

MONTER ET ÊTRE STABLE EN INTRA-CRÂNIEN

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École de la Thrombectomie

01/02/2023

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



NRI PSL



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**

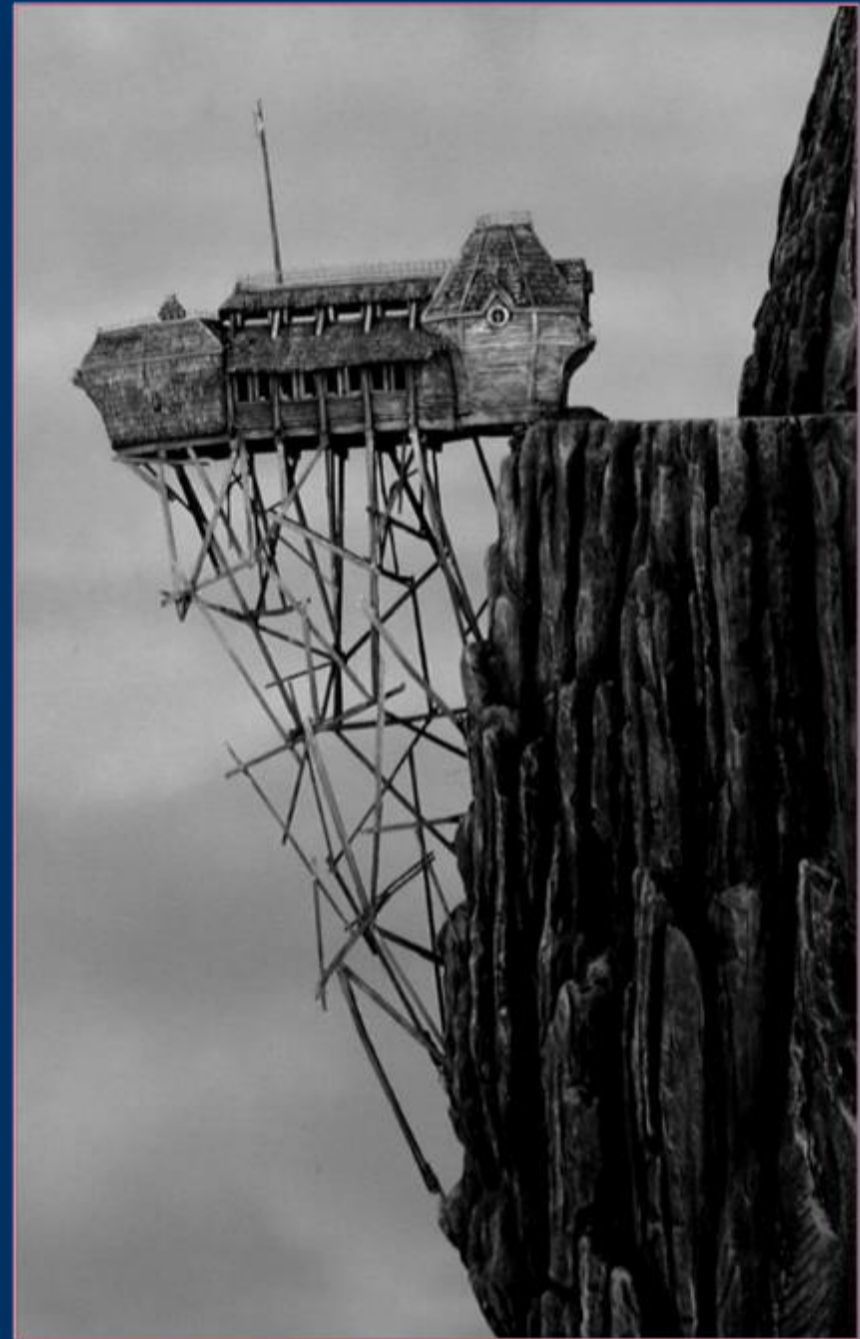
ACCÈS

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

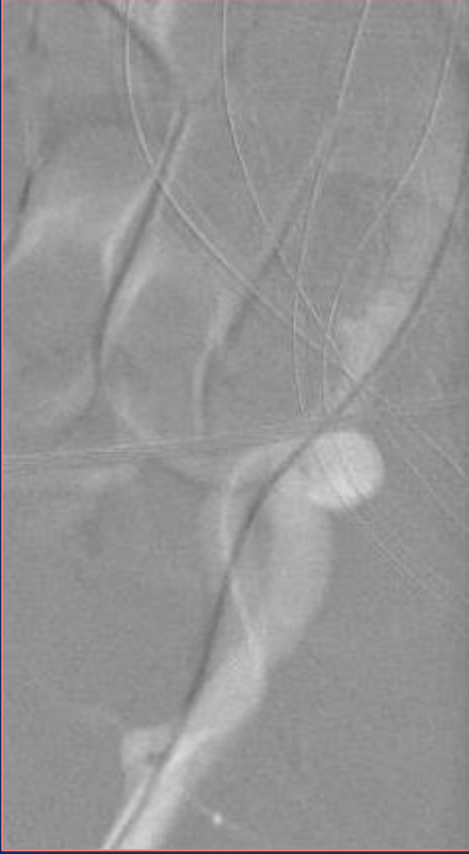
- Un leitmotiv : la **stabilité**
- Plus le cathéter porteur est distal, plus il est stable
- Cathétérisme **triaxial +++**

Stabilité

- *Introduceur Arrow 9F 24 cm*
- *NeuronMax 6F sur sonde Simmons 2 5F*
- *Cathéter aspiration*



École de la thrombectomie



STRATÉGIE

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

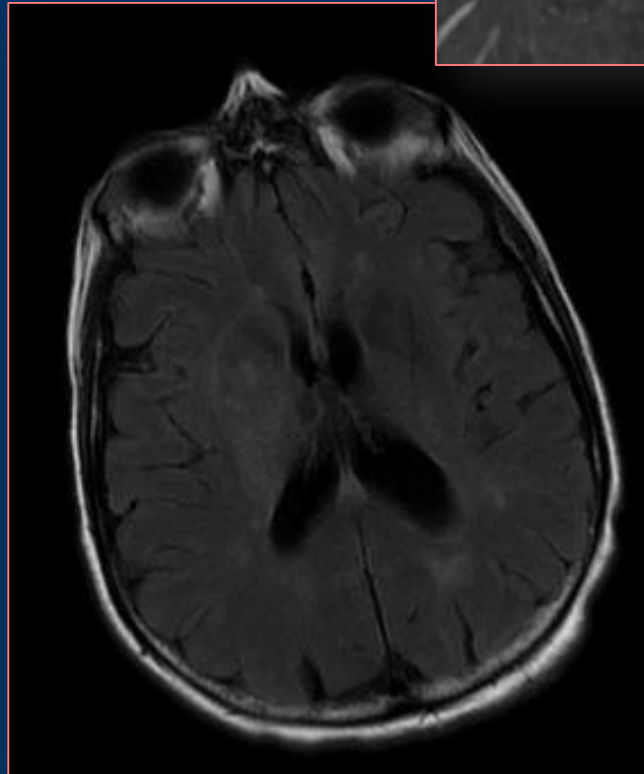
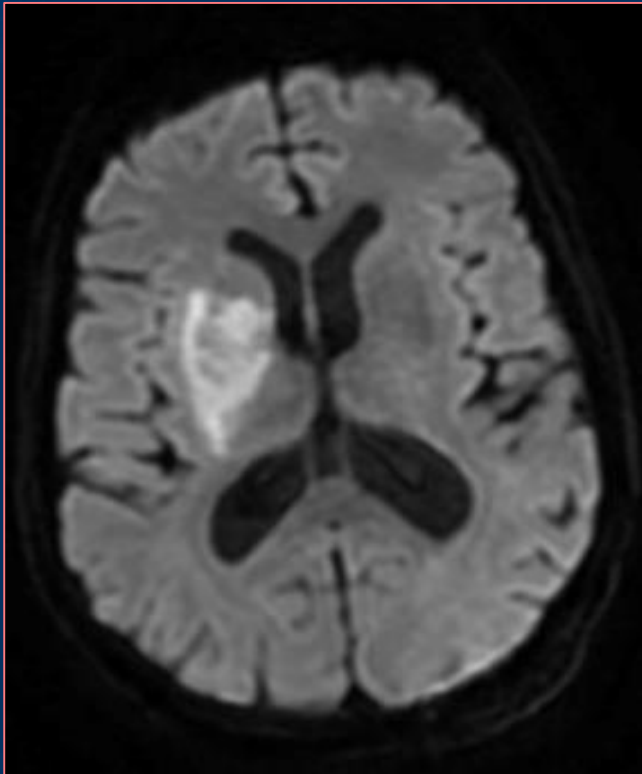


- Mais savoir changer de stratégie en cours d'intervention

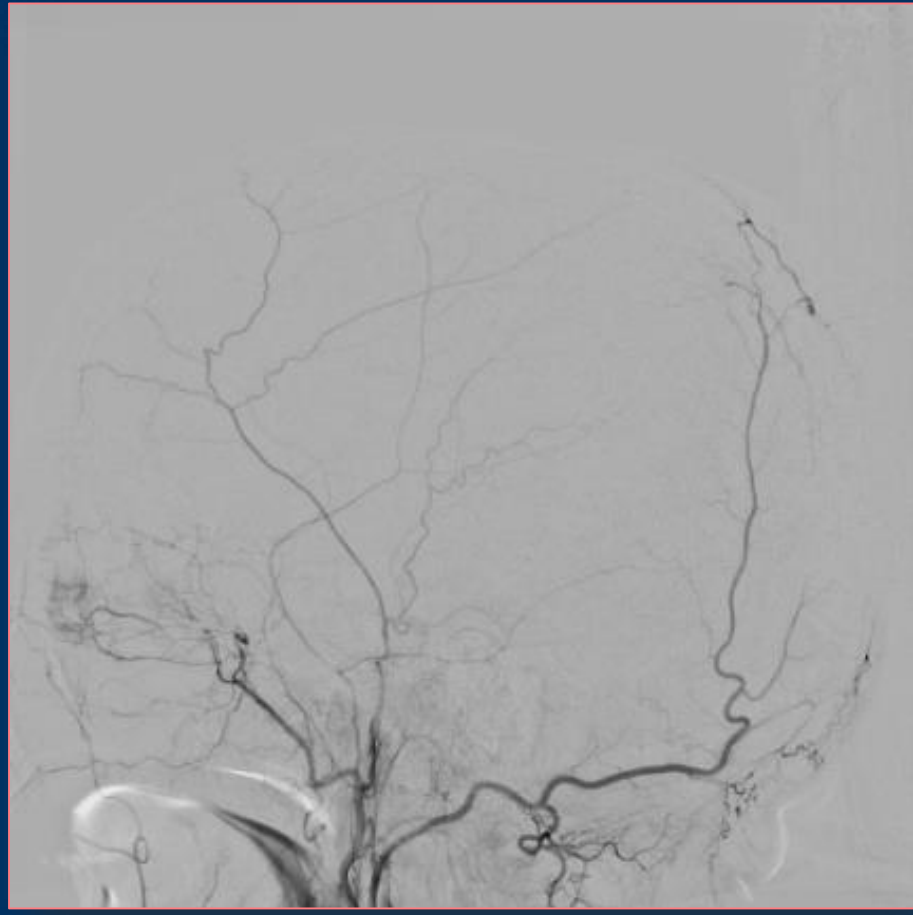
STRATÉGIE

- **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 (24 cm)
- Introducteur long 6F souple (80 ou 90 cm)
- Cathéter d'aspiration 6F

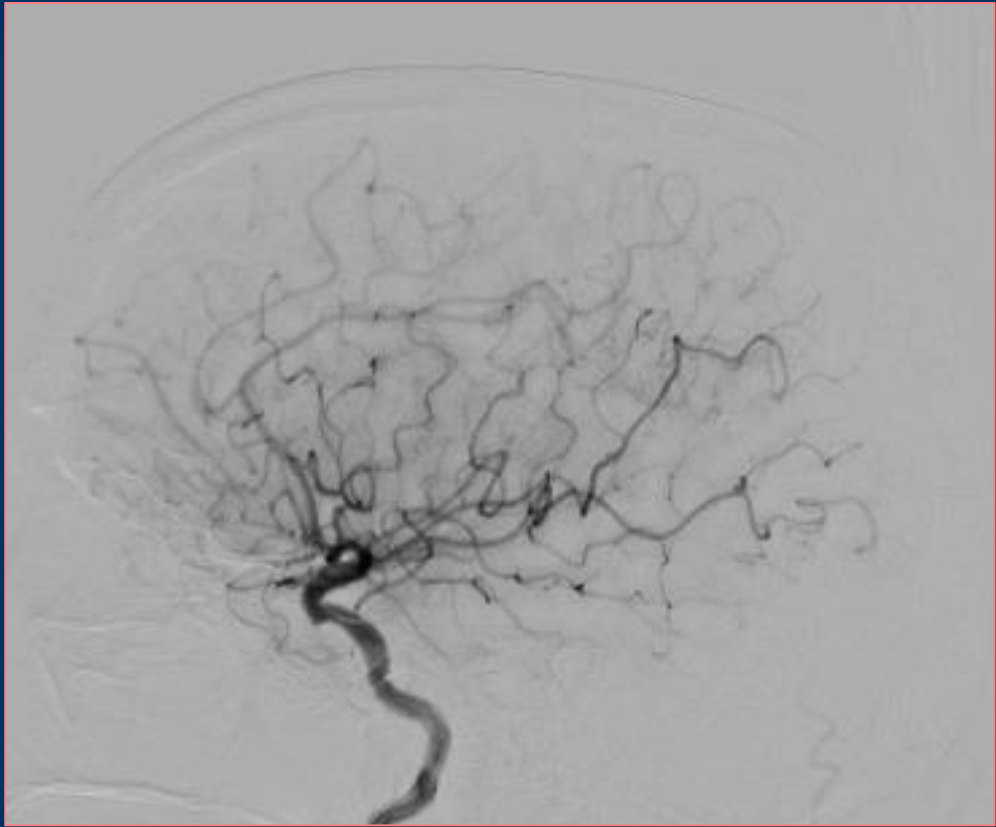
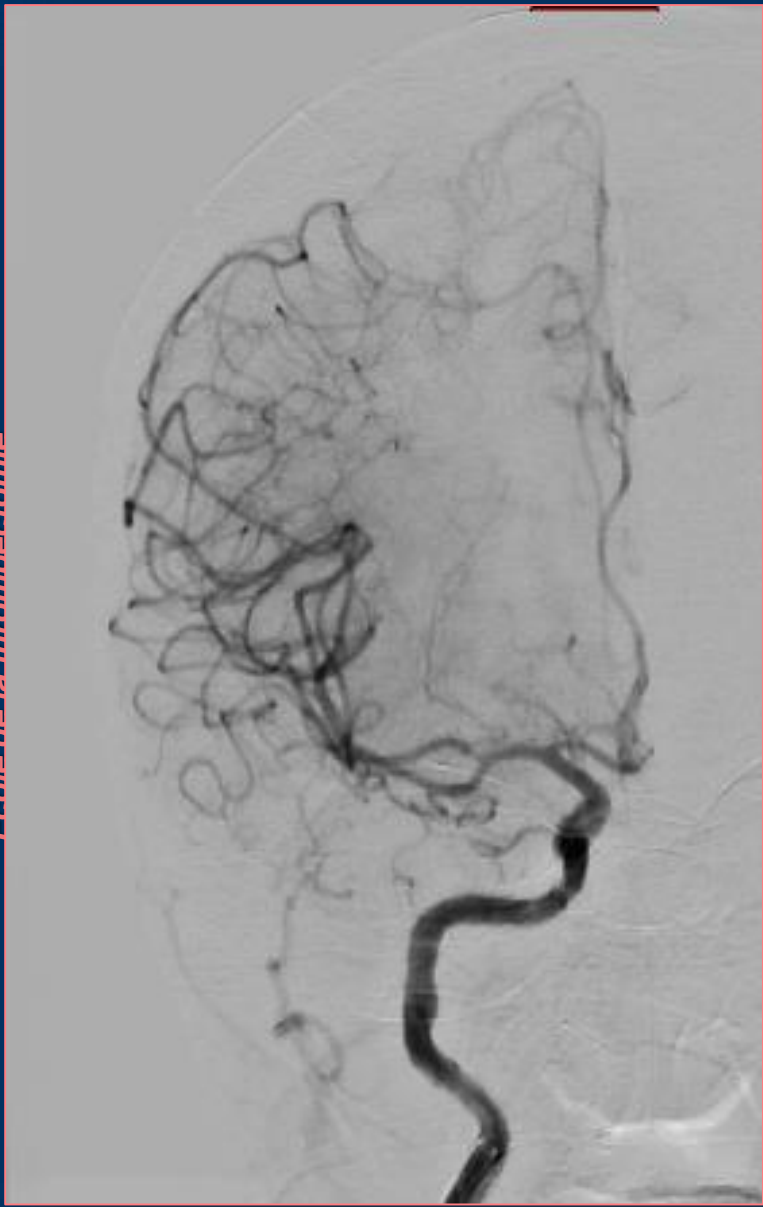
- **Patiente de 63 ans**
- **Déficit brutal hémicorps G**
- **NIHSS = 14**











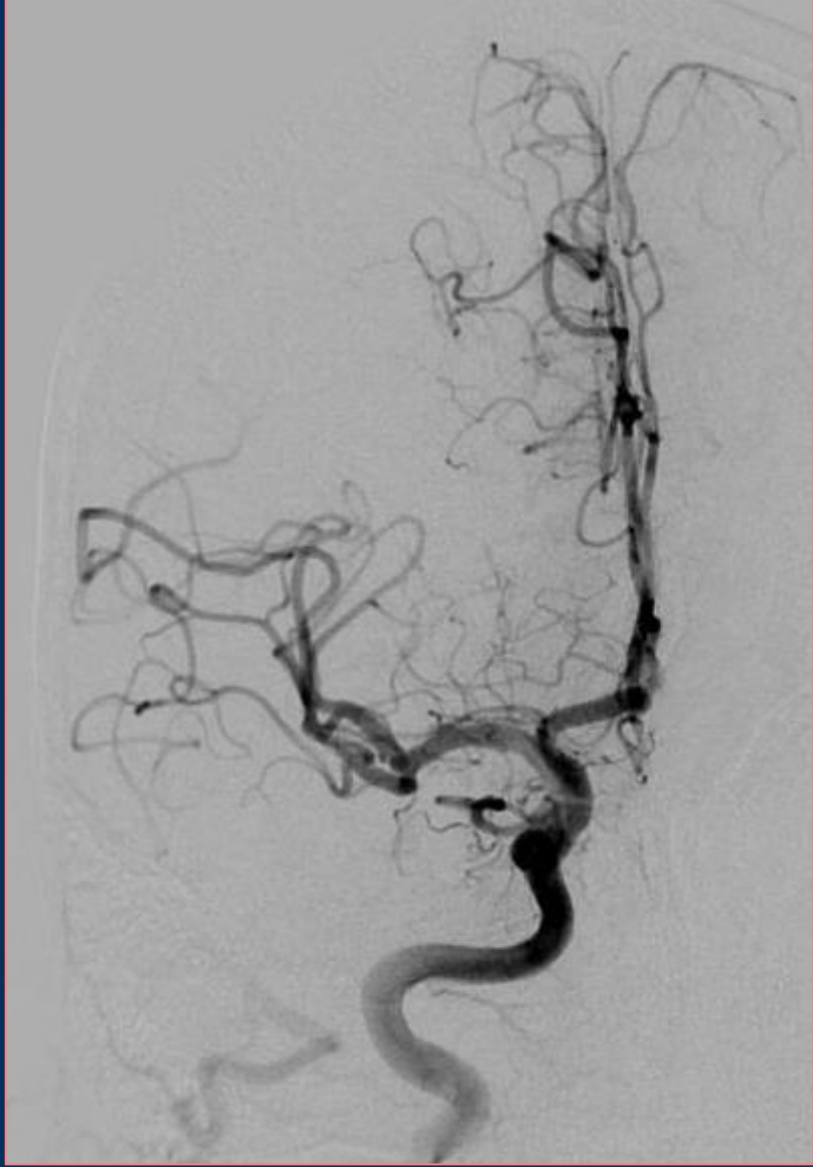


Écol

STRATÉGIE

- **Savoir changer de stratégie :**

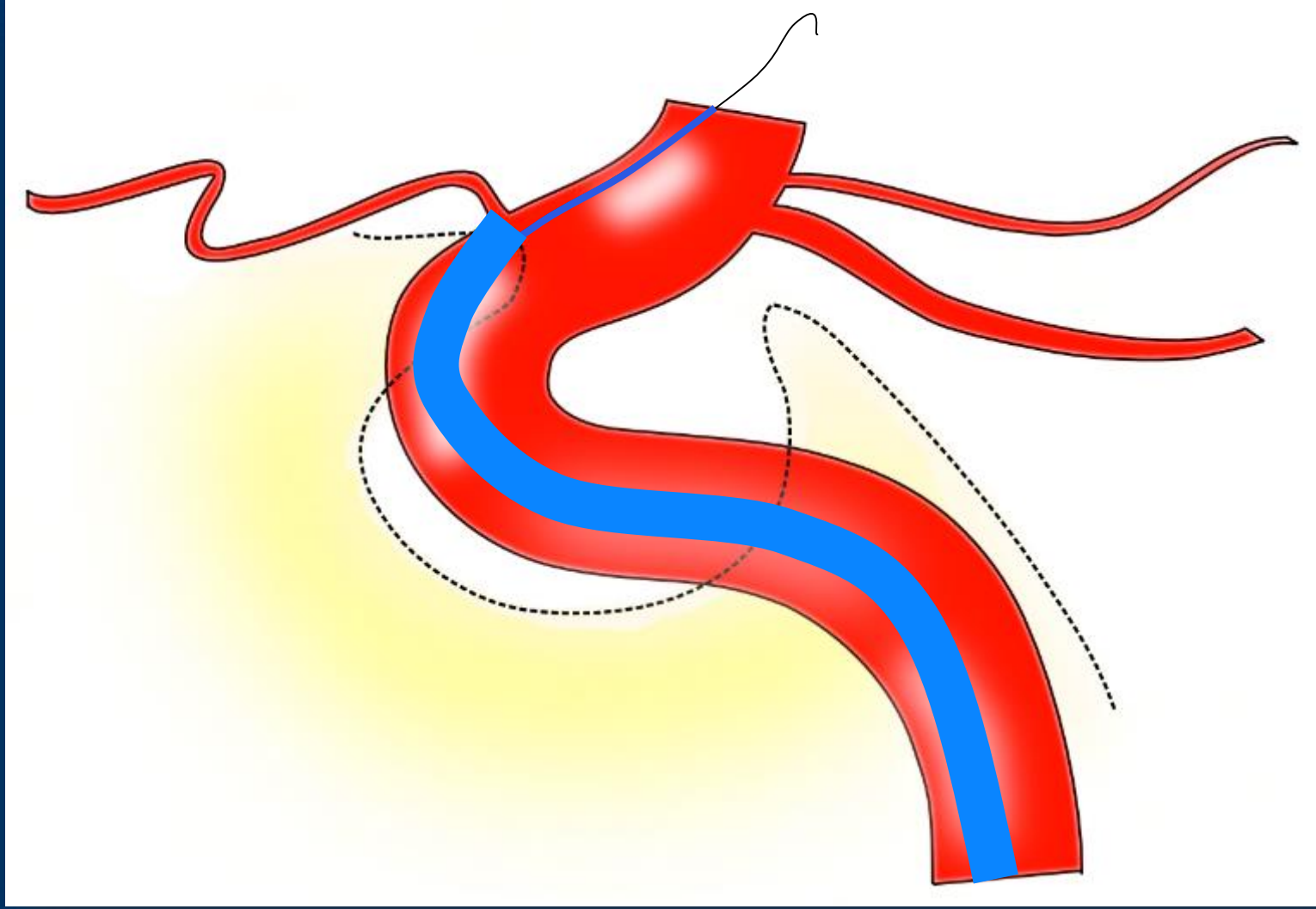


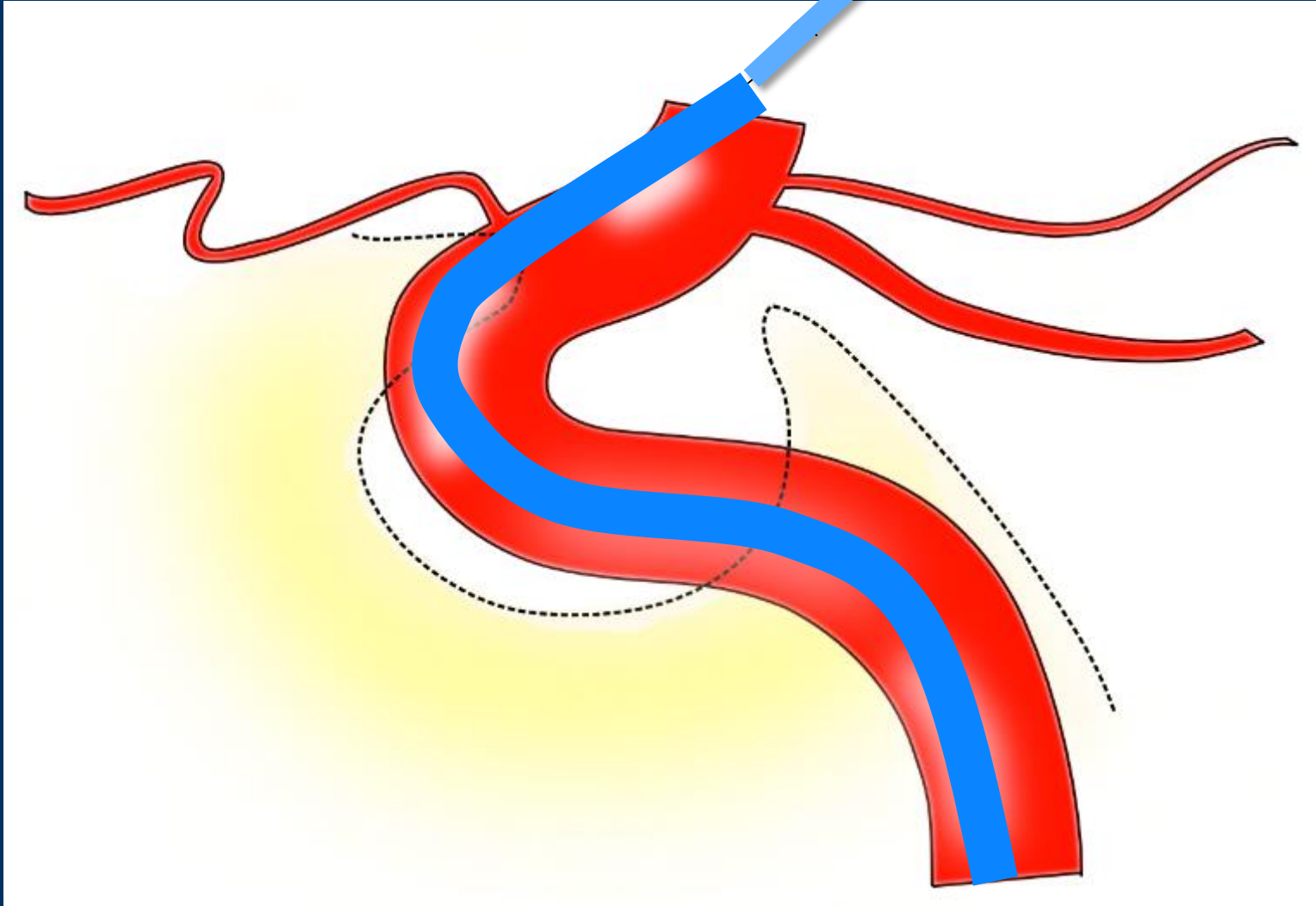


ASPIRATION DIRECTE (ADAPT) OU « SOLUMBRA »

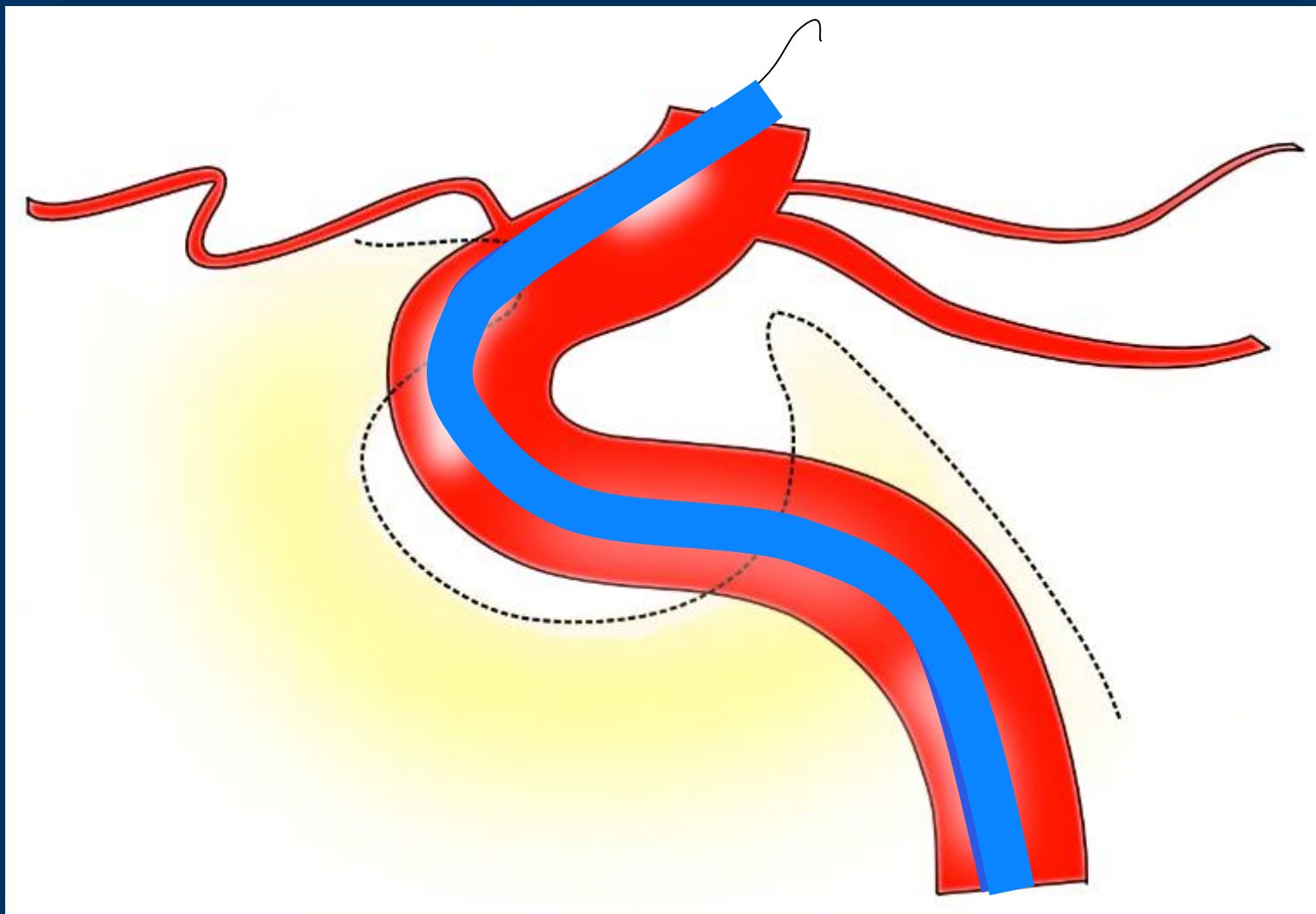
- Mon cathéter ne monte pas dans le siphon
Que faire ?

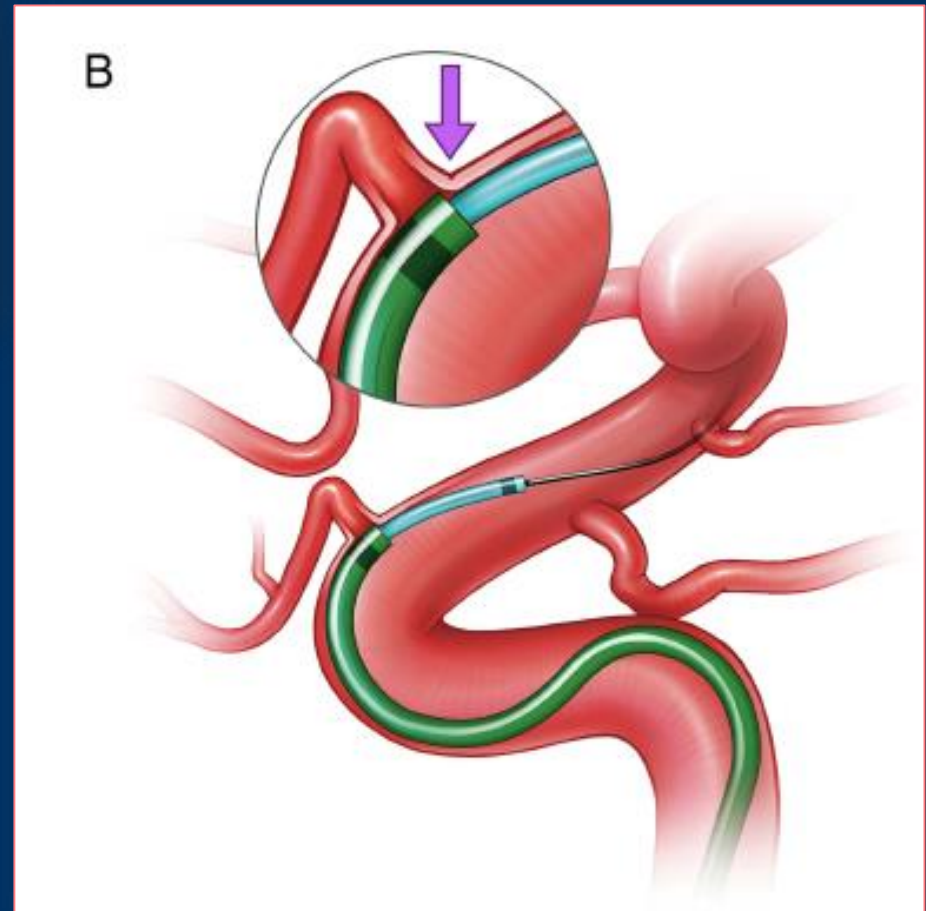
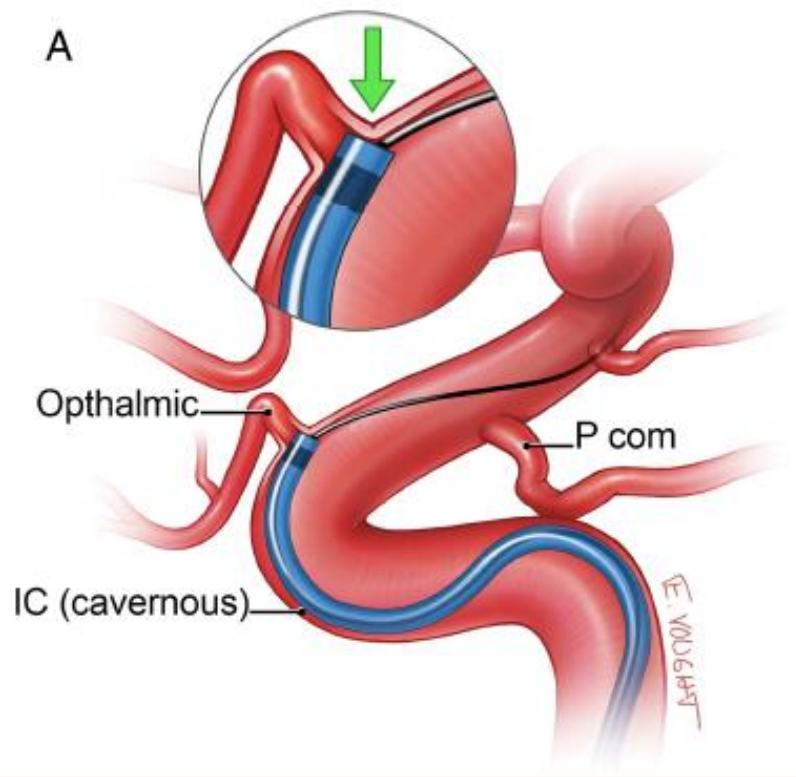




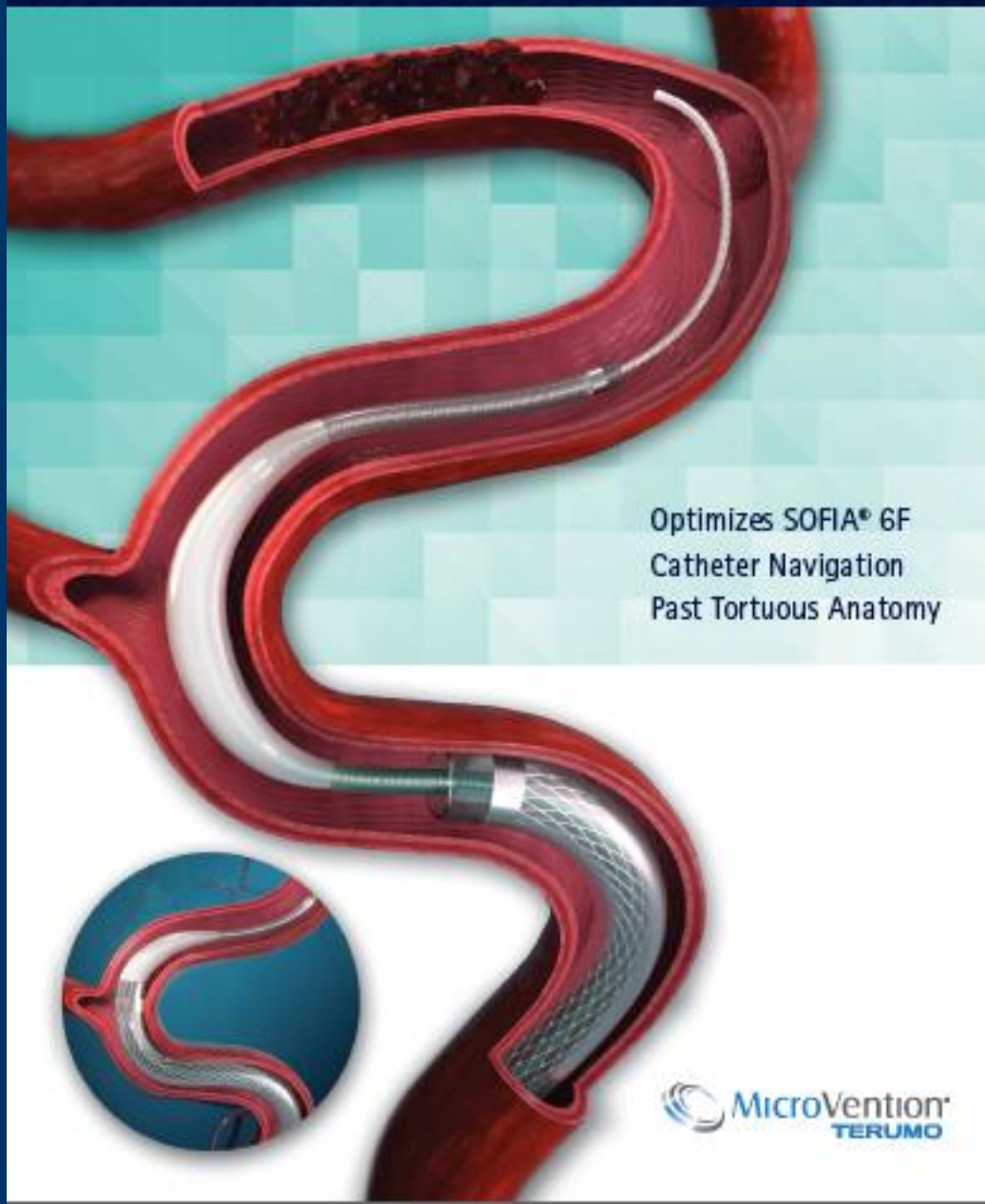


Cathéter 3Max





WEDGE™ CATHETER



Optimizes SOFIA® 6F
Catheter Navigation
Past Tortuous Anatomy



 MicroVention™
TERUMO

WEDGE™ CATHETER

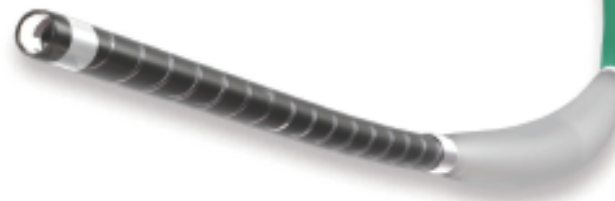
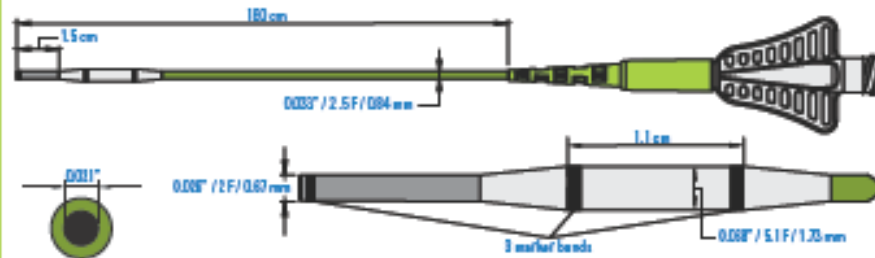
SOFIA® 6F
COMPATIBLE

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" 2.0 F 0.67 mm	0.033" 2.5 F 0.84 mm	1.1 cm	0.068" 5.1 F 1.73 mm	3

One unit per box, includes shaping mandrel 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 (PFI-PD11-07-00-01).



microvention.com

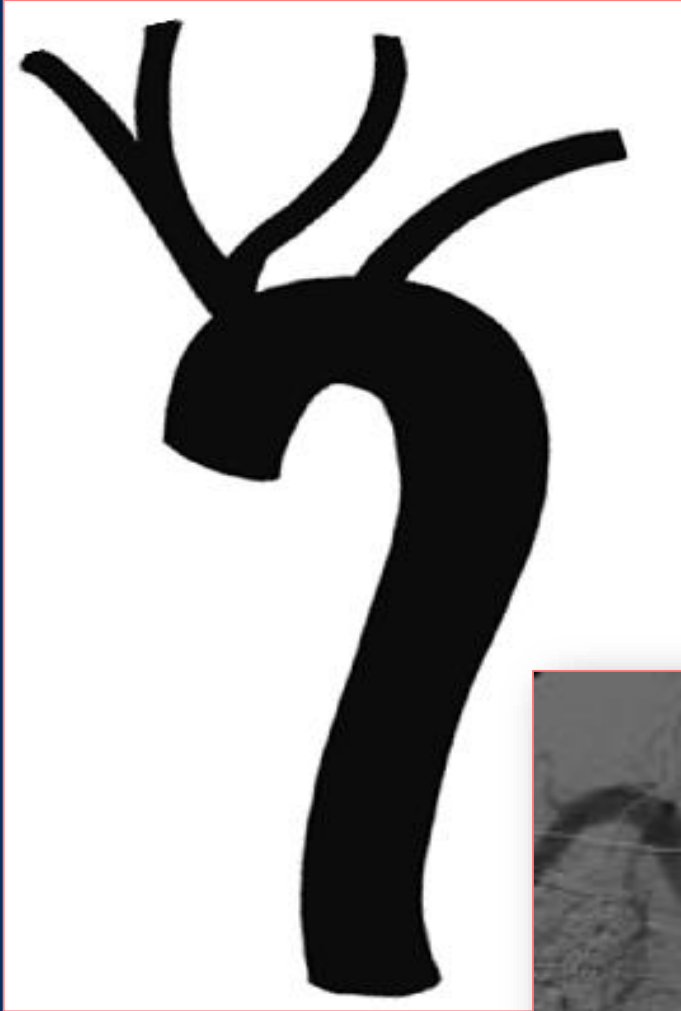
MicroVention Worldwide
Innovation Center
35 Emeryville
Alco Valley, CA 94501
PH: 714.211.0000
PH: 1.800.800.0000

MicroVention UK Limited
Site 2, The Barnack Building
10 Clarendon Park, North Gyle
Sheff and Mill, MK21 1JE
United Kingdom
PH: +44 (0) 191 264 0111
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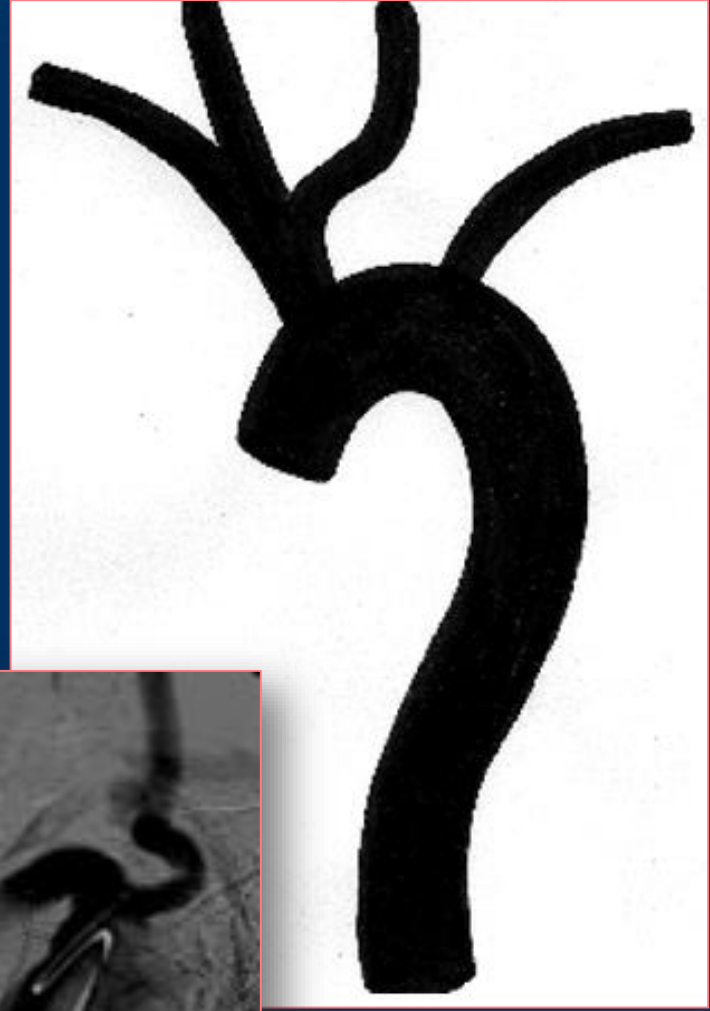
MicroVention Europe S.A.S.L.
20 rue de Mail d'Anvers
10100 Gans, 21 rue de Lays
France
PH: +33 (0) 20 21 77 46
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MicroVention Deutschland GmbH
Helmholtzstr. 67
D-40712 Düsseldorf
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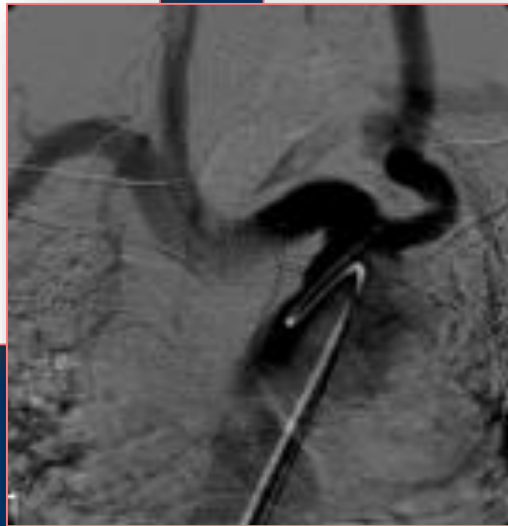
TSA DIFFICILES

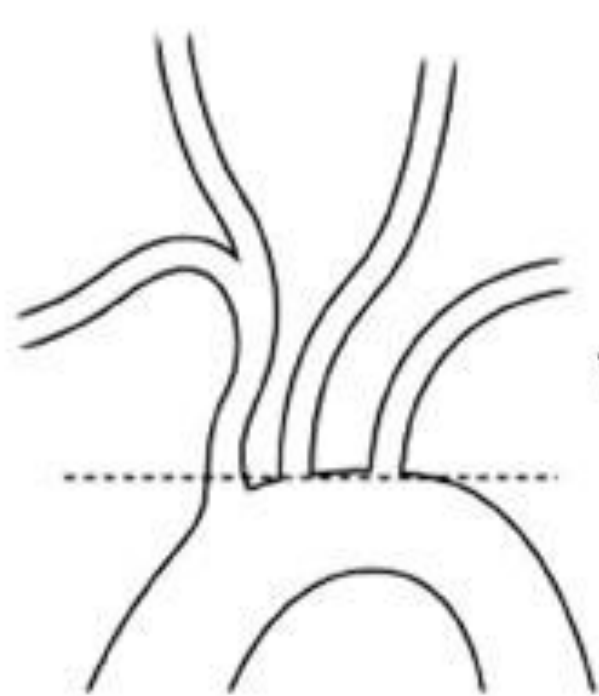


13 %

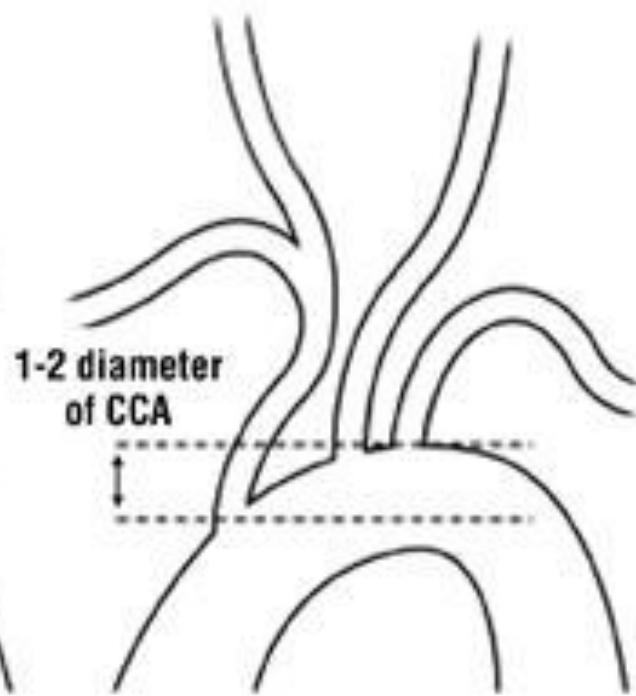


9 %

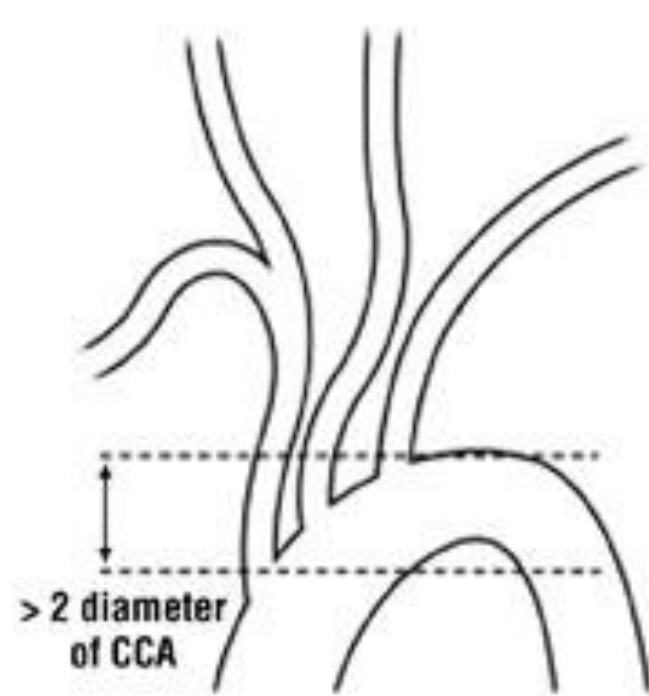




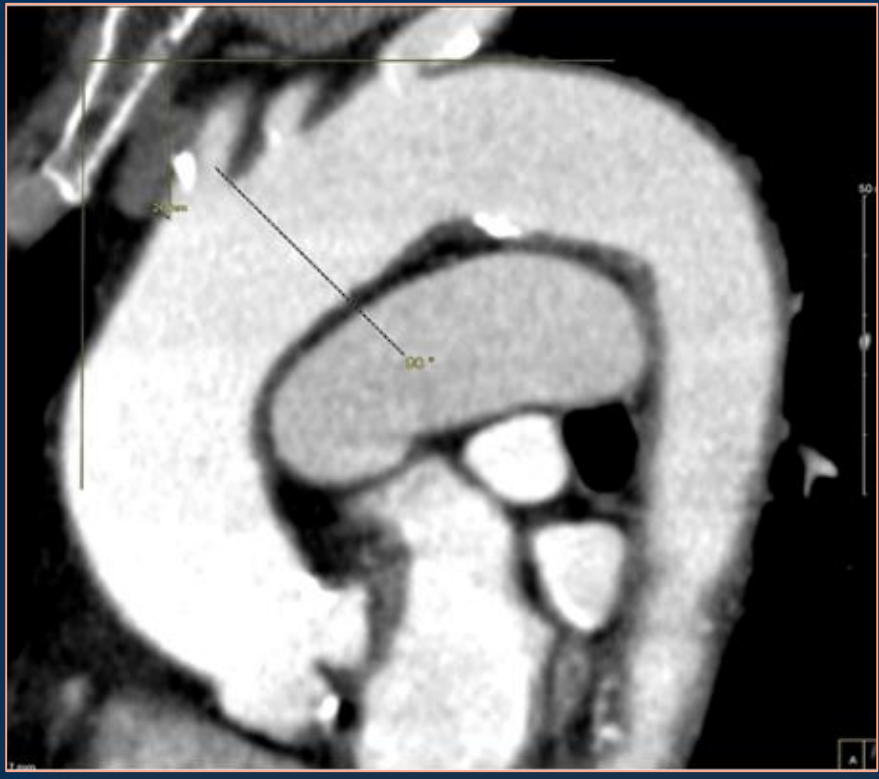
Type I

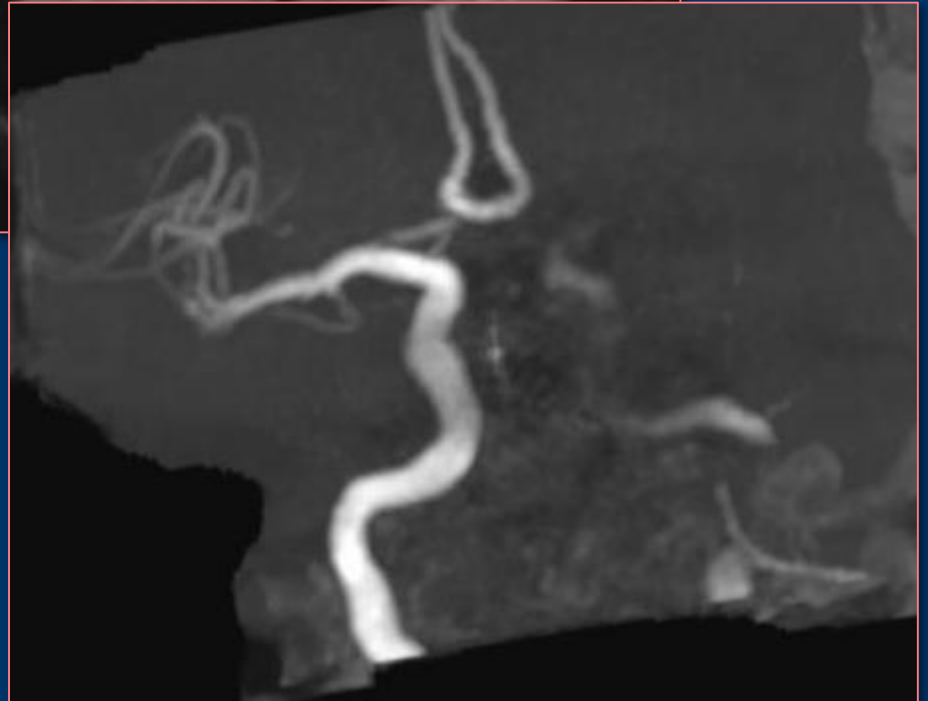
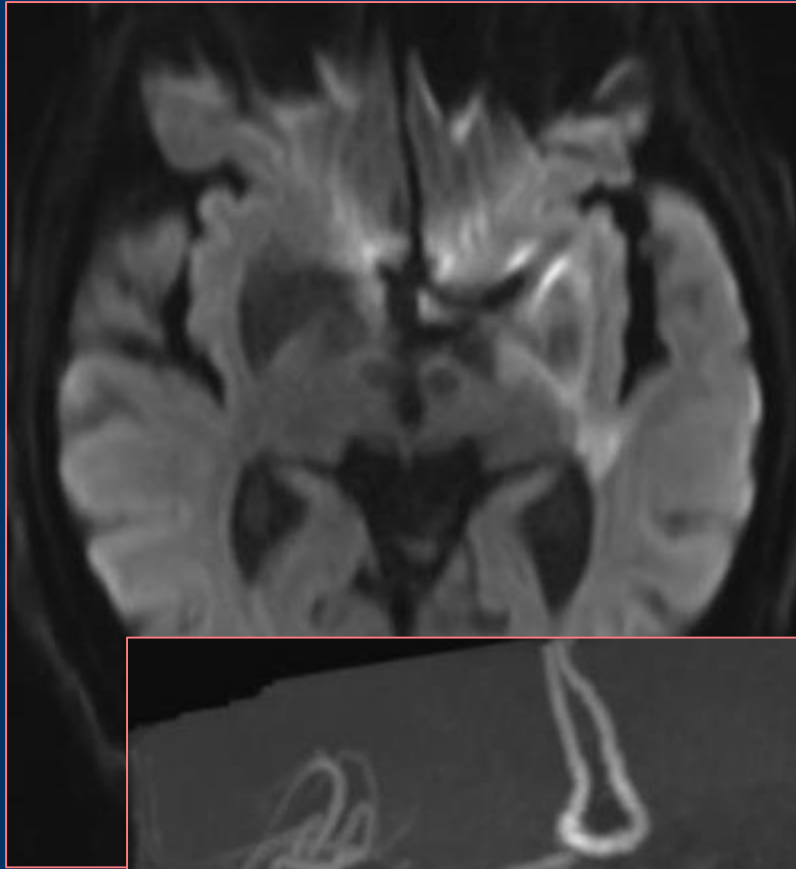
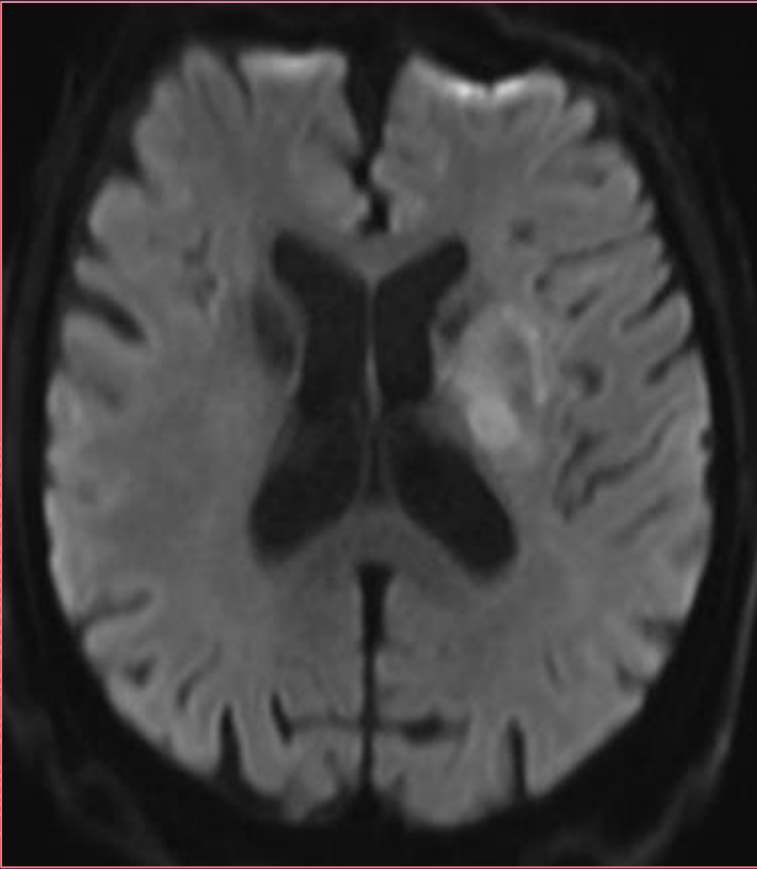


Type II



Type III

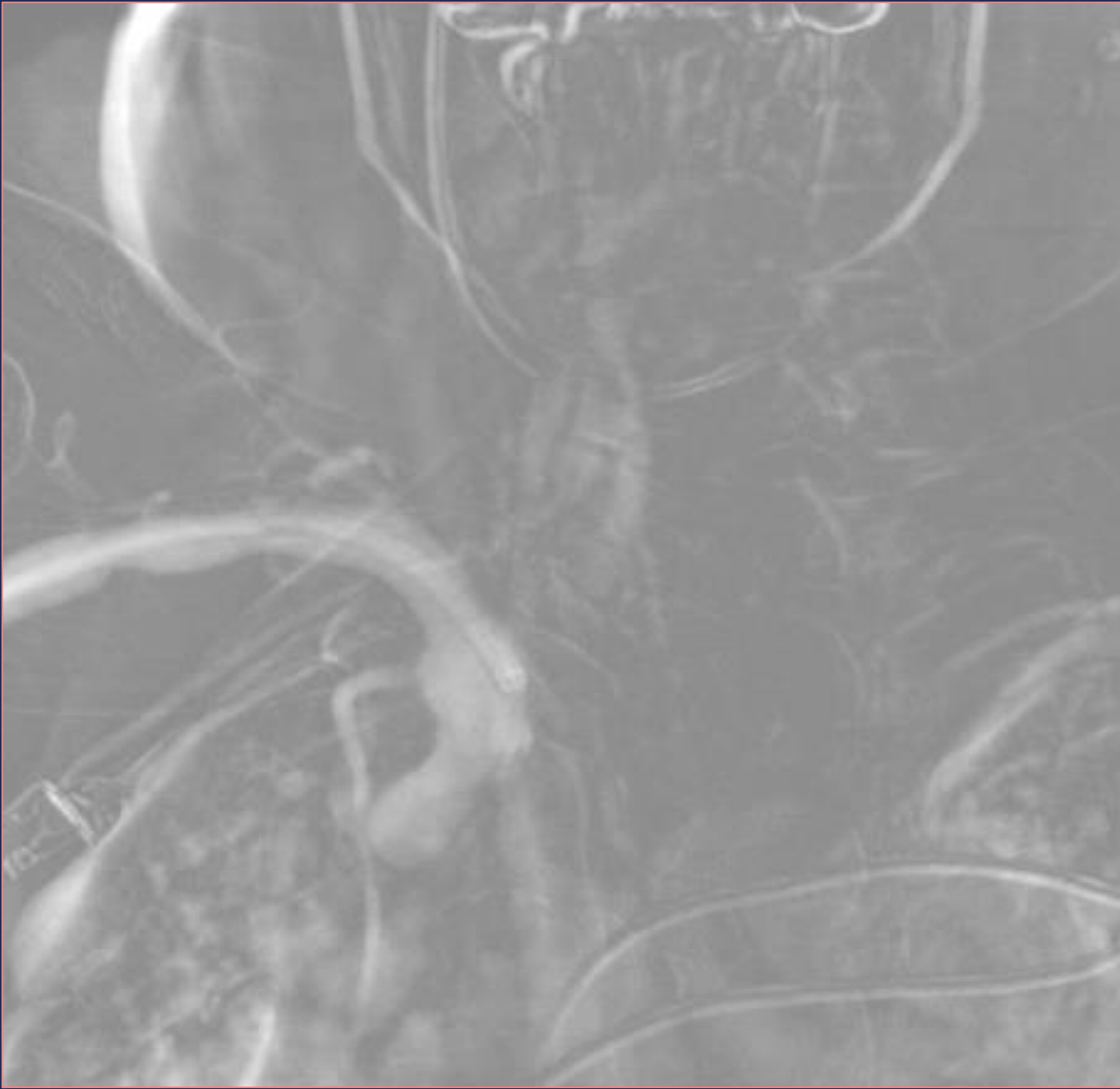




Femme de 80 ans
Hémiplégie Dte, aphasie
NIHSS = 27







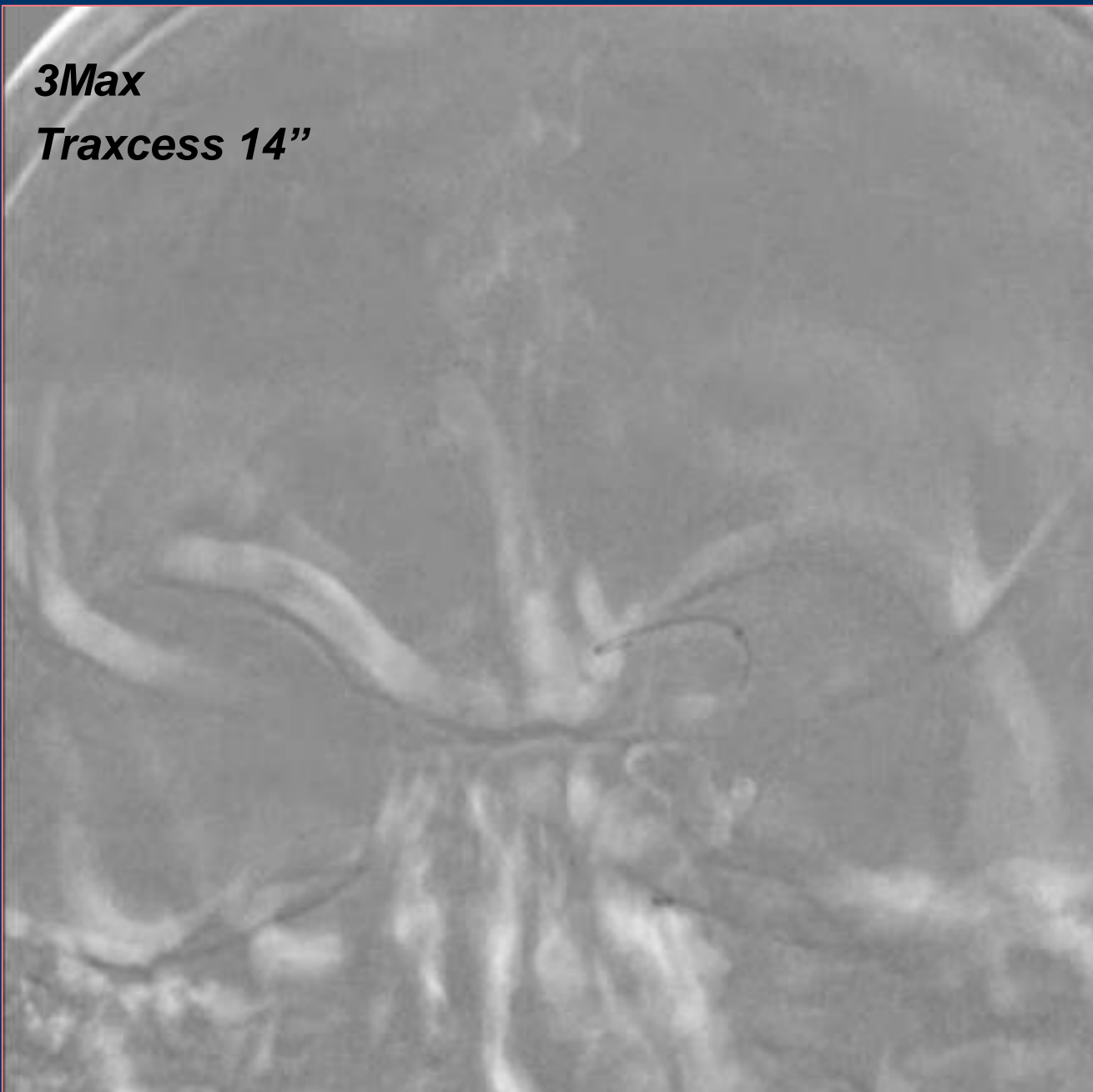






3Max

Traxcess 14"

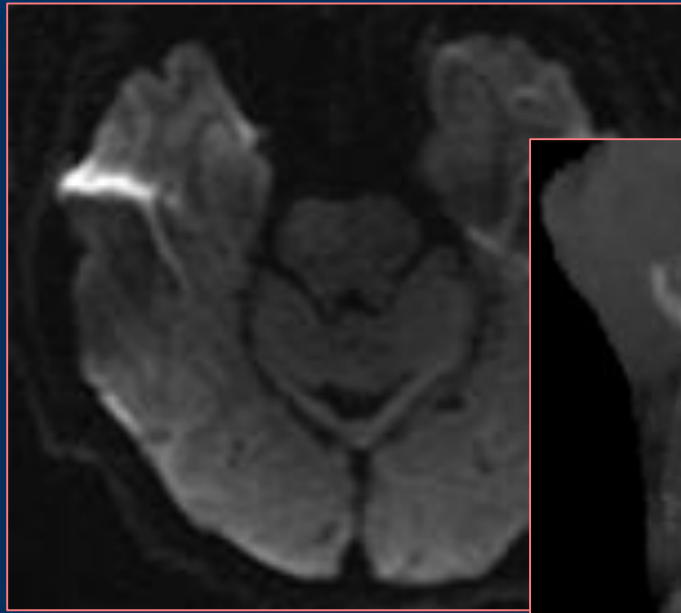
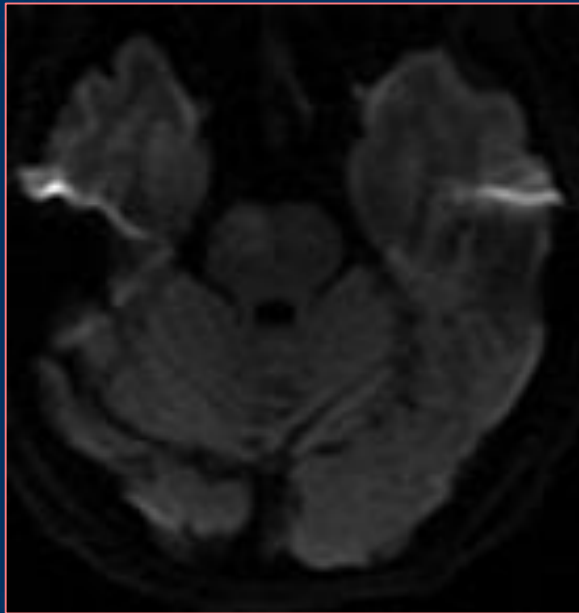




FRANCHIR LE CAILLOT

- 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***



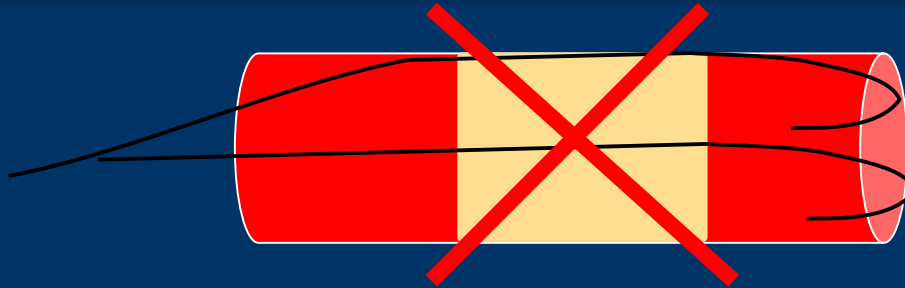




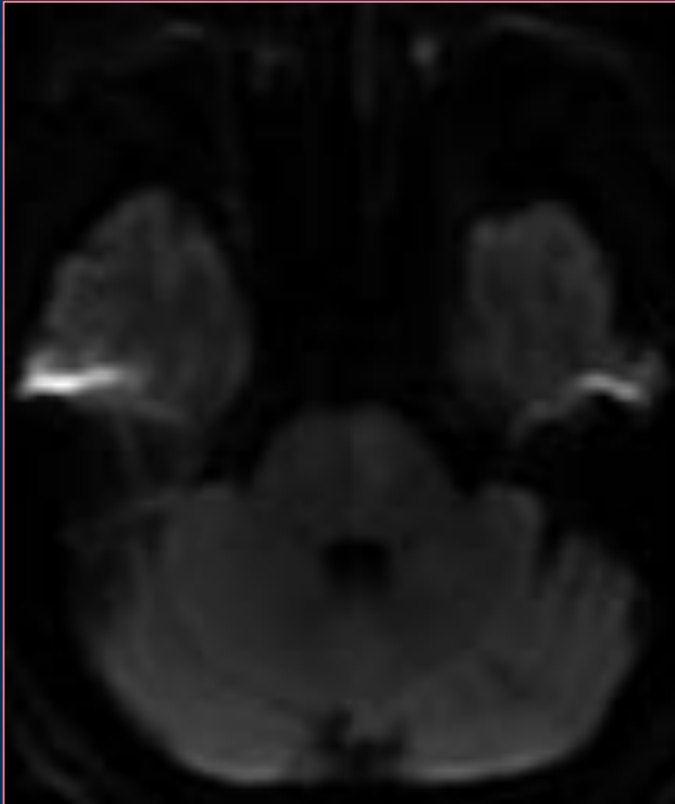


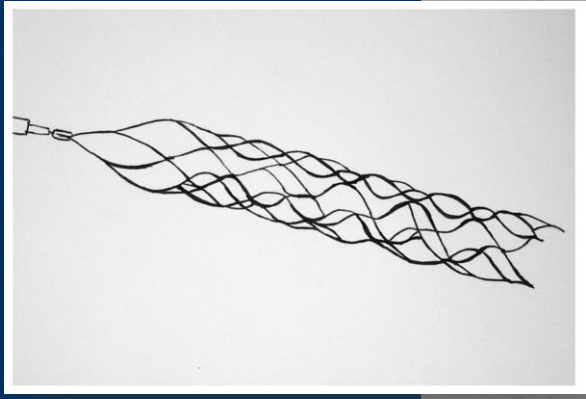
FRANCHIR LE CAILLOT

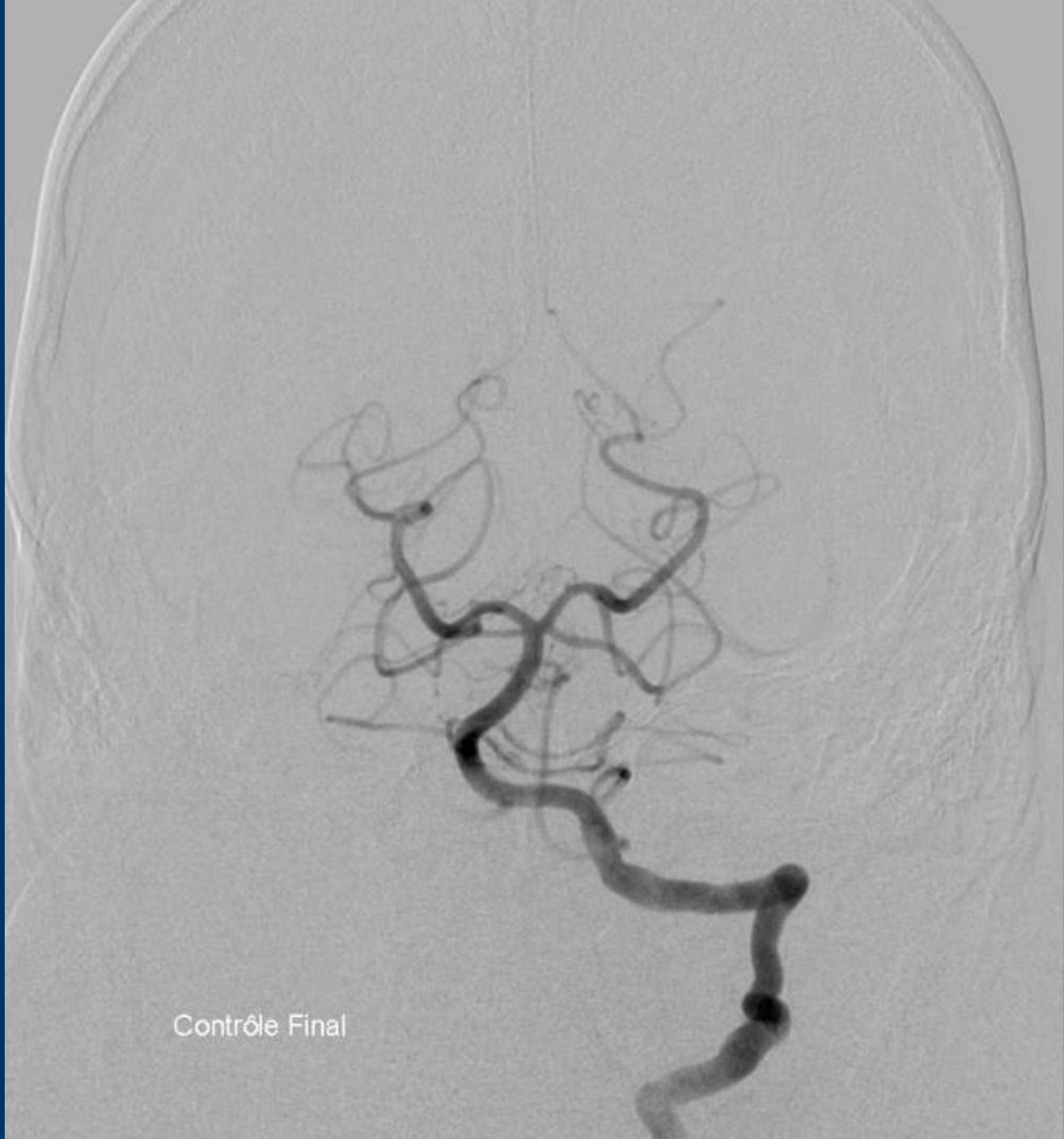
- Quand est-il nécessaire de franchir le caillot ?



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 ?

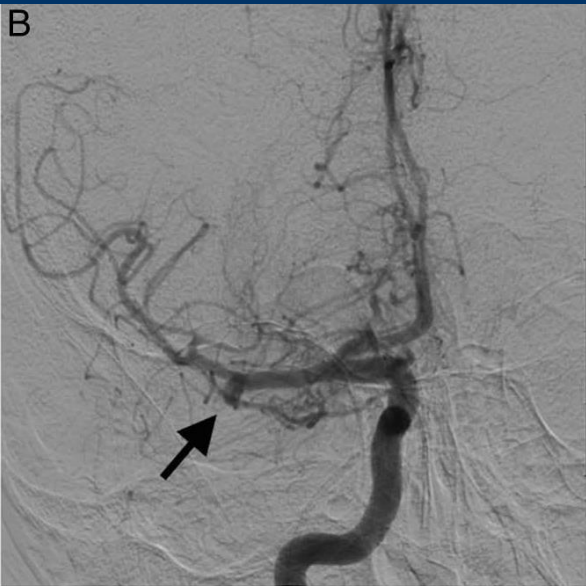
- *toujours avec le microguide*
- *microguide en « J »*
- *torquer le microguide en l'avançant*

FRANCHIR LE CAILLOT

Quelle courbure pour franchir le caillot ?

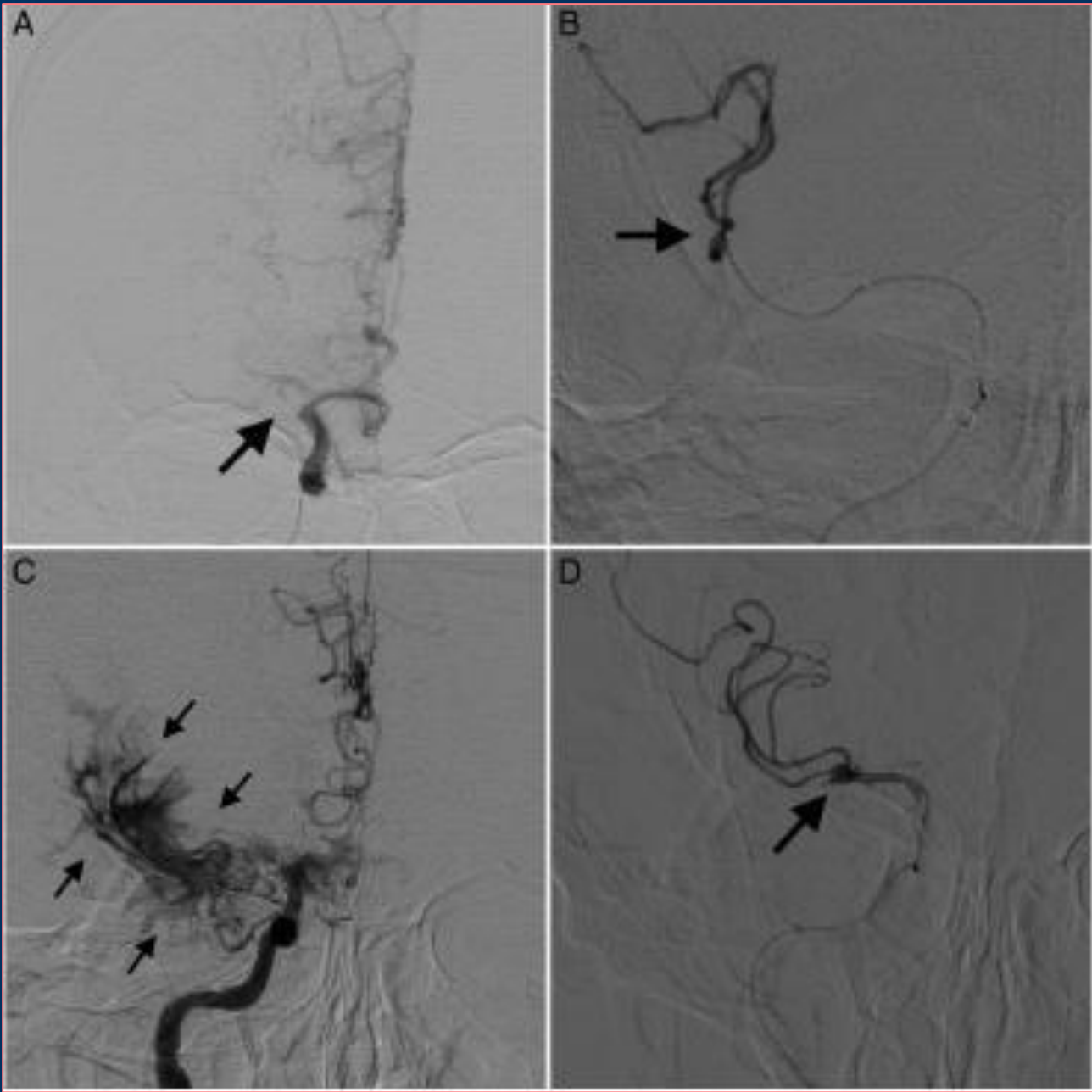
J





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

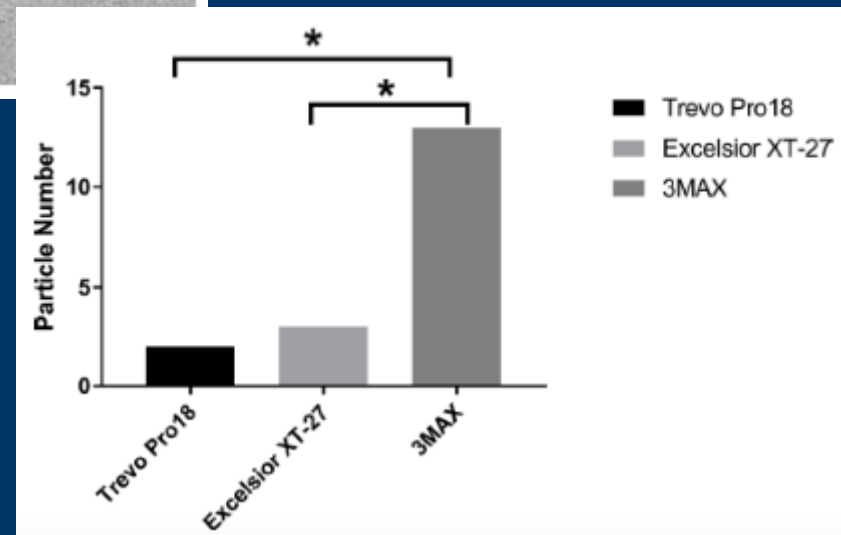
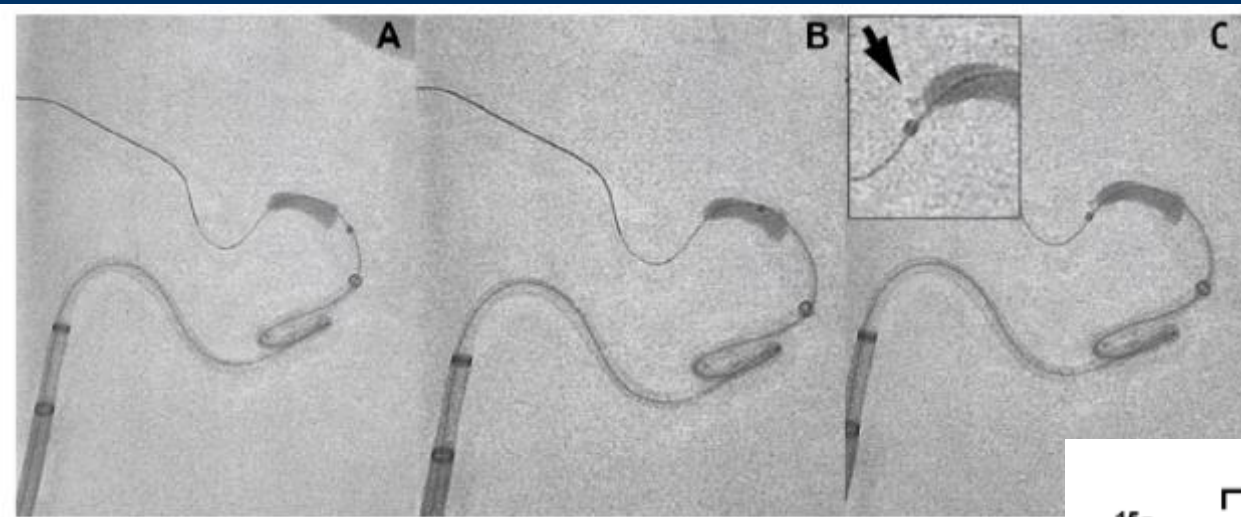
* Zibold F. JNIS. 2016



Microcatheter navigation through the clot: does size matter?

Jildaz Caroff,^{1,2} Robert M King,¹ Rose Arslanian,¹ Miklos Marosfoi,¹ Erin T Langan,¹ Matthew J Gounis,¹ Ju-Yu Chueh¹

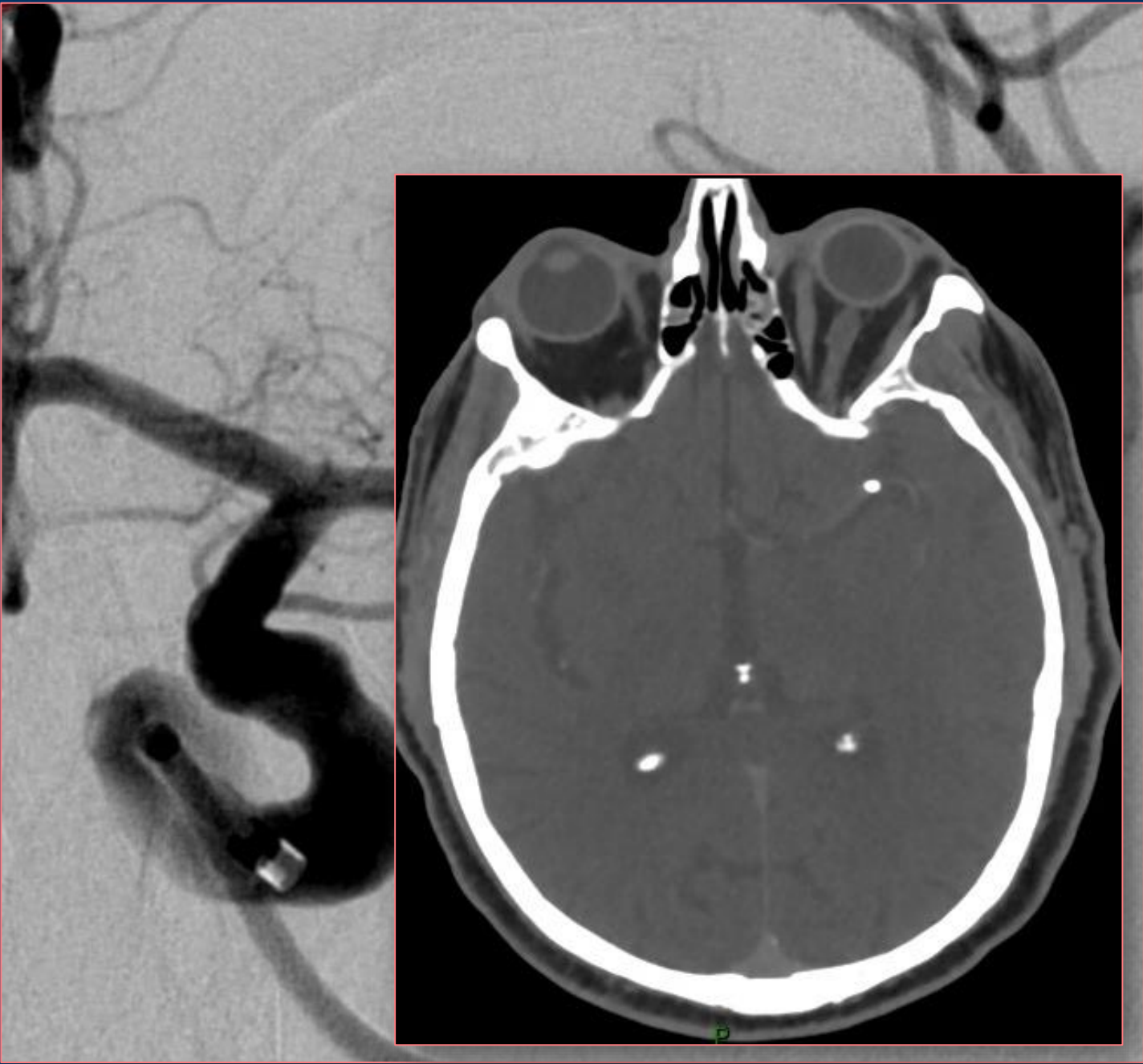
JNIS. 2018

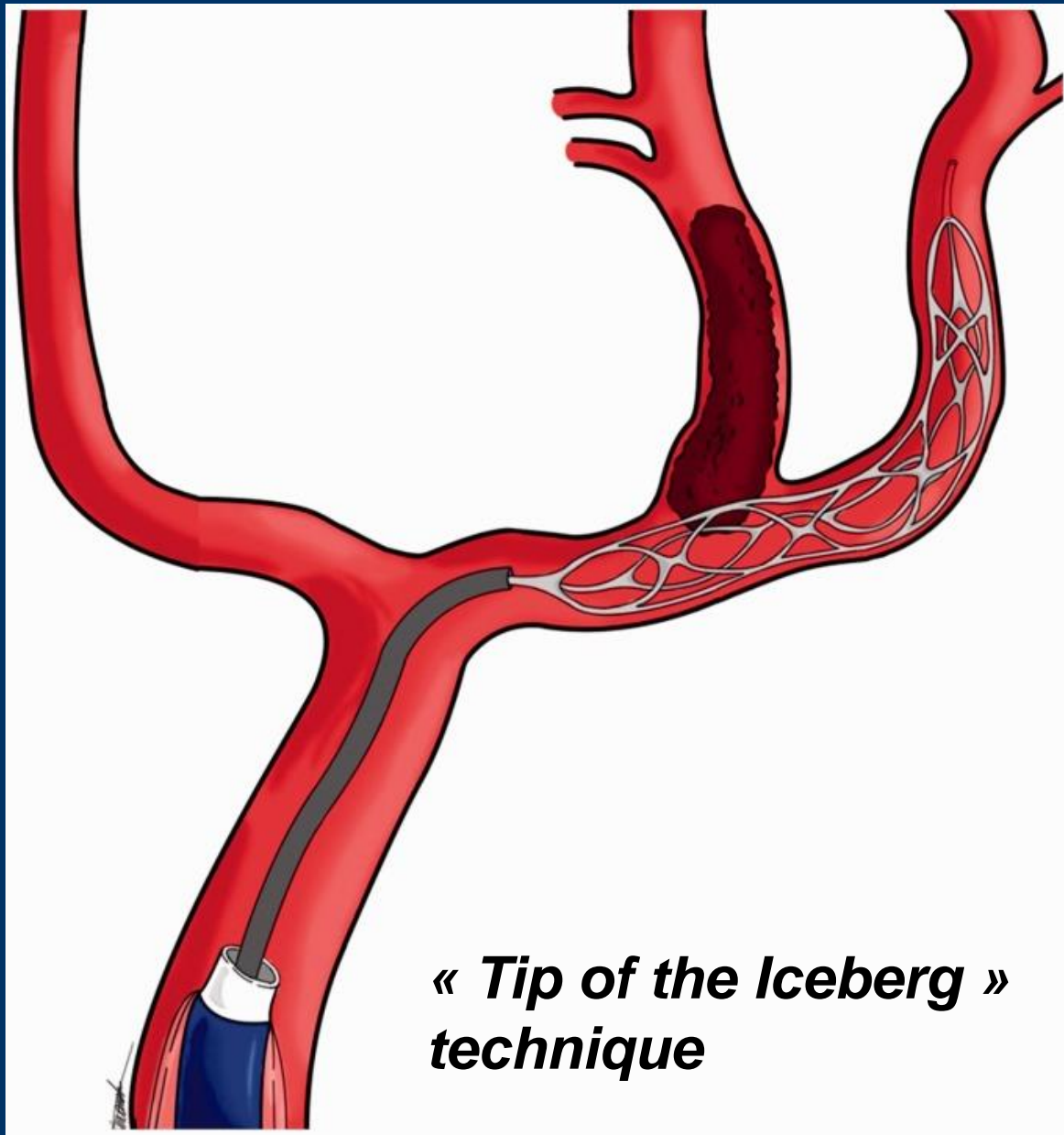


FRANCHIR LE CAILLOT

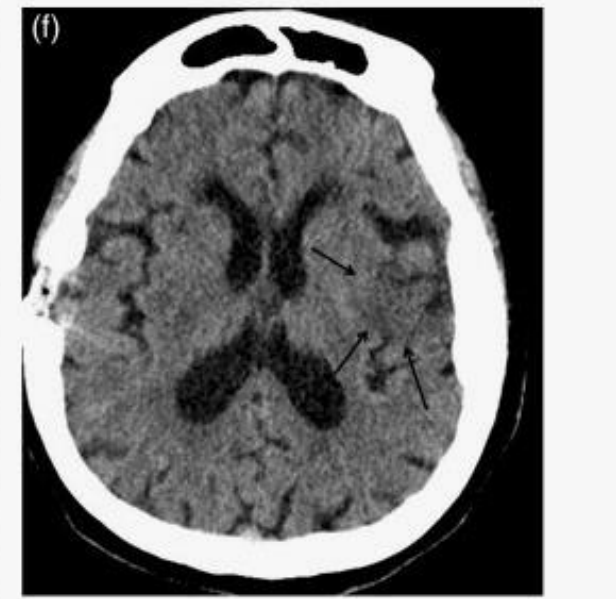
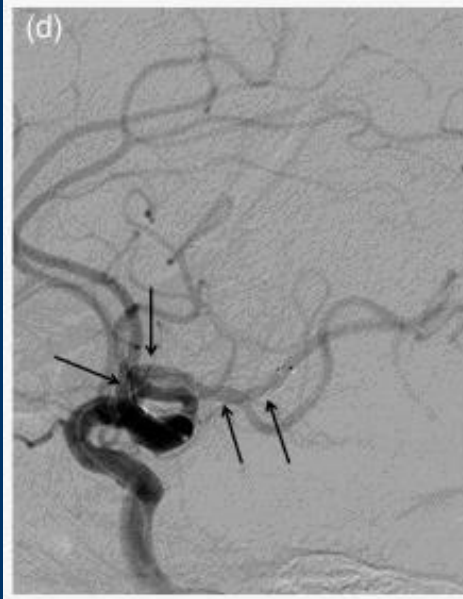
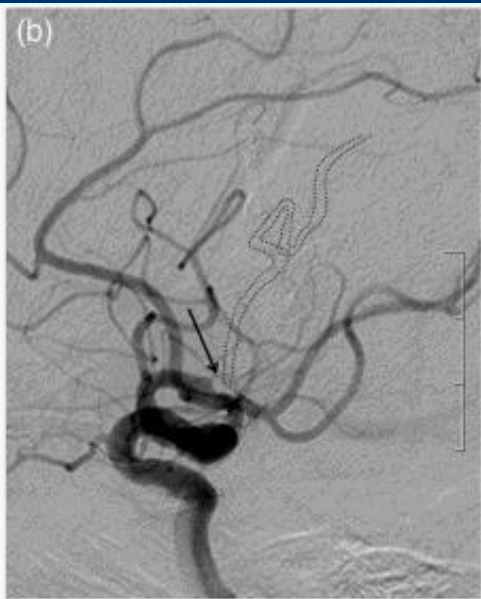
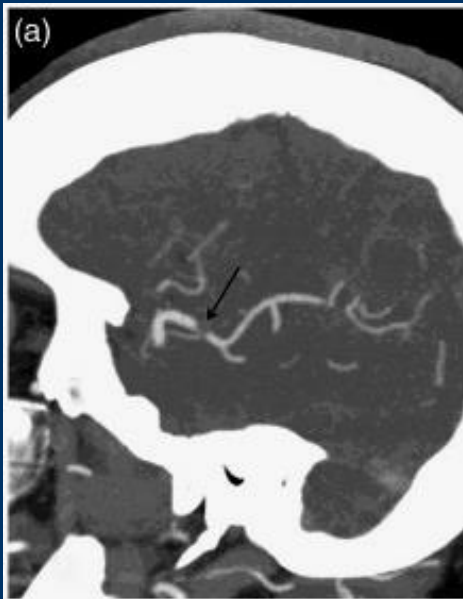
- ***Je n'arrive pas à franchir le caillot.
Que faire ?***

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





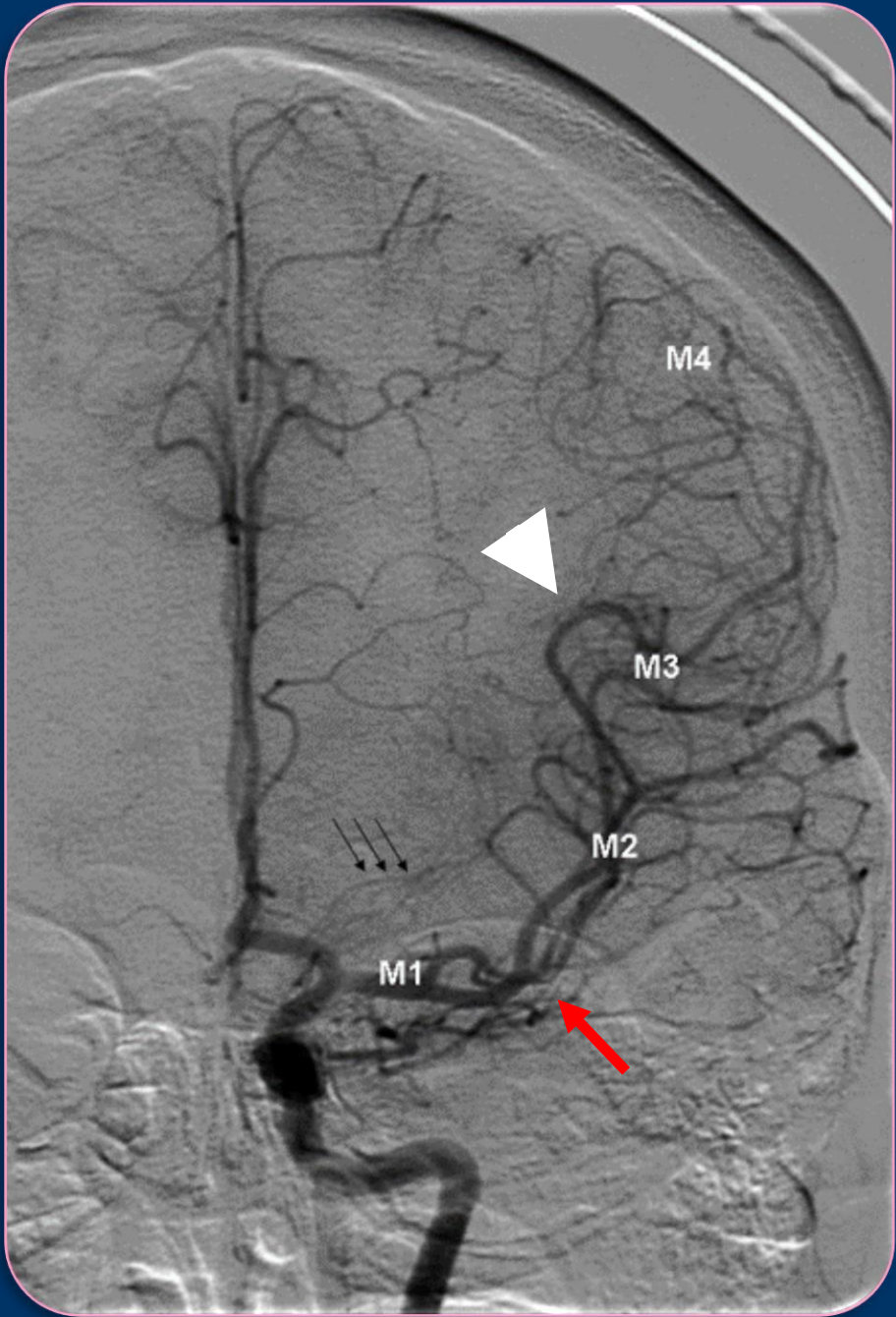
**« Tip of the Iceberg »
technique**






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 (0,5%)



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 Gefäßbild¹

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,

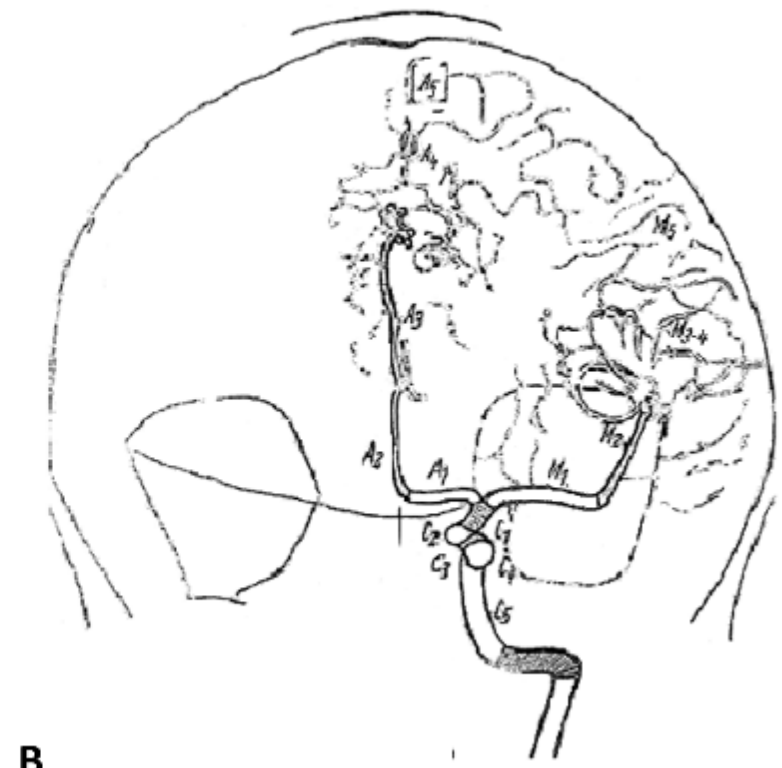
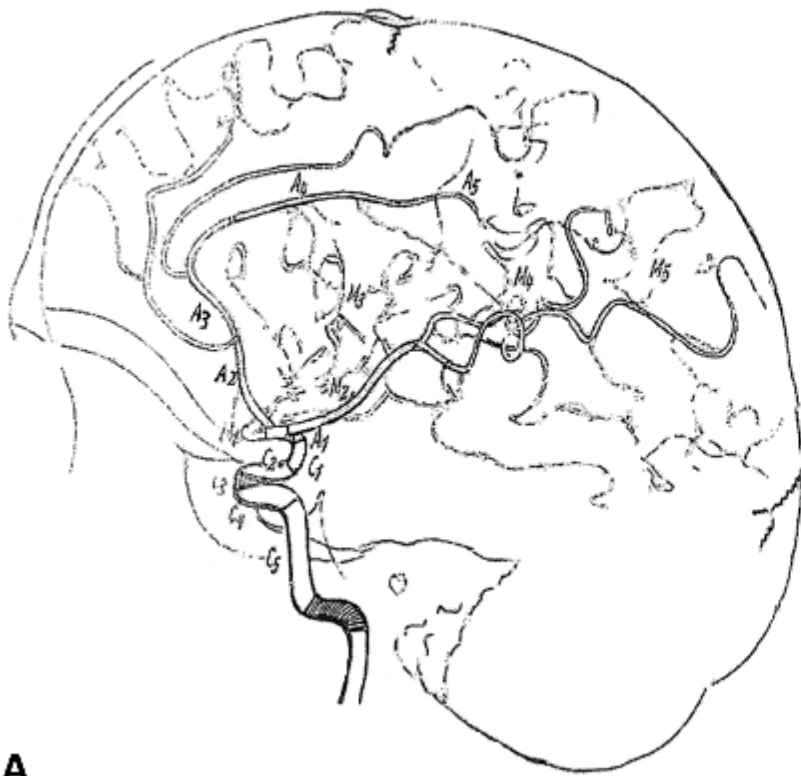
3) Gefäßverzweigungen (M_3) der vorgenannten Hauptäste der Fossa Sylvii mit dem Kandelaber (Foix) und charakteristischen Schleifenbildungen der Aa. frontales asc. im Seitenbild. Auf der Vorderaufnahme bilden diese zusammen mit der folgenden Gruppe ein charakteristisches, nach oben zu scharf begrenztes 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 Fisher ²¹. **A.** Lateral view; **B.** Frontal view

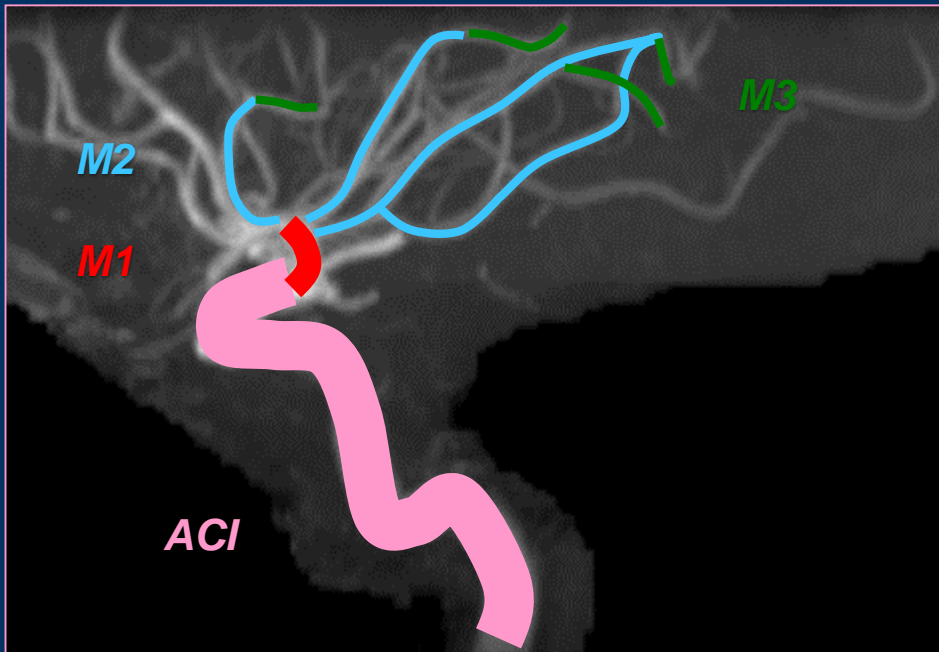


Fischer, E. Zentralblatt Für Neurochir. 300–313 (1938)

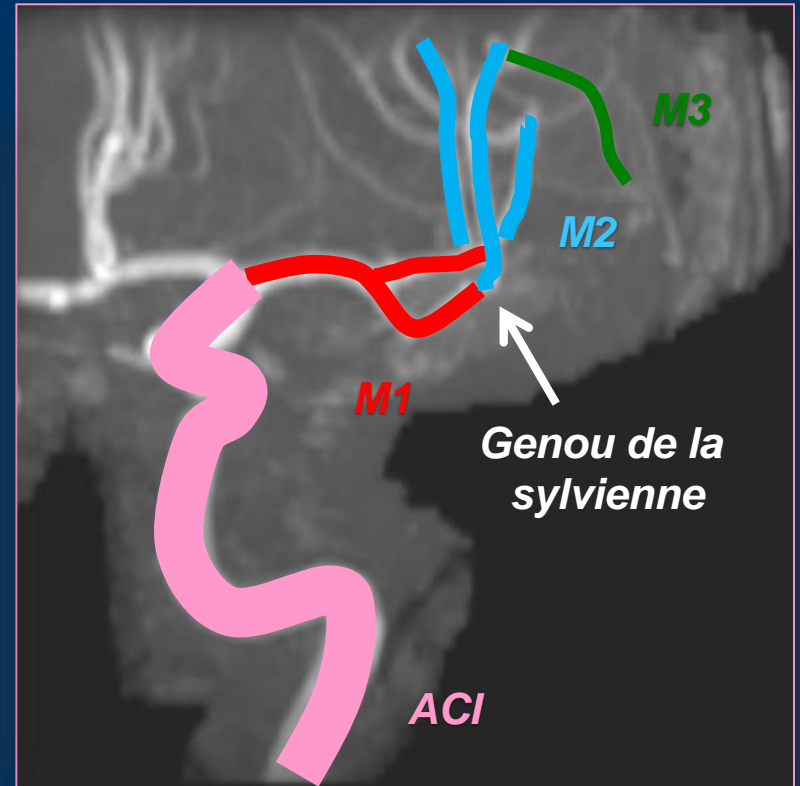
ARM cérébrale

Reconstructions MIP

École de la thrombectomie

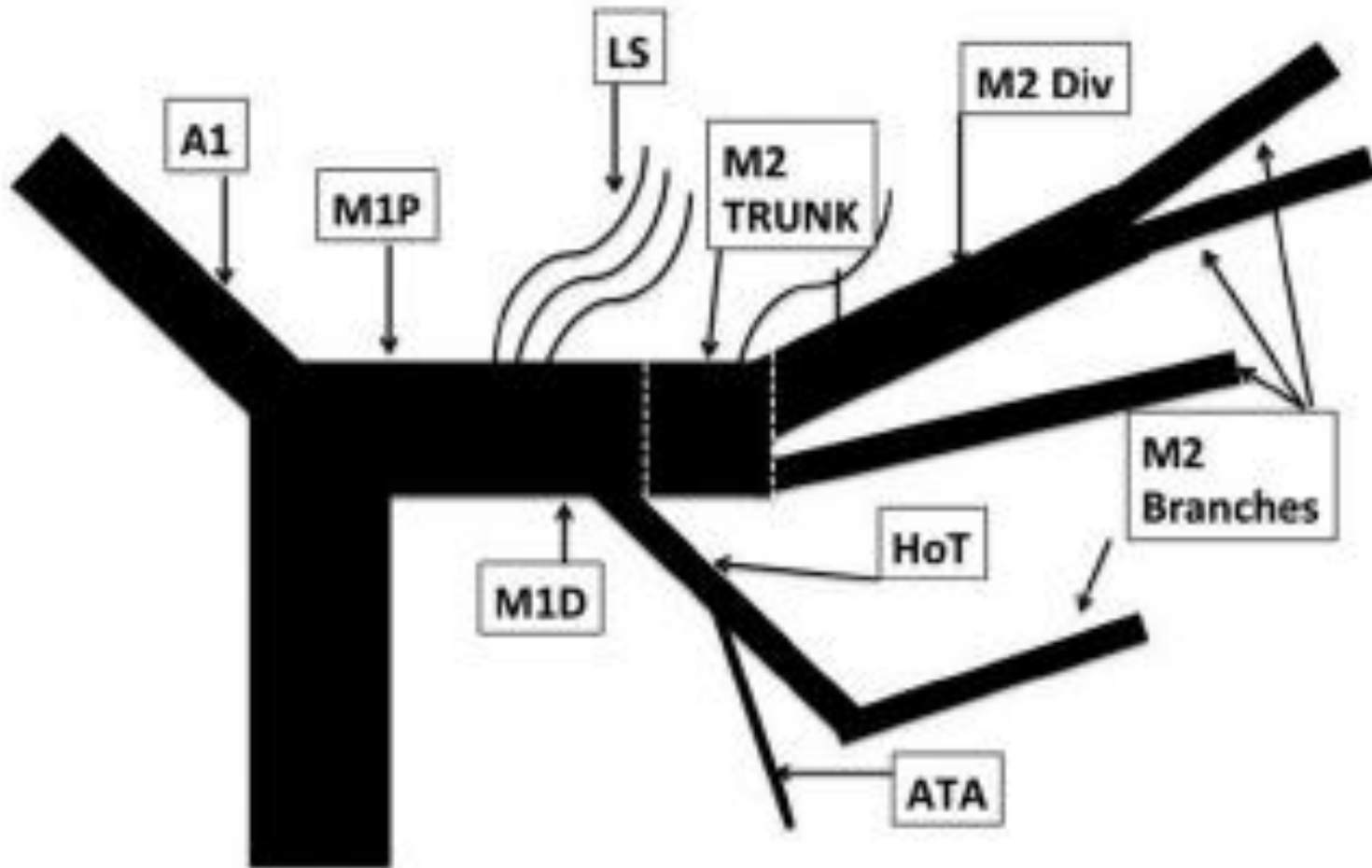


Vue latérale

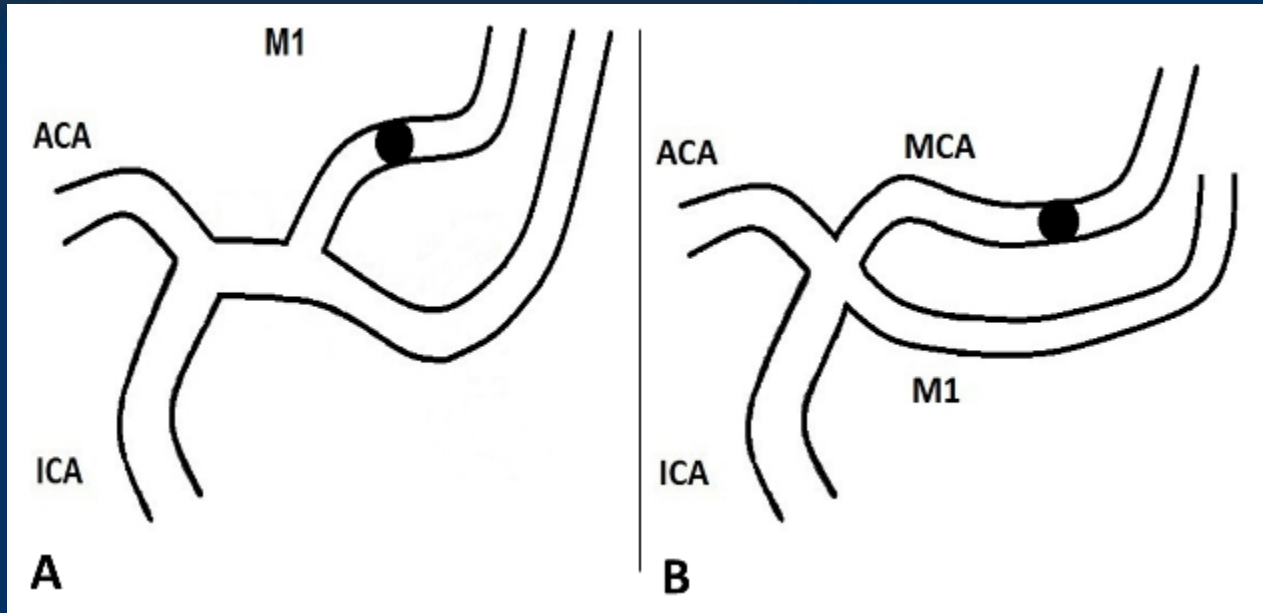
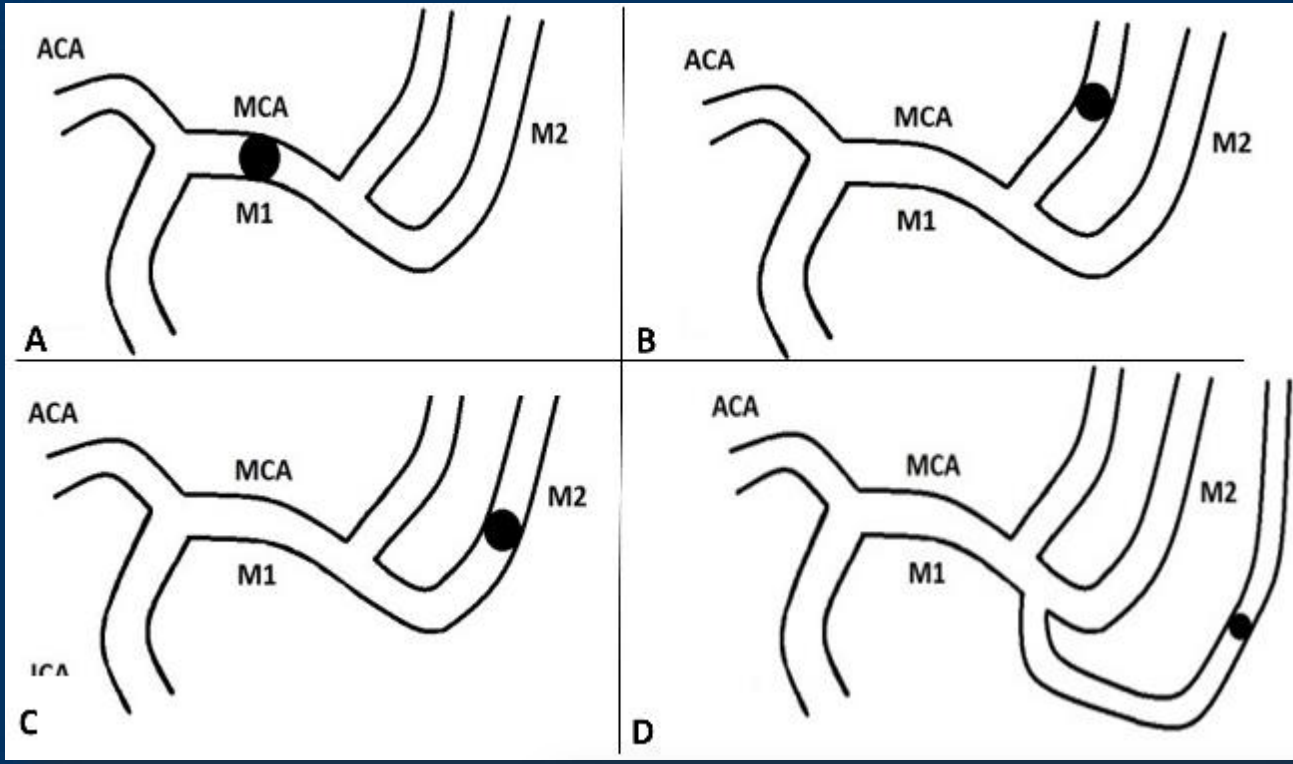


Vue de face

Endovascular Therapy of M2 Occlusion in IMS III



École de la thrombectomie

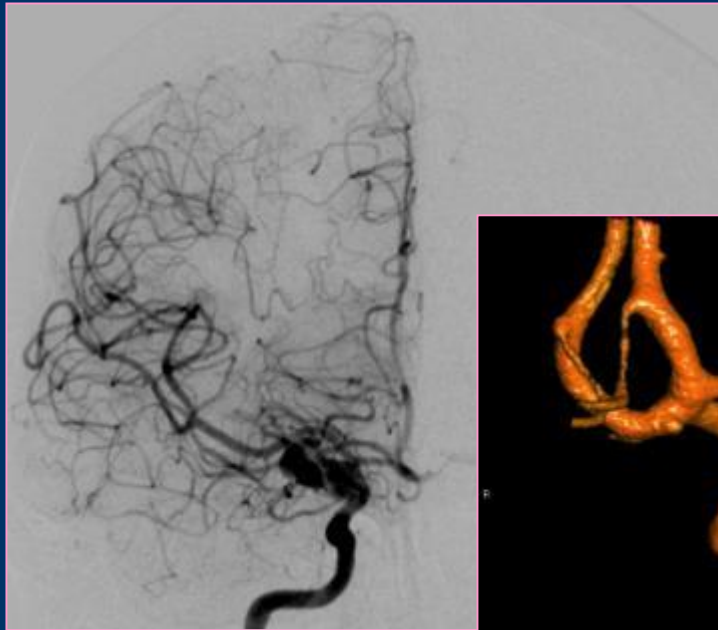
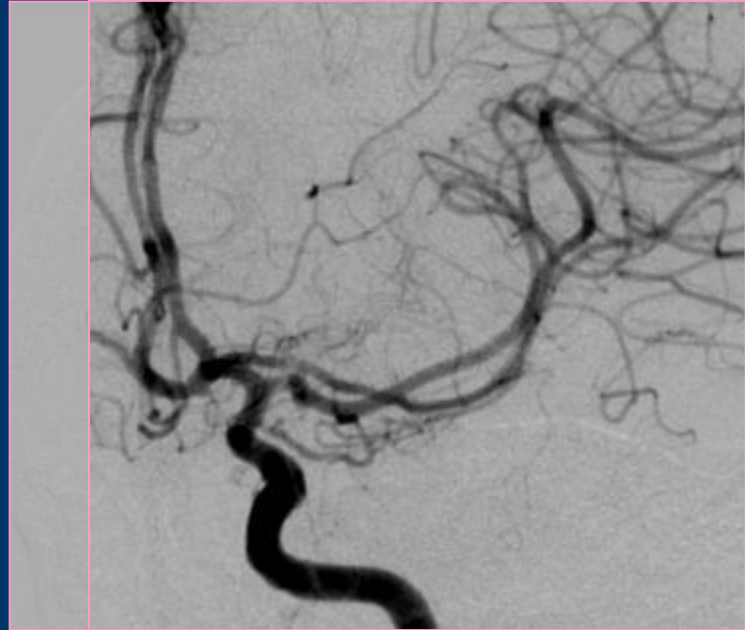


LETTERS

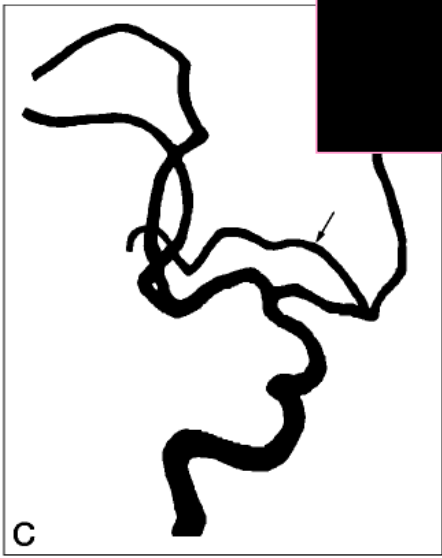
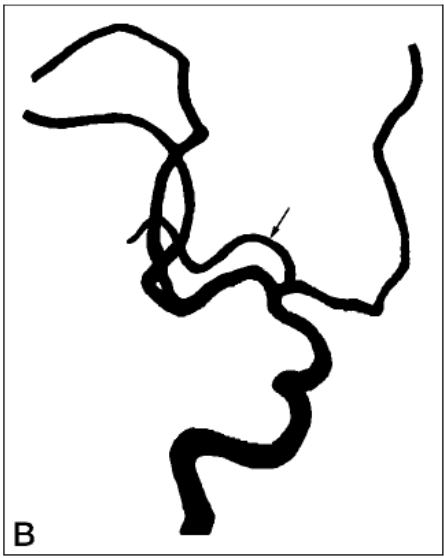
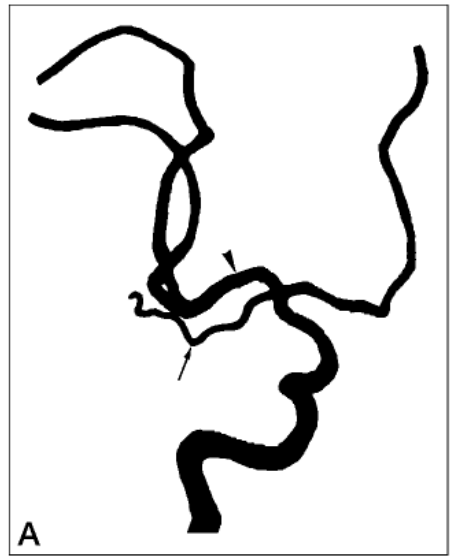
Caution; Confusion Ahead...

VARIATIONS ACM

ACM
accessoire



le

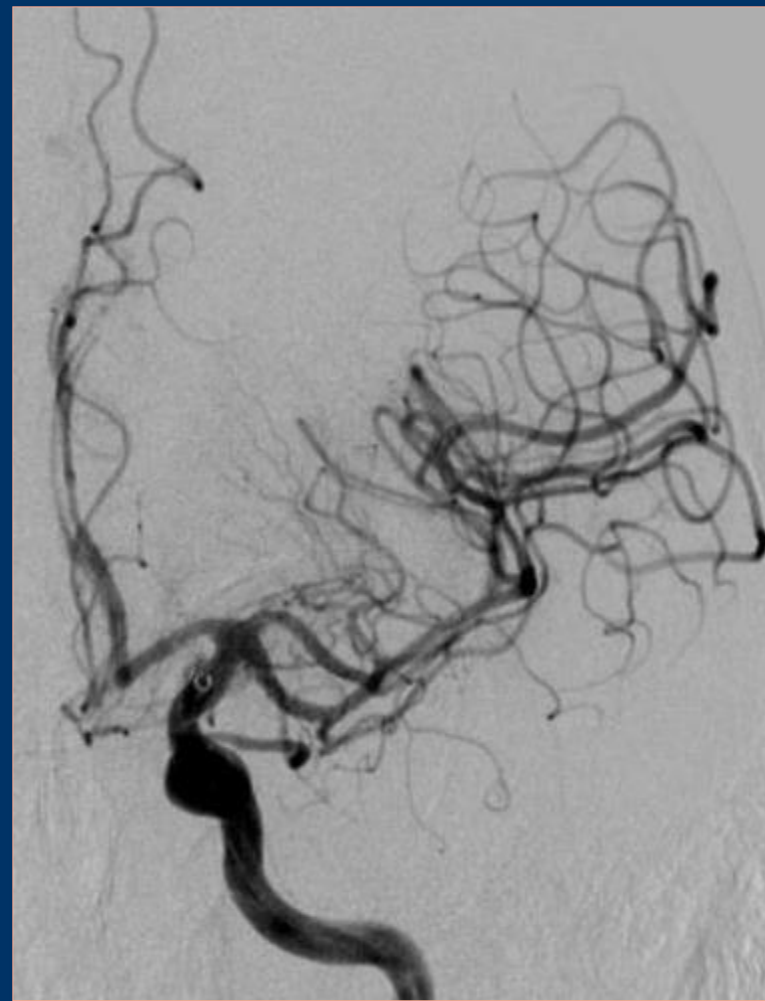


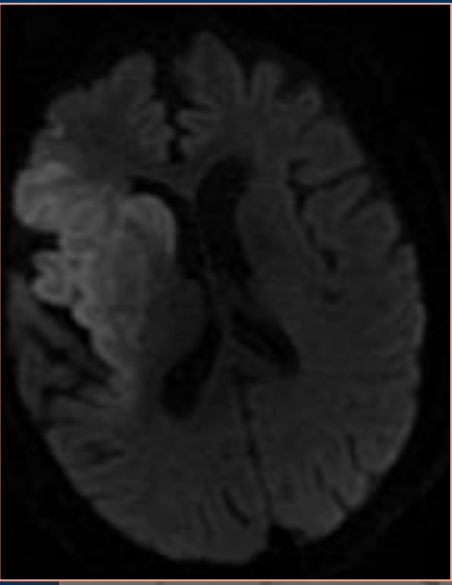
0,2 à 4%



ACM Dte dupliquée

94 ans. Hémiplégie Dte. NIHSS = 17





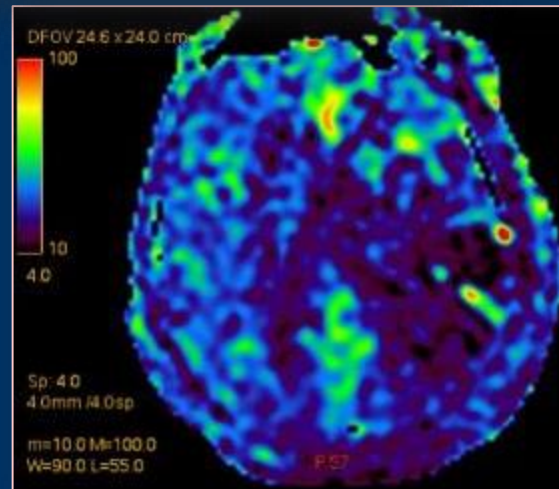
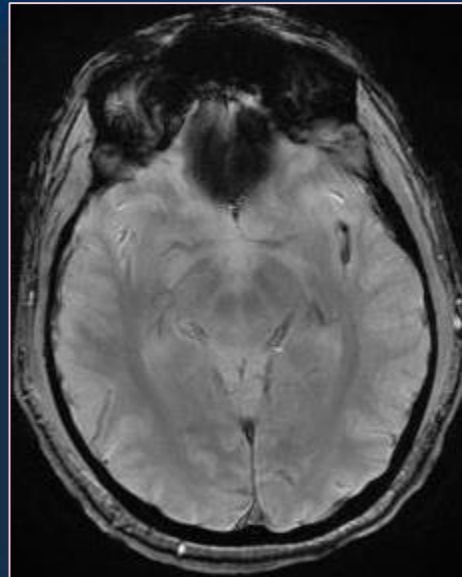
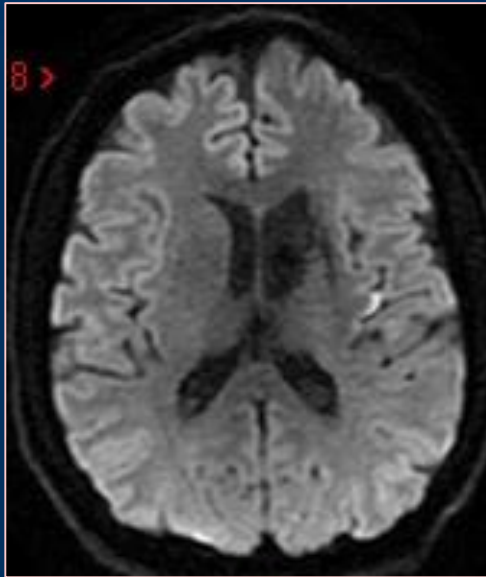
Mechanical Thrombectomy for Isolated M2 Occlusions: A Post Hoc Analysis of the STAR, SWIFT, and SWIFT PRIME Studies

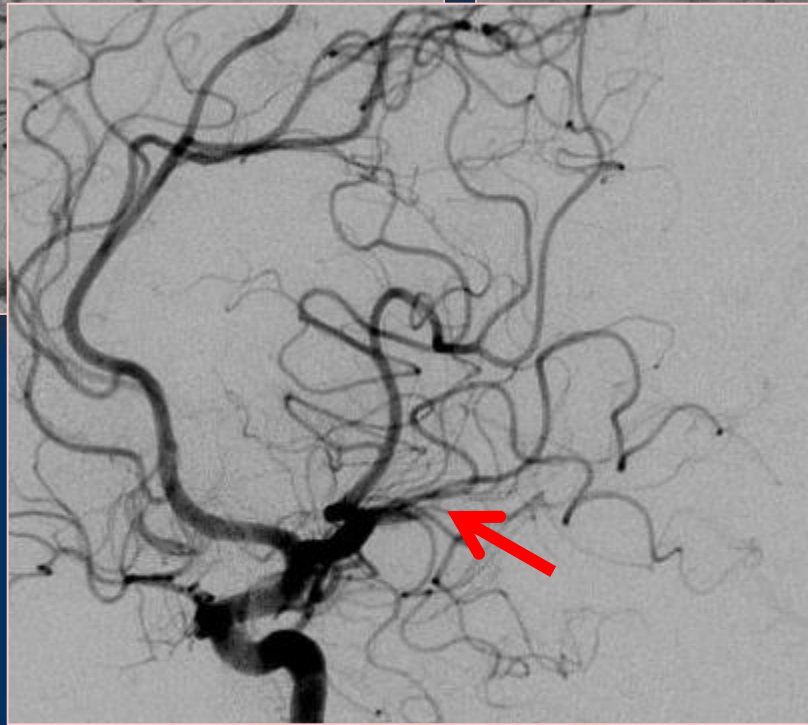
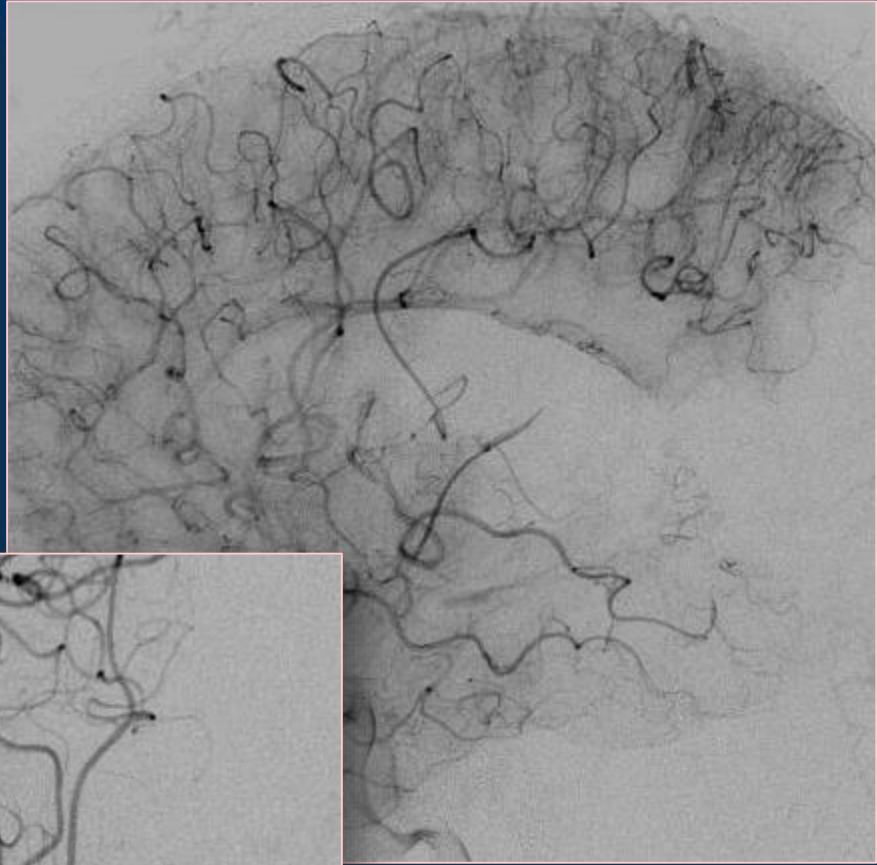
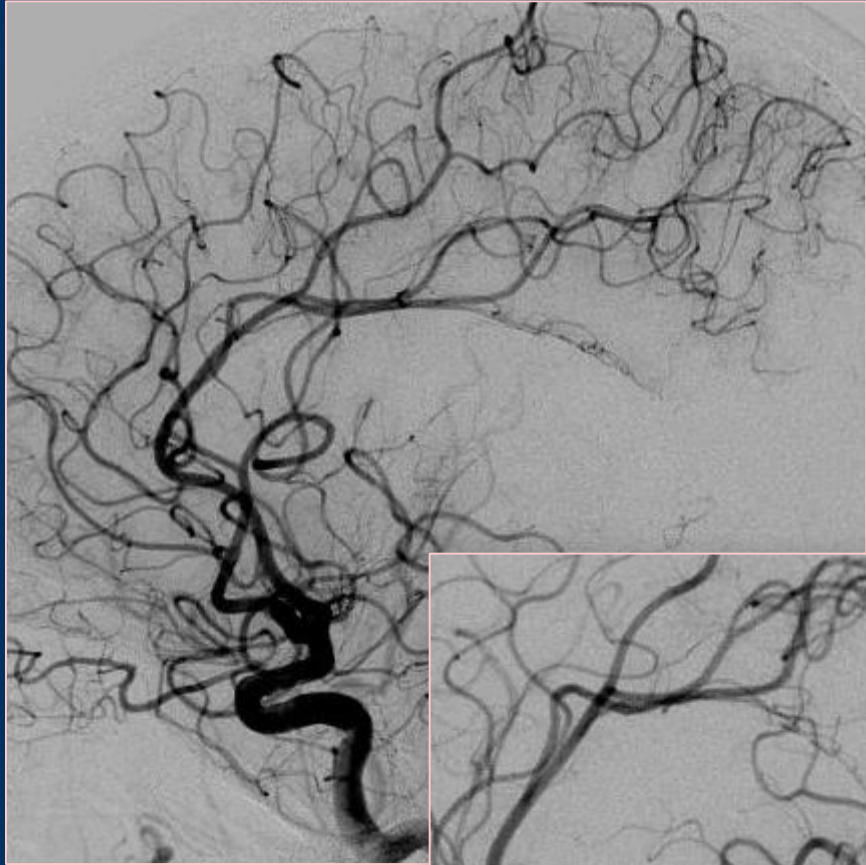
École de la thrombectomie

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

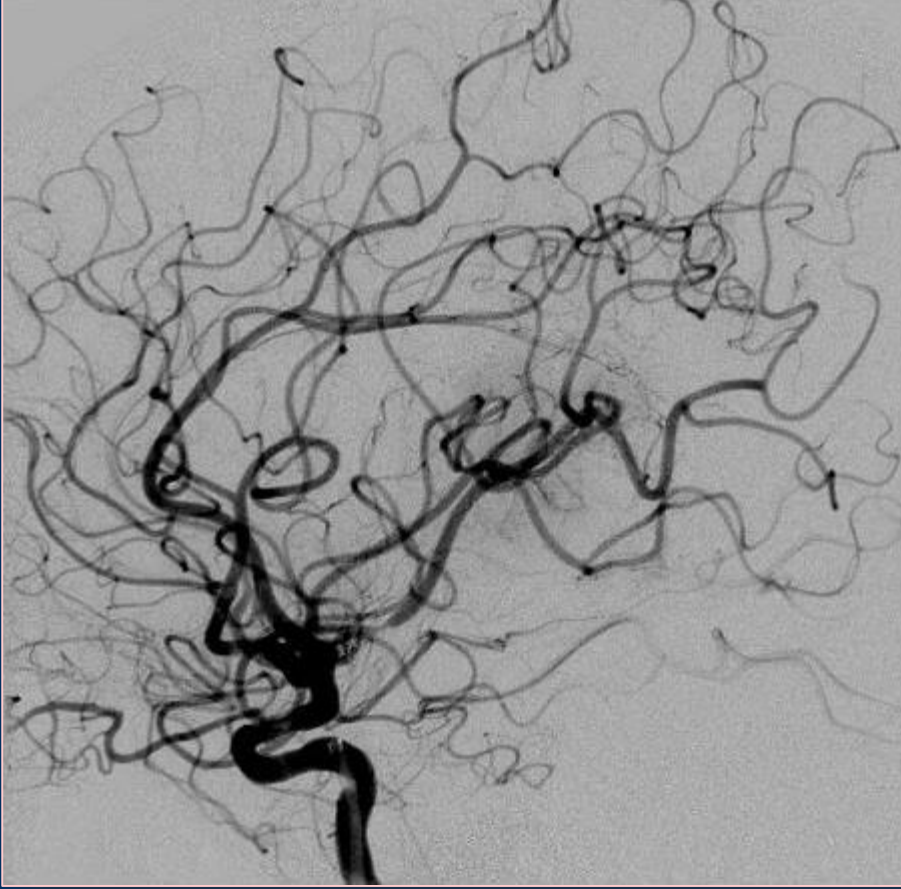
	M2 Occlusion (N = 50)	M1 Occlusion (N = 249)	P Value
Time from groin puncture to recanalization (min) (median) (IQR)	29 (22–45)	35 (25–52)	.41
No. of passes with stent retriever (mean)	1.4 ± 0.8	1.7 ± 1.0	.07
≥3 Passes with stent retriever	13% (5/38)	23% (52/227)	.21
mTICI 2b or 3 reperfusion	85% (34/40)	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

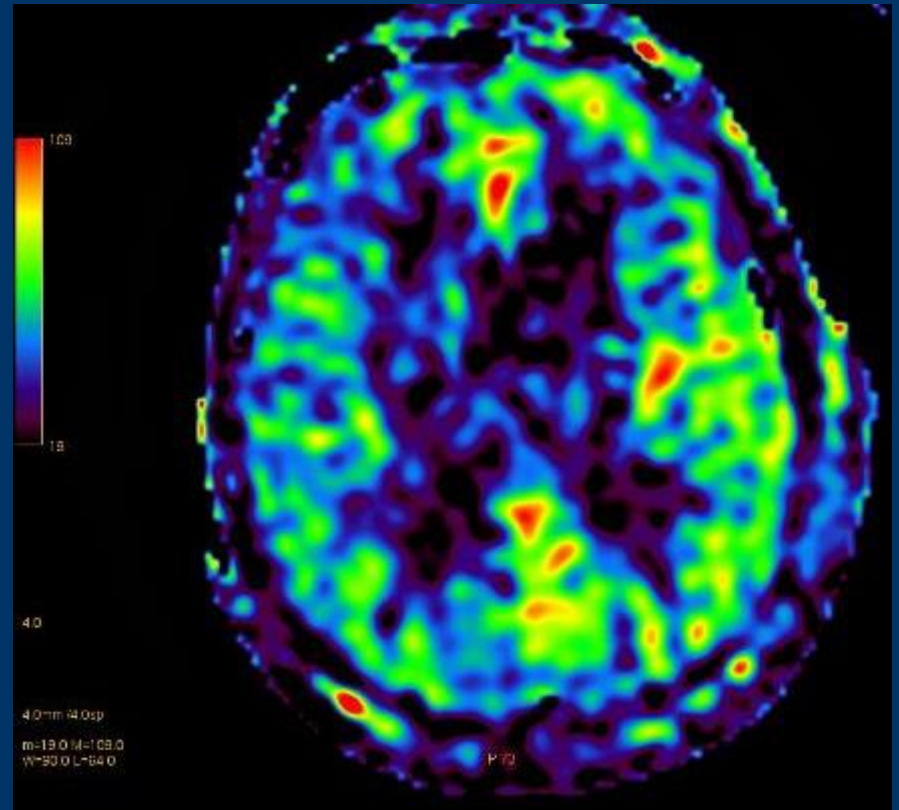
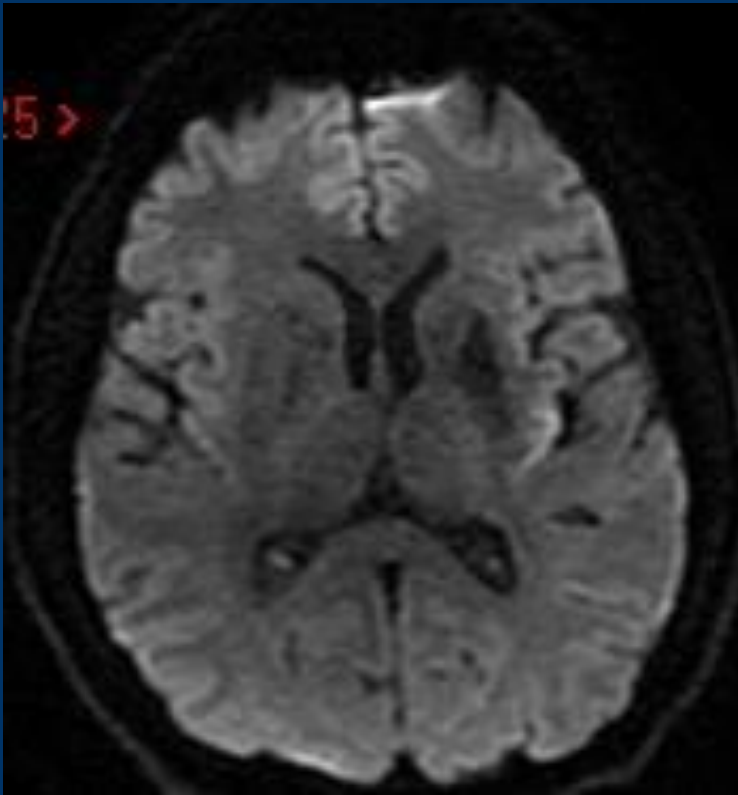








IRM de contrôle à H24



Occlusions distales : Aspiration ou stent retriever ?

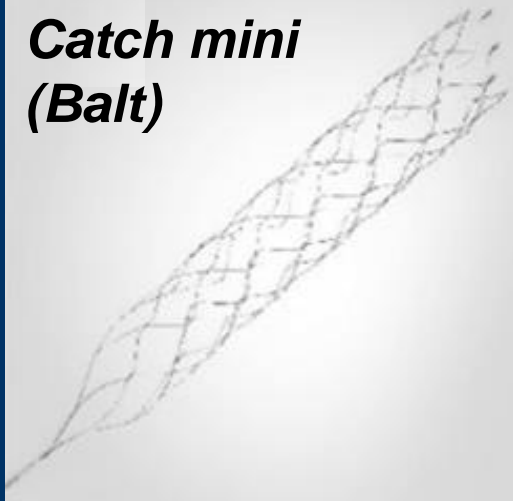
Series	Population	Pre-treatment NIHSS	Device/Technique	TICI 2b/3 recanalization rate	Embolization to new territory	Procedure-related death	0-2 mRS at follow-up
Humphries W. et al. (2015) [9]	105 patients	17	Stent retriever (Solitaire FR or TREVO)	88%	5.7%	2.9%	44% at 90 days
Pfaff J. et al. (2015) [19]	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% 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



God sees everything

but the neurologists miss no complication

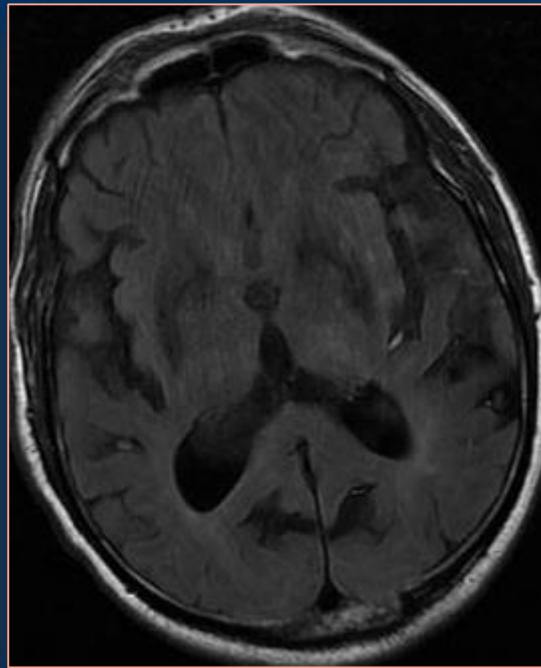
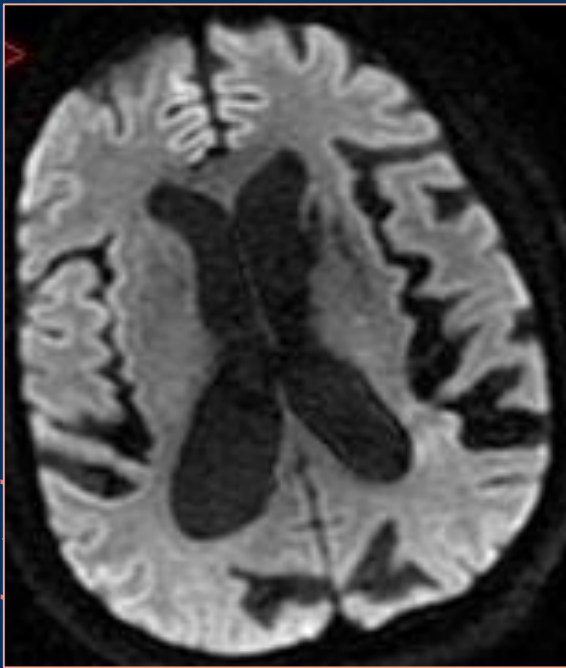


ORIGINAL RESEARCH

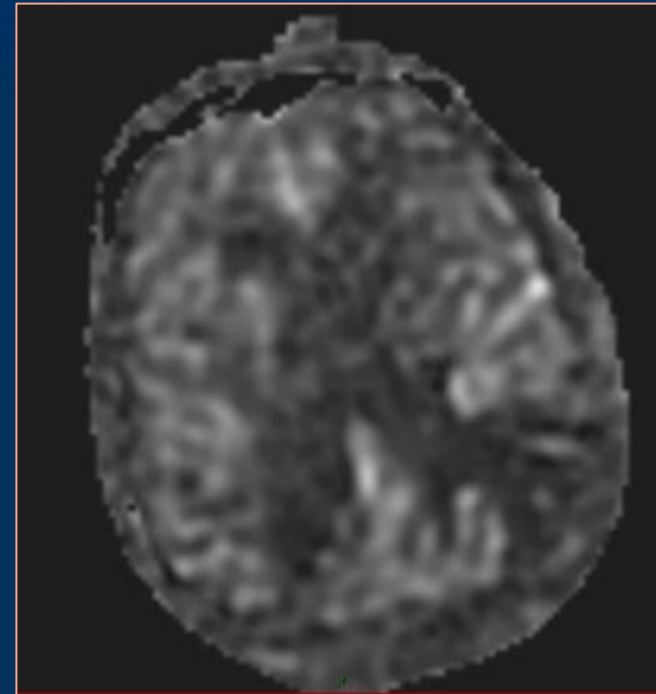
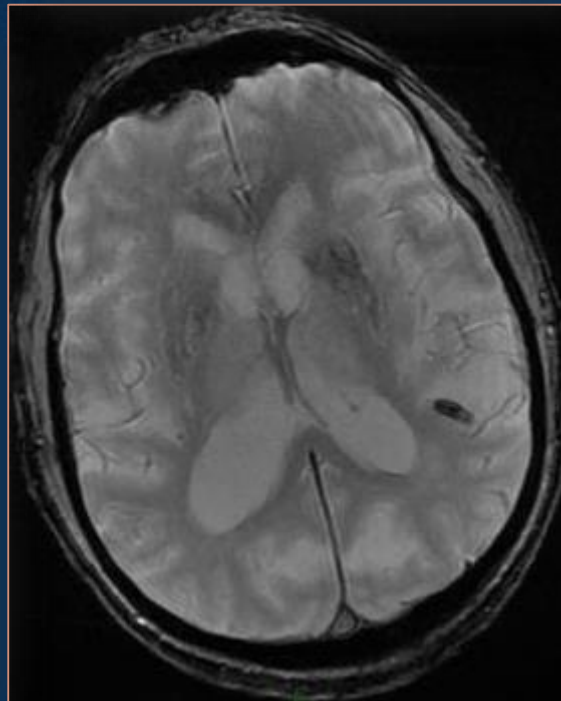
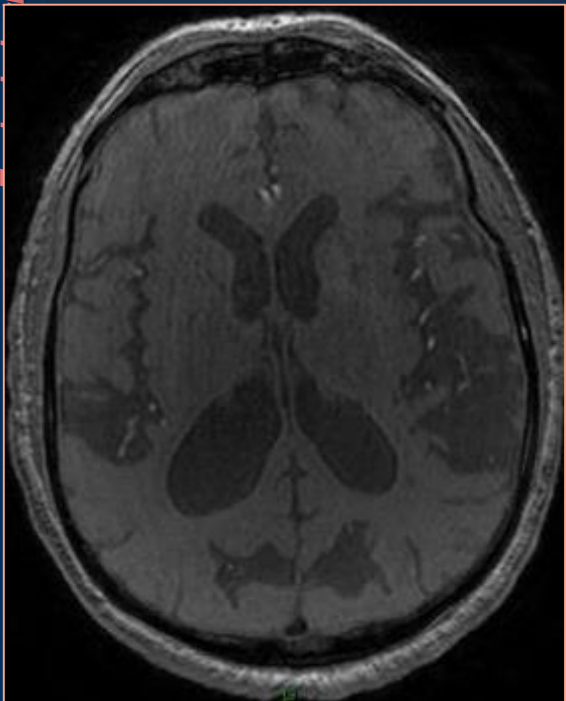
Vessel perforation during stent retriever thrombectomy for acute ischemic stroke: technical details and clinical outcomes

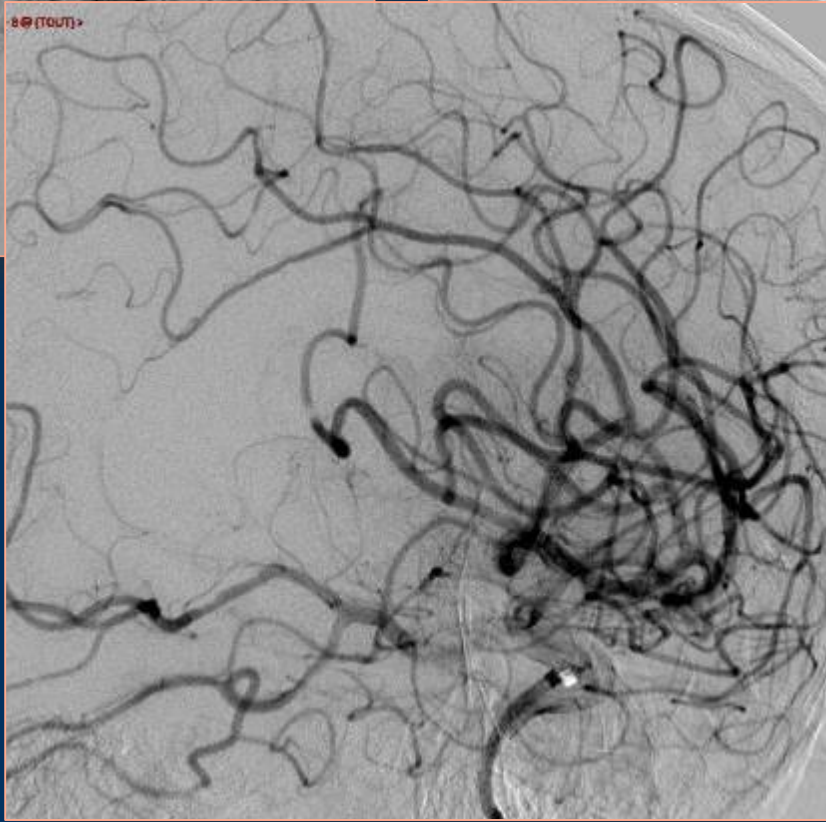
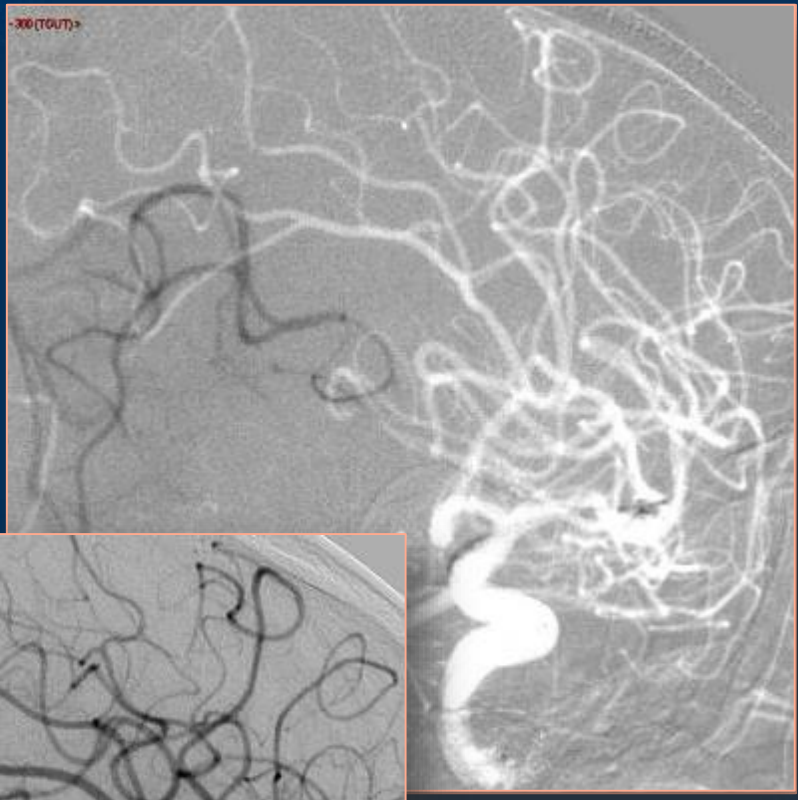
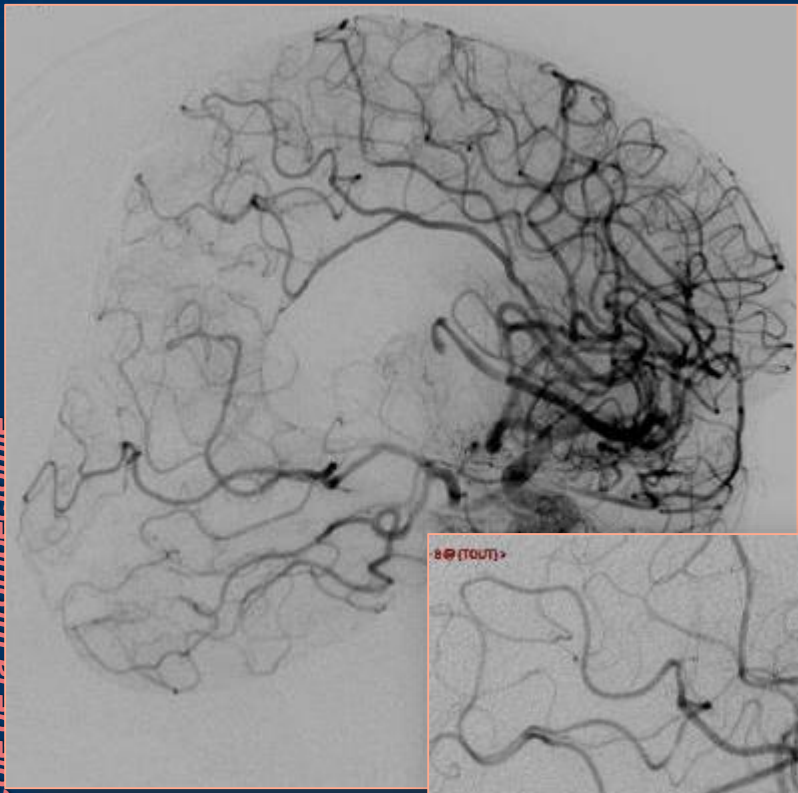
Maxim Mokin,¹ Kyle M Fargen,² Christopher T Primiani,¹ Zeguang Ren,¹ Travis M Dumont,³ Leonardo B C Brasiliense,³ Guilherme Dabus,⁴ Italo Linfante,⁴ Peter Kan,⁵ Visish M Srinivasan,⁵ Mandy J Binning,⁶ Rishi Gupta,⁷ Aquilla S Turk,⁸ Lucas Elijovich,⁹ Adam Arthur,⁹ Hussain Shallwani,¹⁰ Elad I Levy,¹⁰ Adnan H Siddiqui¹⁰

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

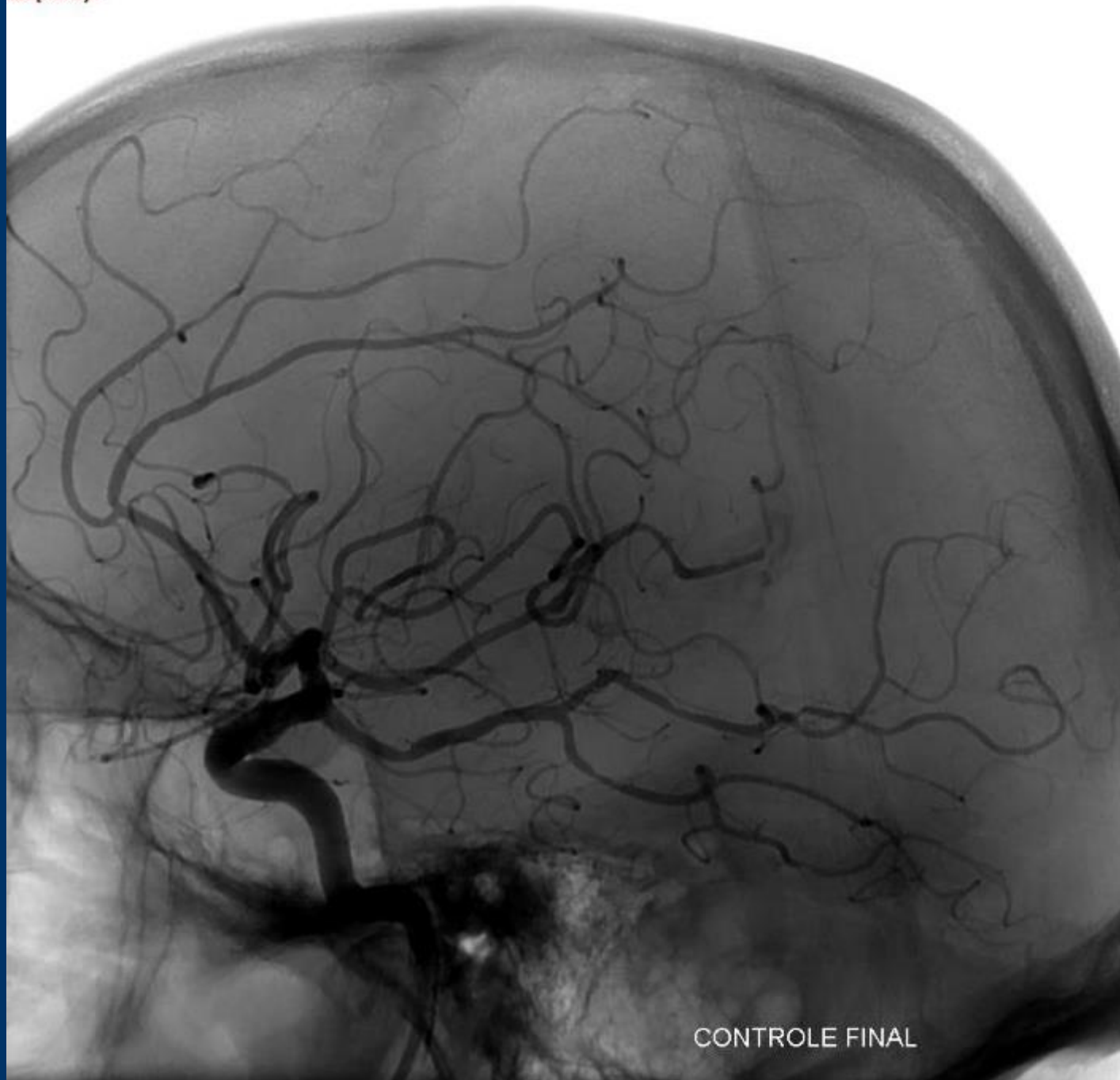


- *Patient de 65 ans*
- *Aphasie au décours d'une coronarographie*
- *Score NIHSS = 5*
- *Patient sous Aspégic/Plavix*



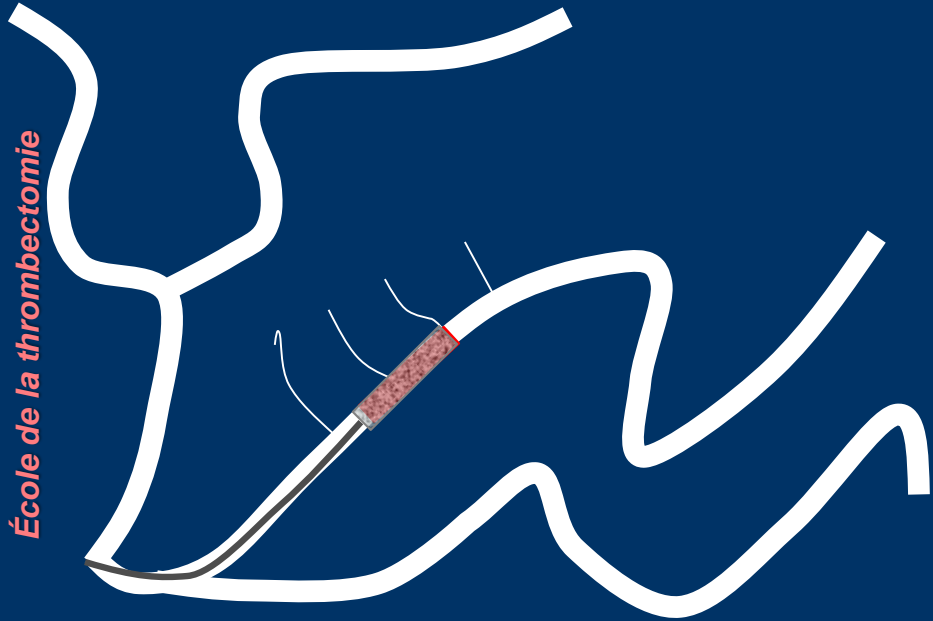


300 (TOUT) >

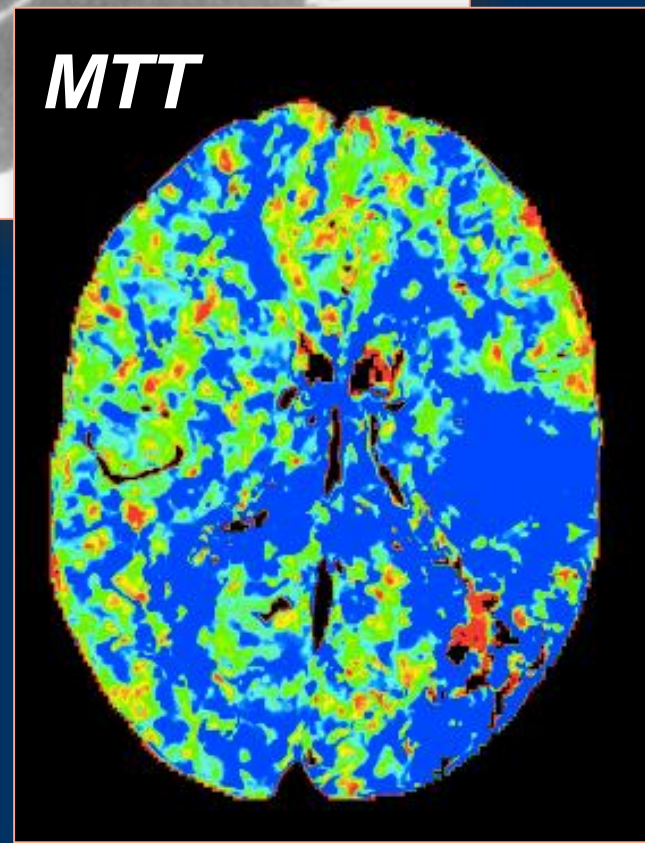
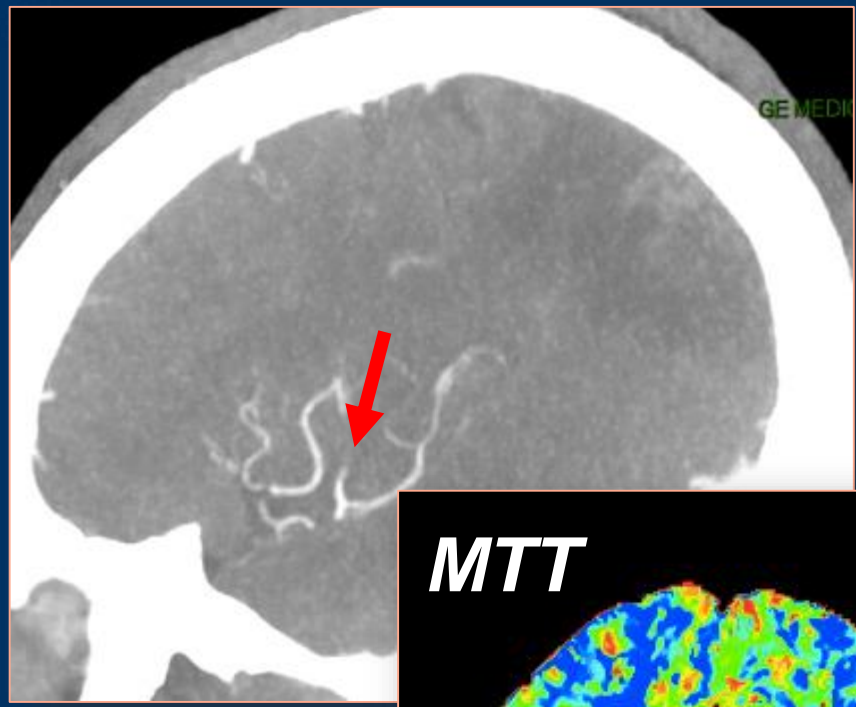


CONTROLE FINAL

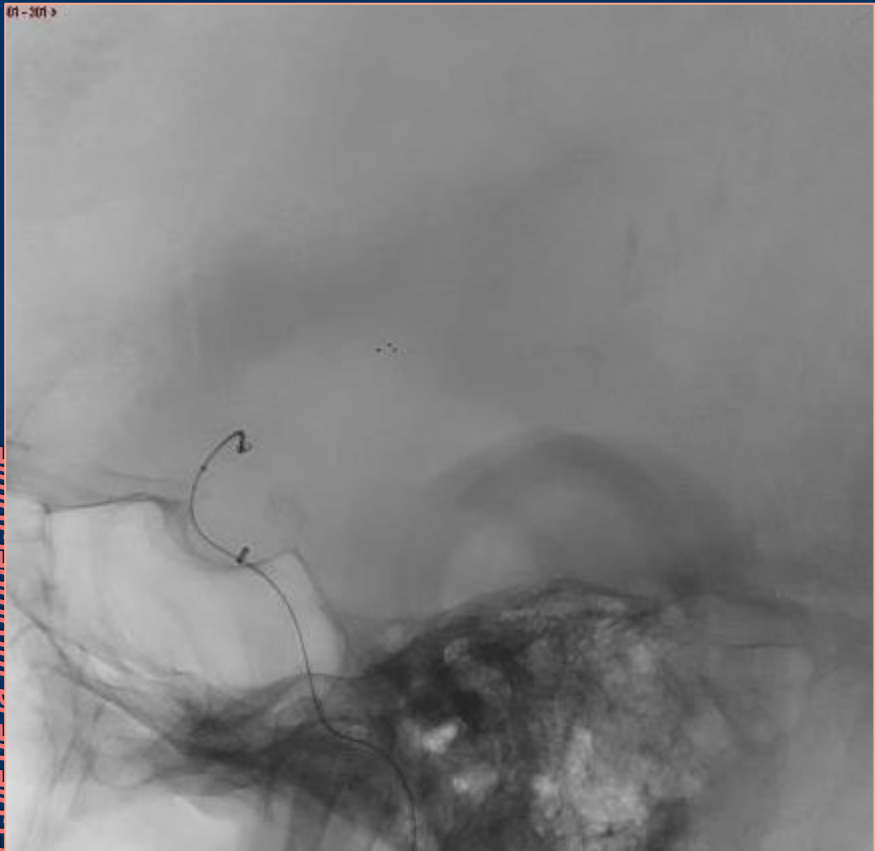




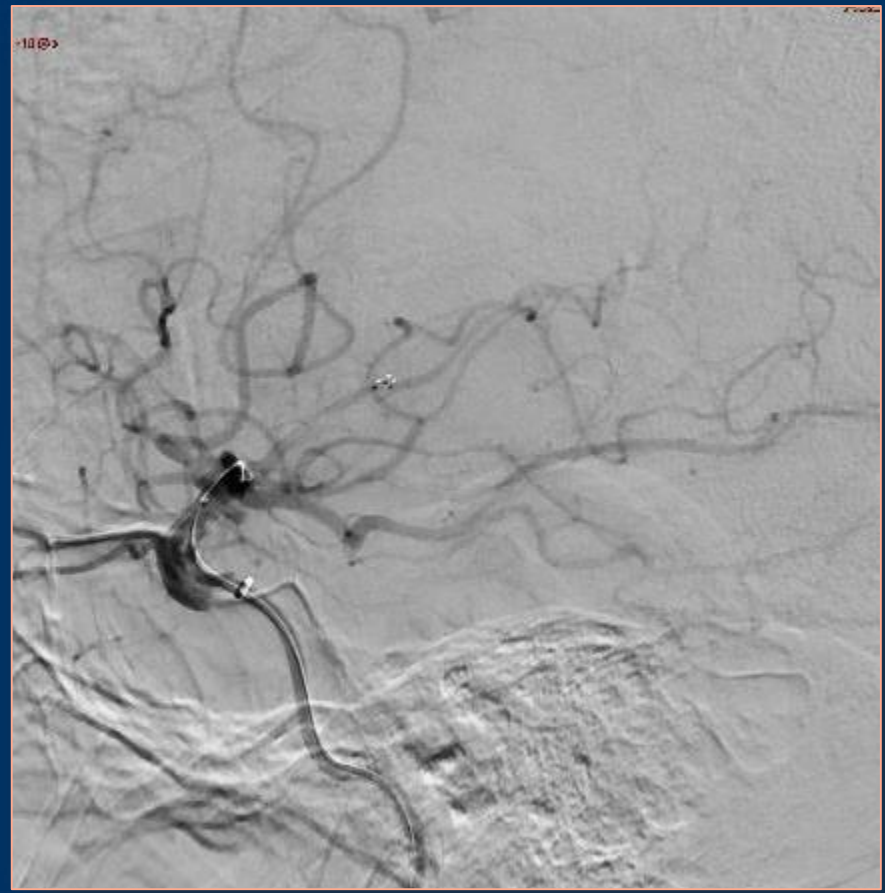
Homme de 53 ans
Aphasie. NIHSS = 4
ATCD AVCi sylvien G
Anticoag. pour arythmie
Pace-maker



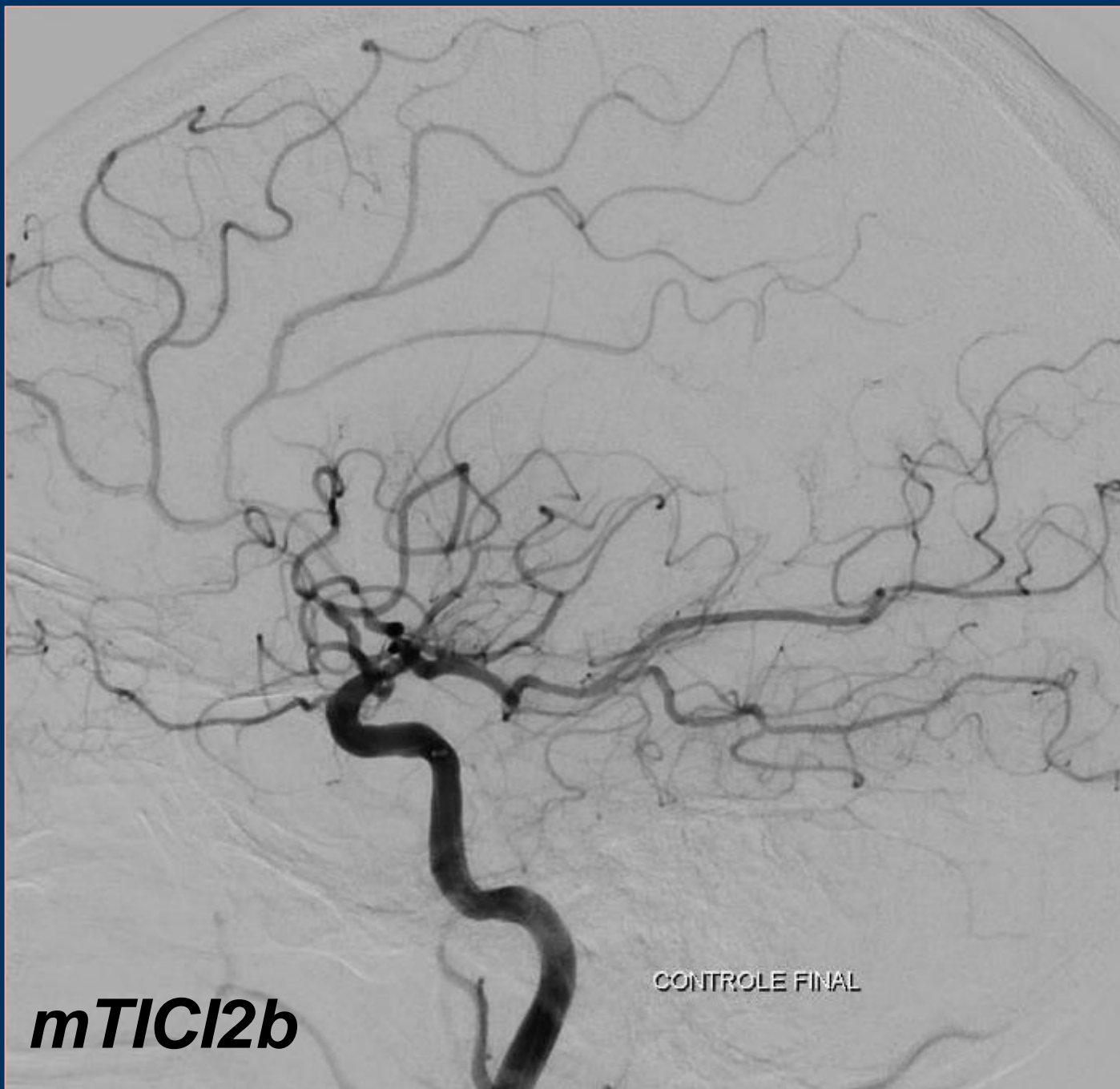




Rebar 18
Traxcess 14
Catch Mini





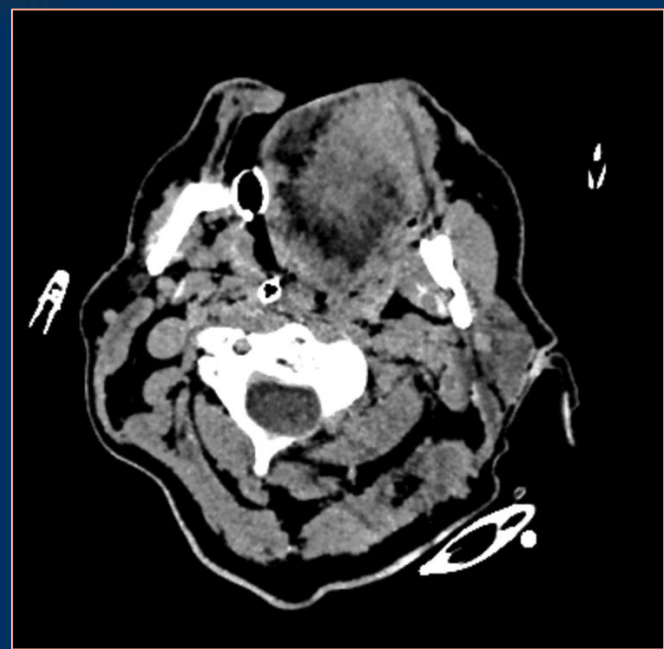


mTICI2b

CONTROLE FINAL



TDM post-procédure



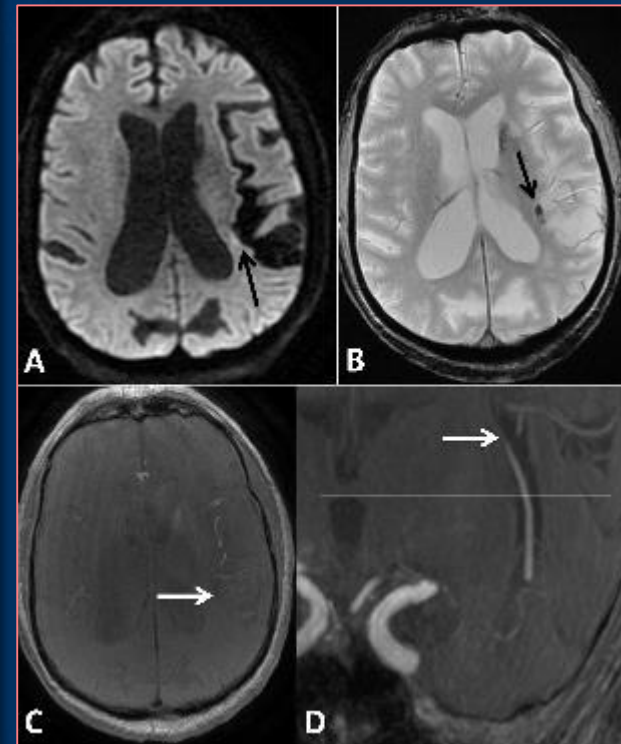
TDM @ H5

PHRC-N DISCOUNT (19-0274)

Étude prospective multi-centrique randomisée

PI : F. Clarençon (Pitié-Salpêtrière)

- Occlusions distales primaires (M2 distale, M3, P1, P2, P3, A1, A2, A3)
- NIHSS ≥ 5
- $\leq 6h$ début des symptômes
- Randomisation 1:1
TM + TMO vs TMO
- Estimation : + 13% évolution favo. groupe TM + TMO
- 488 patients. 21 centres



« 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!



NRI PSL

nri-pitiesalpetriere.fr

frederic.clarencon@aphp.fr