

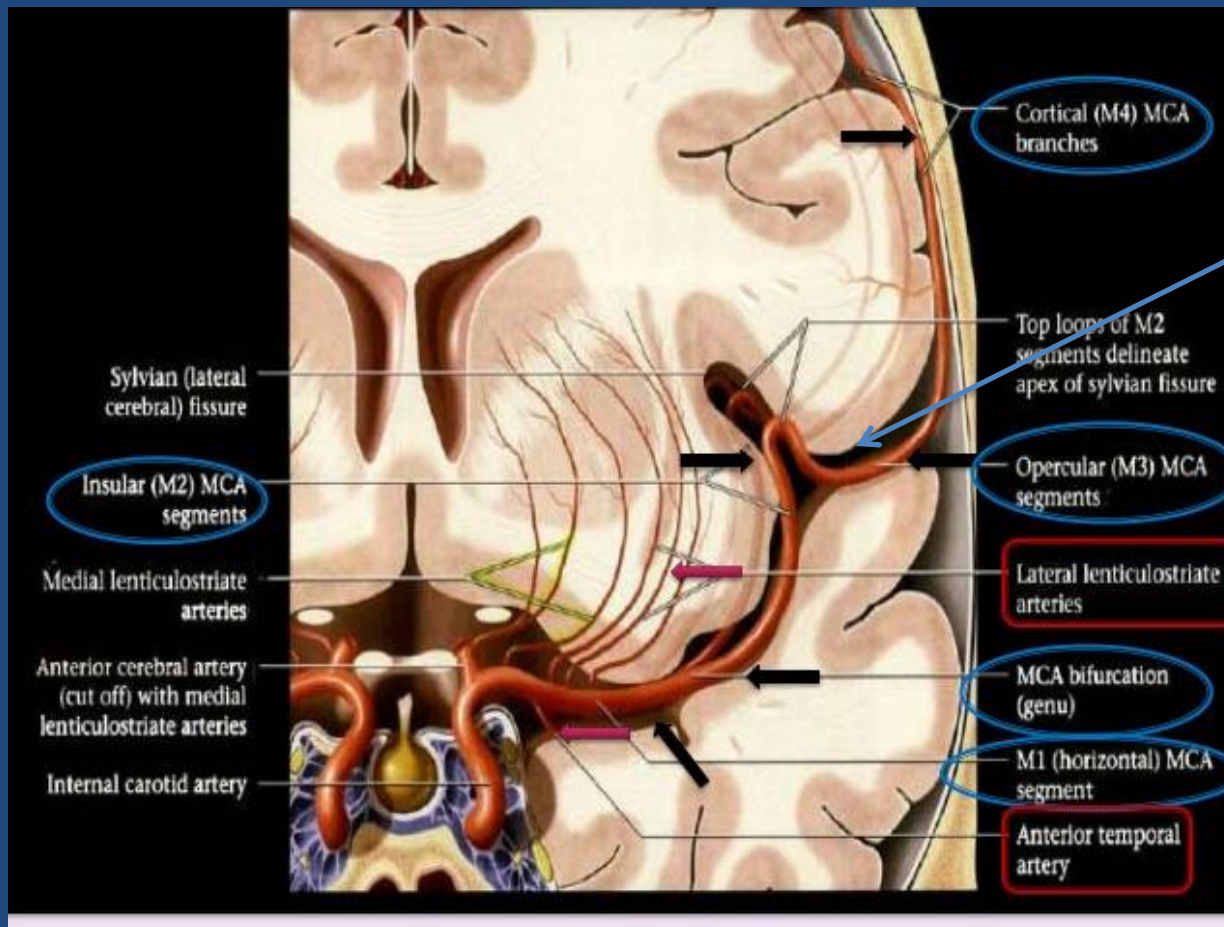
Ανατομία Πρόσθιας κυκλοφορίας Μέση και πρόσθια εγκεφαλική αρτηρία

Χρήστος Γκόγκας

Επεμβατικός Νευροακτινολόγος

Μέση Εγκεφαλική αρτηρία

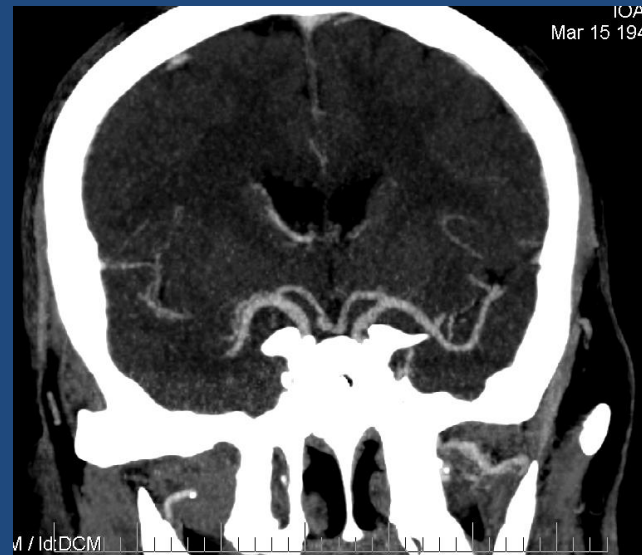
- Φυλογενετική - Εμβρυολογική προέλευση από την πρόσθια εγκ. αρτ.
 - Μείζων περιφερική έξω φακοραβδωτή
- Τμηματική Ανατομία
 - M1 Οριζόντιο τμήμα μέχρι τη σχισμή του Sylvius
 - Συμπεριλαμβάνεται ο διχασμός (ή τριχασμός) και η αρχική μοίρα των κύριων κλάδων
 - Γόνυ
 - M2 Στην νήσο του Reil και αποτελείται από 6-8 κλάδους
 - M3 Καλυπτρική μοίρα
 - M4 Φλοιικοί κλάδοι



Circular sulcus
 (sulcus
 limitans of
 Reil)

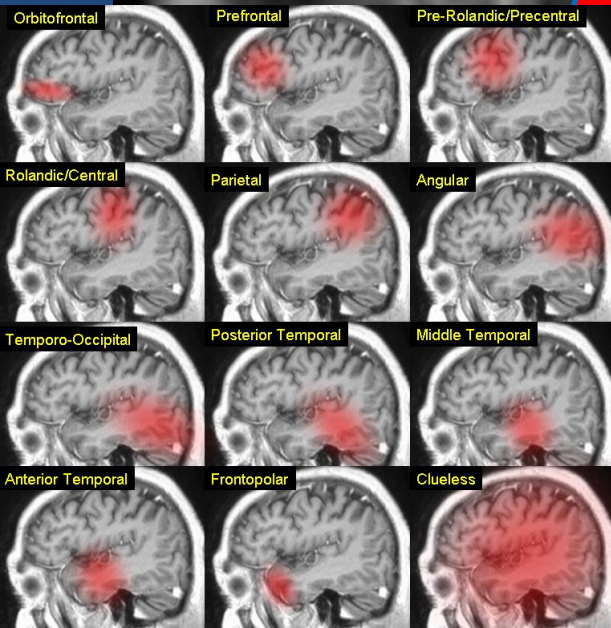
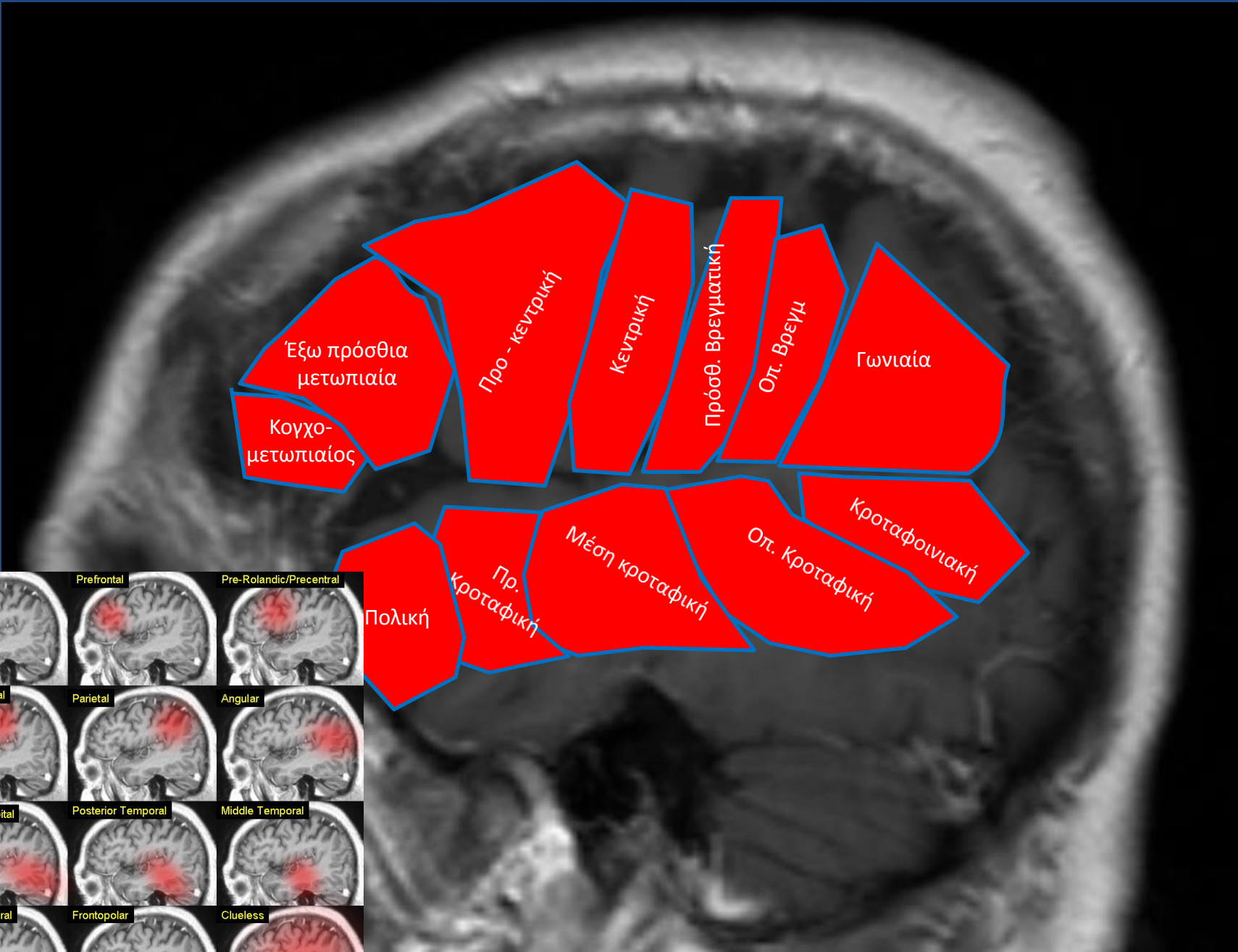
MCA segmental anatomy

- M1-ICA bifurcation to limen insulae
- M2-Genu to circular gyrus of insula
- M3-circular sulcus to opercular turn of MCA branches
- M4-lateral convexity



Μέση Εγκεφαλική αρτηρία

- Κλάδοι
 - Έξω φακοραβδωτές
 - Φλοιϊκοί κλάδοι
 - Κογχομετωπιαίος
 - Πρόσθιος μετωπιαίος
 - Πρόσθια κεντρική
 - Οπίσθια κεντρική (ή πρόσθια βρεγματική)
 - Γωνιαία (angular)
 - Κροταφονιακή
 - Οπίσθια κροταφική
 - Διάμεση ή μέση κροταφική
 - Πρόσθια κροταφική
 - Πολική κροταφική
- } Συνήθως από το M1 τμήμα



Εξω πρόσθια
μετωπιαία

Κορχο-
μετωπιαίος

Προ-κεντρική

Κεντρική

Πρόσθ. Βρεγματική

Οπ. Βρεγμ

Γωνιαία

Πολική

Πρ.
Κροταφική

Μέση κροταφική

Οπ. Κροταφική

Κροταφονιακή

Orbitofrontal

Prefrontal

Pre-Rolandic/Precentral

Rolandic/Central

Parietal

Angular

Temporo-Occipital

Posterior Temporal

Middle Temporal

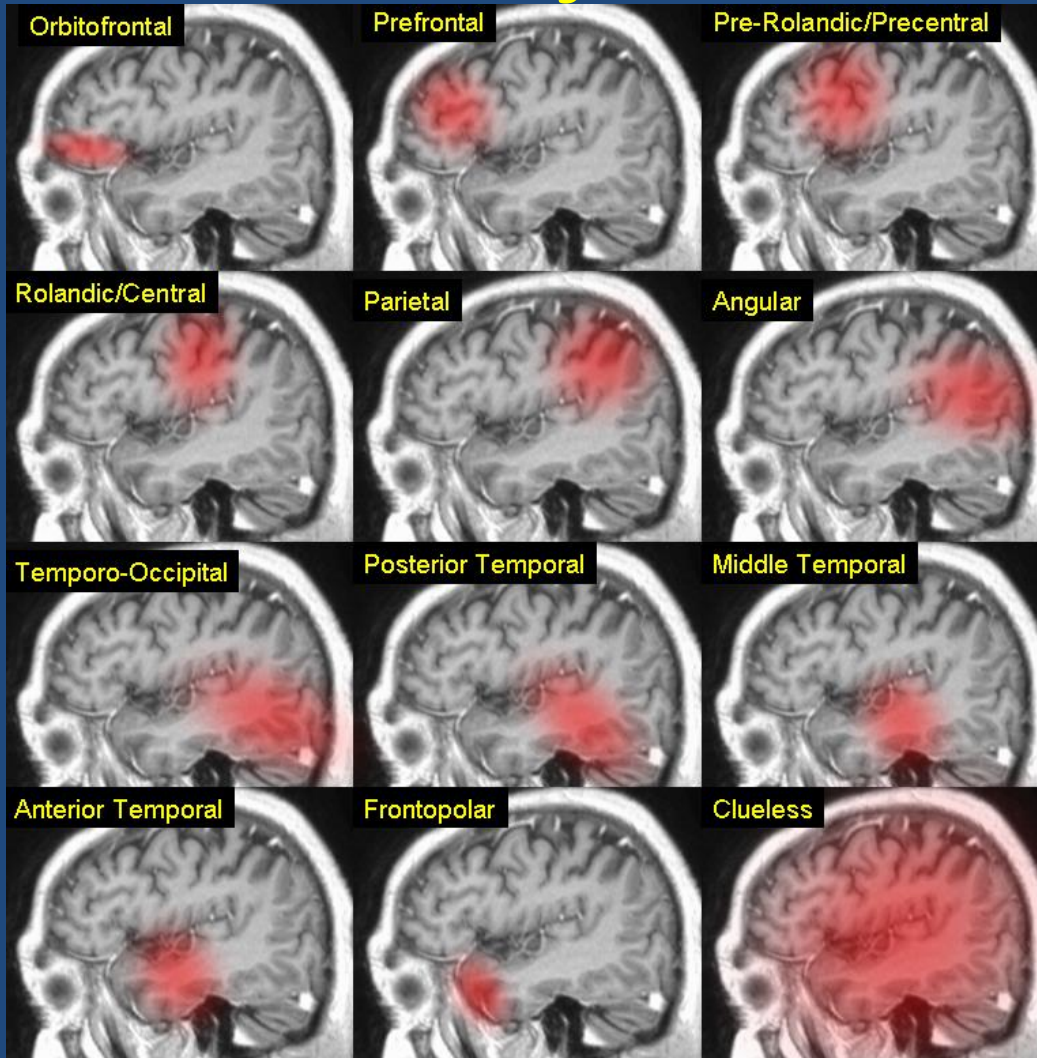
Anterior Temporal

Frontopolar

Clueless

MCA branch nomenclature

Lasjaunias-Berenstein

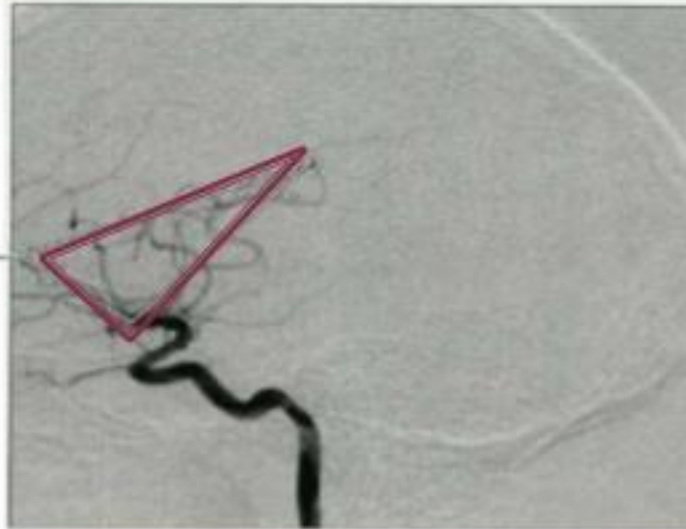




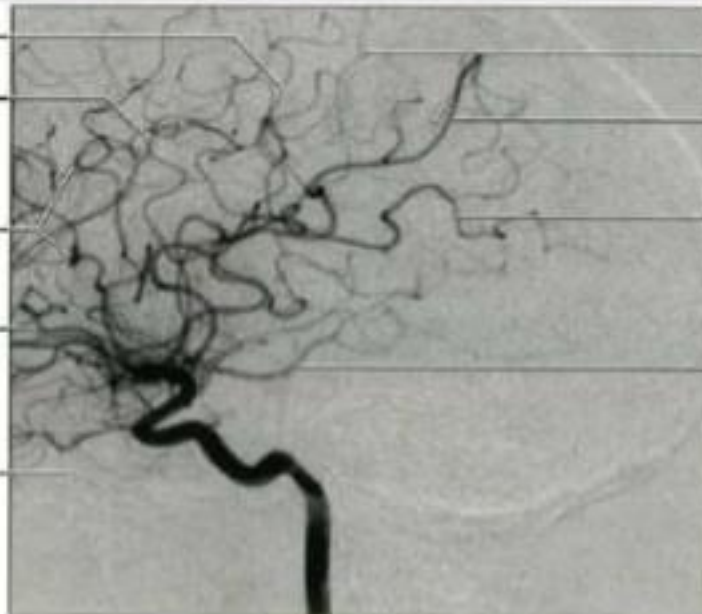
LAT DSA

Early arterial phase

Insular (M2) segments define angiographic sylvian "triangle"



Central sulcus artery
Precentral sulcus artery
Prefrontal arteries
Orbitofrontal (lateral frontobasal) artery
Anterior temporal artery

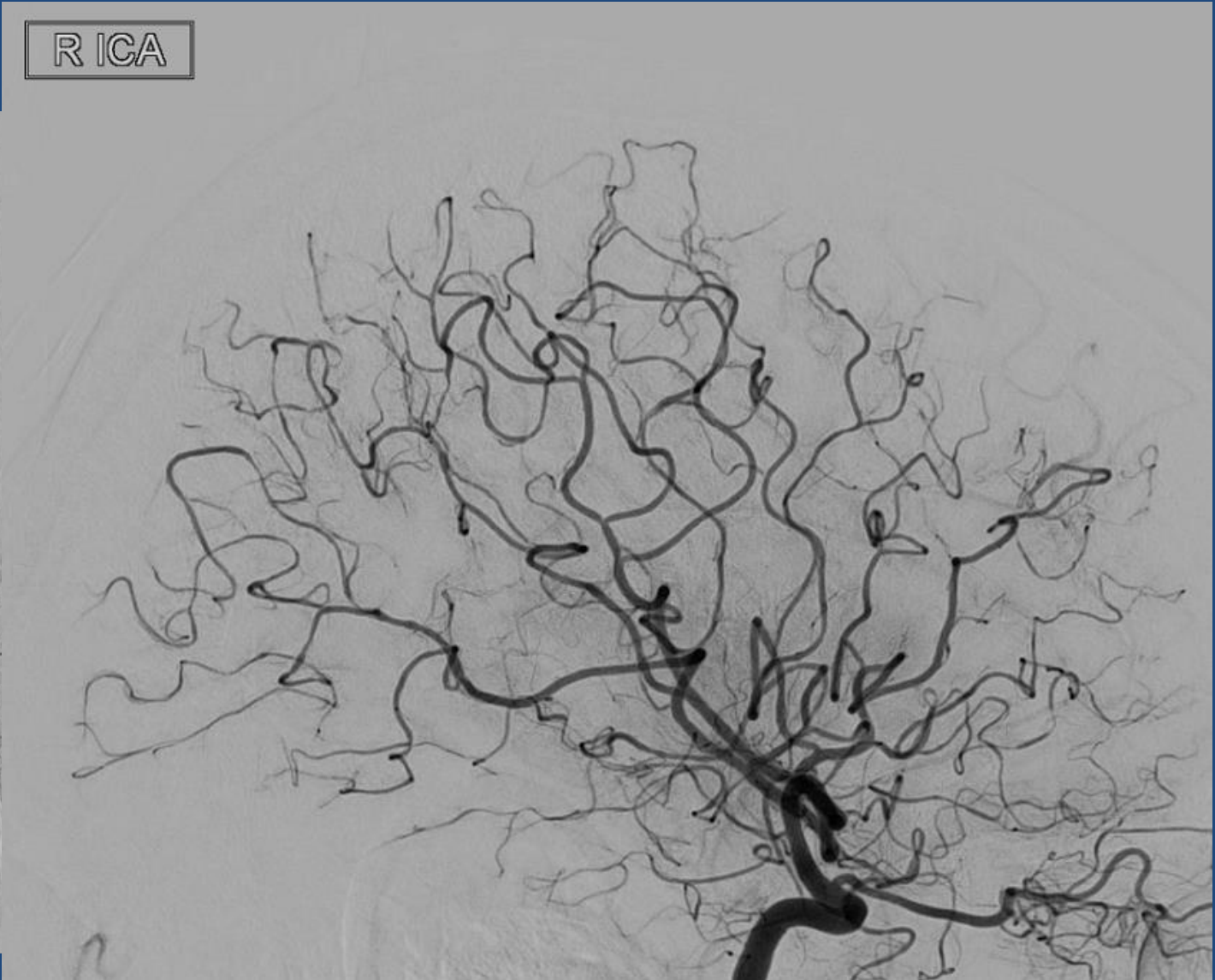


Anterior parietal (postcentral sulcus) artery
Posterior parietal artery
Angular artery
Posterior cerebral artery

Lateral DSA Mid arterial phase

RICA

RICA



MCA branching patterns

- Inferior division-temporal lobe
- Superior division-frontal lobe
- Variable supply of parietal lobe

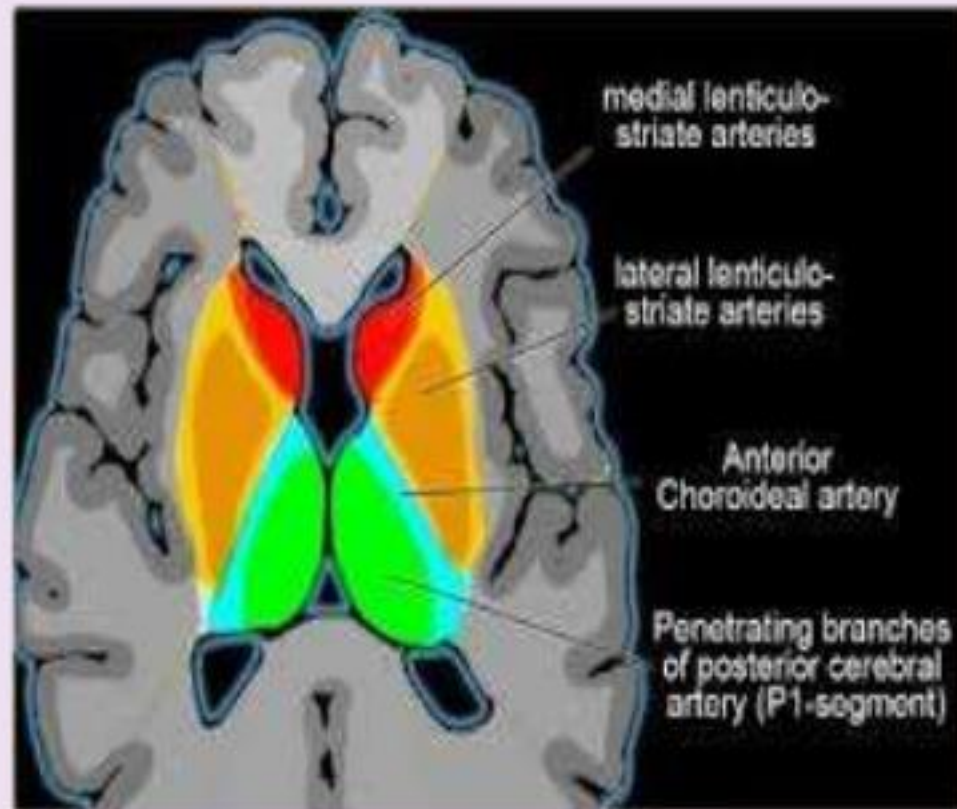
- Inferior division dominant 32%
- Equal bifurcation 18%
- Superior division dominant 28%
- Trifurcation 12-29%

MCA perforating branches

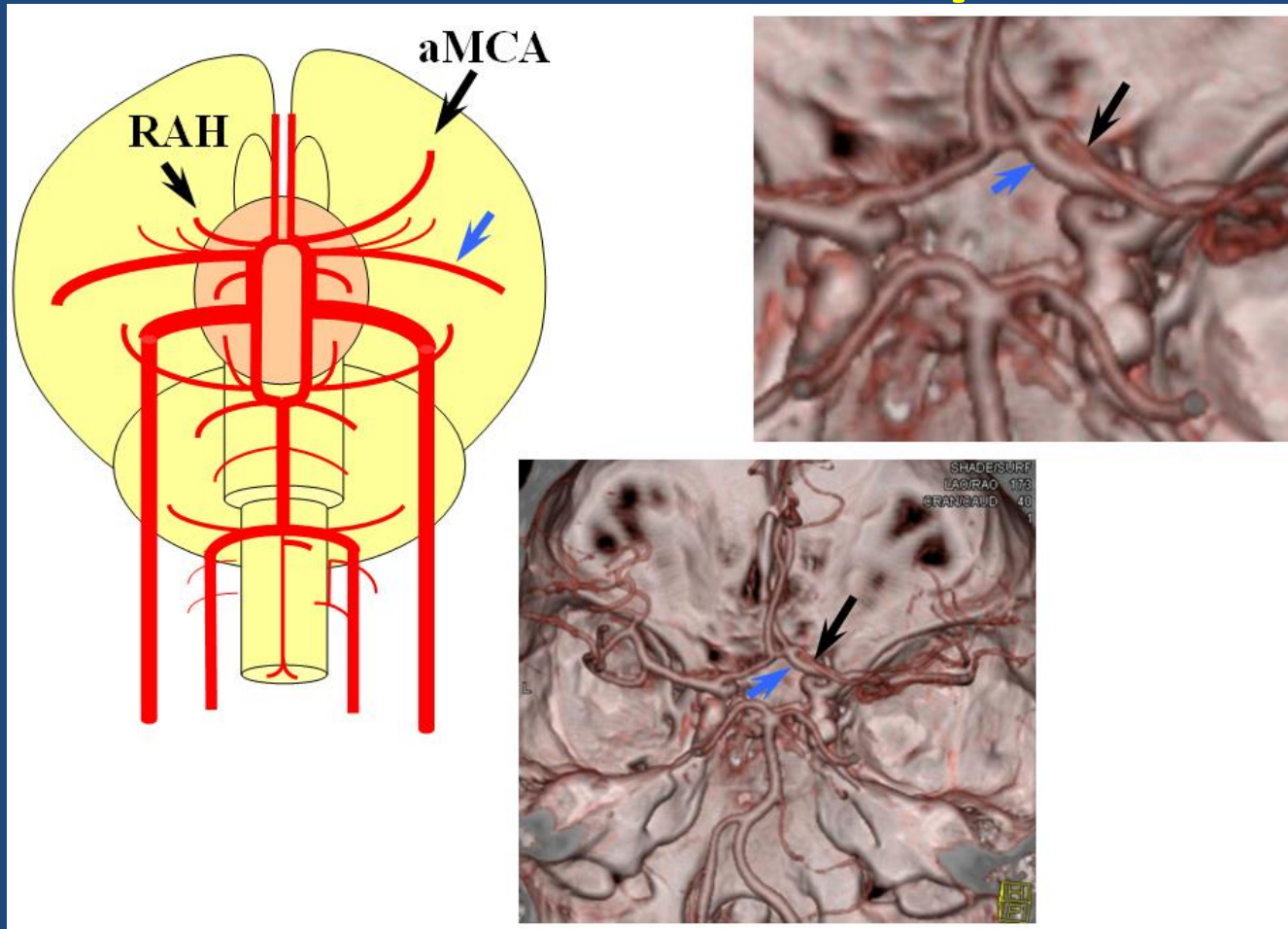
- 1-21 lenticulostriate branches
- 80% arise before MCA bifurcation

Lateral Lenticulostriate Artery

- Origin - M1
- Supplies –
 - Part of head and body of caudate
 - Globus pallidus
 - Putamen
 - Posterior limb of internal capsule



Accessory MCA (Manelfe Type III Heubner like)

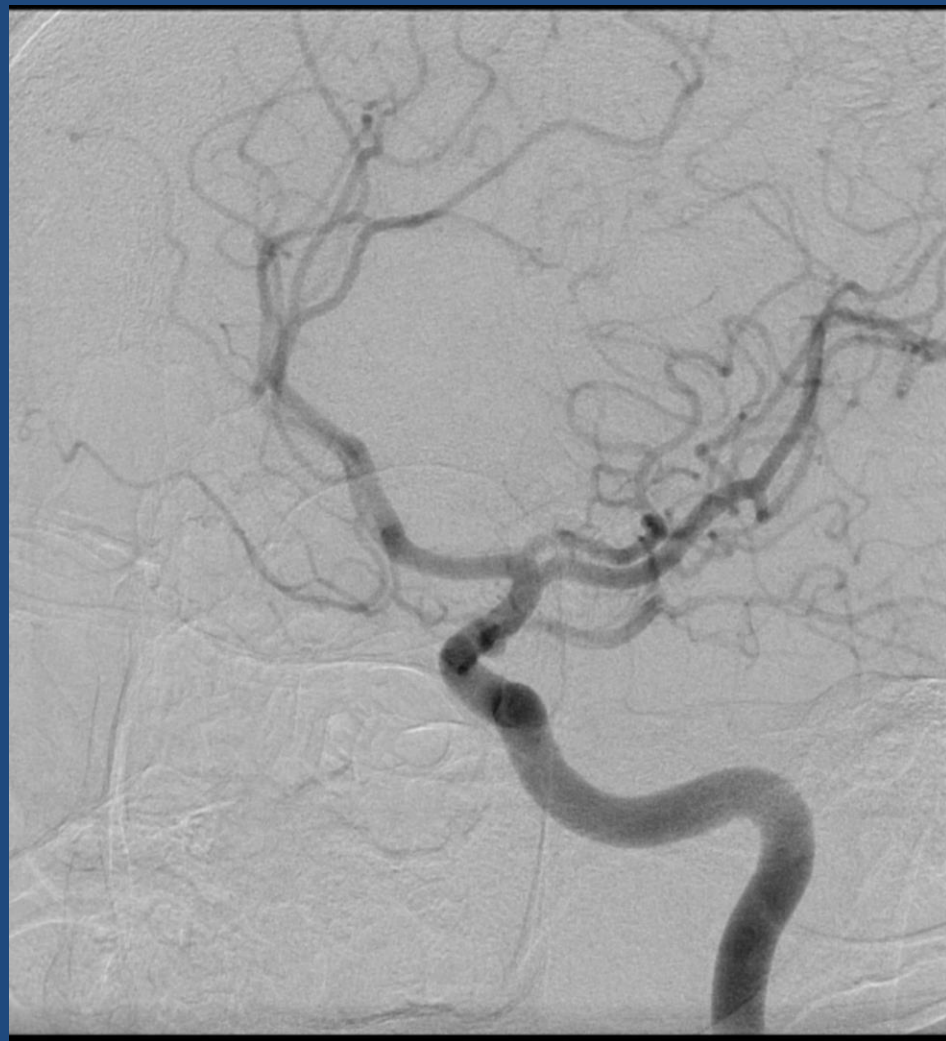
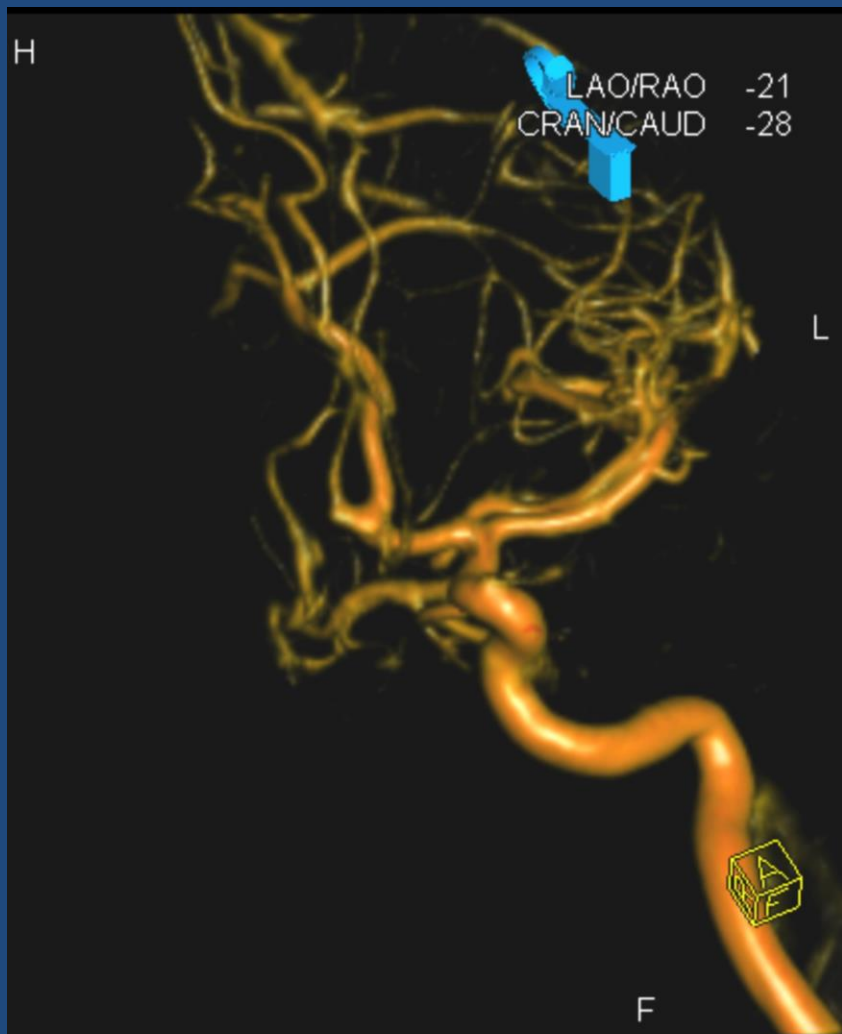




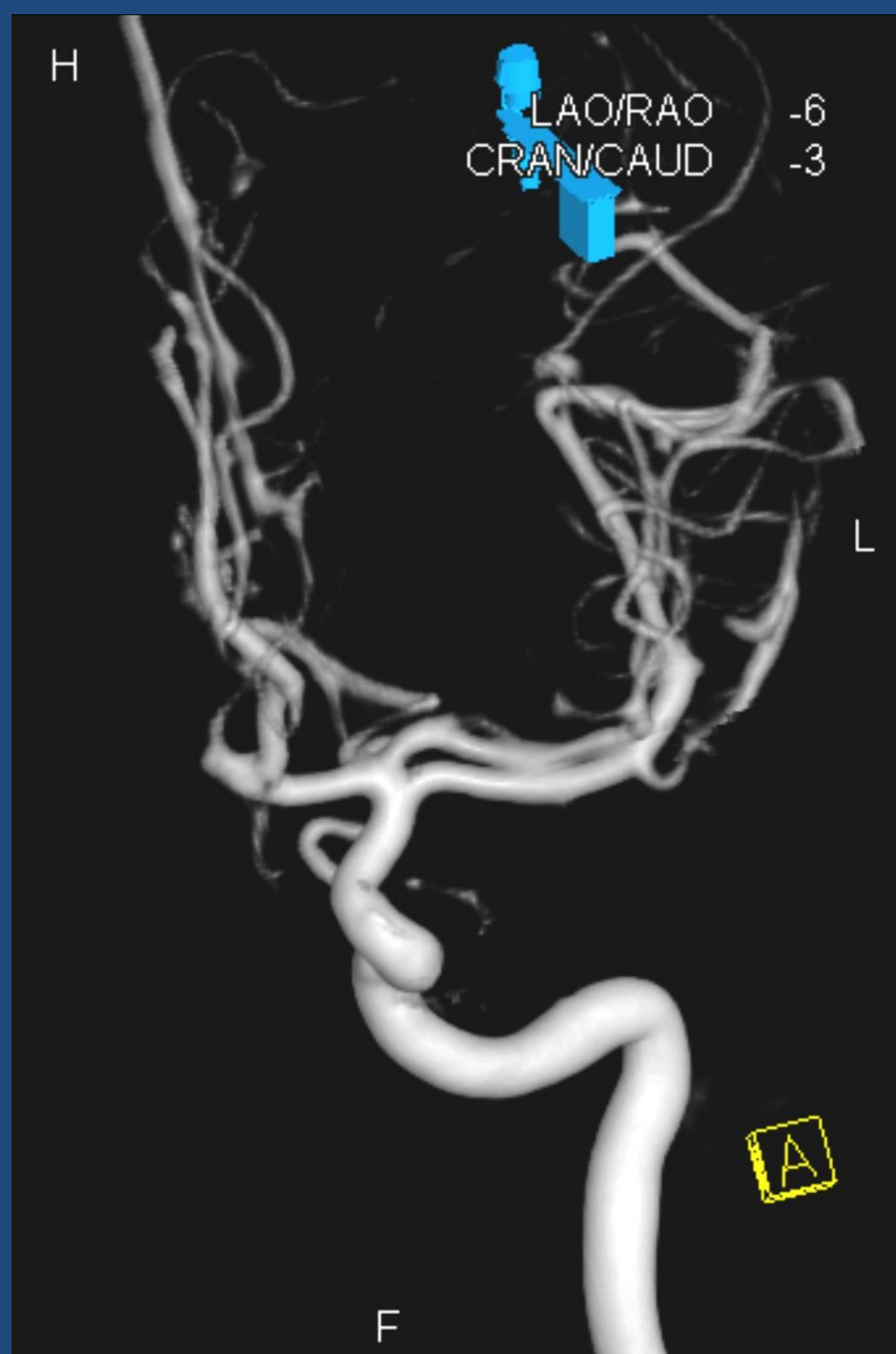
Variant

- **Accessory Middle Cerebral Artery**

- An accessory middle cerebral artery is an artery that arises from the anterior cerebral artery and courses parallel to the M1 segment of the middle cerebral artery, supplying the anterior-inferior region of the frontal lobe
- It may be difficult to differentiate an accessory middle cerebral artery from a duplicated middle cerebral artery.
- A smaller middle cerebral artery branch arising from the anterior cerebral artery is designated as an accessory middle cerebral artery, whereas a smaller middle cerebral artery branch arising from the distal carotid artery is called a duplicated middle cerebral Artery
- Comparison with the level of carotid bifurcation and the pattern of branching on the opposite side may be helpful for identifying this variant

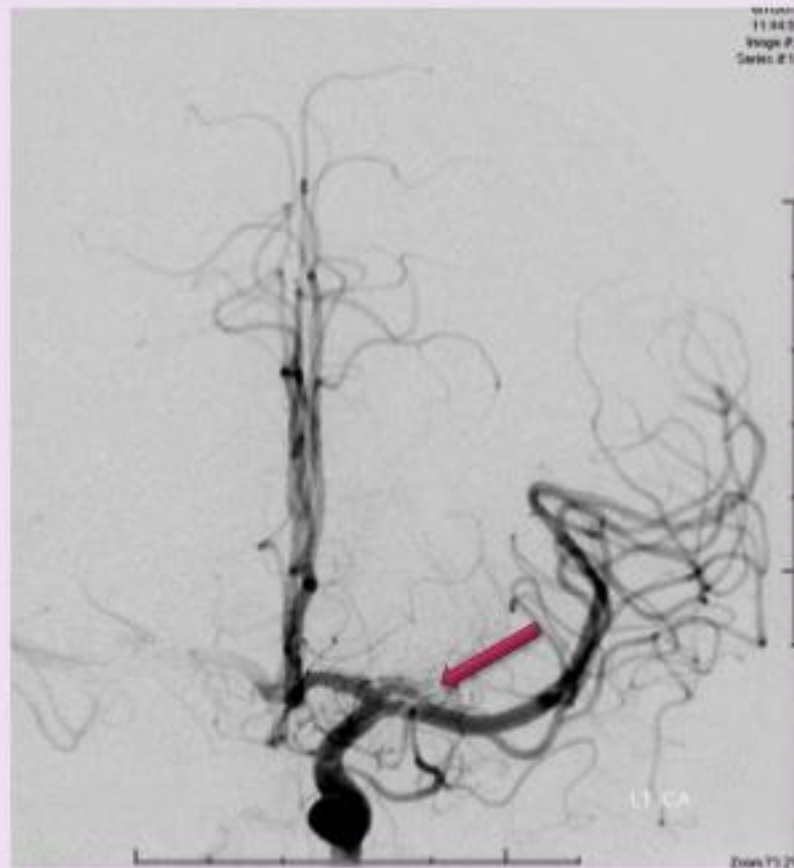


LICA
<VRT Collection>
ARTERIOGRAM



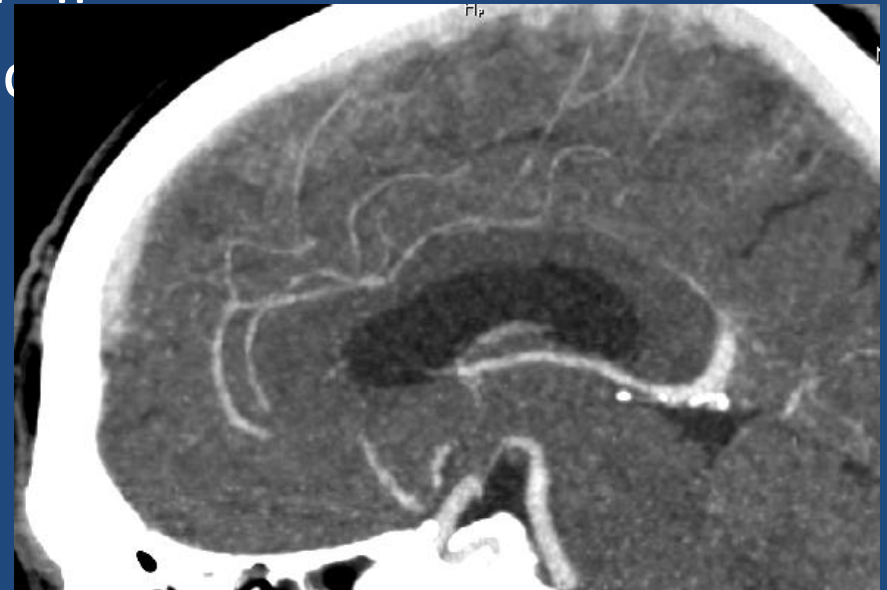
- Proximal vessel MCA proper
- Identify source of perforator and cortical supply

MCA fenestration



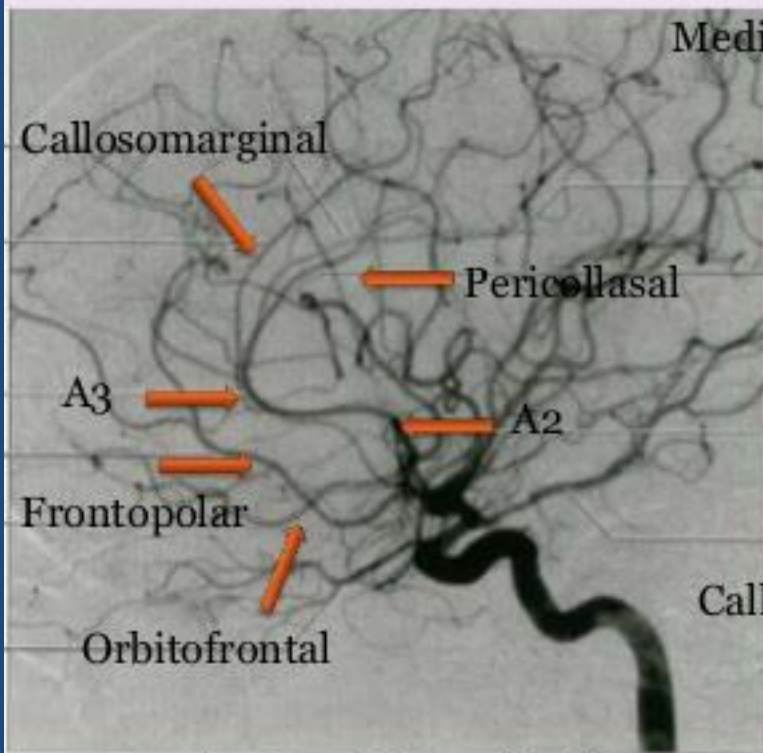
Πρόσθια Εγκεφαλική αρτηρία

- Τμηματική Ανατομία
 - A1 Διχασμός εσ.ΚΑ - πρόσθια αναστομωτική
 - A2 Πρ. Αναστομωτική – γόνυ του μεσολοβίου
 - A3 Γόνυ – Οριζόντιο τμήμα

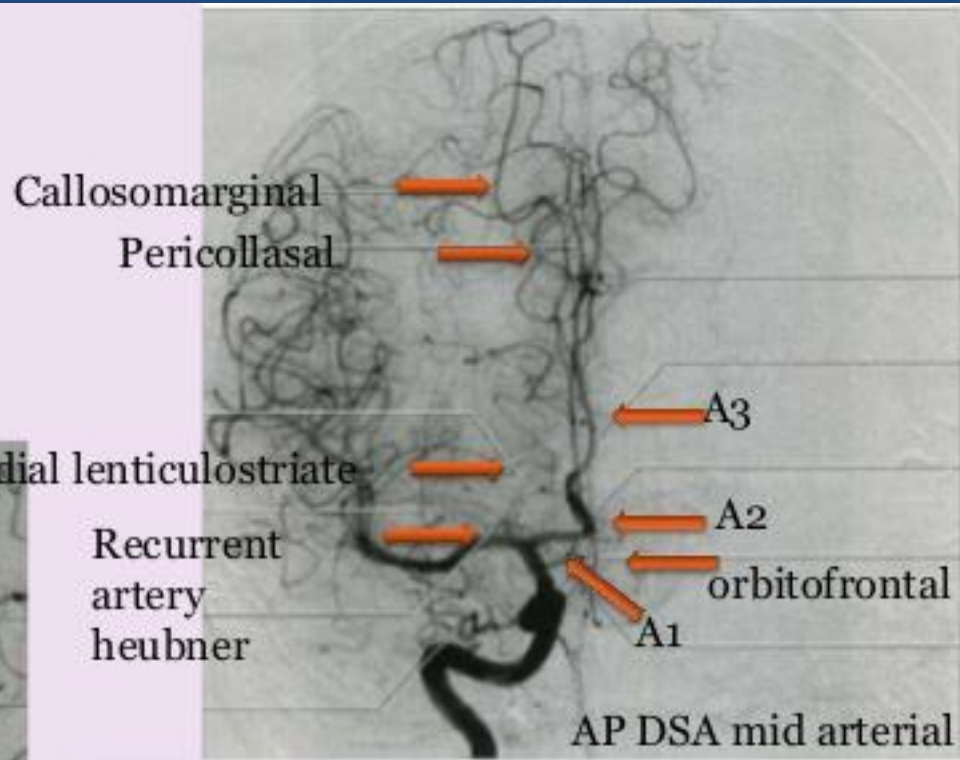


Πρόσθια Εγκεφαλική αρτηρία

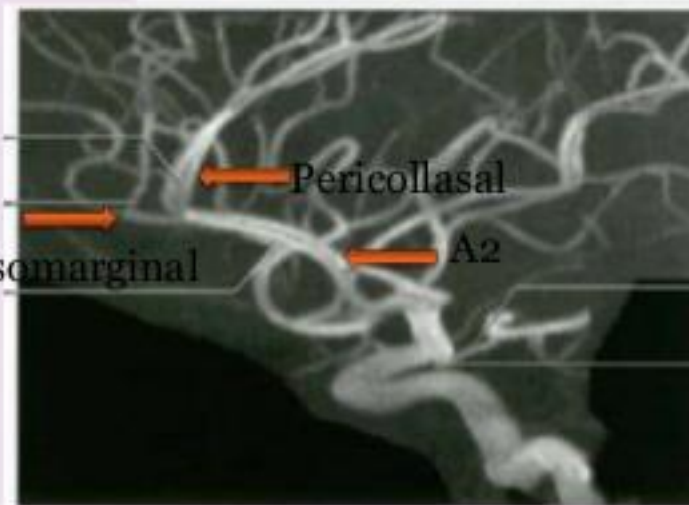
- Κλάδοι της πρόσθιας εγκεφαλικής αρτηρίας
 - Έσω φακοραβδωτές
 - Παλίνδρομη αρτηρία του Huebner
 - Φλοιϊκοί κλάδοι
 - Κογχομετωπιαίοι (orbitofrontal)
 - Πολικοί (frontopolar)
 - Μετωπιαίοι (anterior, middle, posterior internal frontal)
 - Περιμεσολόβιος (pericalosal)
 - Επιχείλιος (Calosomarginal)
 - Βρεγματικοί κλάδοι (precentral, superior & inferior parietal)



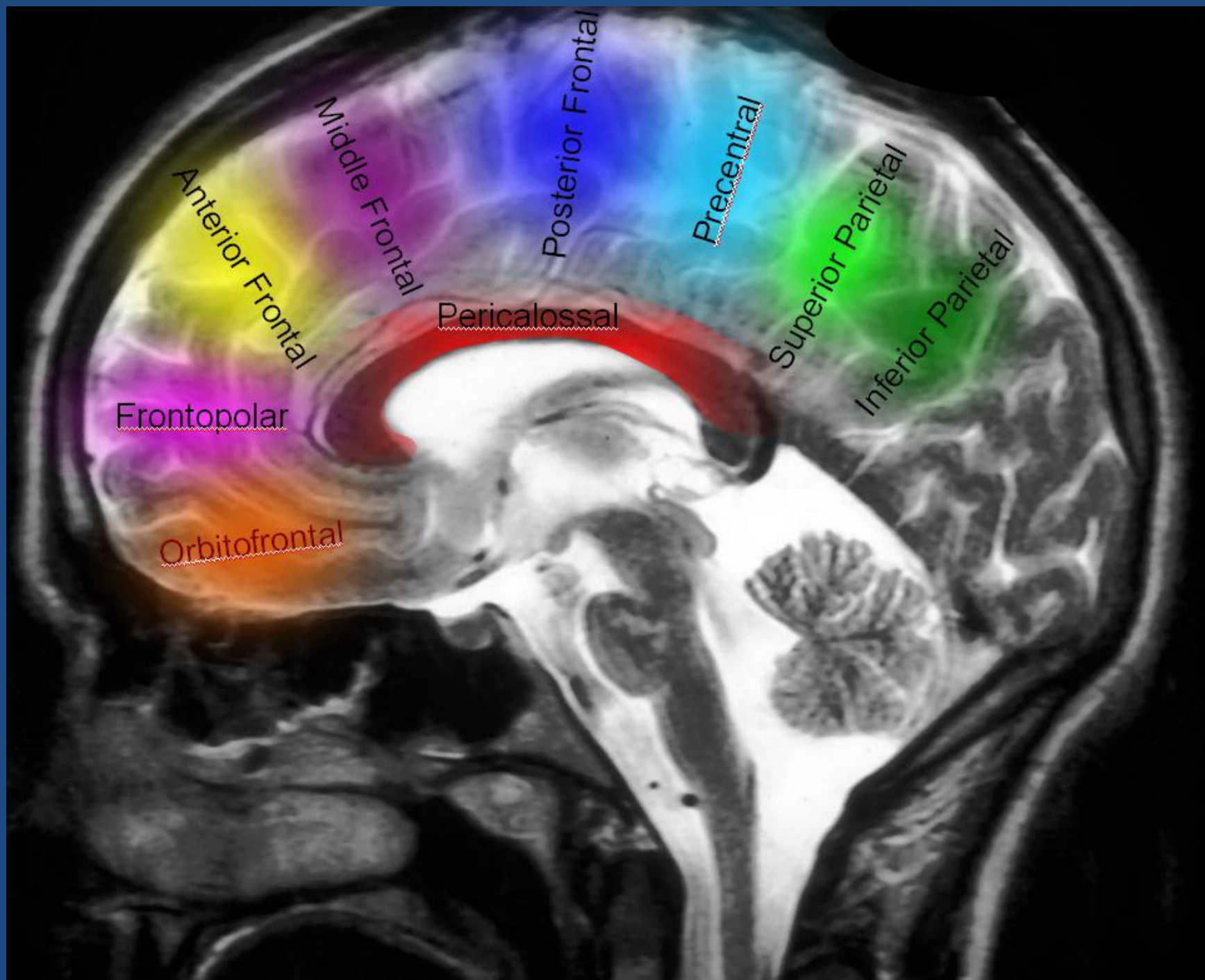
Lateral DSA mid arterial phase



AP DSA mid arterial

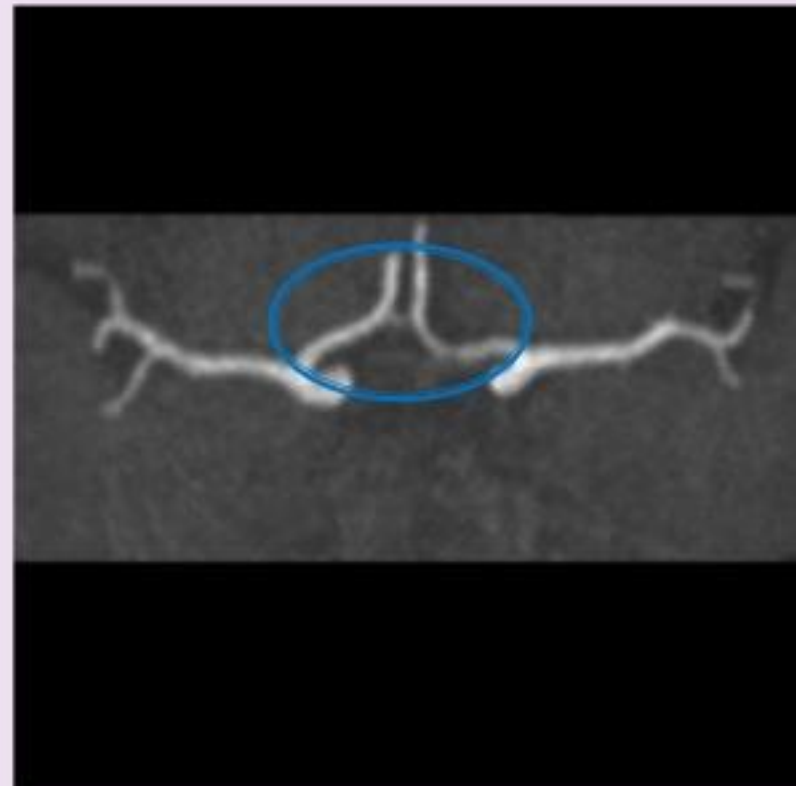


3D MRA



ACA – ACoA complex

- ACoA -Part of COW - not a true branch of ACA
- Branches – perforating
- Supply –Lamina terminalis , Hypothalamus , Anterior commissure , Fornix, Septum pellucidum , Para olfactory gyrus , Subcallosal region , Anterior part of cingulate gyrus



Acom perforator vessels

- Arise from Postero-superior aspect of Acom
- Acom aneurysm surgery risk factor!

Πρόσθια αναστομωτική- Acom

- 80% Acom aneurysms significant A1 asymmetry
- Acom size ~ 7mm, 3.4mm diameter

Variants -ACoA

- ACA – ACoA complex – normal 1/3rd anatomy dissection
- Absent , duplicate or multichannel ACoA – 10-15%

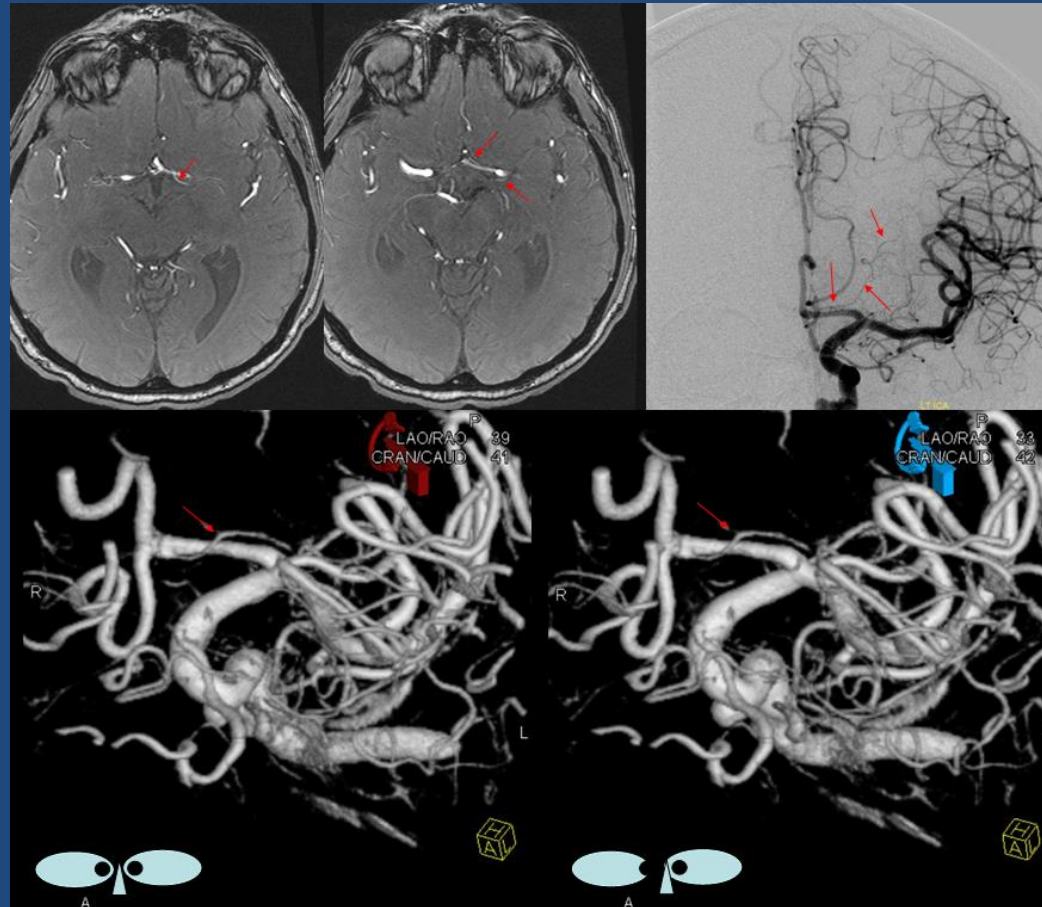


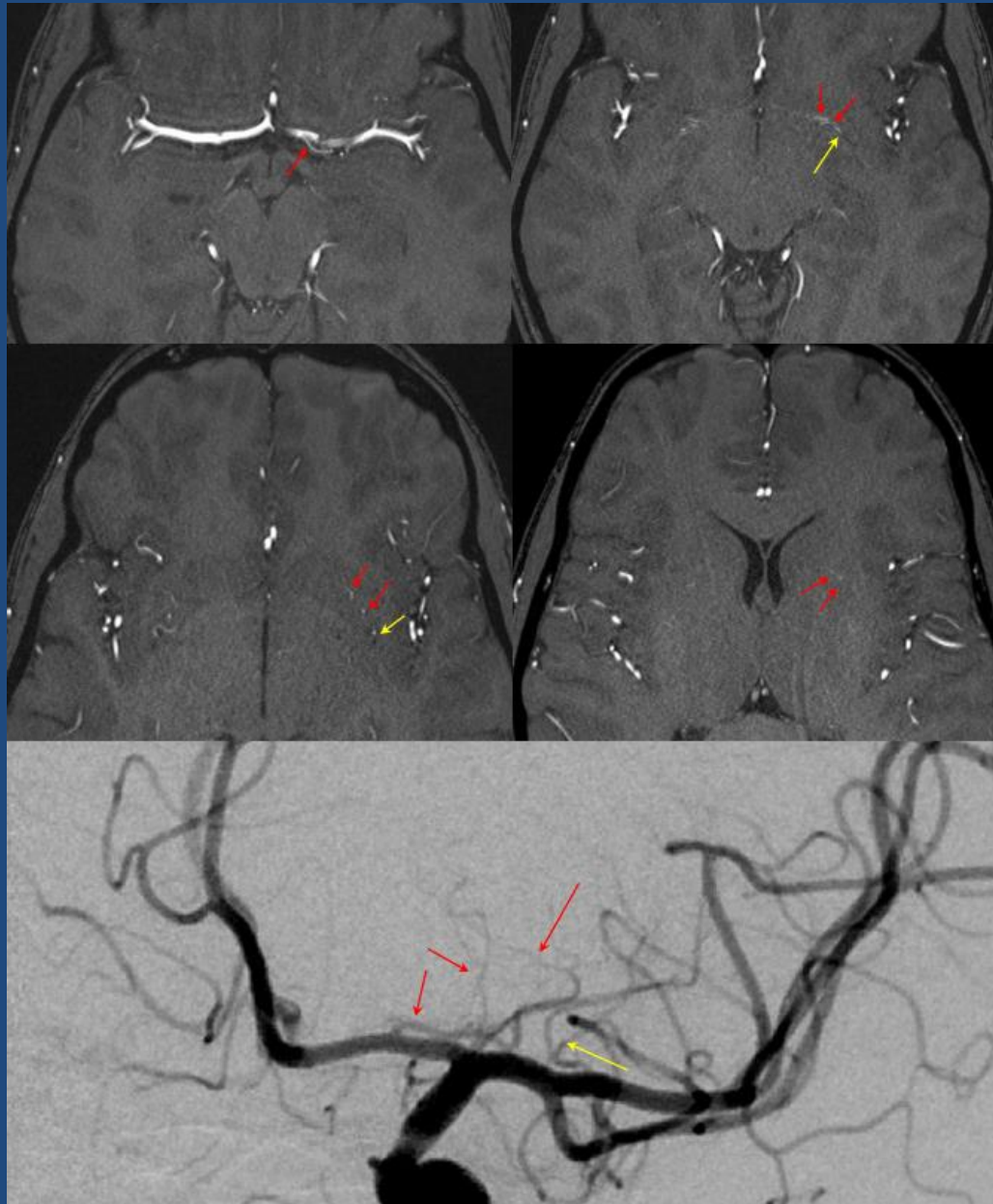
Figure 18. Absence of the anterior communicating artery. Multidetector CT angiogram demonstrates absence of the anterior communicating artery and equal caliber of the A1 segments.

Recurrent artery of Heubner

- Supplies anteroinferior caudate nucleus, anterior limb IC, anterior putamen, paraterminal (subcallosal)gyrus
- Usually 49-78% from A2, also Acom & A1
- Duplication 12%
- Absent 3%

Recurrent artery of Heubner





Variants – A1

- Hypoplasia or absent A1 ACA segment-distal segments fill preferentially from other side via ACoA.

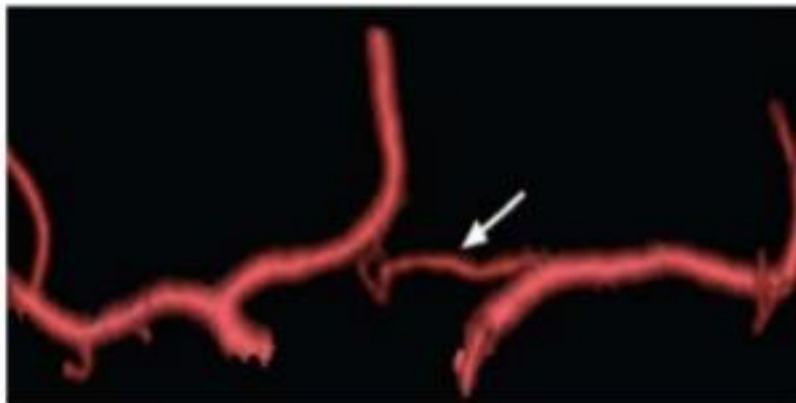


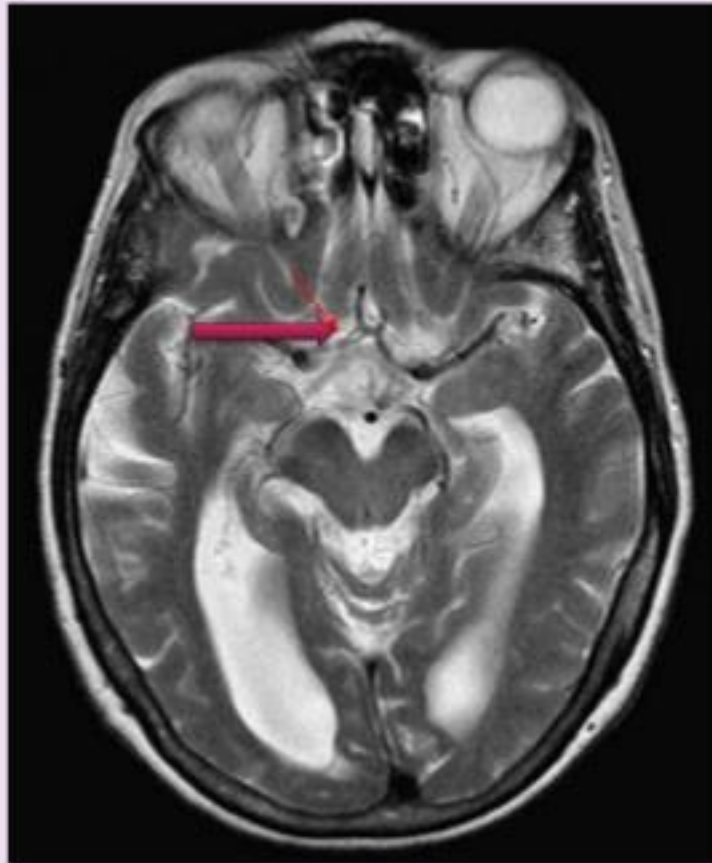
Figure 16. Hypoplasia of an A1 segment of the anterior cerebral artery. Multidetector CT angiogram demonstrates a hypoplastic A1 segment (arrow). Asymmetry of the A1 segments is common.



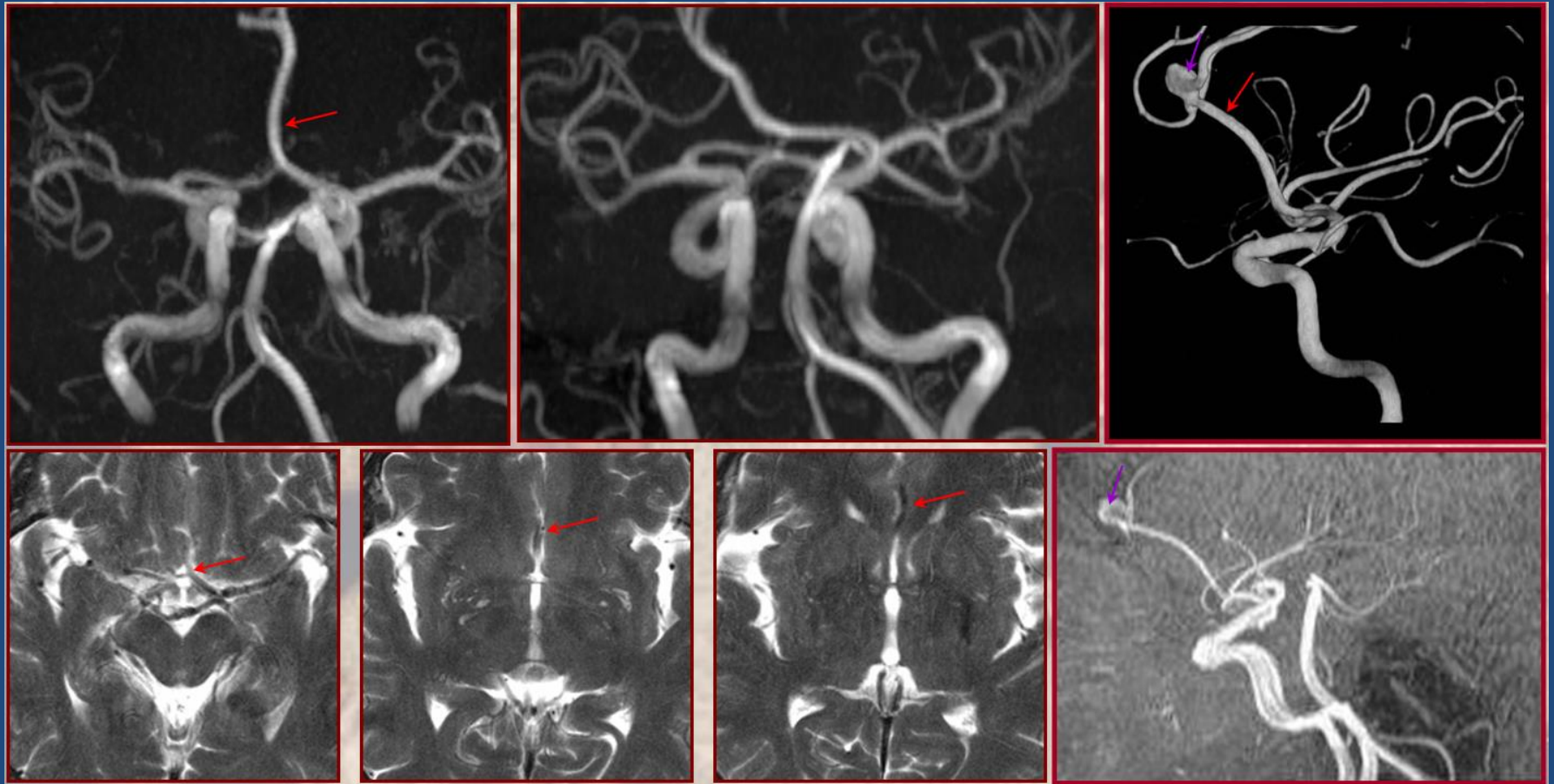
Figure 17. Absence of an A1 segment of the anterior cerebral artery. Multidetector CT angiogram shows the origin of both A2 segments from a single, unilateral A1 segment.

Duplication ACA

- Fenestration / duplication of ACA



Azygous ACA -both pericallosals from one A2





LT ICA

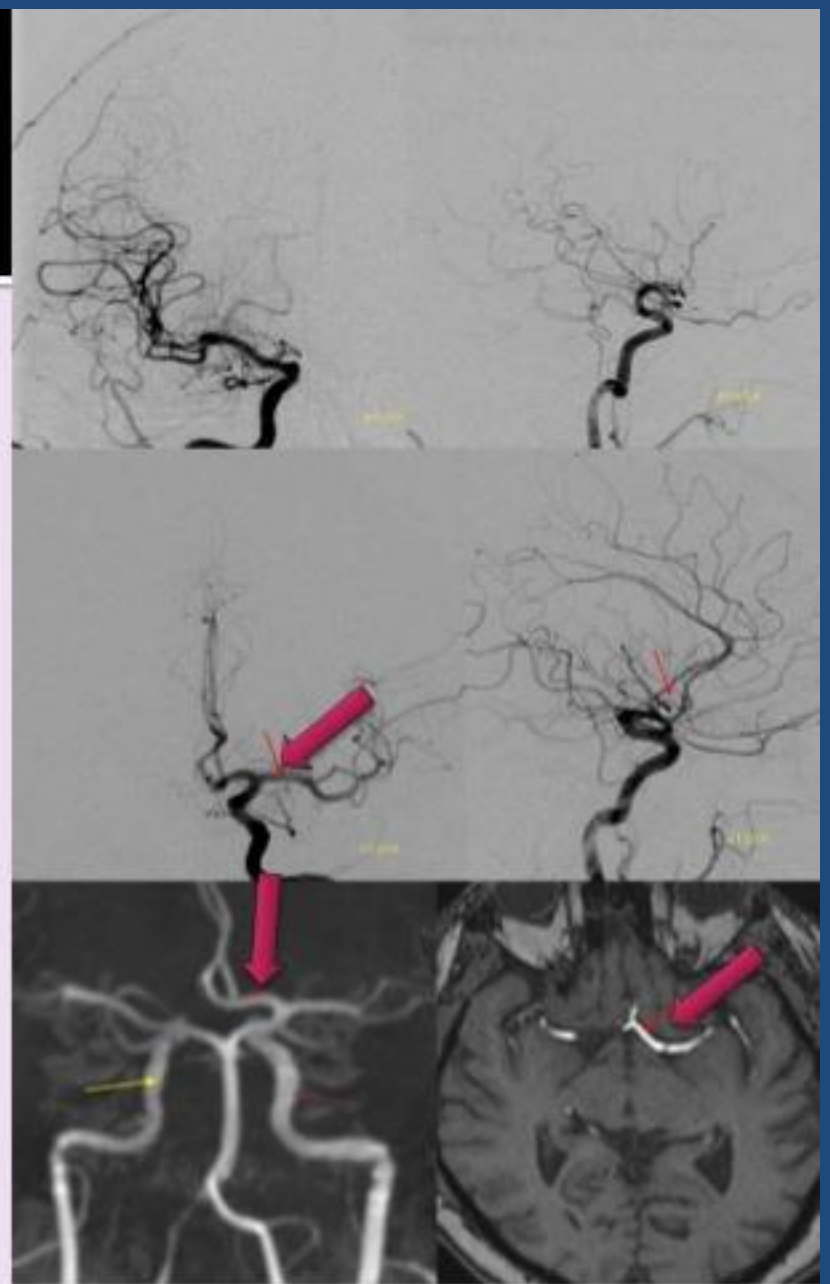
Acom origin Frontopolar artery



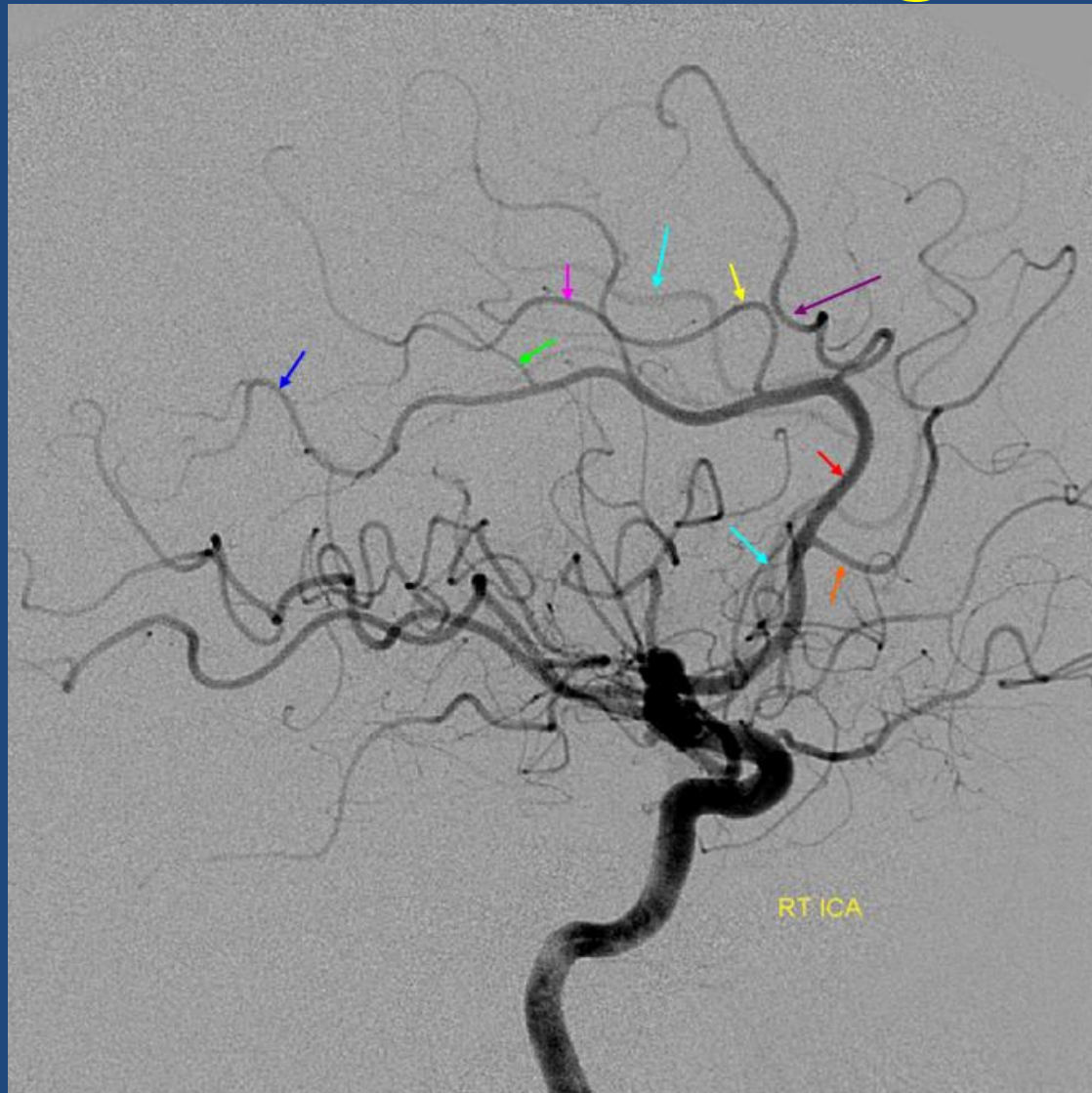
Bihemispheric ACA

Variable branches to C/L hemisphere.

- Separate right n left ACA.
- 1 ACA is dominant than other and it sends branches to other hemisphere.
- Other ACA is hypoplastic – terminate as orbitofrontal or frontopolar branch.



No callosomarginal



No pericallosal



Acom callosomarginal take off



Image size: 1024 x 1024 Atlidaki Areti 1100007 (49 y , 49 y)
View size: 918 x 918 Unnamed
WL: 142 WW: 241 DSA
3



Image size: 1024 x 1024 Atlidaki Areti 318415/5826. (49 y , 49 y)
View size: 918 x 877 Unnamed
70 WW: 683 Head 8



RICA
90% Angle: 0
17
pressed 30/05/17 09:36:04
Made In OsiriX

Zoom: 90% Angle: 0
Im: 1/8
Uncompressed
Position: LFS
04/04/17 18:08:22
Made In OsiriX

Image size: 1024 x 1024 Atlidaki Areti 1100007 (49 y , 49 y)

View size: 918 x 877

WL: 142 WW: 241

Unnamed

DSA

3



Zoom: 90% Angle: 0

Im: 6/8

Uncompressed

Position: HFS

04/04/17 20:44:35

Made In OsiriX

Image size: 1024 x 1024
View size: 918 x 918
WL: 551 WW: 382

Atidaki Areti 318415/5826. (49 y , 49 y)

Unnamed
Head
2



L.I.C.A.

Zoom: 90% Angle: 0
Im: 8/29
Uncompressed

30/05/17 09:18:15
Made In OsiriX

Image size: 1024 x 1024
View size: 918 x 918
WL: 645 WW: 344

Atidaki Areti 318415/5826. (49 y , 49 y)

Unnamed
Head
2



L.I.C.A.

Zoom: 90% Angle: 0
Im: 1/1
Uncompressed

30/05/17 09:18:21
Made In OsiriX

Image size: 1024x1024 Aretj 318415/5826. (49 y , 49 y)

View size: 852 x 852

WL: 600 WW: 592

Unnamed

Head

10



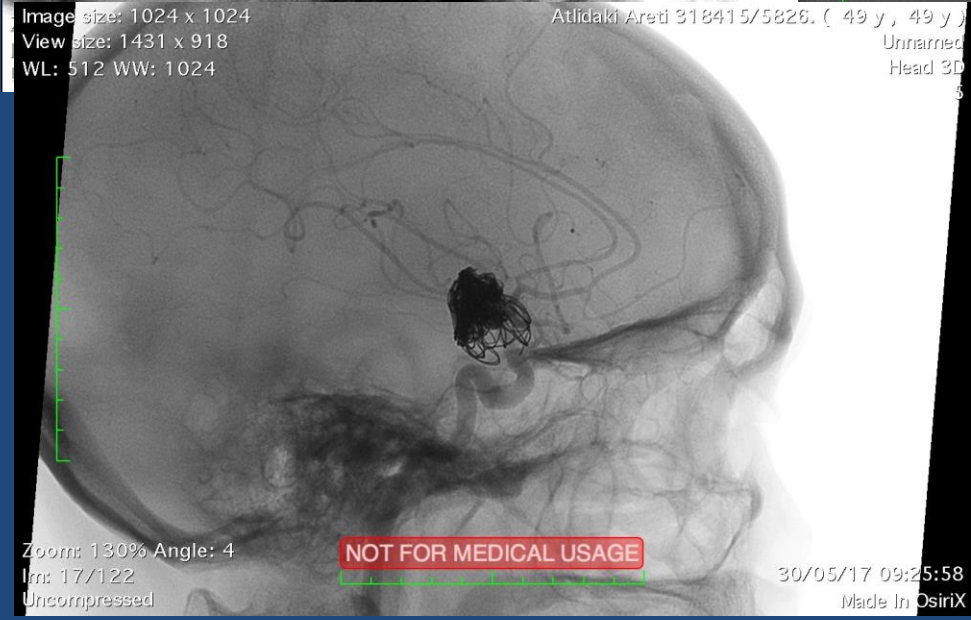
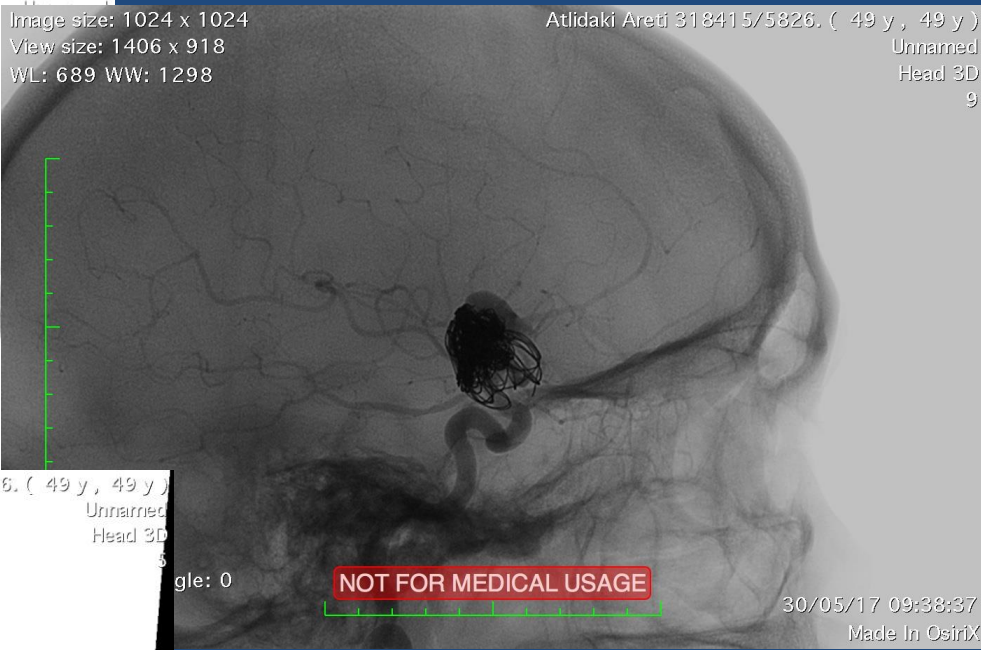
Zoom: 82% Angle: 0

Im: 7/16 R.I.C.A.

30/05/17 09:44:12

Uncompressed

Made In OsiriX



ngle: 0

NOT FOR MEDICAL USAGE

30/05/17 09:38:37
Made In OsiriX

Zoom: 130% Angle: 4
Irr: 17/122
Uncompressed

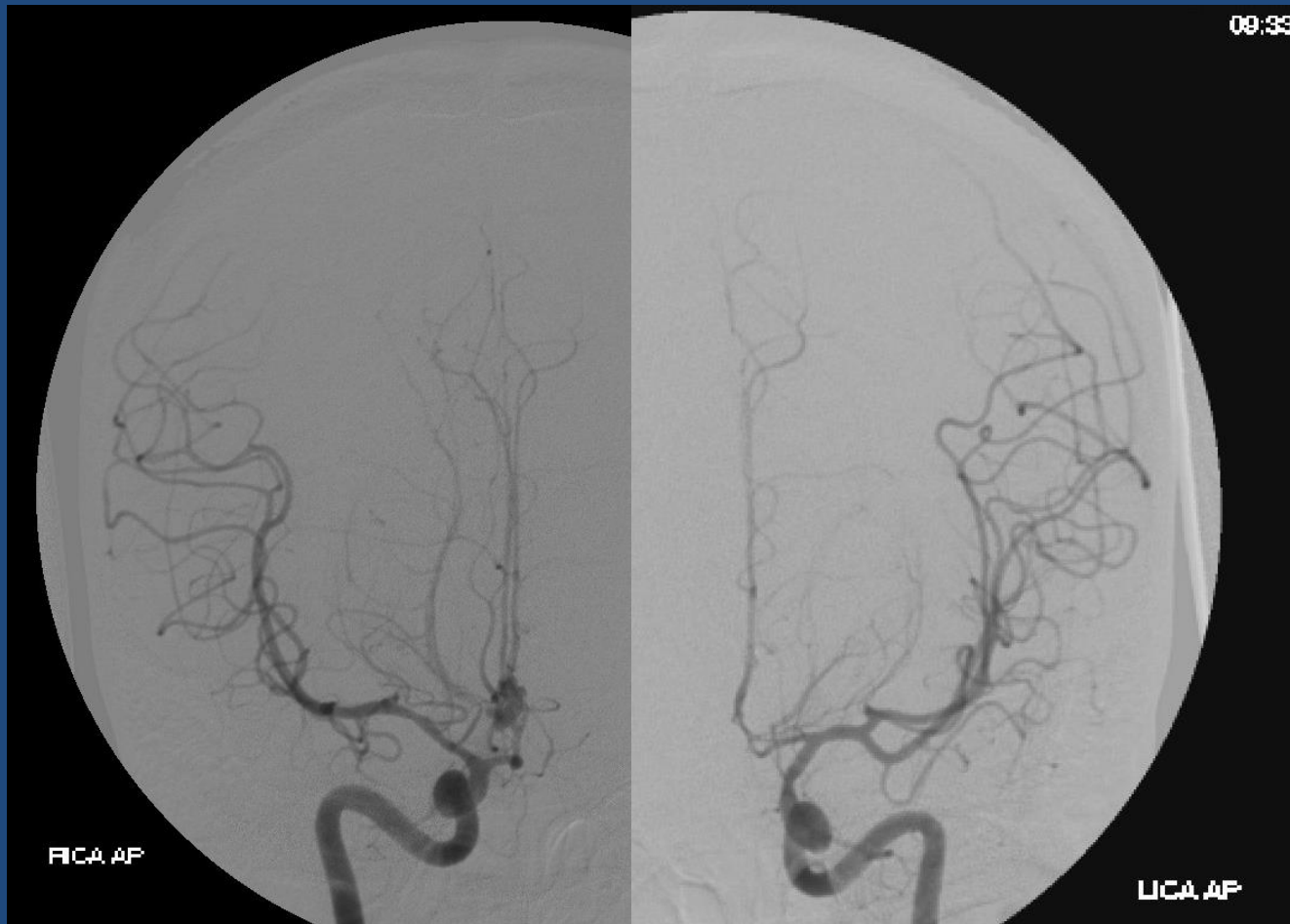
NOT FOR MEDICAL USAGE

30/05/17 09:25:58
Made In OsiriX

Infraoptic A1

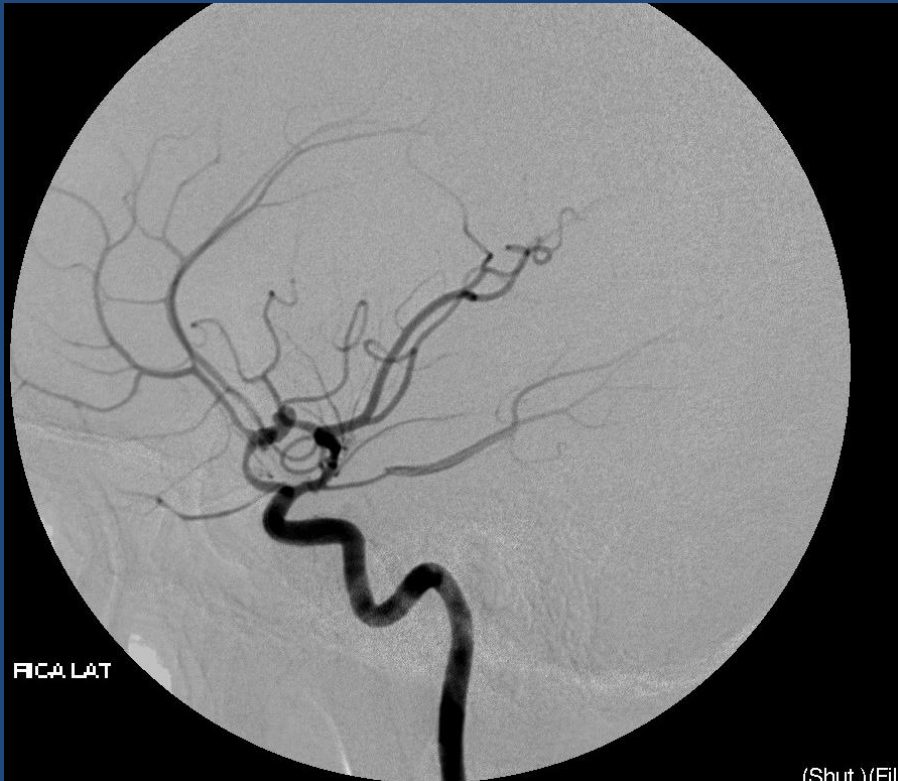


08:33



RCA, AP

LCA, AP

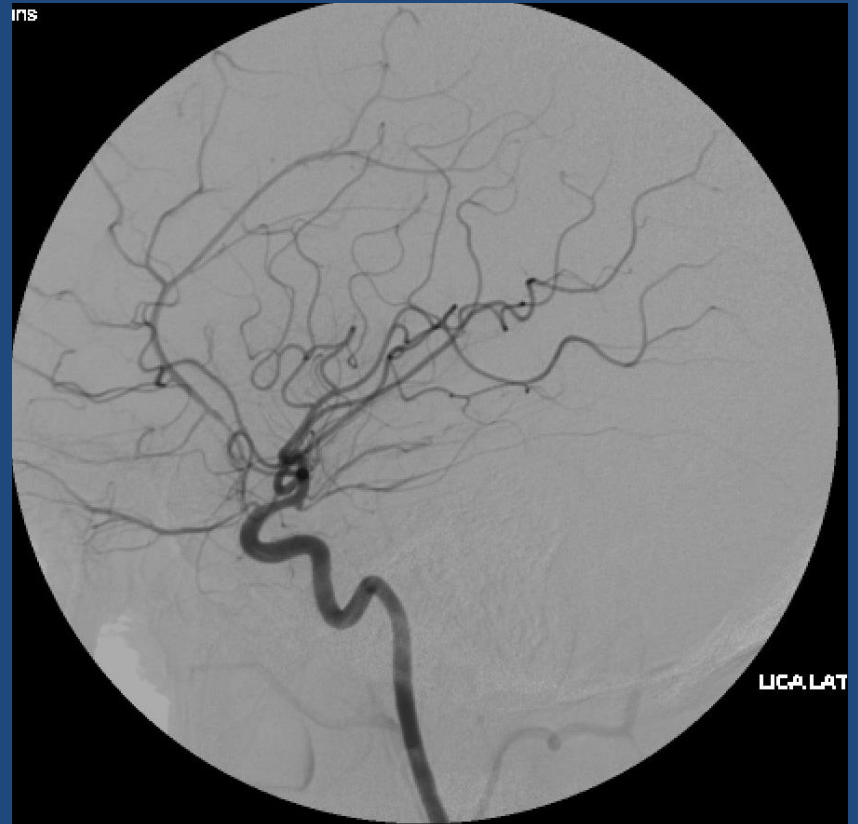


RICA.LAT

(Shut.)(Fil

AO: 83
CRA: 4

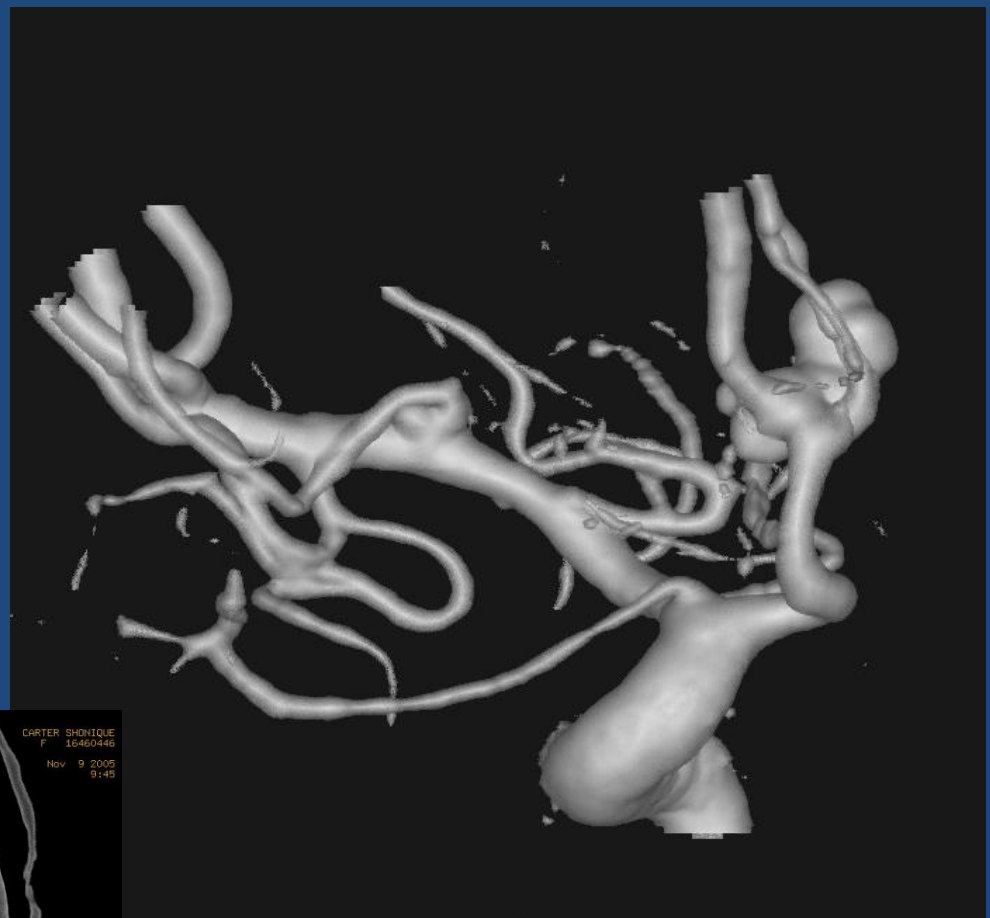
Se
FRAME = 6



LICA

LICA.LAT

2



Infraoptic A1

- The characteristic features of an infraoptic course of the A1 are that the artery ***arises from the ICA at the level of the ophthalmic origin and is located underneath the optic nerve*** to supply distally the territorial distribution of a normal ACA via an anastomotic segment in the vicinity of the ACA. Approximately 75% of infraoptic ACAs are seen on the right side, 15% on the left side, and 10% bilaterally.

Infraoptic A1

- In early embryonic development, orbital structures are supplied by two vessels, both of which do not originate from the “adult” location of the ophthalmic. Instead, a **dorsal ophthalmic artery arises from the region of future *ILT***, and second **ventral ophthalmic artery extends from the anterior cerebral artery** (ACOM region), underneath the optic nerve, and through the optic canal into the orbit. Occasionally, the dorsal ophthalmic artery persists, with several examples shown in the ophthalmic artery and *ILT* sections. Extremely rarely, the ventral ophthalmic artery can persist as well. More commonly, however, the ventral ophthalmic artery conduit persists as the “A1 segment” of the ACA, as in this case, and takes an infraoptic course. It appears as though the ICA bifurcated early — at the ophthalmic segment — such that everything distal to the “early” ICA bifurcation may be perceived as the MCA — implying that both PCOM and A. Choroidal arise from this M1 segment. This, of course, is an incorrect interpretation — in fact, the “classical” A1 segment is developmentally hypoplastic, and is compensated by its collateral ventral ophthalmic conduit, which functions as the A1 segment, such that both PCOM and A. Chor. arise exactly as they should, and the M1 segment is defined as the vessel distal to the choroidal.