

# ***MONTER ET ÊTRE STABLE EN INTRA-CRÂNIEN***

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***École de la Thrombectomie***

***05/02/2020***

**Service de Neuroradiologie  
Hôpital Pitié-Salpêtrière. Paris**



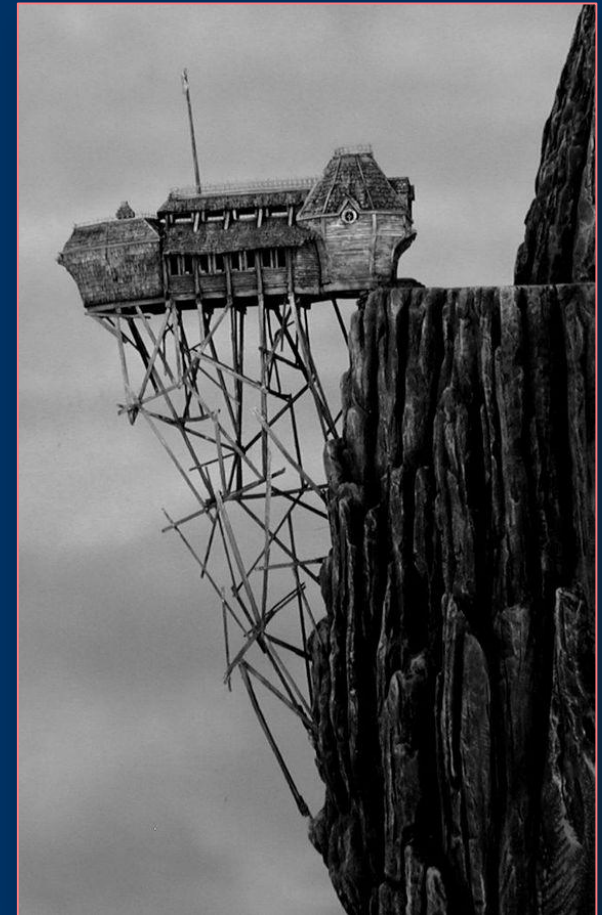
# OBJECTIFS

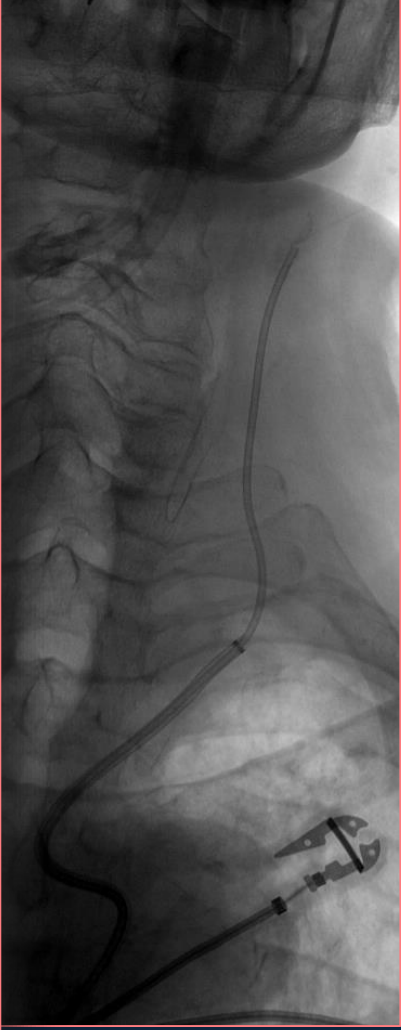
- Connaître les stratégies pour obtenir un **micro-cathétérisme stable en intra-crânien**
- Connaître les stratégies pour **franchir le caillot**
- Connaître les stratégies pour les **recanalisations distales**

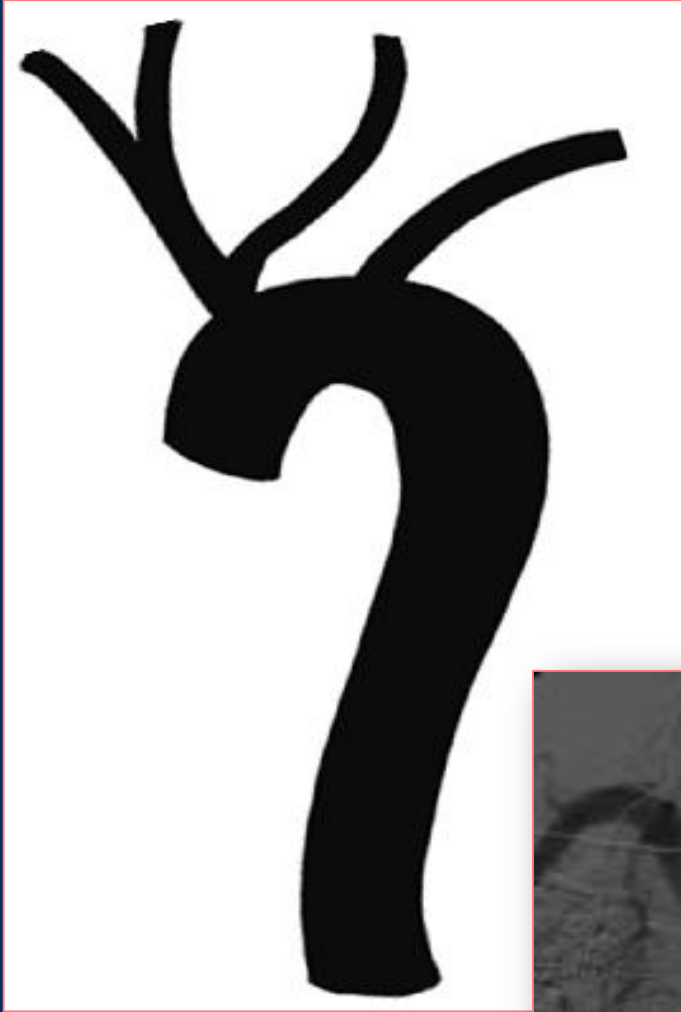
# ACCÈS

*Tout commence par les fondations de l'édifice ...*

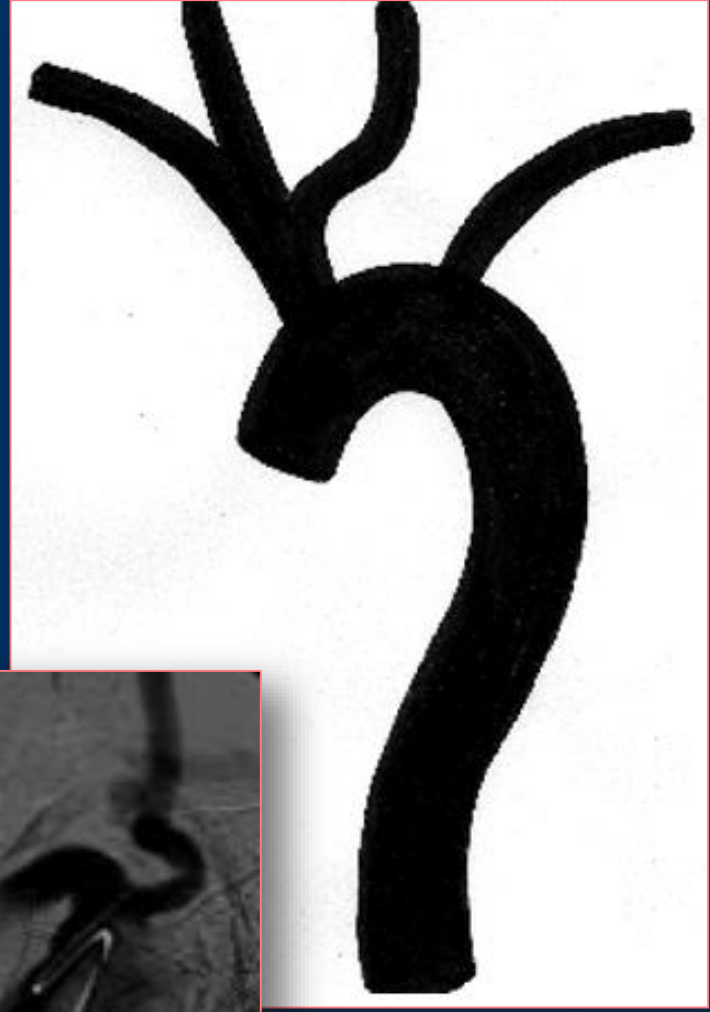
- Un leitmotiv : la **stabilité**
- Plus le cathéter porteur est distal, plus il est stable
- Cathétérisme **triaxial +++**



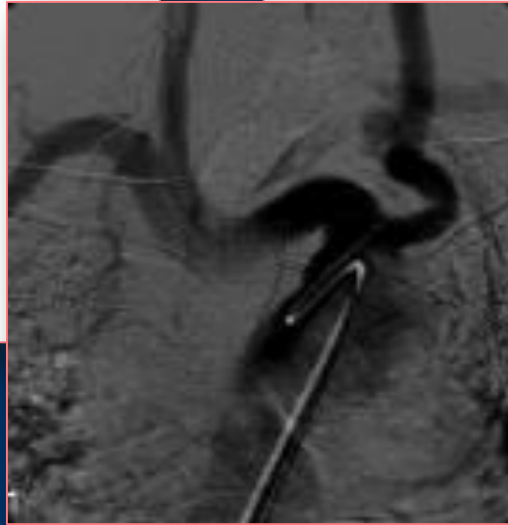


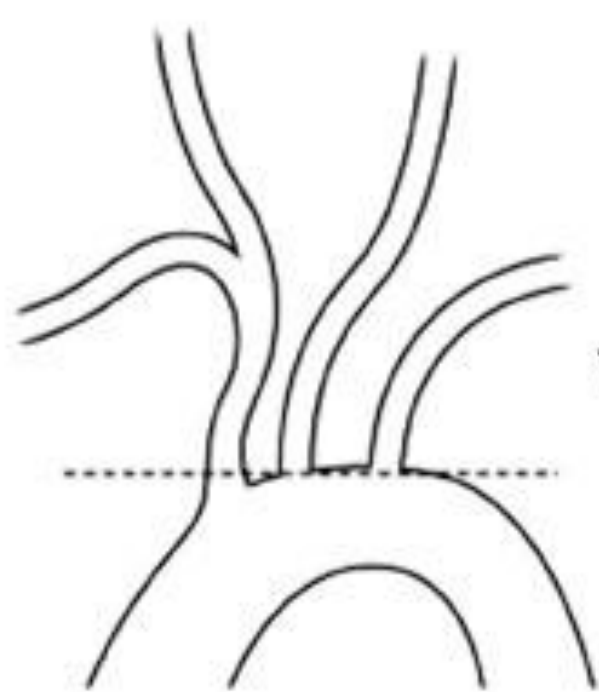


**13 %**

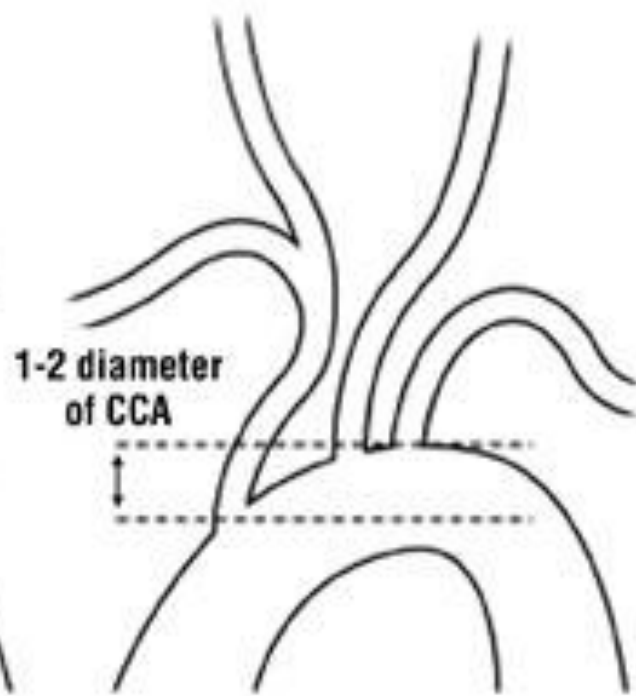


**9 %**



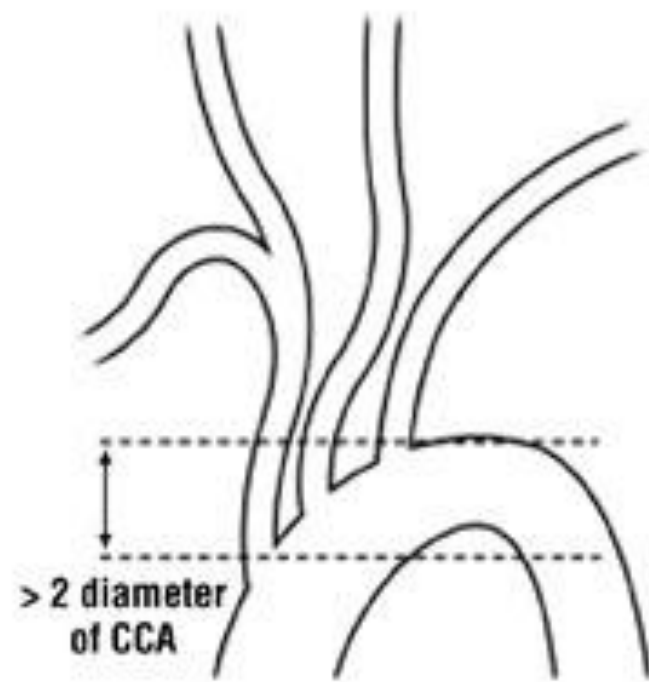


**Type I**



1-2 diameter  
of CCA

**Type II**



> 2 diameter  
of CCA

**Type III**



# STRATÉGIE

- Aviation civile :
  - Plan the flight
  - Flight the plan



- Mais savoir changer de stratégie en cours d'intervention



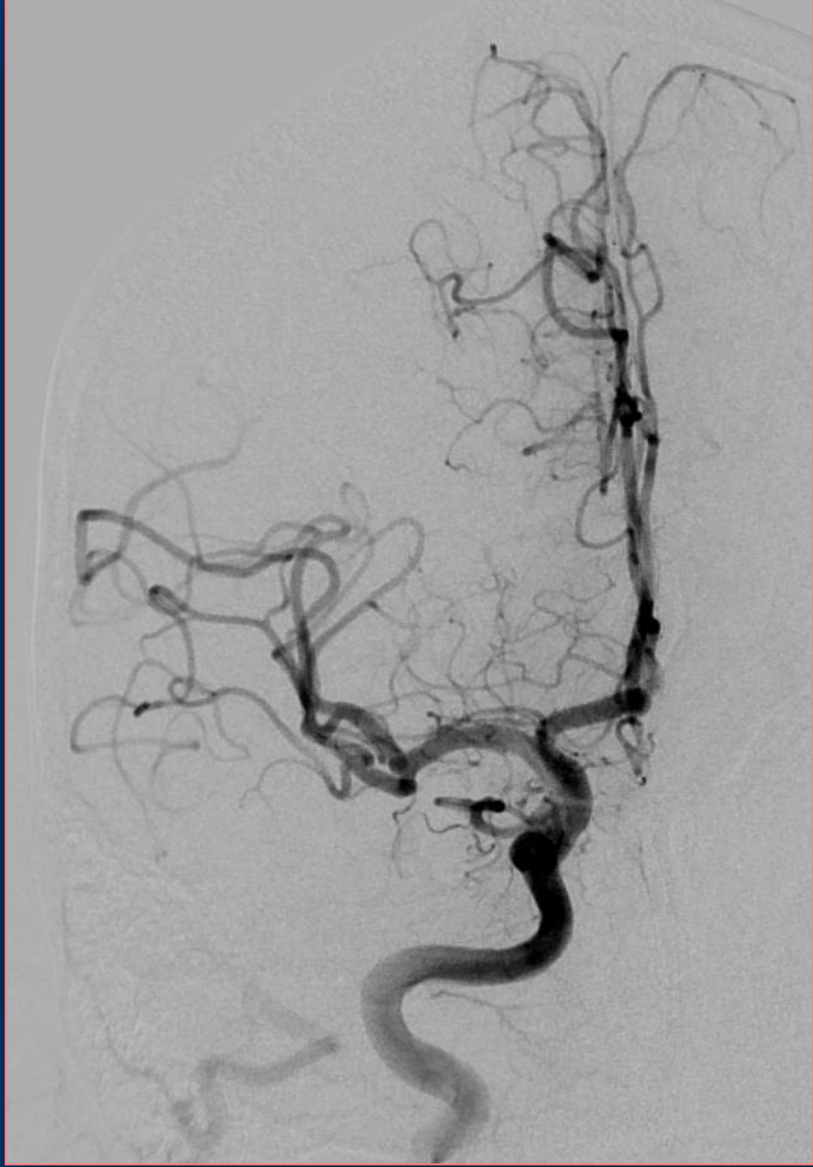
# STRATÉGIE

- **Dès le bilan diagnostique :**  
Patient de plus de 70 ans et/ou absence de visualisation de l'ACI ou de l'a. vertébrale dominante en intra-crânien :  
imagerie des TSA
- Introducteur long fémoral 9F (25 cm)
- Introducteur long 6F souple (80 ou 90 cm)
- Cathéter intermédiaire 5F ou 6F

# STRATÉGIE

- Savoir changer de stratégie :

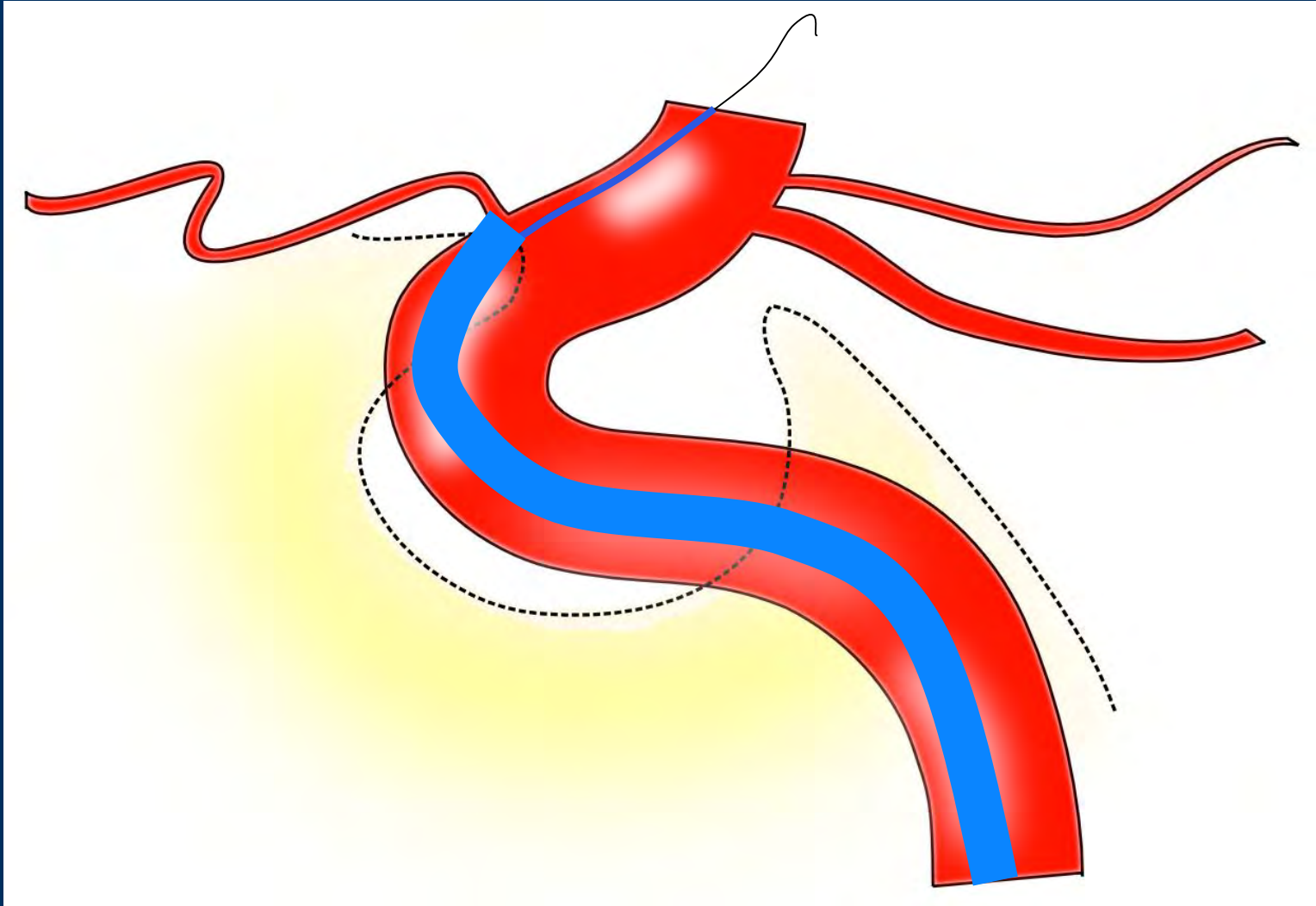


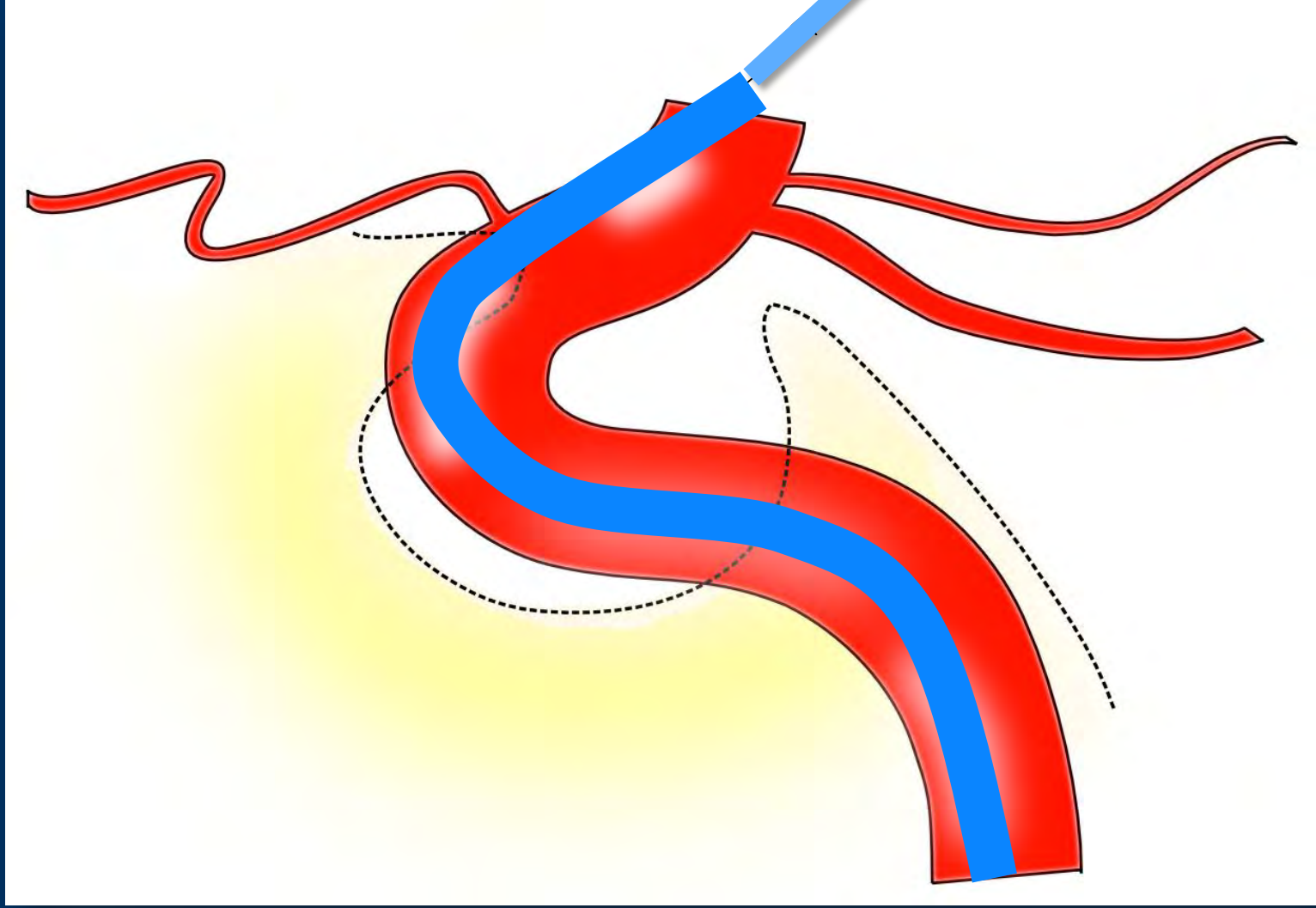


# ***ASPIRATION DIRECTE (ADAPT) OU « SOLUMBRA »***

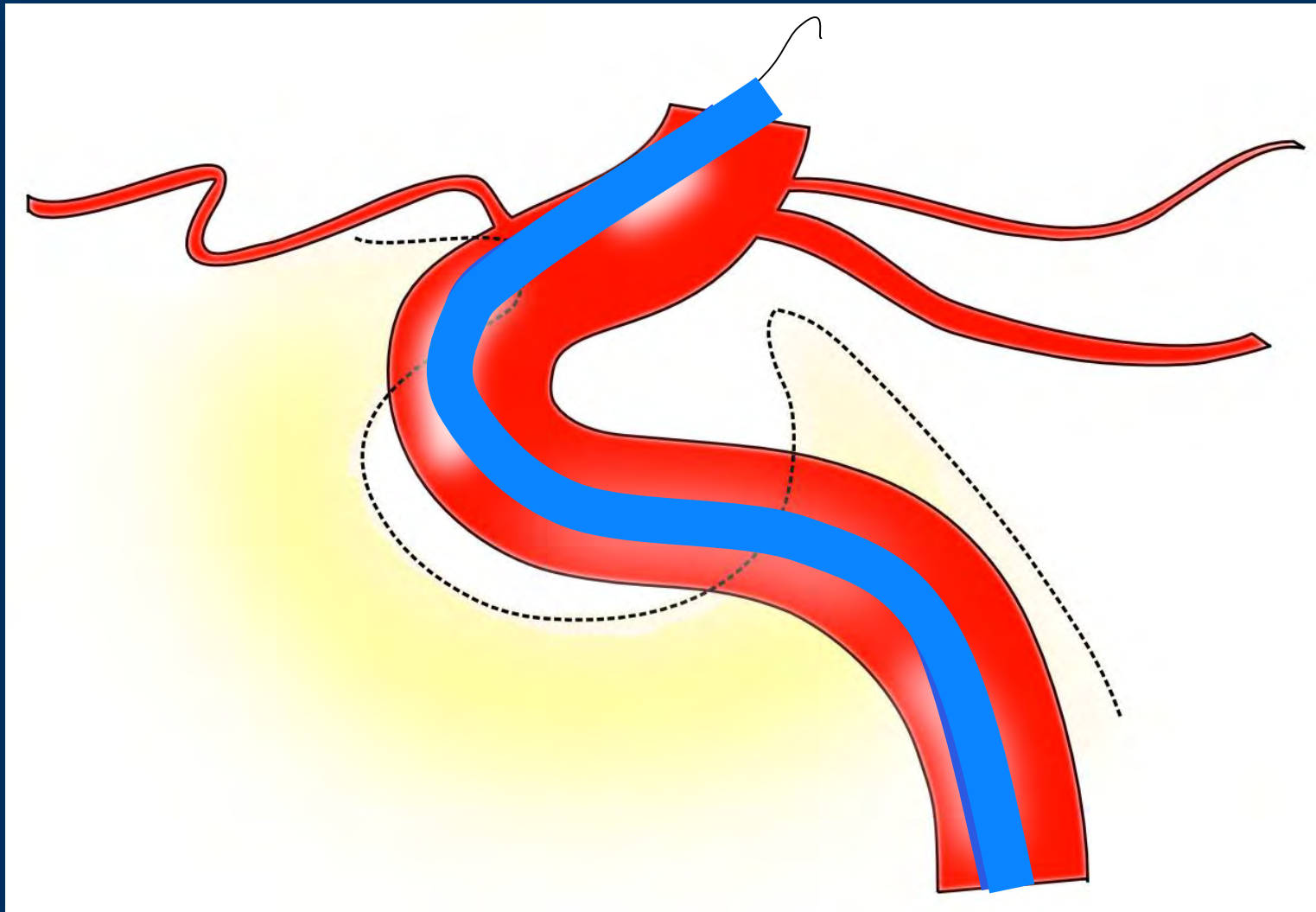
- Mon cathéter ne monte pas dans le siphon  
***Que faire ?***





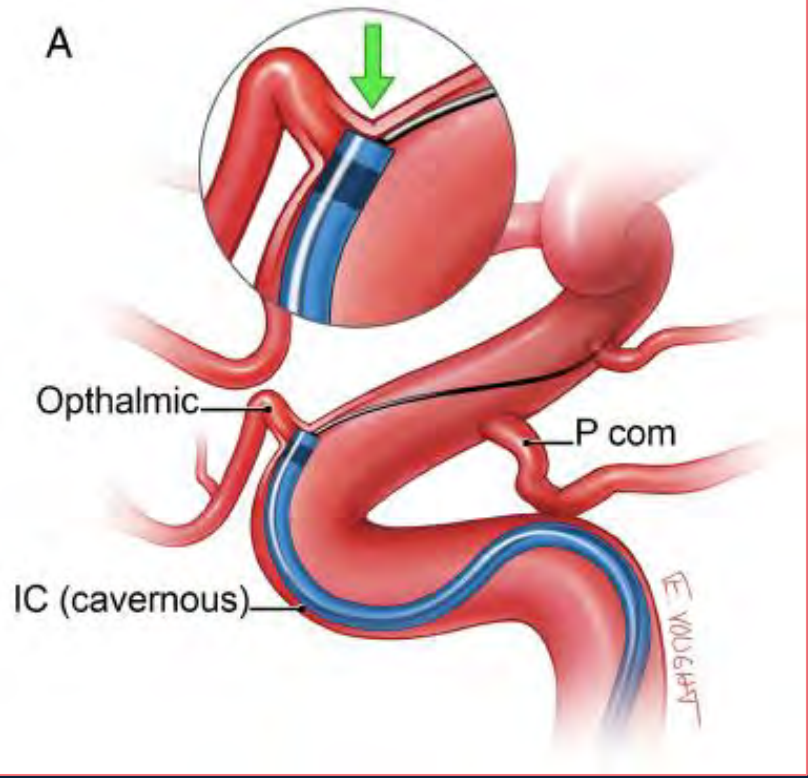


# Cathéter 3Max

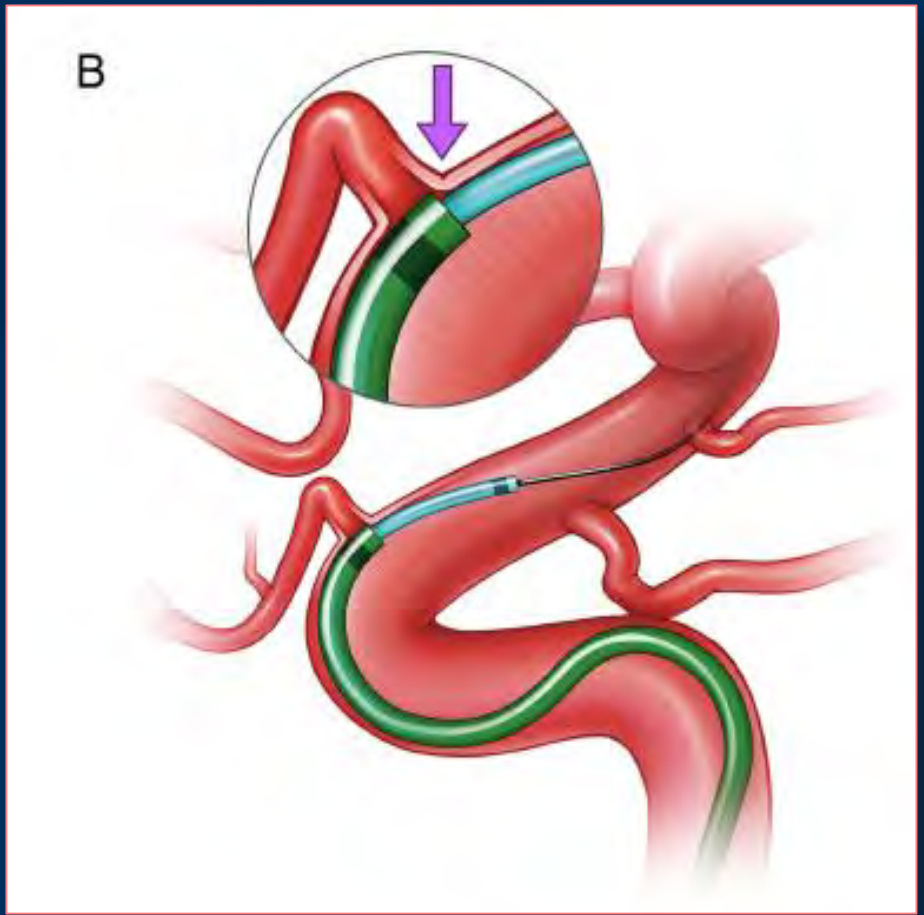




A

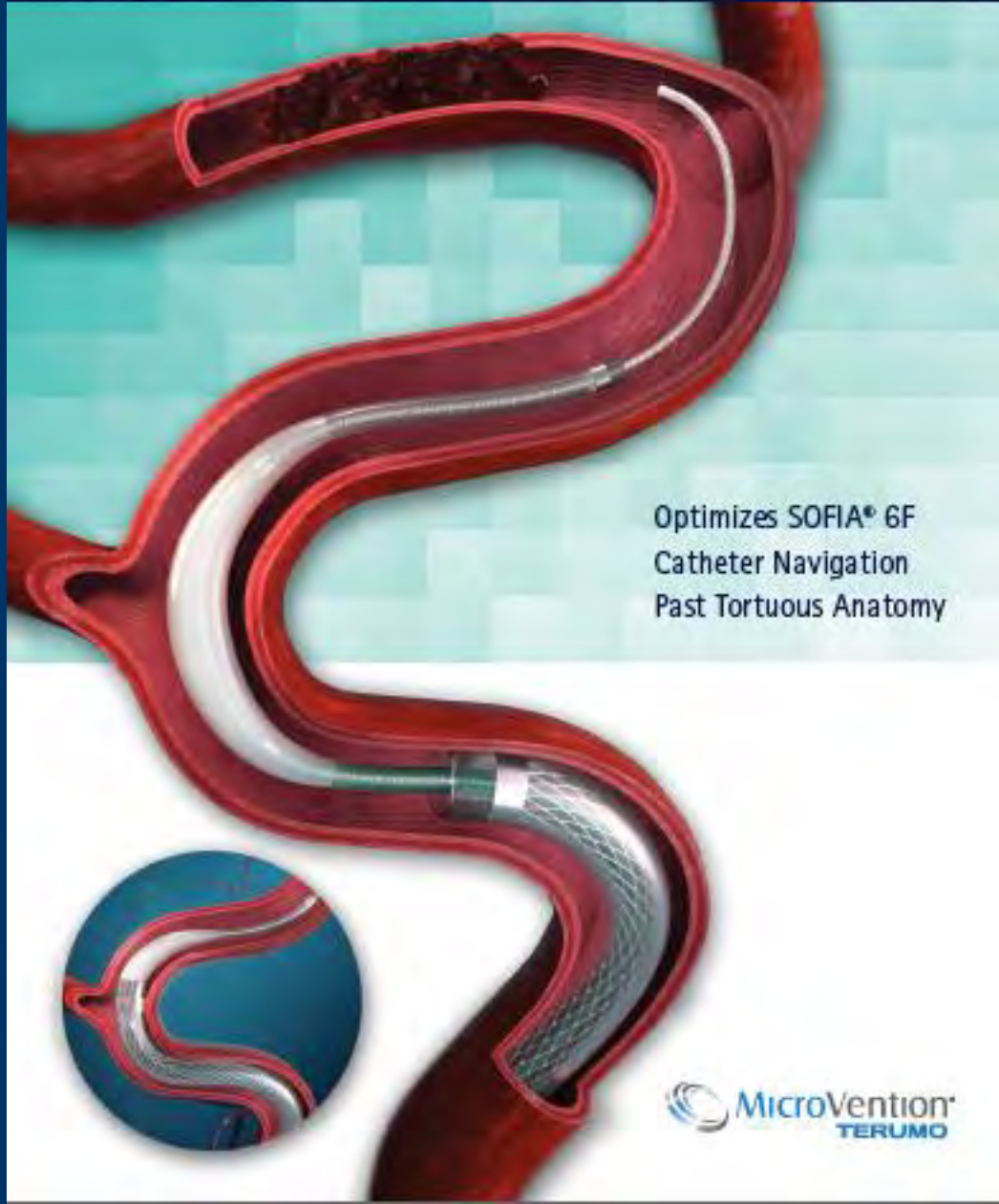


B



École

# WEDGE™ CATHETER



Optimizes SOFIA® 6F  
Catheter Navigation  
Past Tortuous Anatomy

# WEDGE™ CATHETER

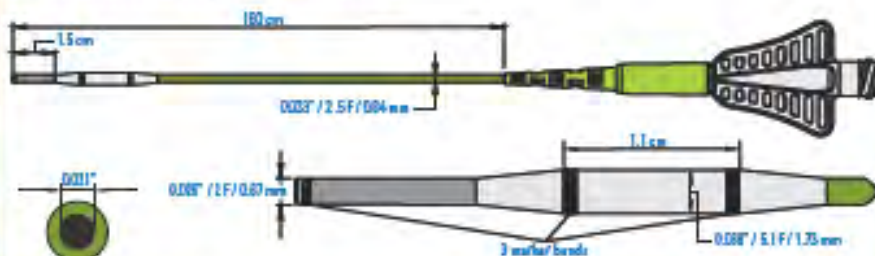
SOFIA® 6F  
COMPATIBLE

## WEDGE™ CATHETER

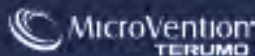
Optimizes SOFIA® 6F Catheter Navigation Past Tortuous Anatomy

| PRODUCT CODE | ID     | TIP SHAPE | CATHETER LENGTH | TIP LENGTH | OD DISTAL                  | OD PROXIMAL                | BULB WORKING LENGTH | BULB MAX OD                | TIP MARKERS |
|--------------|--------|-----------|-----------------|------------|----------------------------|----------------------------|---------------------|----------------------------|-------------|
| MCWED21160   | 0.021" | Straight  | 160 cm          | 1.5 cm     | 0.025"<br>2.0 F<br>0.67 mm | 0.033"<br>2.5 F<br>0.84 mm | 1.1 cm              | 0.068"<br>5.1 F<br>1.73 mm | 3           |

One unit per box, includes shaping restraint and introducer sheath



The Wedge™ Microcatheter is intended for general intravascular use, including the peripheral, coronary and neurovasculature for the infusion of diagnostic agents, such as contrast media, and therapeutic agents. For cerebral indications, potential complications, warnings and instructions, see Instructions for Use (P/N PD110780C).



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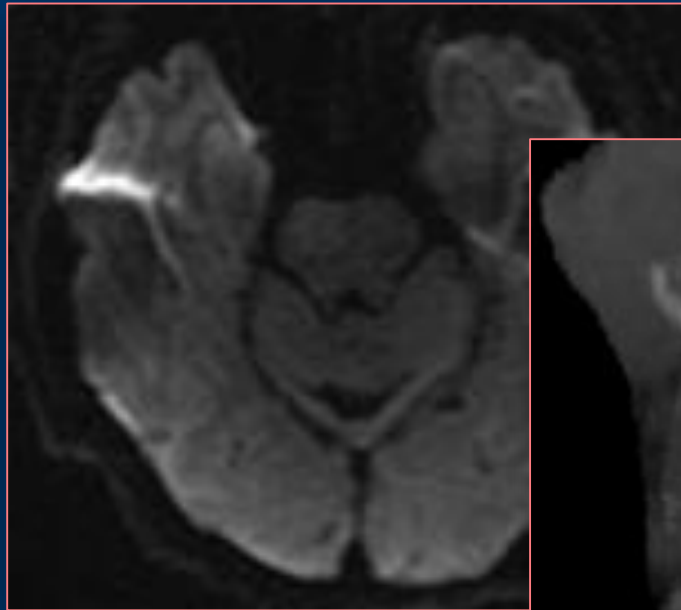
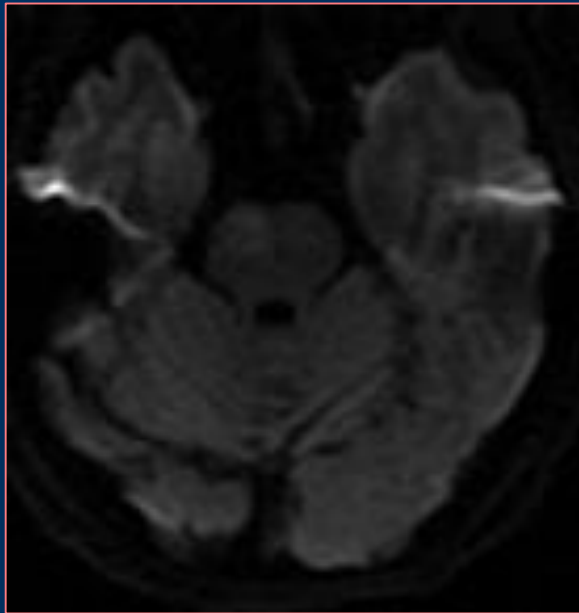
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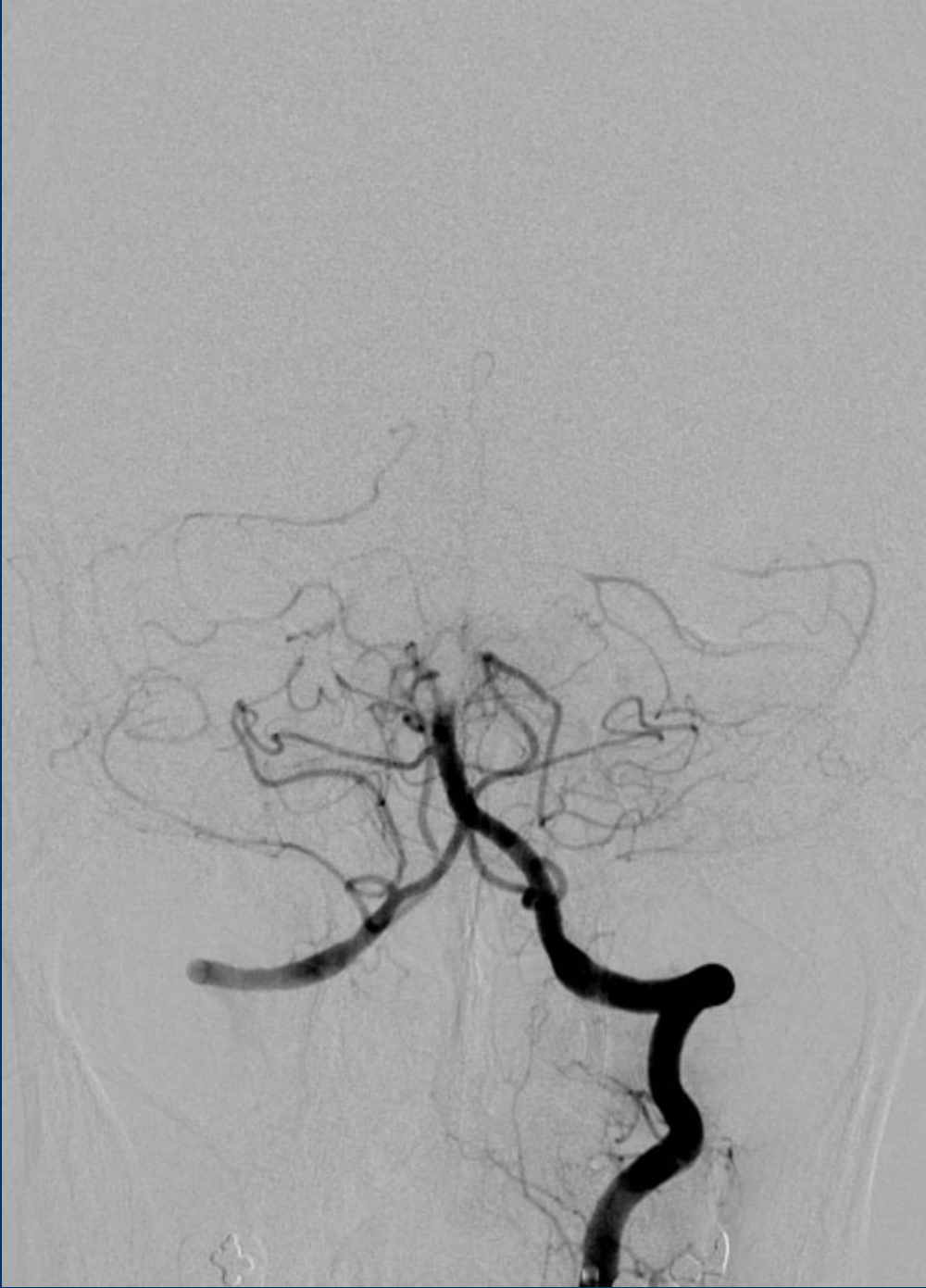


# FRANCHIR LE CAILLOT

- Le moyen **le plus sûr** de franchir le caillot, c'est de ne pas le franchir ...
- Intérêt de l'aspiration : cathéter à large lumière au contact du caillot
- Pas de nécessité de franchir le caillot

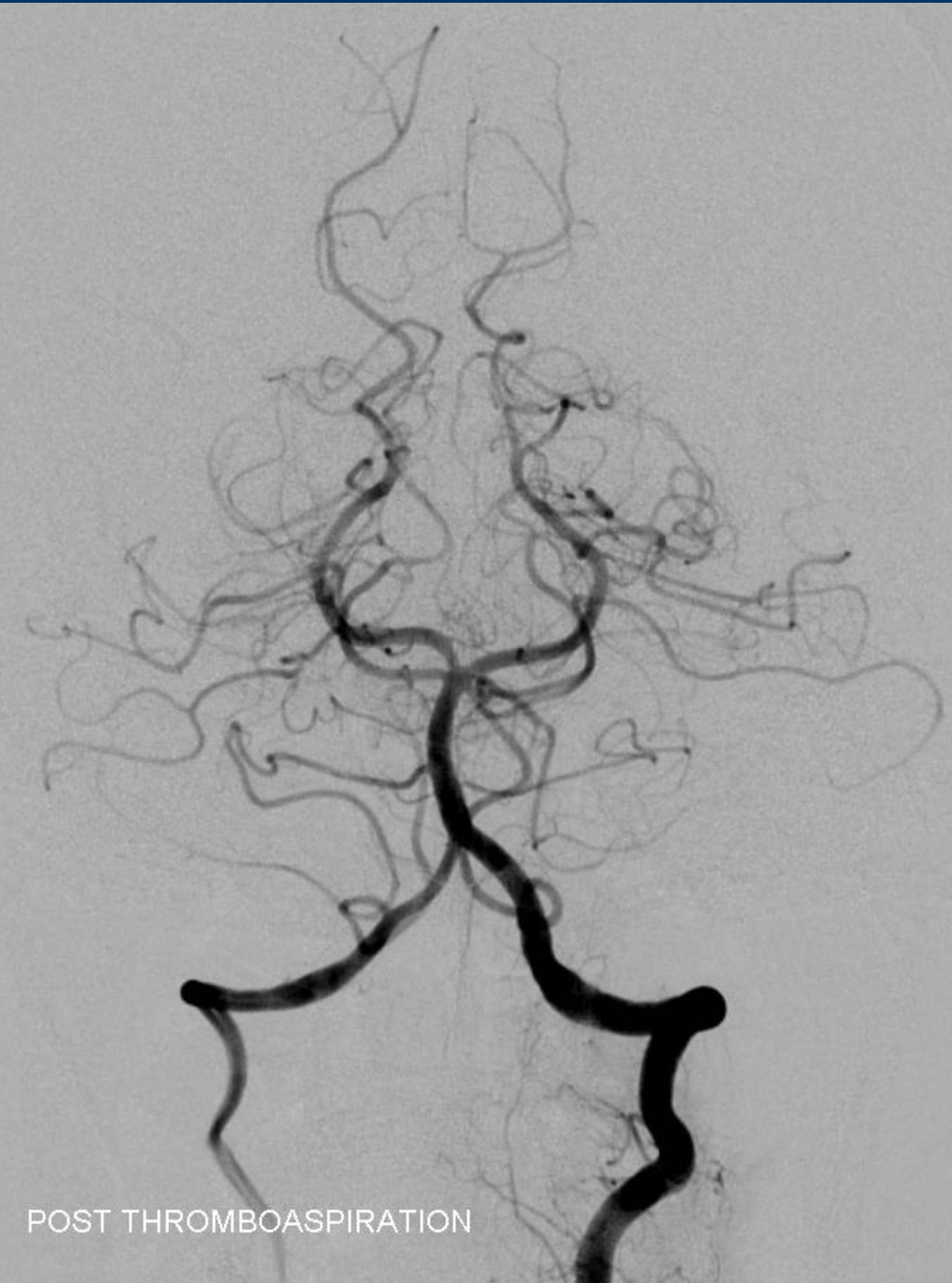
- *Patiente de 63 ans*
- *Hémiplégie G*
- *NIHSS = 12*
- *Patiente en salle d'angio à H7*







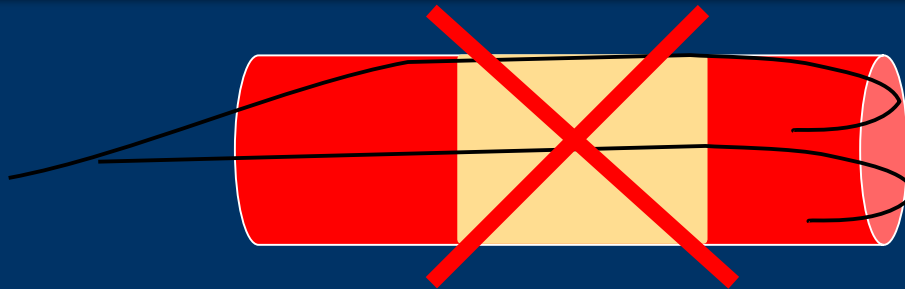




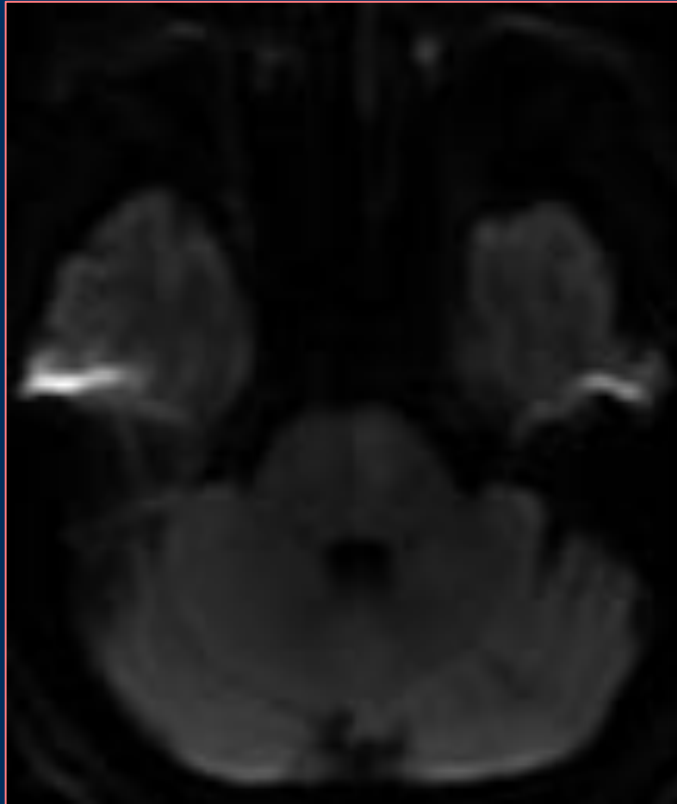
POST THROMBOASPIRATION

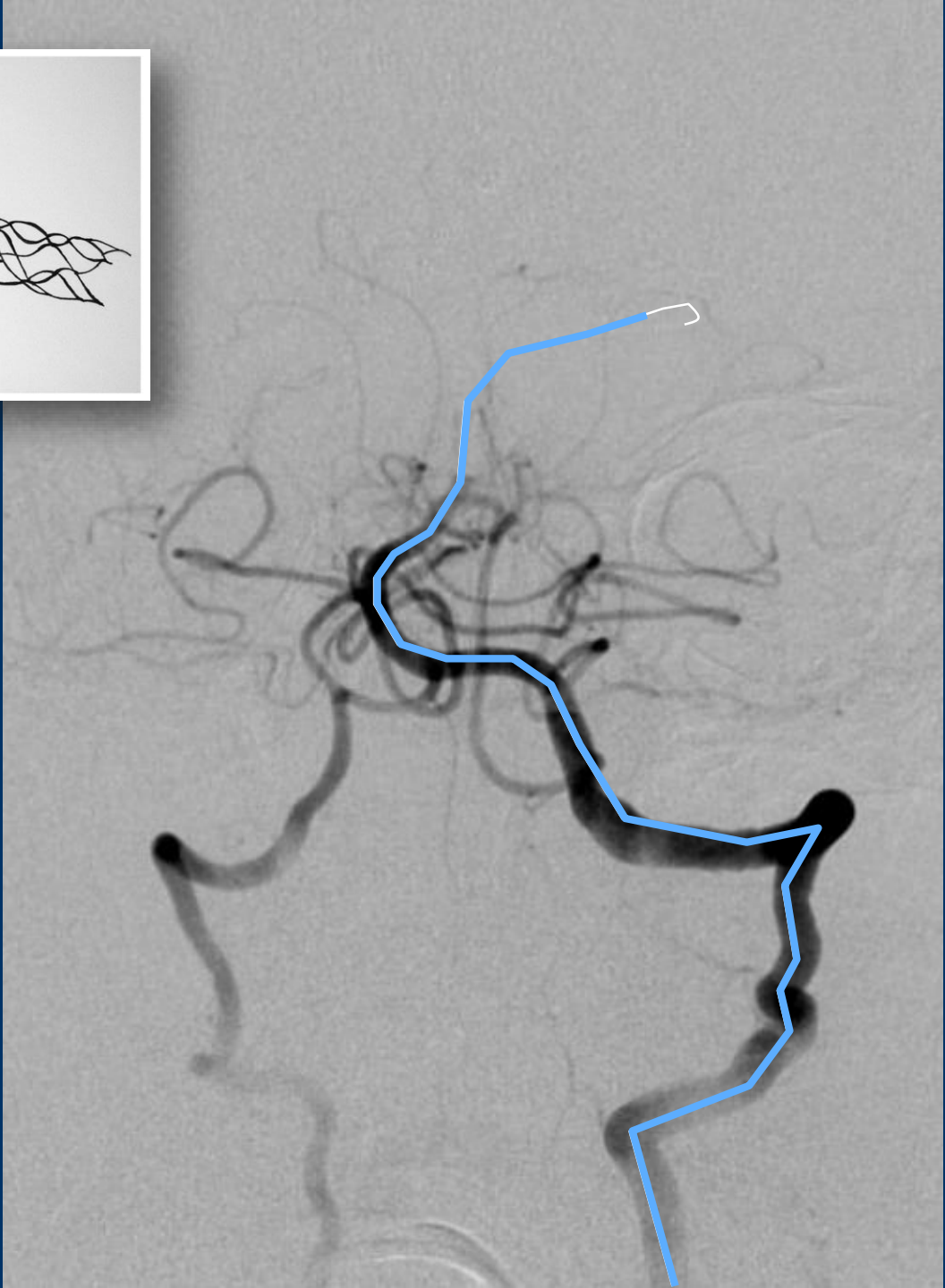
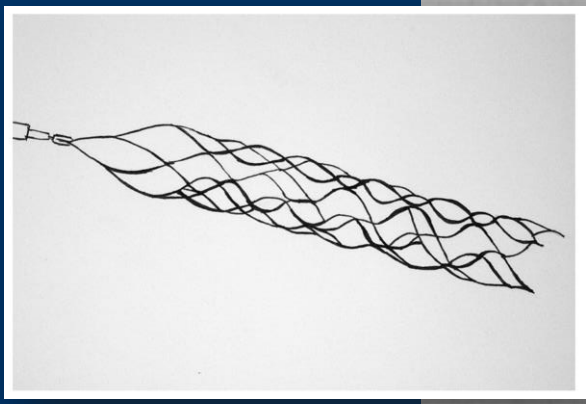
# FRANCHIR LE CAILLOT

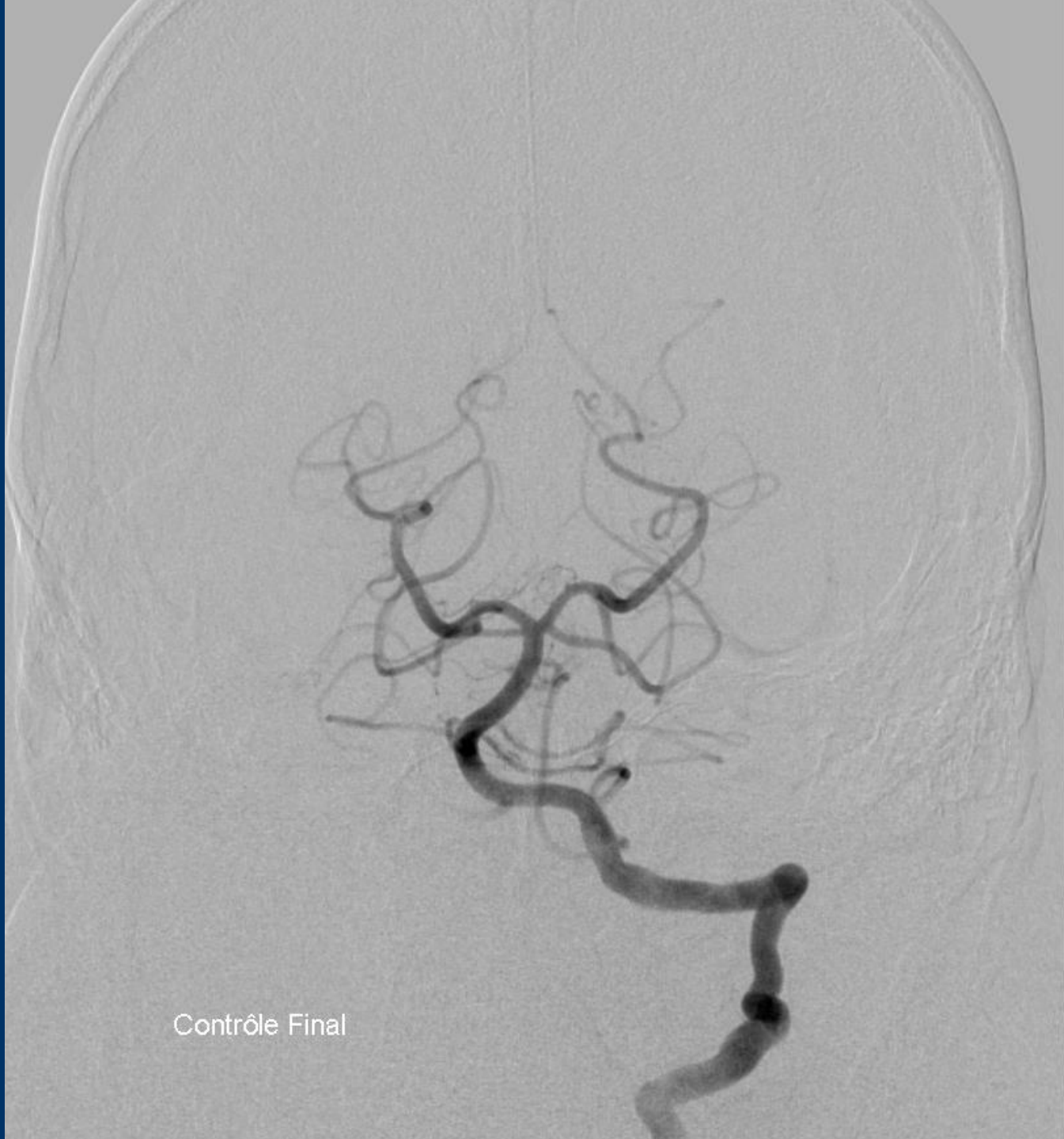
- Quand est-il nécessaire de franchir le caillot ?



# ***Patient de 52 ans. Coma brutal***







Contrôle Final

8-1 @ >

# ***FRANCHIR LE CAILLOT***

- *Quels sont les risques à franchir le caillot ?*

***Comment franchir le caillot de façon sûre ?***

- ***toujours avec le microguide***
- ***microguide en « J »***
- ***torquer le microguide en l'avançant***

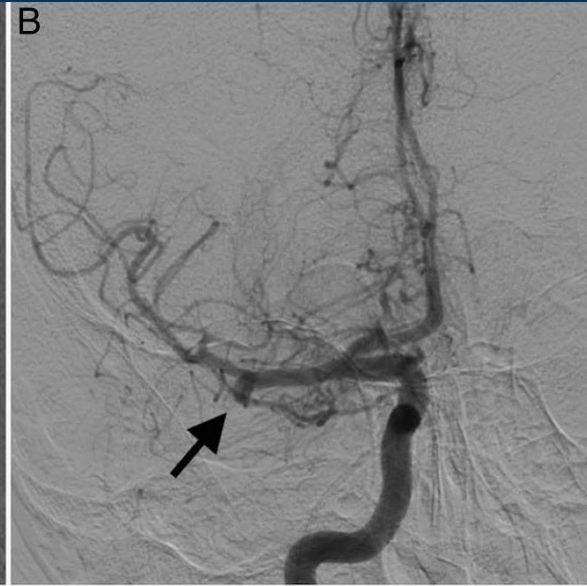
# *FRANCHIR LE CAILLOT*

*Quelle courbure pour franchir le caillot ?*

*J*

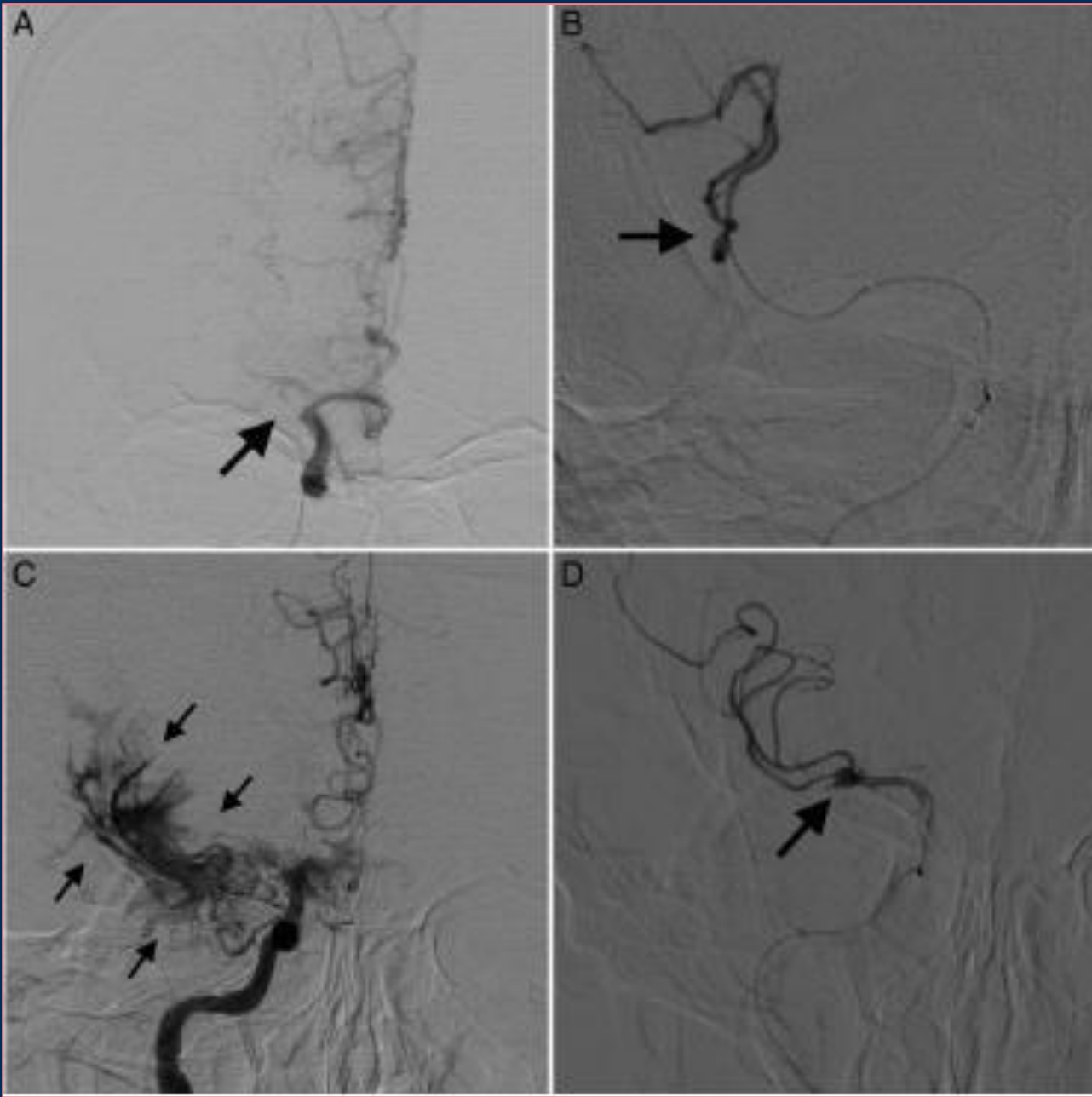






**Anévrysme sur site occlusion**  
**Pas exceptionnel ; jusqu'à 3,7%**  
**des cas \***

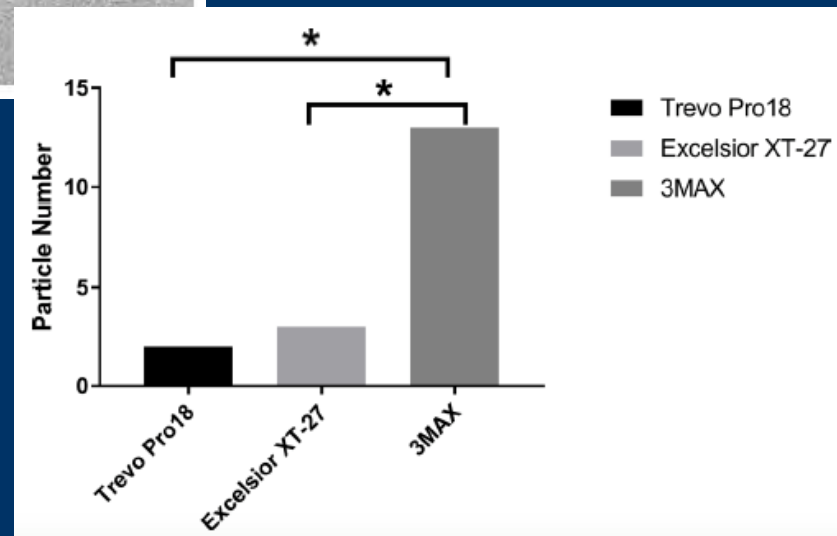
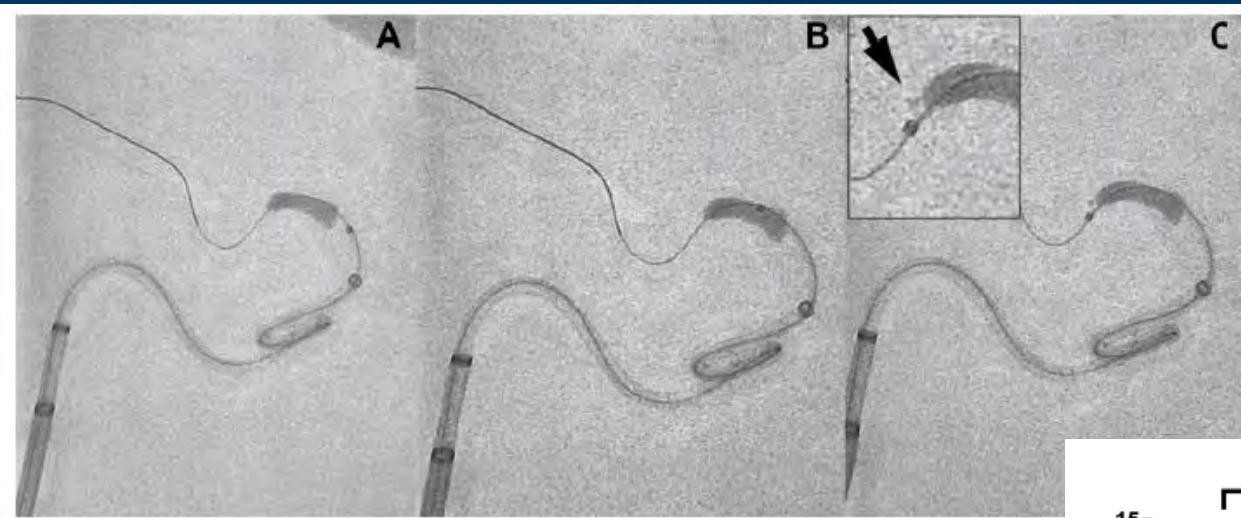
\* Zibold F. JNIS. 2016



# Microcatheter navigation through the clot: does size matter?

Jildaz Caroff,<sup>1,2</sup> Robert M King,<sup>1</sup> Rose Arslanian,<sup>1</sup> Miklos Marosfoi,<sup>1</sup> Erin T Langan,<sup>1</sup> Matthew J Gounis,<sup>1</sup> Ju-Yu Chueh<sup>1</sup>

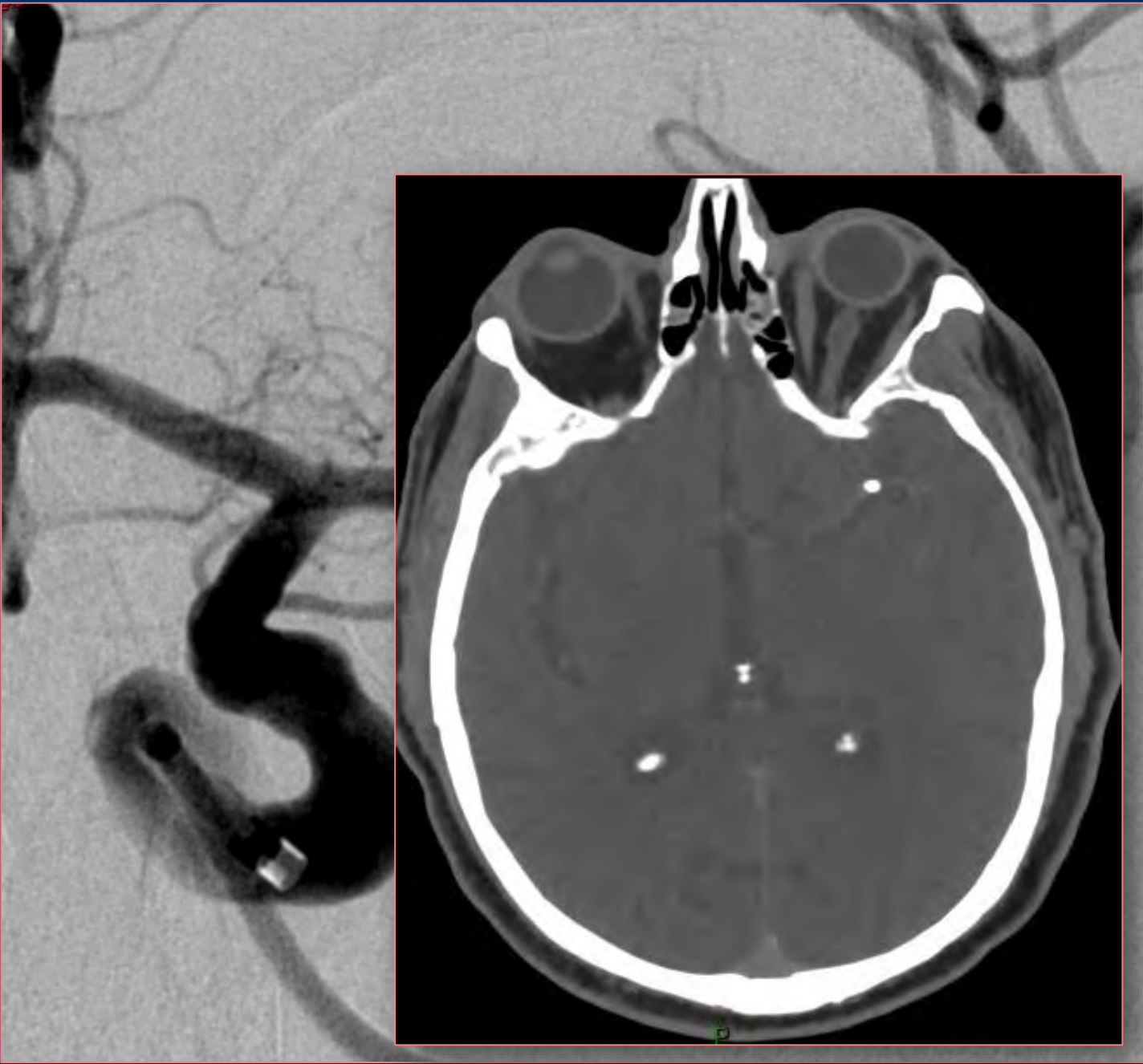
**JNIS. 2018**

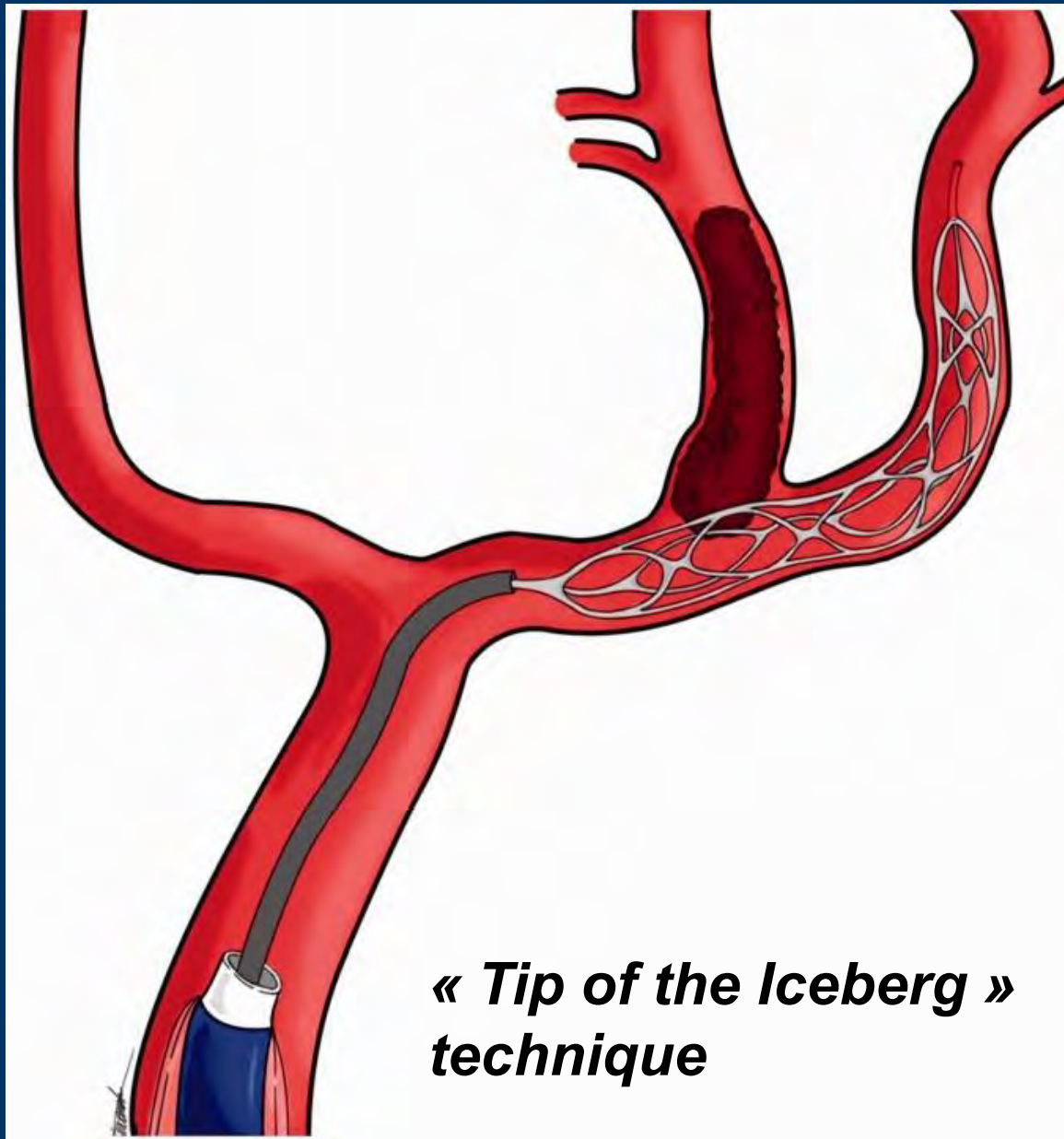


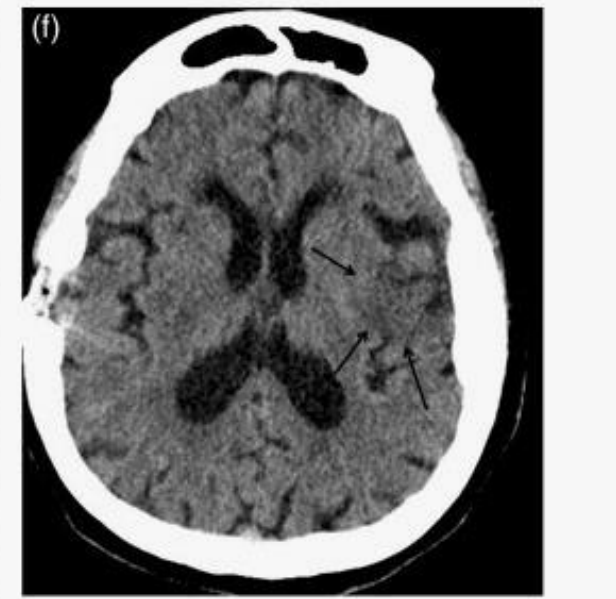
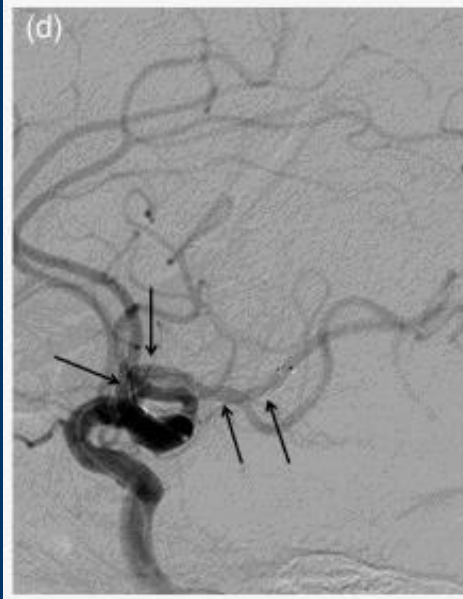
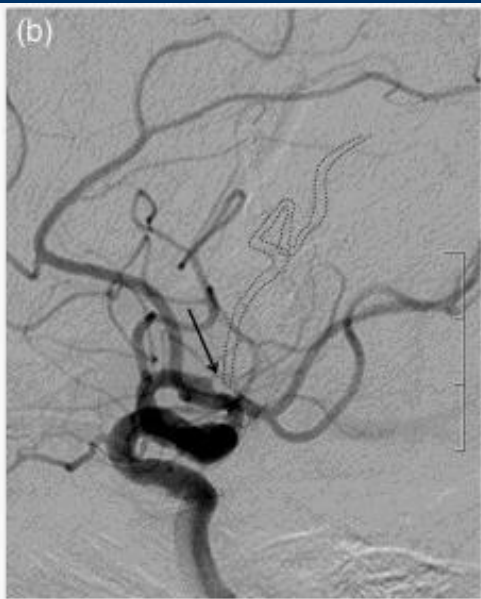
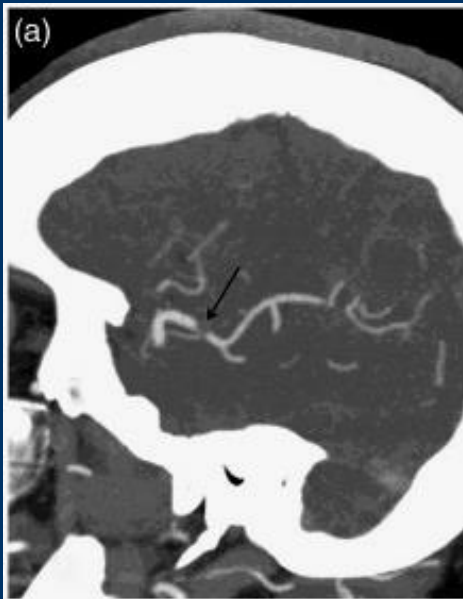
# ***FRANCHIR LE CAILLOT***

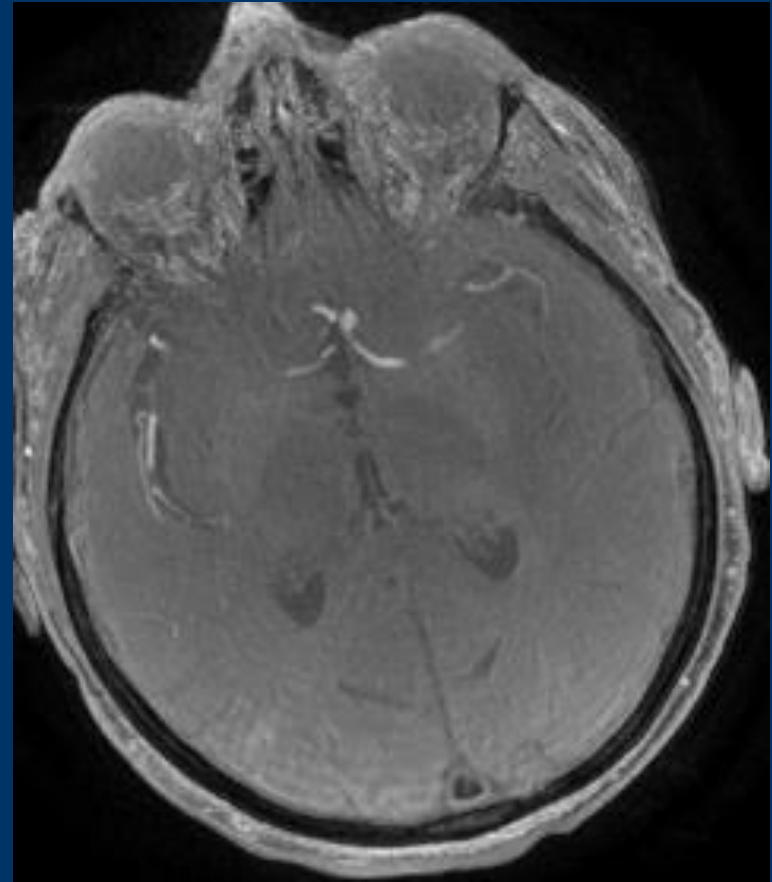
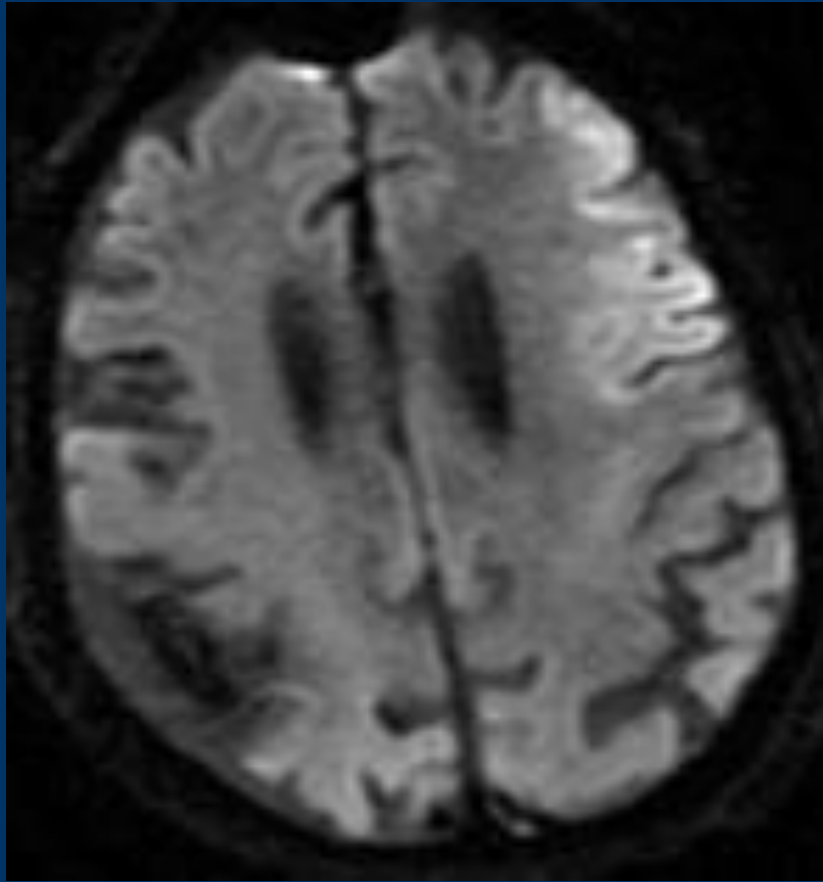
- ***Je n'arrive pas à franchir le caillot.  
Que faire ?***

- ***Savoir changer de stratégie/  
s'arrêter***
- ***« Tip of the Iceberg » technique***







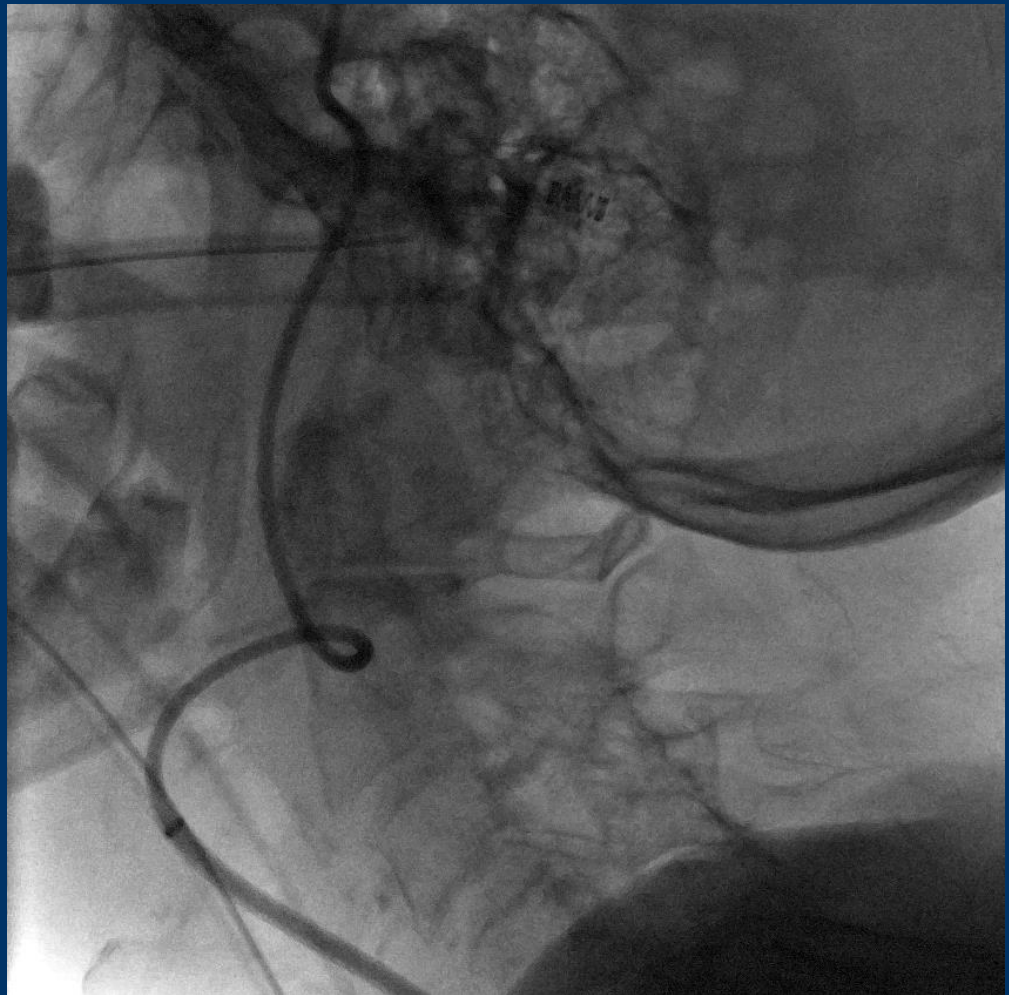


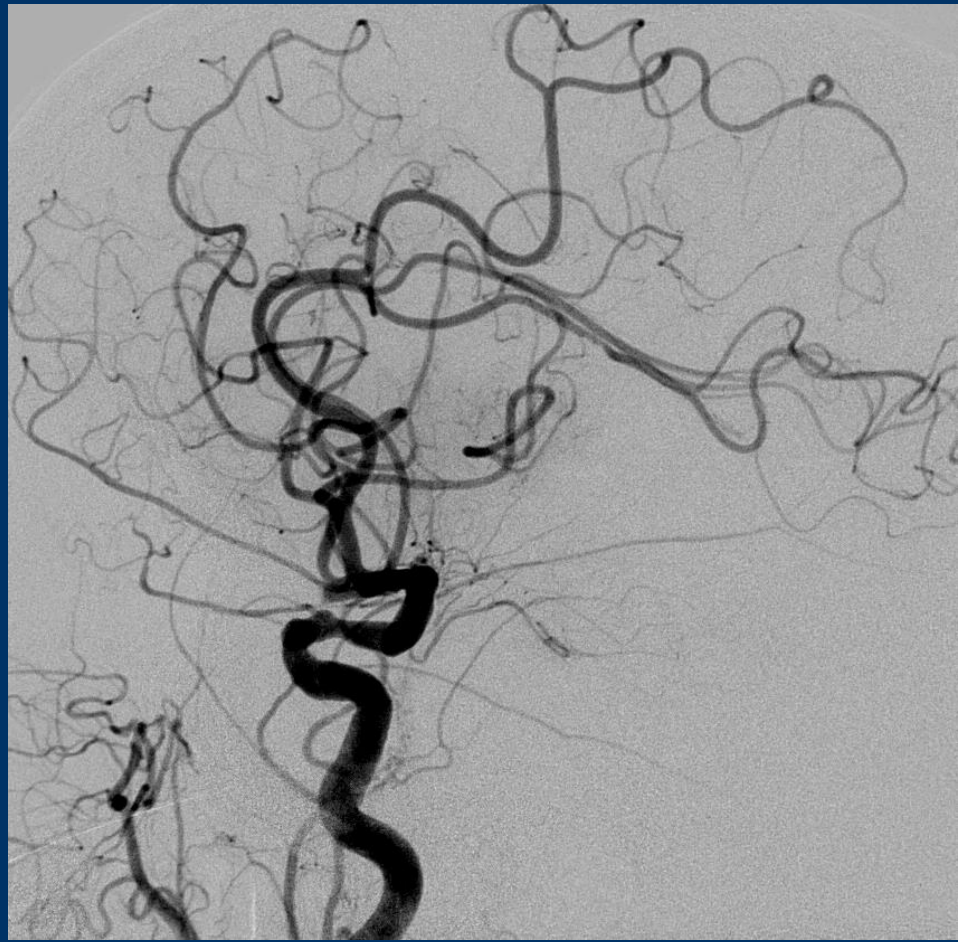
***Patiente de 89 ans. Déficit 1/2 corps dt. NIHSS = 17***

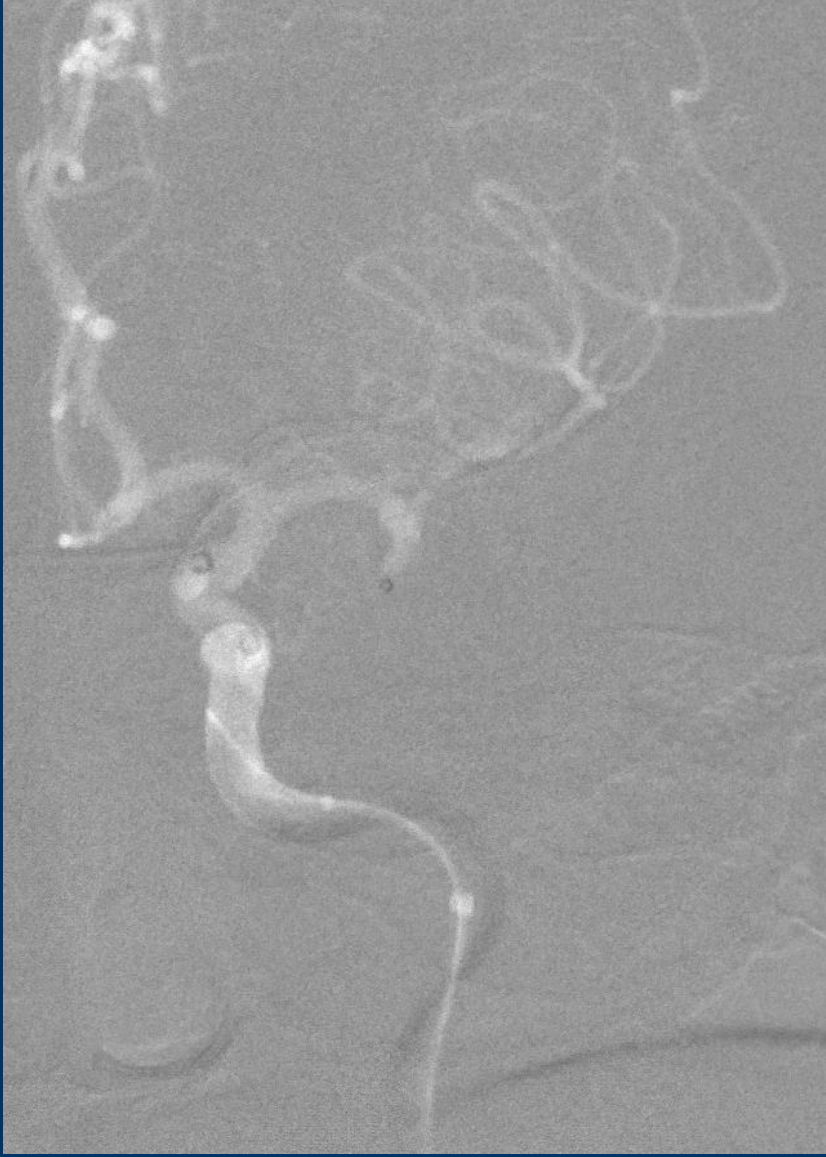


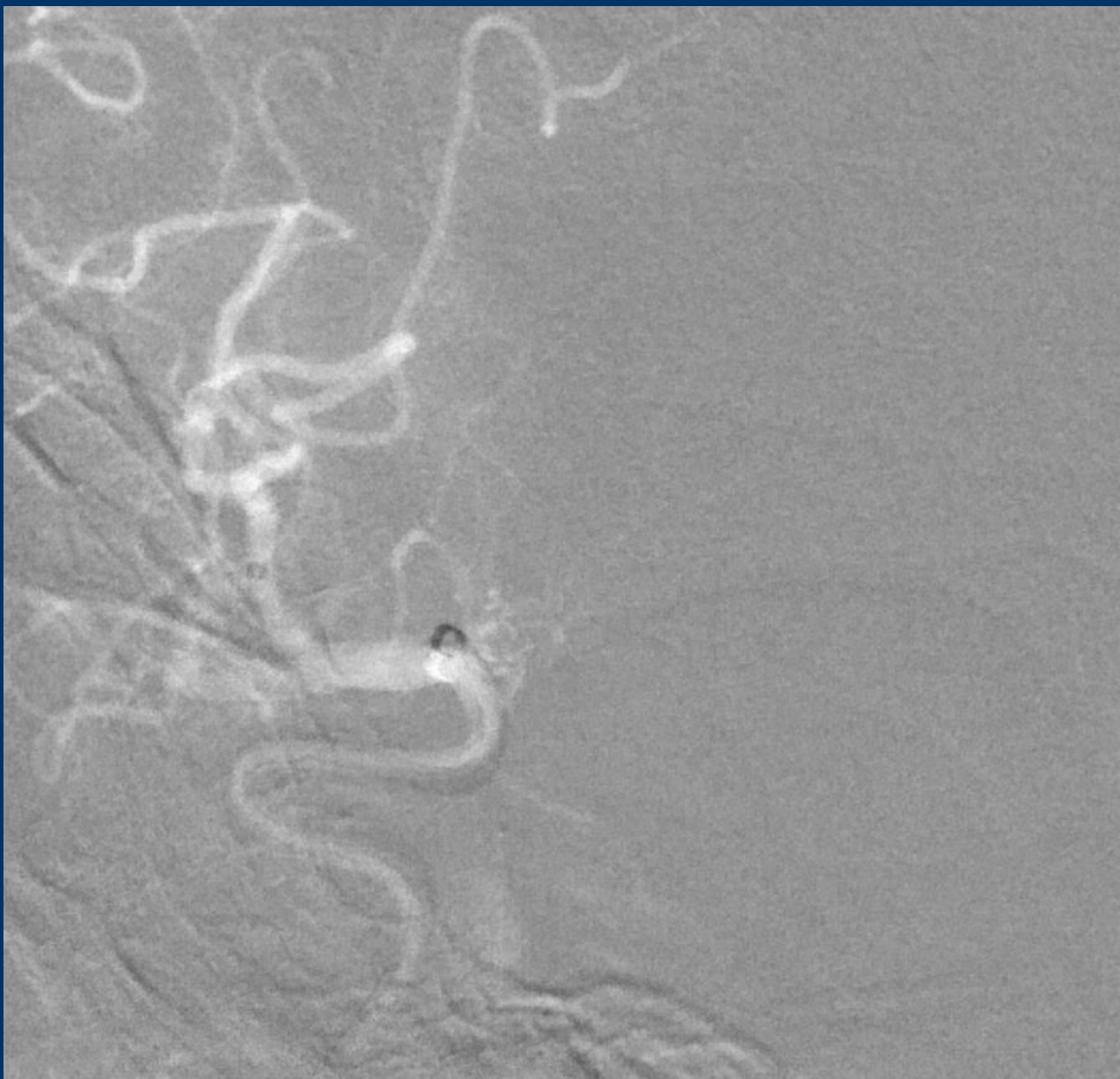








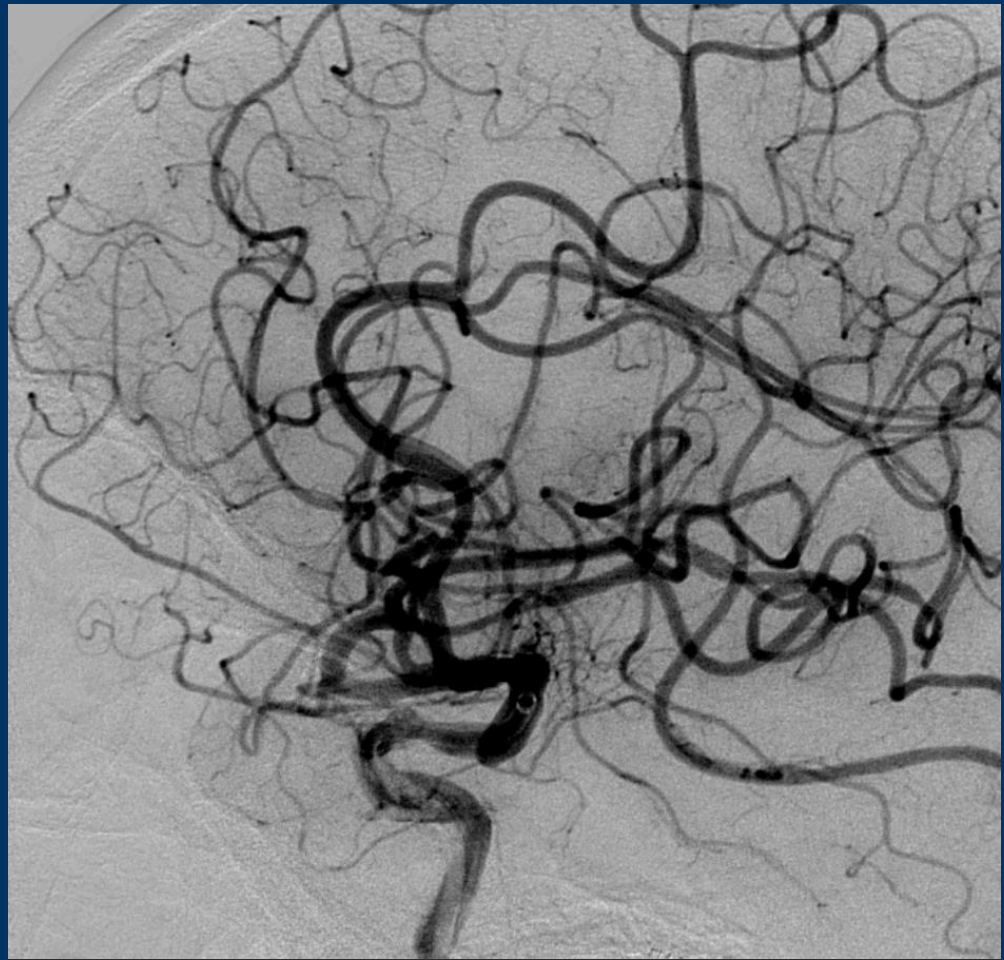
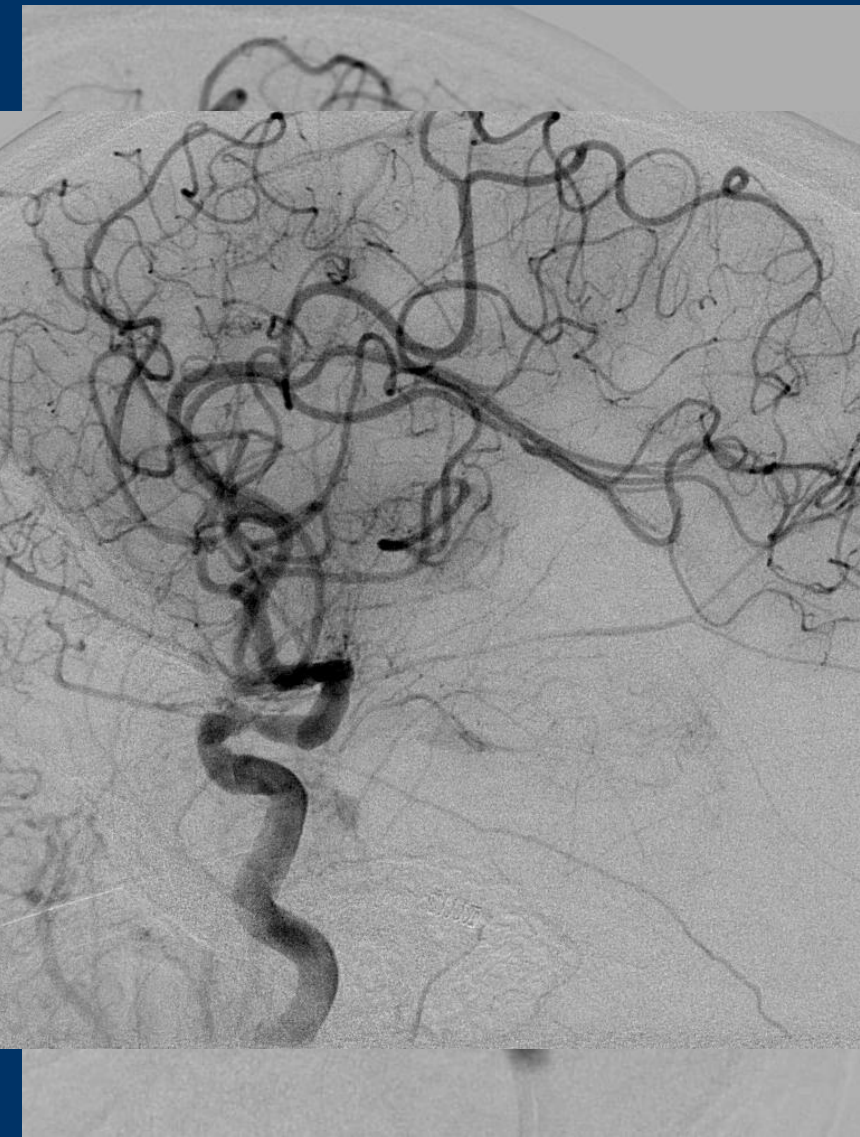


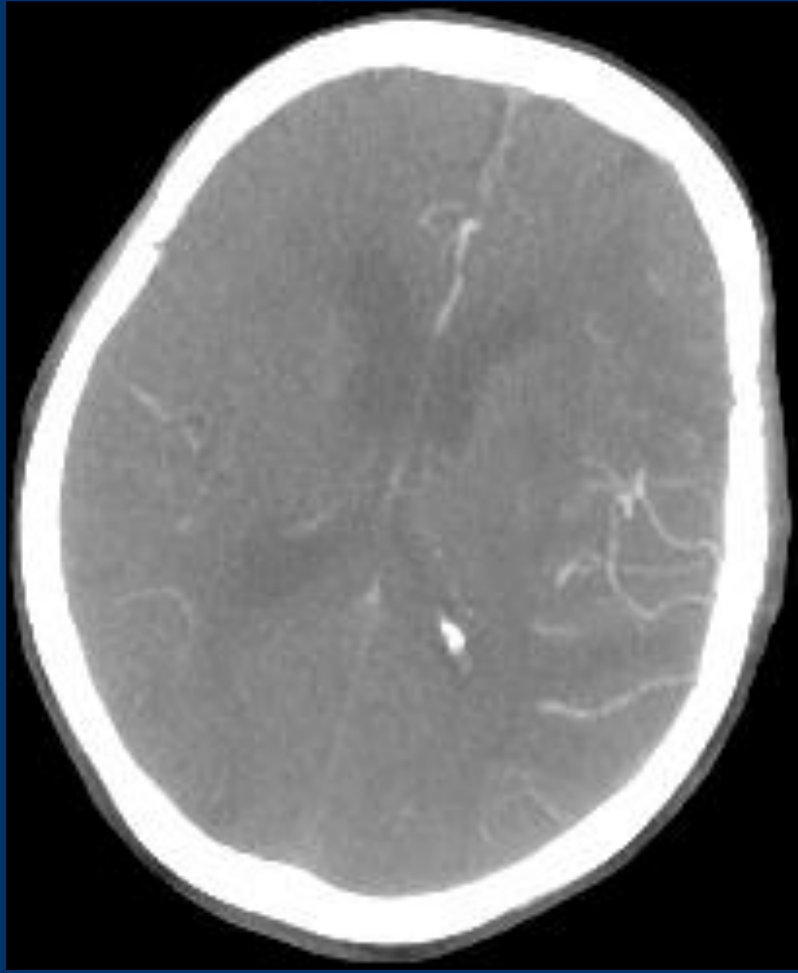








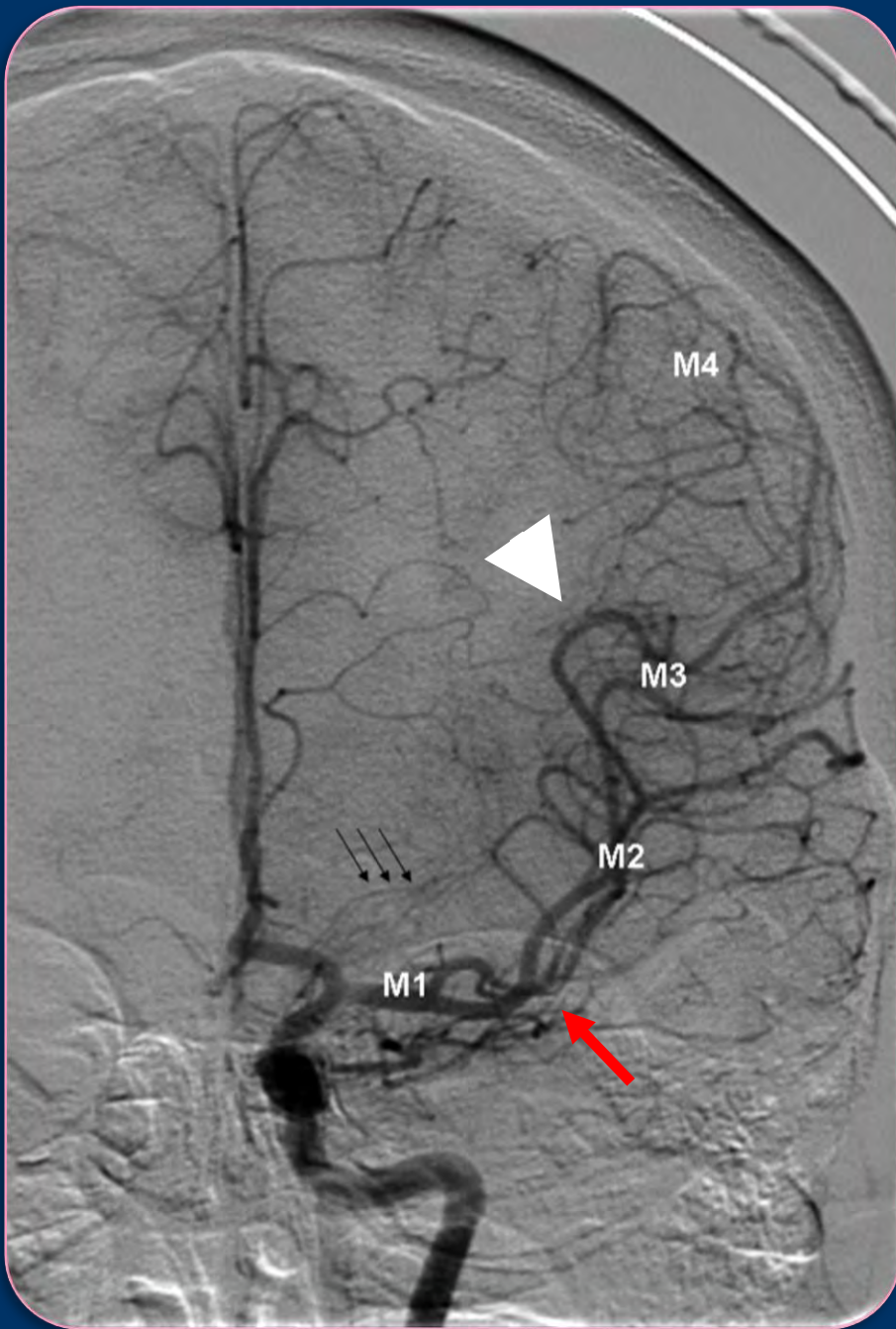







# *Occlusions distales*

# *Occlusion M2*

- MR CLEAN : 39 patients (7,8%)
- SWIFT PRIME : 19 patients (10%)
- REVASCAT : 18 patients (9%)
- EXTEND-IA : 10 patients (14,3%)
- ESCAPE : 9 patients (2,9%)
- THRACE : 2 patients (1%)



- M1 (basal): Horizontal**  
**Bifurcation (78 %)/trifurcation (12 %)**
- M2 (insulaire) : le long insula;**  
**ascendante**
- M3 (operculaire) : concavité**  
**crâniale**
- M4 (cortical) : longe le cortex**

-  **Genou de la sylvienne**
-  **Point sylvien angio.**
-  **a. lenticulo-striées**

# Die Lageabweichungen der vorderen Hirnarterie im Gefäßbild<sup>1</sup>

Von Dr. Erich Fischer, Assistent der Klinik

Der Verlauf der A. cerebri media zerfällt in folgende Unterabschnitte:

1) den horizontalen Anfangsteil ( $M_1$ ), von der Teilungsstelle der Carotis int. bis zu dem etwa rechtwinkligen Knie der A. cerebri media reichend,

2) den nach hinten zu ansteigenden Inselabschnitt ( $M_2$ ), welcher mit 2—3 Hauptästen dem Inselgebiet dicht aufliegt, im Seitenbild in der arteriellen Gefäßachse (Moniz) des Gehirns verläuft und im Vorderbild nahezu vertikal ansteigt,

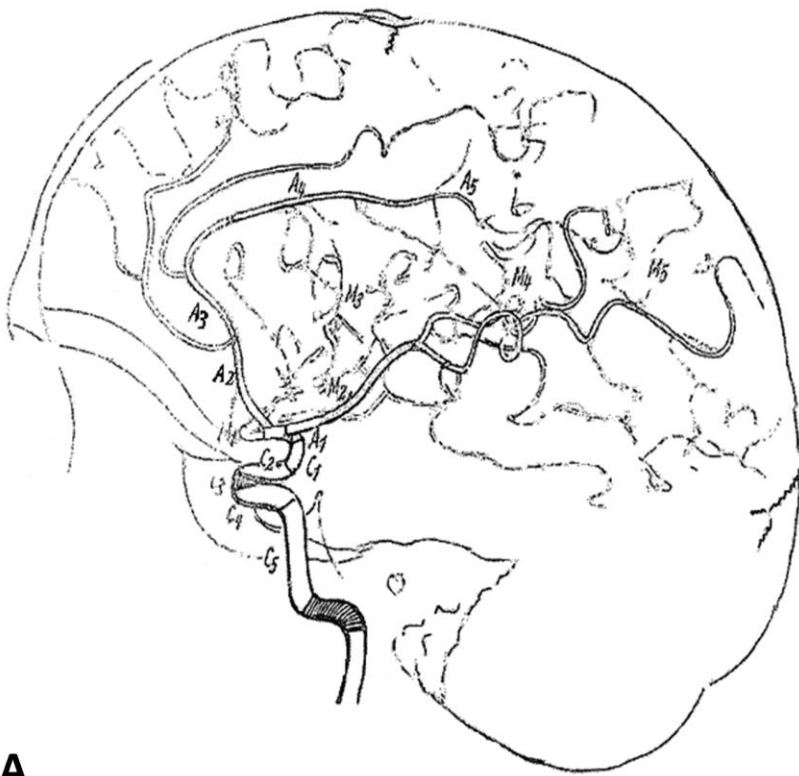
3) Gefäßverzweigungen ( $M_3$ ) der vorgenannten Hauptäste der Fossa Sylvii mit dem Kandelaber (Foix) und charakteristischen Schleifenbildungen der Aa. frontales asc. im Seitenbild. Auf der Vorderaufnahme bilden diese zusammen mit der folgenden Gruppe ein charakteristisches, nach oben zu scharf begrenztes Fächerbild ( $M_{3-4}$ ), das bei Tumoren der Zentral- oder Parietalregion eine typische Kompression nach unten erfährt,

4) Gefäßverzweigungen ( $M_4$ ) im hintersten Teil der Fissura Sylvii (Gyrus angularis-Gebiet), die im Seitenbild deutlich hervortreten, dagegen auf der Vorderaufnahme mit dem Fächer ( $M_{3-4}$ ) zusammenfallen,

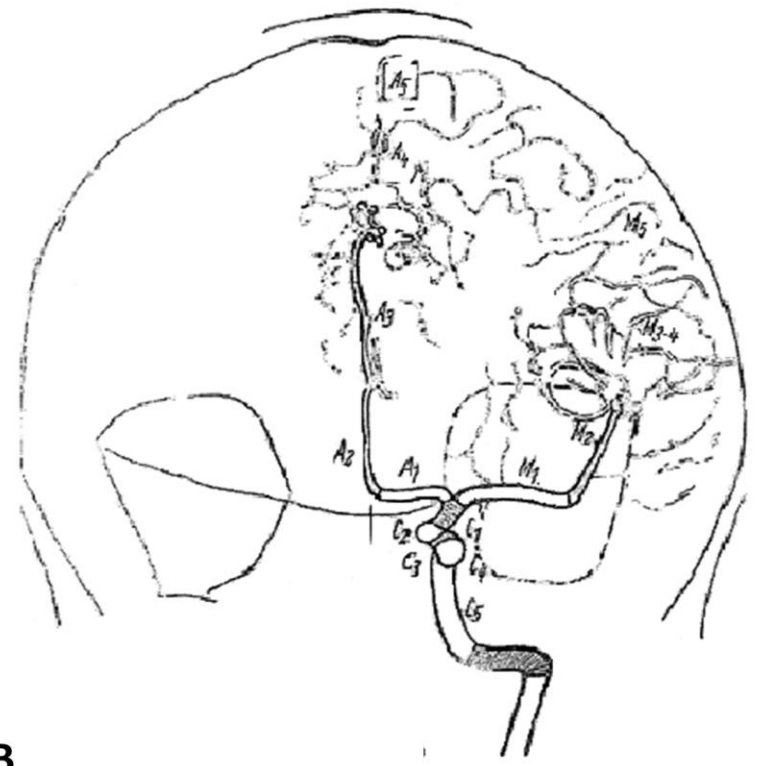
5) Endausbreitungen ( $M_5$ ) der mittleren Hirnarterie. Sie sind zum Teil auf der Vorderaufnahme als feinere und mehr lockere Gefäßmaschen unmittelbar über dem dichteren und etwas gröber gezeichneten Fächerbild sichtbar, besonders klar jedoch im Seitenbild als divergierende Endäste ( $M_5$ ) zu erkennen (Aa. parietalis post., angularis und temporalis post.). Bei Tumoren des Hinterhauptlappens können diese Äste von unten her eine Zusammendrängung und Parallelverlagerung nach oben oder aber, bei Entwicklung des Tumors mehr von dorsal her, eine stärkere Auseinanderdrängung in rechtwinkliger bis gerader Form erfahren.

# Classification de Fischer, 1938

Original drawings of the intracranial arteries, by Fischer <sup>21</sup>. A. Lateral view; B. Frontal view



A



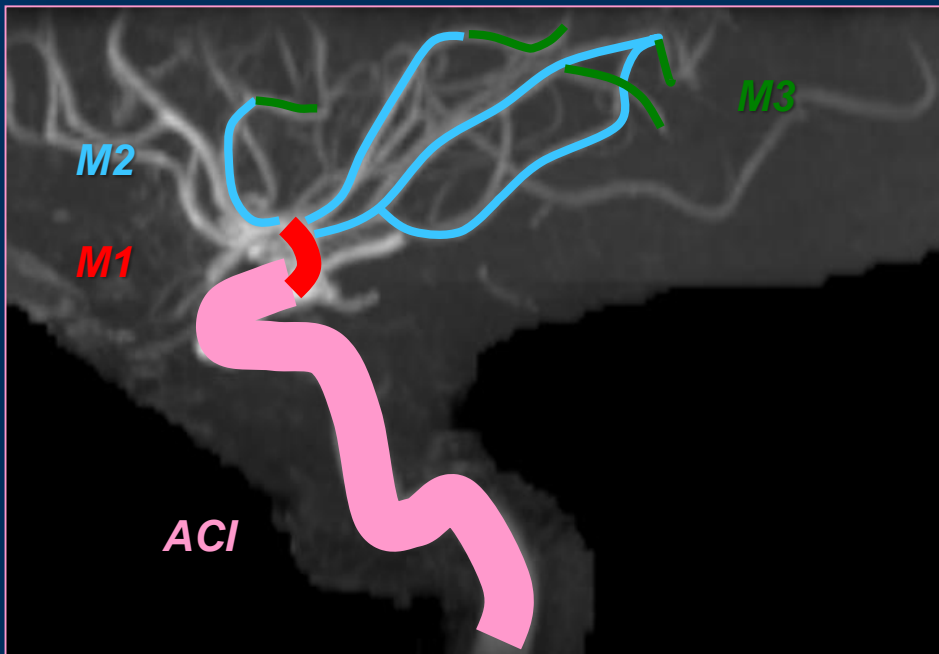
B

Fischer, E. Zentralblatt Für Neurochir. 300–313 (1938)

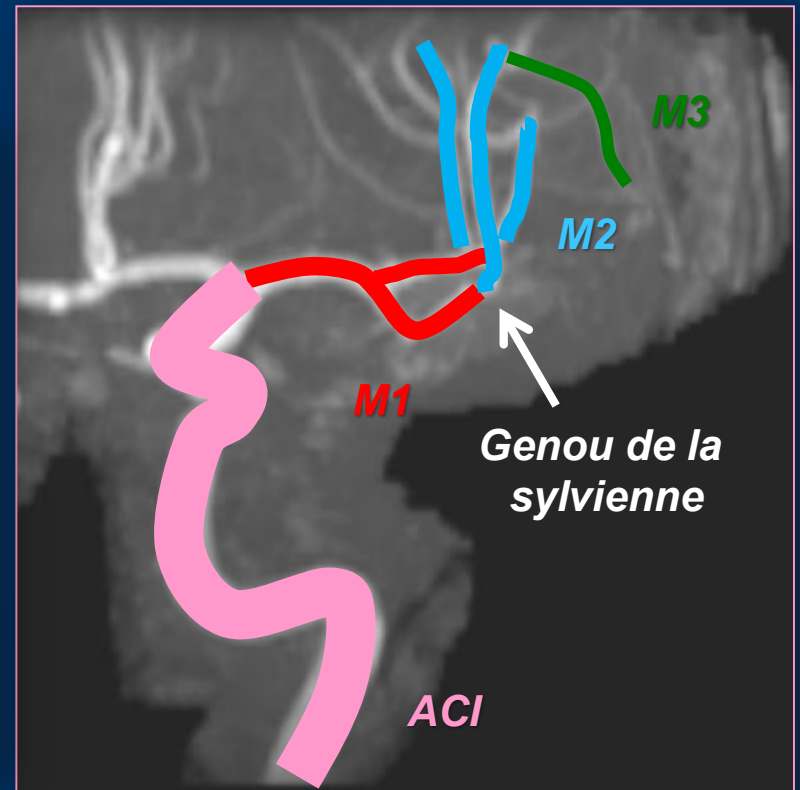
# ARM cérébrale

## Reconstructions MIP

École de la thrombectomie



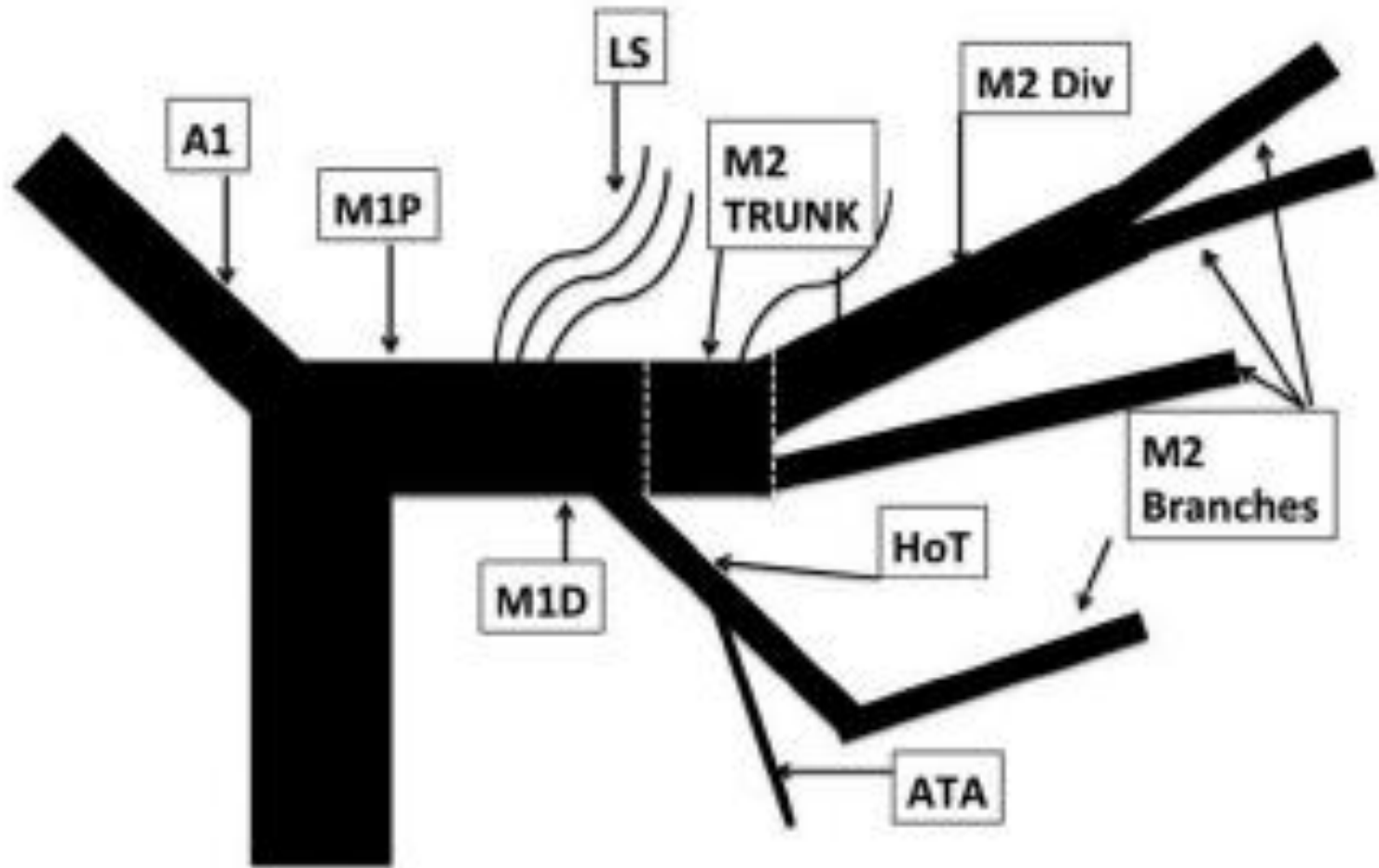
Vue latérale

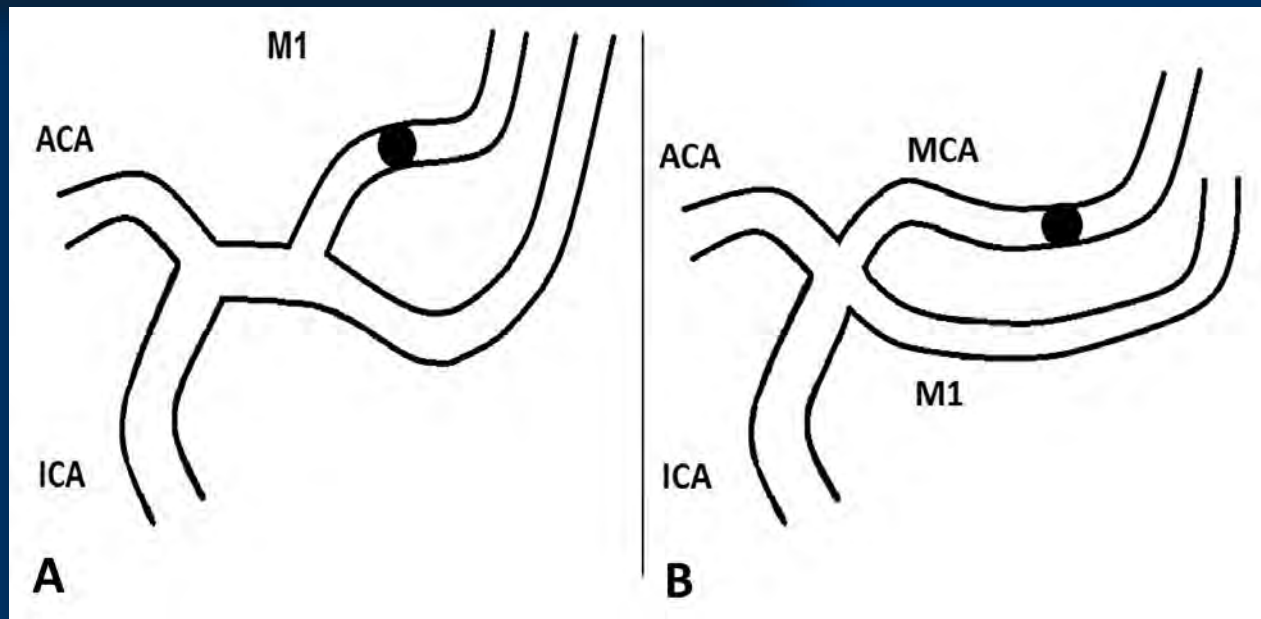
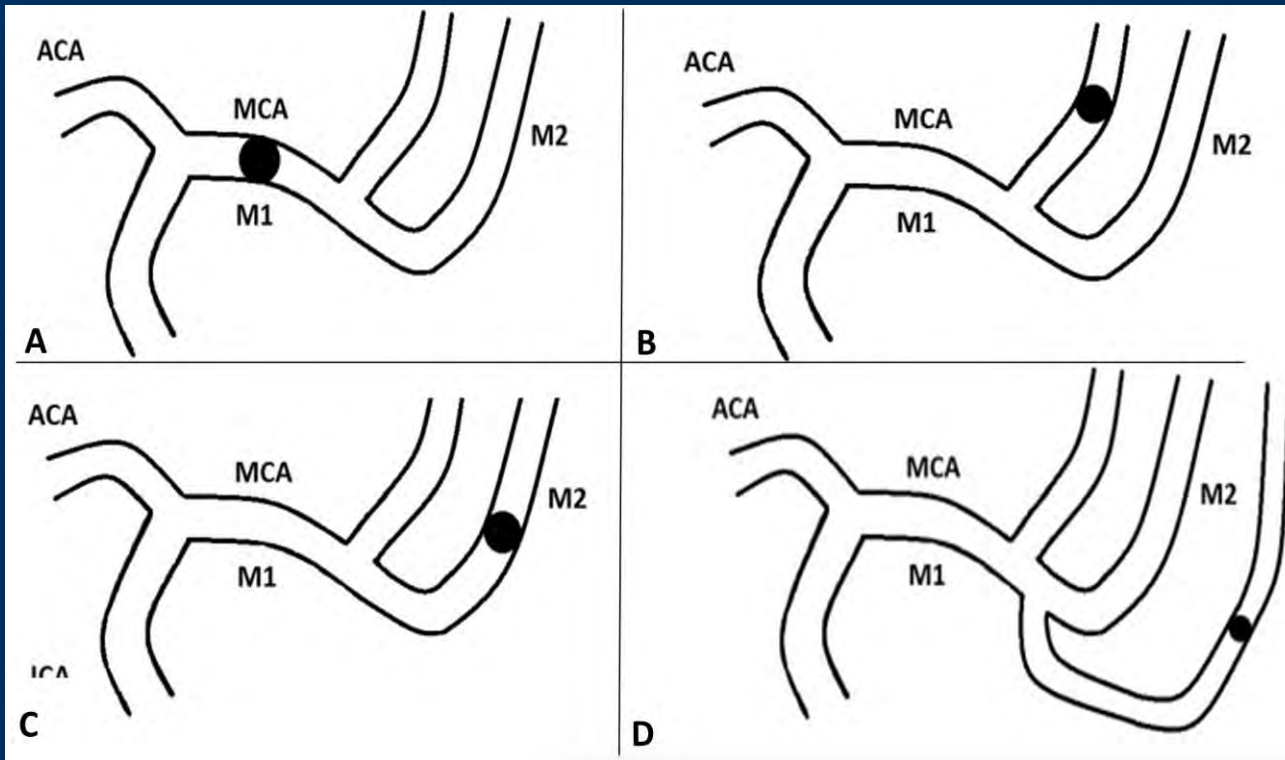


Vue de face



# Endovascular Therapy of M2 Occlusion in IMS III



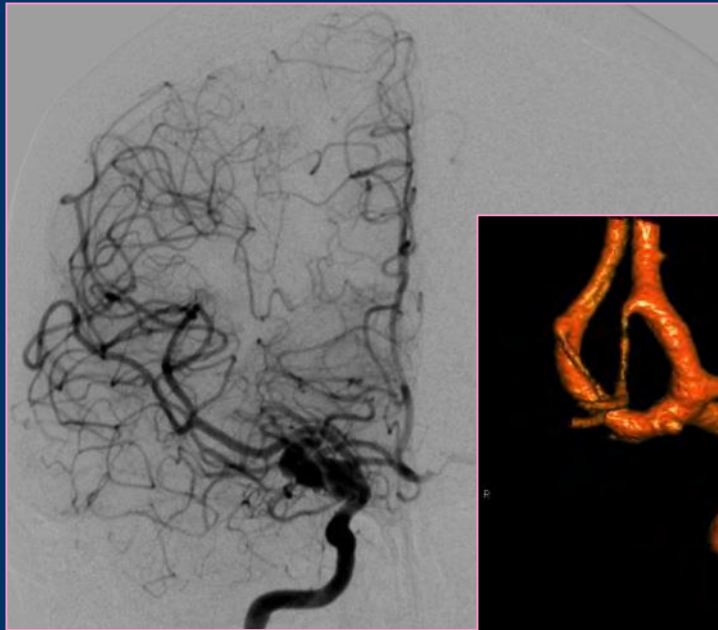
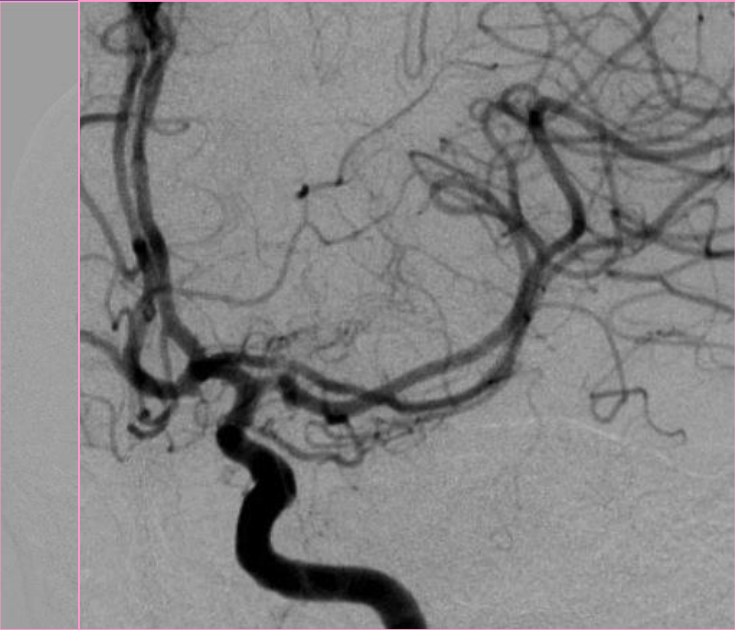


LETTERS

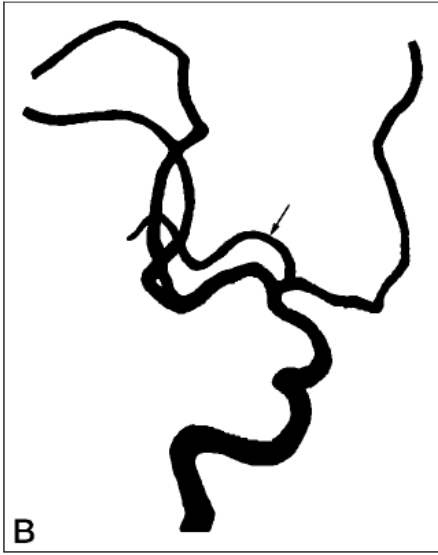
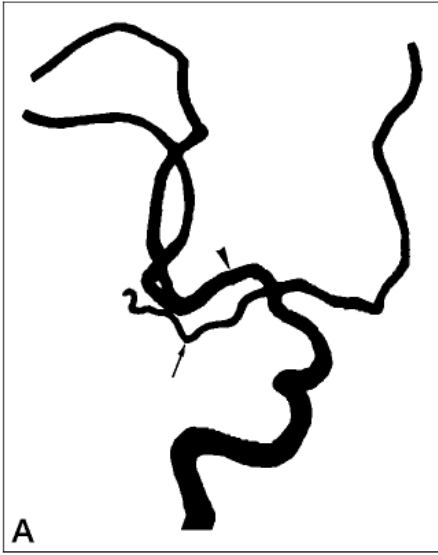
Caution; Confusion Ahead...

# VARIATIONS ACM

**ACM  
accessoire**



le



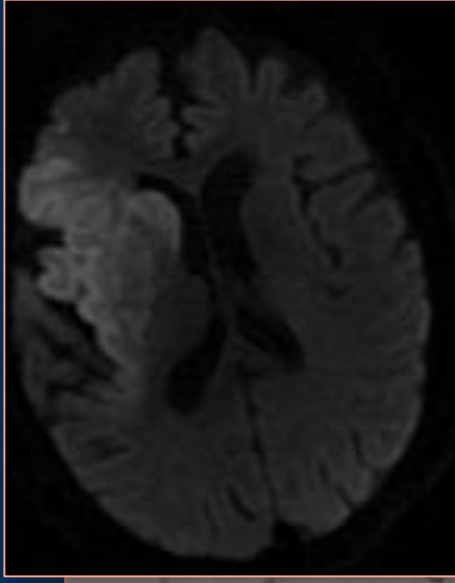
**0,2 à 4%**



***ACM Dte dupliquée***

**94 ans. Hémiplégie Dte. NIHSS = 17**





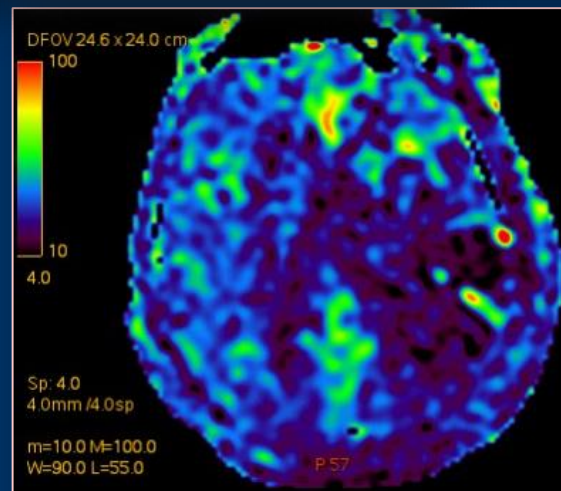
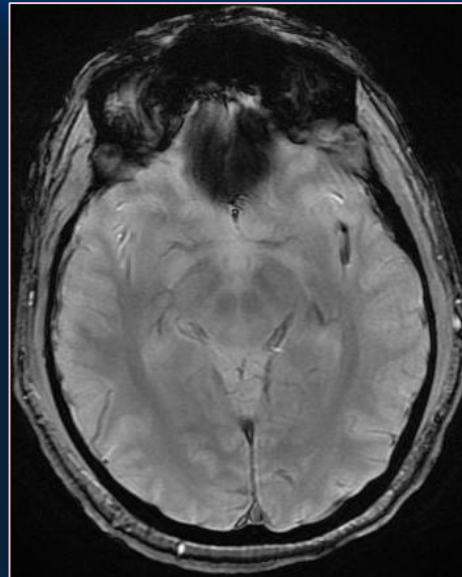
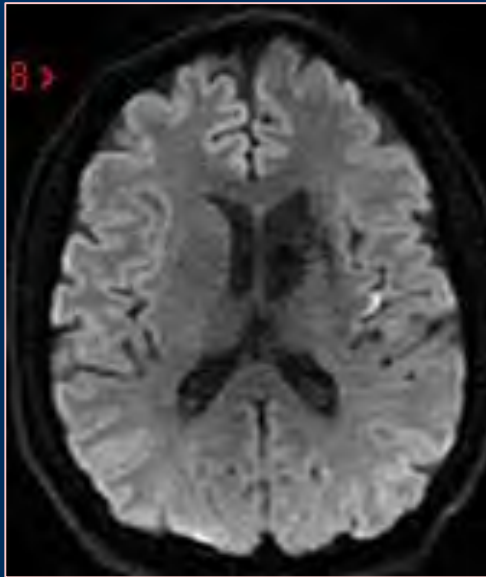
# Mechanical Thrombectomy for Isolated M2 Occlusions: A Post Hoc Analysis of the STAR, SWIFT, and SWIFT PRIME Studies

École de la thrombectomie

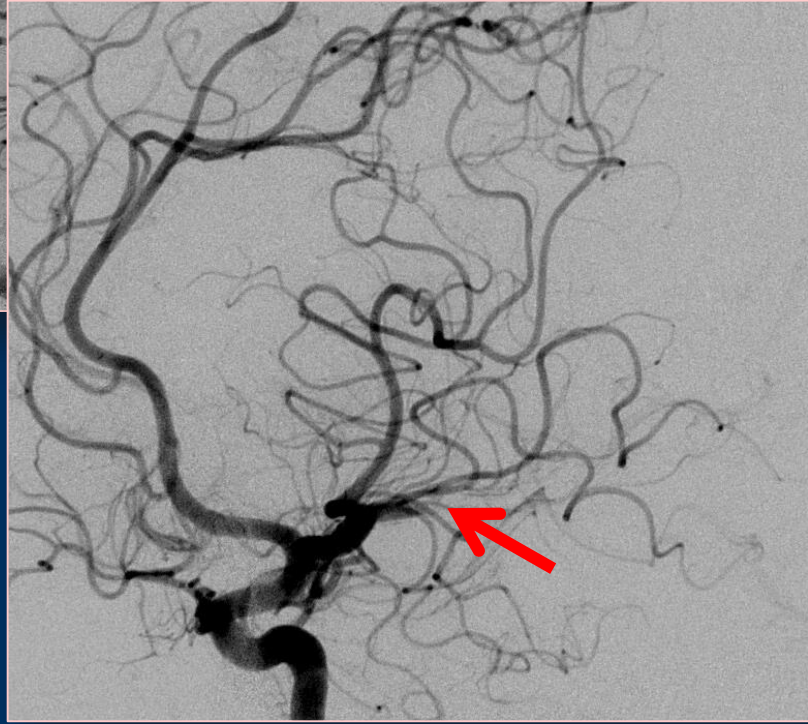
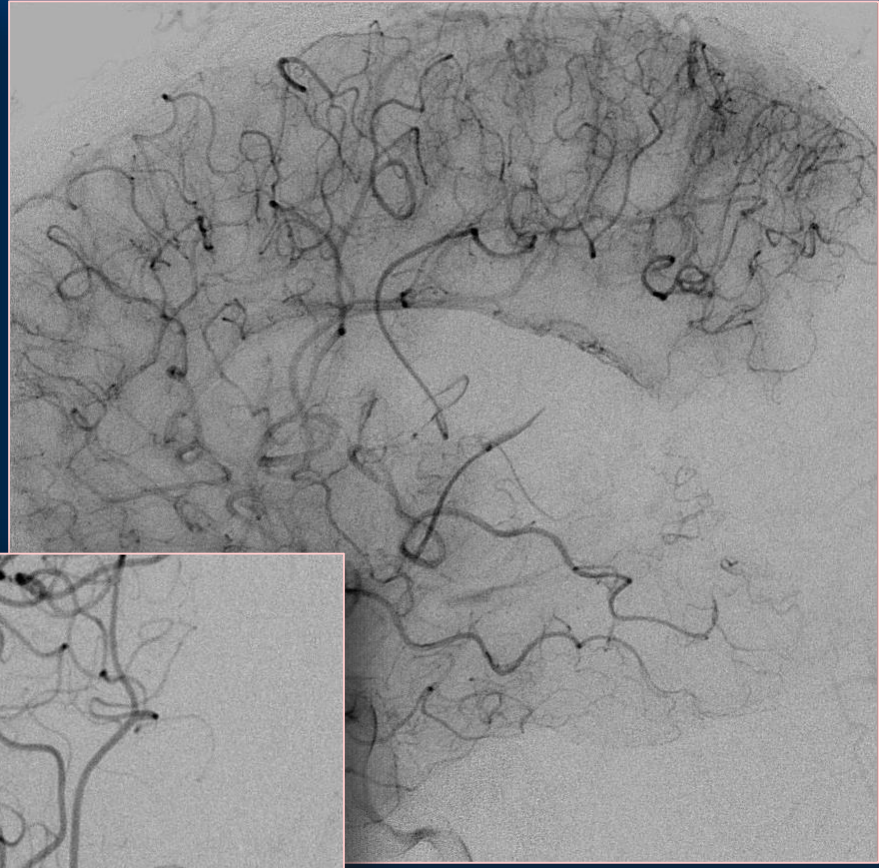
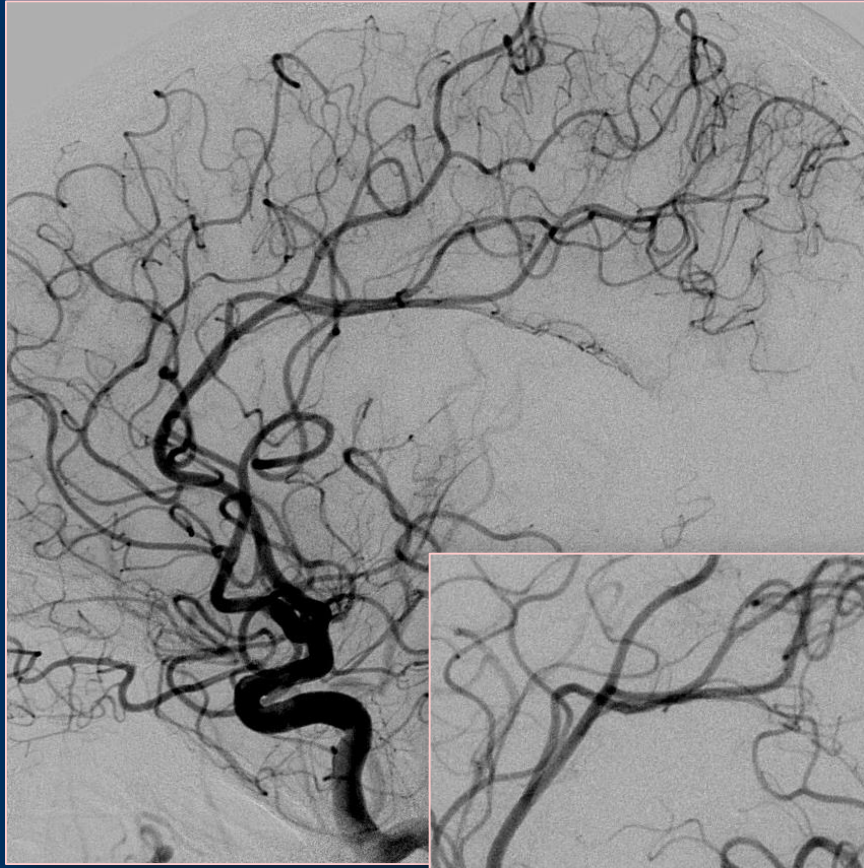
- **50 patients occlusion M2**
- **Taux de recanalisation : 85%**
- **mRS ≤ 2 : 60%**

|   | M2 Occlusion<br>(N = 50) | M1 Occlusion<br>(N = 249) | P Value |
|---|--------------------------|---------------------------|---------|
| Time from groin puncture to recanalization (min) (median) (IQR) | 29 (22–45)               | 35 (25–52)                | .41     |
| No. of passes with stent retriever (mean)                       | 1.4 ± 0.8                | 1.7 ± 1.0                 | .07     |
| ≥3 Passes with stent retriever                                  | 13% (5/38)               | 23% (52/227)              | .21     |
| mTICI 2b or 3 reperfusion                                       | 85% (34/40)              | 82% (193/235)             | .82     |
| Rescue therapy  | 6% (3/50)                | 8% (19/249)               | 1.000   |
| Complications   |                          |                           |         |
| Device-related serious adverse events                           | 6% (3/50)                | 4% (10/249)               | .46     |
| Symptomatic ICH   | 2% (1/50)                | 2% (5/249)                | 1.000   |
| Outcome at 90-day follow-up                                     |                          |                           |         |
| mRS 0–1   | 50% (25/50)              | 41% (100/243)             | .27     |
| mRS 0–2   | 60% (30/50)              | 56% (136/243)             | .64     |
| Mortality   | 12% (6/50)               | 10% (25/249)              | .62     |

- Patient de 36 ans
- Aphasie brutale

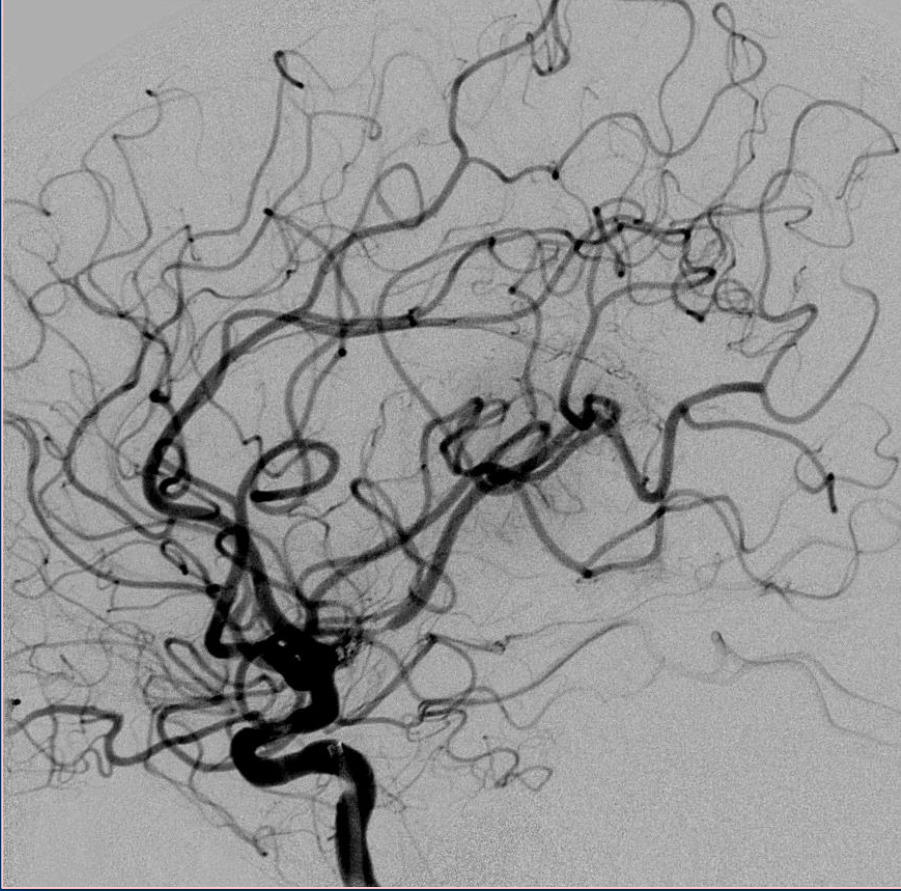




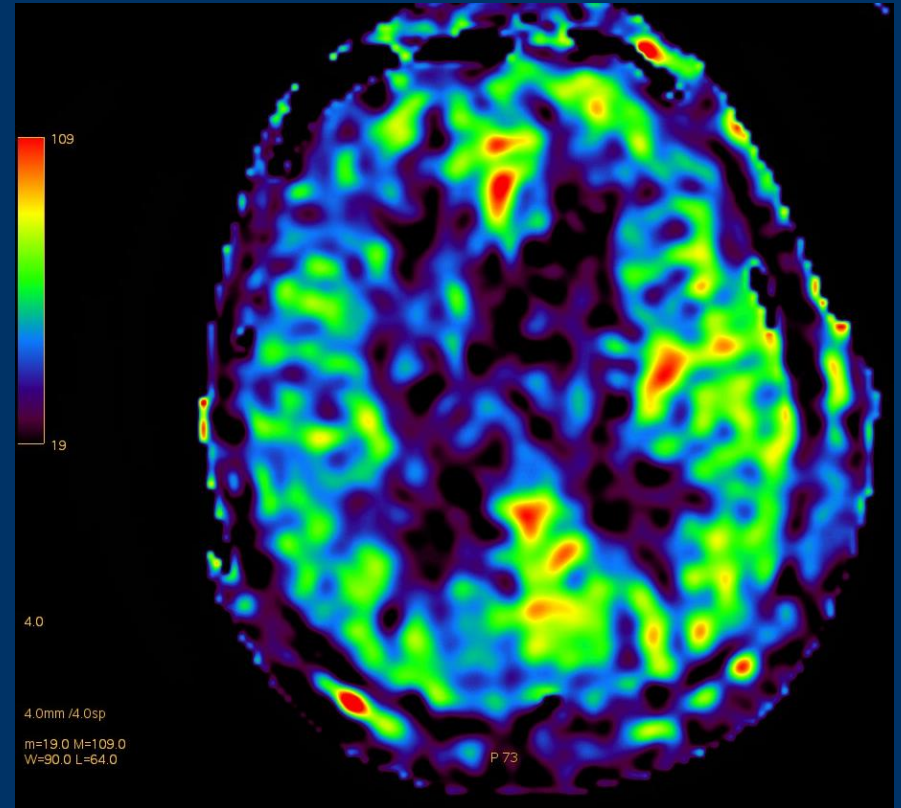
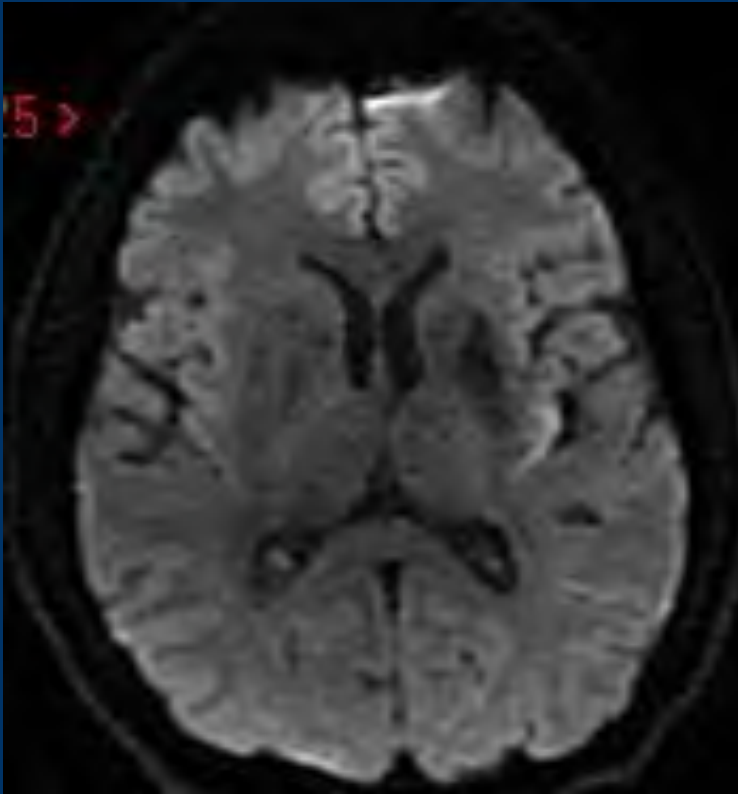


0 (roul) >





# IRM de contrôle à H24



# Occlusions distales : Aspiration ou stent retriever ?

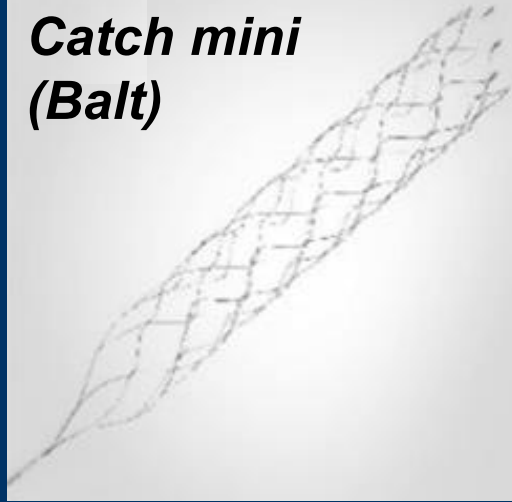
| Series                         | Population                      | Pre-treatment NIHSS | Device/Technique                        | TICI 2b/3 recanalization rate        | Embolization to new territory | Procedure-related death | 0-2 mRS at follow-up |
|--------------------------------|---------------------------------|---------------------|---|--------------------------------------|-------------------------------|-------------------------|----------------------|
| Humphries W. et al. (2015) [9] | 105 patients                    | 17                  | Stent retriever (Solitaire FR or TREVO) | 88%                                  | 5.7%                          | 2.9%                    | 44% at 90 days       |
| Pfaff J. et al. (2015) [19]    | 30 occlusions of the distal ACA | 18                  | Stent retriever                         | 88%                                  | 0%                            | 0%                      | 36.2% at 90 days     |
| Navia P. et al. (2015) [17]    | 6 patients                      | 12                  | ADAPT (3MAX)                            | 100%                                 | 0%                            | 0%                      | 83% at discharge     |
| Kurre W. et al. (2016) [15]    | 76 patients for 90 occlusions   | 14                  | Stent retriever (pREset LITE)           | 70.0%                                | 13.3%                         | 0%                      | ~34% at 90 days.     |
| Haussen DC. et al. (2016) [8]  | 8 patients for 10 occlusions    | 19                  | Stent retriever (Baby TREVO)            | 75%                                  | 0%                            | 0%                      | 25% at 3 months      |
| Coutinho JM. et al. (2016) [4] | 50 M2 occlusions                | 13                  | Stent retriever                         | 85%                                  | NA                            | NA                      | 60% at 90 days       |
| Park JS. et al. (2016) [18]    | 32 M2 occlusions                | 10.9                | Manual aspiration (4MAX)                | 84%                                  | 0%                            | 0%                      | 78% at 3 months      |
| Vargas J. et al. (2016) [28]   | 35 patients                     | 14                  | ADAPT (5/4/3MAX)                        | 77.1%                                | NA                            | 0%                      | 59.4% at 90 days     |
| Presented study                | 32 patients for 37 occlusions   | 14                  | ADAPT (3MAX)                            | Overall: 76.3%<br>3MAX alone : 59.5% | 6.3%                          | 3.1%                    | 40% at 3 months      |

- *Stent retriever : préférer petite taille (3 mm)*
- *Pas d'étude randomisée comparant aspi. et stent retriever*

**pREset LITE 3-20**  
*(Phenox)*

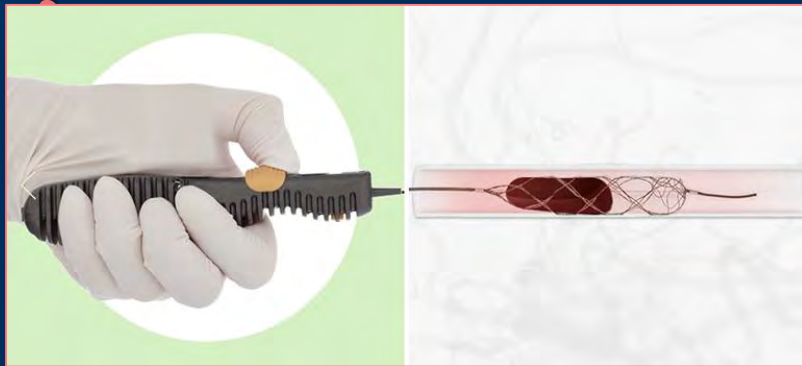


**Catch mini**  
*(Balt)*



**Compatibles avec  
microcathéters 0.017"**

**Penumbra**



**Tiger 13 (Rapid Medical)**  
*compatible avec microcathéter 1.3F*

**Headway Duo® 167cm**

**2.1F**  
0.70mm

**1.3F**  
0.43mm

Flexible Support

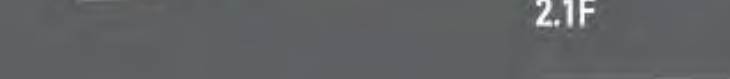
Progressively Soft 30cm

1 Tip Marker

Hydrophilic Coating ~115cm

ID:0.013"

Catheter Working Length 167cm



God sees everything

but the neurologists miss no complication

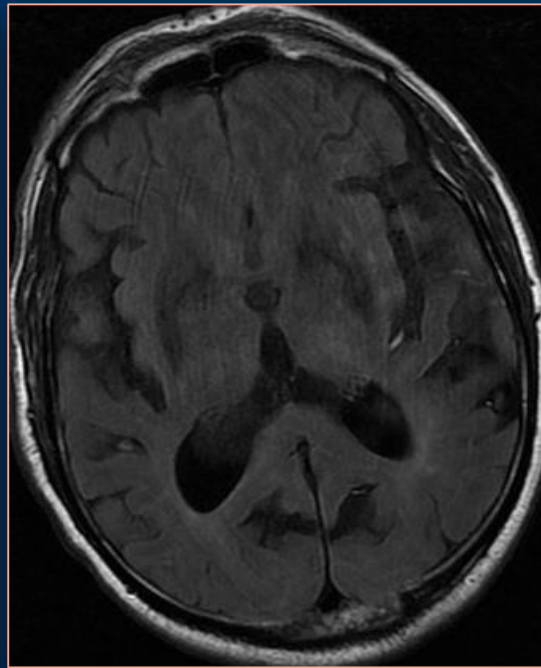
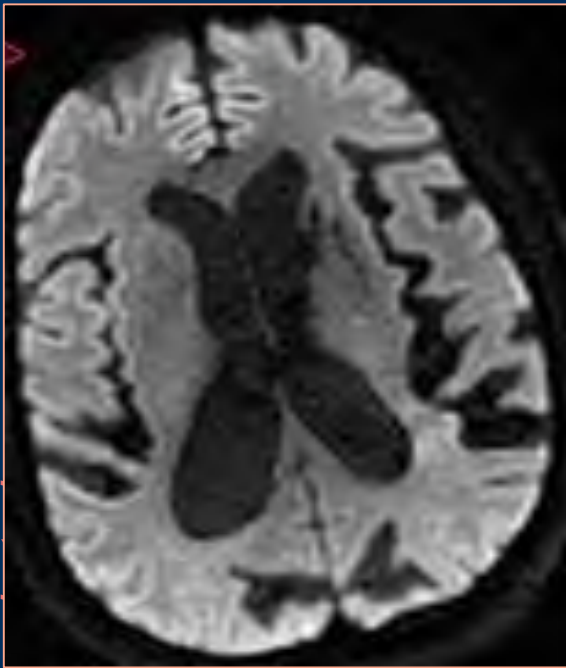


ORIGINAL RESEARCH

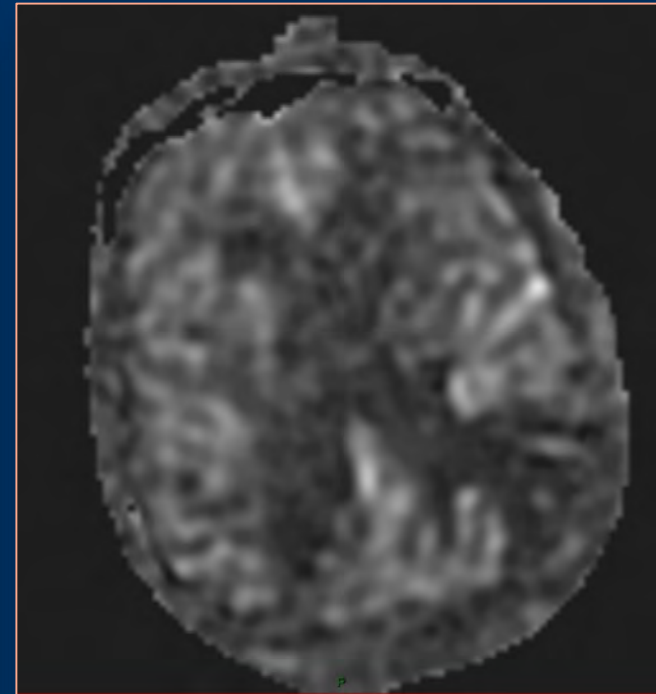
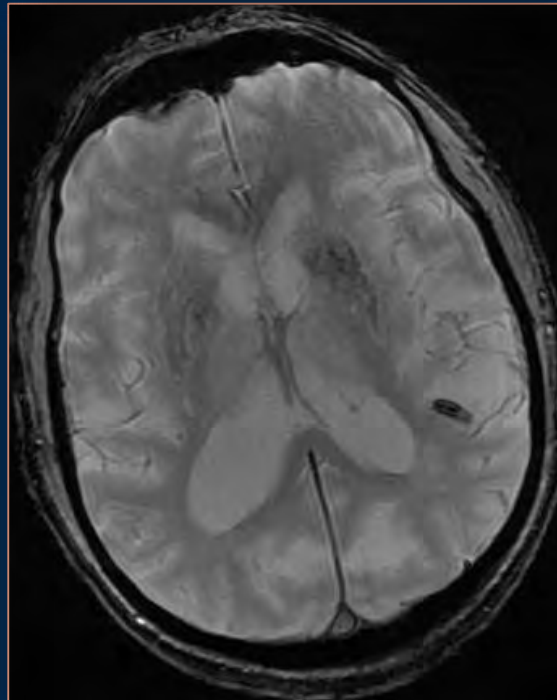
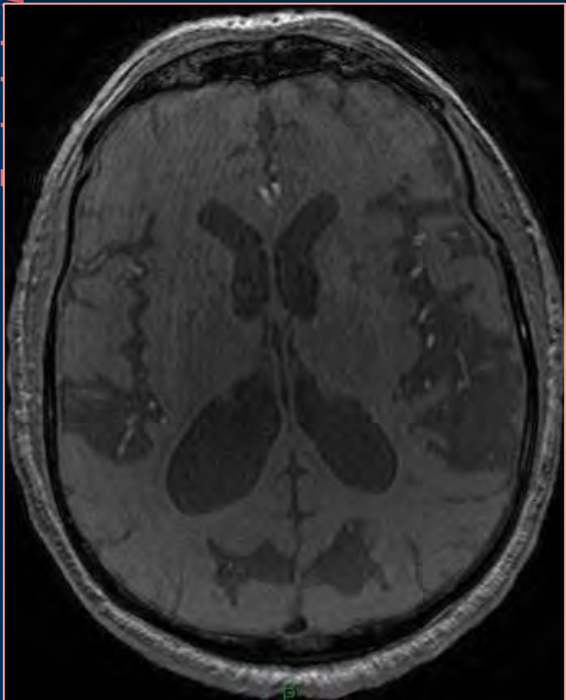
## Vessel perforation during stent retriever thrombectomy for acute ischemic stroke: technical details and clinical outcomes

Maxim Mokin,<sup>1</sup> Kyle M Fargen,<sup>2</sup> Christopher T Primiani,<sup>1</sup> Zeguang Ren,<sup>1</sup> Travis M Dumont,<sup>3</sup> Leonardo B C Brasiliense,<sup>3</sup> Guilherme Dabus,<sup>4</sup> Italo Linfante,<sup>4</sup> Peter Kan,<sup>5</sup> Visish M Srinivasan,<sup>5</sup> Mandy J Binning,<sup>6</sup> Rishi Gupta,<sup>7</sup> Aquilla S Turk,<sup>8</sup> Lucas Elijevich,<sup>9</sup> Adam Arthur,<sup>9</sup> Hussain Shallwani,<sup>10</sup> Elad I Levy,<sup>10</sup> Adnan H Siddiqui<sup>10</sup>

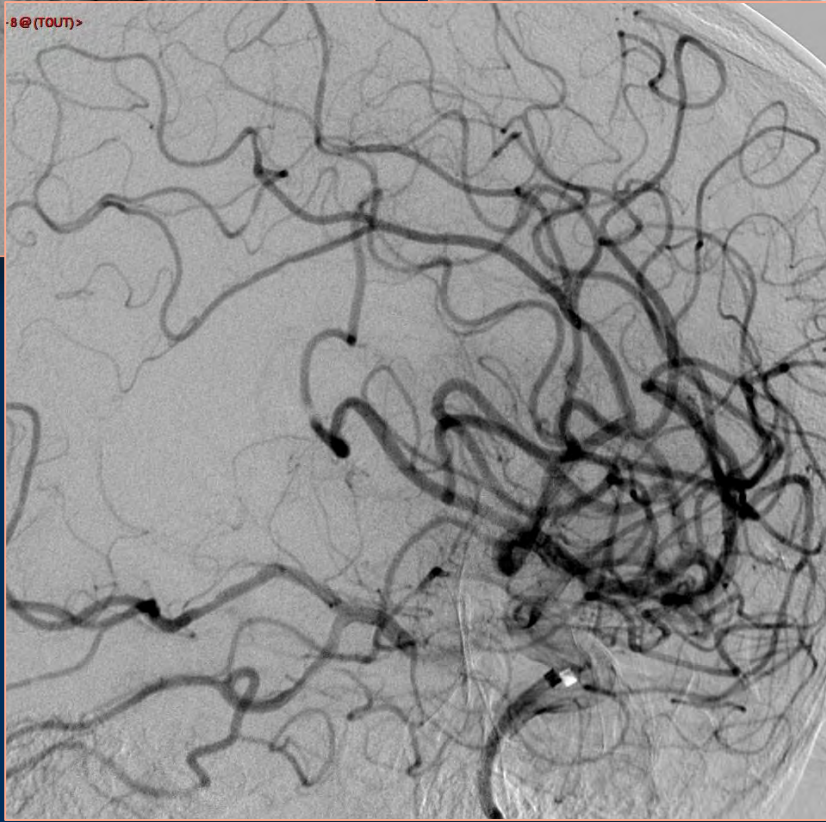
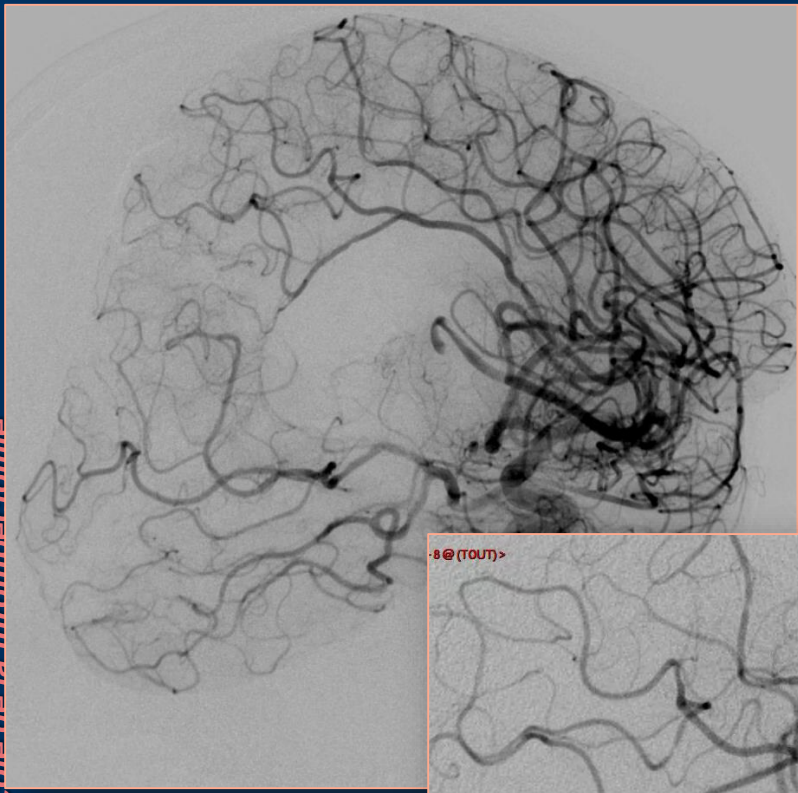
- **1599 cas de TM**
- **1% de perforations**
- **63% des perforations survenues sur TM distales**



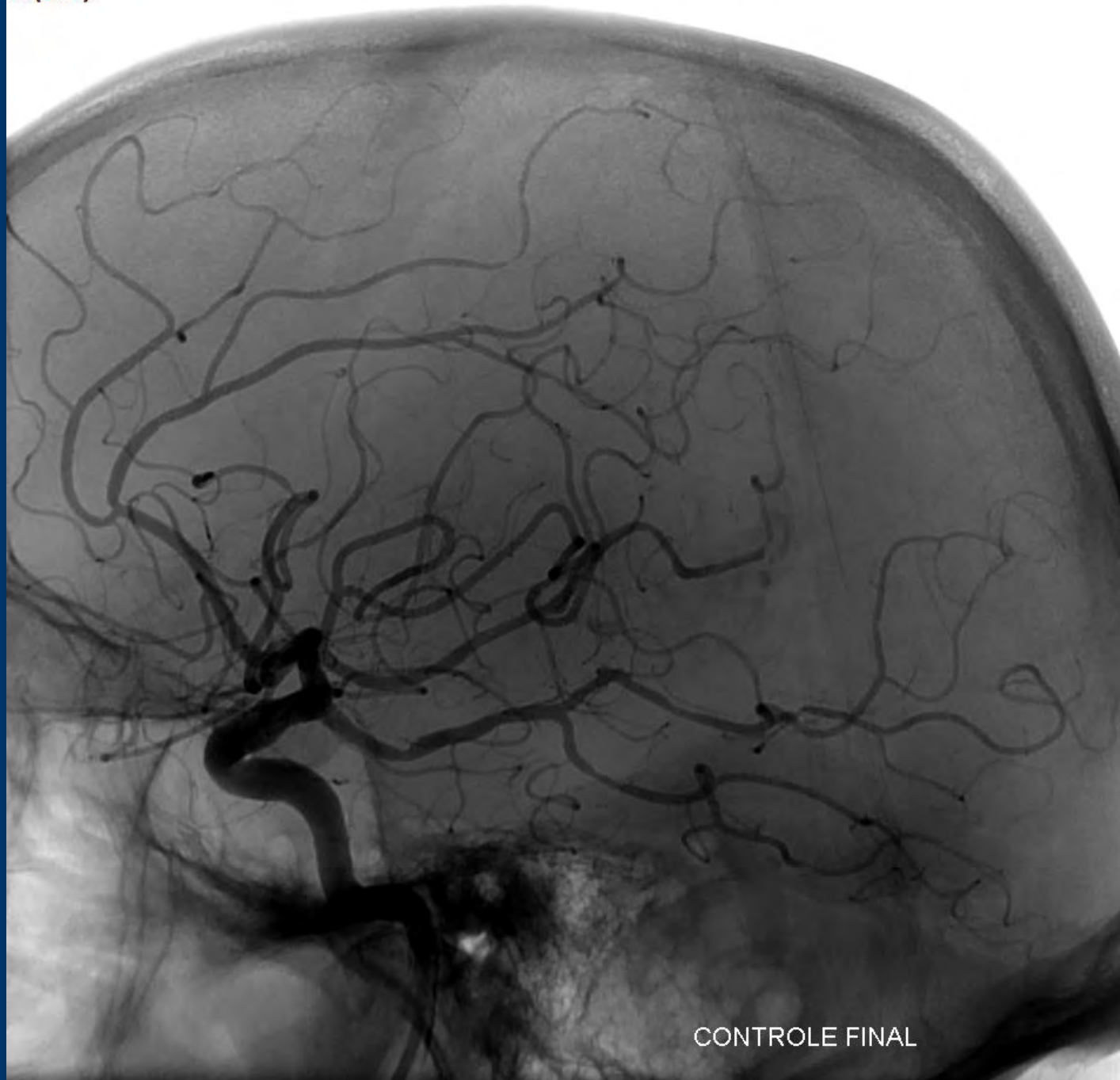
- *Patient de 65 ans*
- *Aphasie au décours d'une coronarographie*
- *Score NIHSS = 5*
- *Patient sous Aspégic/Plavix*



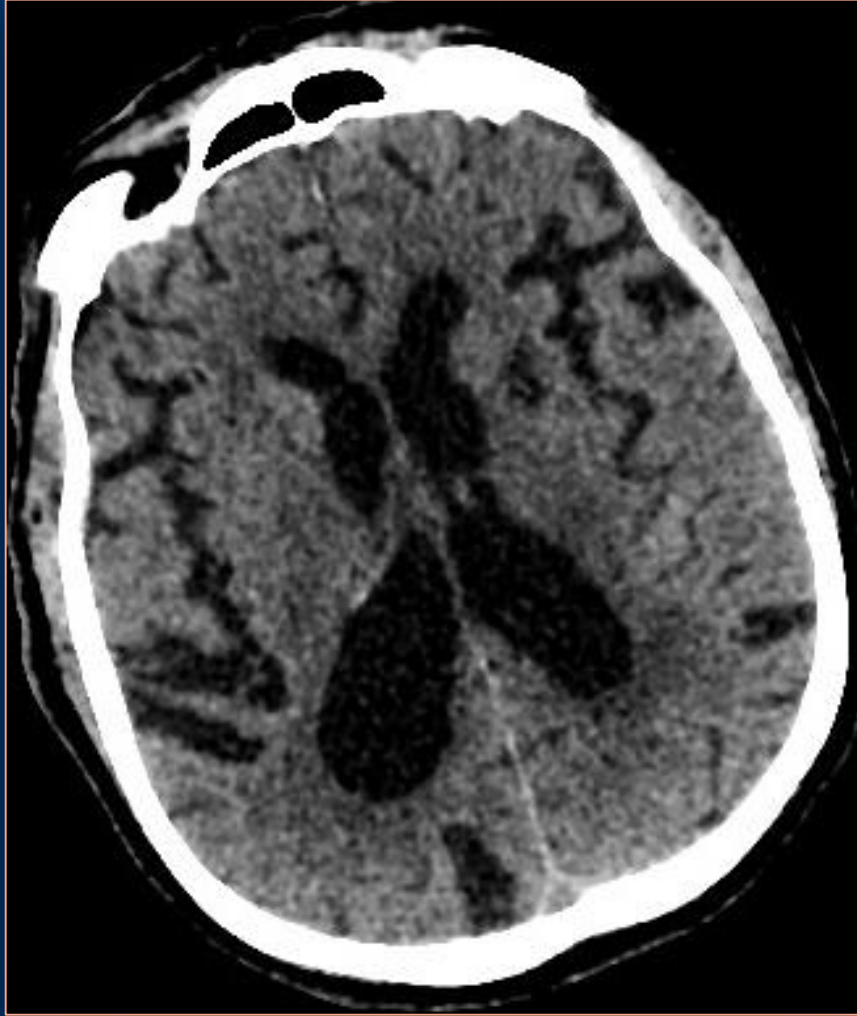




300 (TOUT) >



CONTROLE FINAL





***A venir : étude DISCOUNT (PHRC national)  
RCT : TMO + TM vs. TMO***

# « TAKE HOME » MESSAGE



- Importance de la **stabilité**
- **Tri-axial** +++
- Cathéters intermédiaires souples
- Franchissement du caillot avec **micro-guide**, de préférence en « **J** »
- Occlusions distales (M2) : stent retriever et aspiration efficaces. **Risque de complication hémorragique plus élevé**

***Merci pour votre attention!***

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**NRI PSL**

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*[frederic.clarencon@aphp.fr](mailto:frederic.clarencon@aphp.fr)*