

Cathétérisme arche aortique/intra-crânien



M ISMAIL,MD
CHU de Caen



Conflits d'intérêt : Aucun

L'ENJEU TECHNIQUE de la thrombectomie est de la réaliser

1. Le plus vite possible

2. Le plus efficace possible (TICI 2C/3)

3. en premier passage

un premier passage efficace TICI 2C/3

=> 90 % du territoire occlus et 0 embol ds autres territoires

Stroke

Volume 49, Issue 3, March 2018; Pages 660-666
<https://doi.org/10.1161/STROKEAHA.117.020315>



CLINICAL SCIENCES

First Pass Effect

A New Measure for Stroke Thrombectomy Devices

Osama O. Zaidat, MD, Alicia C. Castonguay, PhD, Italo Linfante, MD, Rishi Gupta, MD, Coleman O. Martin, MD, William E. Holloway, MD, Nils Mueller-Kronast, MD, Joey D. English, MD, PhD, Guilherme Dabus, MD, Tim W. Malisch, MD, Franklin A. Marden, MD, Hormozd Bozorgchami, MD, Andrew Xavier, MD, Ansaar T. Rai, MD, Michael T. Froehler, MD, PhD, Aamir Badruddin, MD, Thanh N. Nguyen, MD, M. Asif Taqi, MD, Michael G. Abraham, MD, Albert J. Yoo, MD, PhD, Vallabh Janardhan, MD, Hashem Shaltoni, MD, Roberta Novakovic, MD, Alex Abou-Chebl, MD, Peng R. Chen, MD, Gavin W. Britz, MD, Chung-Huan J. Sun, MD, Vibhav Bansal, MD, Ritesh Kaushal, MD, Ashish Nanda, MD, and Raul G. Nogueira, MD



Le plus stable possible mène au : plus rapide possible et au plus efficace possible

Et au pire , être le plus stable possible et le facteur le plus important de recanaliser même en plusieurs passages

ORIGINAL RESEARCH

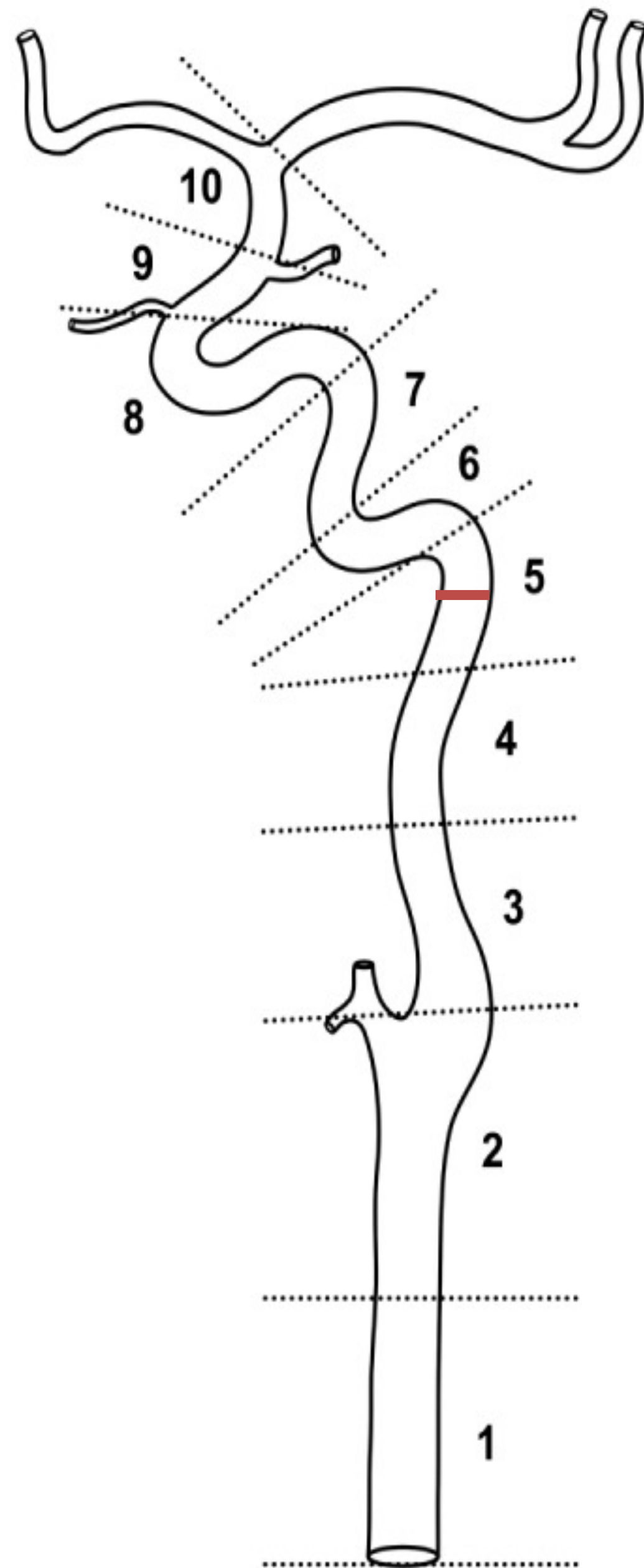
Understanding risk factors for perioperative ischemic events with carotid stenting: is patient age over 80 years or is unfavorable arch anatomy to blame?

Travis M Dumont,^{1,2} Maxim Mokin,^{1,2} Michael M Wach,^{1,2} Patrick S Drummond,^{1,2}
Adnan H Siddiqui,^{1,2,3,4} Elad I Levy,^{1,2,3,4} L Nelson Hopkins^{1,2,3,4,5}

Dumont TM, et al. *J NeuroIntervent Surg* 2014;**6**:219–224. doi:10.1136/neurintsurg-2013-010721

La taux des complications périop des stents carotidiens est plus élevée en cas d une crosse aortique défavorable , mais pas à l' âge de >80 ans

I. Système carotidien



Technique standard ; matériel

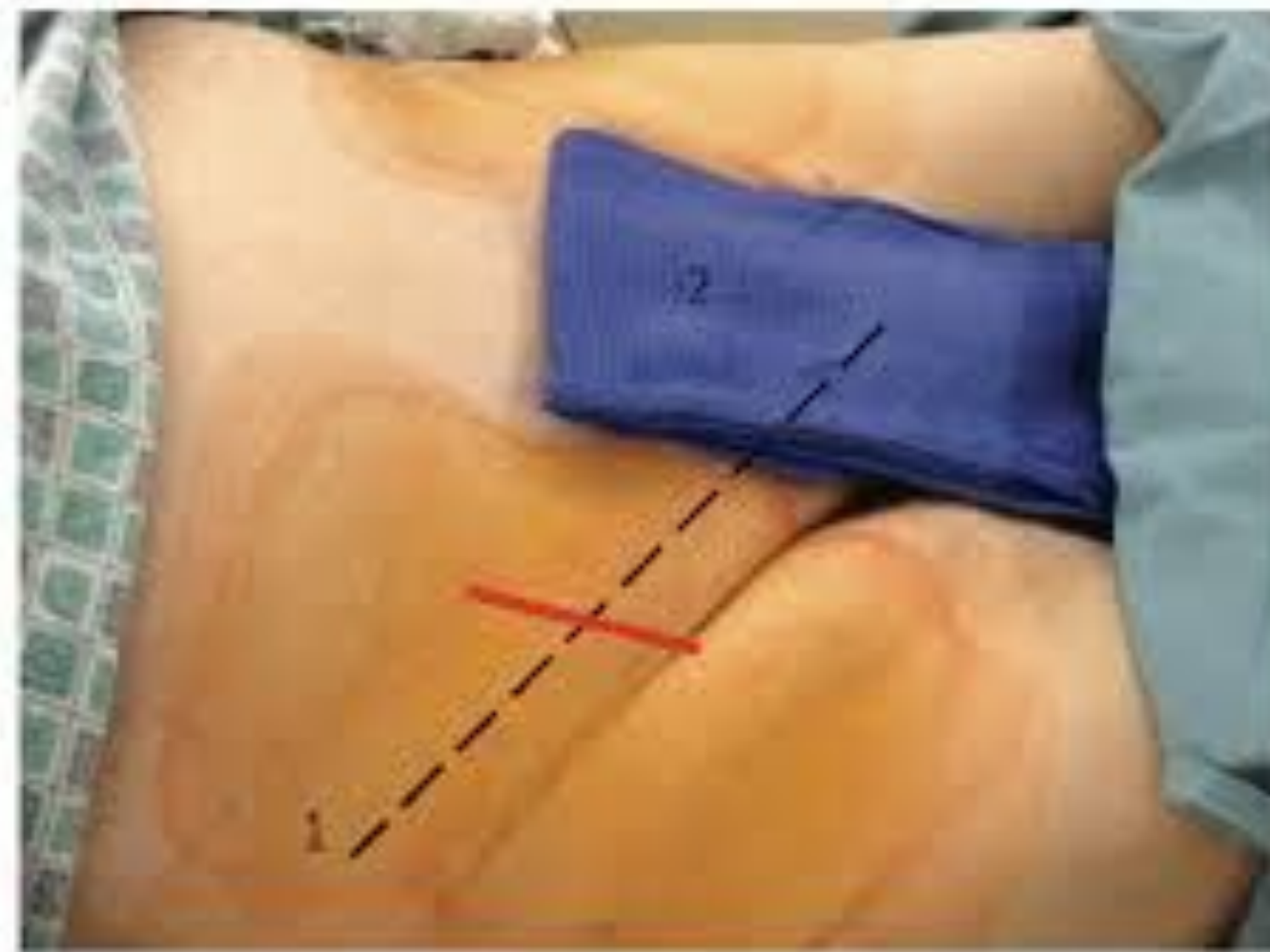
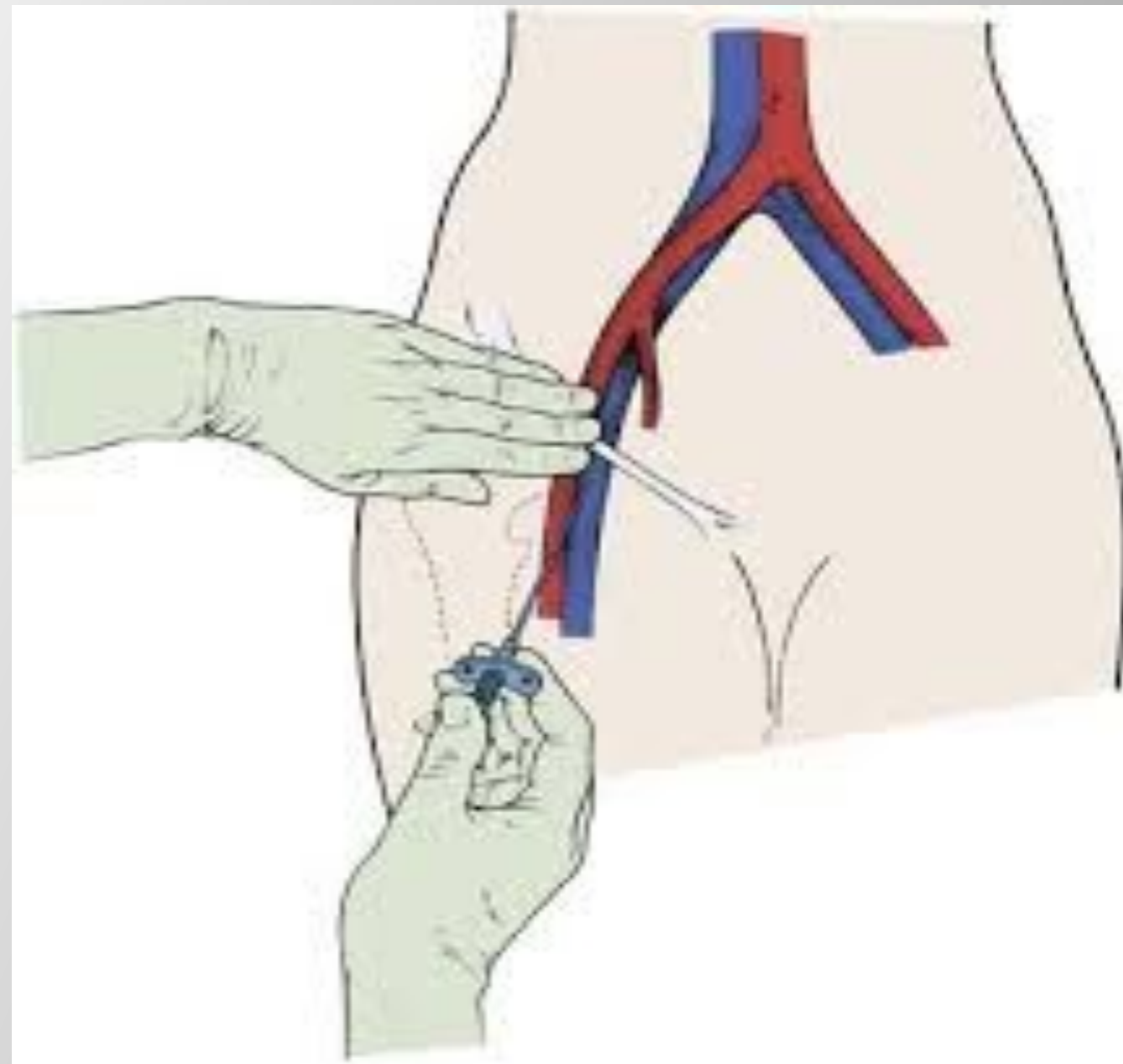


Figure 1a. Bony landmarks and the femoral artery. 1. Iliac crest. 2. Symphysis pubis. Dotted line is path of inguinal ligament and red line is proposed path of femoral artery. The inguinal crease may or may not be directly over the ligament.



6F,7F,8F,9F

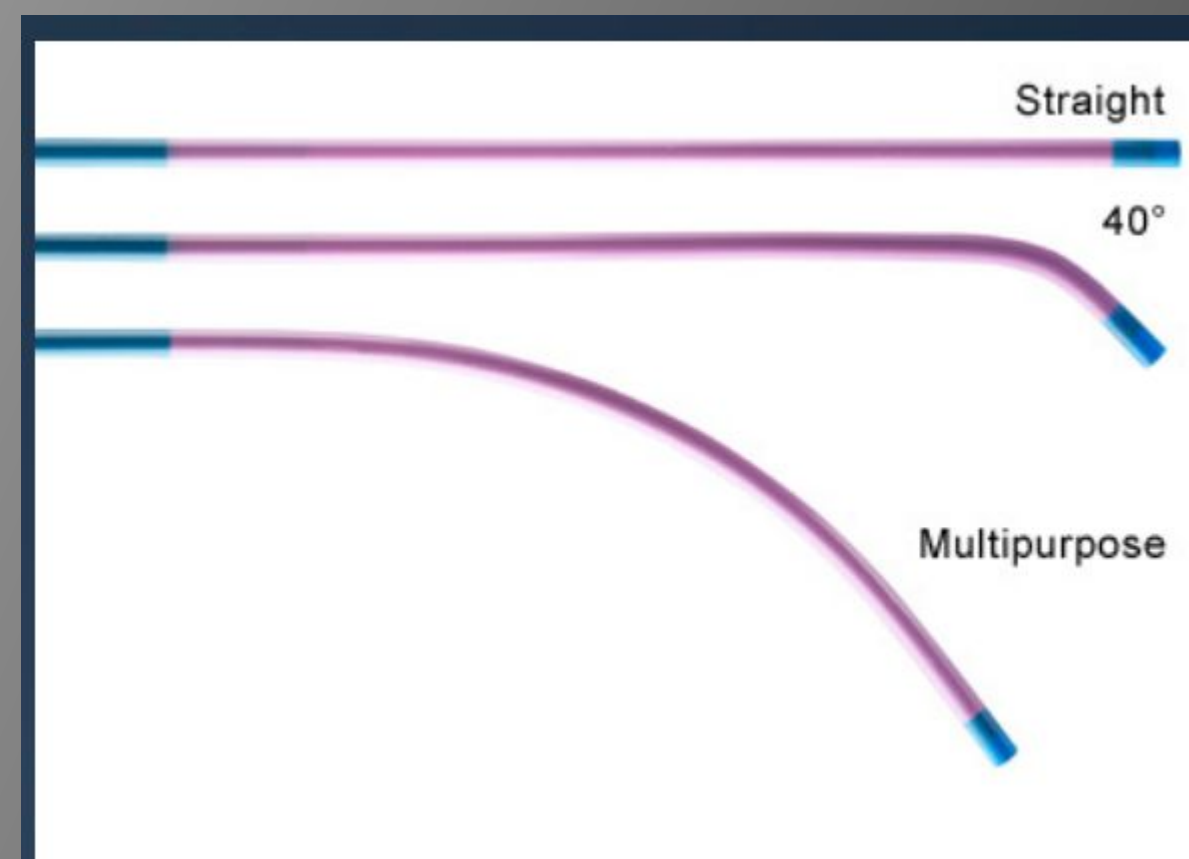
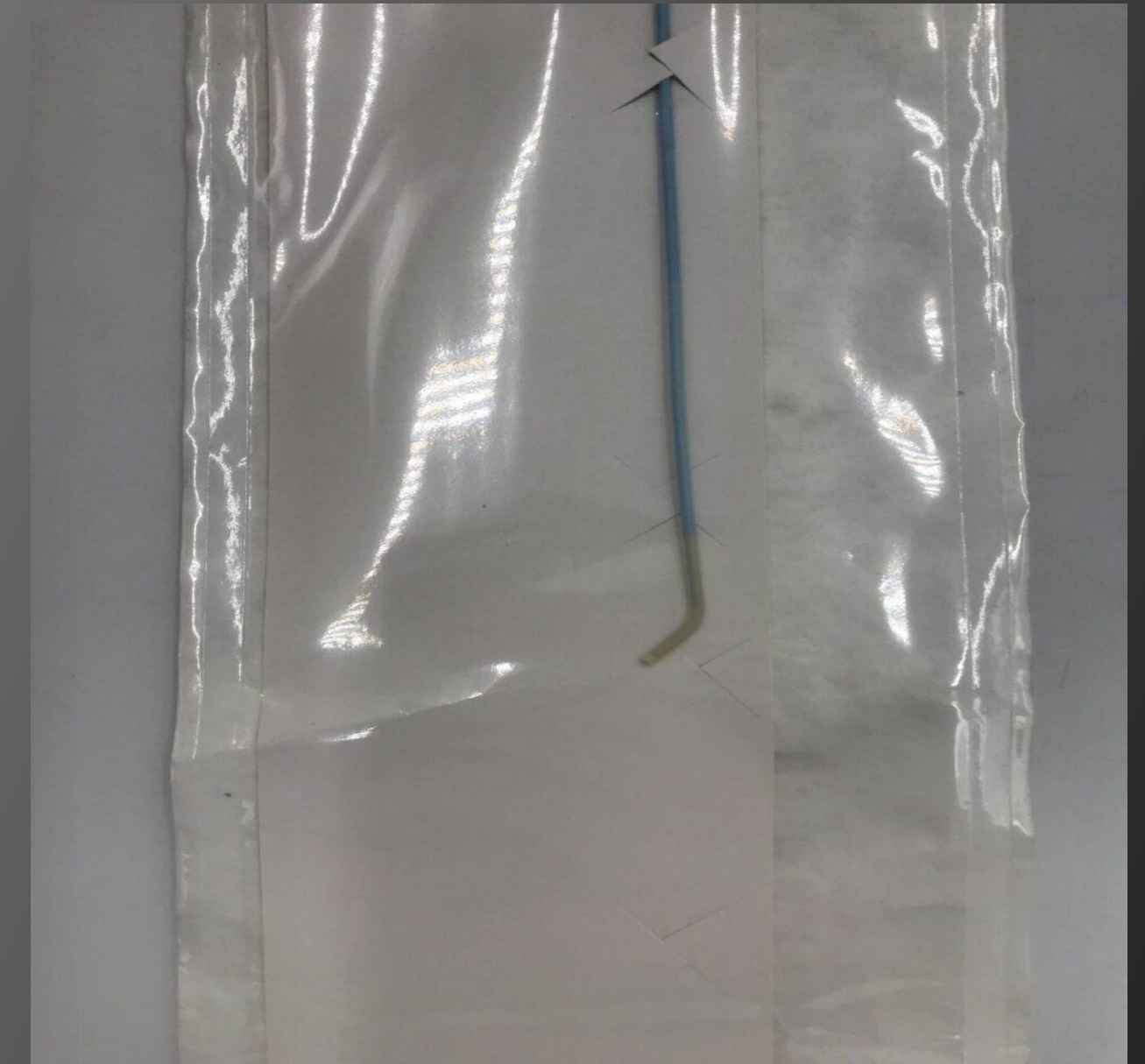
Porteuses

GUIDING CATHETER

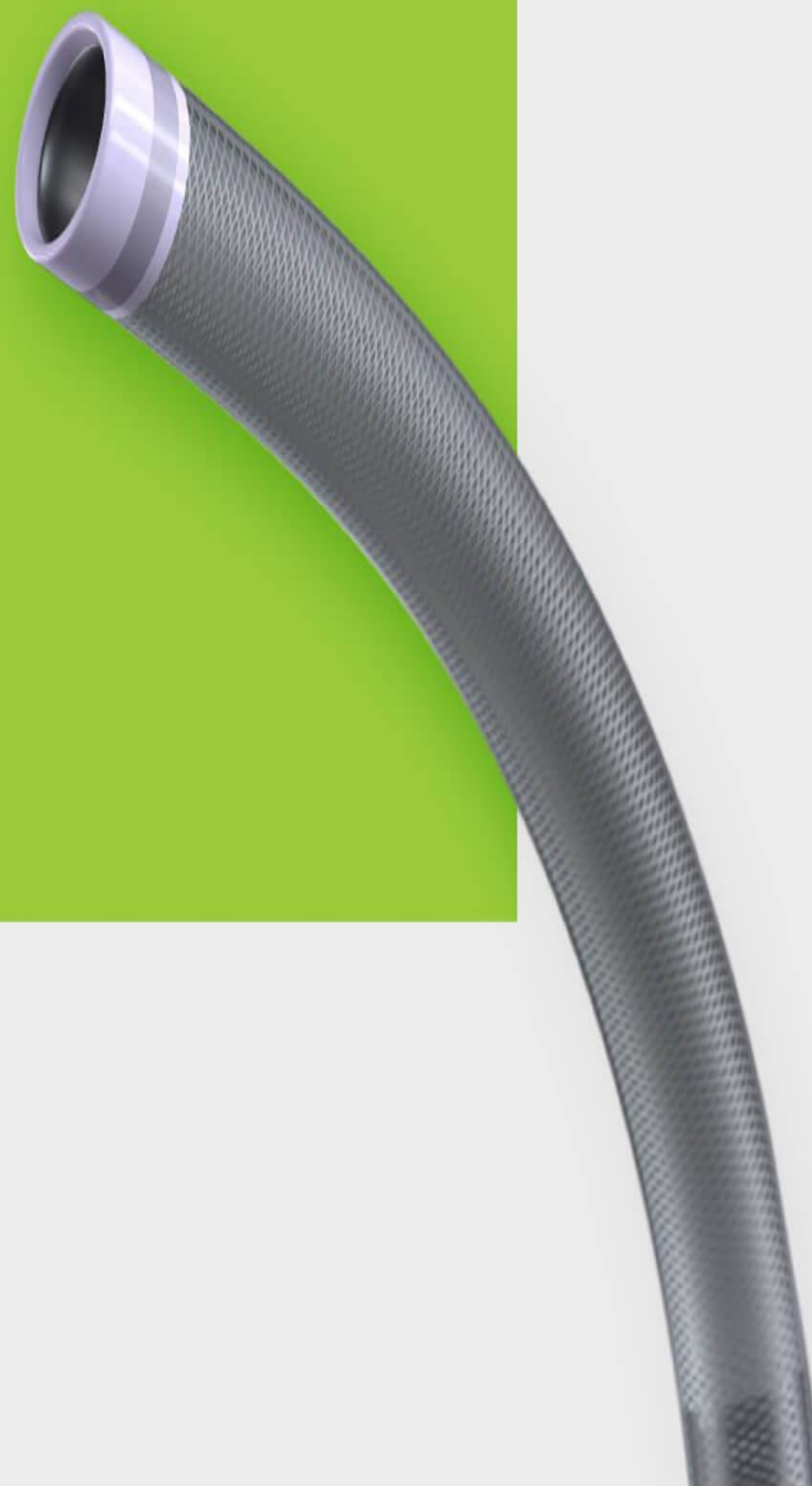


Guider soft tip
Envoy
Chaperon
Mach
Vista brite

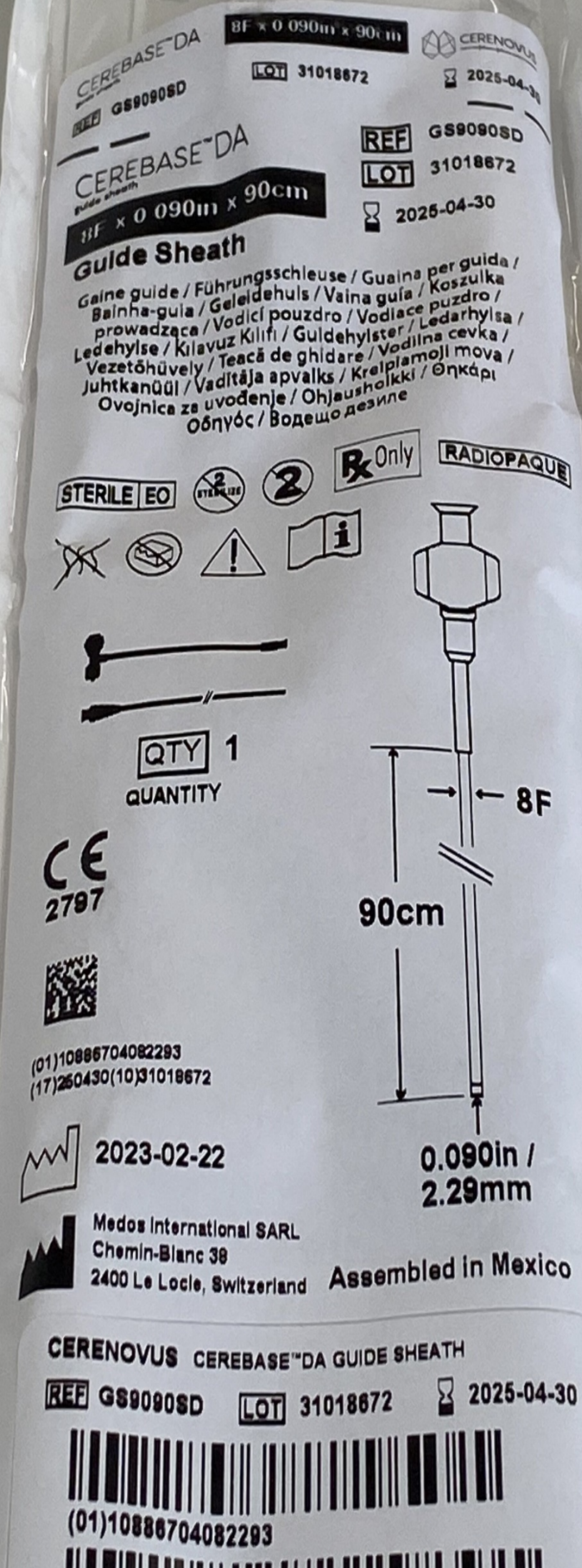
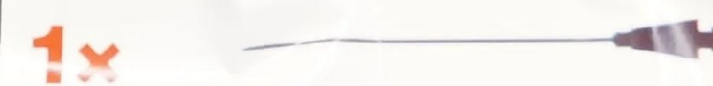
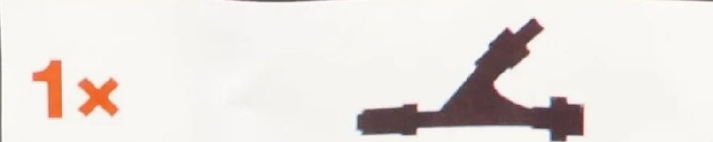
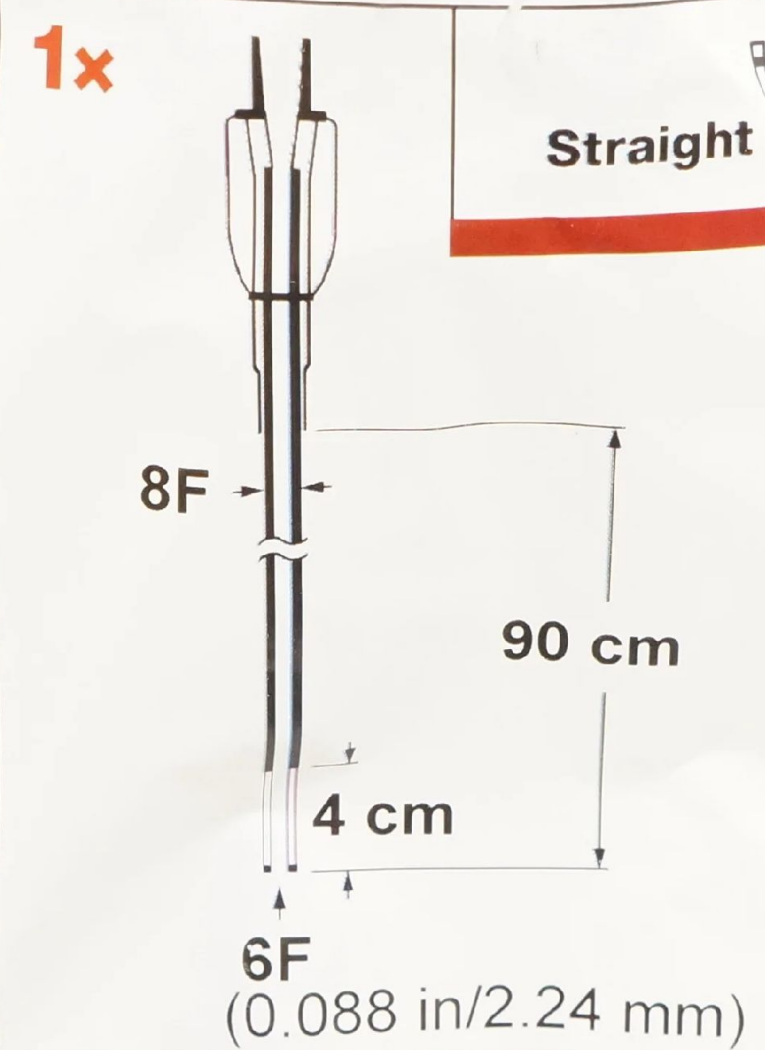
6F,7F,8F



LONG SHEATH



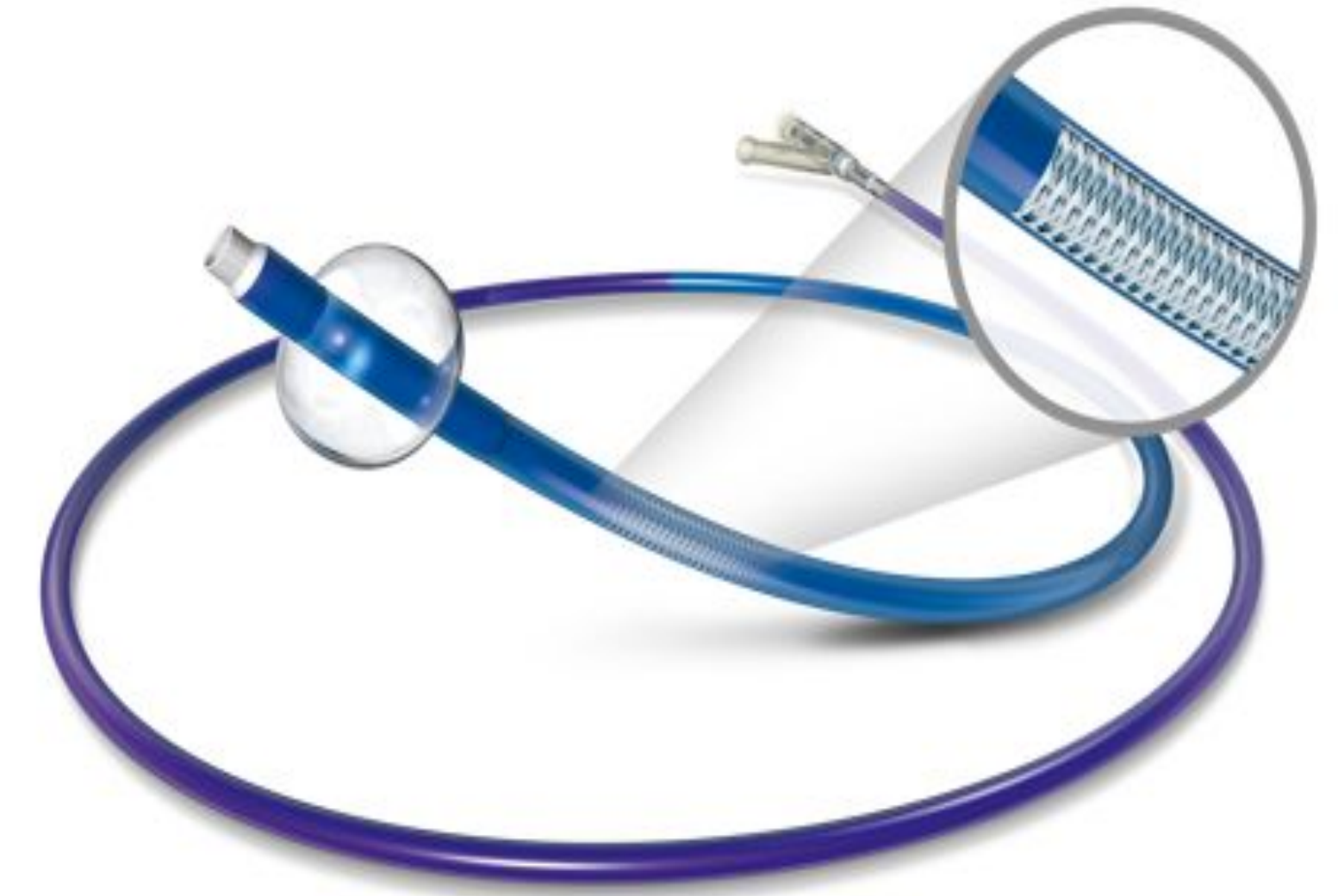
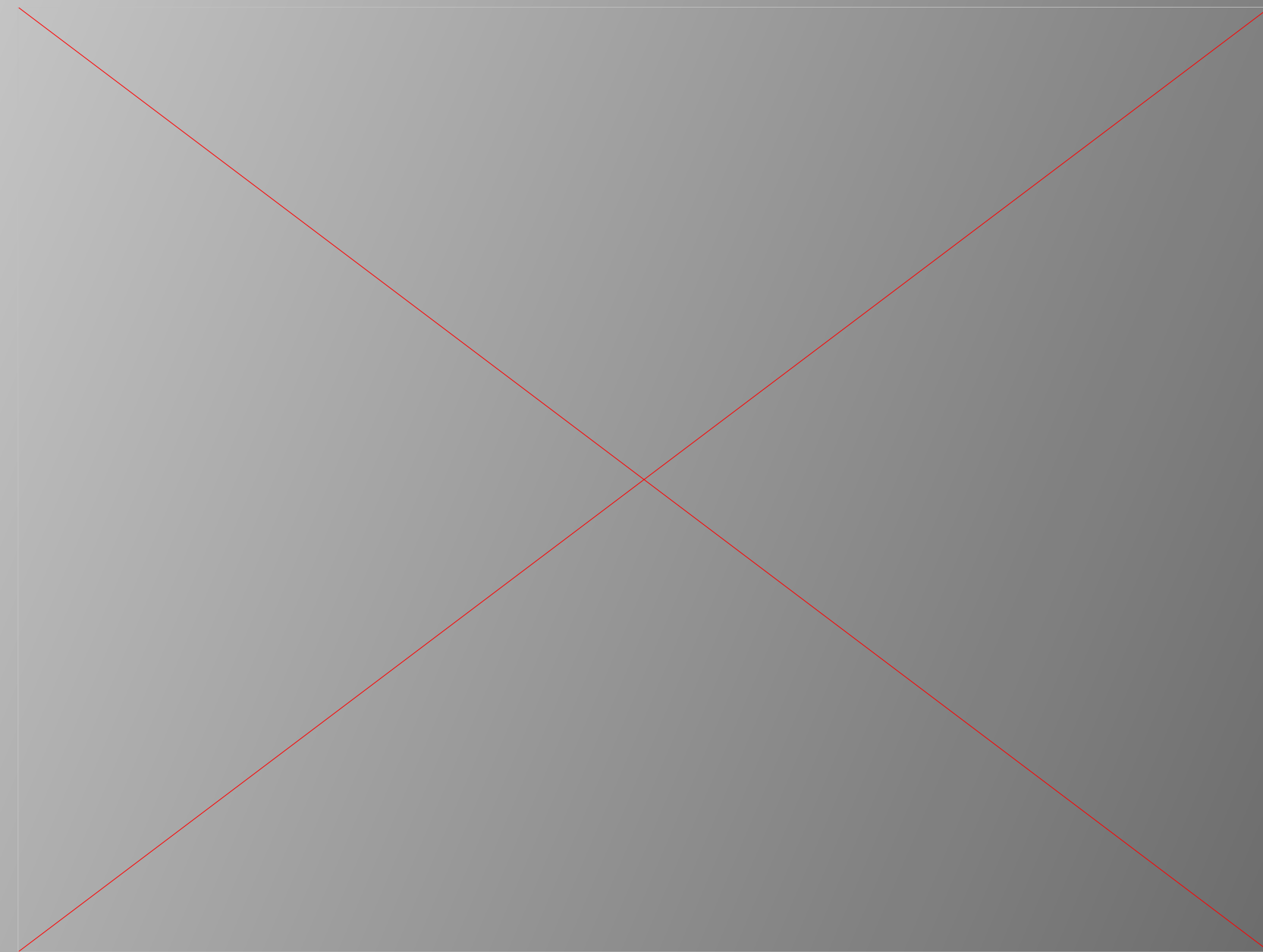
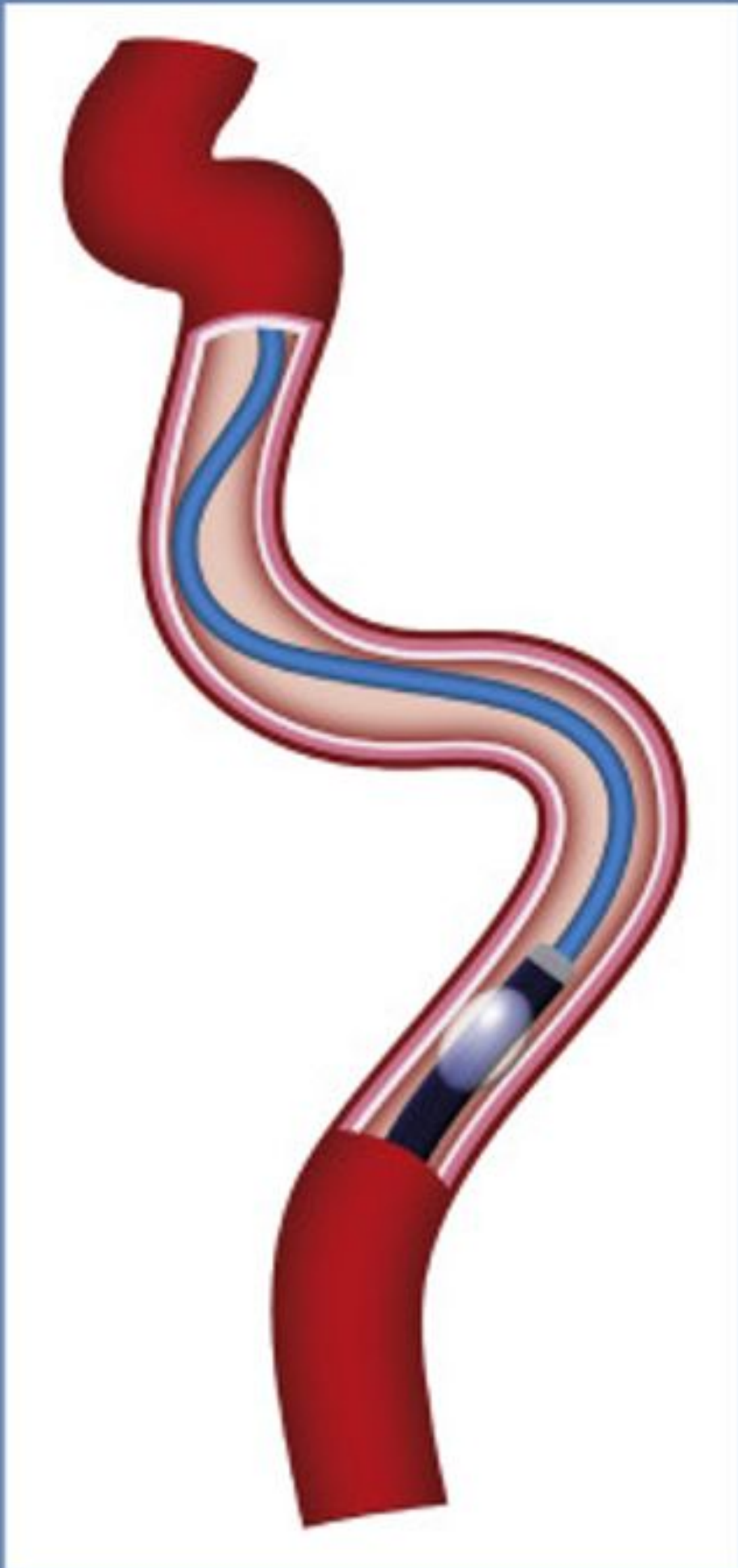
Penumbra
NeuronTM MAX
6F 088
Long Sheath



**Neuron Max
Infinity
Ballast
Benchmark
Cerebase
Shuttle
Rist**

6F,7F,8F

BALLOON GUIDING CATHETER



Flow gate
Cello
Merci
Emboguard
Walrus

6F,7F,8F,9F



Technique standard:

KIT de thrombectomie : stent seul (MC) , aspi seul , combine

- 
- Une littérature en faveur de leur utilisation suggérant un meilleur pronostic
 - Plus de premiers passages efficaces (2C,3)
 - Nombre passage divisé par 2
 - Diminution des embols distaux
 - Surtout diminue le risque de fragmentation d un caillot long
 - Meilleur outcome à 3 mois



Technique standard: **cathé ballon**

Mais :

spasme

diamètre interne limité (sauf cello 9F . ponction 10F)

voie radiale et circulation postérieure exclues

Spasme, comment éviter?

En sus bulbaire , en aspiration = spasme

Monter en sous pétreux = carotide fixée



Technique standard: système du cathétérisme

Selon les centres :

Monoaxial

Bi axial

Monoaxial **Classique**

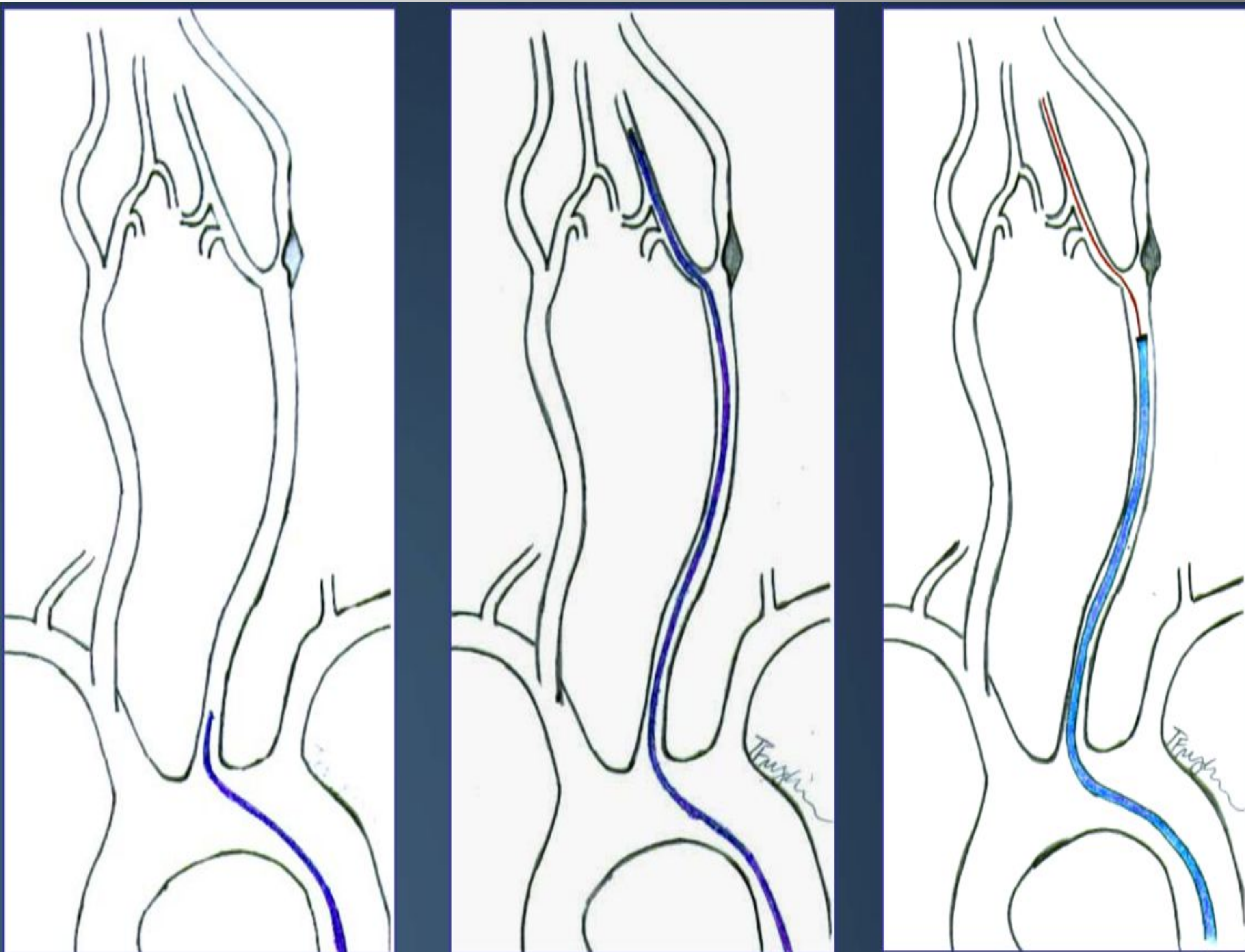


Terumo 035 hydophil



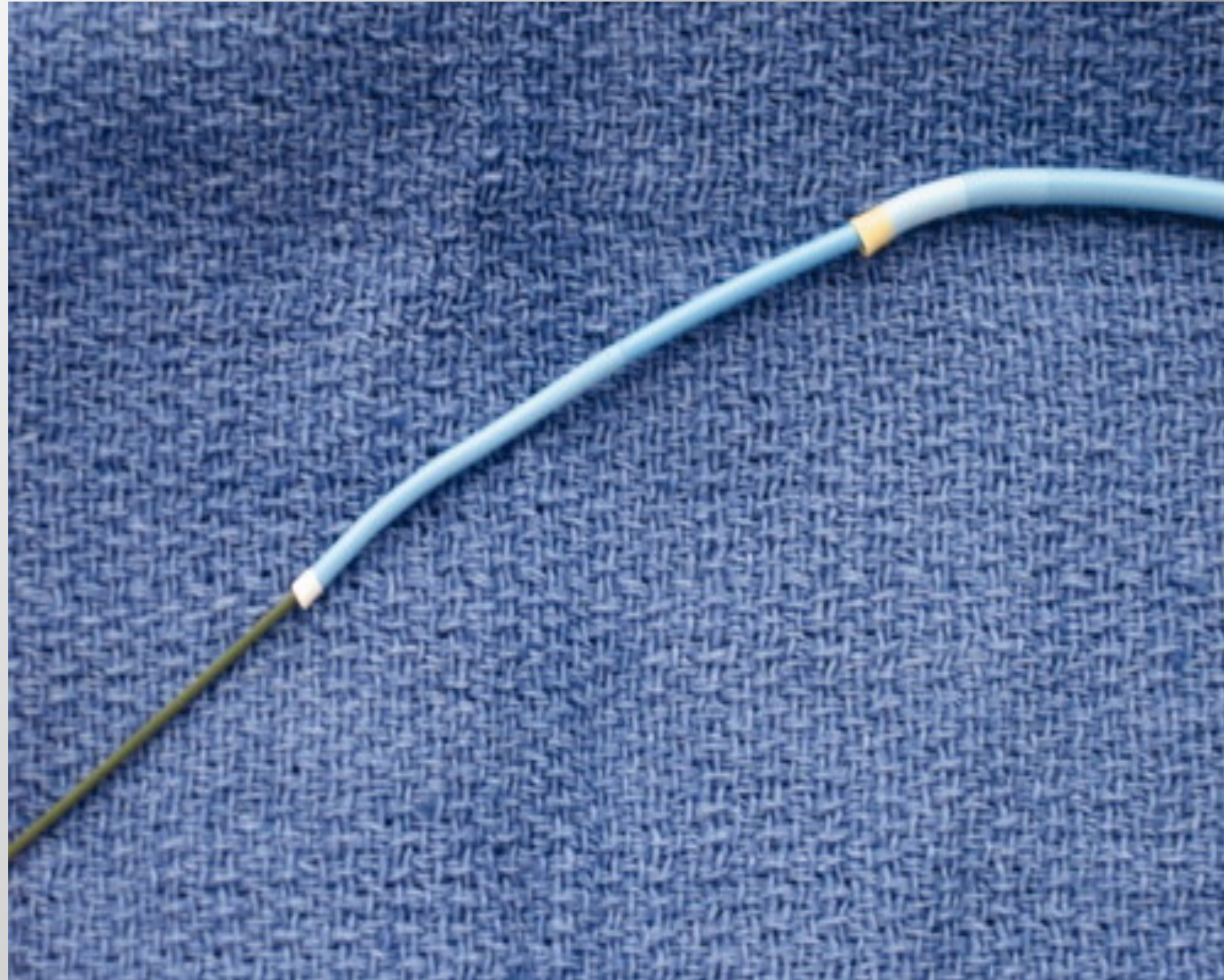
**Terumo ou advantage hydro stiff
035**

Monoaxial échange



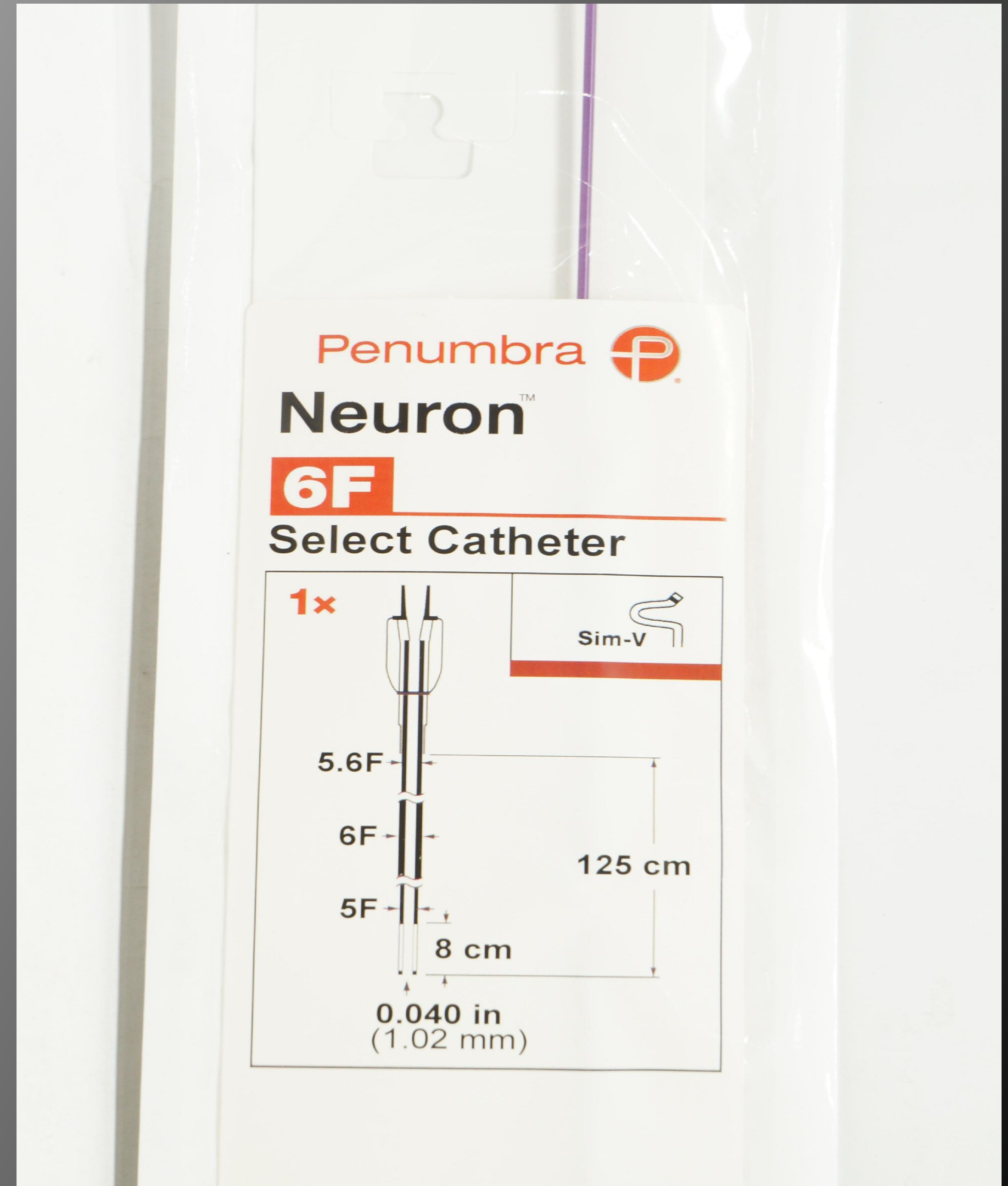
Amplatz
super stiff
035 ou 038

BIAXIAL

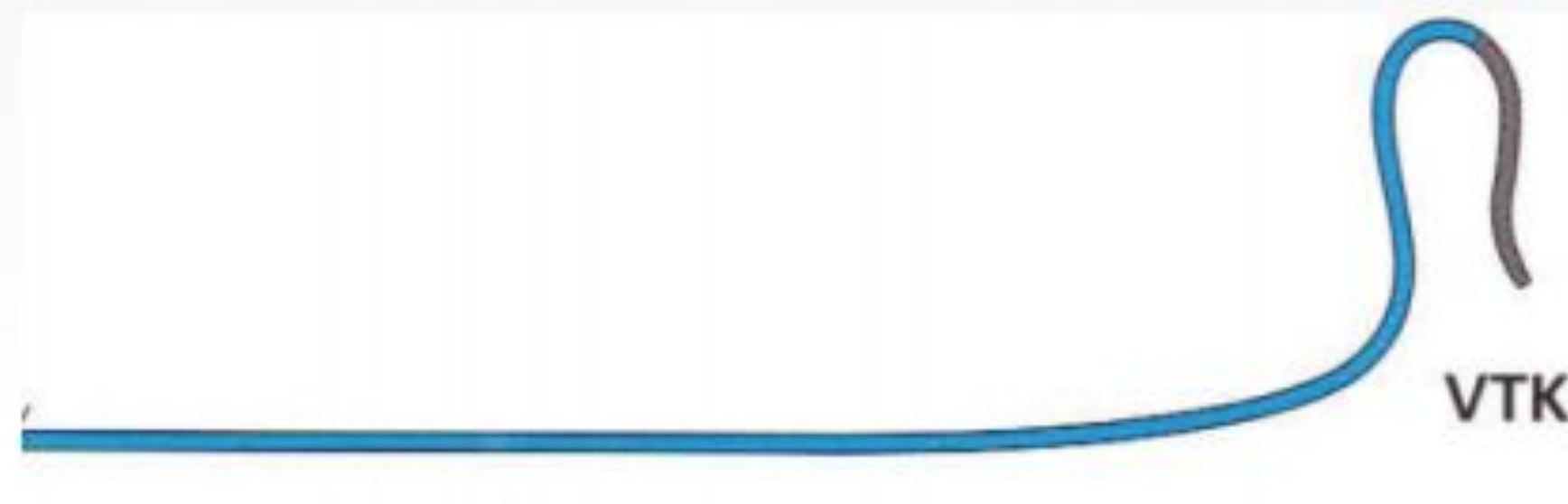


BIAXIAL

- Cathétér diagnostiques 125 cm
- Bern ou SIM
- 5F ou 6F

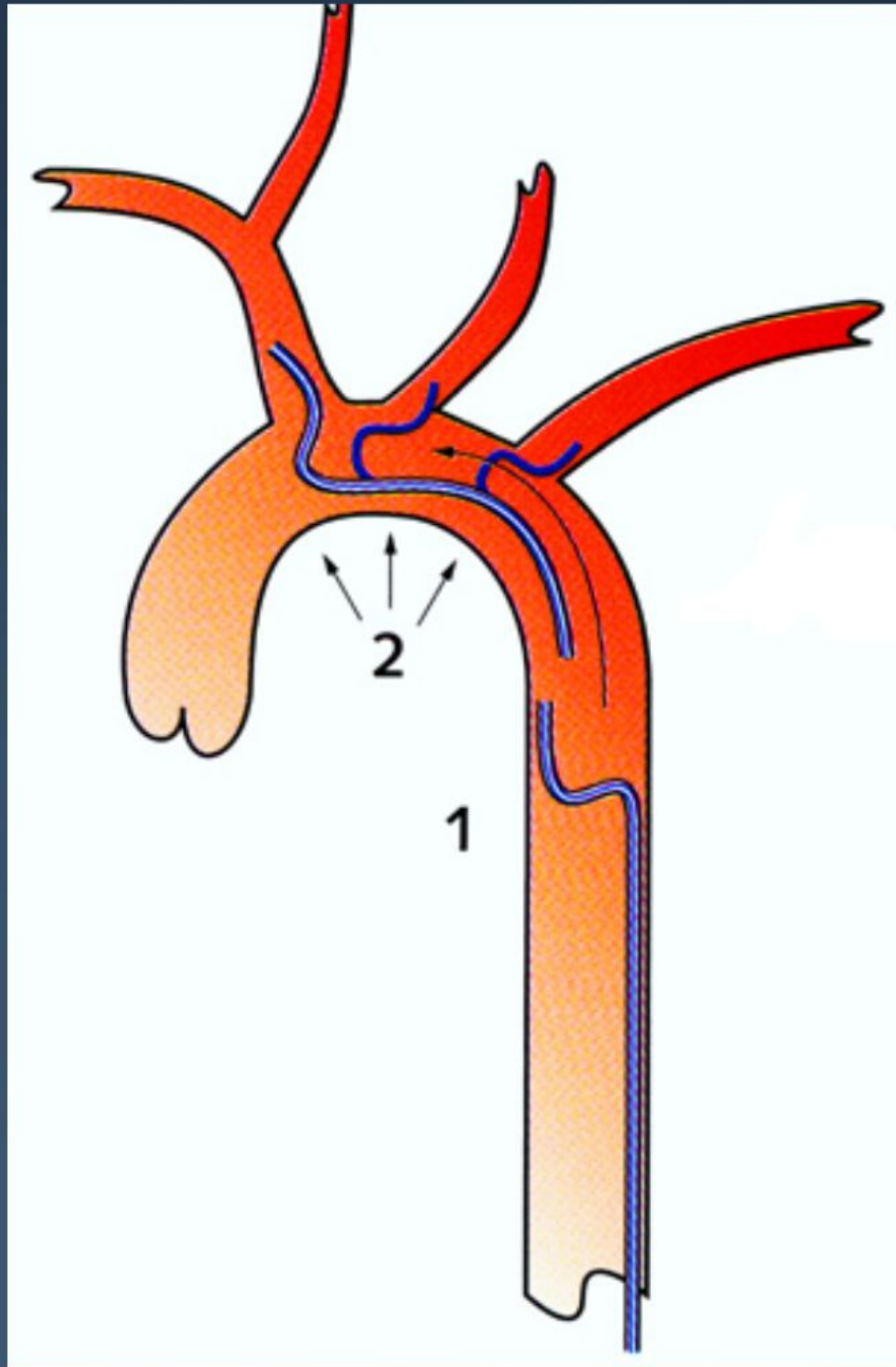


Cathétérisme des TSAs

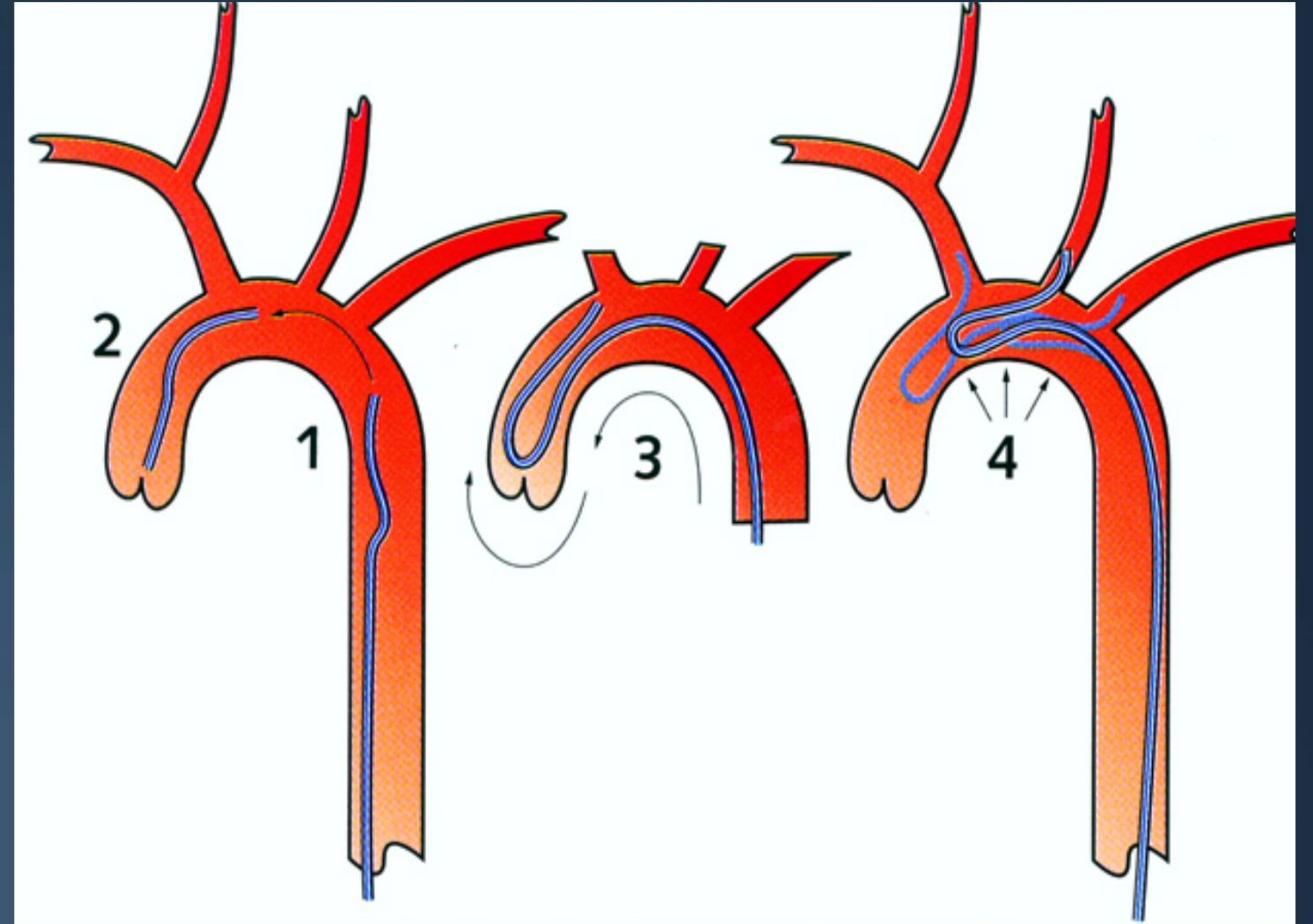




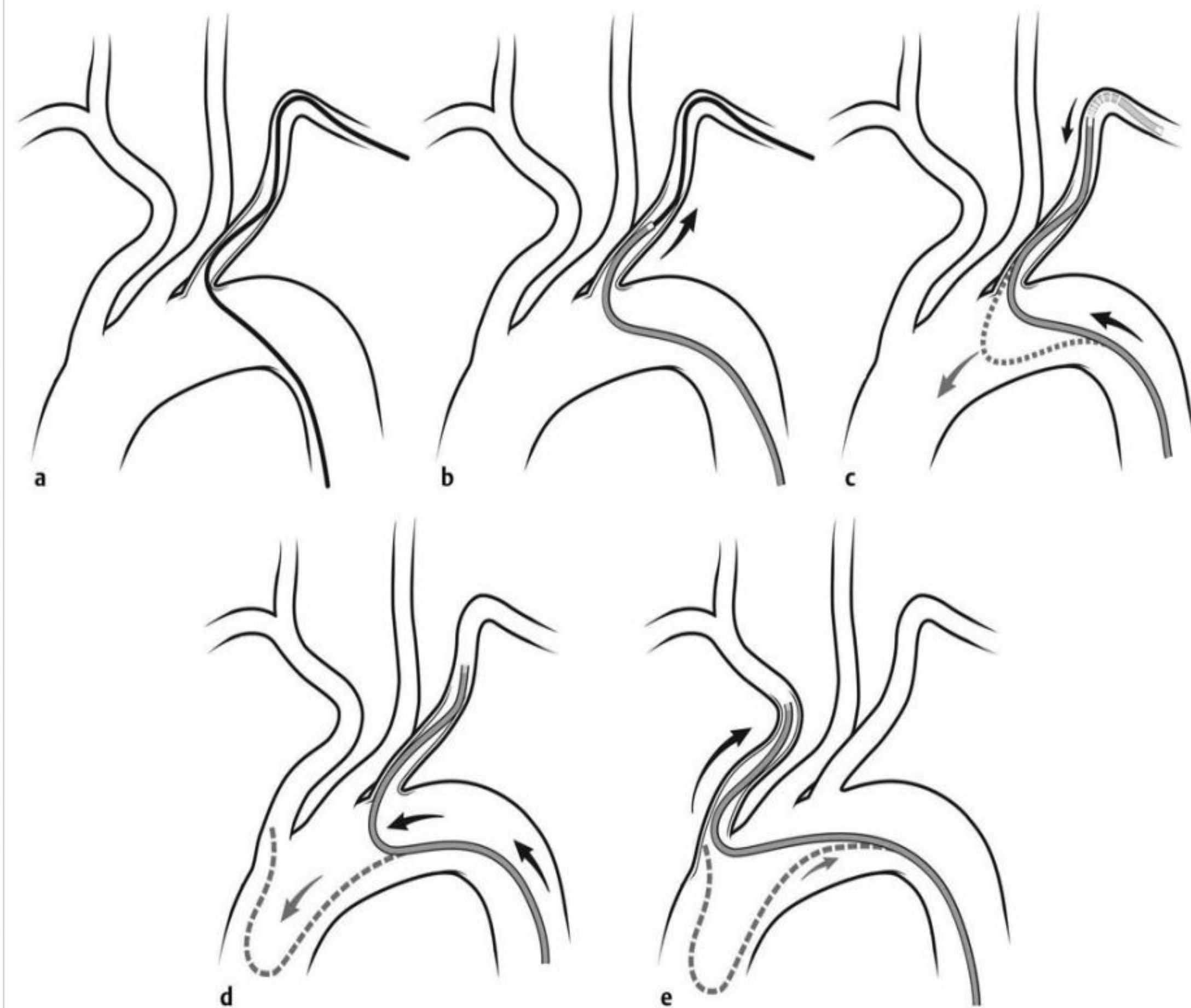
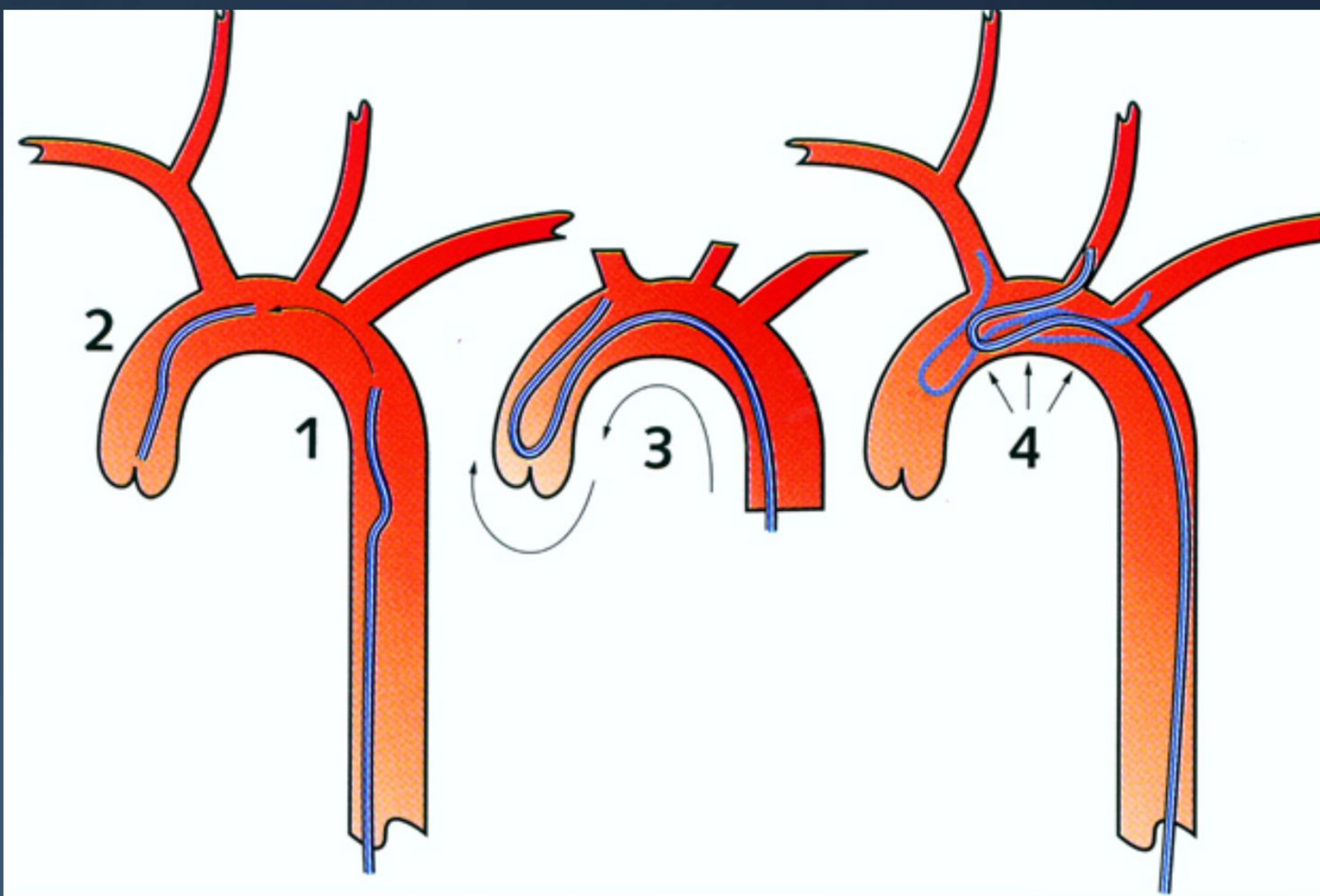
Vitek Catheter



Simmons Catheter



Simmons Catheter





Crosse aortique et TSAs

Crosses faciles....

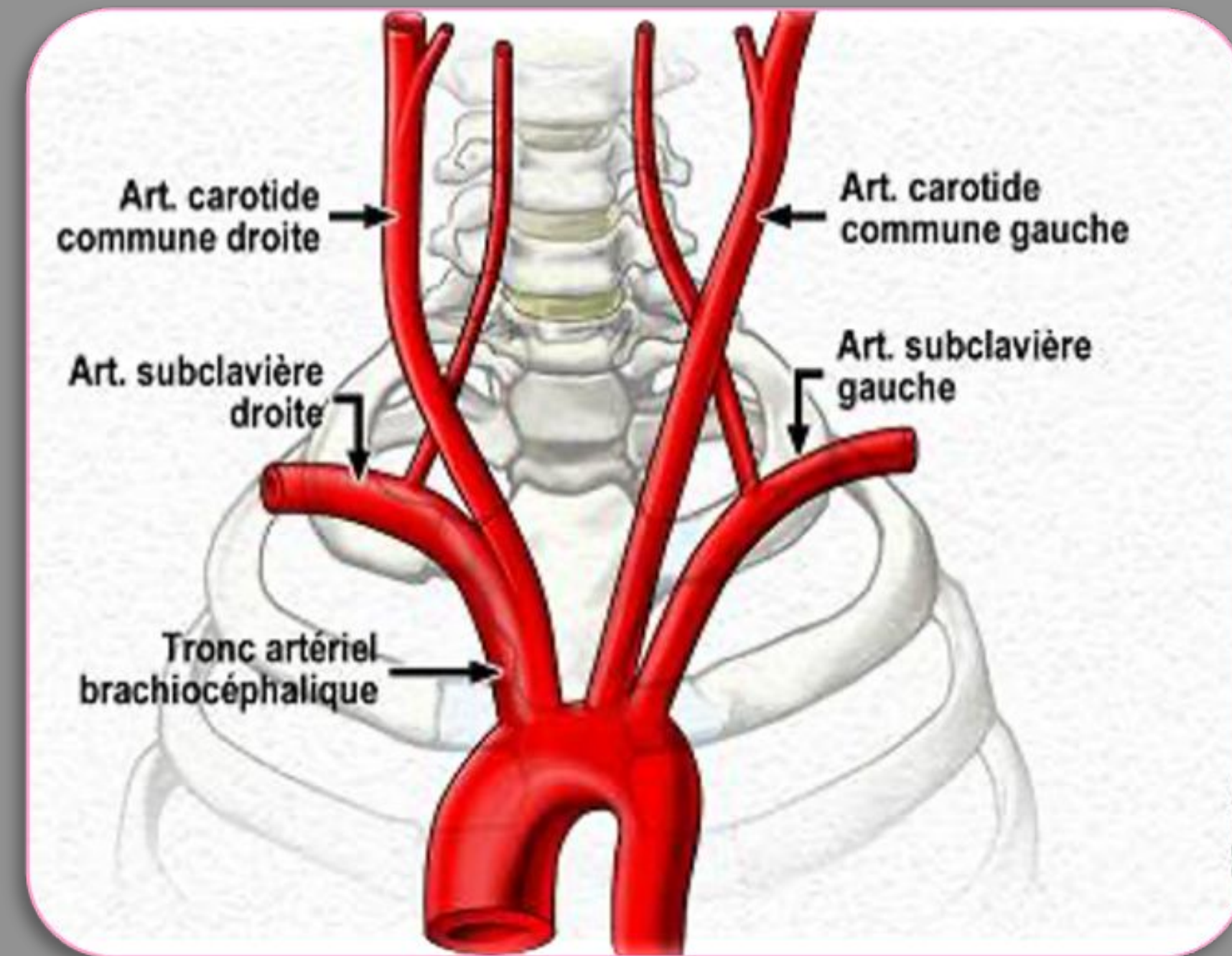
angle ouvert $\pm 90^\circ$

absence de tortuosité au delà de l'ostium



Troncs Supra-Aortiques

- | | |
|--------------------|--------------------|
| 1. TABC | 5. ACPG |
| 2. ACPD | 6. A. vertébrale G |
| 3. A. vertébrale D | 7. ASCG |
| 4. ASCD | |



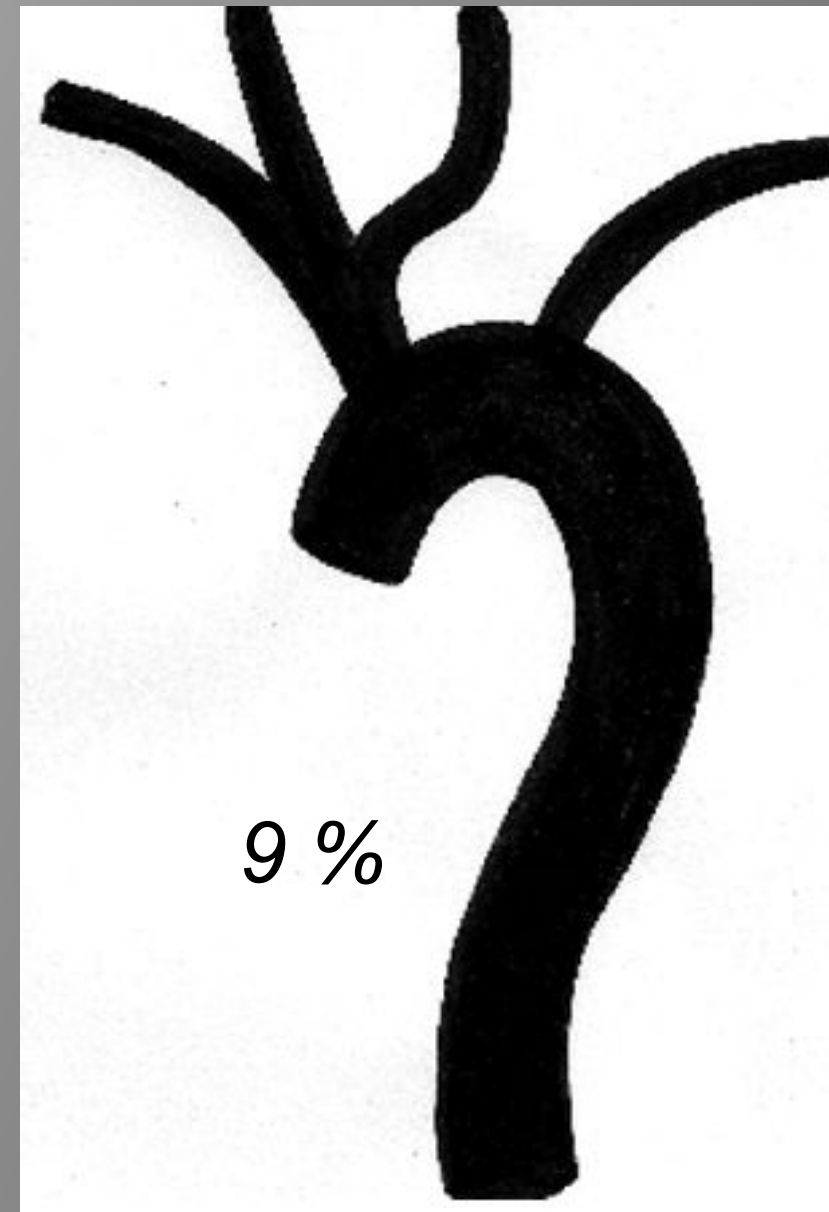
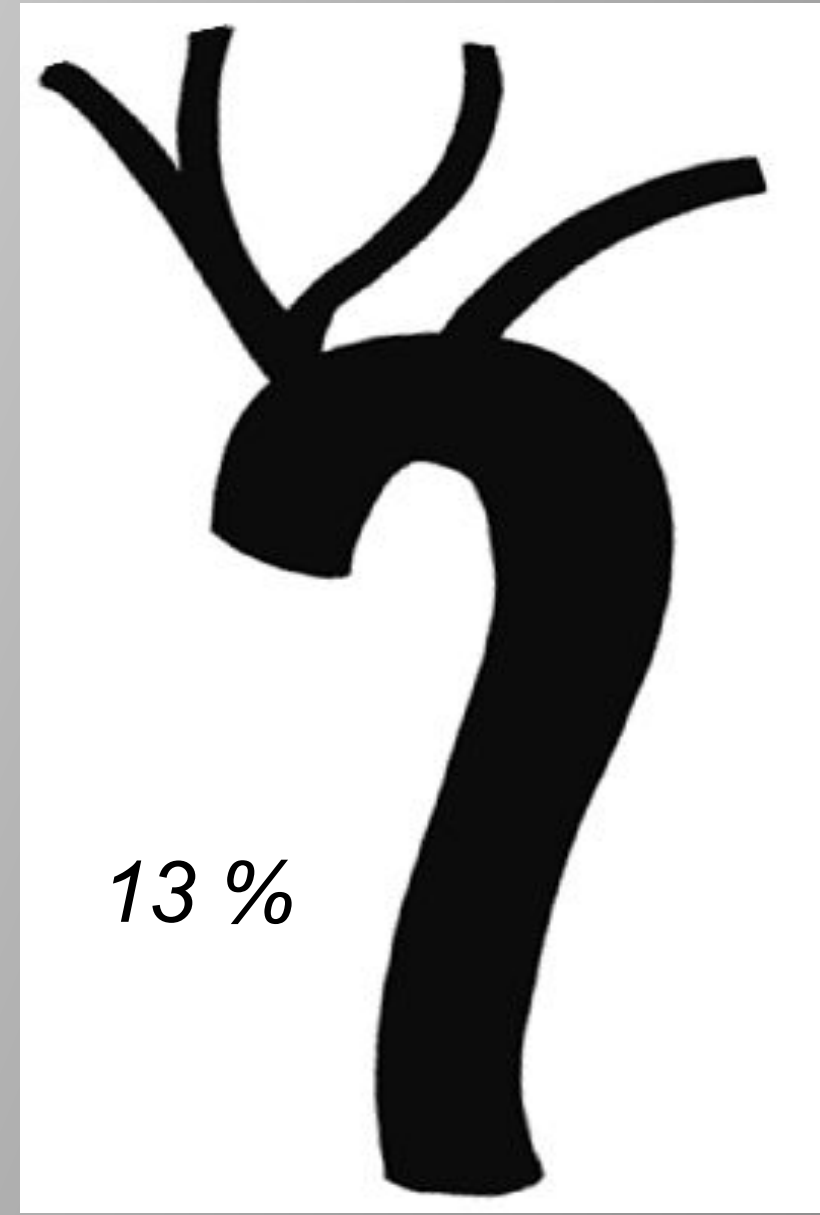
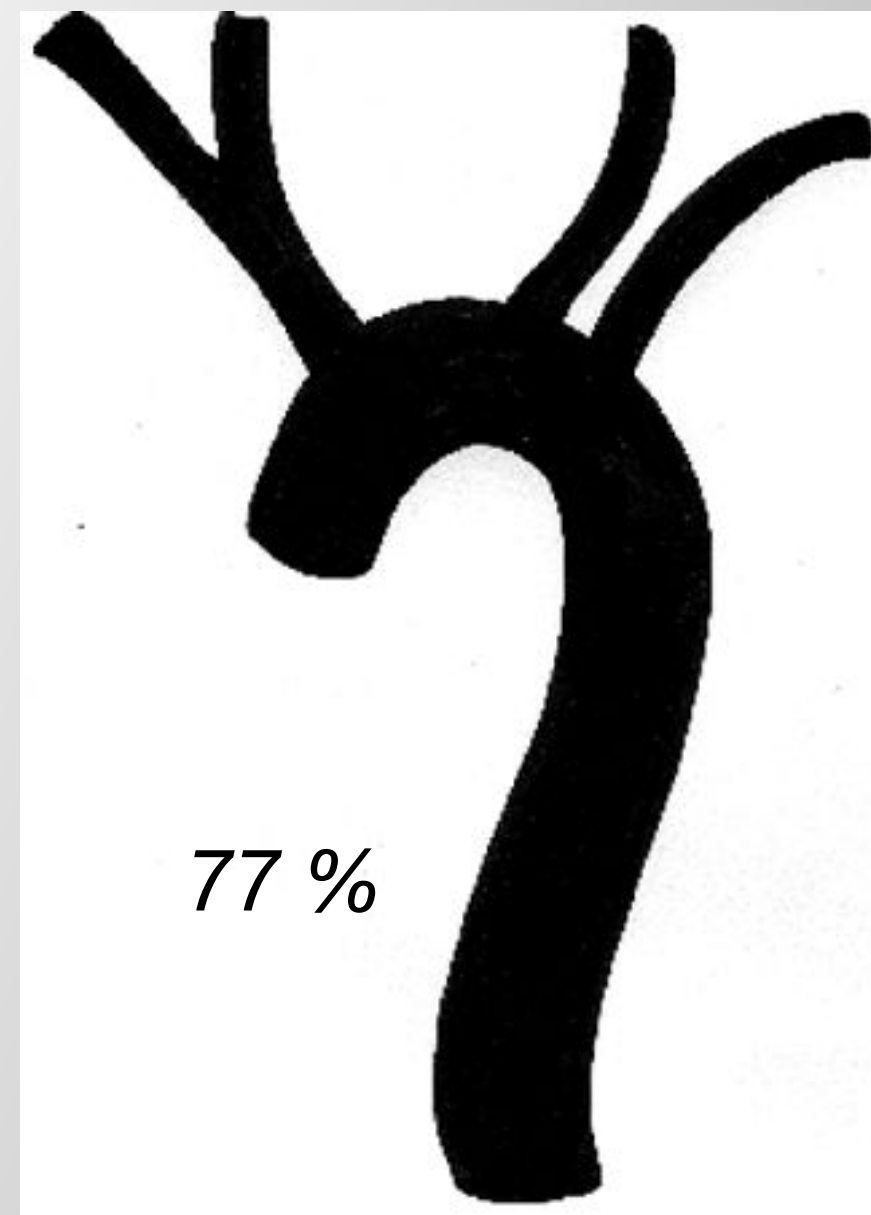


Crosses difficiles

variantes anatomiques

Difficulté liée à l'âge

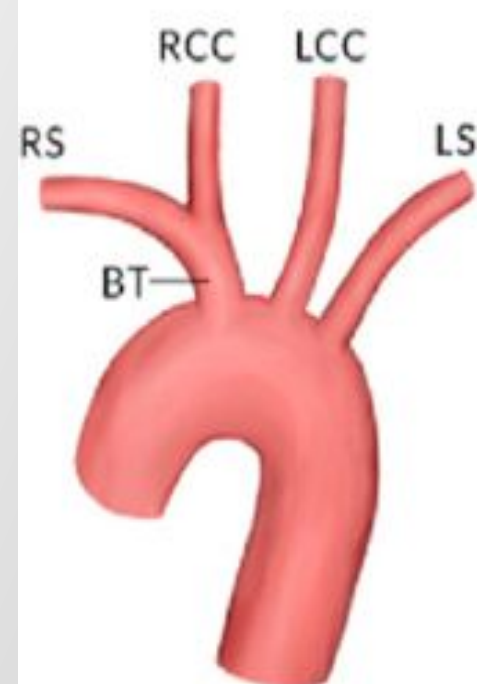
CROSSES DIFFICILES par variantes anatomiques



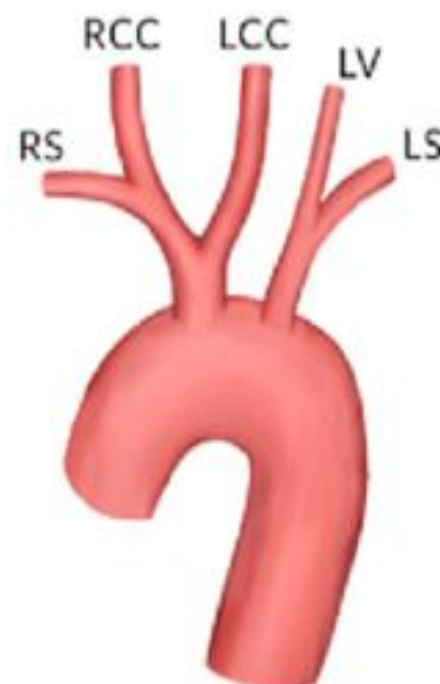
Variations naissance des TSA (Lippert)



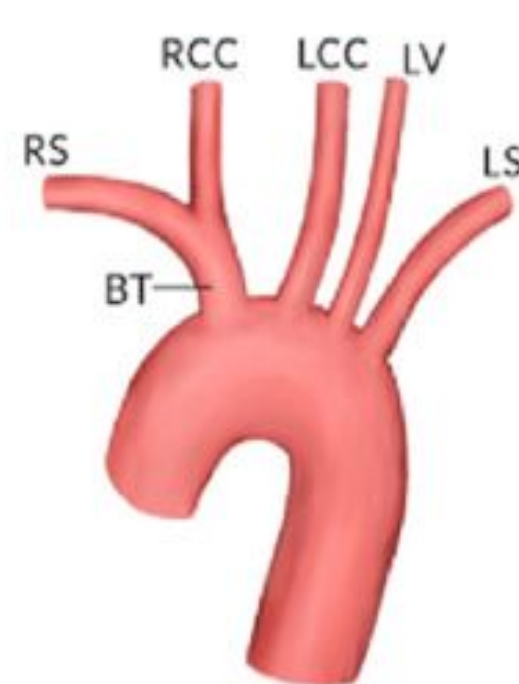
Type 1 – Normal



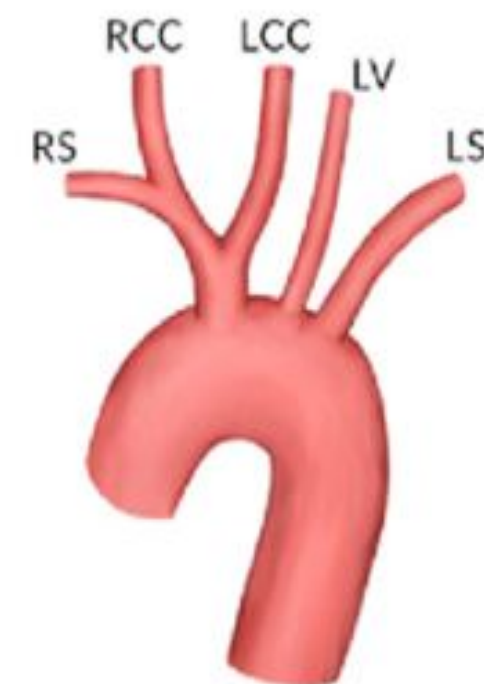
Type 2 – Bovine Arch



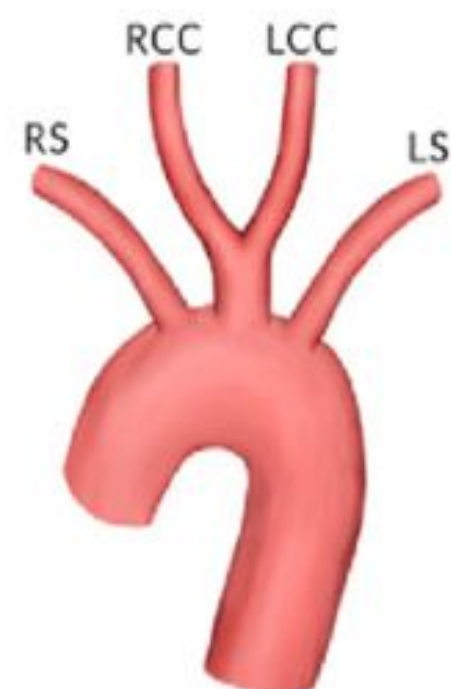
Type 3 – Left Vertebral



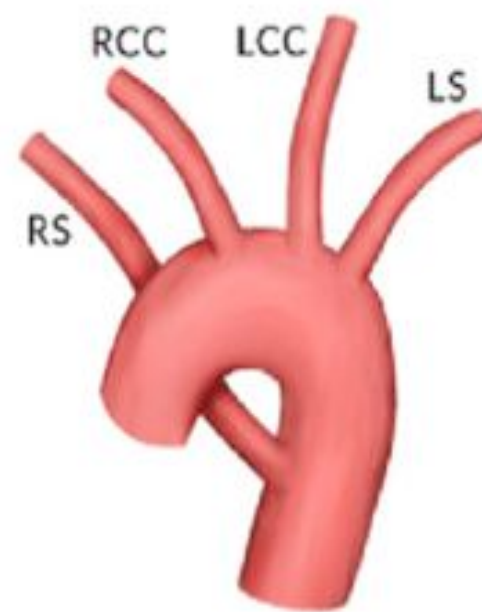
Type 4 – Bovine and Left Vertebral



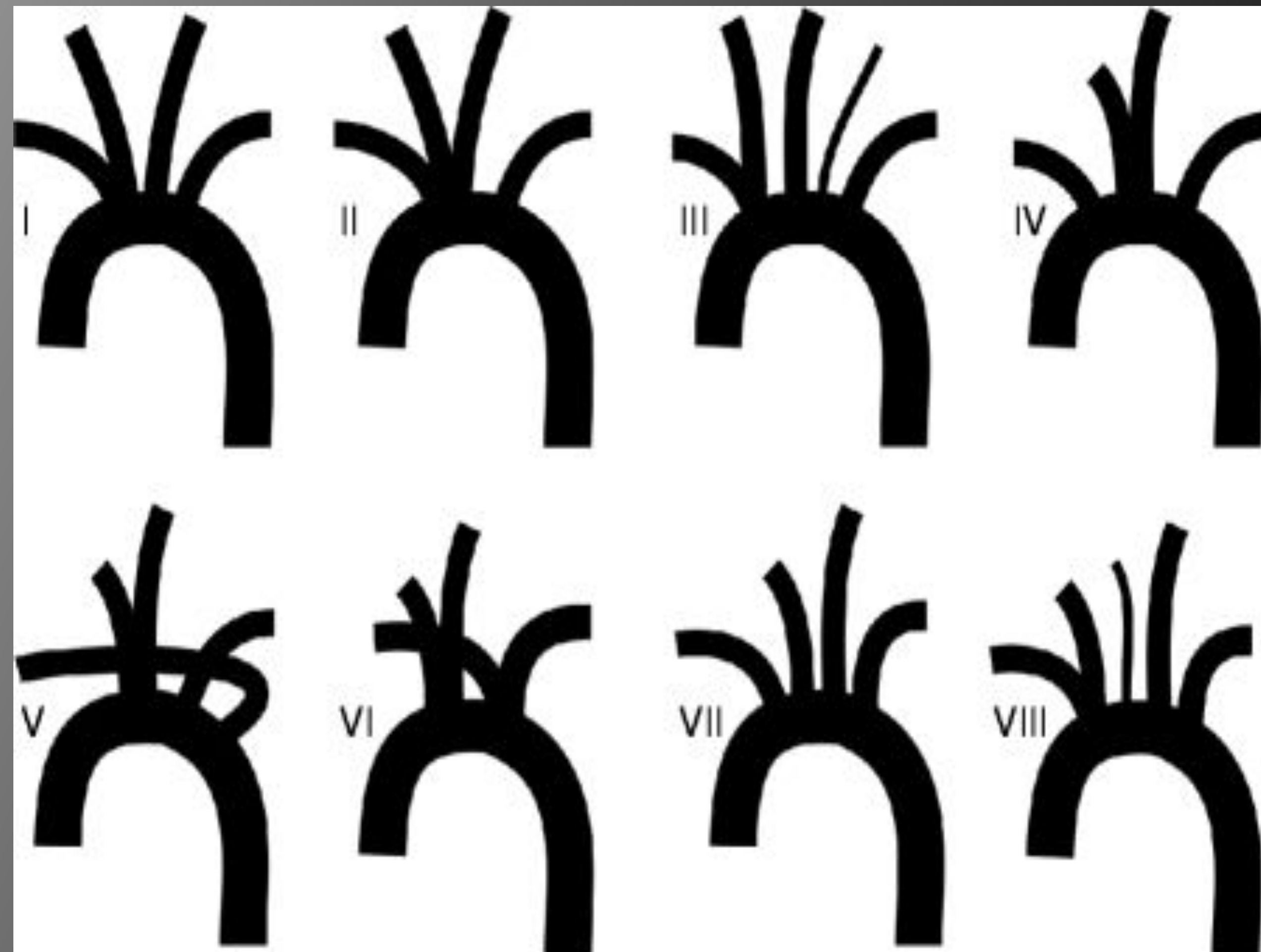
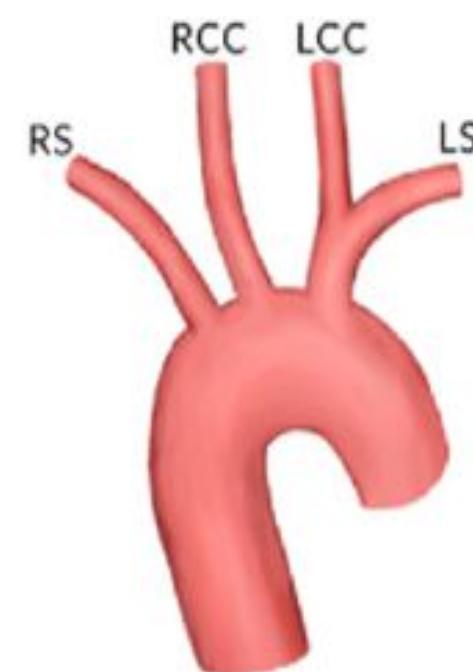
Type 5 – Common Carotid



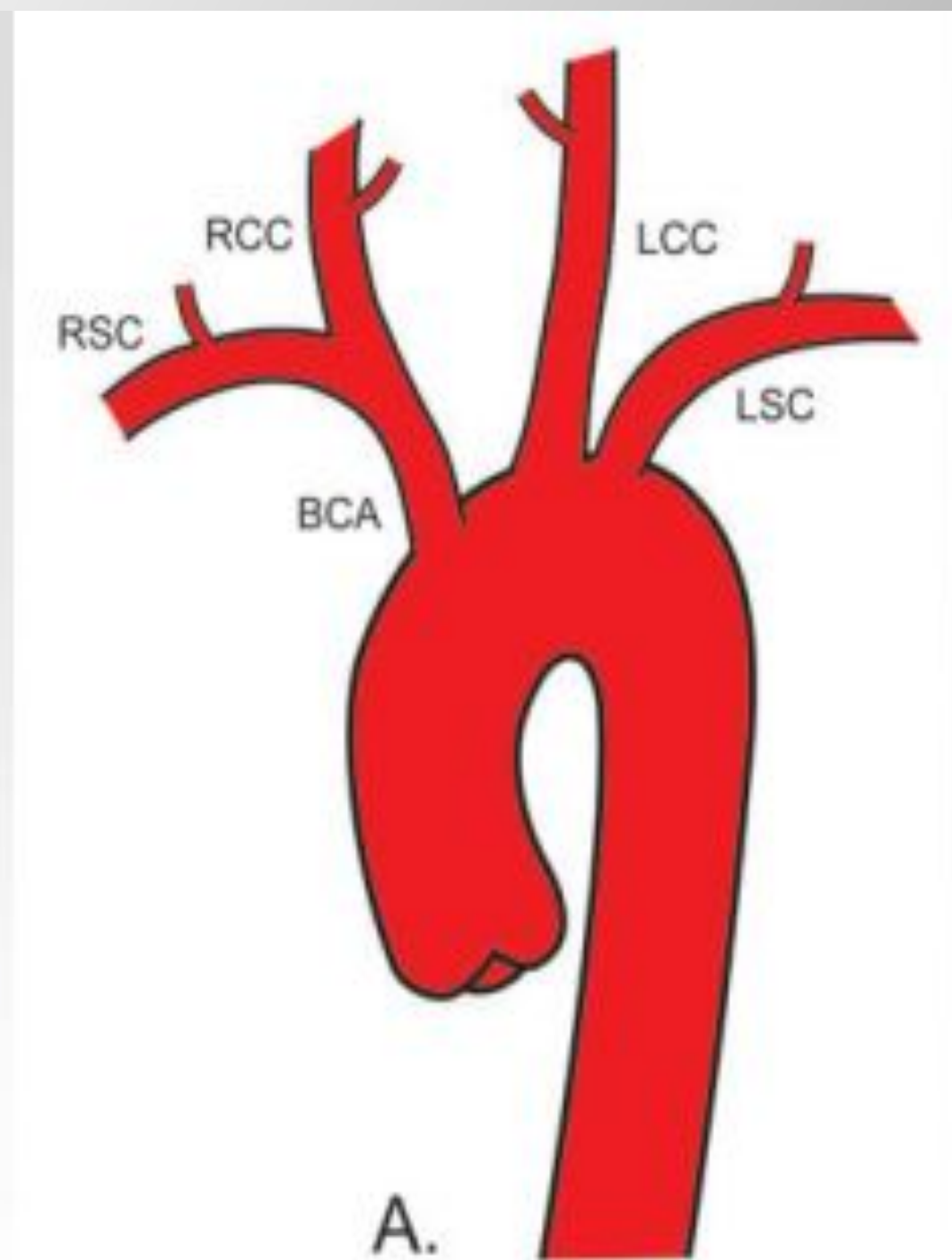
Type 6 – Aberrant RS



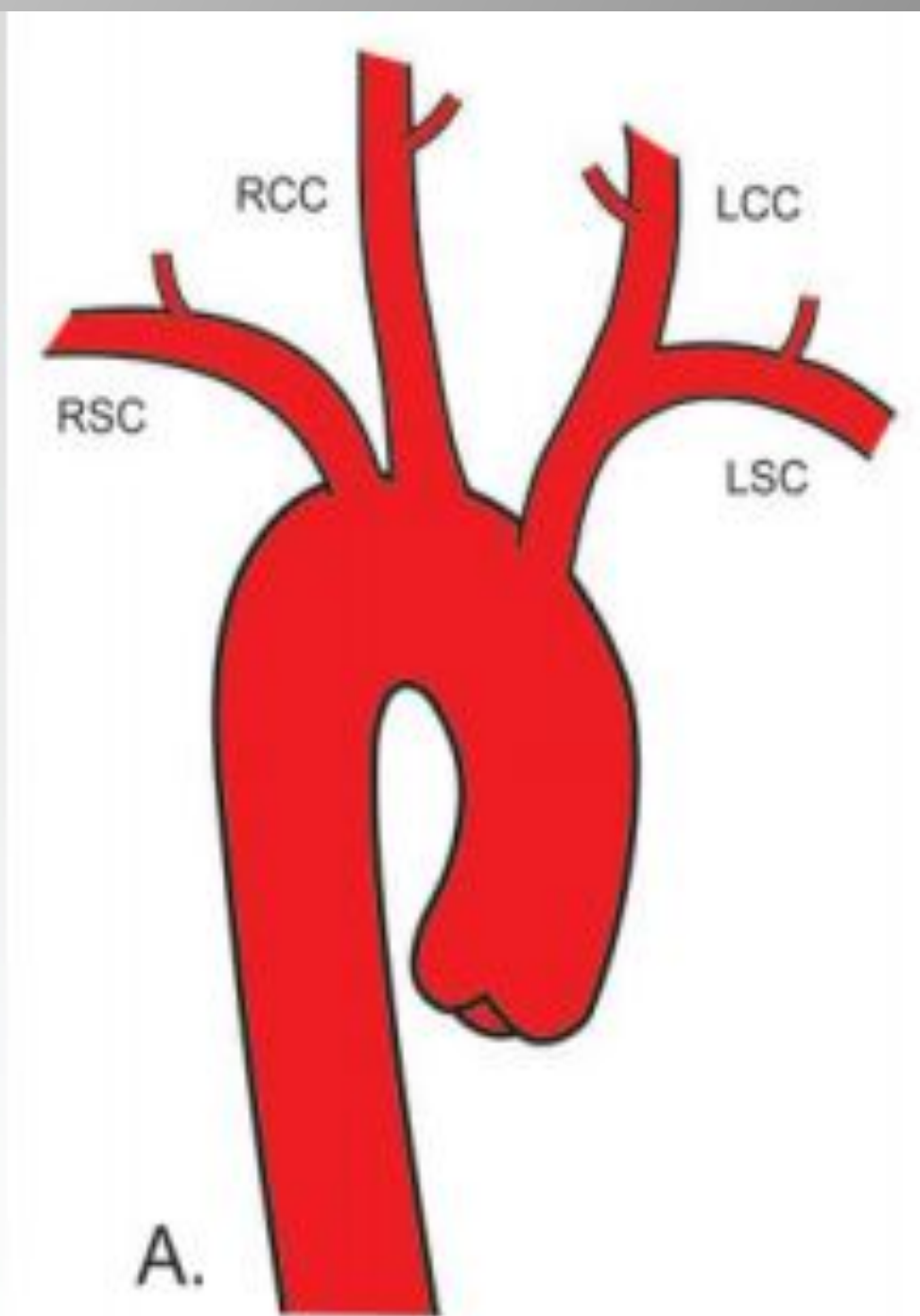
Type 7 – Right Arch



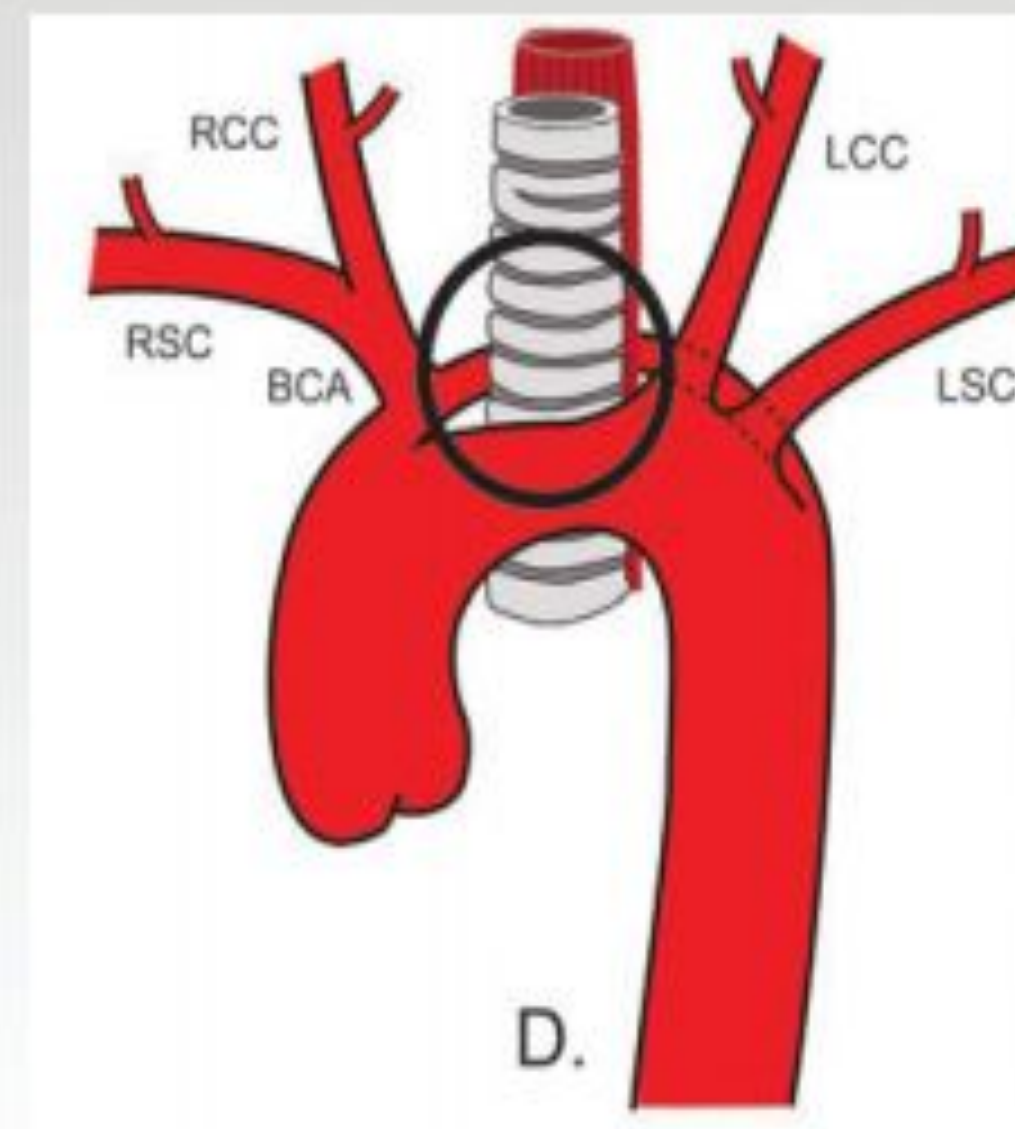
Anomalies congénitales



Left-Sided



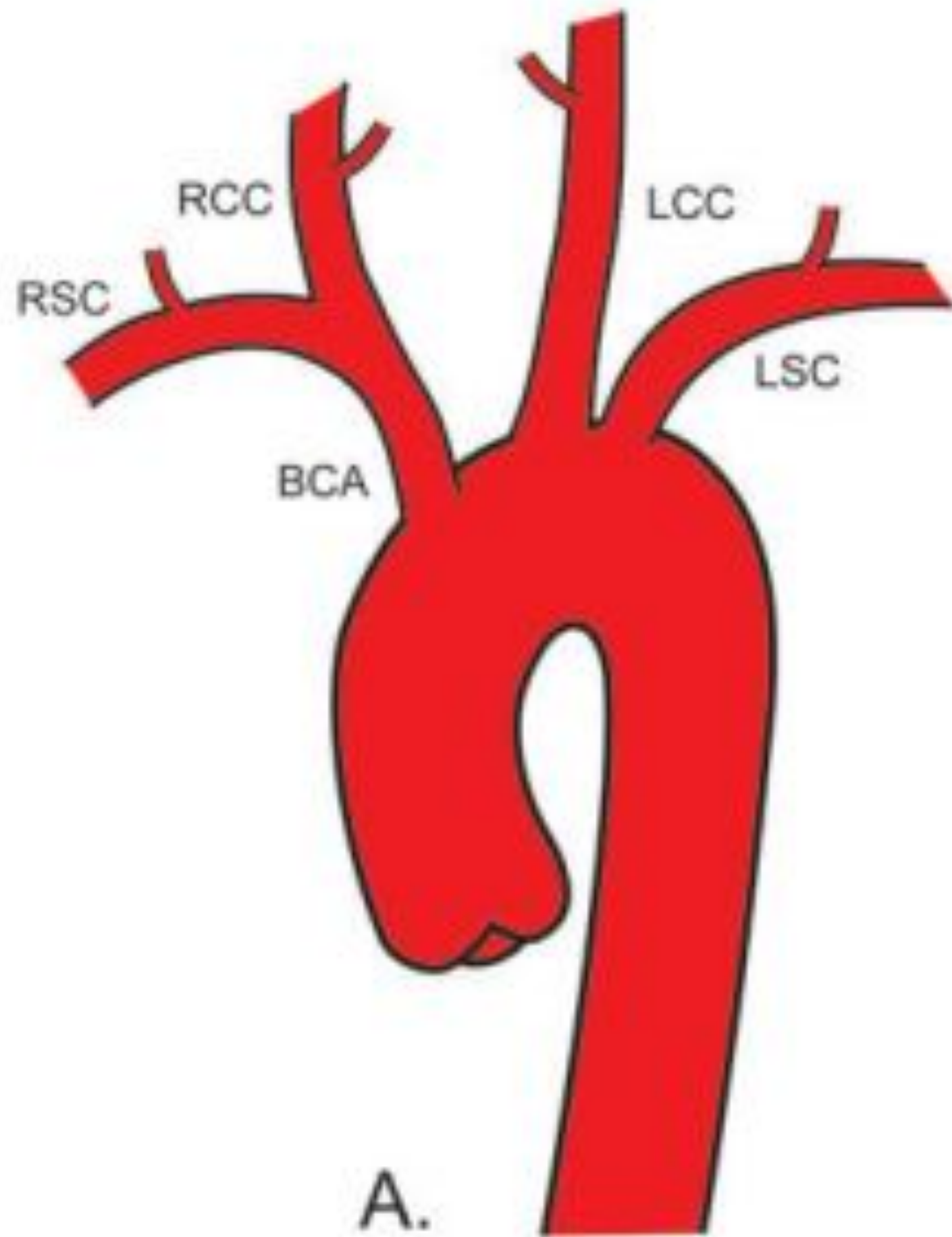
Right-Sided



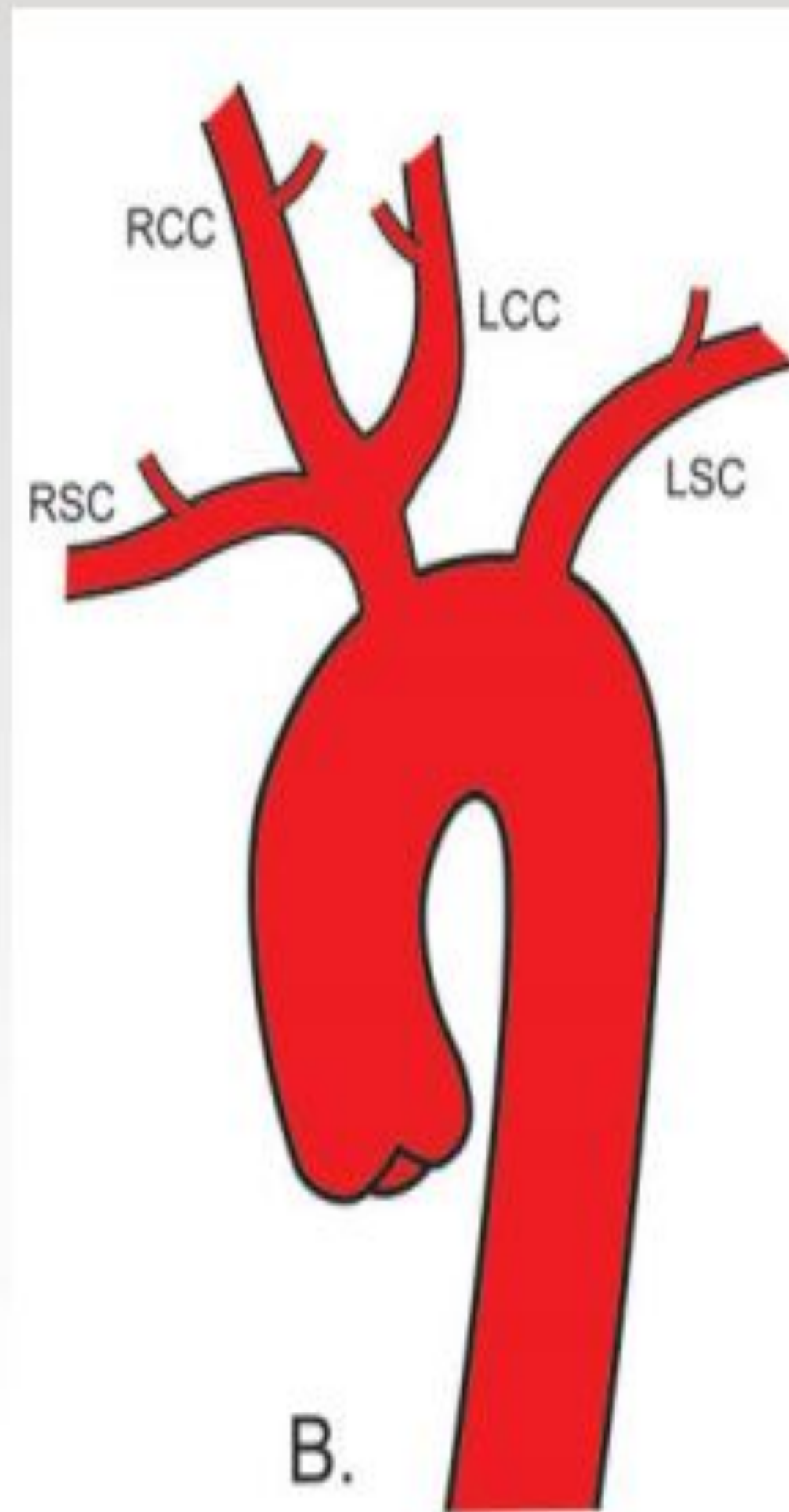
Double



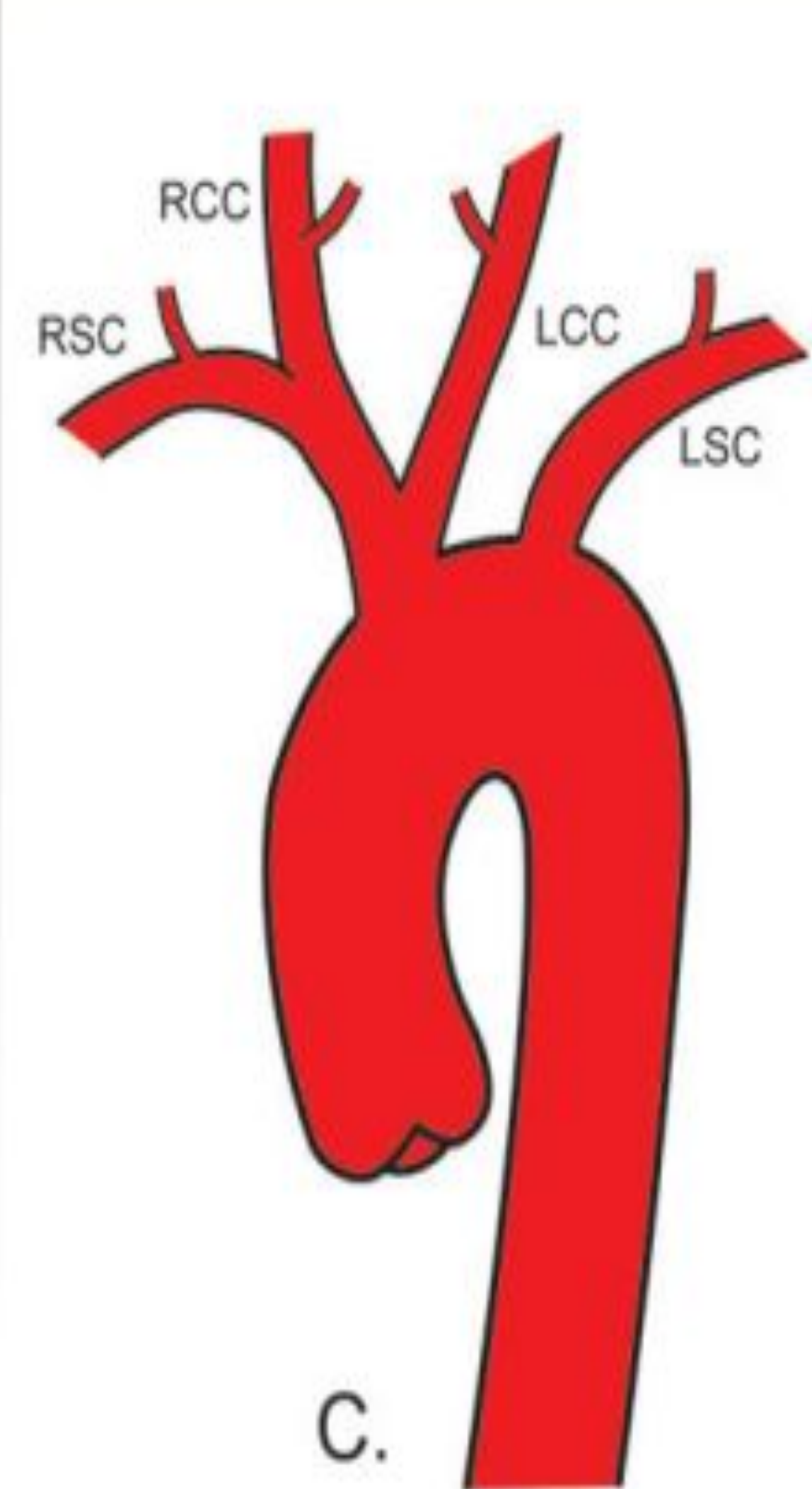
Variantes de la crosse gauche



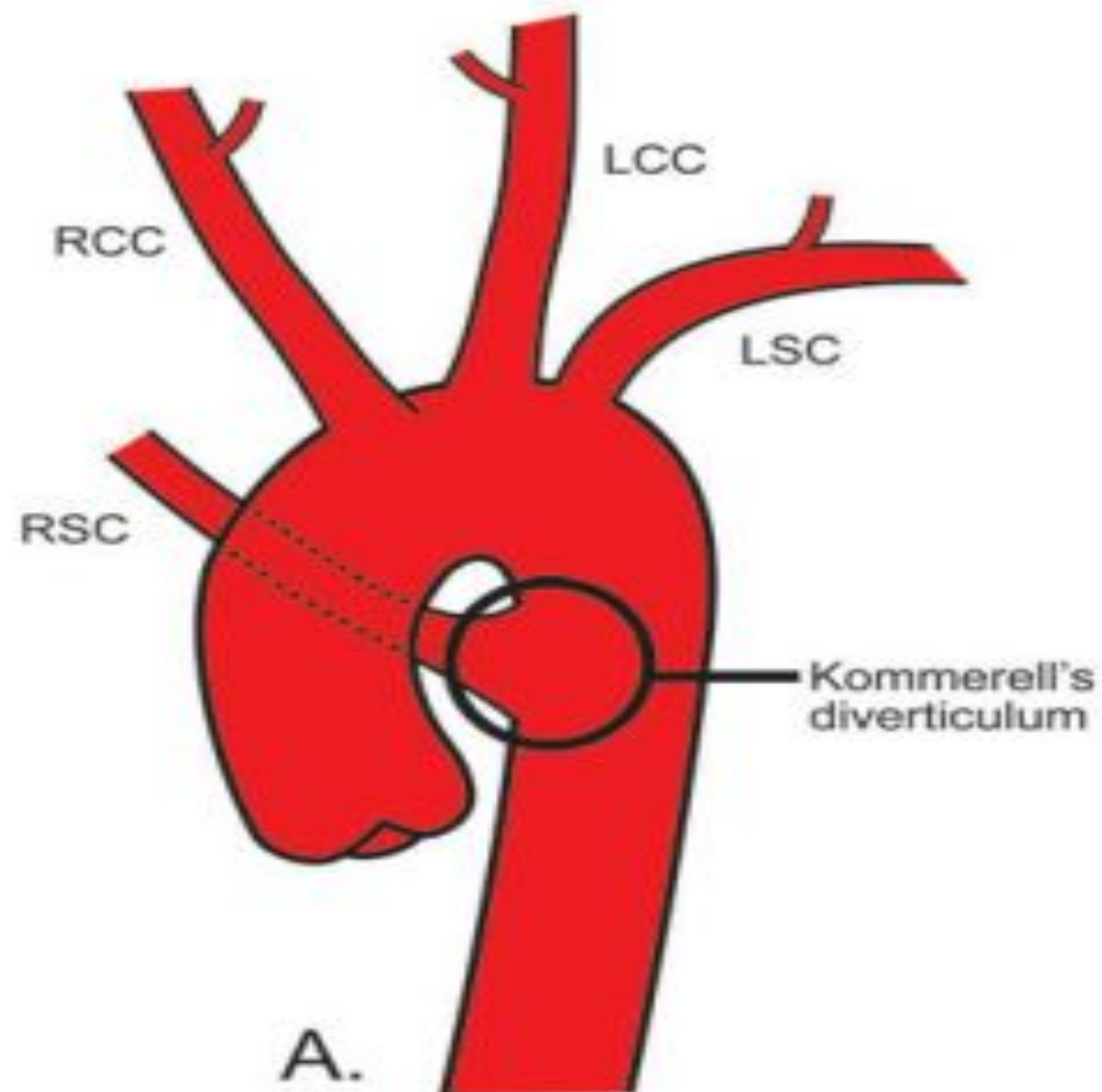
Left-Sided



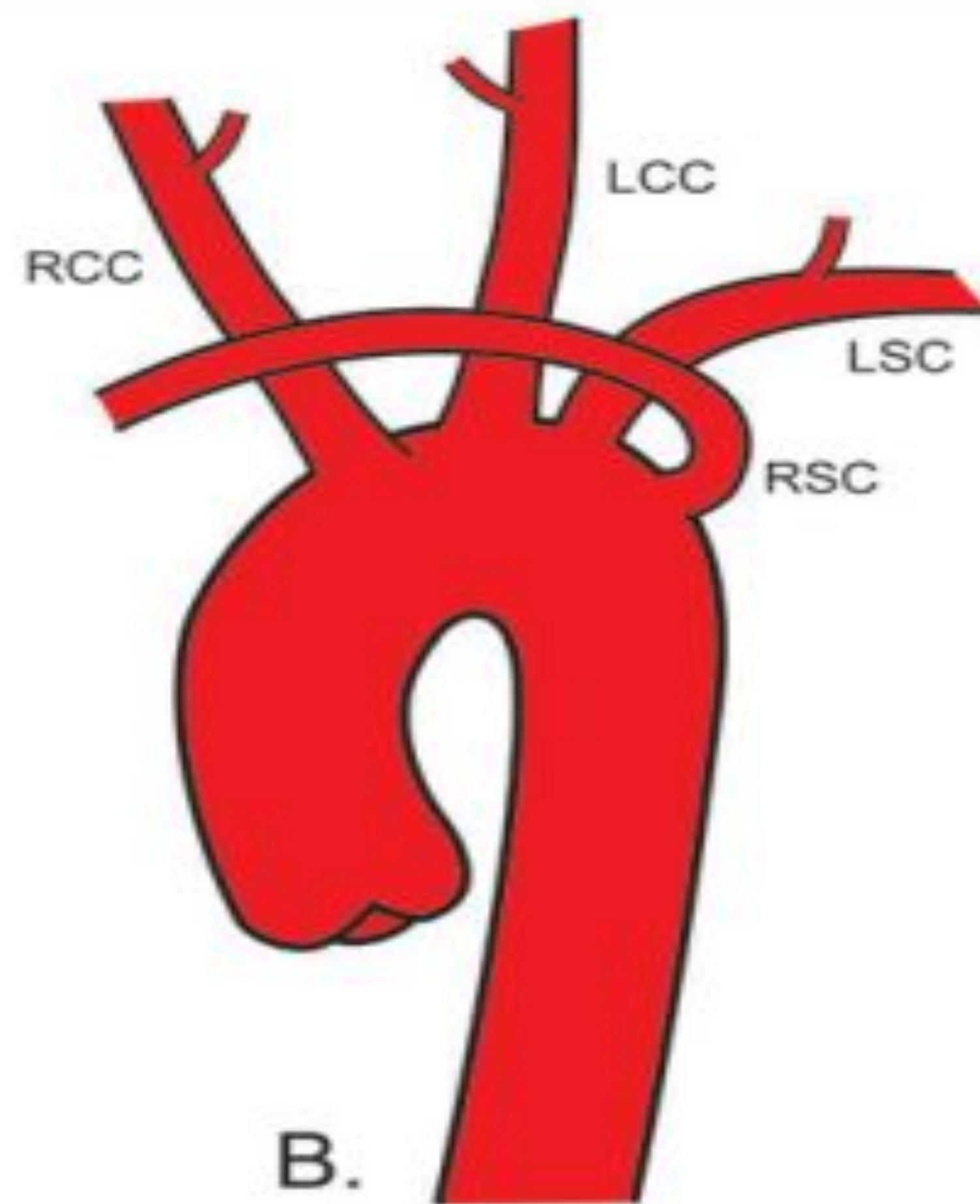
Bovine



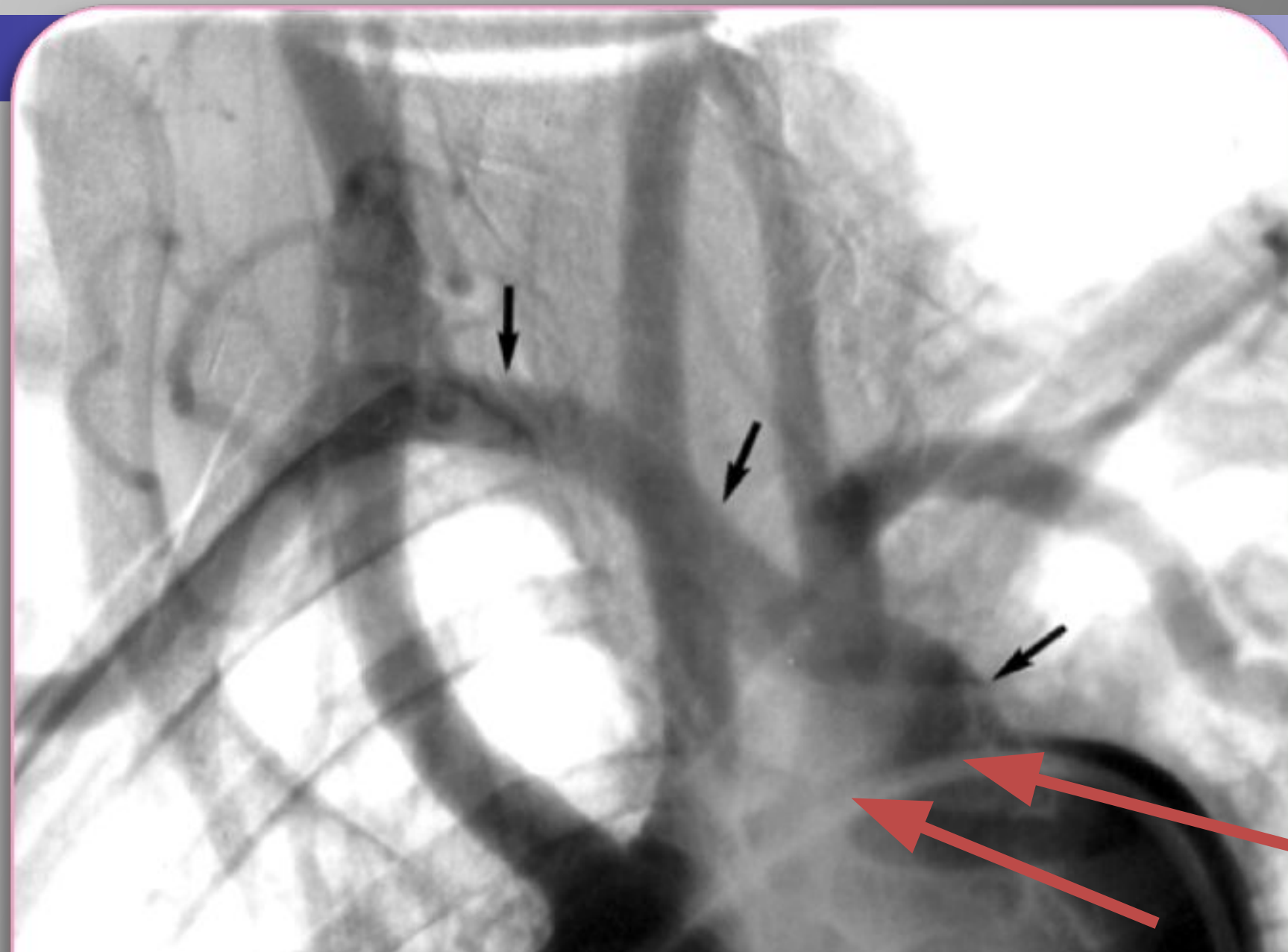
Bovine – like



**Trajet aberrant de la SCD née
d'un diverticule de Kommerell**

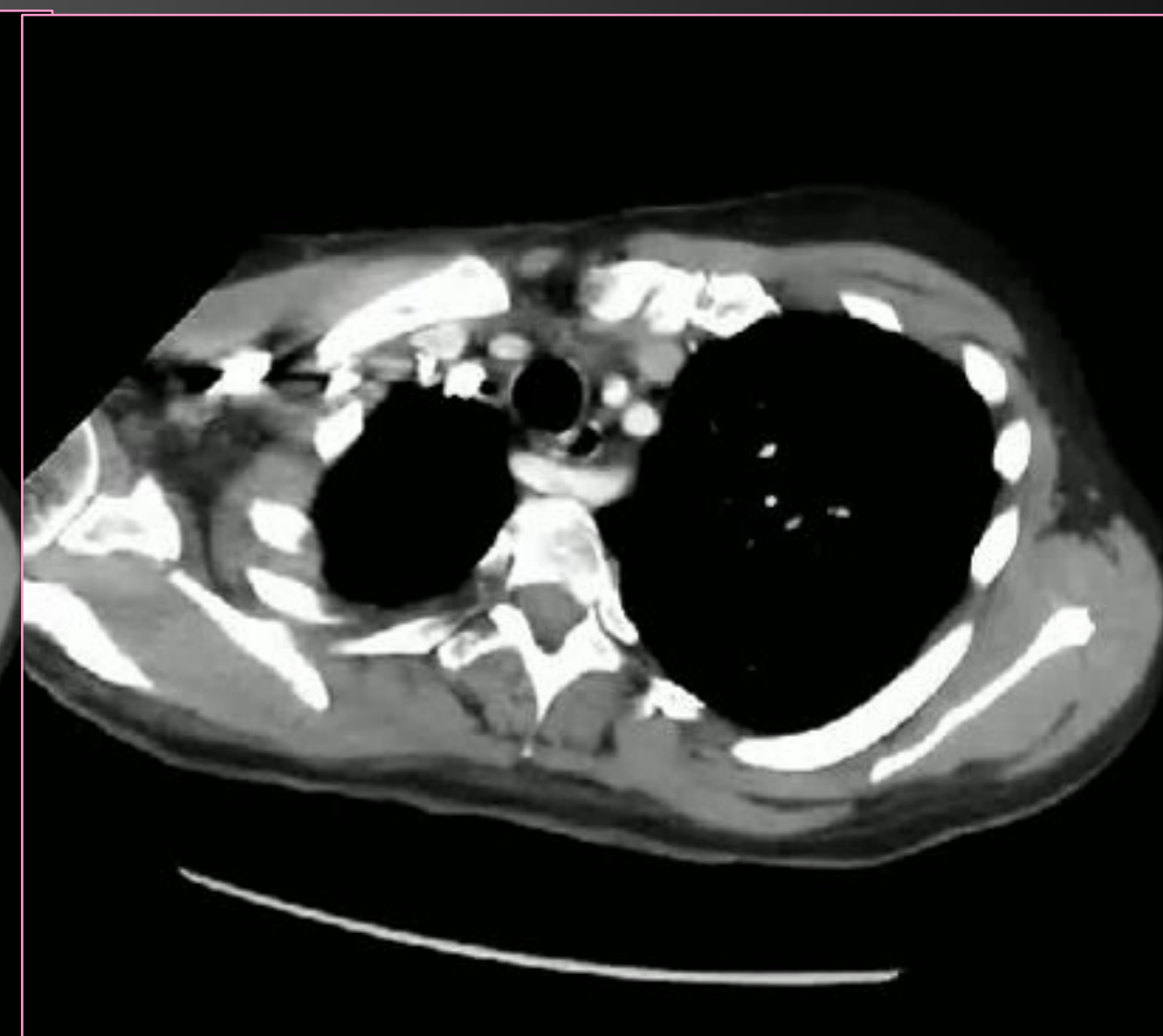
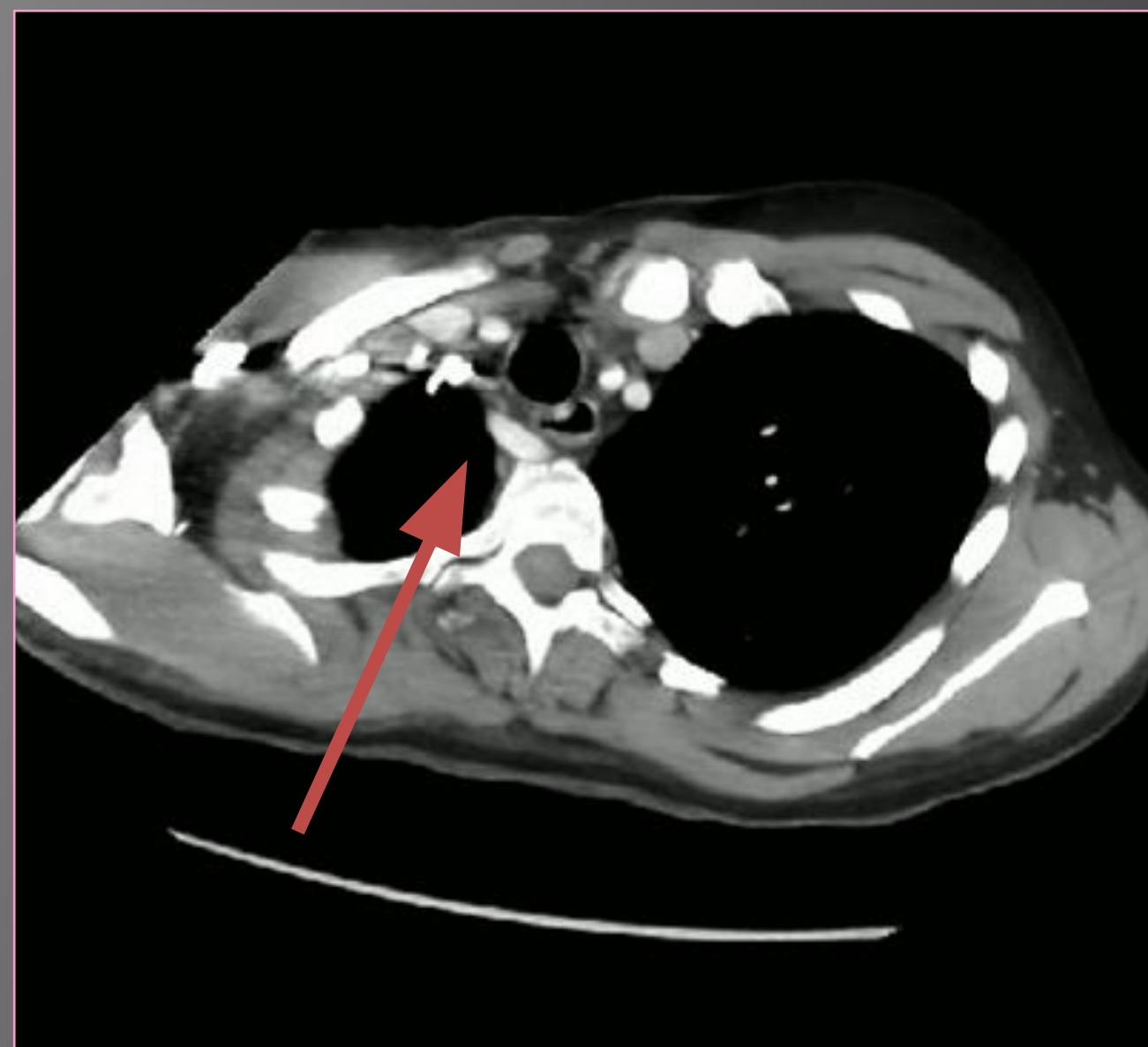


**Trajet aberrant de la SCD
(artère de lusoria)**

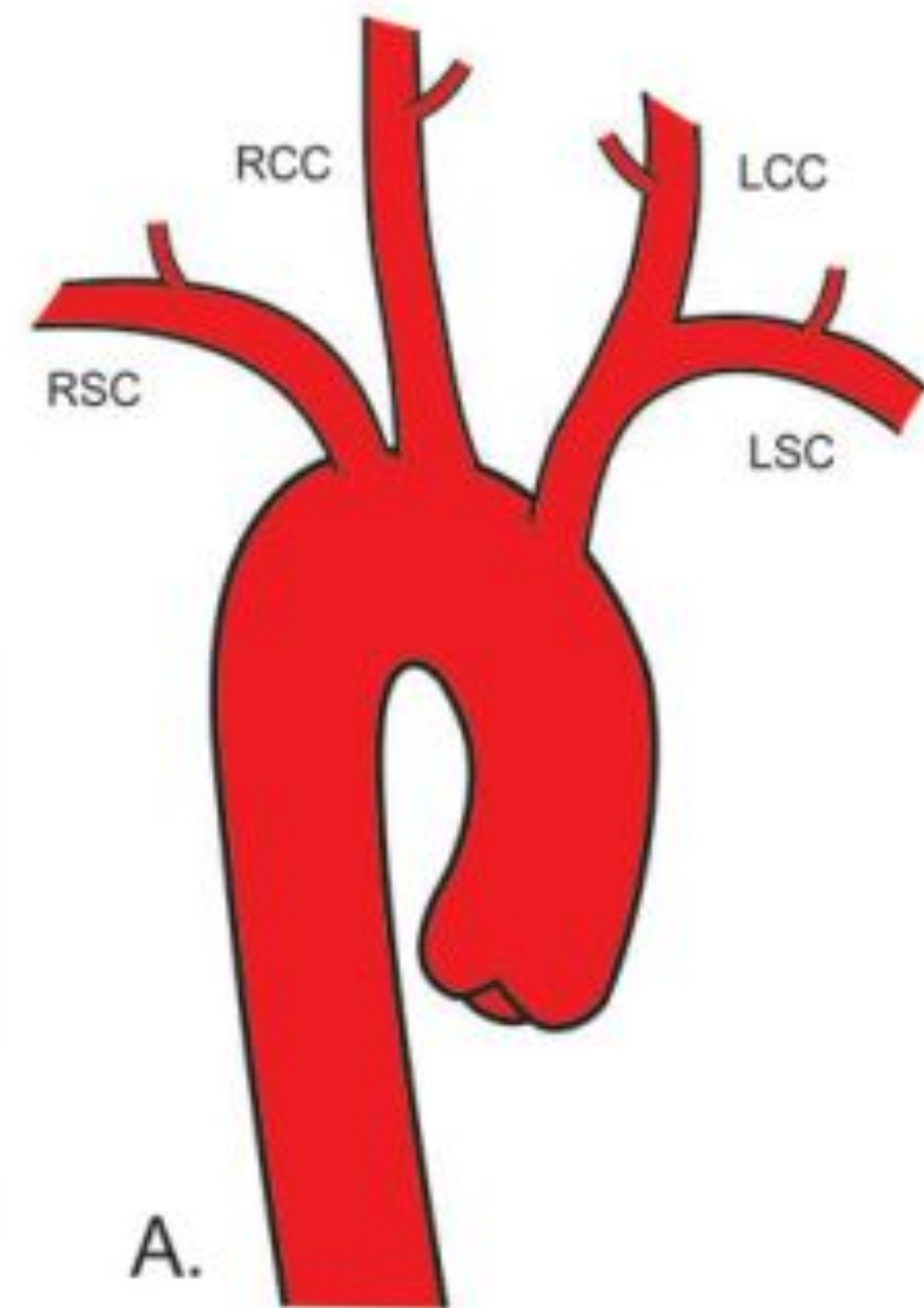


A. sous-clavière droite rétro-œsophagienne (*arteria lusoria*)
Naissance en aval de l'ASCG

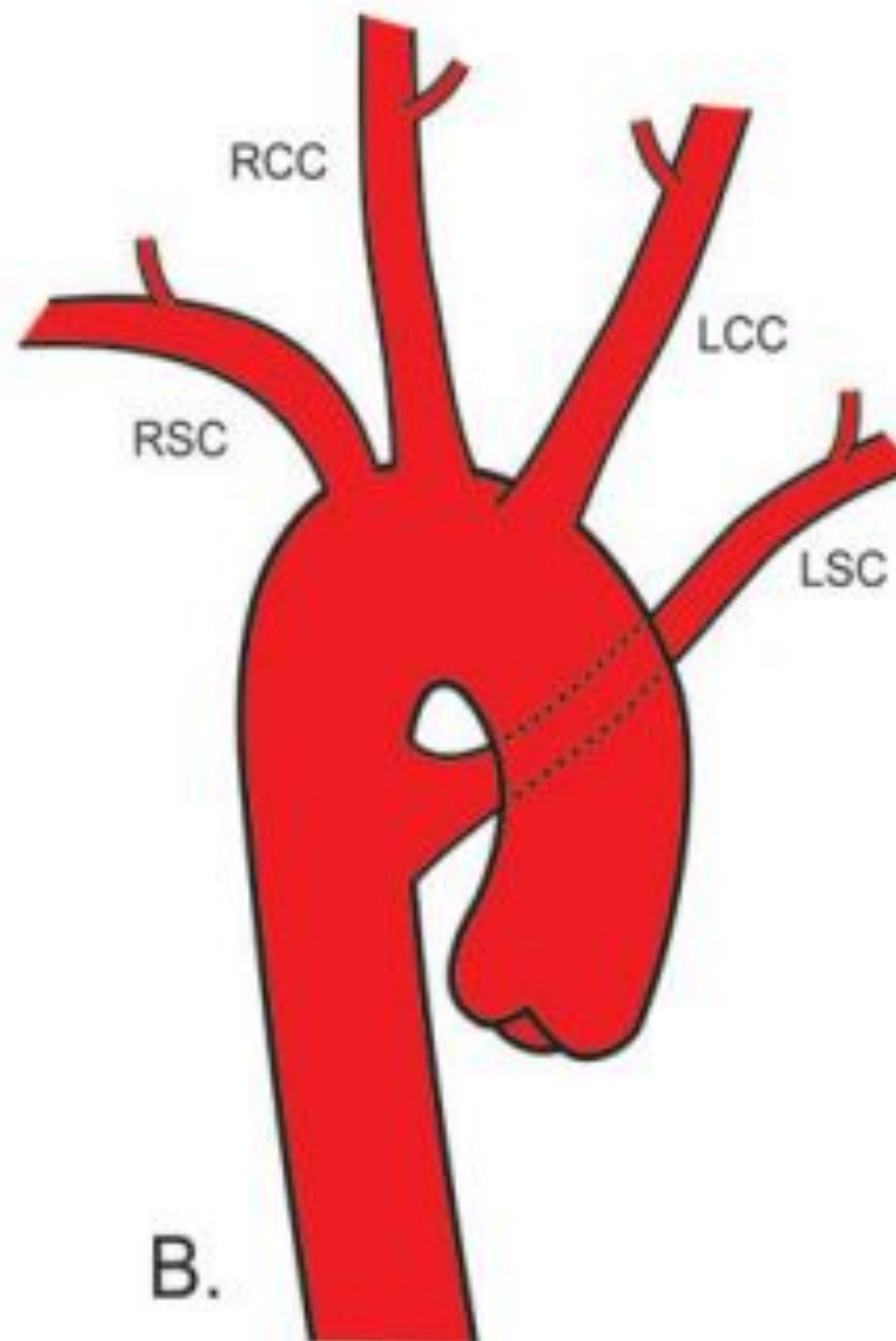
Voie radiale = 0 !



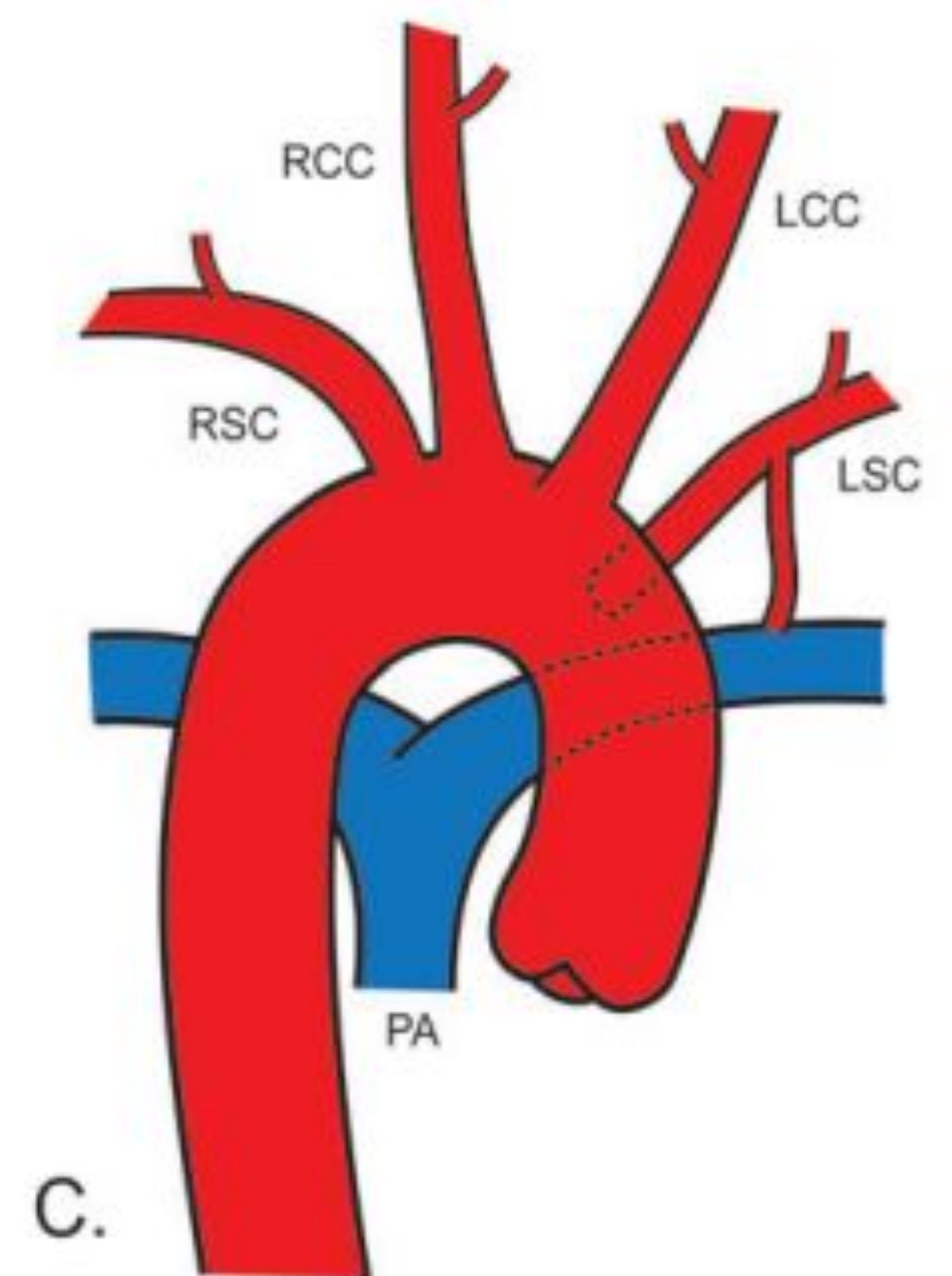
Variantes de la crosse droite



Divison en miroir



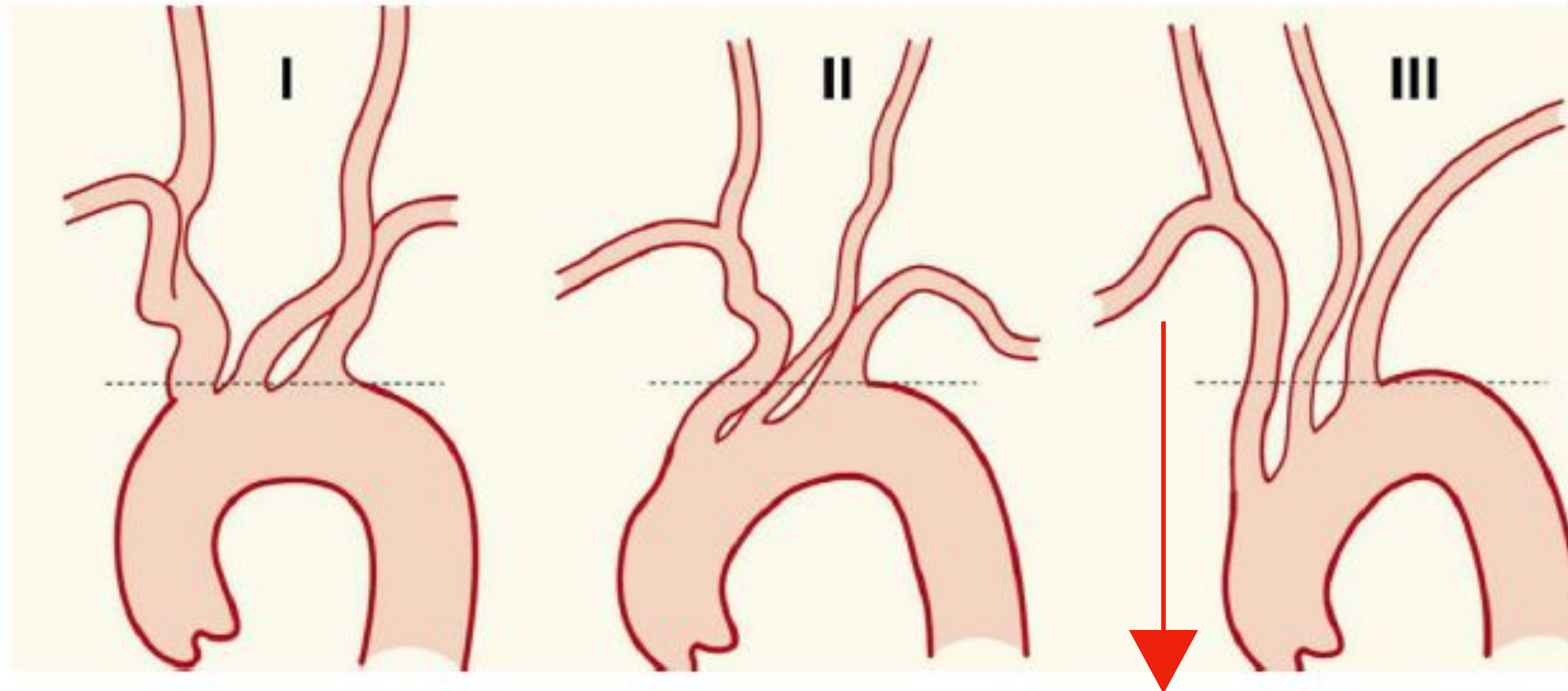
Trajet aberrant de la SCG



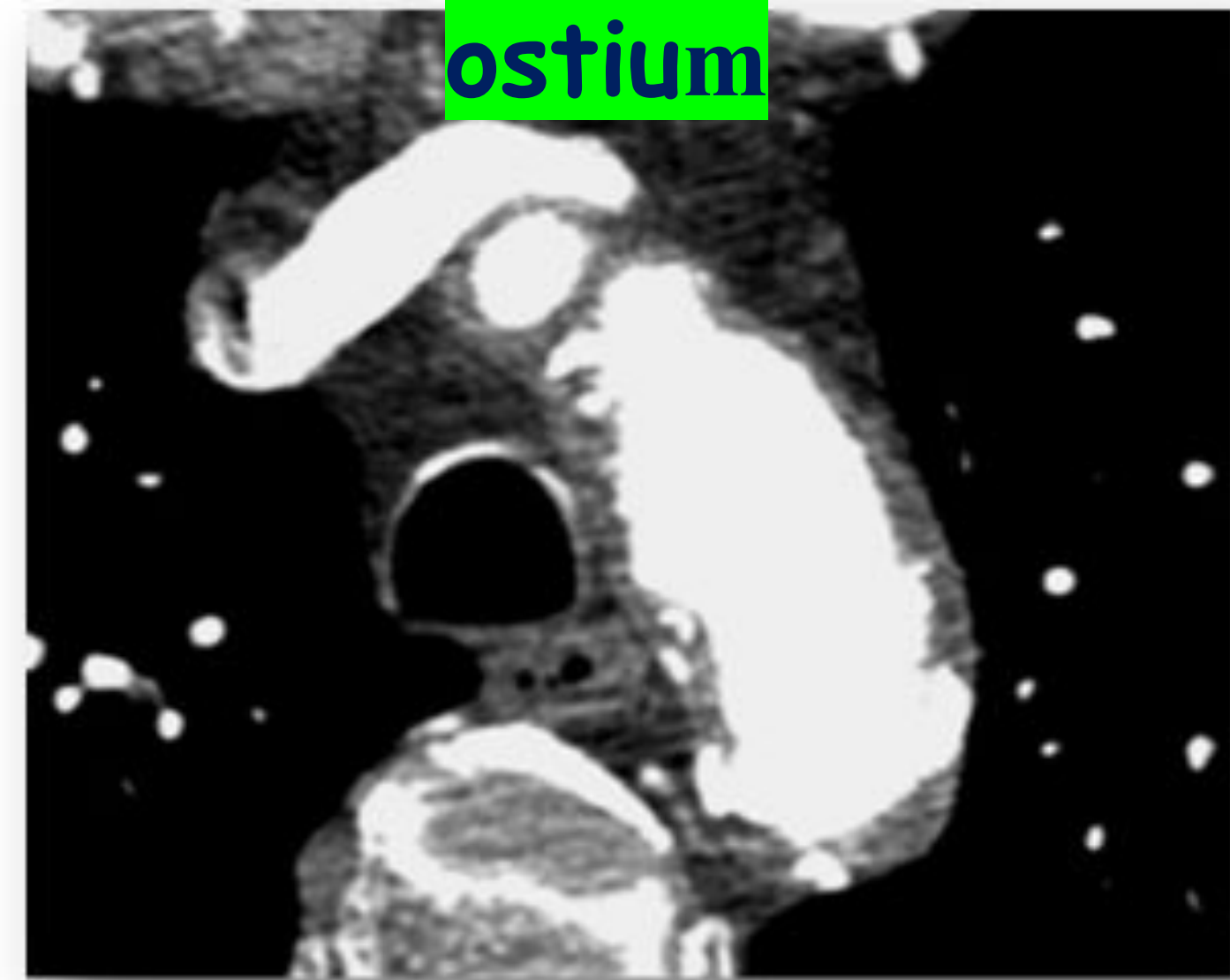
ASCG isolée

Crosses difficiles: l'âge

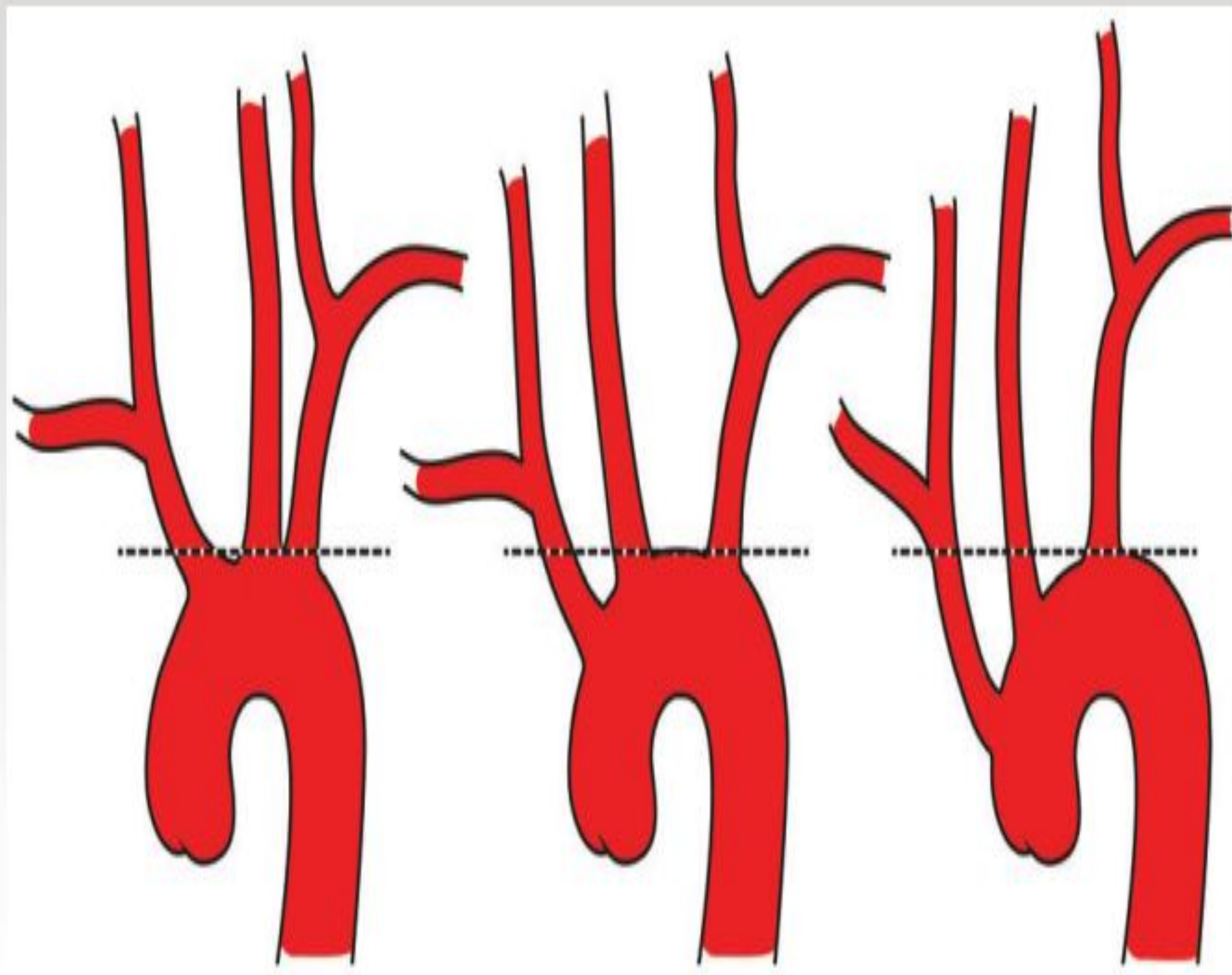
Du plus simple au plus compliqué



angle aigu
tortuosité au delà de l'
ostium



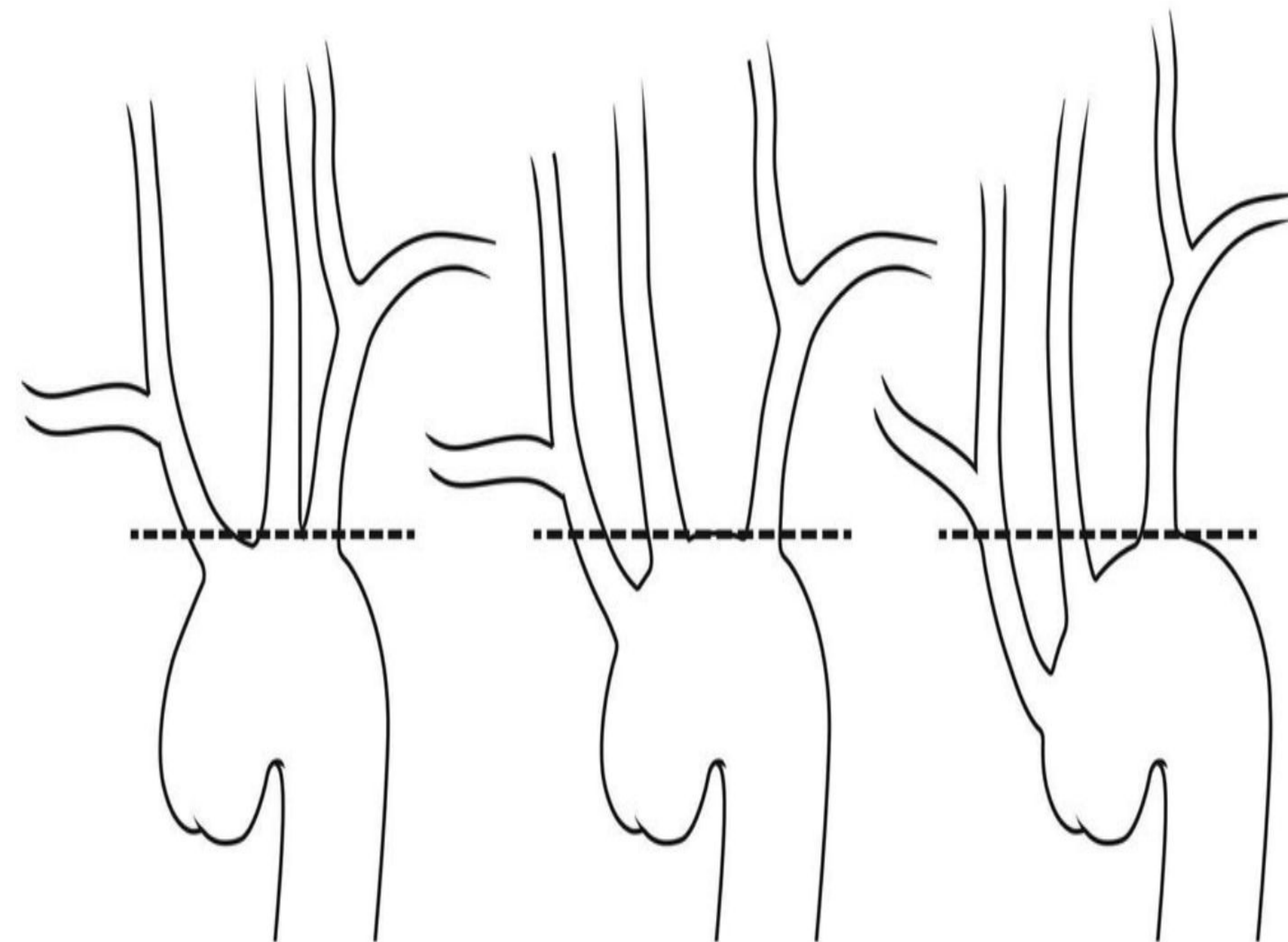




Type I

Type II

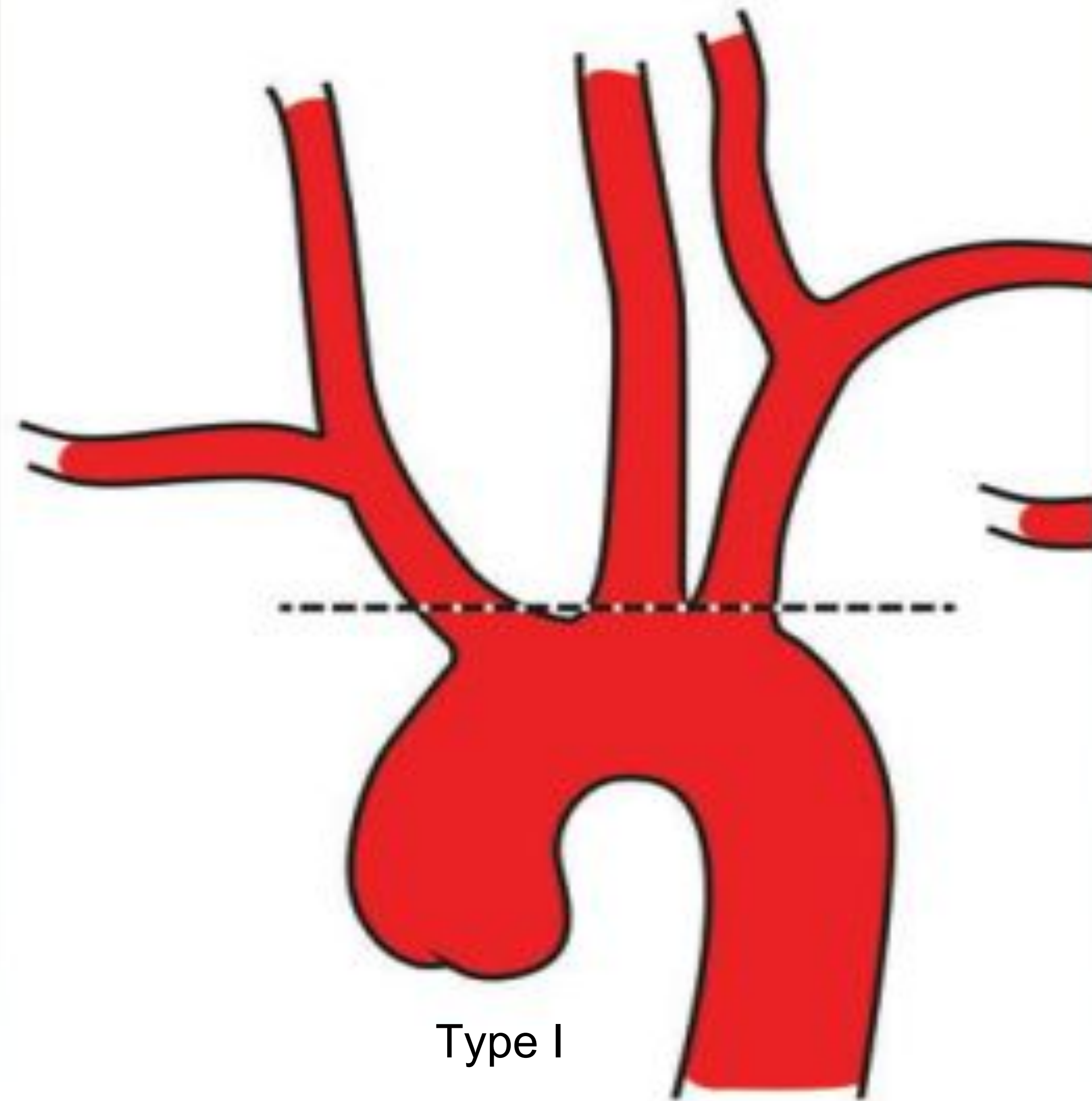
Type III



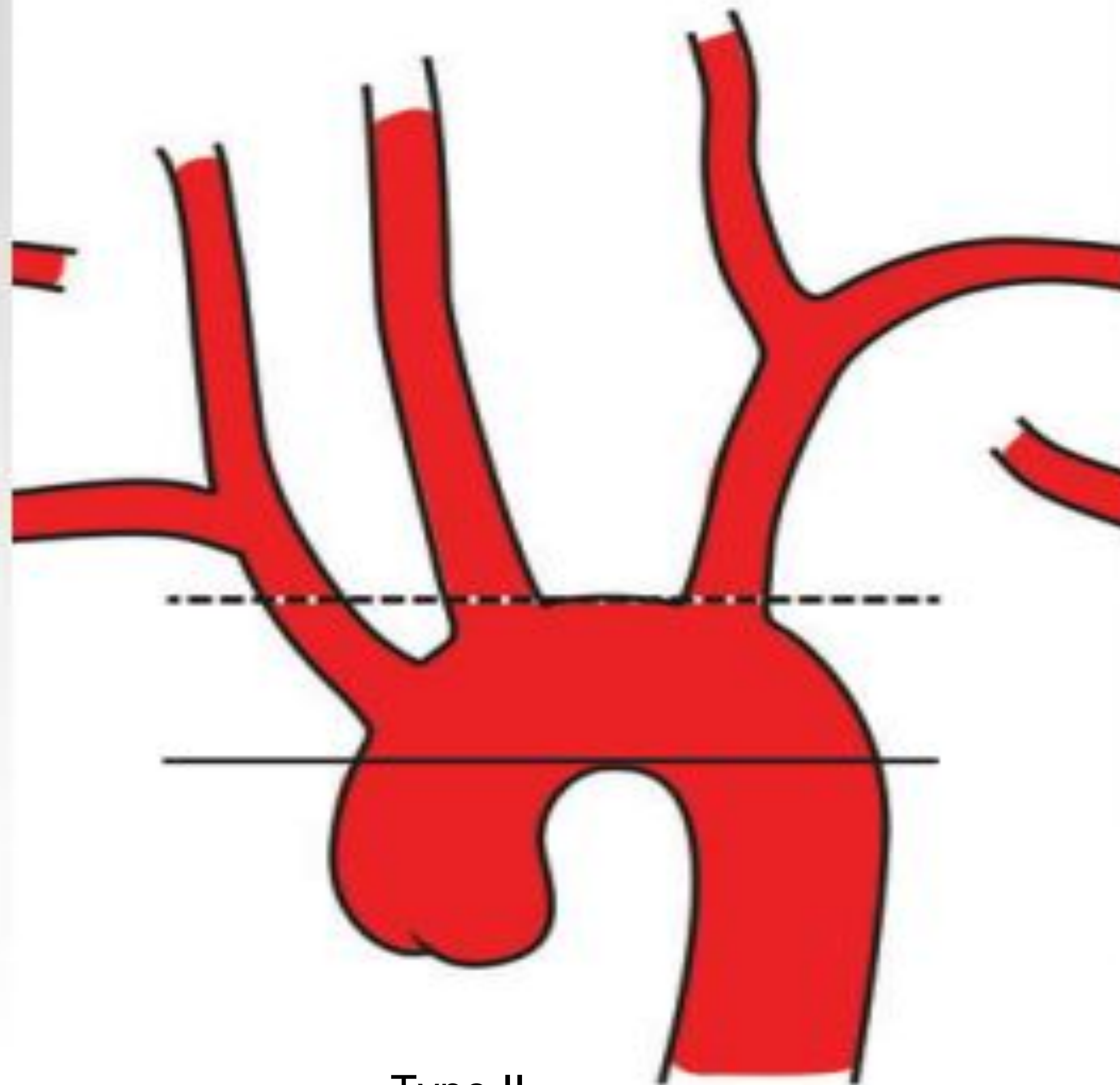
Type I

Type II

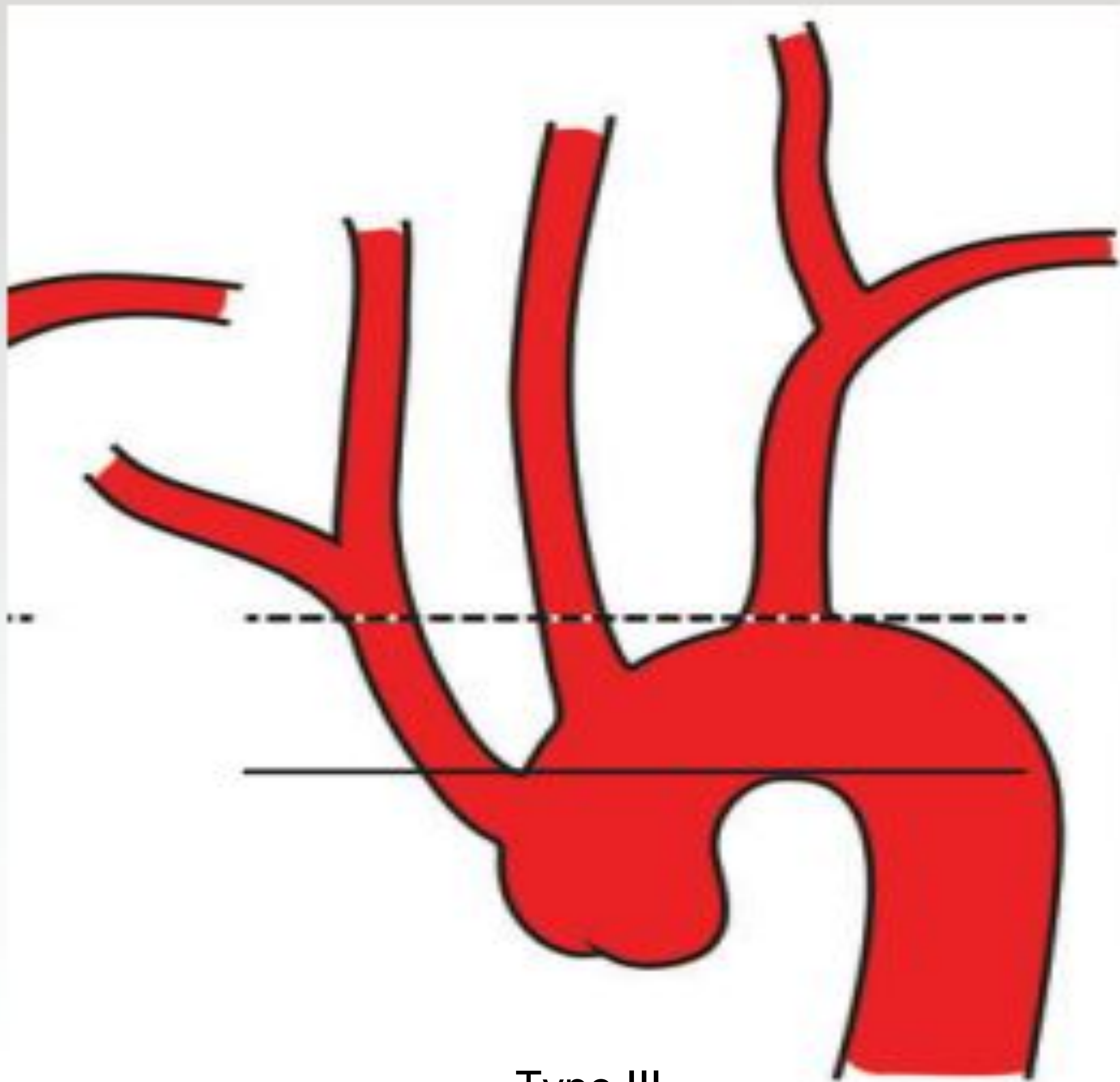
Type III



Type I

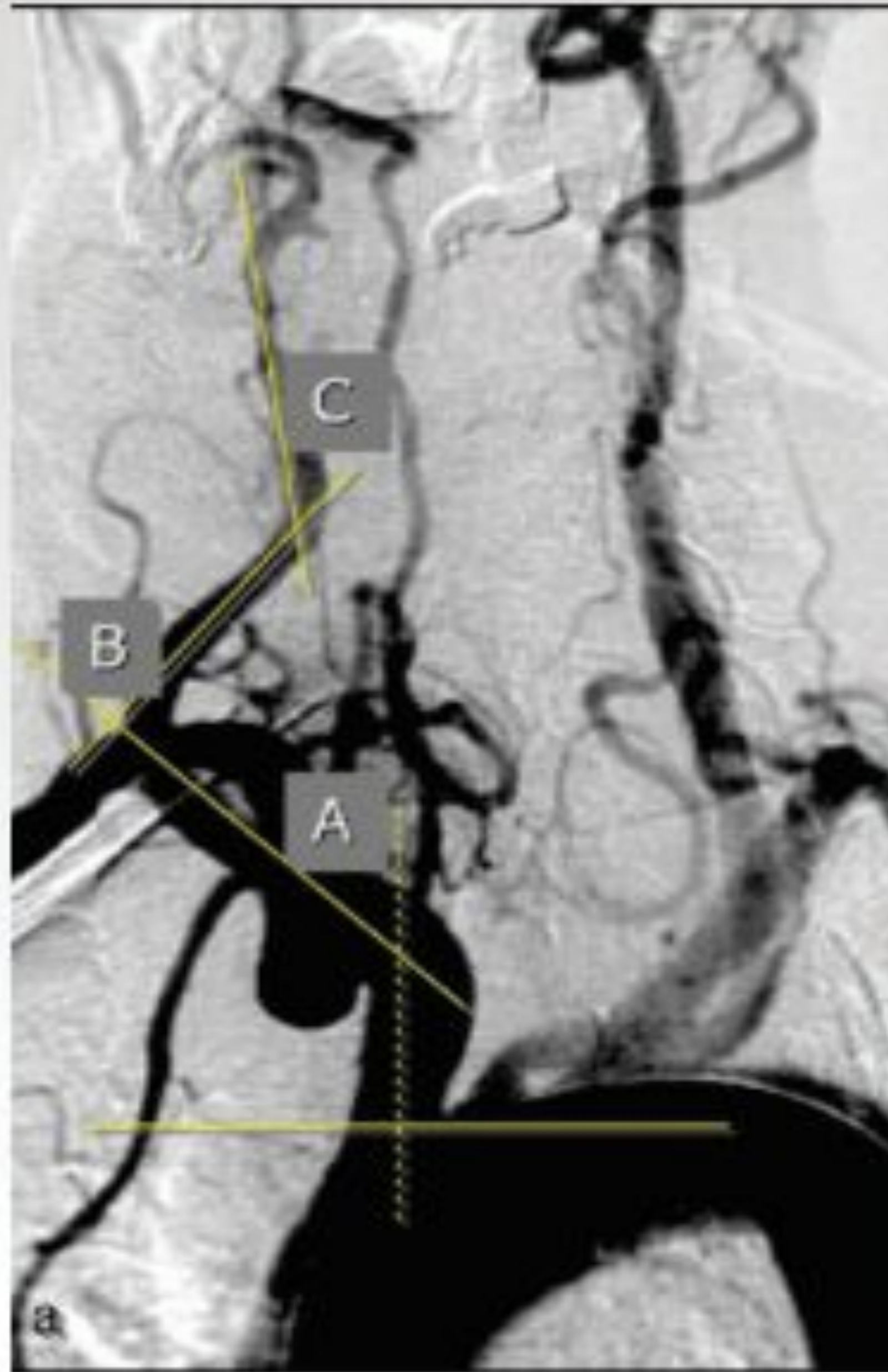


Type II

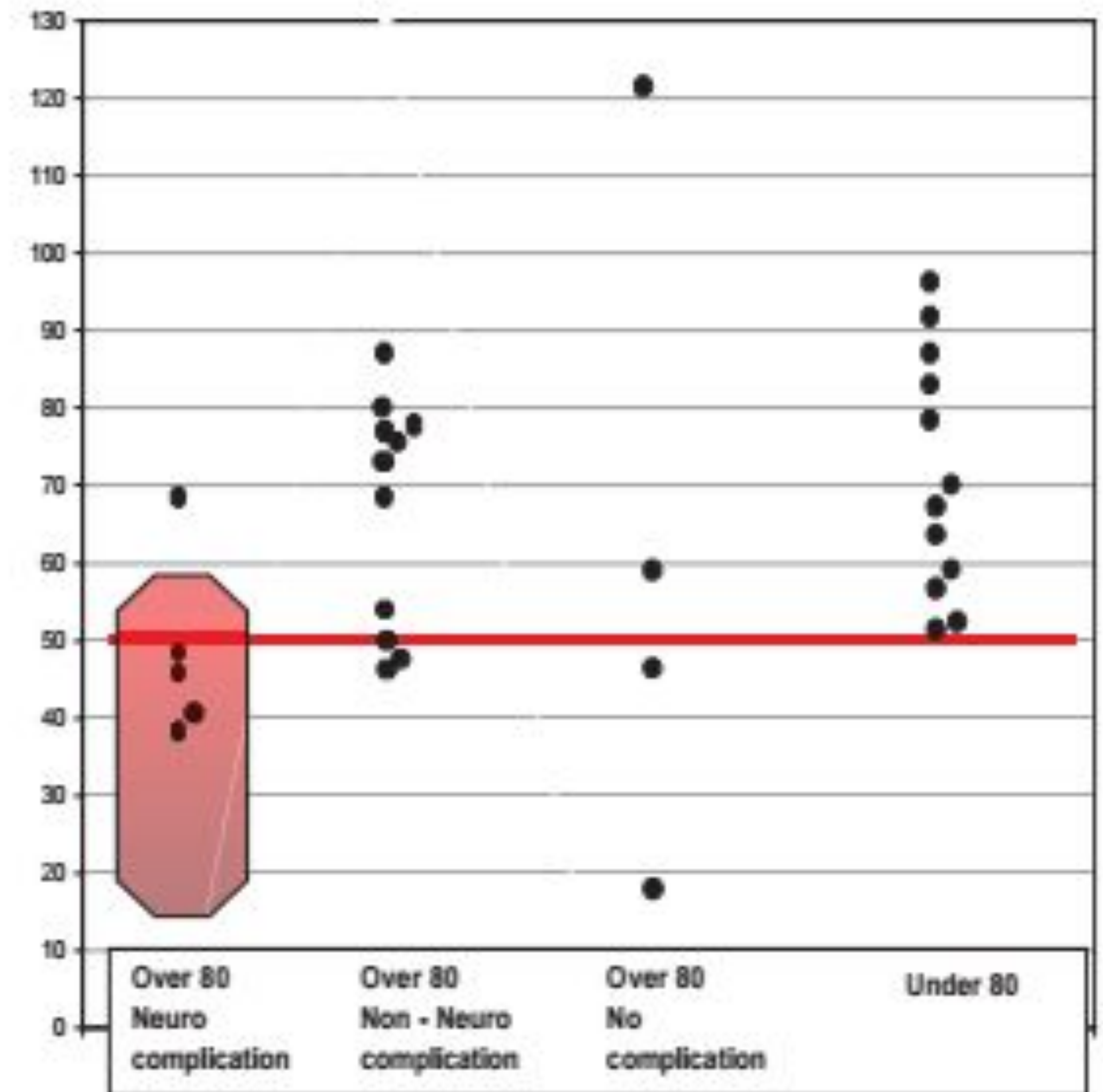
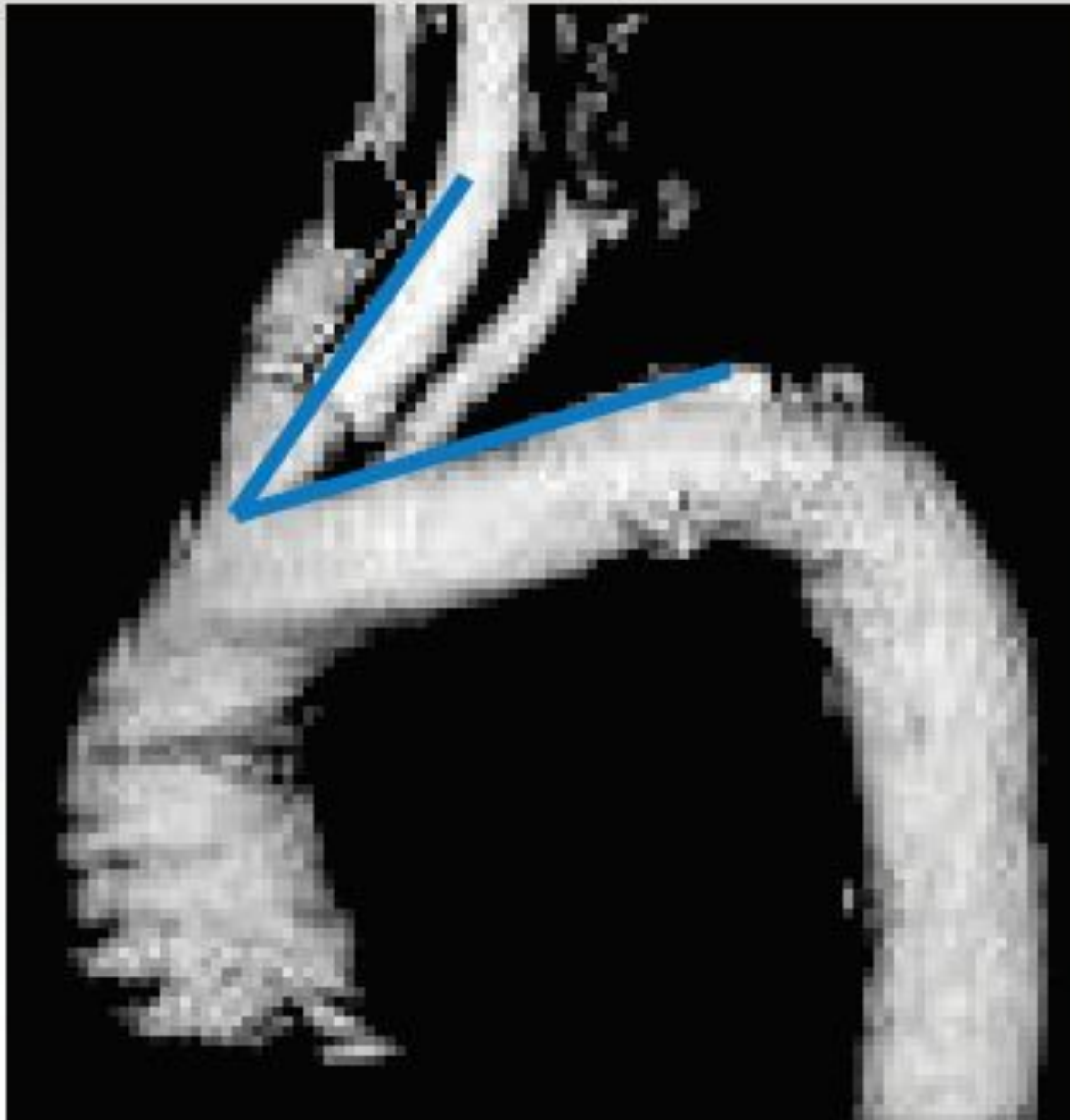


Type III

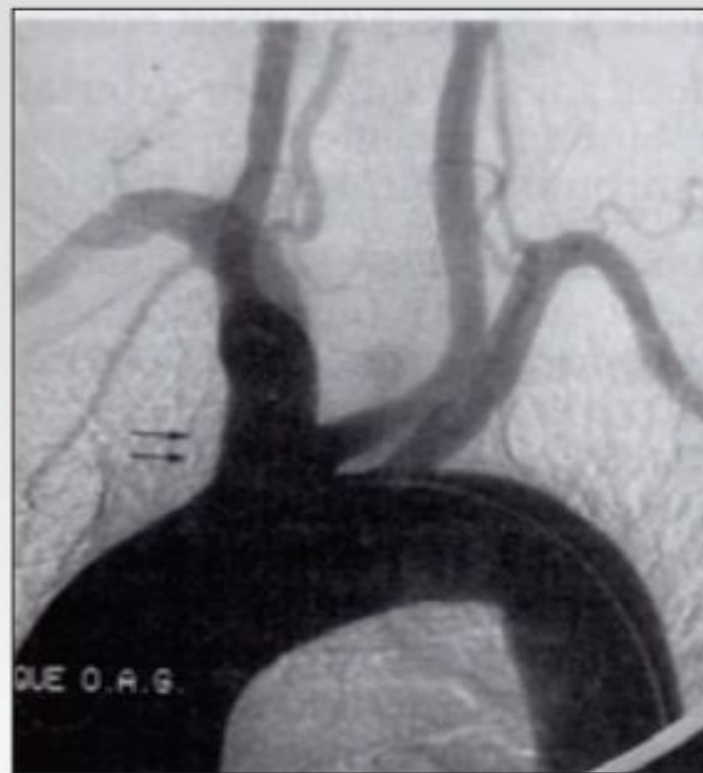
Indice de tortuosité (IT)



Angle Carotido-Aortique



Crosse difficile



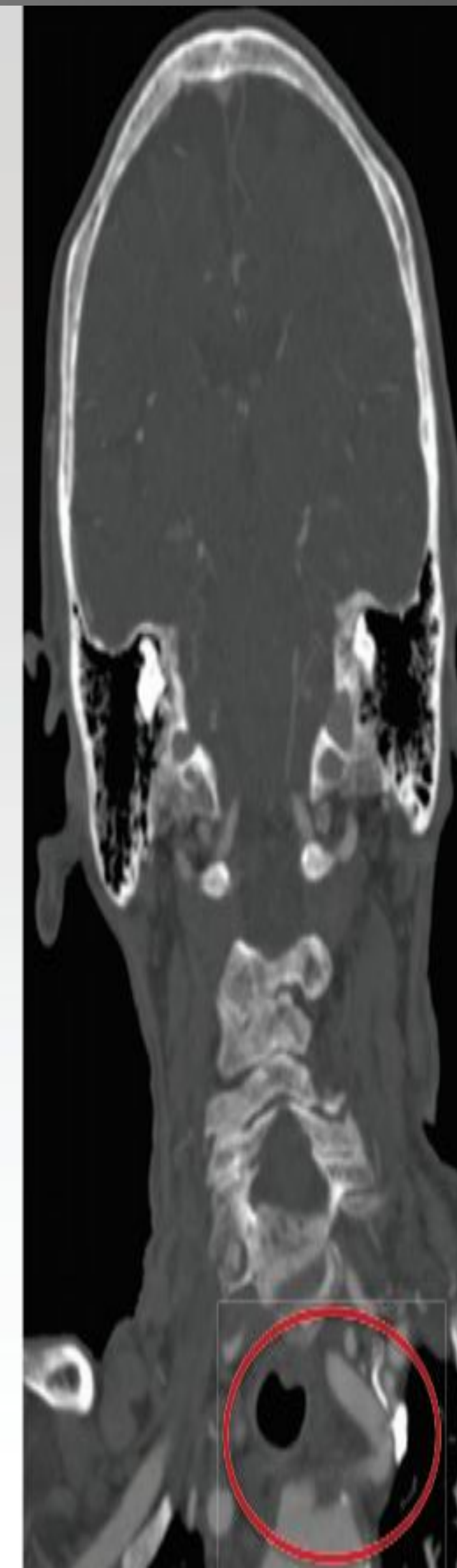
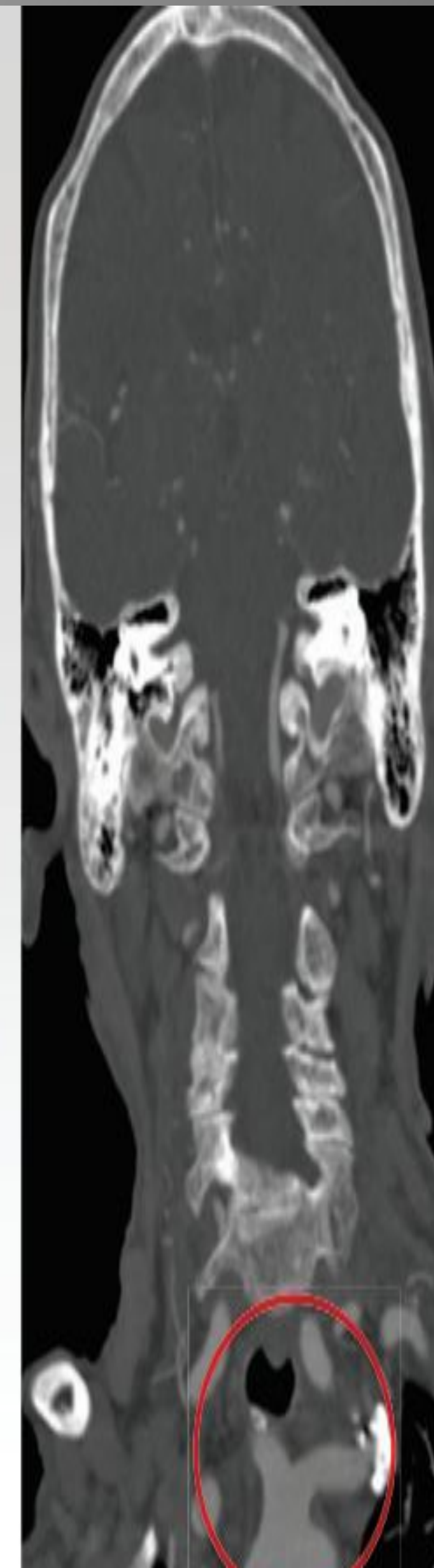
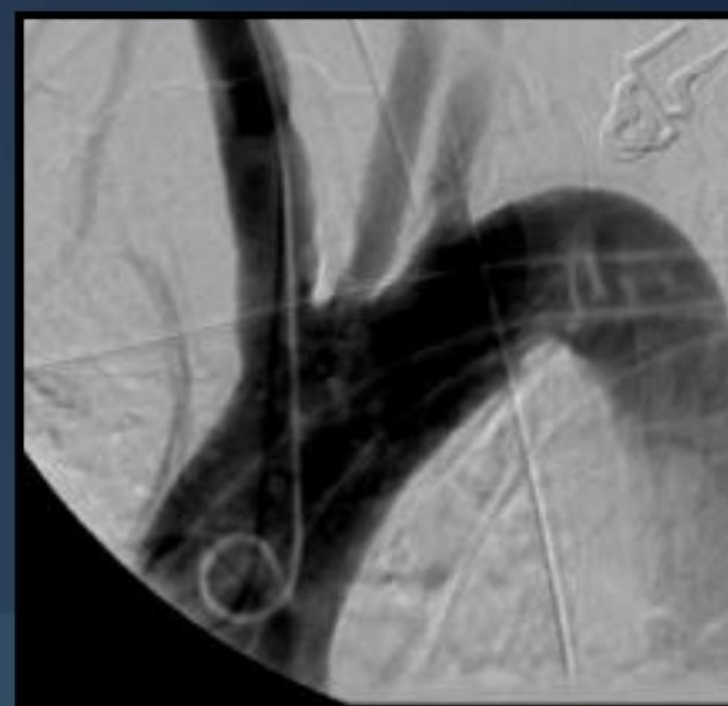
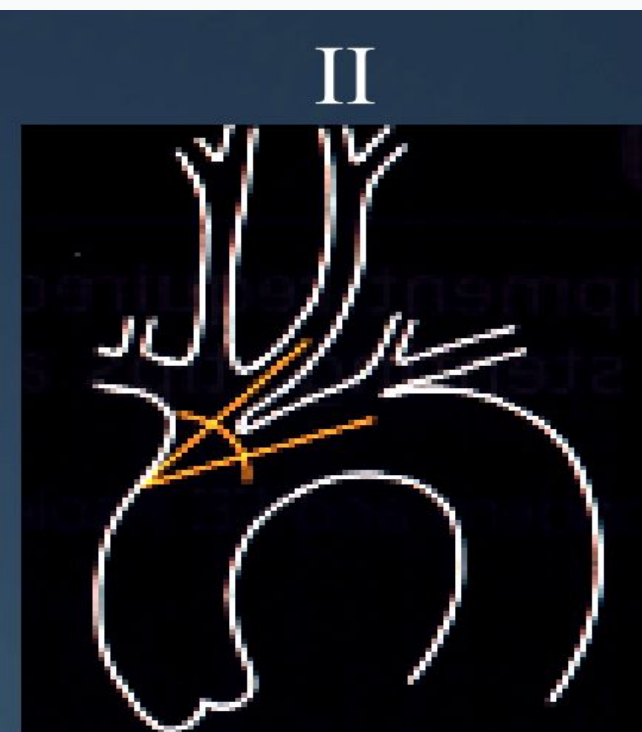
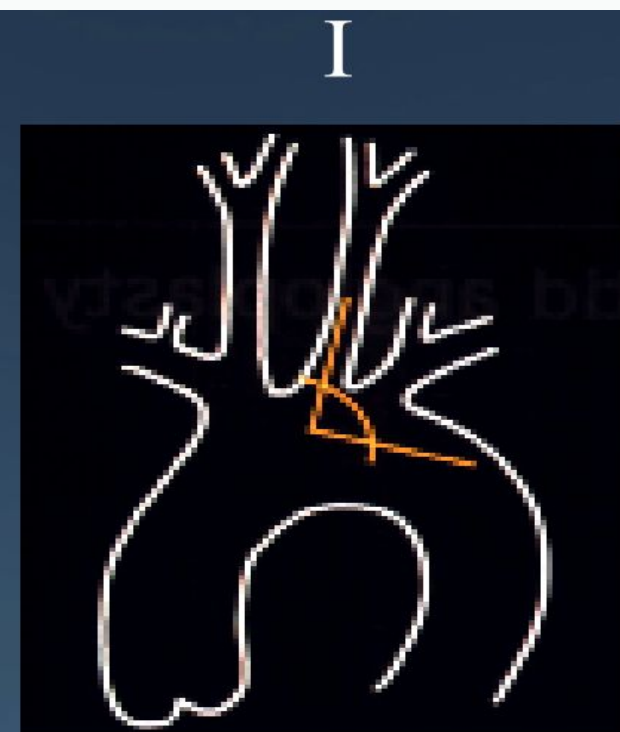
Type I – “Bovine Arch”



Type III – “Bovine Arch”



Tortuous Access





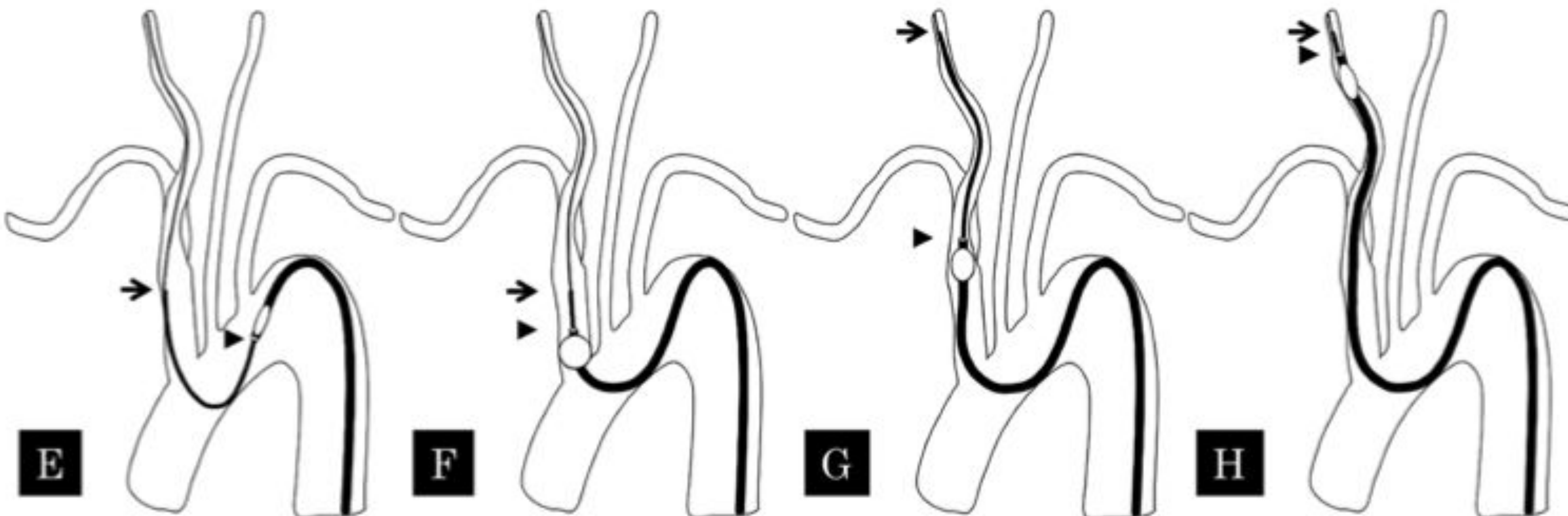
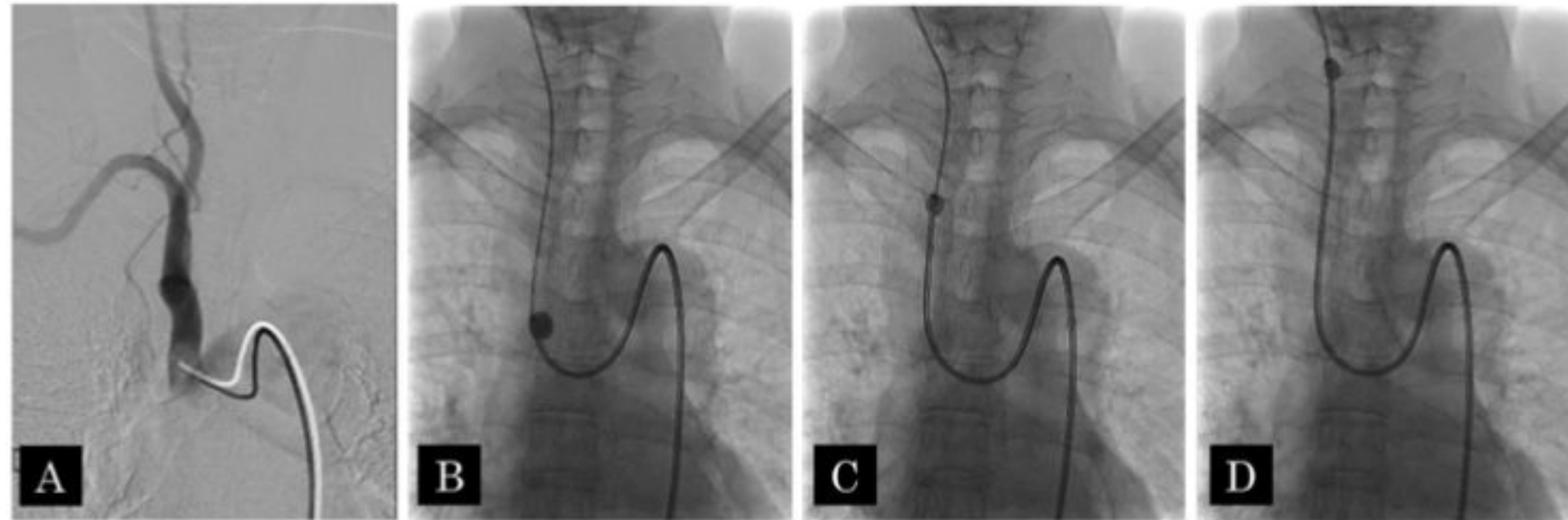
Comment surmonter les crosses difficiles ??

1. TSA avant
2. Bien connaître l'anatomie
3. Savoir faire (SIM)

Les Problèmes les plus fréquents sont type III et la tourtuosité !

Y a quelques astuces techniques par la voie fémorale

Crosses difficiles: technique d'appoint par VF



Journal of Neuroendovascular Therapy 2017; 11: 53–58
DOI: 10.5797/jnet.0a.2016-0072

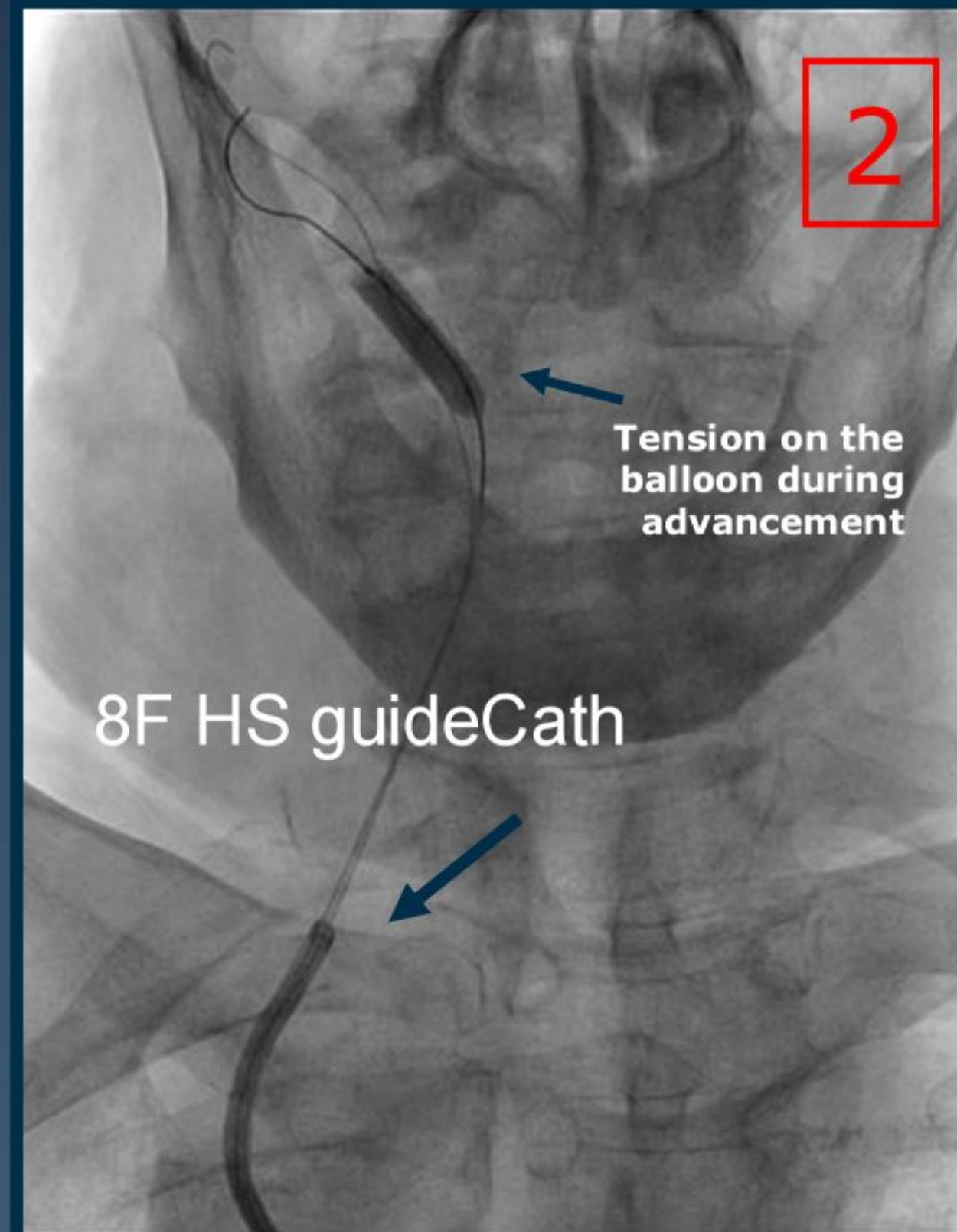
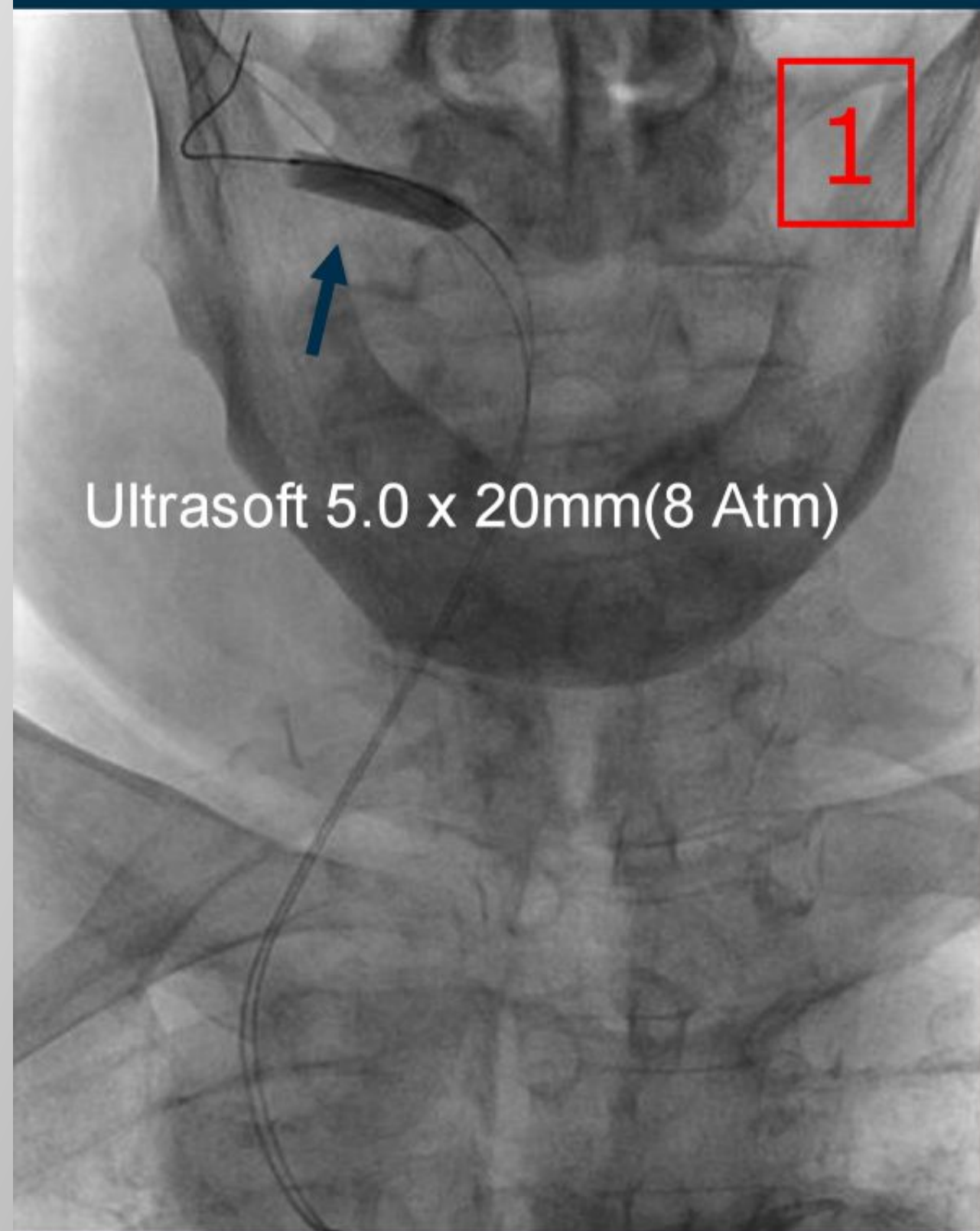
original article Balloon-inflation Anchoring Technique for Insertion of a Guiding Catheter in Acute Mechanical Thrombectomy

Ikunaga, Yuichiro Tsurusaki, Yoshiki Sambongi, and Tomoyuki Tsumoto

BIAT

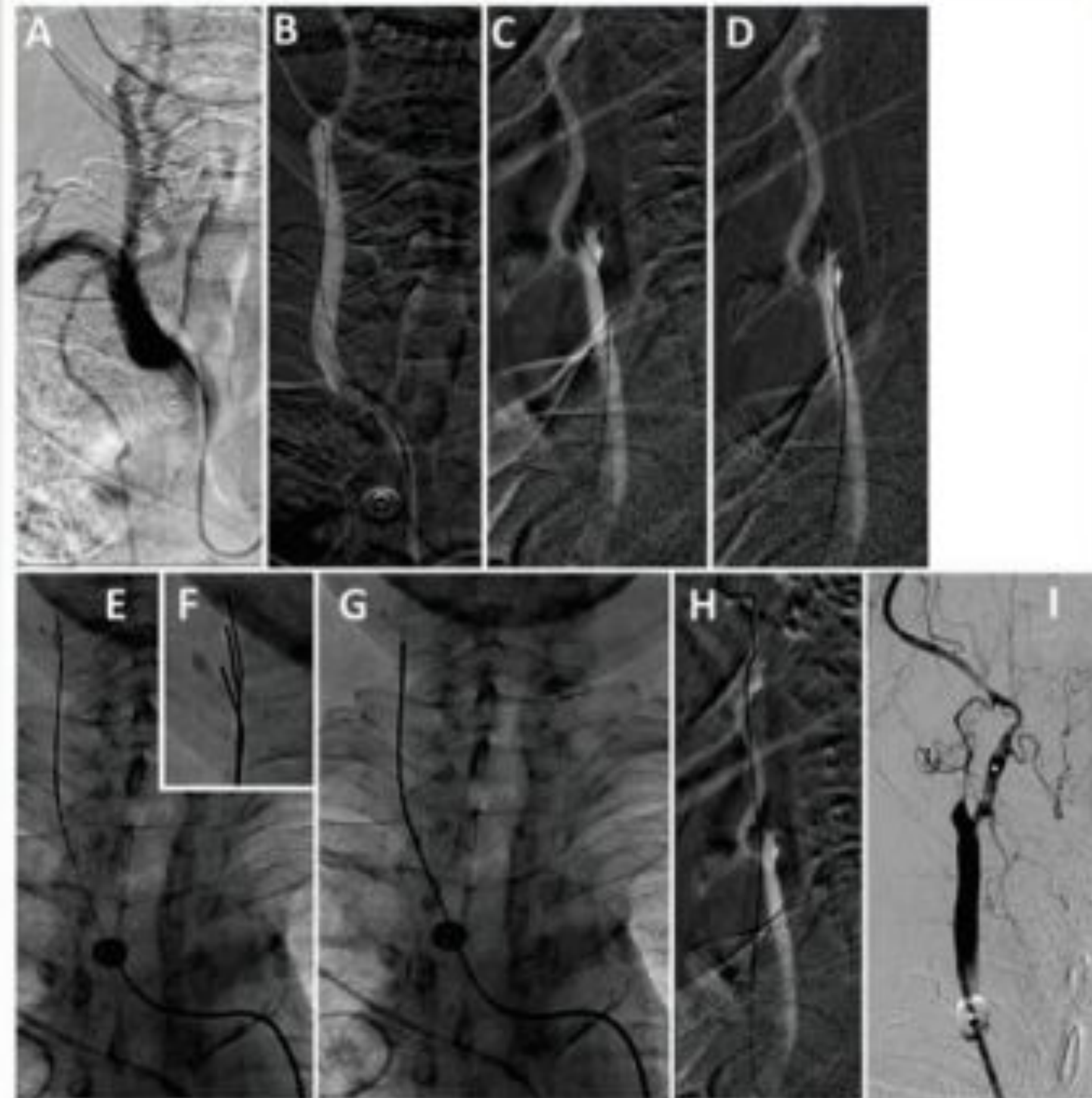
Fig. 1 The angiogram and illustration show how to navigate a BGC in a case with type-3 aortic arch. (A) The innominate artery

“Balloon Anchoring to ECA”



Successful advancement of the 8F HS GuideCath over both wires supported by the balloon inflated into the ECA

Tower of Power







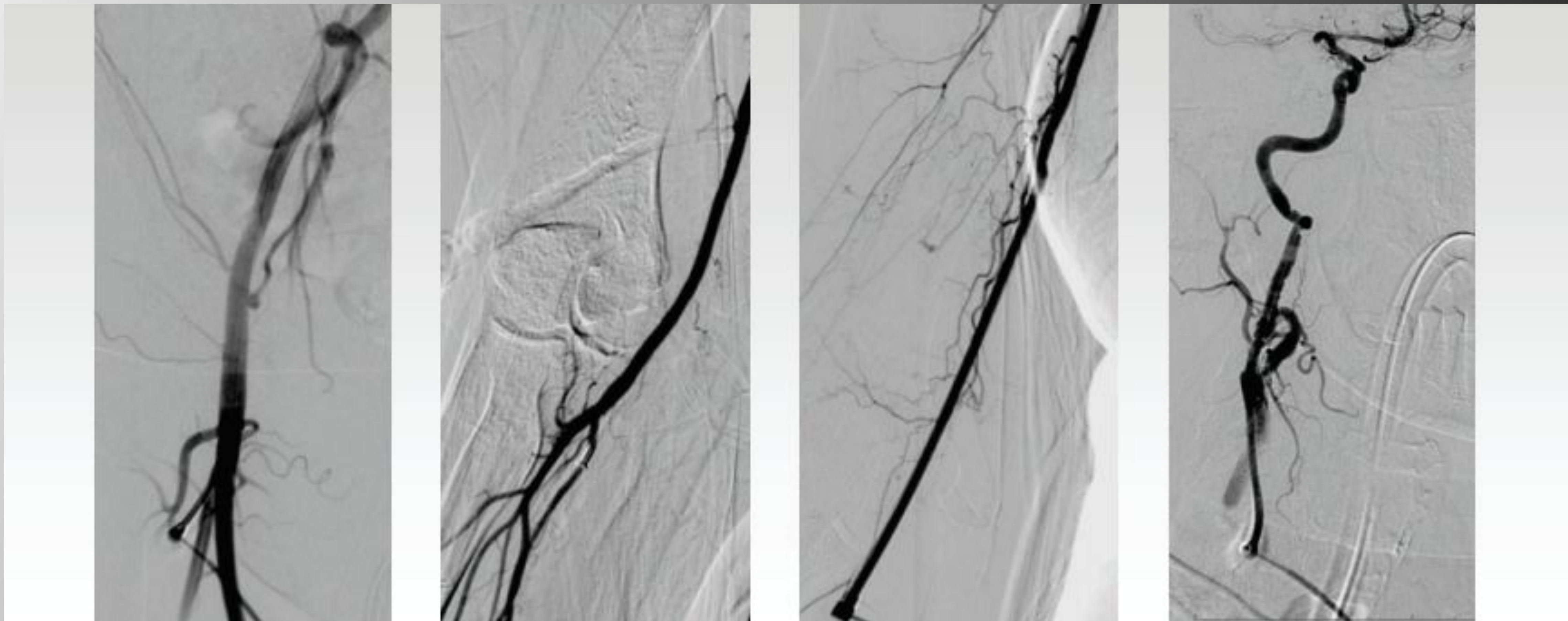
Mais

Time is brain : 20-30 mins ... Max 1H !!

Prévoir d emblée une préparation d une voie humérale / radiale

Et mois fréquement ponction carotidienne directe

Voies d'abord



Fémorale

Avantages

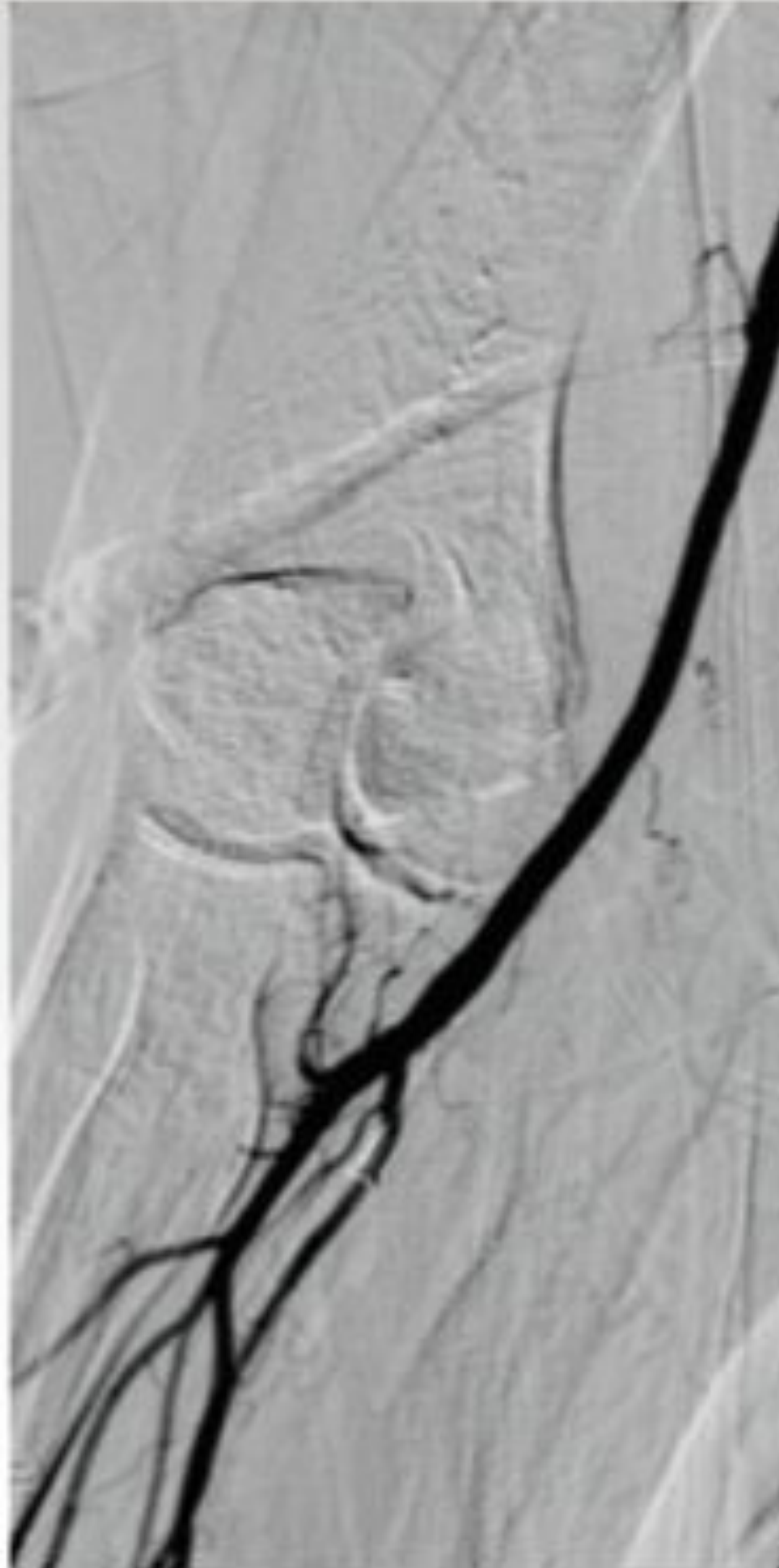
1. Familiale donc une plus grande liberté de l'improviser
2. Permet des cathéters plus grands (cathés ballon)
3. Anatomique ; Artère vertébrale gauche, crosse de type I et II



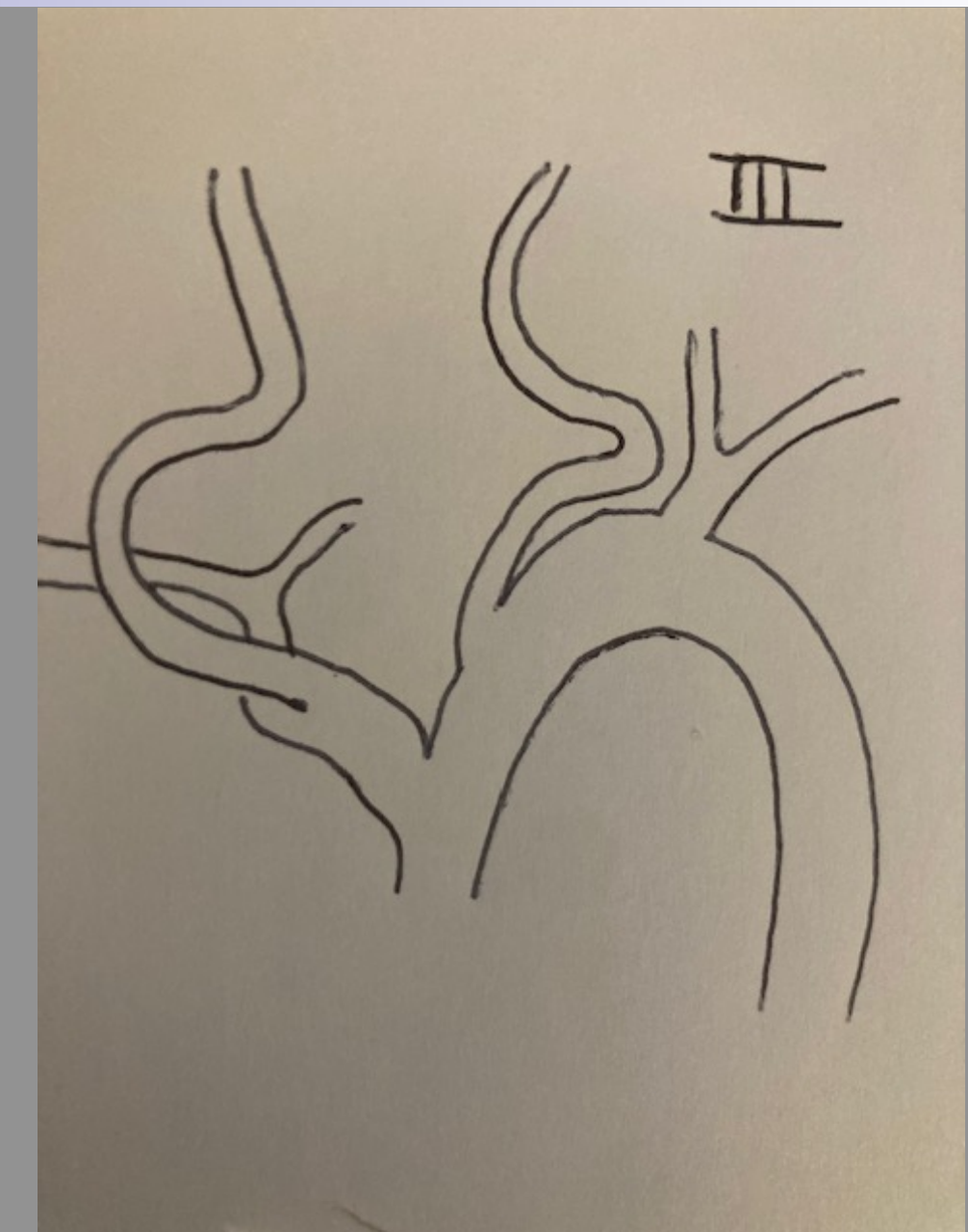
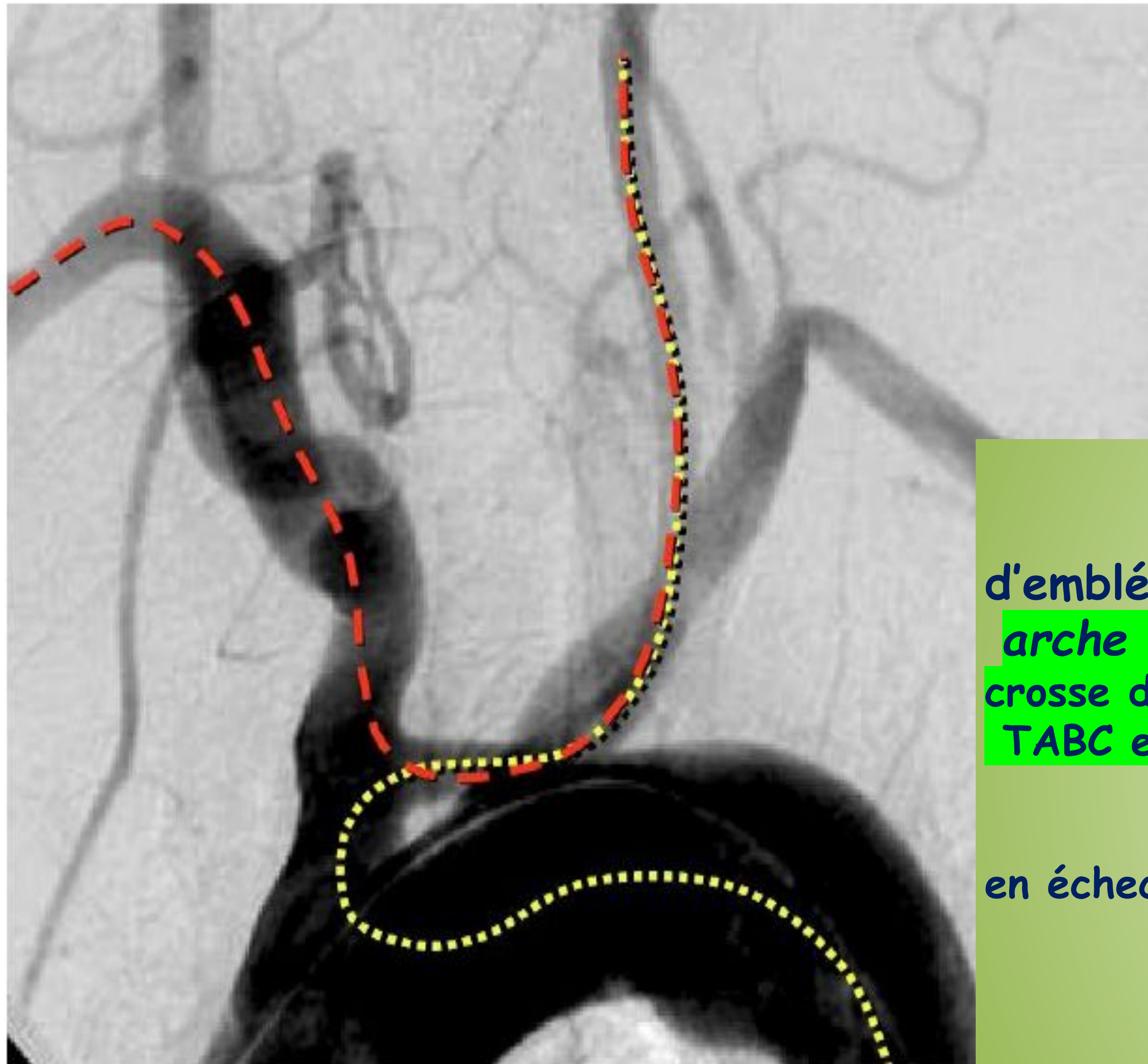
Inconvénients

1. Anatomique ; Artère vertébrale droite tortueuse
2. Crosses de type III
3. Arcs bovins

Radiale



Voie fémorale vs voie radiale



LA VOIE RADIALE :

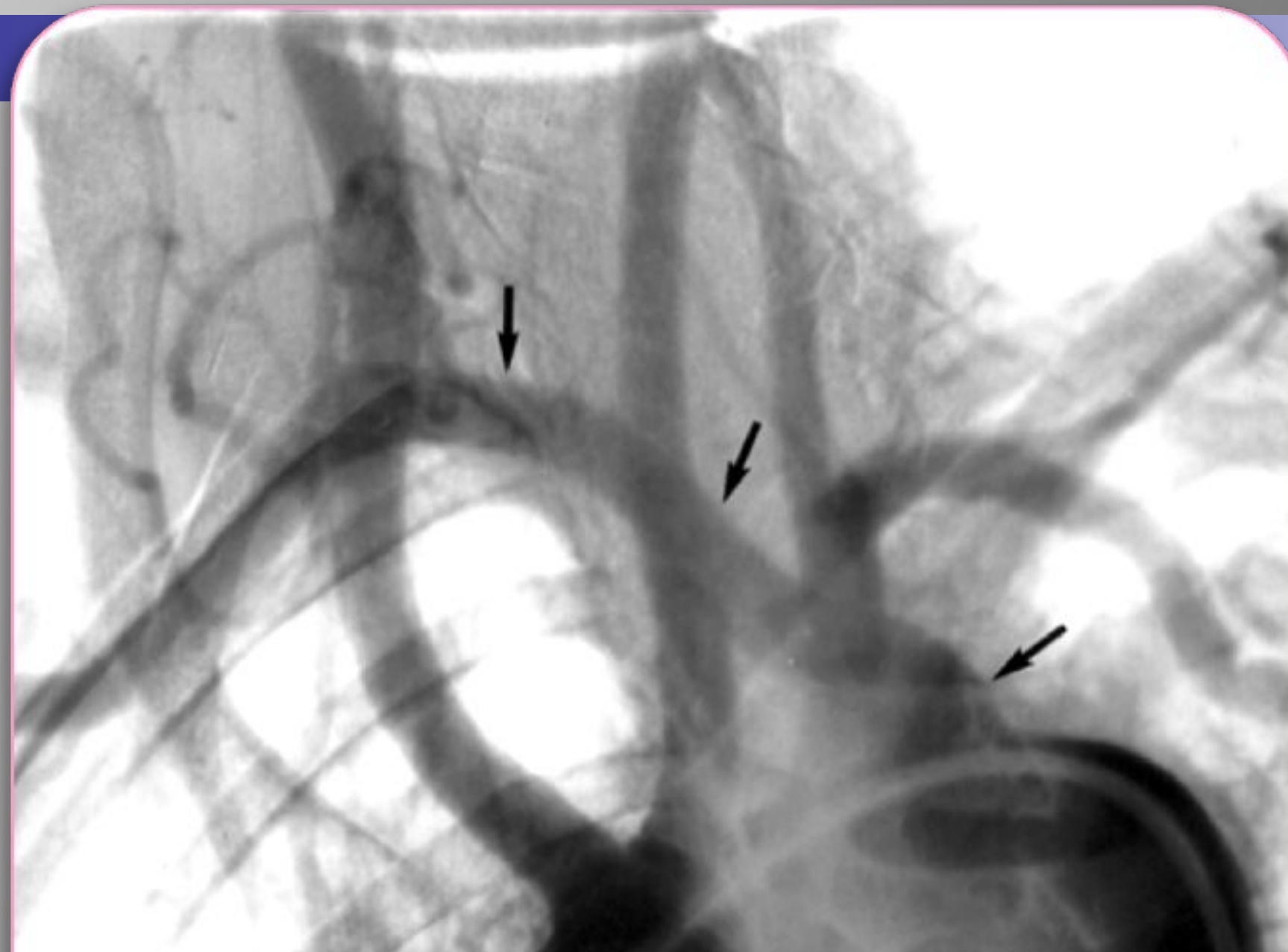
d'emblée :

arche bovine

crosse de type III associées à des tortuosités

TABC et AV droite difficile

en échec de l'abord fémoral (>1H d'échange entre les 2 techniques)



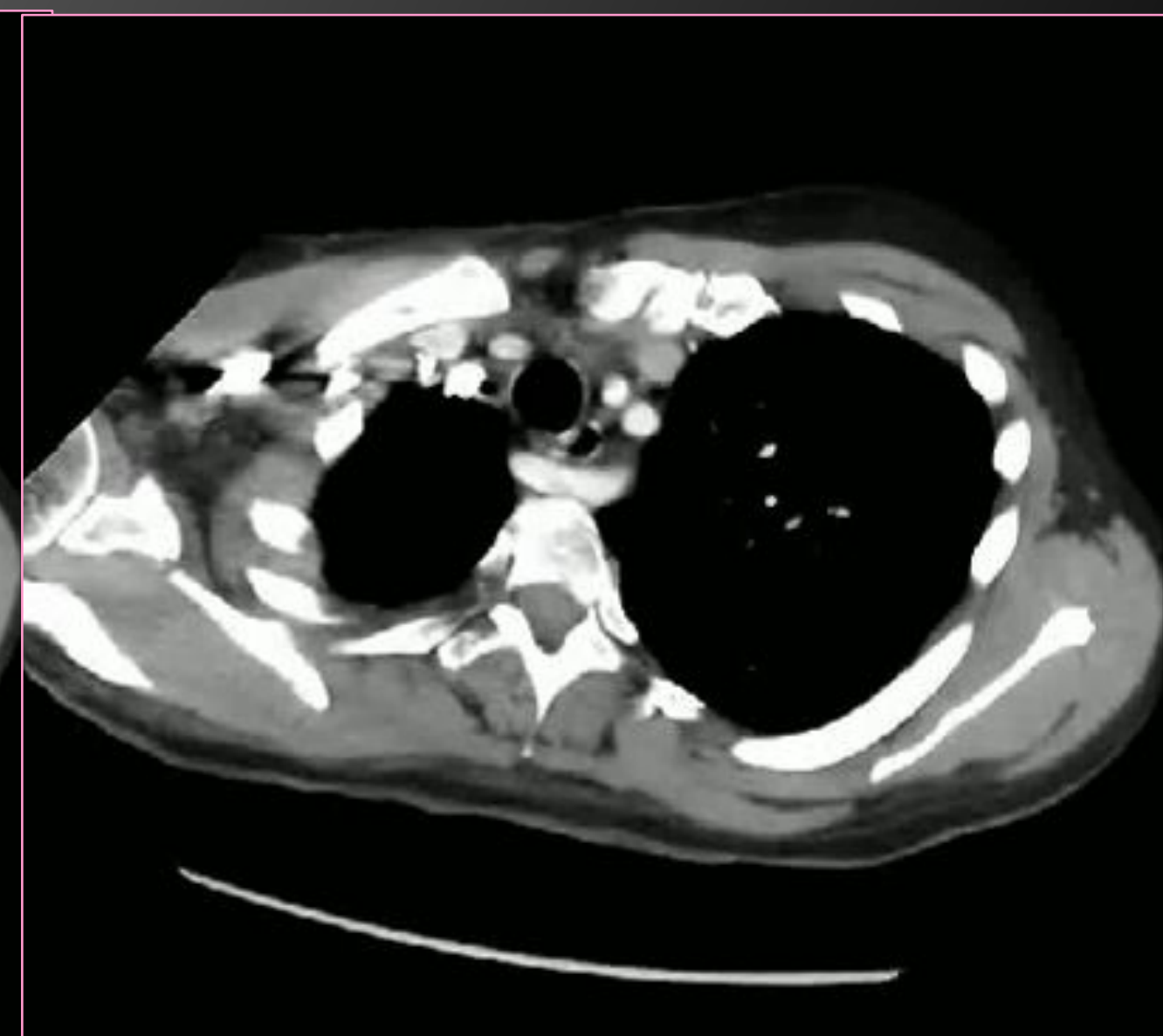
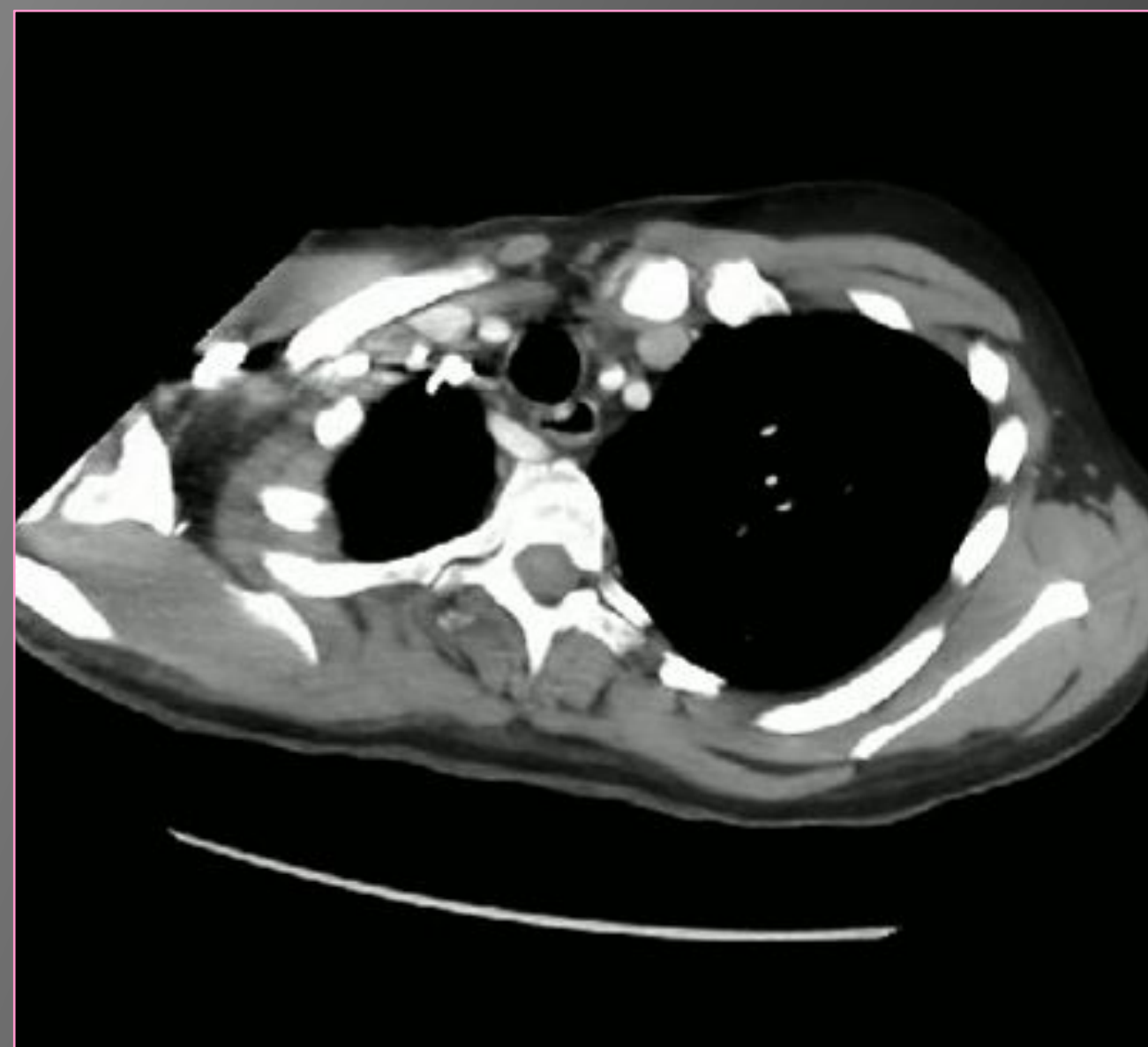
Inconvienents

1. Taille limitée (6F)
2. Anatomique
 - Artère vertébrale gauche
 - Anatomie aberrante

A. sous-clavière droite rétro-œsophagienne (*arteria lusoria*)

Naissance en aval de l'ASCG

Voie radiale = 0 !





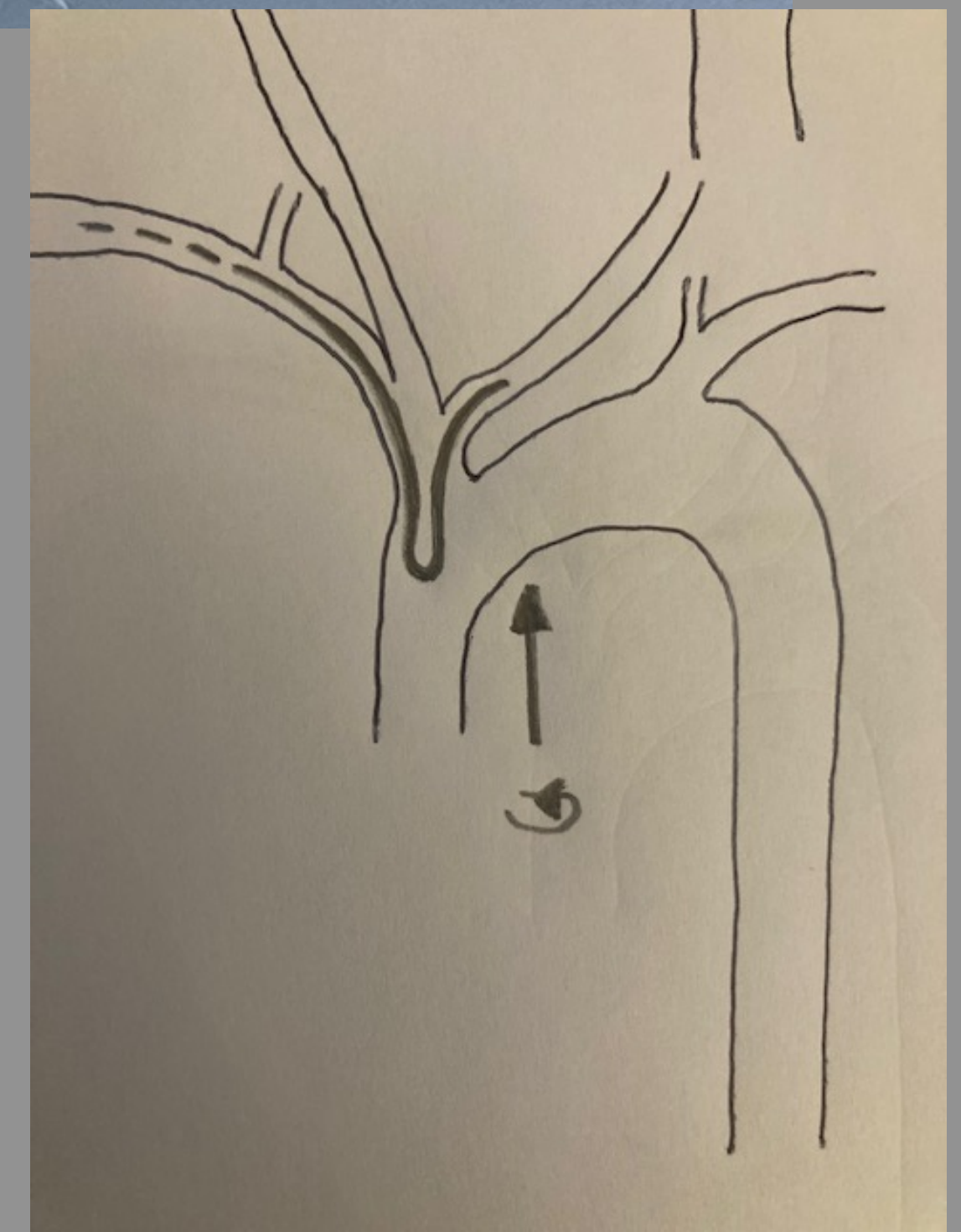
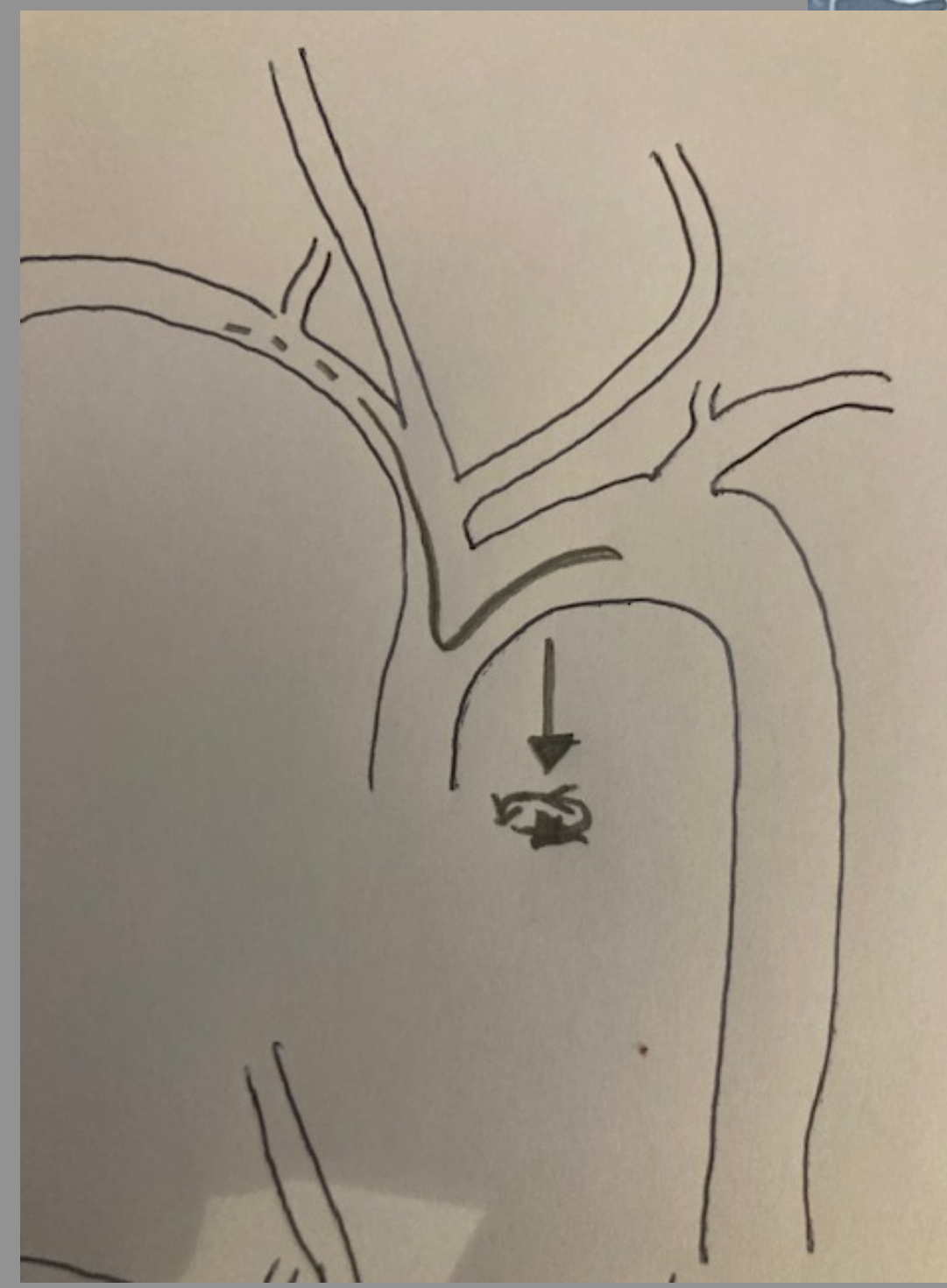
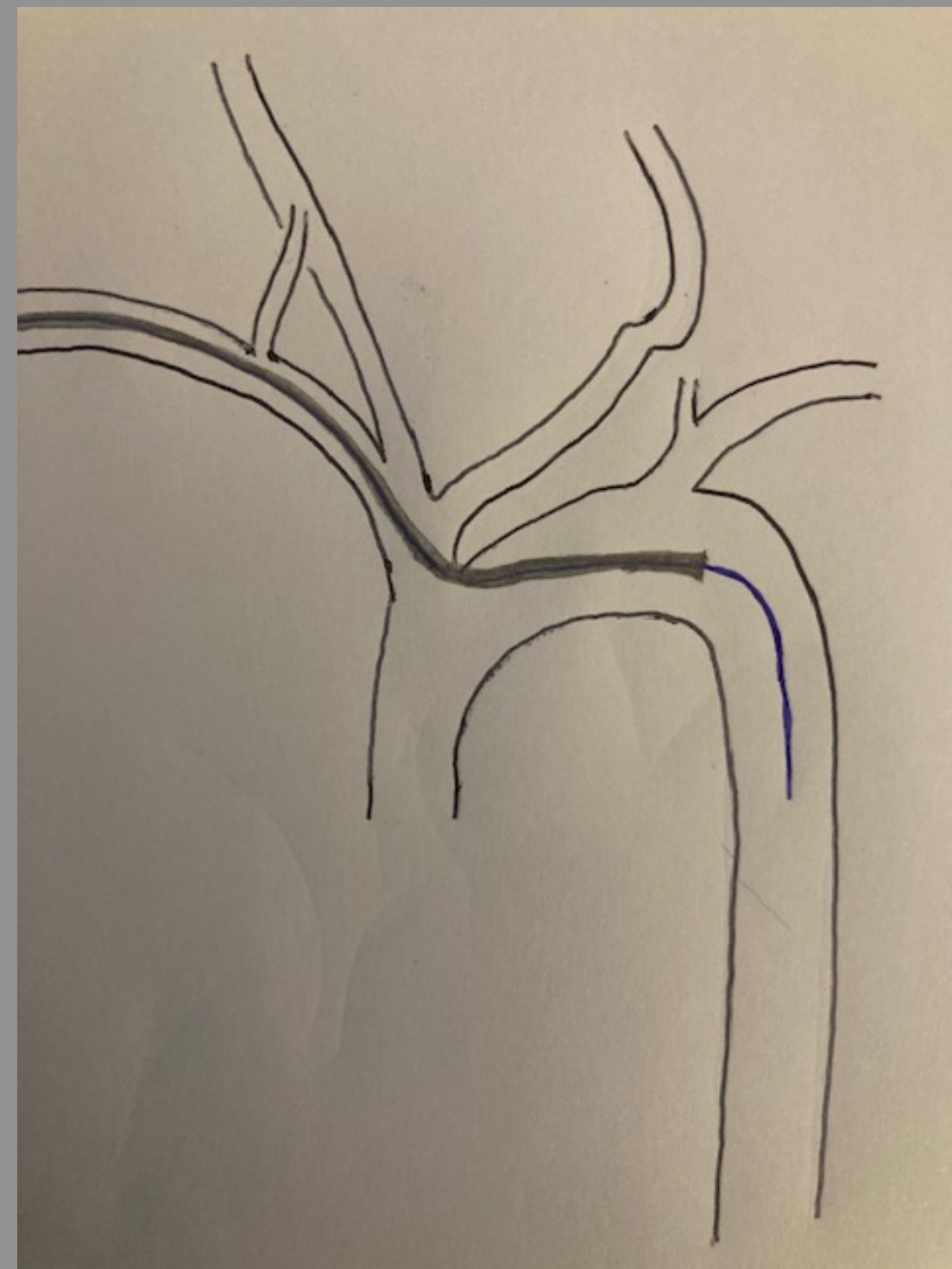
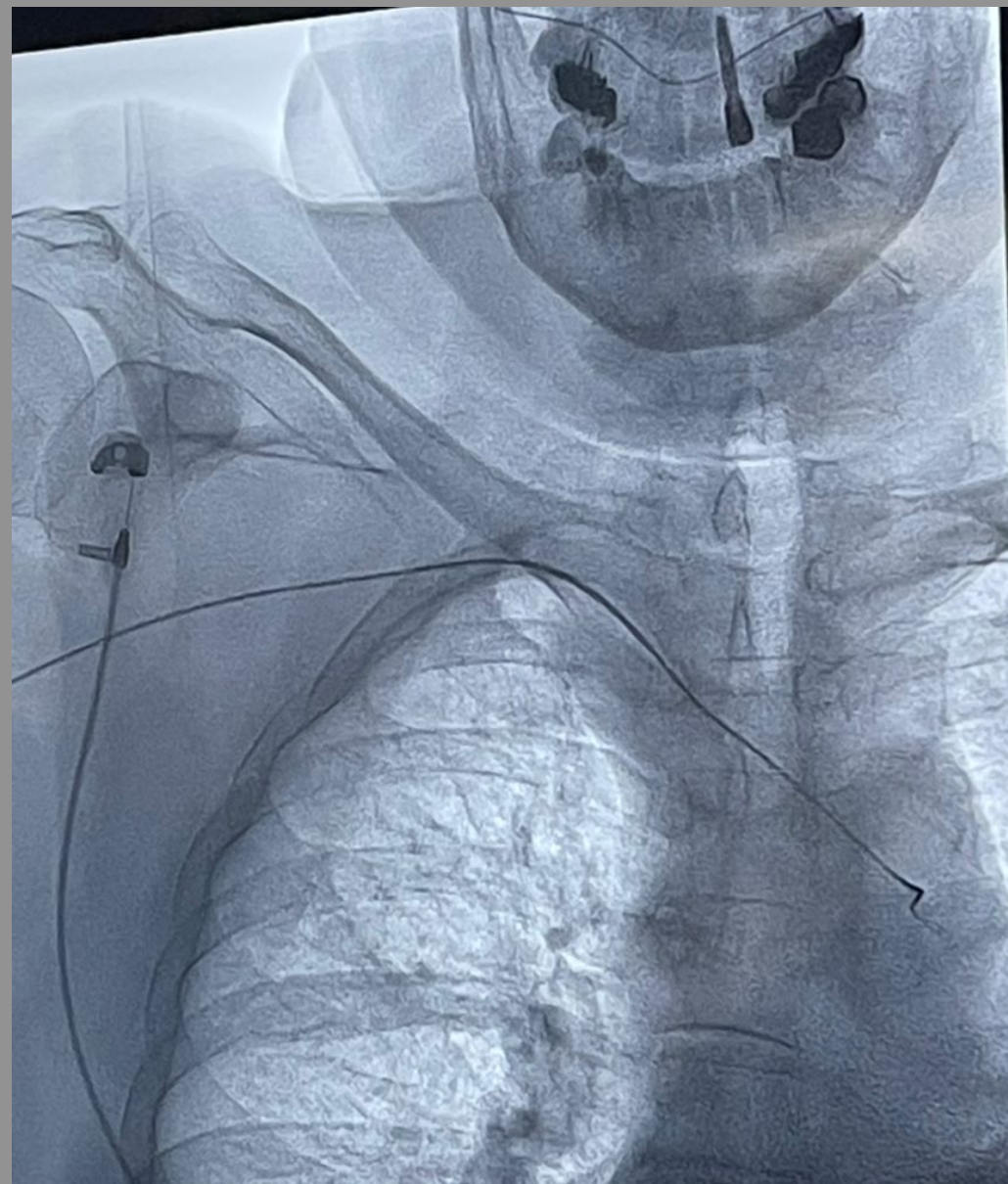
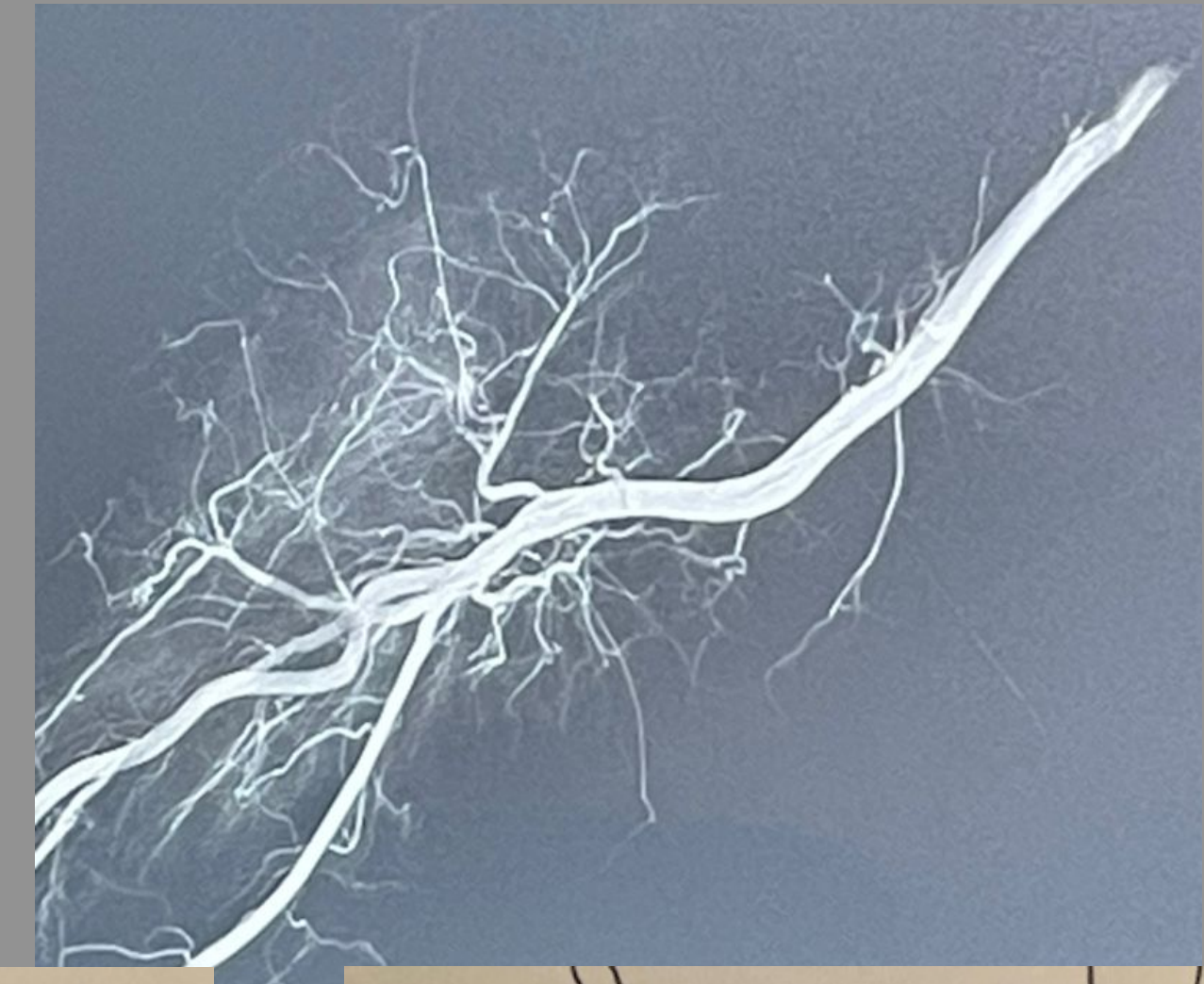
Sous écho ?

4 F puis 6F puis cathe porteur. : ballast (8F) , RIST (7F) , Benshmark (6F)

4F : injection de risordan et nimodipine

Table 45 degré latérale

Raod map



Questions des arches difficiles:

- Faut il faire systématiquement une exploration des TSA pré T si ≥ 70 ans ?
- la voie radiale supérieure à la voie fémorale?



Voie radiale versus voie fémorale

Pas de supériorité

Radial Access

Ischemic Stroke

ORIGINAL RESEARCH

Transradial versus transfemoral access for anterior circulation mechanical thrombectomy: comparison of technical and clinical outcomes

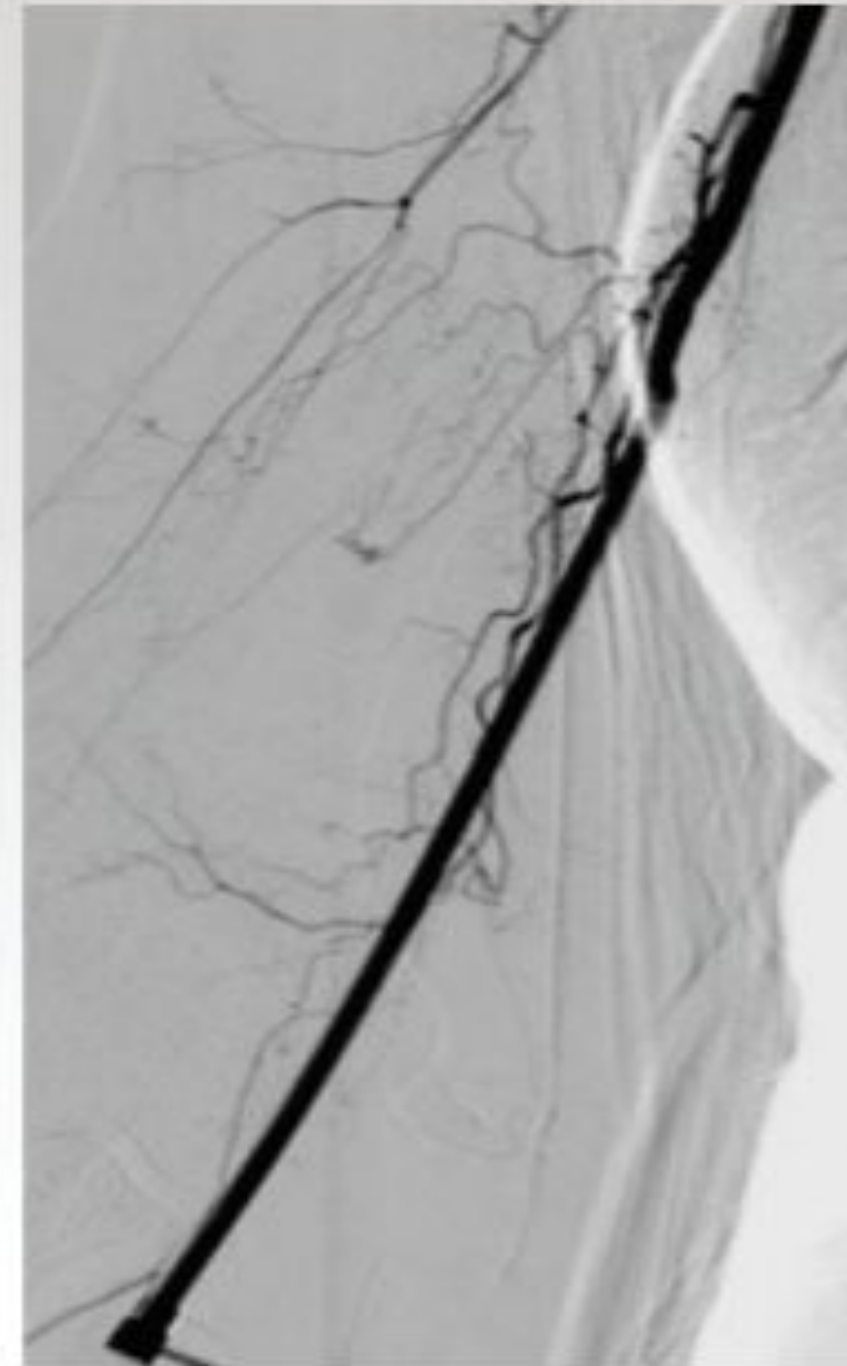
Stephanie H Chen,¹ Brian M Snelling,² Samir Sur,¹ Sumedh Subodh Shah,¹
David J McCarthy,¹ Evan Luther,¹ Dileep R Yavagal,^{1,3} Eric C Peterson,¹
Robert M Starke^{1,4}

JNIS

Humérale

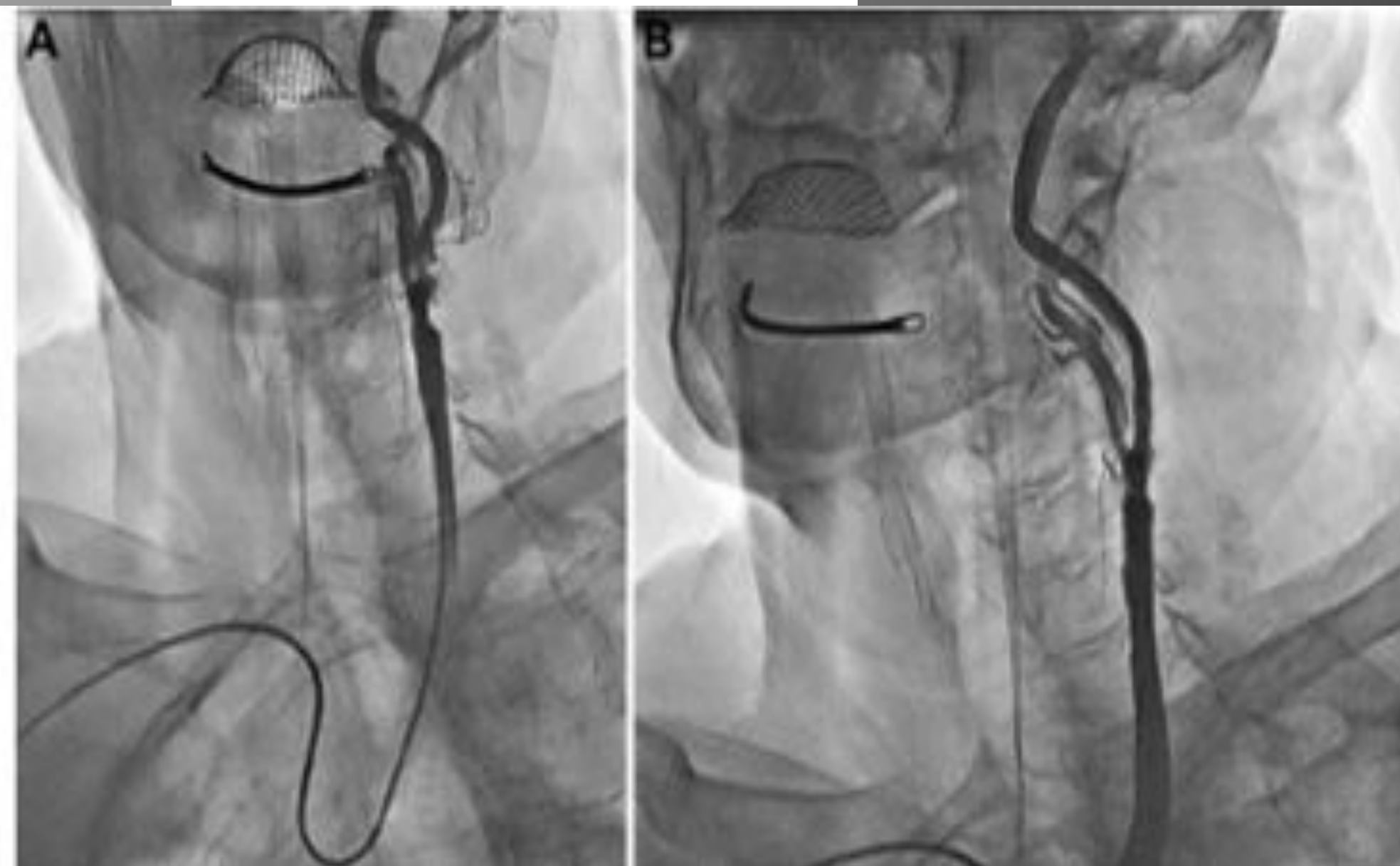
Avantages

1. Anatomique; Artère vertébrale droite—crosses de type III—Arches bovines
2. Permet des cathéters plus grands donc Une plus grande liberté de l'improviser



Inconvénients

- Anatomique :
- Artère vertébrale gauche
 - Carotide gauche tortueuse (augmentation de la longueur)
 - Anatomie aberrante



Carotidienne

dernier effort

Complications potentielles
–Hématome cervical,
dissection/pseudo-anévrisme



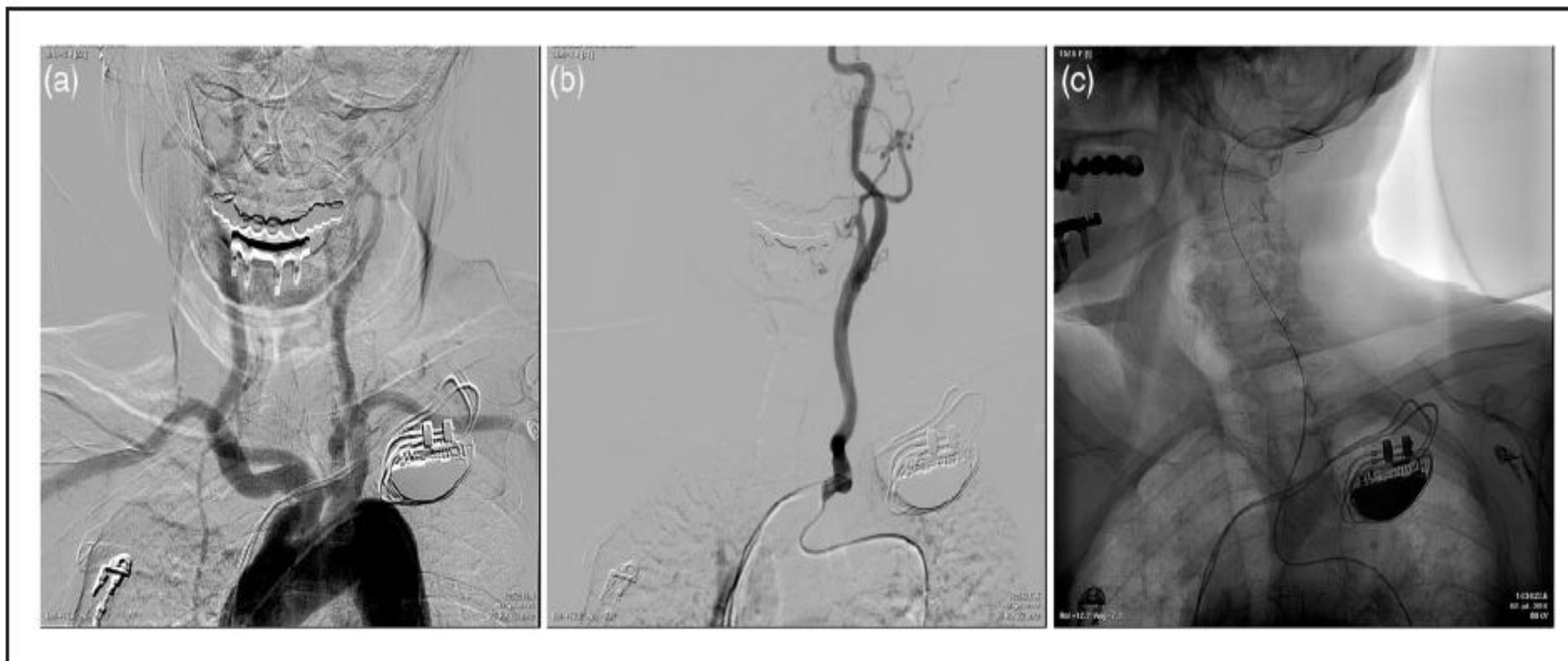
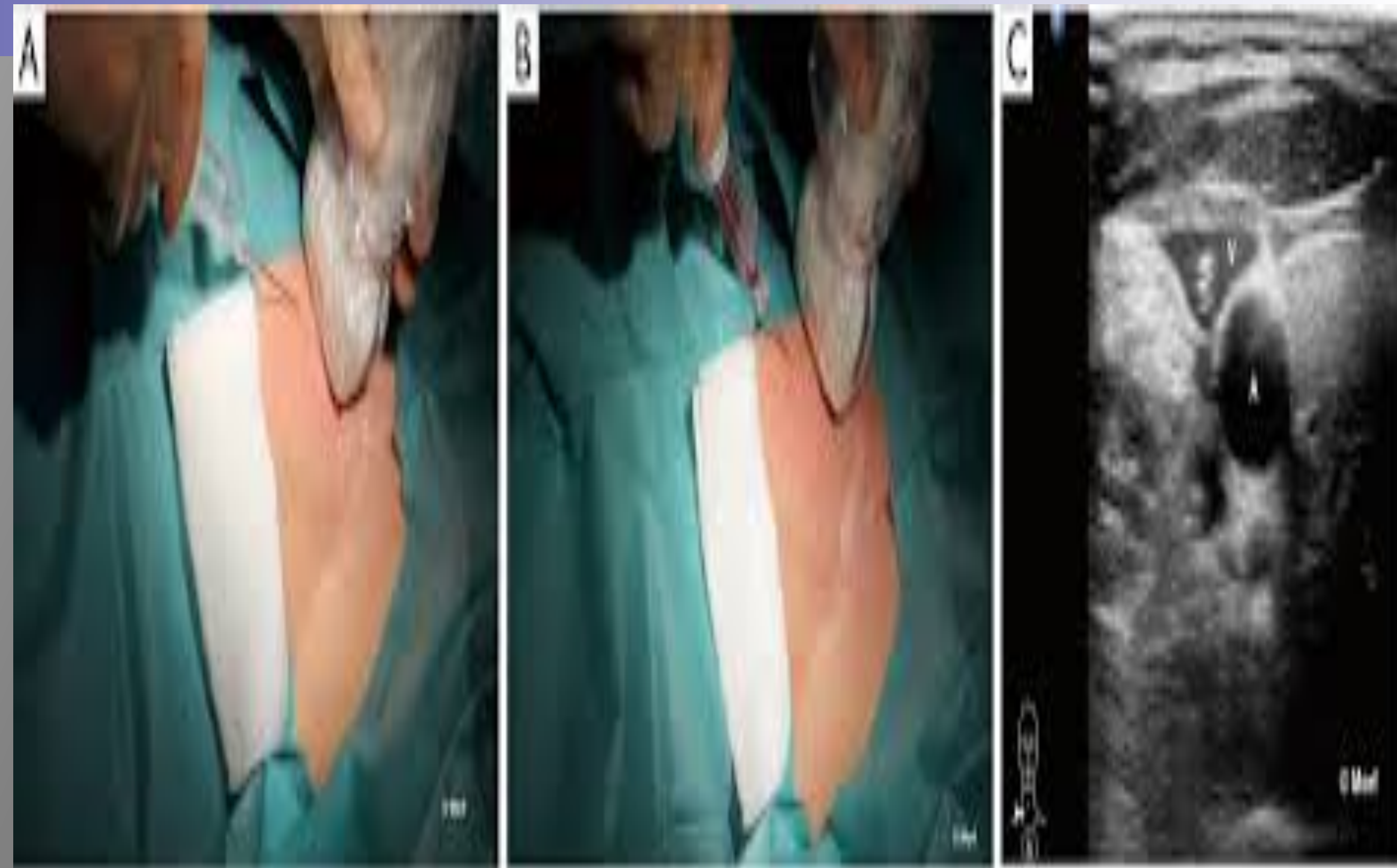


Figure 1. (a) Aortic arch angiography showing elongated and tortuous supra-aortic trunks. (b) and (c) After multiple attempts, it was impossible to make a stable catheterization of the left common carotid artery. Numerous catheters and wires could not be passaged distally in the common carotid to permit exchange of the diagnostic catheter for a shuttle sheath or a balloon-guiding catheter.



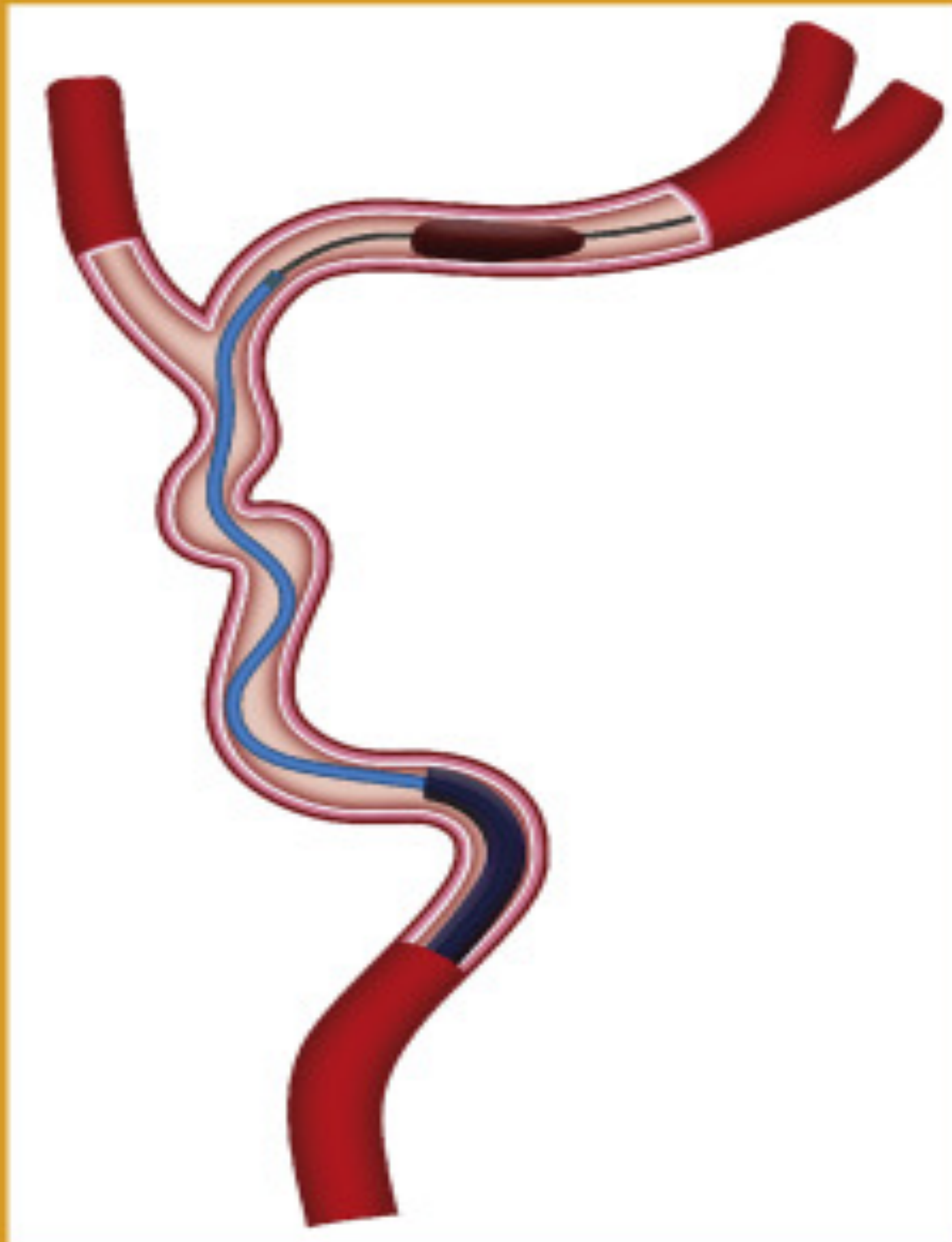
Figure 2. Ultrasound-guided puncture of the common carotid artery.



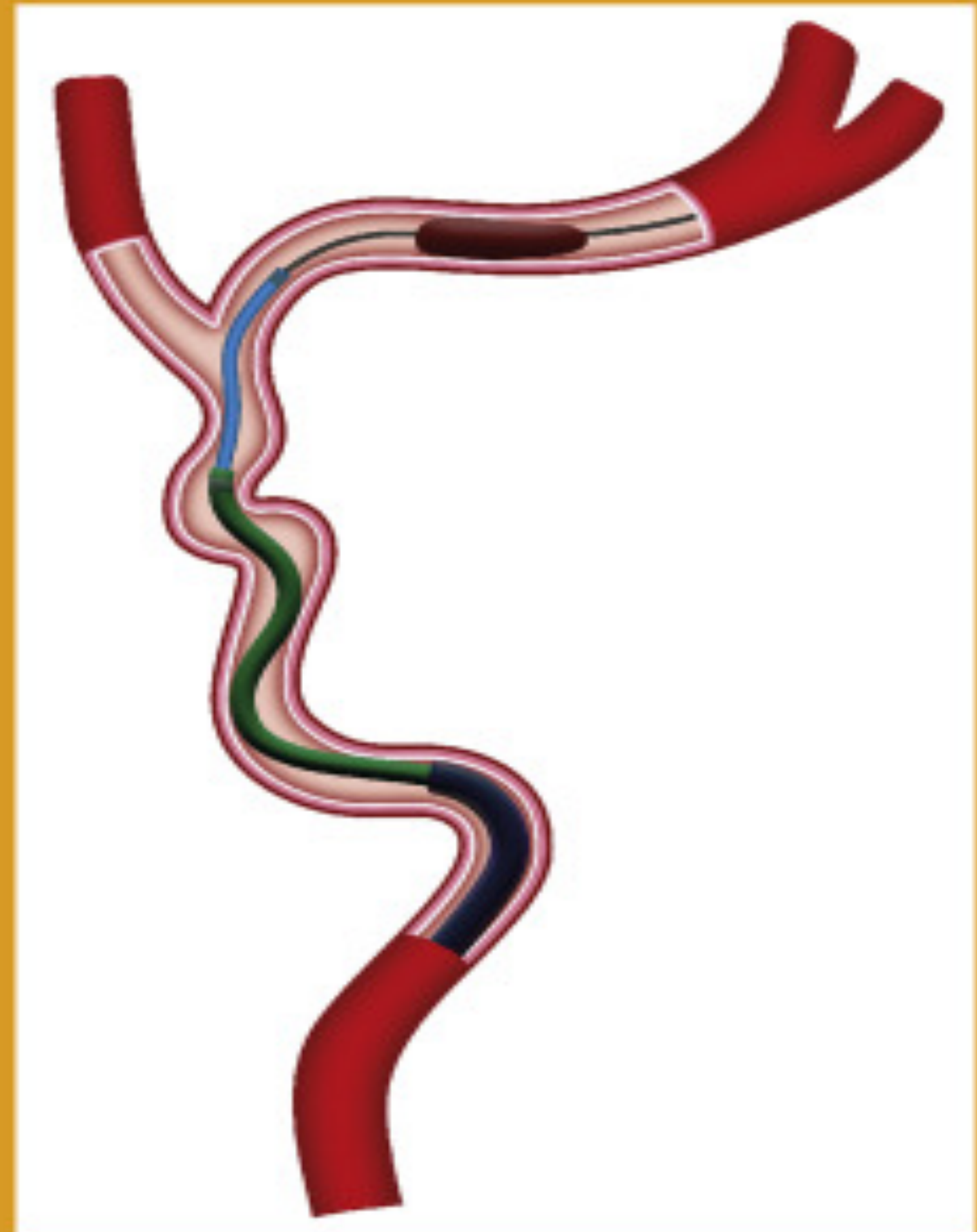
Cathétérisme intracranien

Accessing the thrombus / occlusion

BIAXIAL



TRIAxIAL



Technique standard: **Armoire de thrombectomie**

Cathéter d'accès distal : ***CAD = aspiration au contact caillot***

Tendance vers les plus gros diamètres: 70 (sofia 6F/react) jusqu'à 78 !!!

Micro-cathéter MK : 0.21 ou 0.27 ou 3F

MK et CAD : de plus en plus longs 160cm/130cm.... boucles

équilibre flexibilité distale et rigidité/support...

équilibre entre gros diamètre d aspi et navigabilité

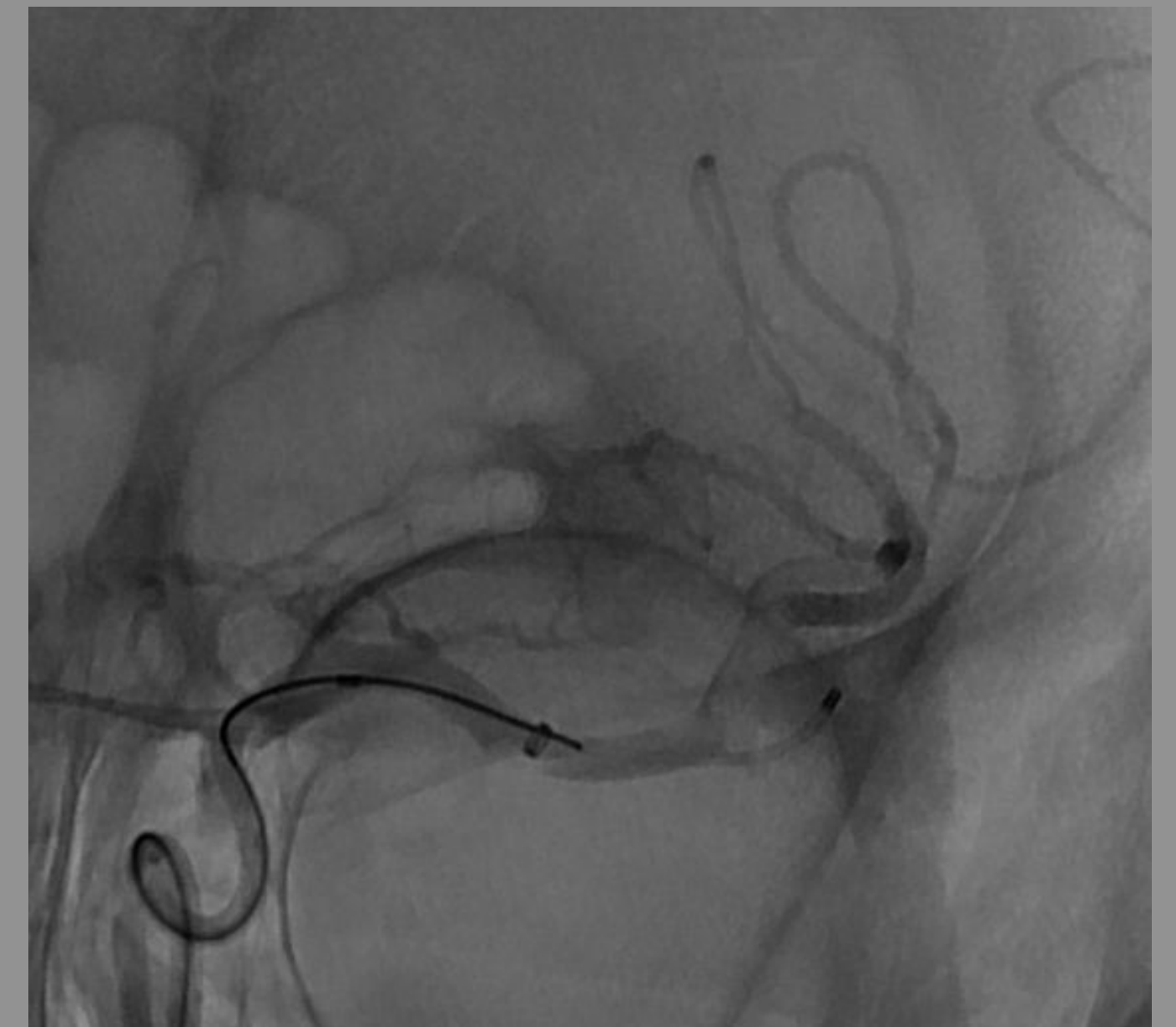
Stratégie habituelle : technique combinée CAD/stent

CAD : 5 ou 6F dans M1 monté sur micro KT

Tendance à l'augmentation de calibre distal (0.60>>0.68>>0.70>>74, 78)

Guide 0.14 ou 0.16

éviter l'effet « marche d'escalier »



CAD parfois difficile à monter au contact du caillot

CAD stoppe à la terminaison carotide interne

Pas d'aspi au contact

INUTILE = stent retriever seul

surtout les gros calibre > 70

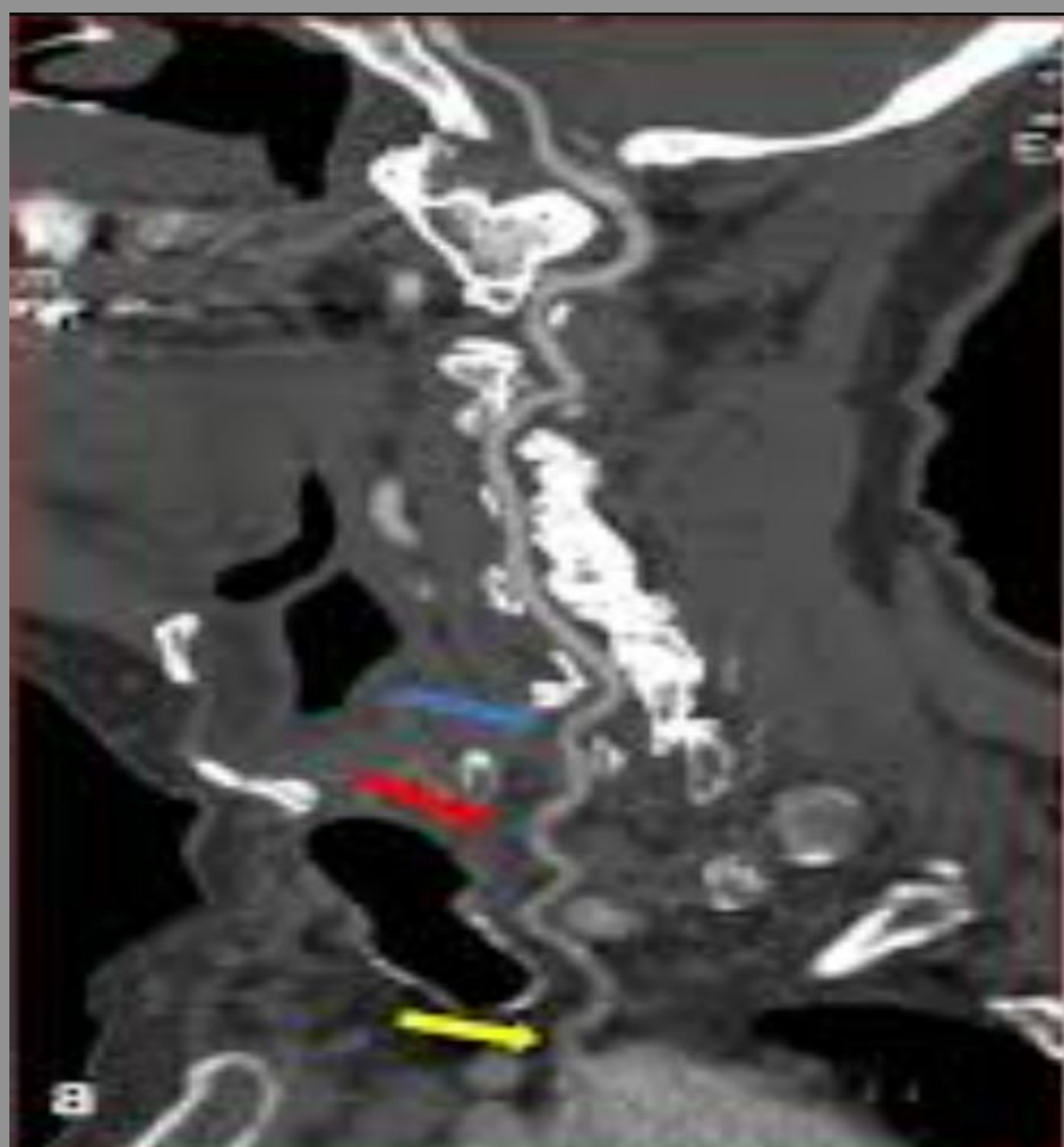
Les **préformer à la vapeur** (siphon)

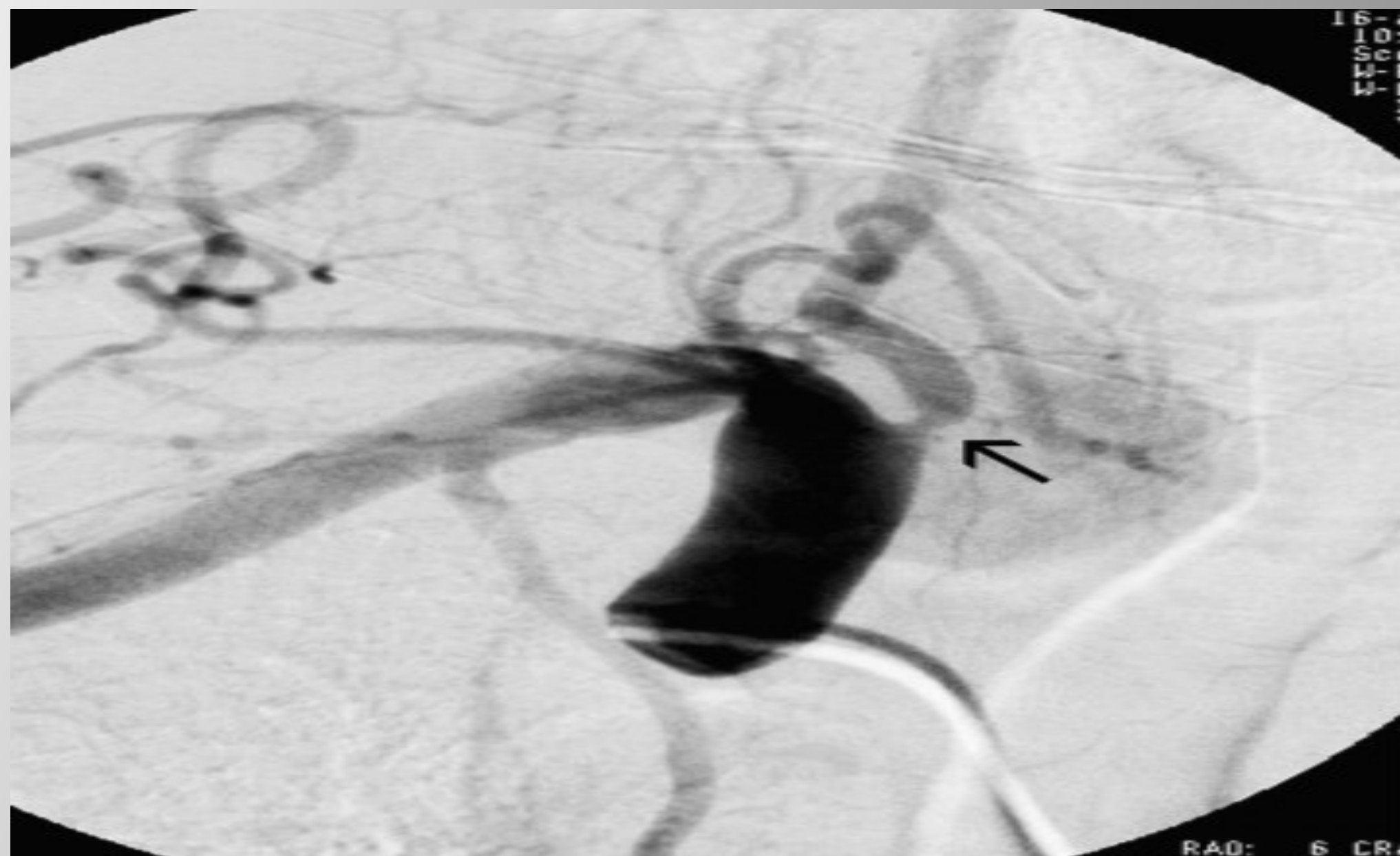


Système vertébro-basilaire

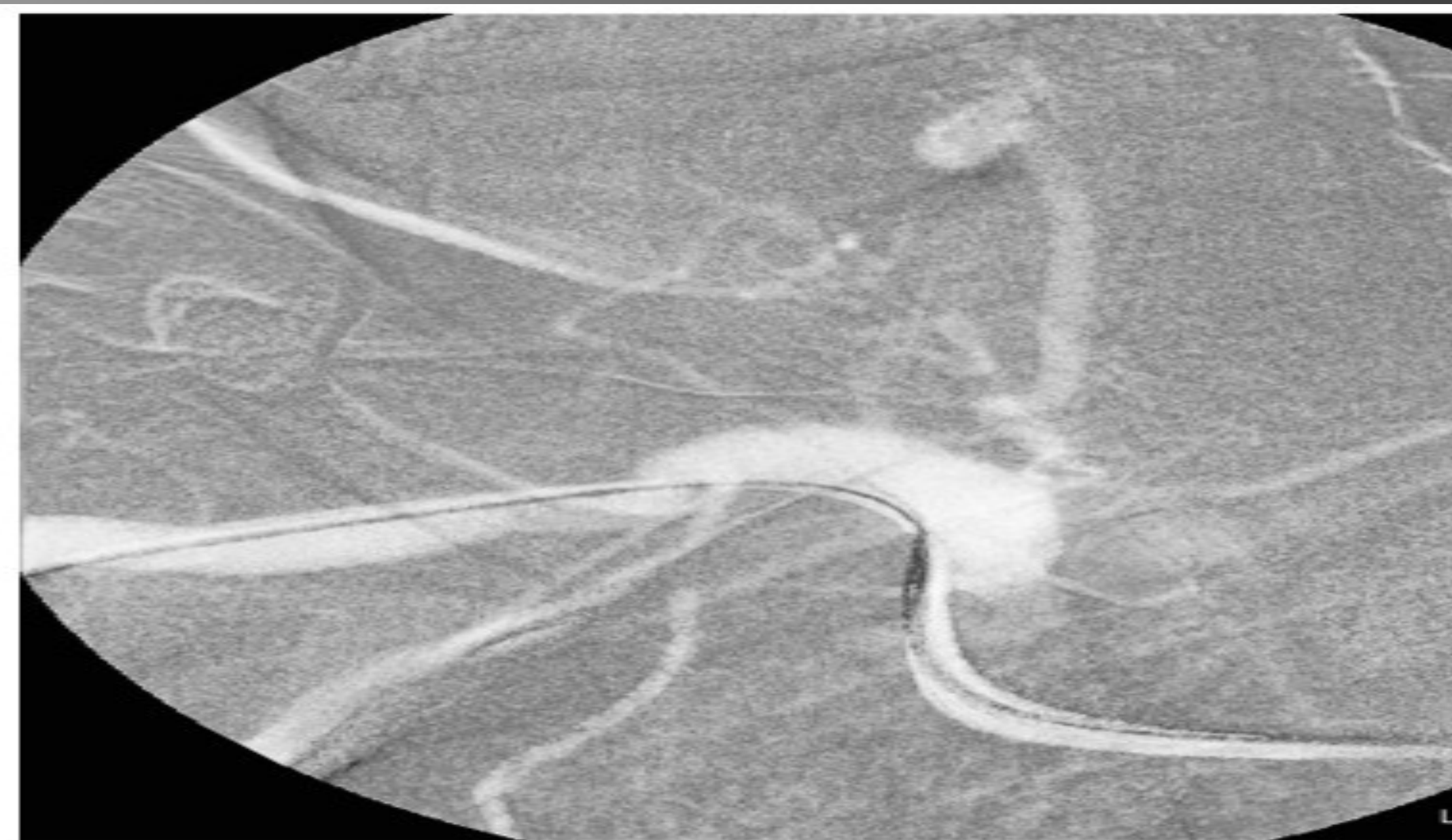
Pose des problèmes spécifiques

Origine, **tortuosité proximale**





(a)



(b)



(c)



(d)



Diamètre inférieure :

Cathés ballon??

essayer 8F ballast-infinity

sinon 6F de 110 cm à lumière élargie : benchmark
ou seulement CAD de grosse lumière

2 vertébrales souvent asymétriques : **Gauche+++**

petite taille/boucle : flux stagnant +++



Sinon artère tortueuse, surtout à l'origine, fine= porteur 6F et micro KT 0.18 peuvent fonctionner

Systeme vertebro-basilaire

Thrombectomie par la vertébrale droite ; voie radiale ou humérale

Tendance +++ à l'aspi seule en CAD de 70 :

thrombus du top B / navigation facile du 70 sans microKT

stent retriever : si trombus long (stent de 45 mm de longueur)

Traverser le thrombus (stent) = savoir où sont les ACP :

challenge car souvent on confond avec ACS , fragiles +++

Guide en J



KIT DE ROUTINE ?? Oui mais

Kit de choix perso de routine

1. Cathétérisme Biaxial avec SIM d'emblée si >55 ans ou bovine

2. Carotide internes

si; TSA favorable : fémorale ; cathé ballon , cathé d aspi compatible , mc et microguide formé en J ,stent retriever plus aspi

TSA défavorable ; fémorale , 30 a 45 mins max de tentative puis radiale ou humérale

Si radiale ;

si pas bcp de boucles : benchmark en biaxial plus stent retriever seul,
si boucles ++ ; Rist en biaxial puis CAD et stent retriever

Si humérale ; ballast en biaxial plus cad plus stent

3. Vertébrale gauche ; porteuse souple en biaxial avec une **bern** ,puis, **aspi seule**

4. Vertébrale droite

si TSA favorable ; femorale

TSA non favorable ; radiale d'emblée

points importants

Connaître l'anatomie

angioTSA si > 75 ans si possible : difficulté arche

armoire thrombectomie prête

cathétérisme des TSA : difficulté majeure de la thrombectomie

TB : plus petit porteur dans la vertébrale

CAD au contact du caillot

effet de premier passage ++++



Merci de votre attention