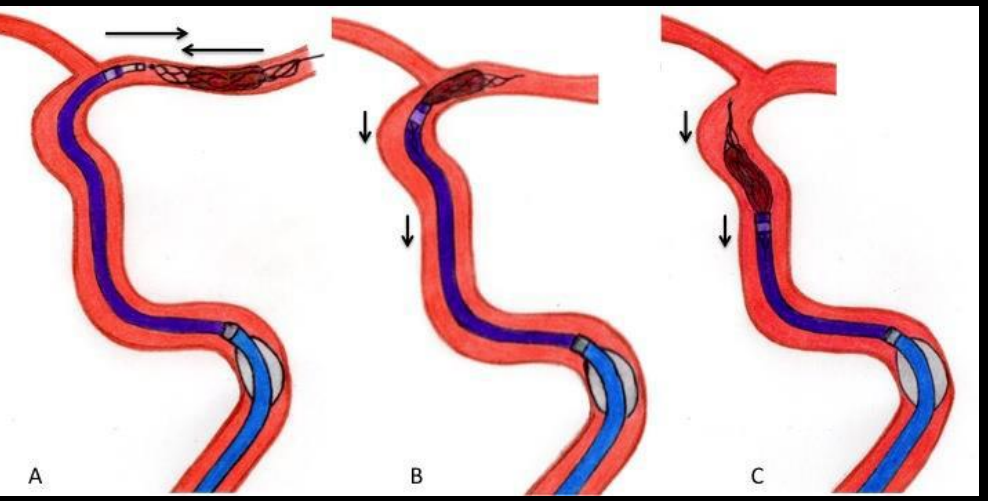
PULLING THE STENT IN AC
SOLUMBRA 2



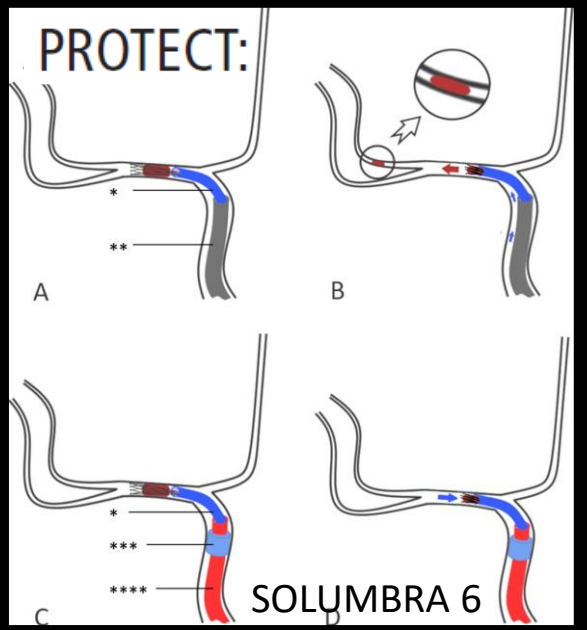

**ADVANCING THE AC COMPLETELY**

SOLUMBRA 3




Aspiration–Retriever Technique for Stroke

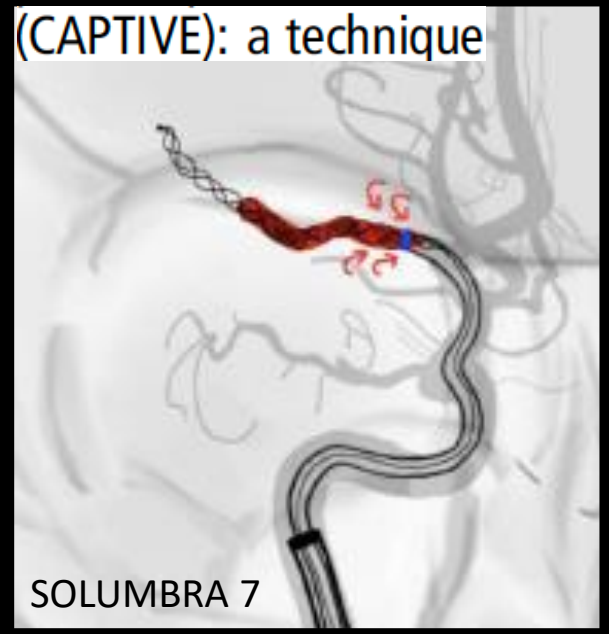
SOLUMBRA 5




SOLUMBRA 6

The SAVE Technique

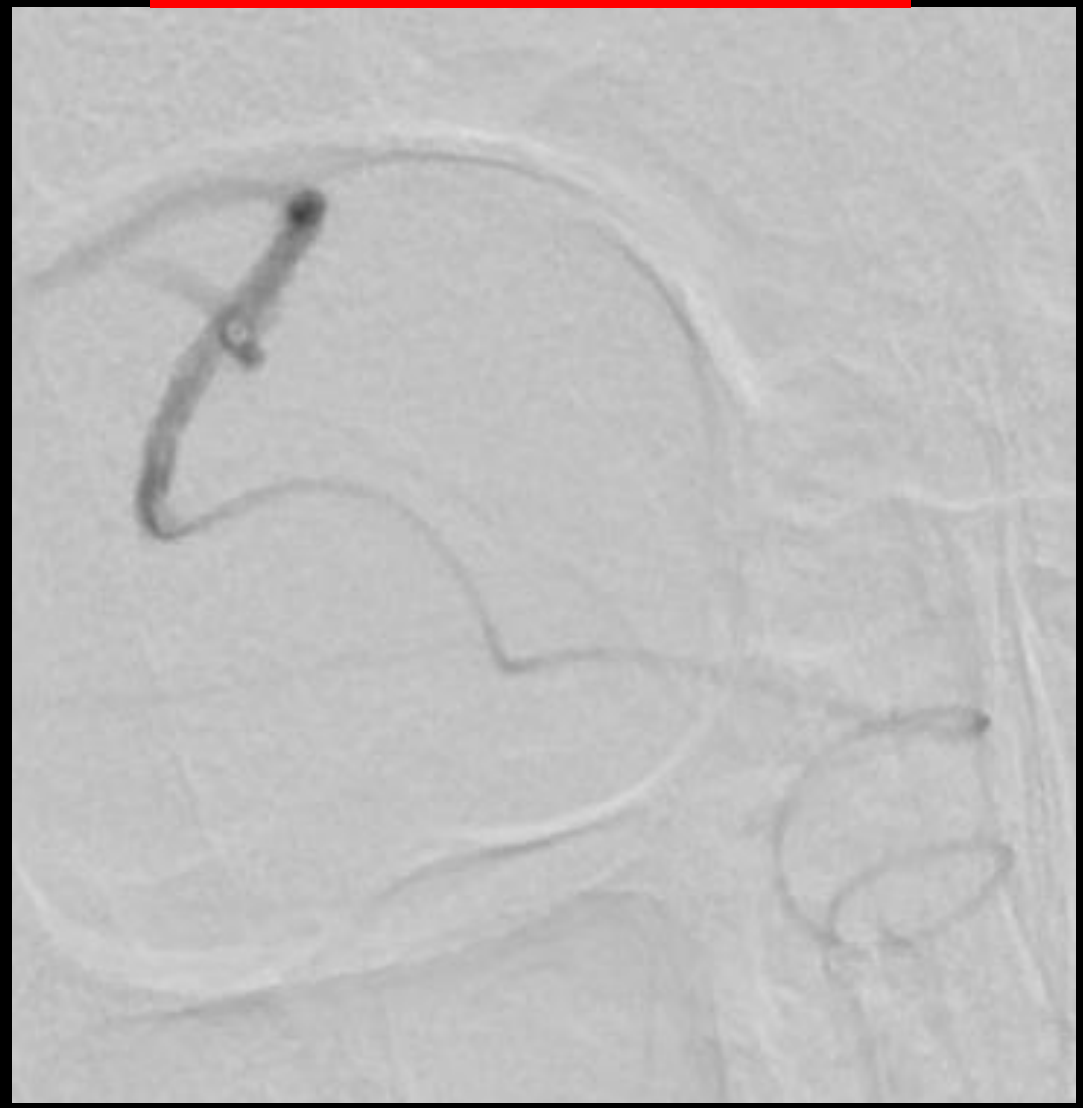
SOLUMBRA 4




SOLUMBRA 7

# MeVo SOLUMBRA

CROSS THE CLOT WITH MICROCATH

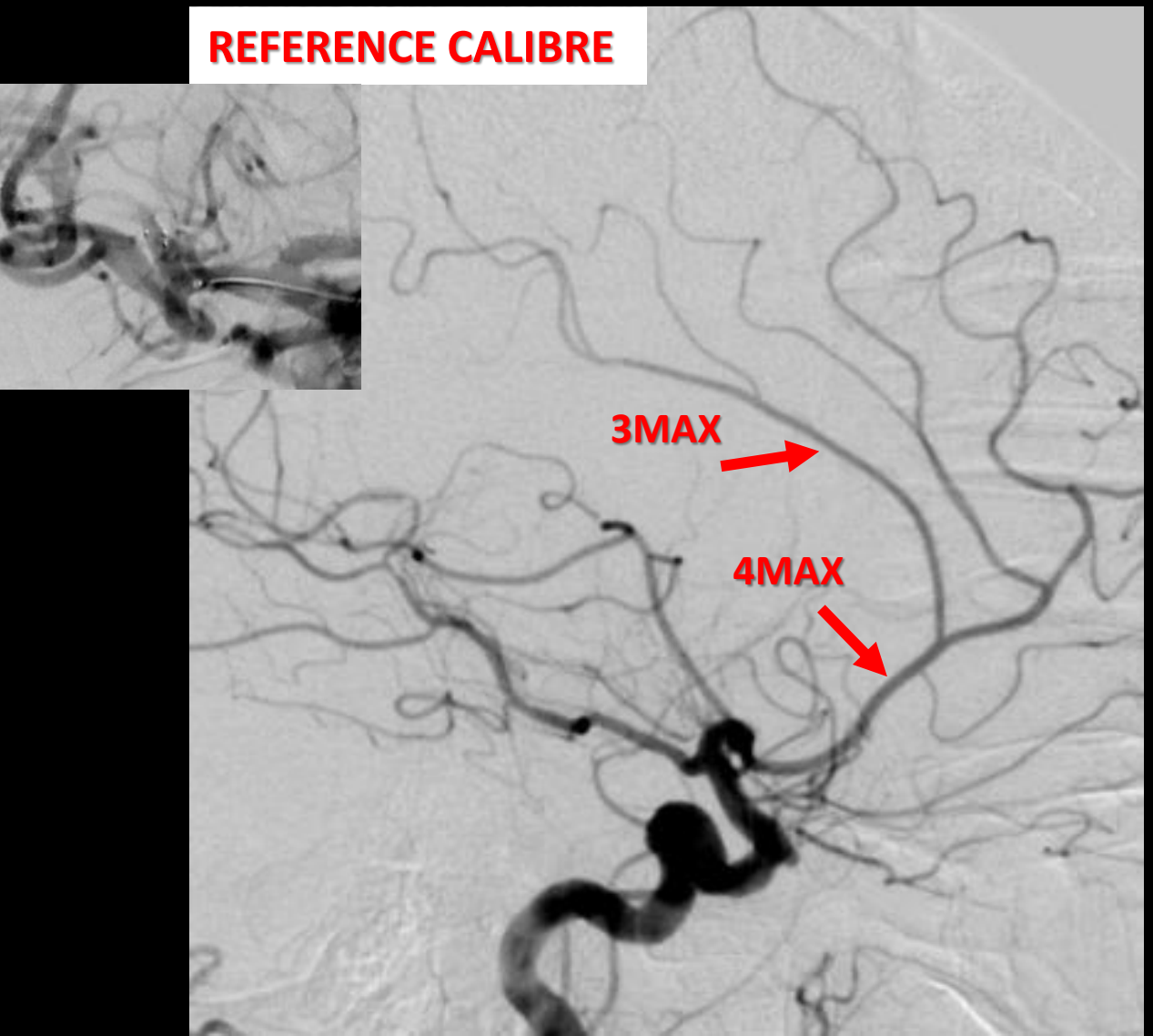


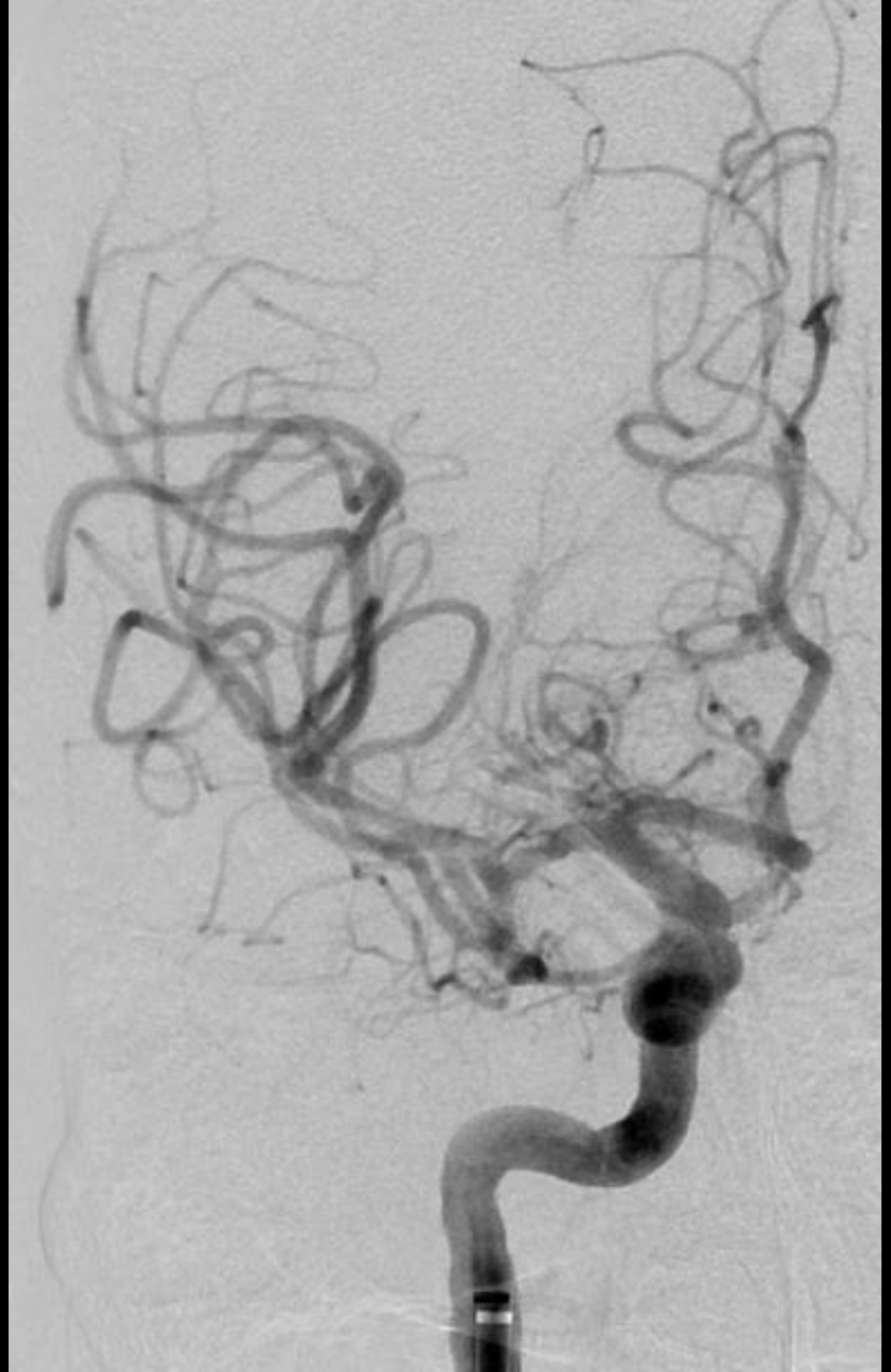
DEPLOY THE STENT
LOCALIZE THE CLOT

CHOOSE APPROPRIATE SIZE ASPIRATION CATHETER

**REACH TO THE SITE OF CLOT**

**REFERENCE CALIBRE**



# LIMITATION OF TECHNIQUE

ACE 68: 132 cm

4 Max : 139 cm

3 Max : 132 cm

BLIND EXCHANGE REQUIRED

ONE EXTRA HARDWARE – COST


THANK YOU