

Diagnostica per immagini, importanza della diagnostica differenziale



Napoli
SURGERY

PROGRAMMA SEMINARI
28 SETTEMBRE

Aula Magna Scuola di Medicina di Scampia
Centro Congressi Università degli Studi di Napoli Federico II
Via Valerio Verbano Snc, Scampia - Napoli

CON IL PATROCINIO DI:



Dott. Vincenzo D'Agostino
U.O.C. Neuroradiologia ODM



Emorragia cerebrale

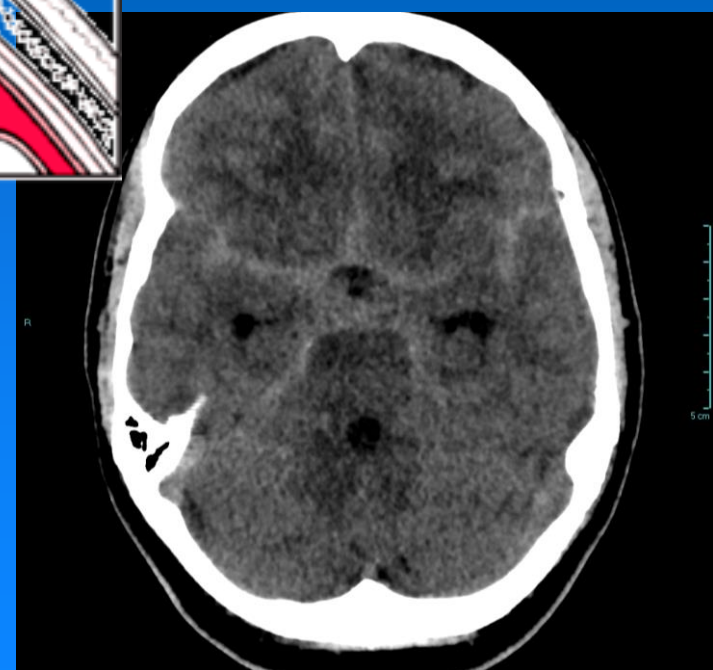
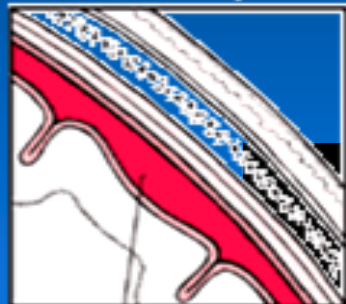
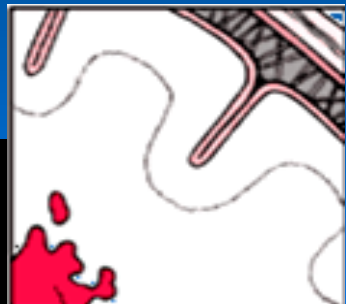


Intracerebrale

Subaracnoidea

2/3

1/3



EMORRAGIA CEREBRALE

✓ IPERTENSIONE CRONICA

✓ ANGIOPATIA AMILOIDE

✓ MALFORMAZIONI VASCOLARI, ANEURISMI

✓ TUMORI

✓ COAGULOPATIE

✓ ALTRI

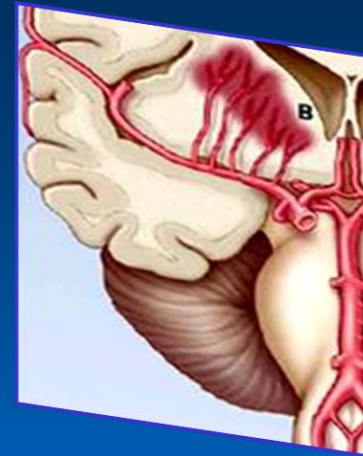
- trombosi venosa

- vasculiti

- trasformazione emorragica ischemia

- droghe: simpaticomimetici, cocaina, amfetamina, ecstasy

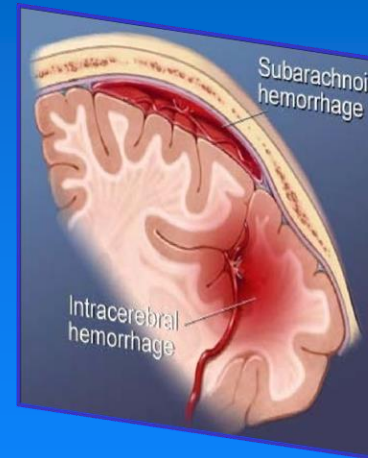
- eclampsia



60-90%

5-20%

PRIMARIA



5-20%

10%

5-10%

SECONDARIA

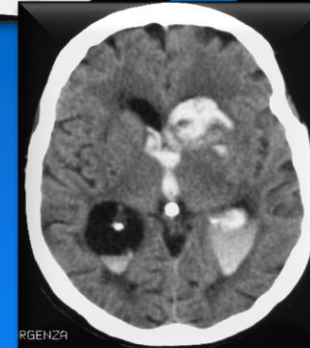
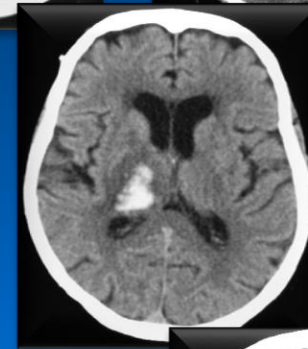
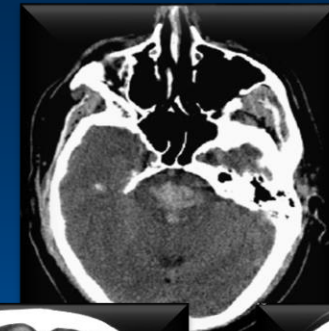
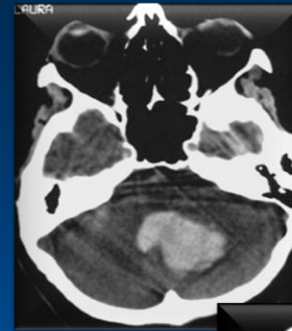
EMORRAGIA INTRACEREBRALE

TC: prima istanza

Rapidità di esecuzione

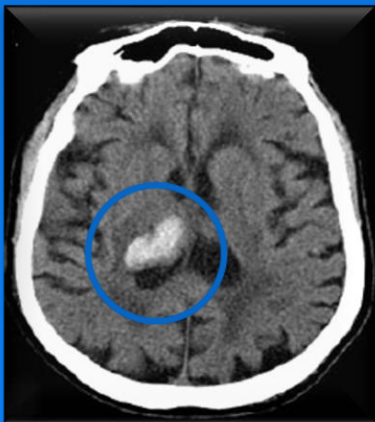
Facilmente reperibile

Immediate informazioni: sede, dimensioni, fattori associati (edema, presenza di ernie cerebrali, stato dei ventricoli, idrocefalo)



EMORRAGIA INTRACEREBRALE

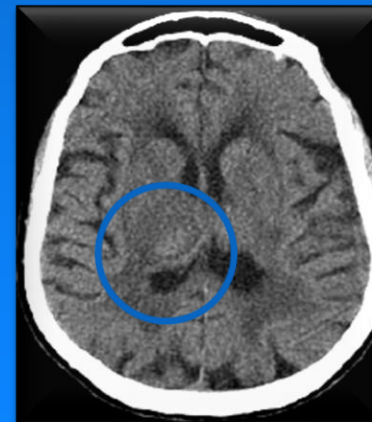
STADIO DELL' EMATOMA	REPERTO TC
Iperacuto (0-6 ore)	Iso/iperdenso
Acuto (6 ore-3 gg)	Iperdenso (60-90 HU)
Subacuto precoce (1 sett-1 mese)	Iper/isodenso
Subacuto tardivo (1 sett-1 mese)	Iper/iso/ipodenso (degradazione delle proteine dalla periferia al centro)
Cronico (> 1 mese)	ipodenso



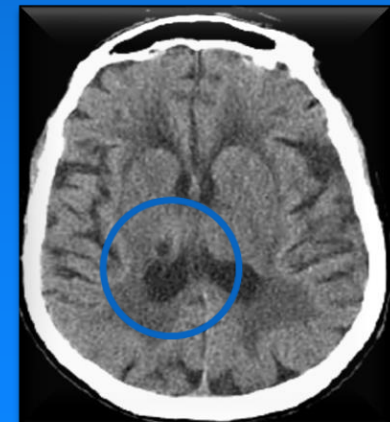
Acuto



Subacuto precoce



Subacuto tardivo



Cronico

STUDIO CON RM

FATTORI INTRINSECI

- Et  del paziente
- Dimensioni dell'ematoma

FATTORI TECNICI

- Sequenze
- Parametri

FATTORI BIOLOGICI

- pO_2
- pH tissutale
- Concentrazione proteica

EMORRAGIA INTRACEREBRALE

STADIAZIONE DELL'EMATOMA CON RM

Evoluzione del segnale RM dell'ematoma cerebrale

STADIO EMATOMA	STADIO EMOGLOBINA	SE T1	SE T2/FLAIR	T2*	DWI
Iperacuto (0-6 ore)	Ossiemoglobina (intracellulare)	ISO / IPO	IPER	Cercine IPO	IPER
Acuto (6ore- 3 giorni)	Deossiemoglobina (intracellulare)	ISO / IPO	Centro IPO Cercine IPER	Nettamente IPO	IPO Cercine IPER
Subacuto precoce (3gg-1 sett)	Metaemoglobina (intracellulare)	Nettamente IPER	Nettamente IPO	Nettamente IPO	IPO Cercine IPER
Subacuto tardivo (1sett- 1 mese)	Metaemoglobina (extracellulare)	Nettamente IPER	Nettamente IPER	Cercine IPO	IPER
Cronico (>1 mese)	Emosiderina e ferritina	IPO	Nettamente IPO	Cercine IPO	IPO

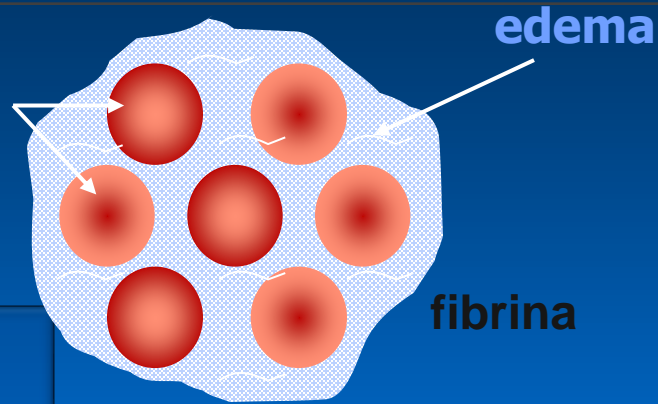
EMORRAGIA INTRACEREBRALE

L'RM PERMETTE DI DATARE L'EMORRAGIA

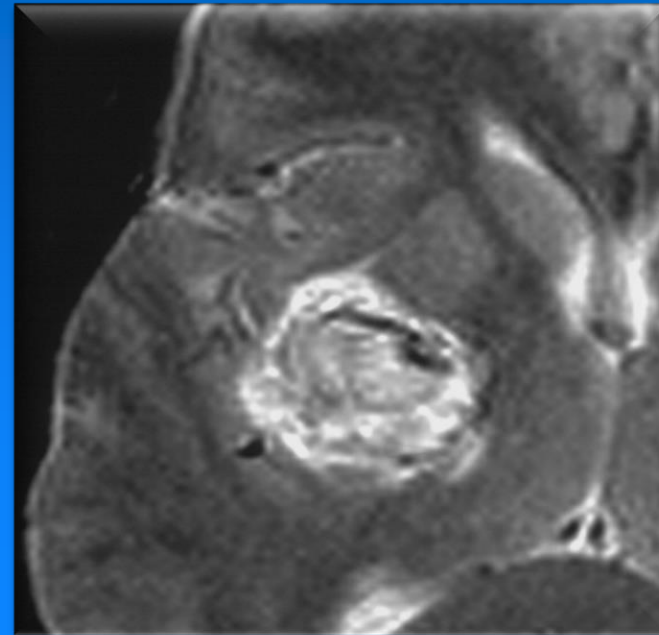
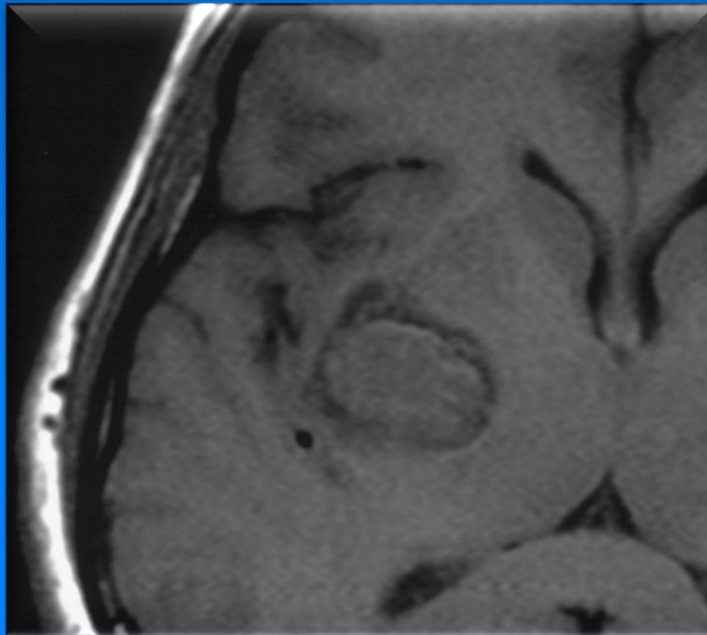
**Iper
acuto
0-6 ore**

ossiHB
DIA magnetica

**Globuli rossi
Biconcavi e
sferici**



T1 -- MRI -- T2



EMORRAGIA INTRACEREBRALE

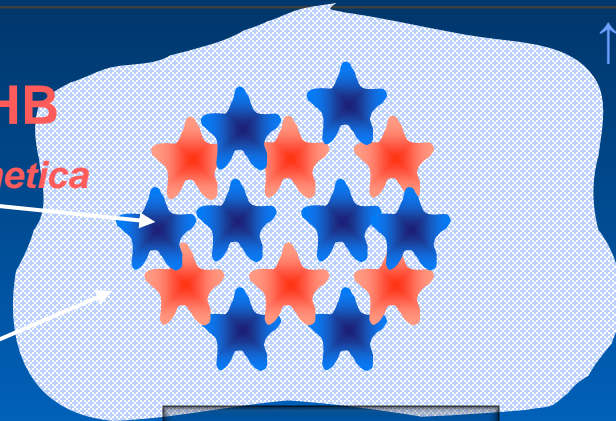
L'RM PERMETTE DI DATARE L'EMORRAGIA

Acuto
7-96 ore

deossigenazione

desossiHB
*PARA*magnetica

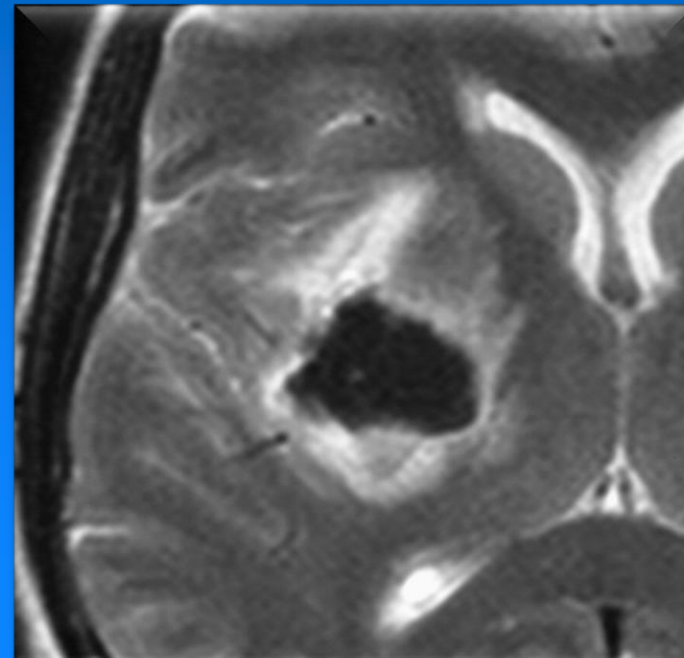
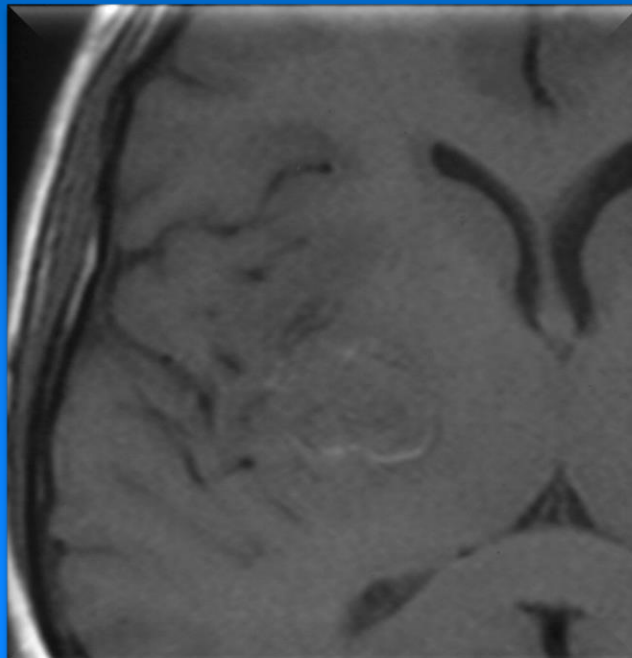
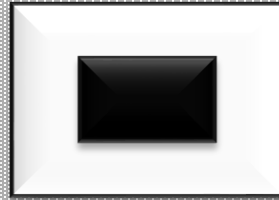
ossiemoglobina



↑edema

Echinociti

T1 -- MRI -- T2



EMORRAGIA INTRACEREBRALE

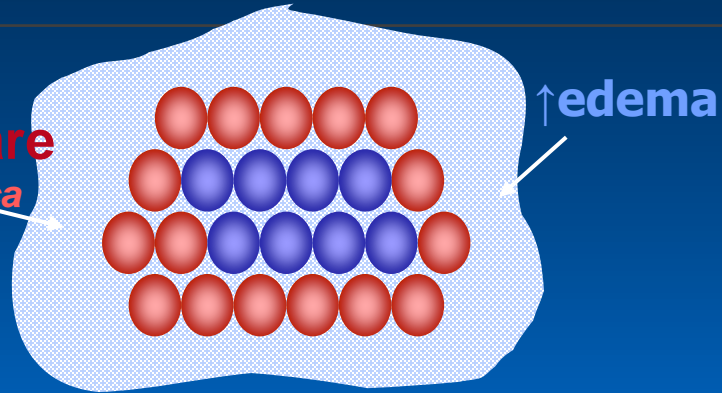
L'RM PERMETTE DI DATARE L'EMORRAGIA

**Subacuta
precoce**

4-7 giorni

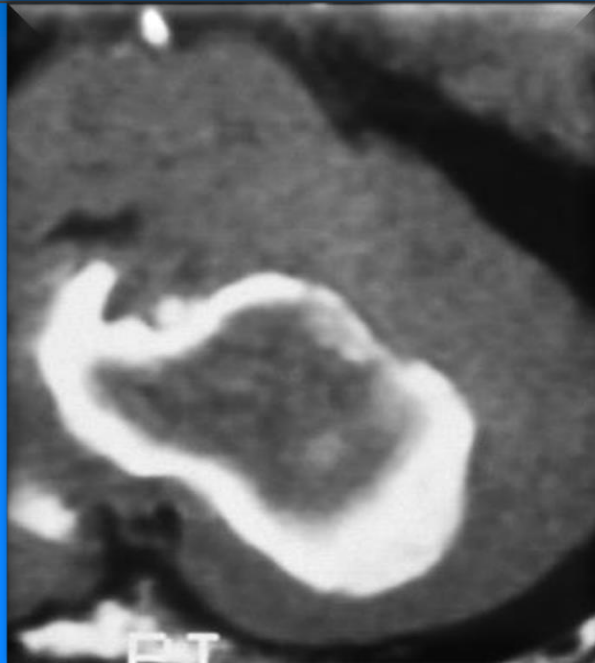
Ossidazione/
denaturazione

MetaHB
Intracellulare
paramagnetica



**Sferociti
assottigliati**

T1 -- MRI -- T2



EMORRAGIA INTRACEREBRALE

L'RM PERMETTE DI DATARE L'EMORRAGIA

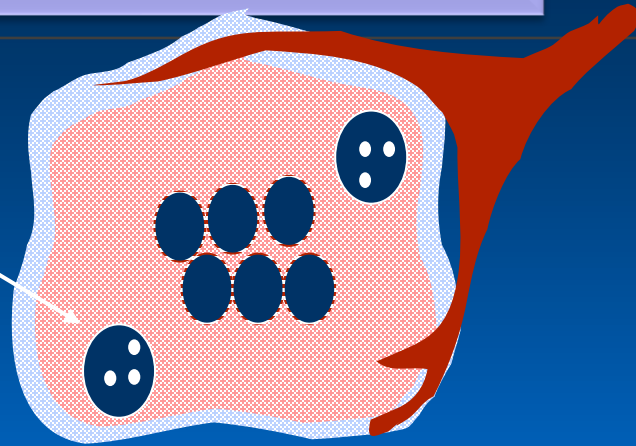
Subacuto

Tardivo

1-4 sett

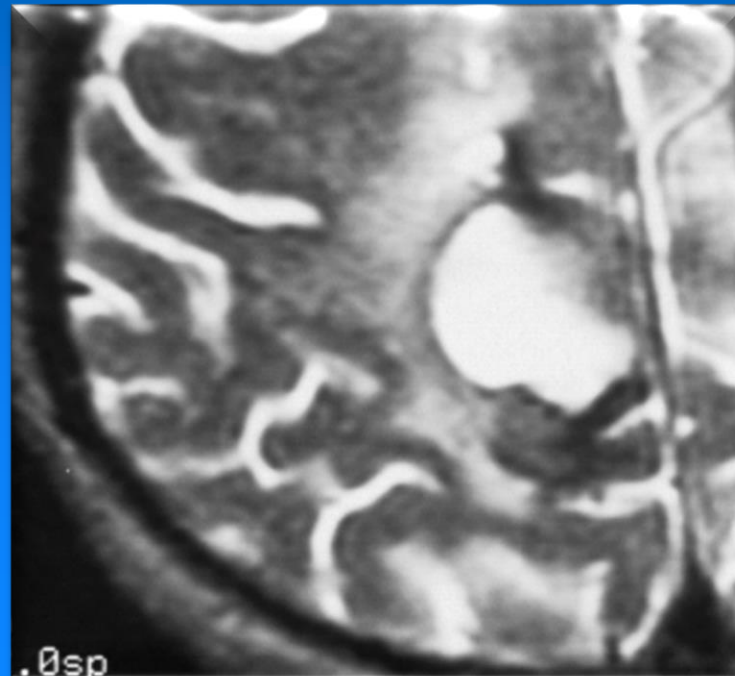
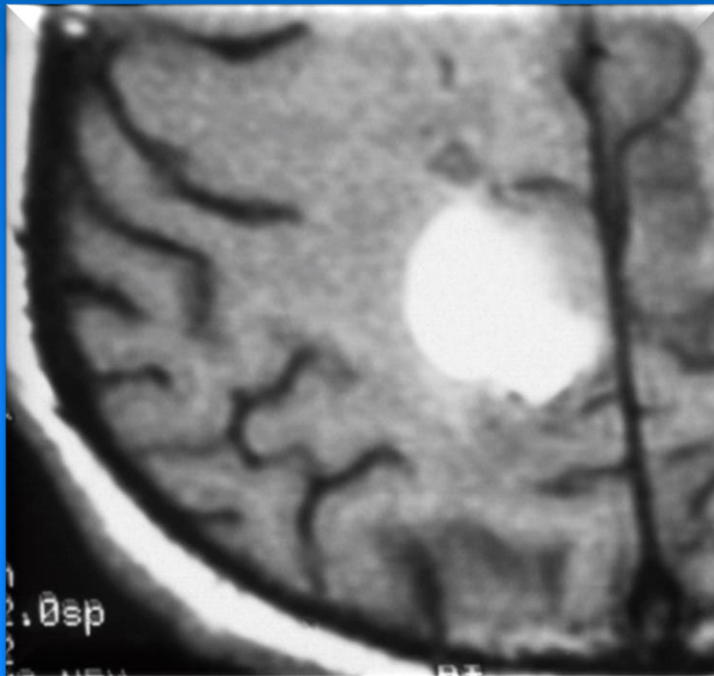
Rottura dei globuli rossi

MetaHB
Extra-cell.



↓ edema

T1 -- MRI -- T2

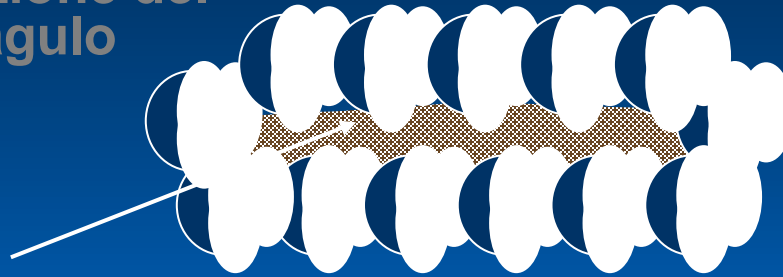


EMORRAGIA INTRACEREBRALE

L'RM PERMETTE DI DATARE L'EMORRAGIA

**Cronica
tardiva**
anni

Risoluzione del
coagulo



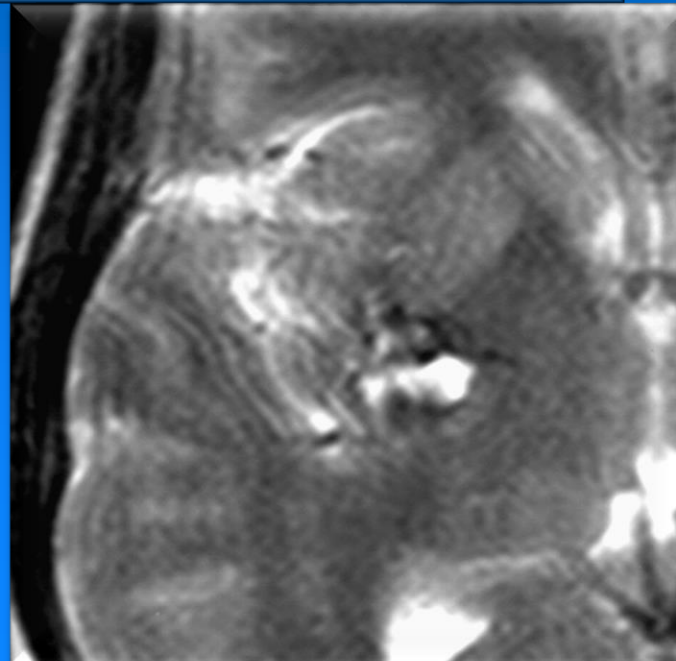
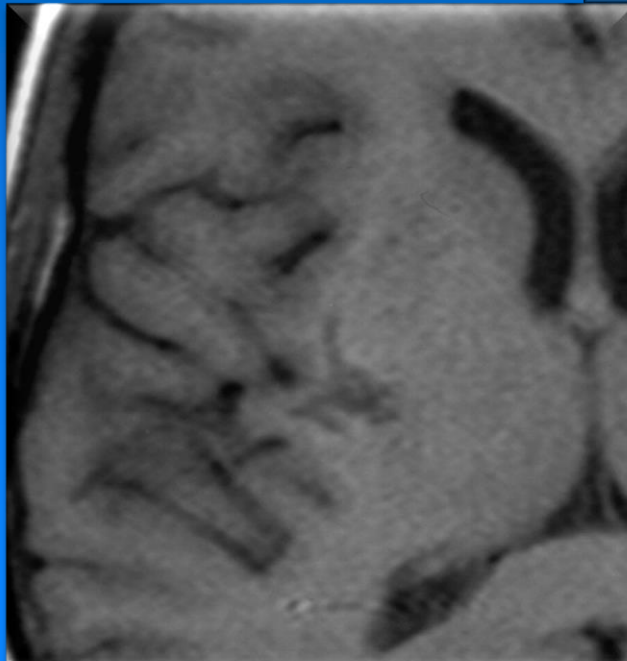
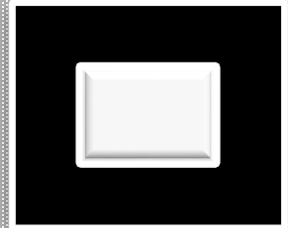
Cavitazione:

Cisti o Collasso con cicatrice
fibrosa

Matrice fibrotica

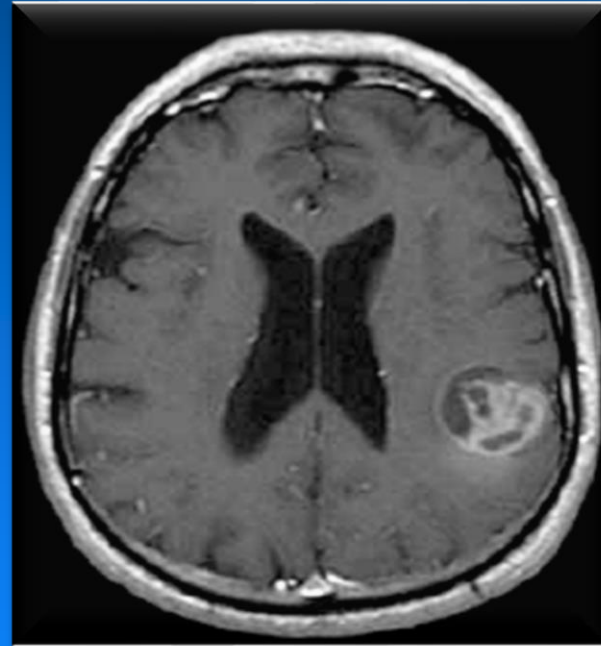
Macrofagi con
ferritina + emosiderina

T1 -- MRI -- T2



TUMORI

- Rottura di vasi neoformati
- Infiltrazione di strutture vascolari
- Zone di presa di contrasto nell'ambito dell'ematoma



EMORRAGIA INTRACEREBRALE

Emorragia spontanea

Emorragia tumorale

omogenea

STRUTTURA

disomogenea

completo

**CERCINE DI
EMOSIDERINA**

lieve, incompleto

transitorio

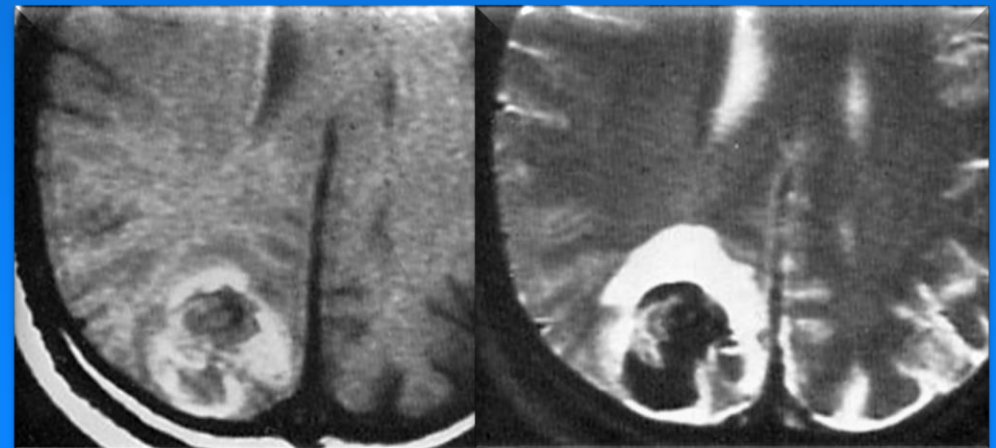
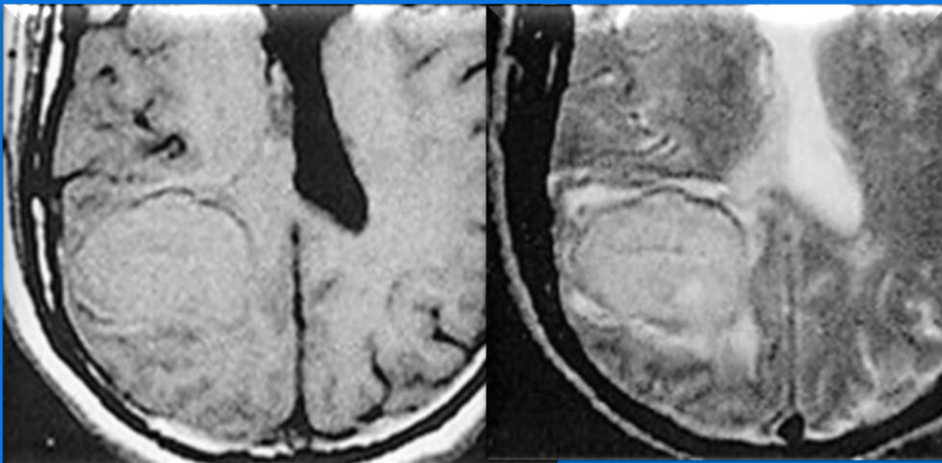
EDEMA PERIFERICO

persistente

normale

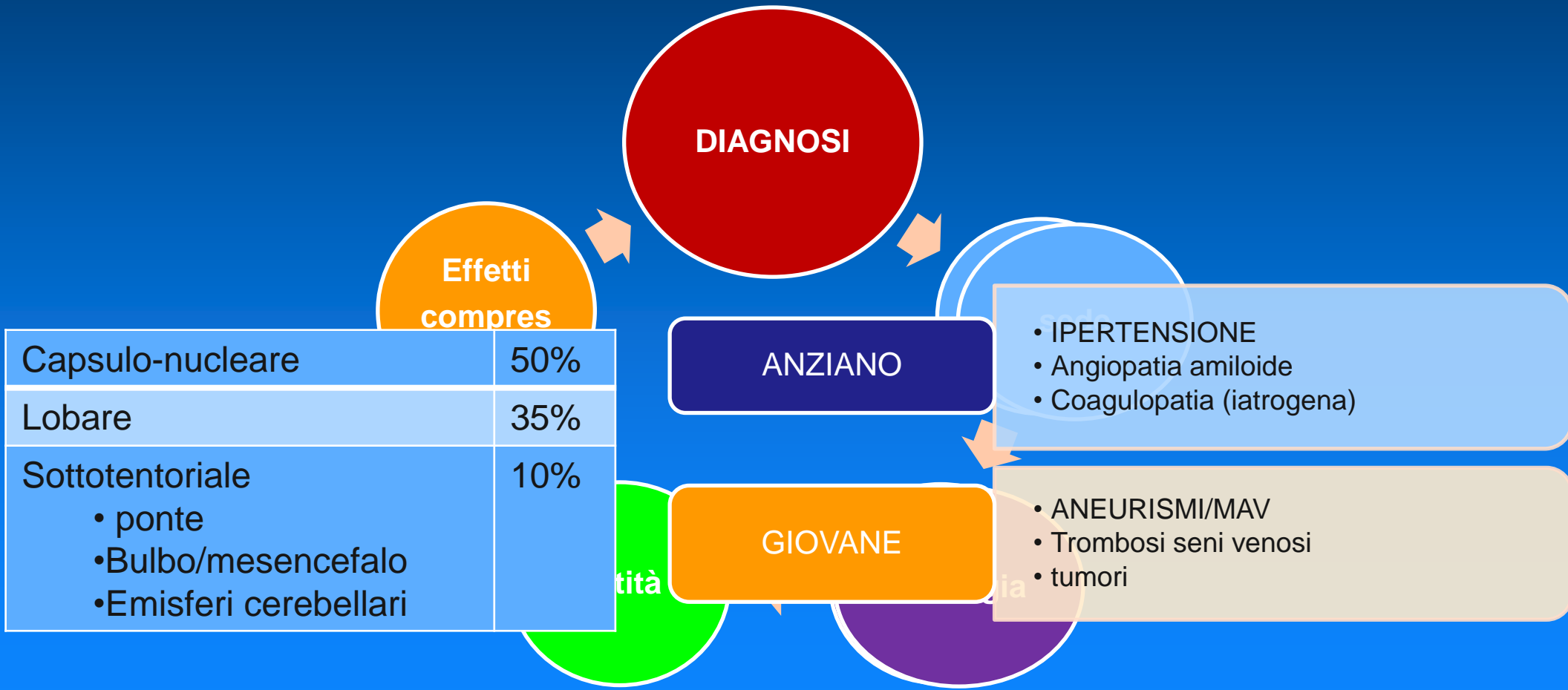
**EVOLUZIONE
TEMPORALE**

lenta, imprevedibile



EMORRAGIA INTRACEREBRALE

OBIETTIVI DELLA DIAGNOSTICA PER IMMAGINI:



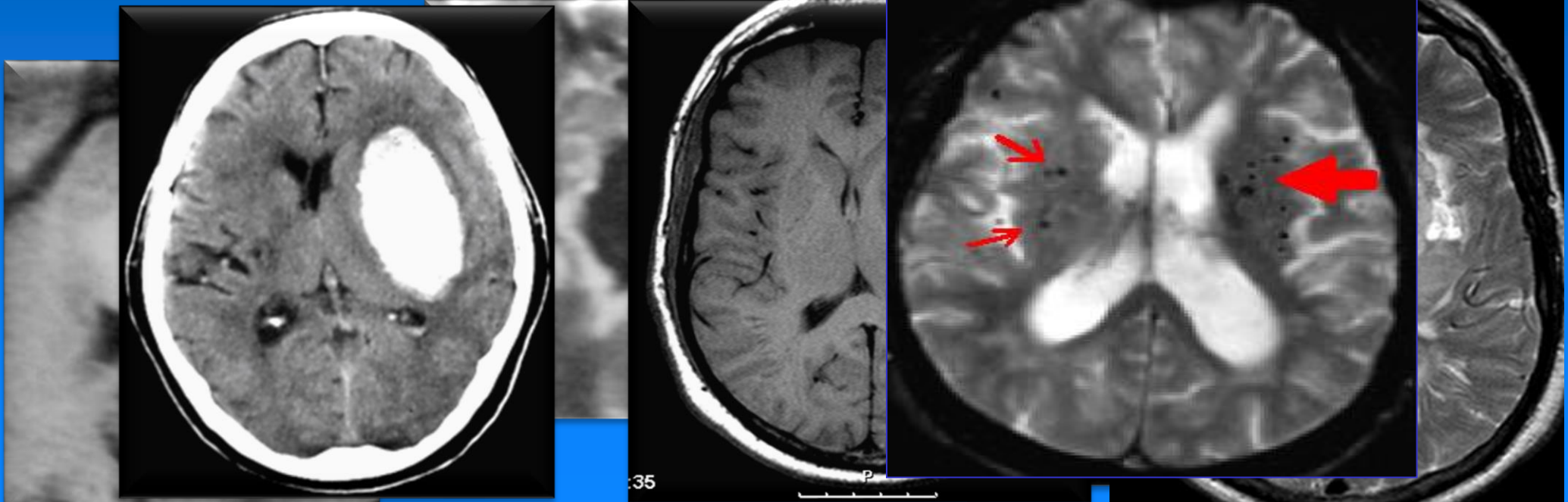
EMORRAGIA INTRACEREBRALE

IPERTENSIONE

- Max causa emorragia tra 45-70aa
- 2 aspetti: sanguinamento franco o "pallini neri multifocali" visibili in T2*
- Ipertensione cronica+ arteriosclerosi> necrosi fibrinoide> rottura parete vasale

Sede

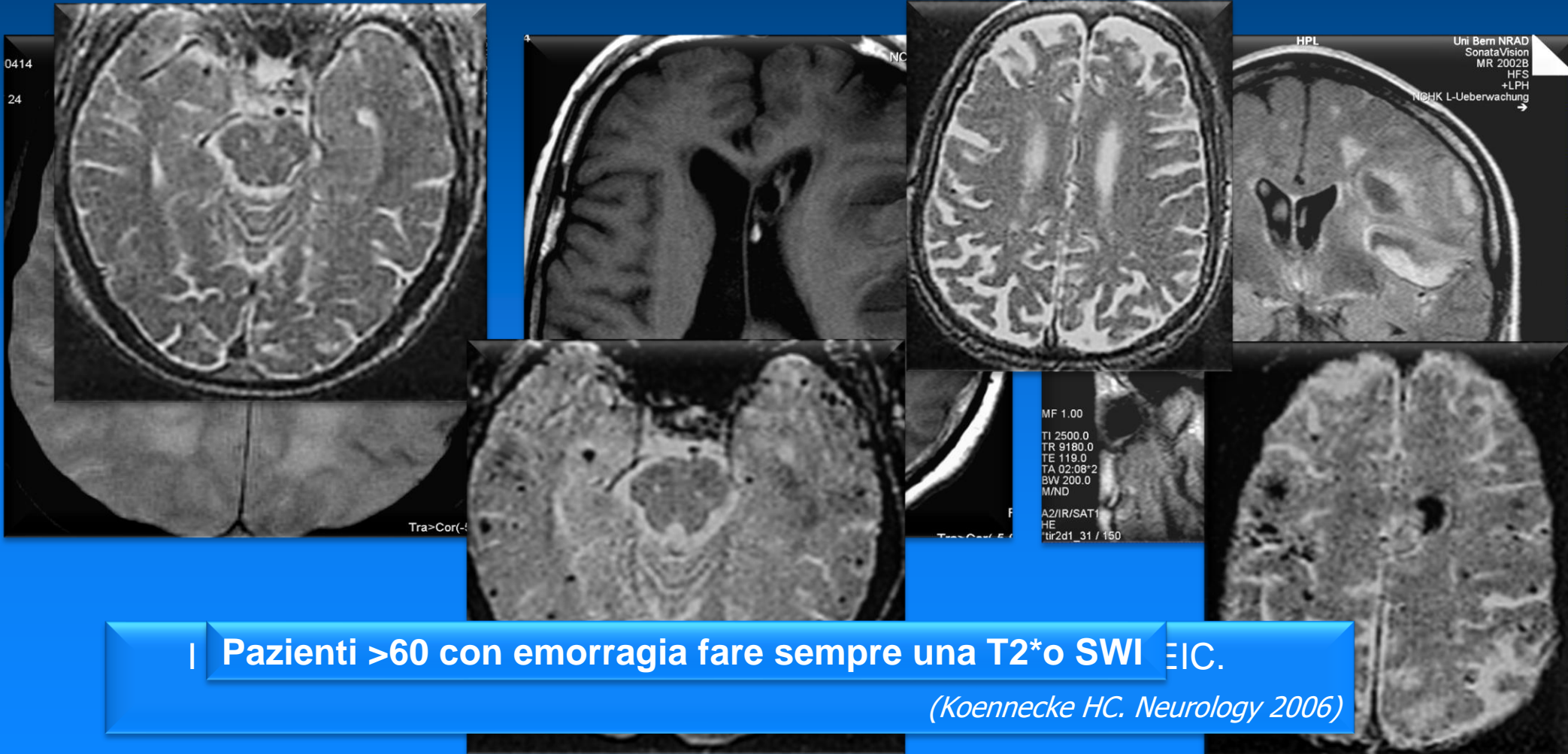
1. Striato-capsulare (putamen/capsula interna) 60-65%
2. Talamo 15-25%
3. **Ponte-cervelletto 10%**
4. Lobare 5-15%
5. Microemorragie multifocali 1-5%



EMORRAGIA INTRACEREBRALE

ANGIOPATIA AMILOIDE

- Paziente anziano, non iperteso, demente
- Raramente nuclei profondi sottocorticali >lobari
- Emorragie superficiali coinvolgenti la corteccia+ sost.bianca sottocorticale



| Pazienti >60 con emorragia fare sempre una T2*o SWI EIC.

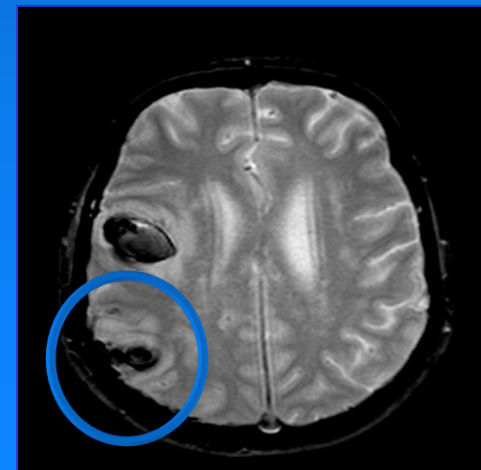
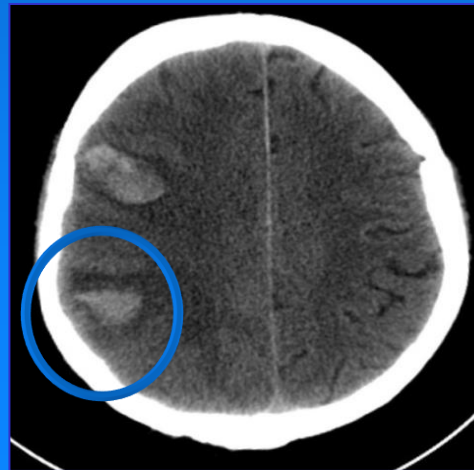
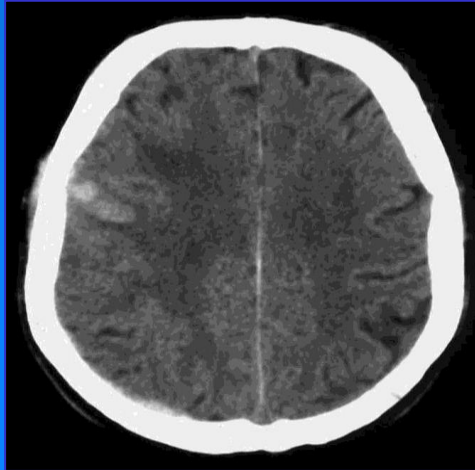
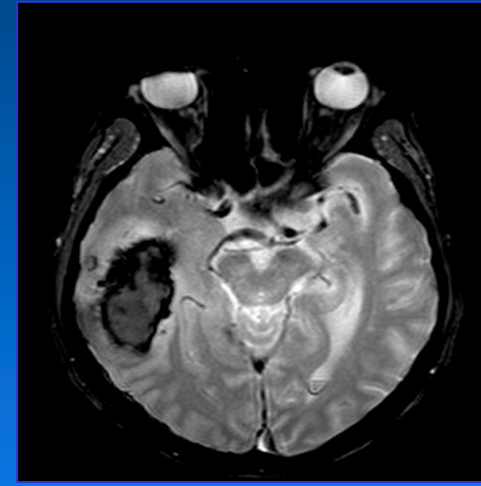
(Koennecke HC. Neurology 2006)

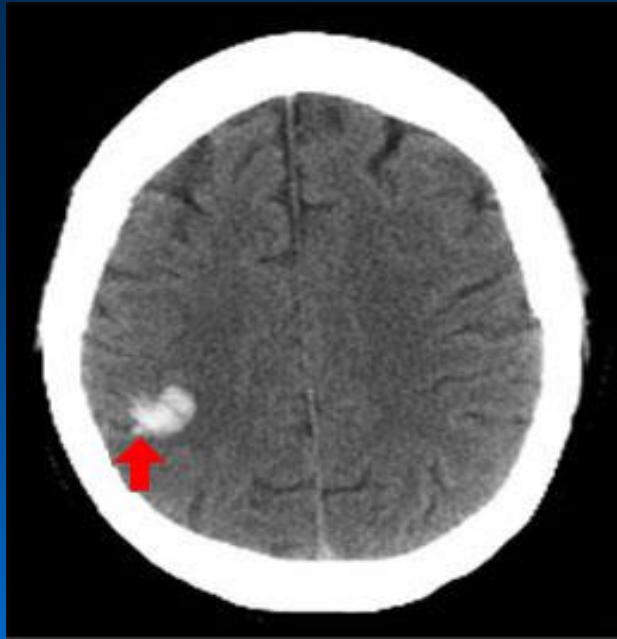
EMORRAGIA INTRACEREBRALE

COAGULOPATIA

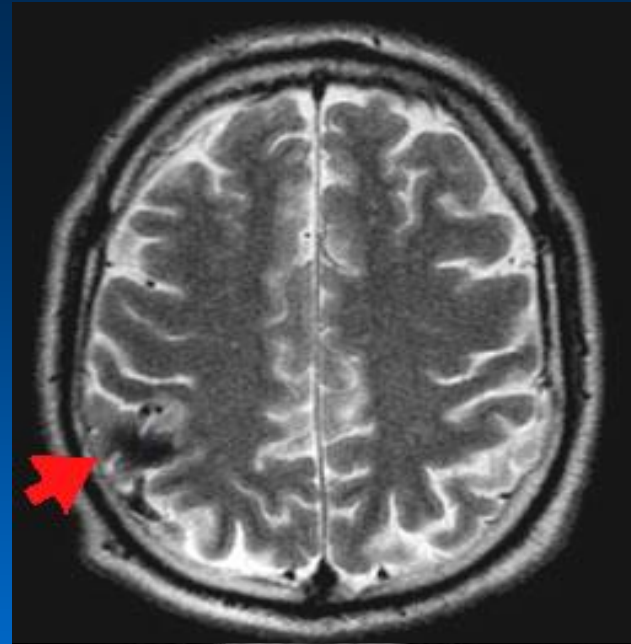
- Multiple ed ampie
- Rapida evoluzione (frequenti risanguinamenti)
- Sangue in diversi stadi di evoluzione- "livelli"
- Prognosi infausta

a 24 ore





Paziente
anni 46



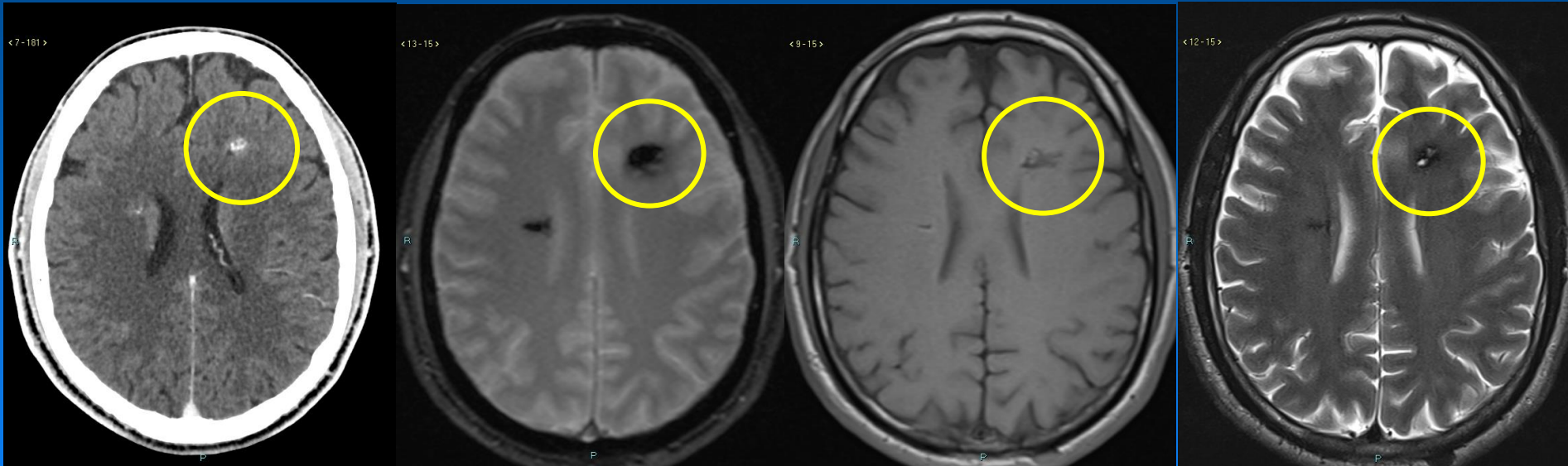
Verosimile sanguinamento
da angioma cavernoso



EMORRAGIA INTRACEREBRALE

Angioma cavernoso

- Rimane occulto alle angiografie
- Elementi ematici in varie fasi di evoluzione
- Lesione “a pop-corn” con bordo di emosiderina (<3cm)

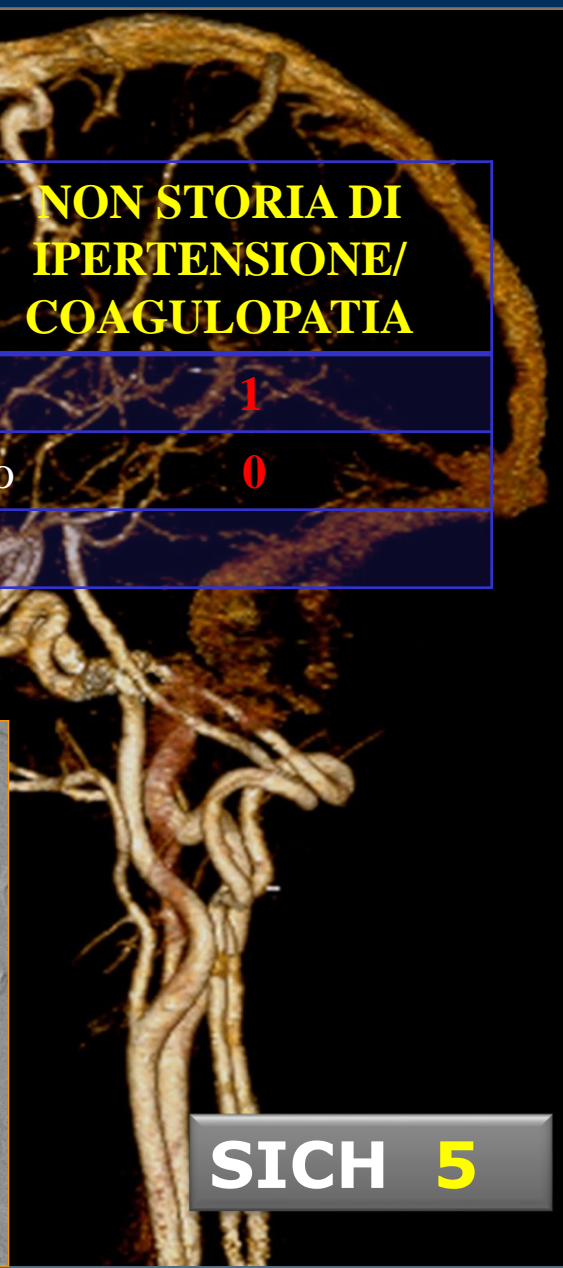
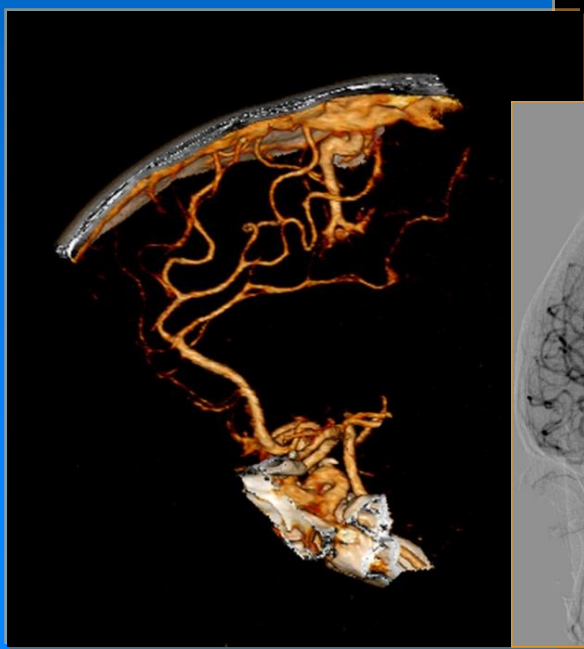
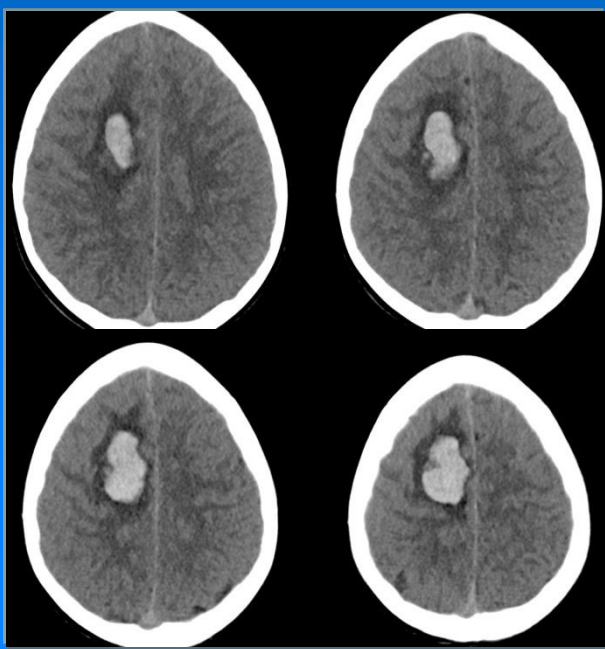


GE T2*w

SECONDARY INTRACEREBRAL HEMORRHAGE SCORE

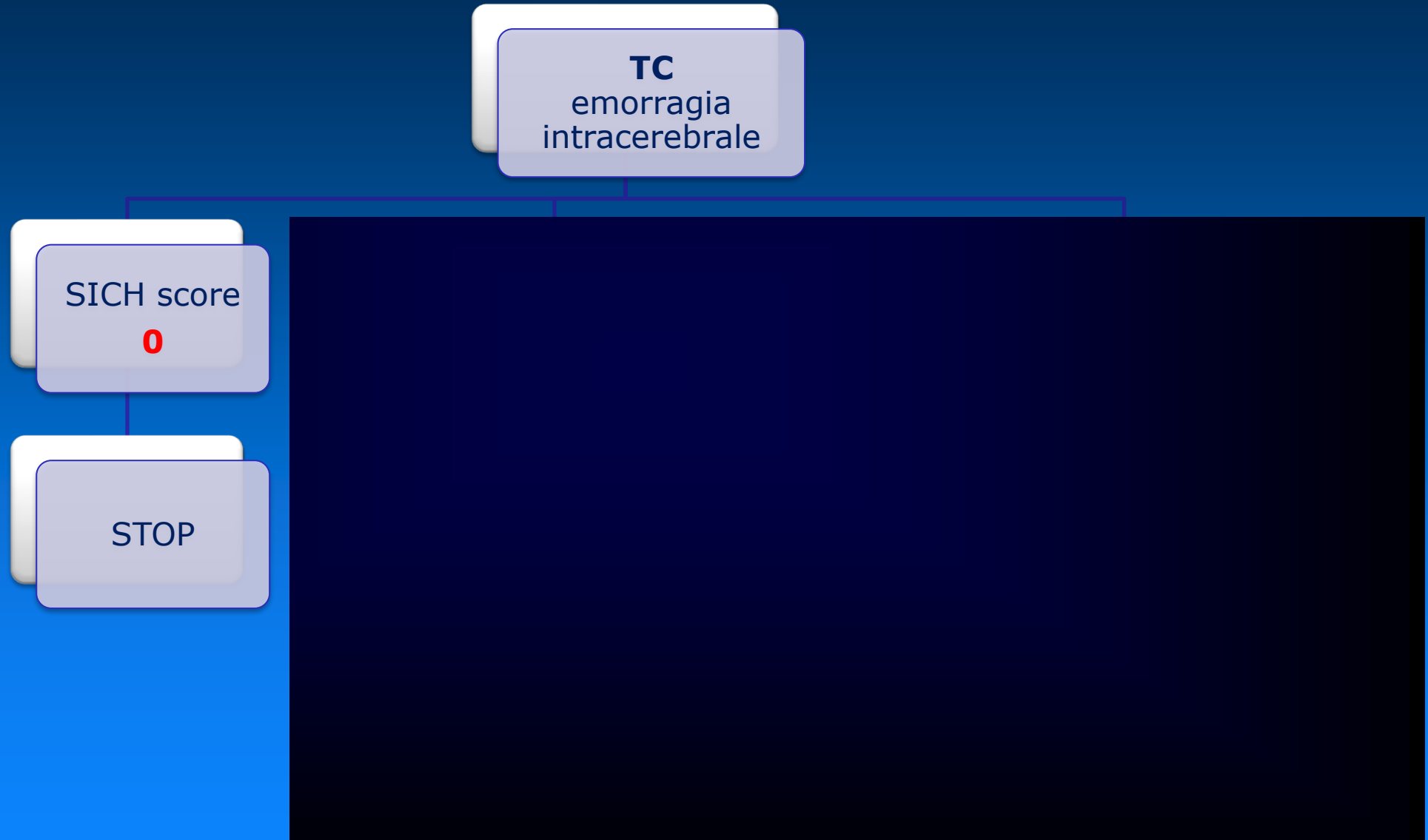
CLASSIFICAZIONE TC		GRUPPI DI ETÀ	
alta probabilità	2	18-45	2
intermedio	1	46-70	1
bassa probabilità	0	≥ 71	0

SESSO	NON STORIA DI IPERTENSIONE/ COAGULOPATIA	
1	si	1
0	no	0



SICH 5

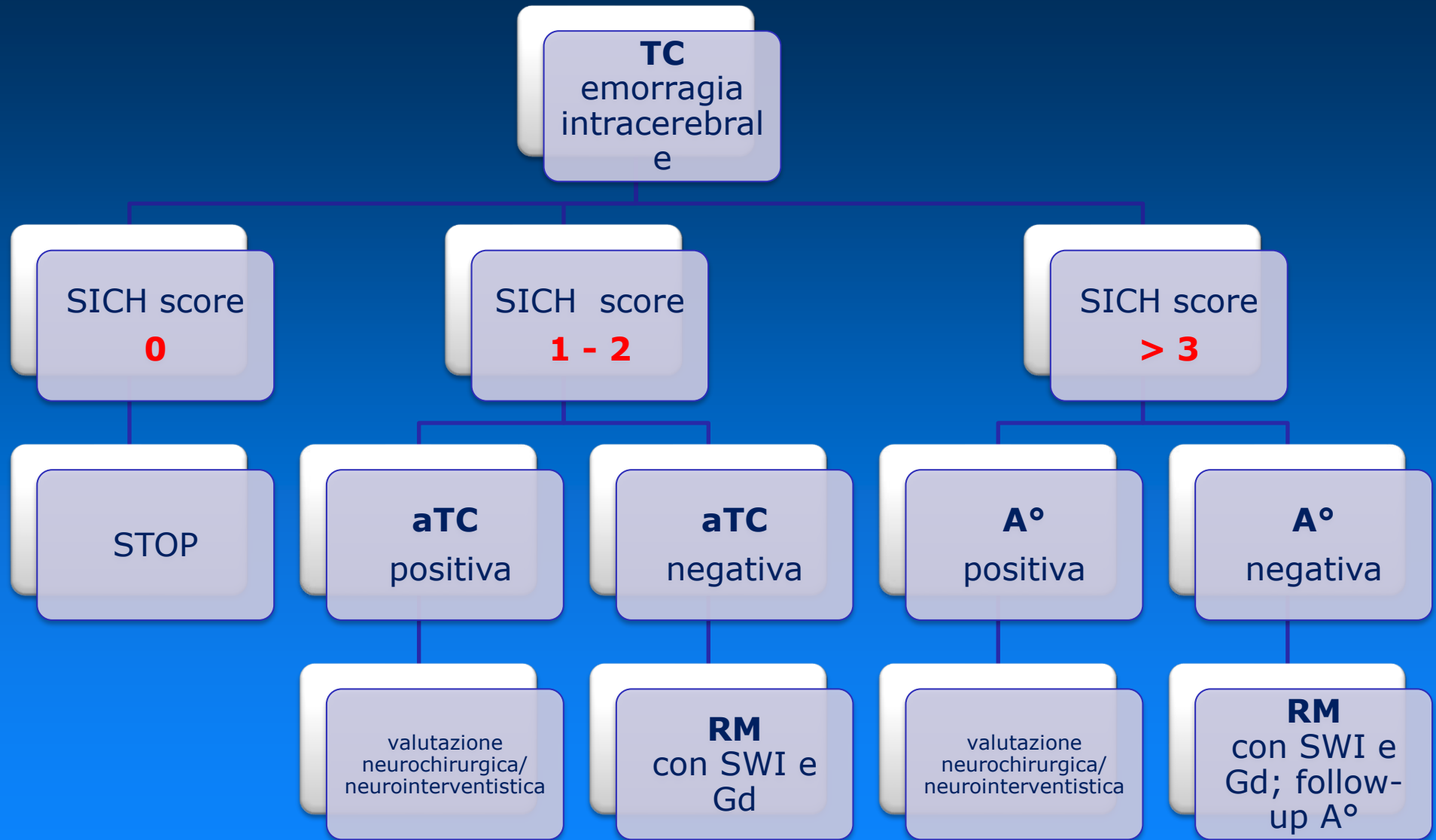
EMORRAGIA INTRACEREBRALE



EMORRAGIA INTRACEREBRALE



EMORRAGIA INTRACEREBRALE



EMORRAGIA INTRACEREBRALE

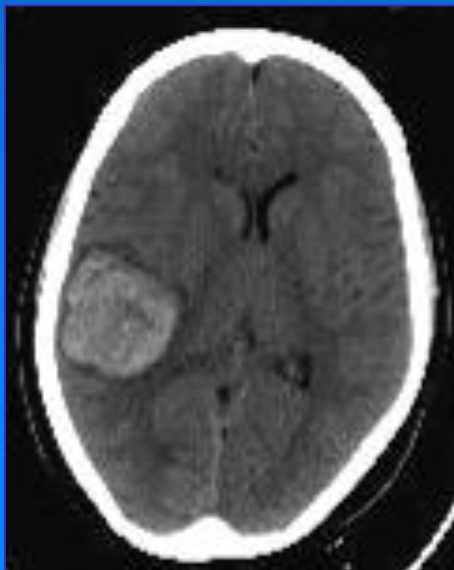
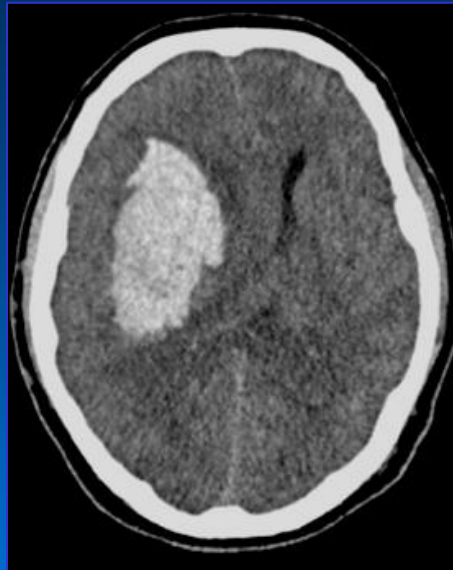
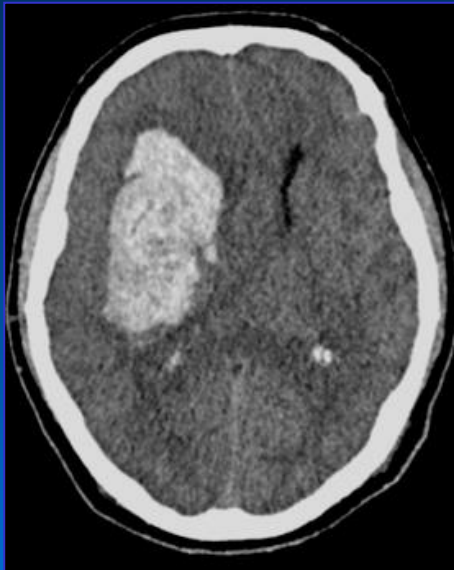
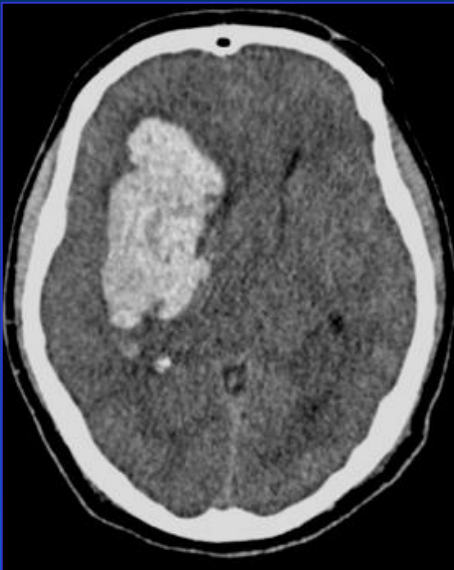
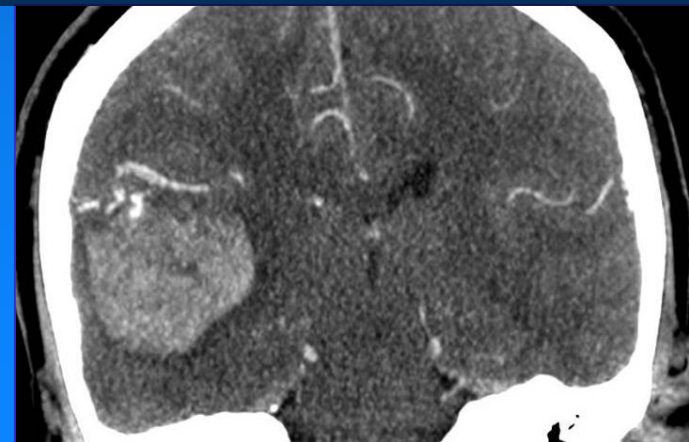
✓ uomo, 49 anni

✓ storia di ipertensione



✓ donna, 54 anni

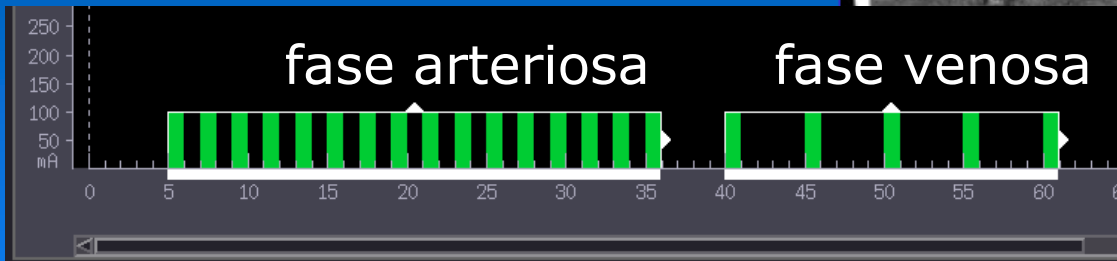
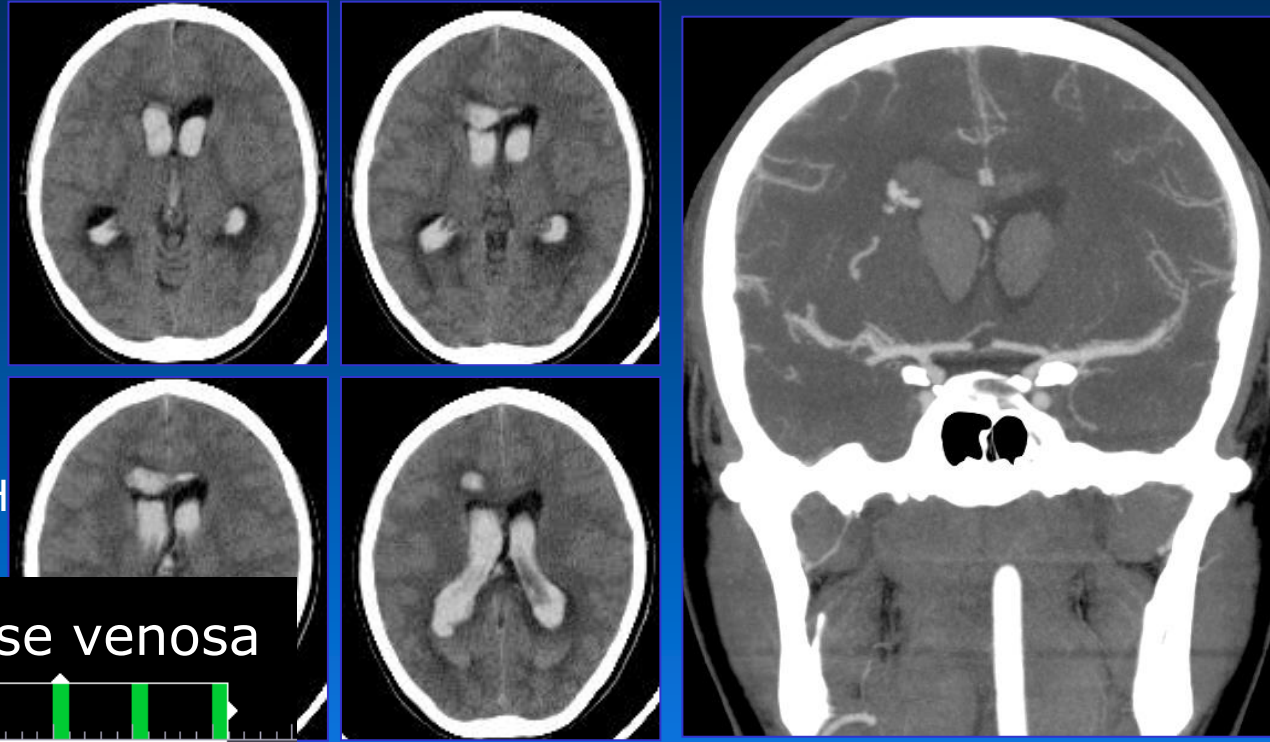
✓ storia di ipertensione, uso di ASA



EMORRAGIA INTRACEREBRALE

ANGIO-TC

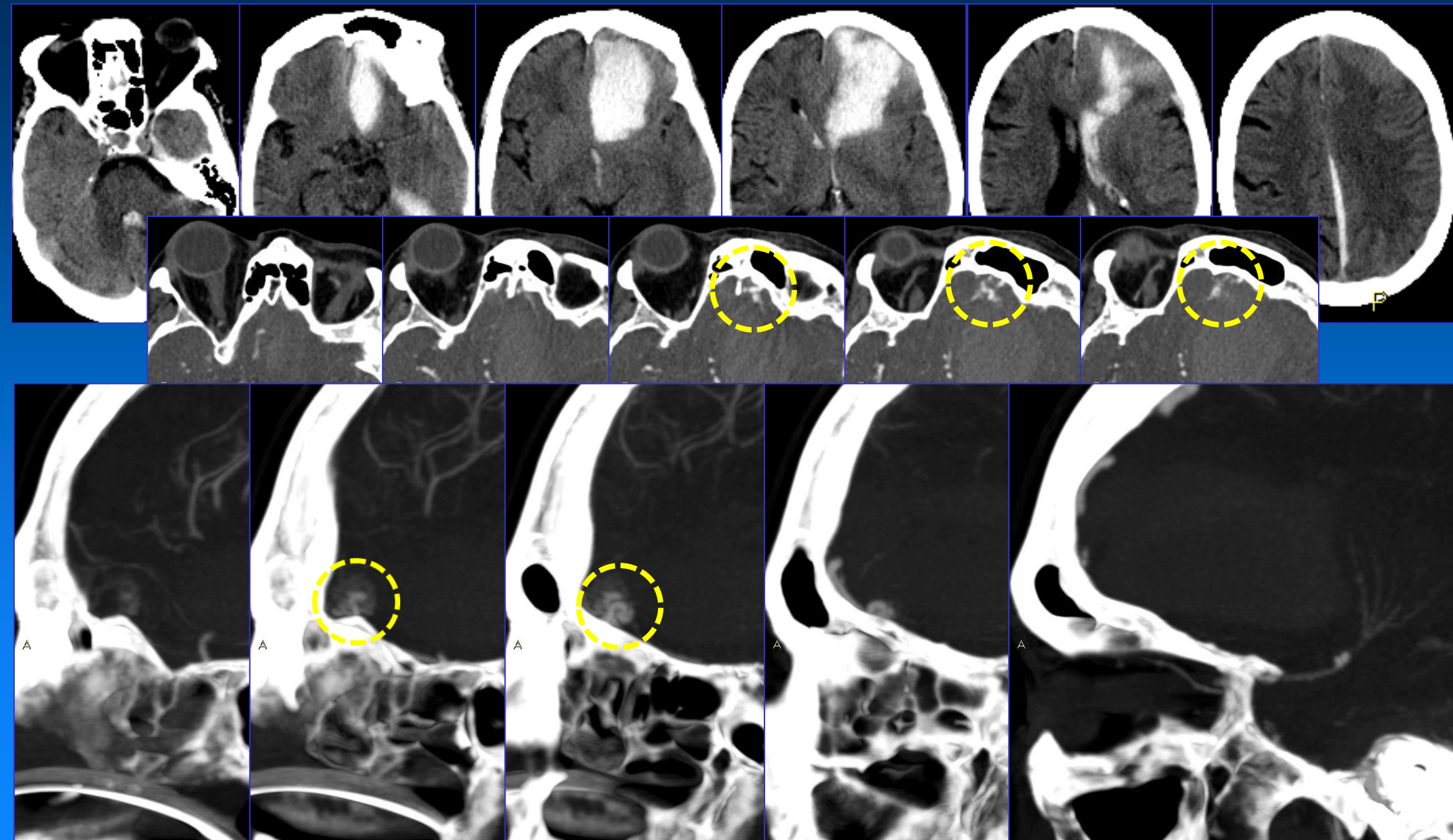
- ✓ AMPIA DIFFUSIONE
- ✓ RAPIDA ACQUISIZIONE
- ✓ BASSO COSTO
- ✓ FAVOREVOLE PROFILO DI RISCHIO



aTC vs A°

STUDIO	N	SENSIBILITÀ	SPECIFICITÀ	ACCURATEZZA
Yeung et al	55	89	92	91
Romero et al	43	96	100	98
Yoon et al	78	96	100	99
Delgado Almandoz et al	210	96	98	98

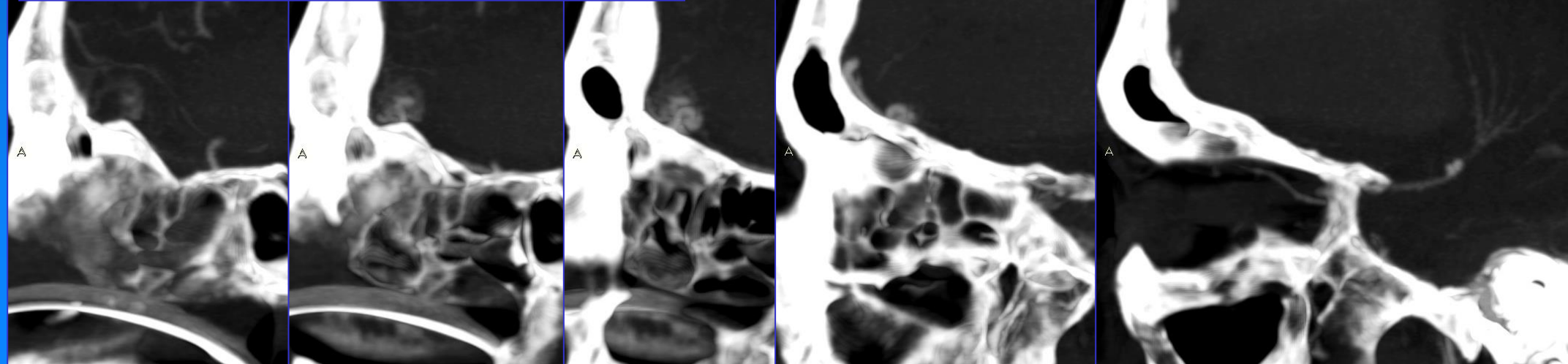
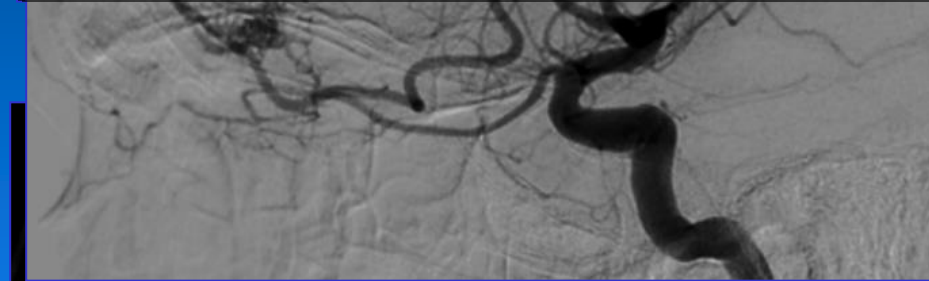
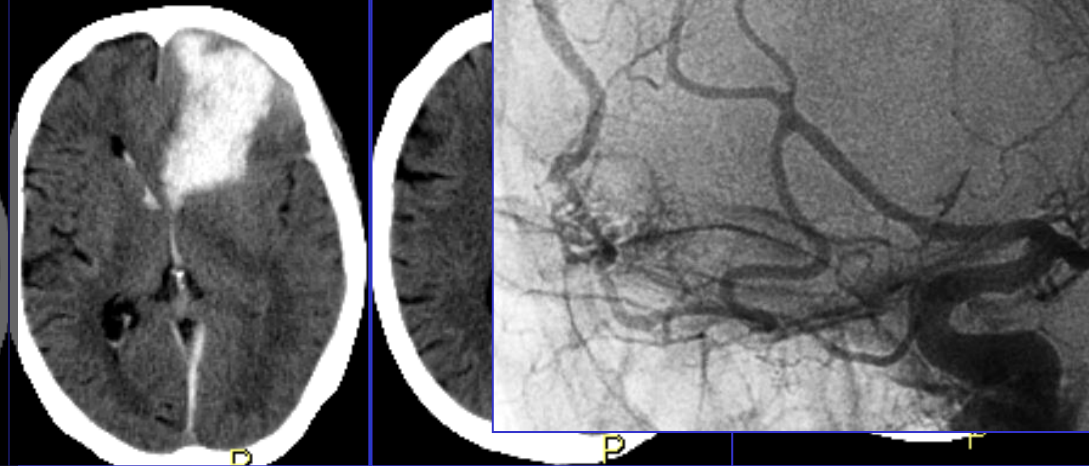
EMORRAGIA INTRACEREBRALE



EMORRAGIA INTRACEREBRALE

1. Delineare l'angioarchitettura della MAV
2. Identificare le 3 componenti principali (afferenza arteriosa, nidus, scarico venoso)
3. Riconoscere duplici apporti arteriosi (piali, durali; 27-32% dei casi)

DSA



Emorragia cerebrale

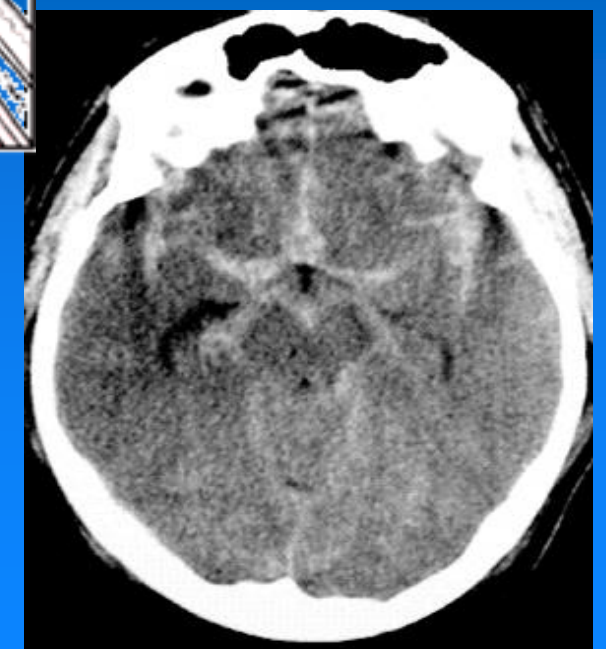
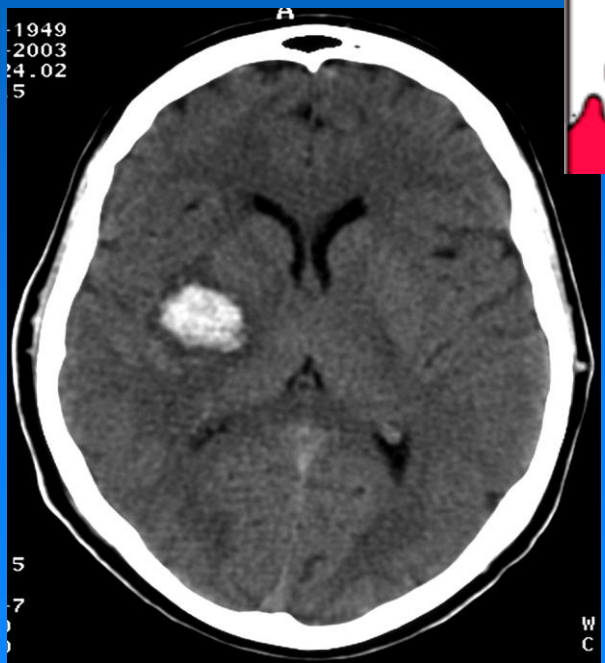


Intracerebrale

Subaracnoidea

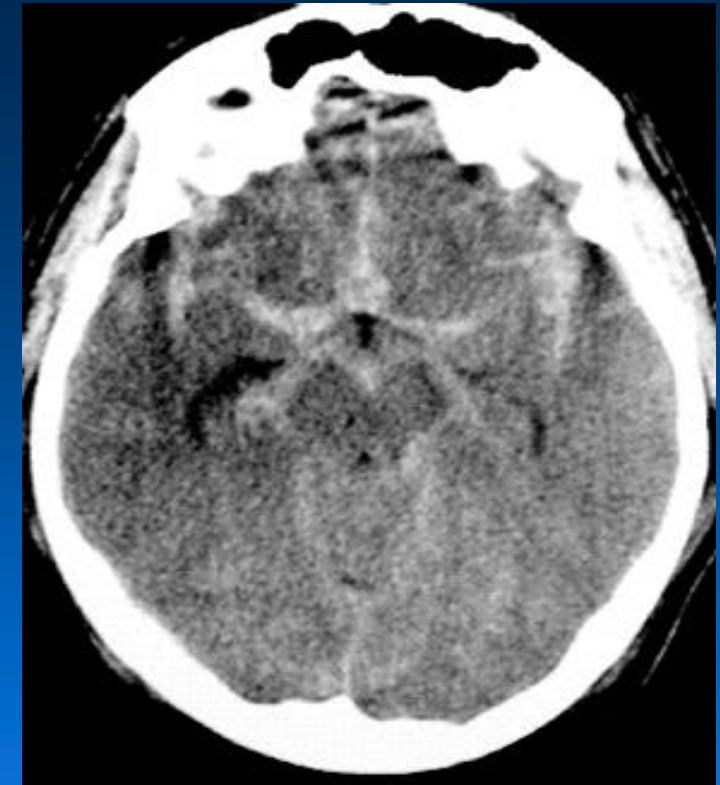
2/3

1/3



EMORRAGIA SUBARACNOIDEA

CAUSE	
ROTTURA ANEURISMA	70-80%
Diffusione ematoma intracerebrale	10%
Rottura MAV	5%
Neoplasie	
Alterazioni coagulazione	



ESA aneurismatica	ESA non-aneurismatica
Cisterne soprasellari /silviana/ interemisferica	Anteriormente al ponte e lateralmente al mesencefalo

- cefalea improvvisa e severa
- nausea / vomito
- rigidità nucale, intolleranza alla luce
- deterioramento dello stato di coscienza

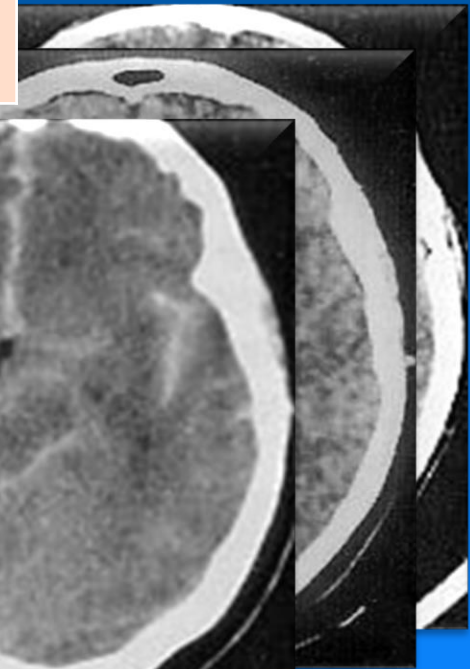
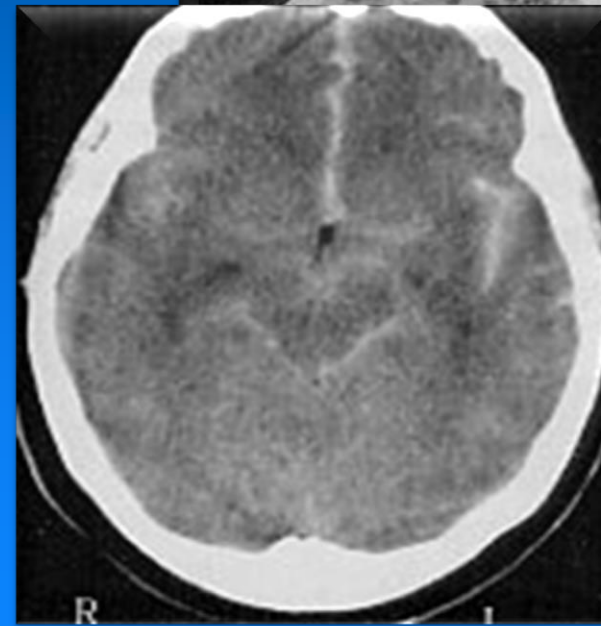
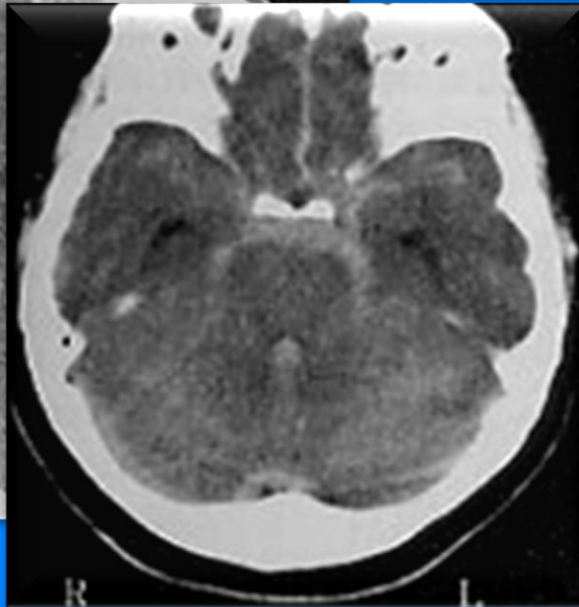
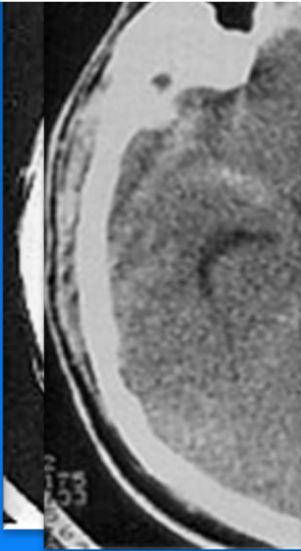
SCALA Hunt-Hess

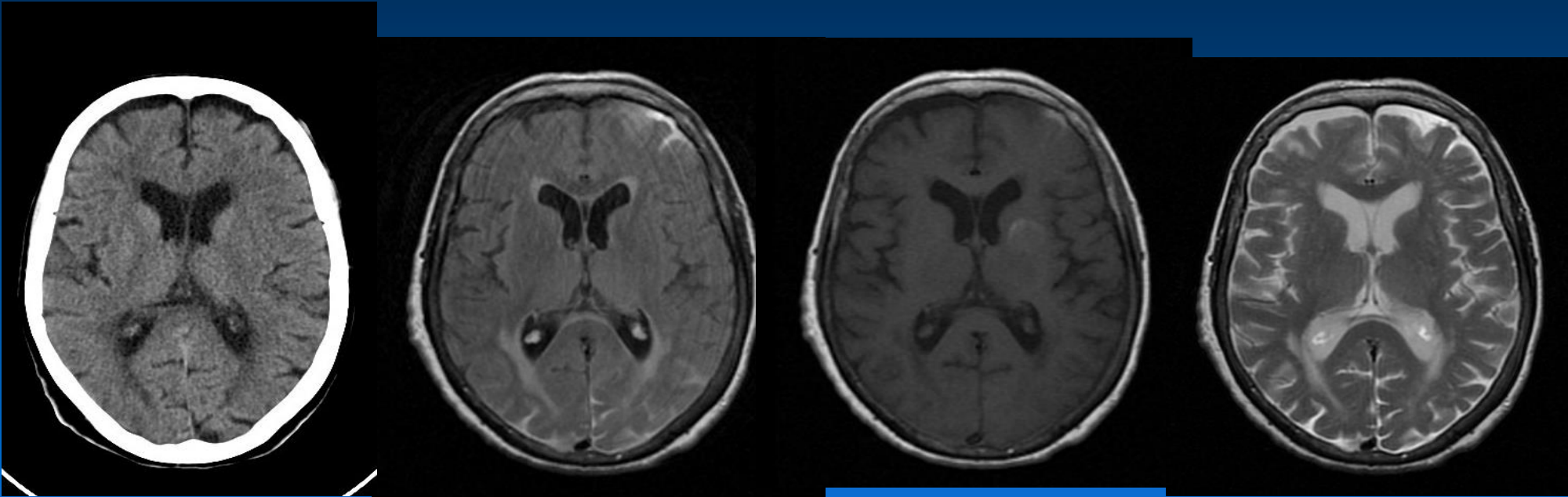
- Grado 1: pz. cosciente con o senza segni di sangue negli spazi subaracnoidei
- Grado 2: pz assopito senza deficit neurologici
- Grado 3: pz assopito con deficit neurologico
- Grado 4: pz con deficit neurologico importante a causa di un grosso sanguinamento intracerebrale
- Grado 5: pz moribondo con deficit dei centri vitali e rigidità estensoria

EMORRAGIA SUBARACNOIDEA

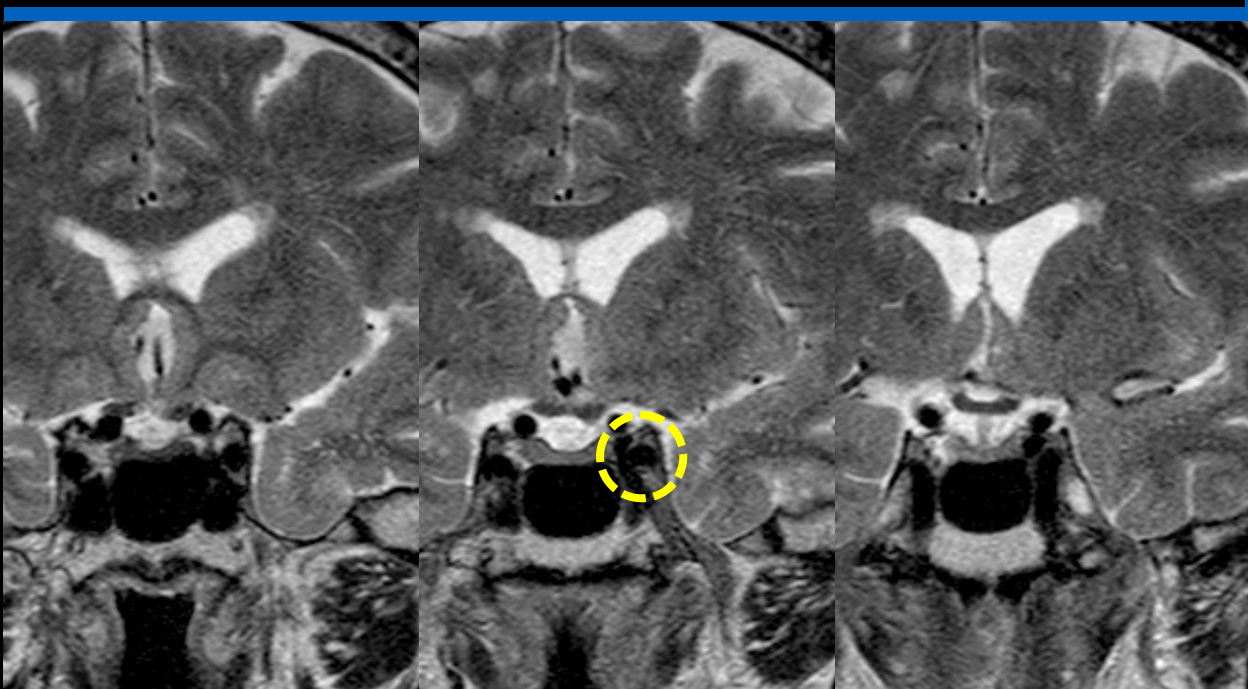
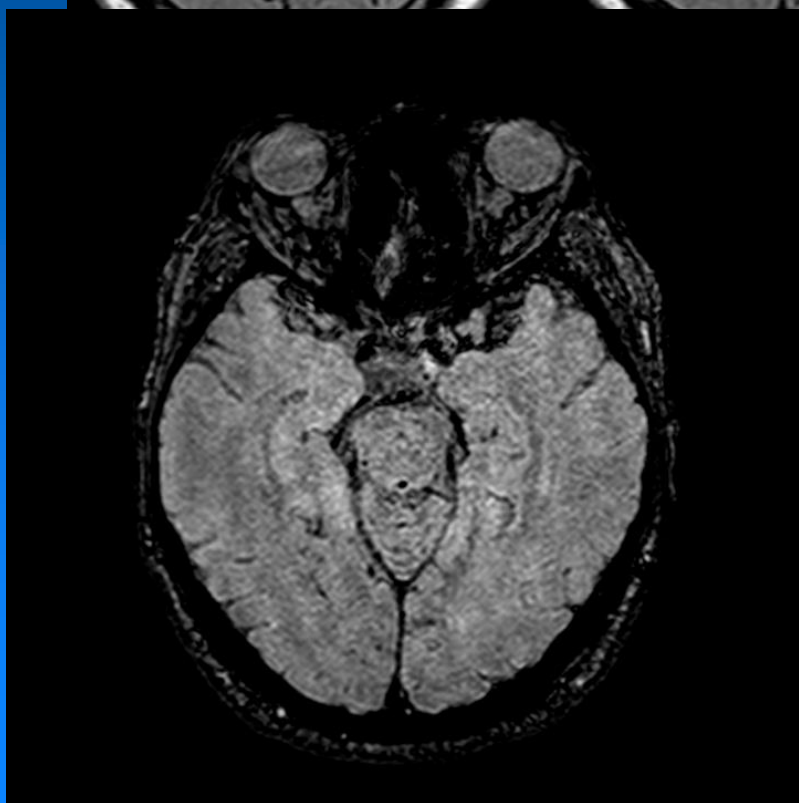
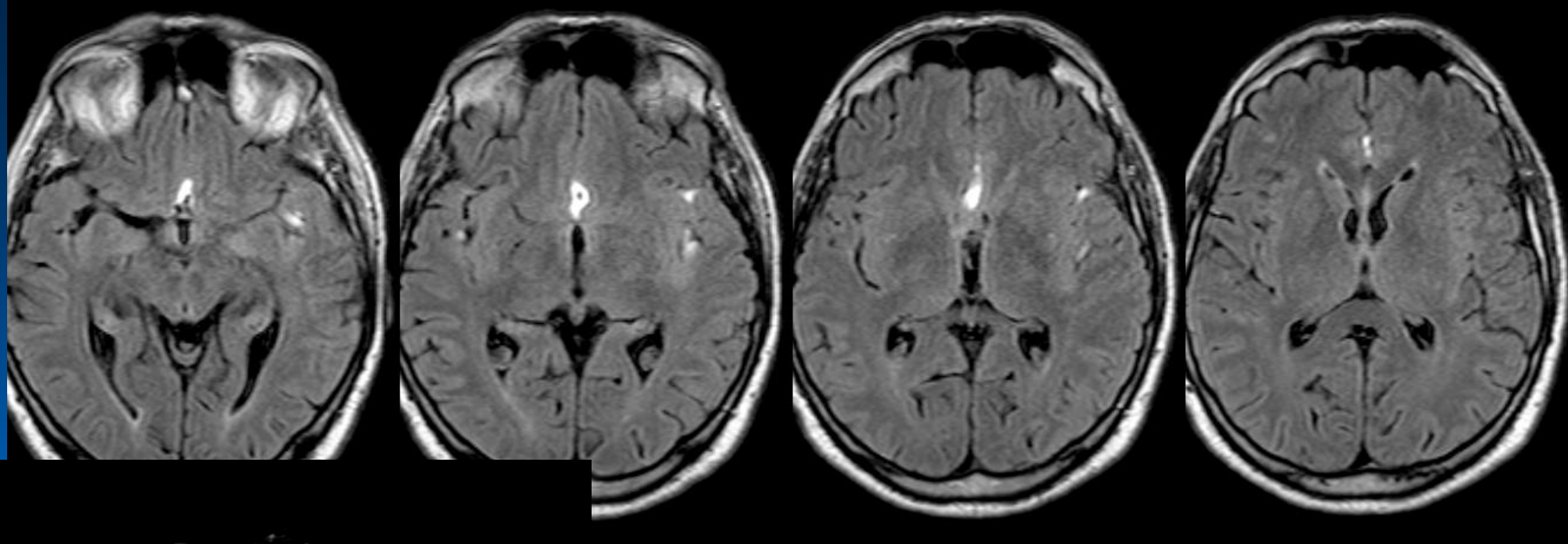
ELEMENTI INDICATIVI DELLA SEDE

Sede sangue	Origine sanguinamento
INTEREMISFERICA	Aneurisma Co. Anteriore
LATERALIZZATO	Aneurisma Ce. Media
CISTERNE DELLA BASE	Aneurisma circolo vertebro-basilare



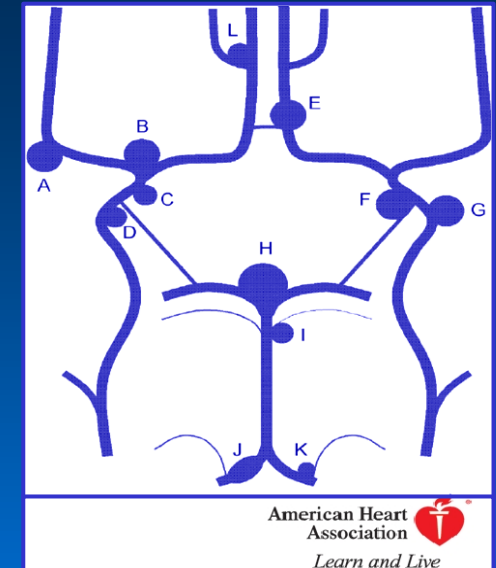
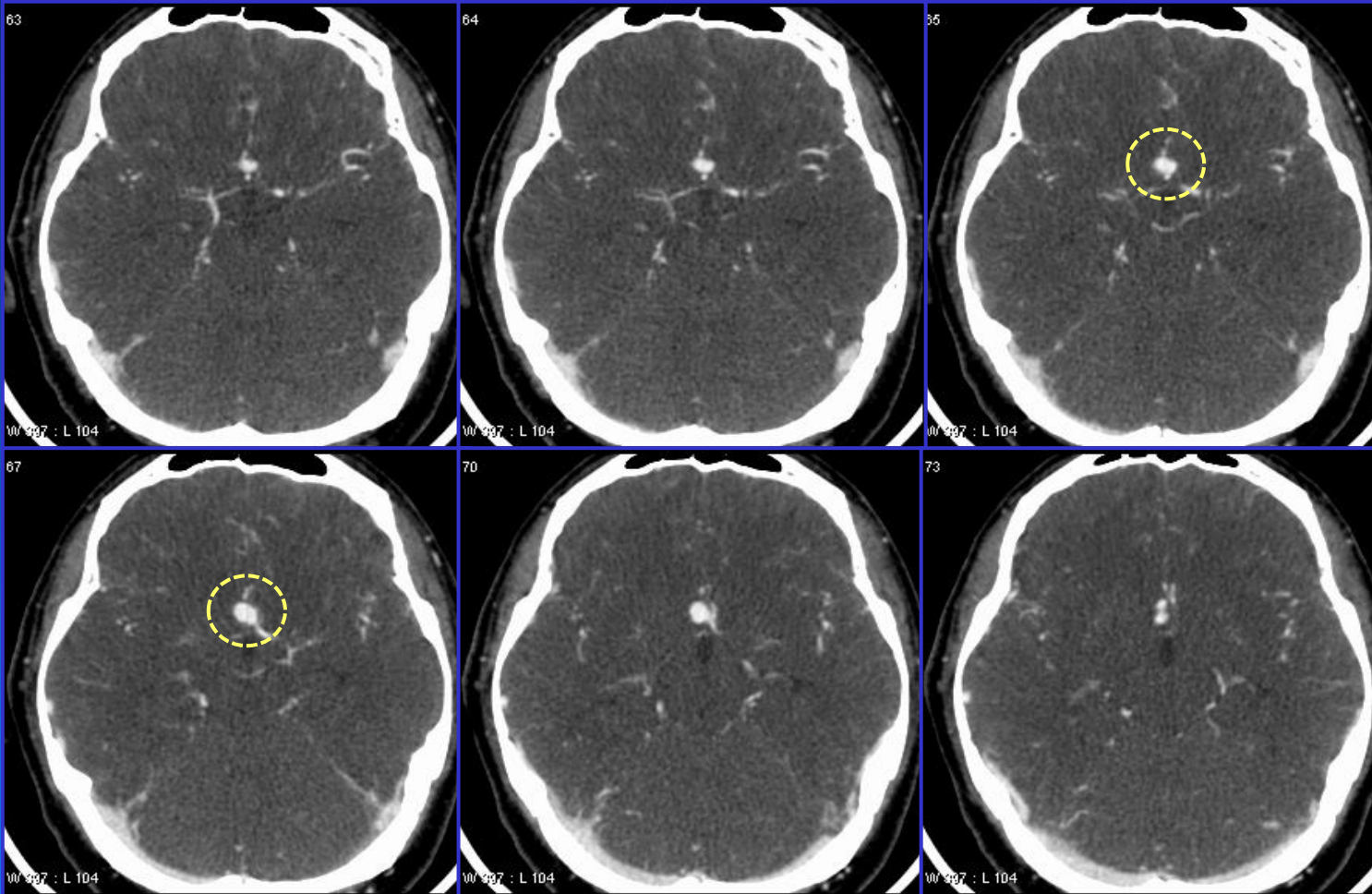


- FLAIR may be even more sensitive than CT in acute SAH
(Woodcock RJ. AJNR 2001)
- MRI may be more sensitive in detecting SAH > 4 days old.





EMORRAGIA SUBARACNOIDEA



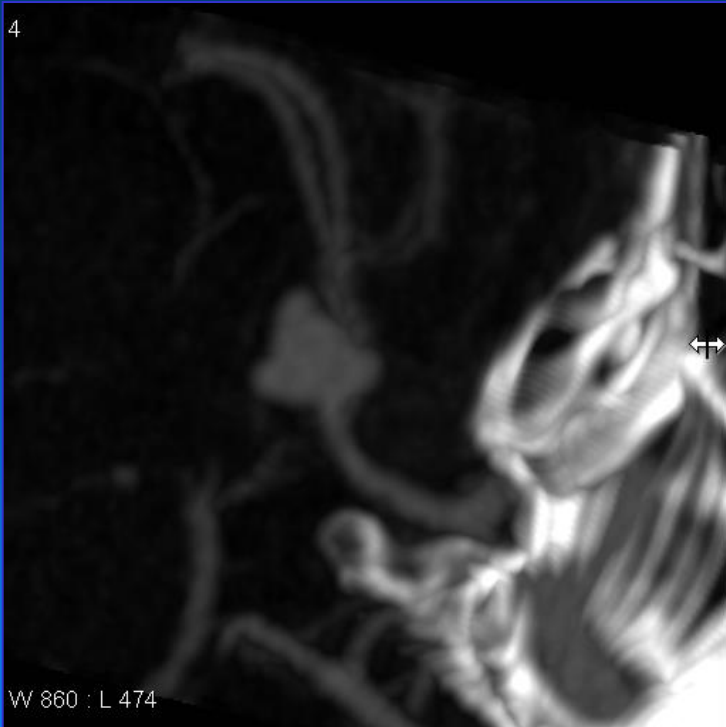
- ✓ imaging isotropico
- ✓ volume da arco aortico al vertice
- ✓ ridotto tempo acquisizione
- ✓ elevata risoluzione ricostruzioni 3D

SENSIBILITÀ 98%
SPECIFICITÀ 100%
VALORE PREDITTIVO POSITIVO 100%

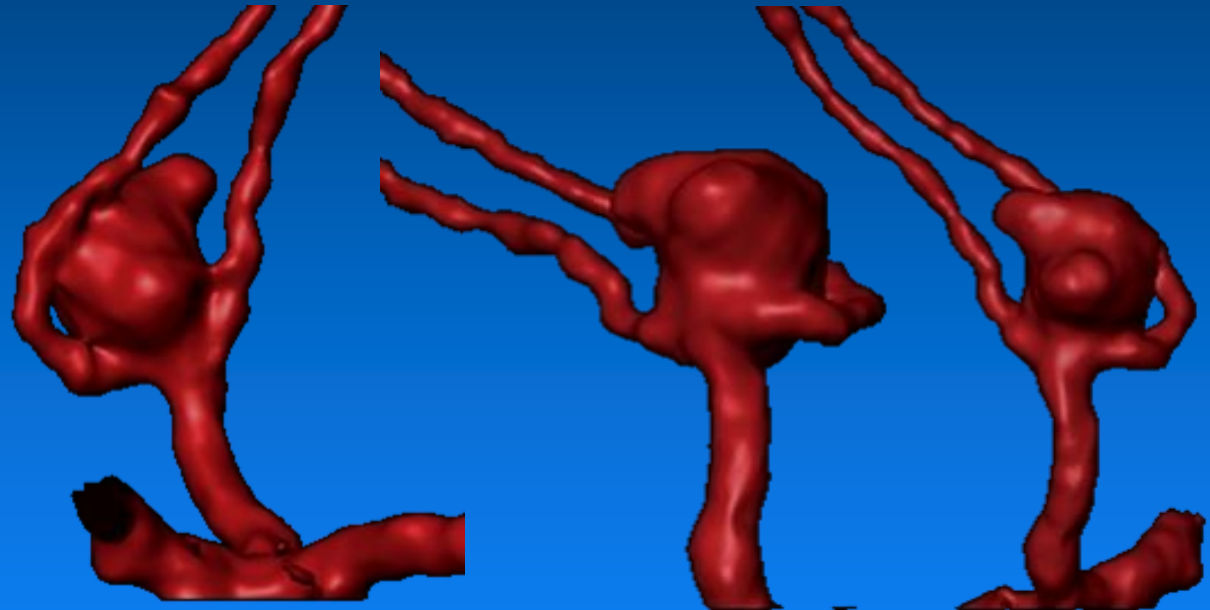
ANGIO-TC

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2D - MIP



3D - SSD

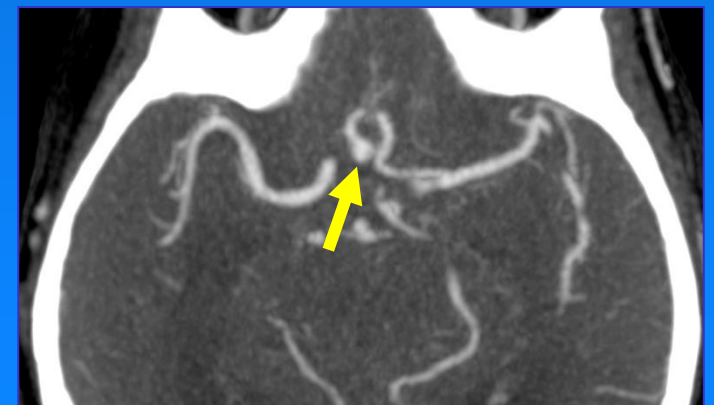
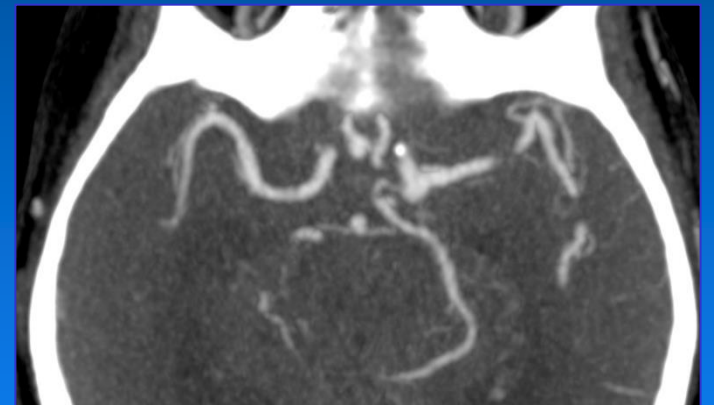
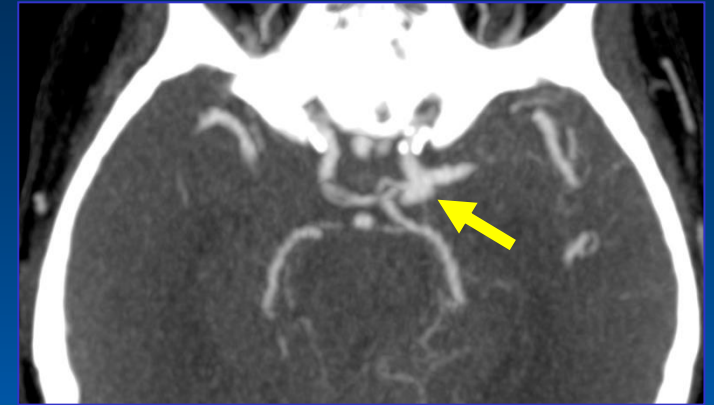
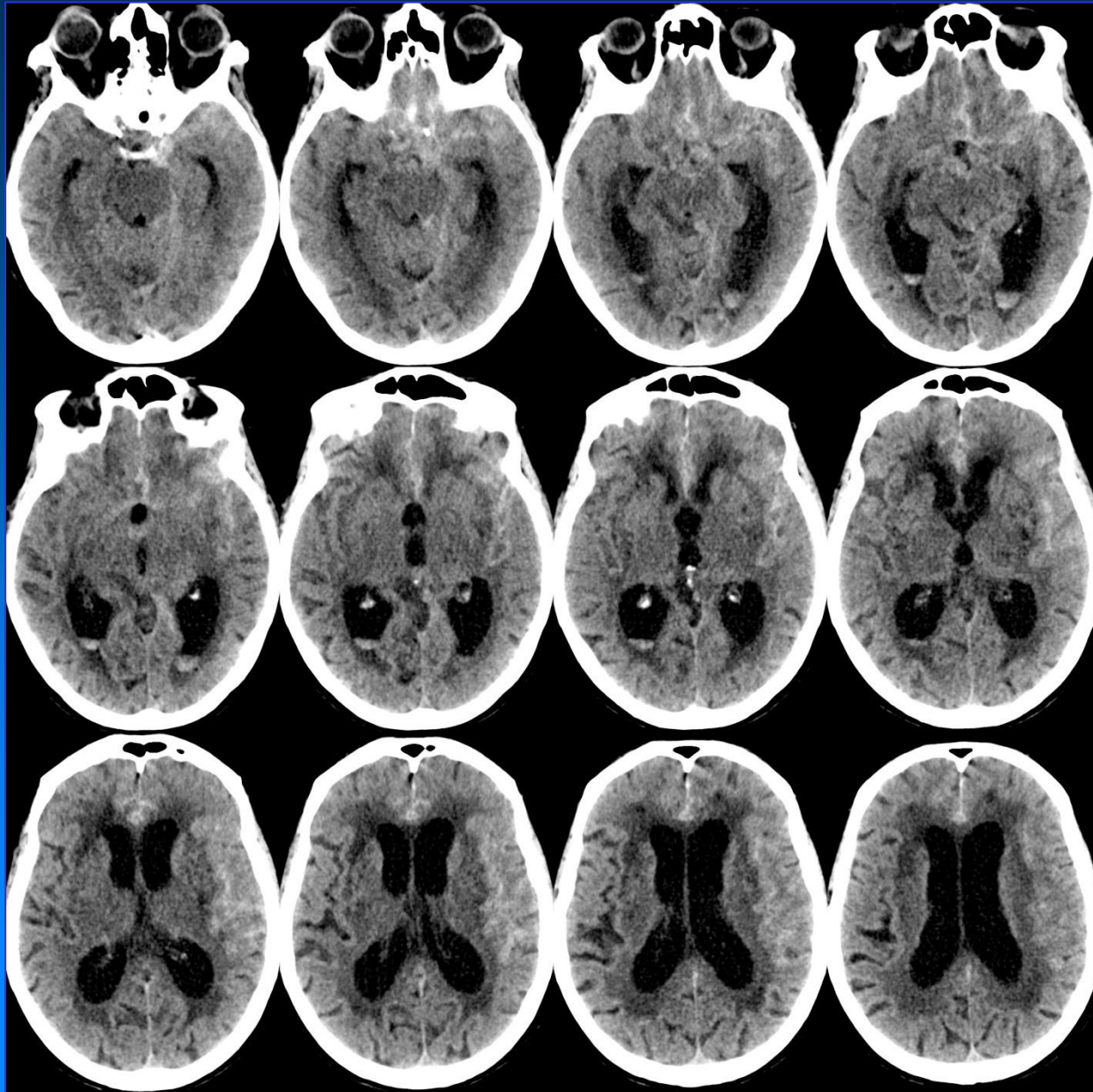


- ✓ *Dimensioni*
- ✓ *Rapporto sacca-colletto*

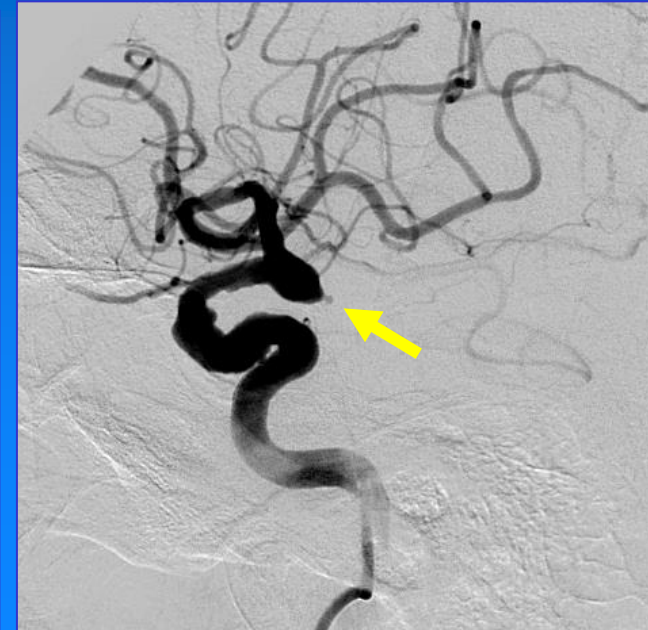
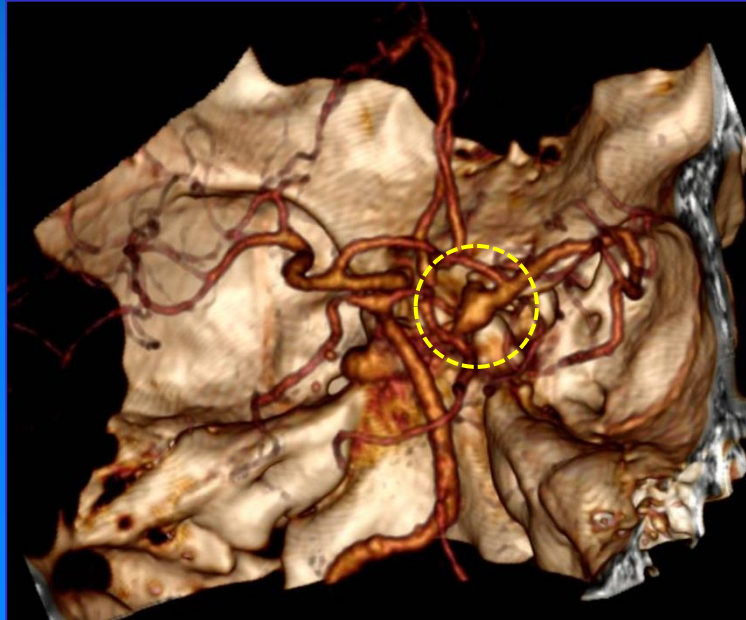
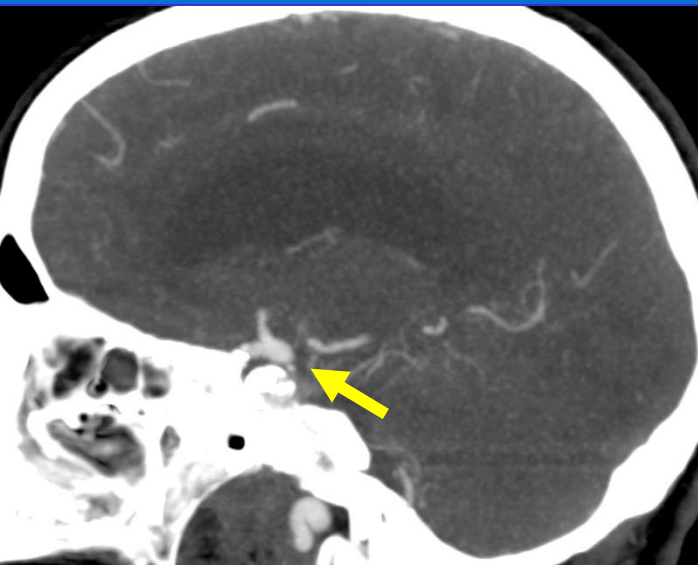
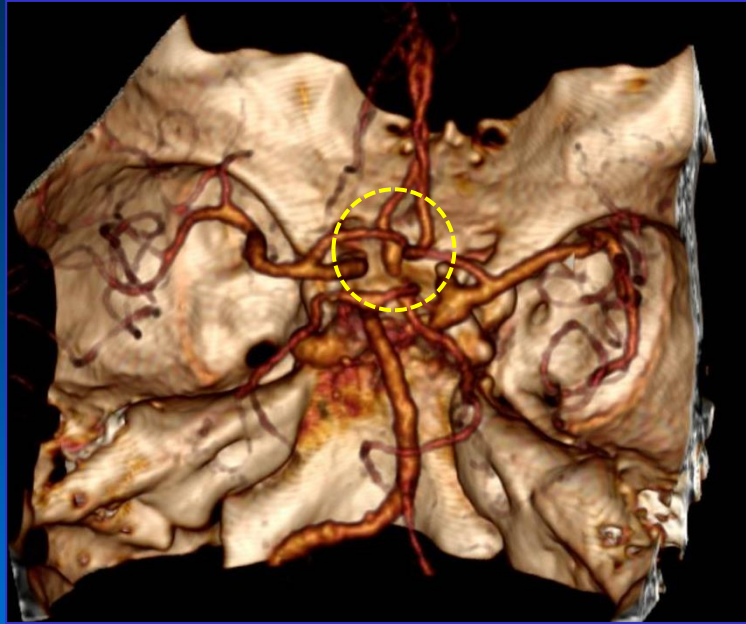
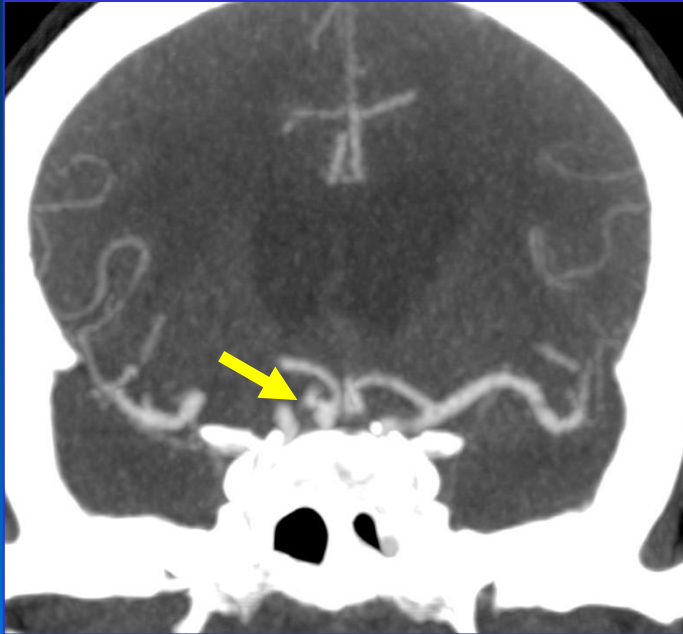
- ✓ *Morfologia sacca*
- ✓ *Posizione*

- ✓ *Rapporti*
- ✓ *Anomalie associate*

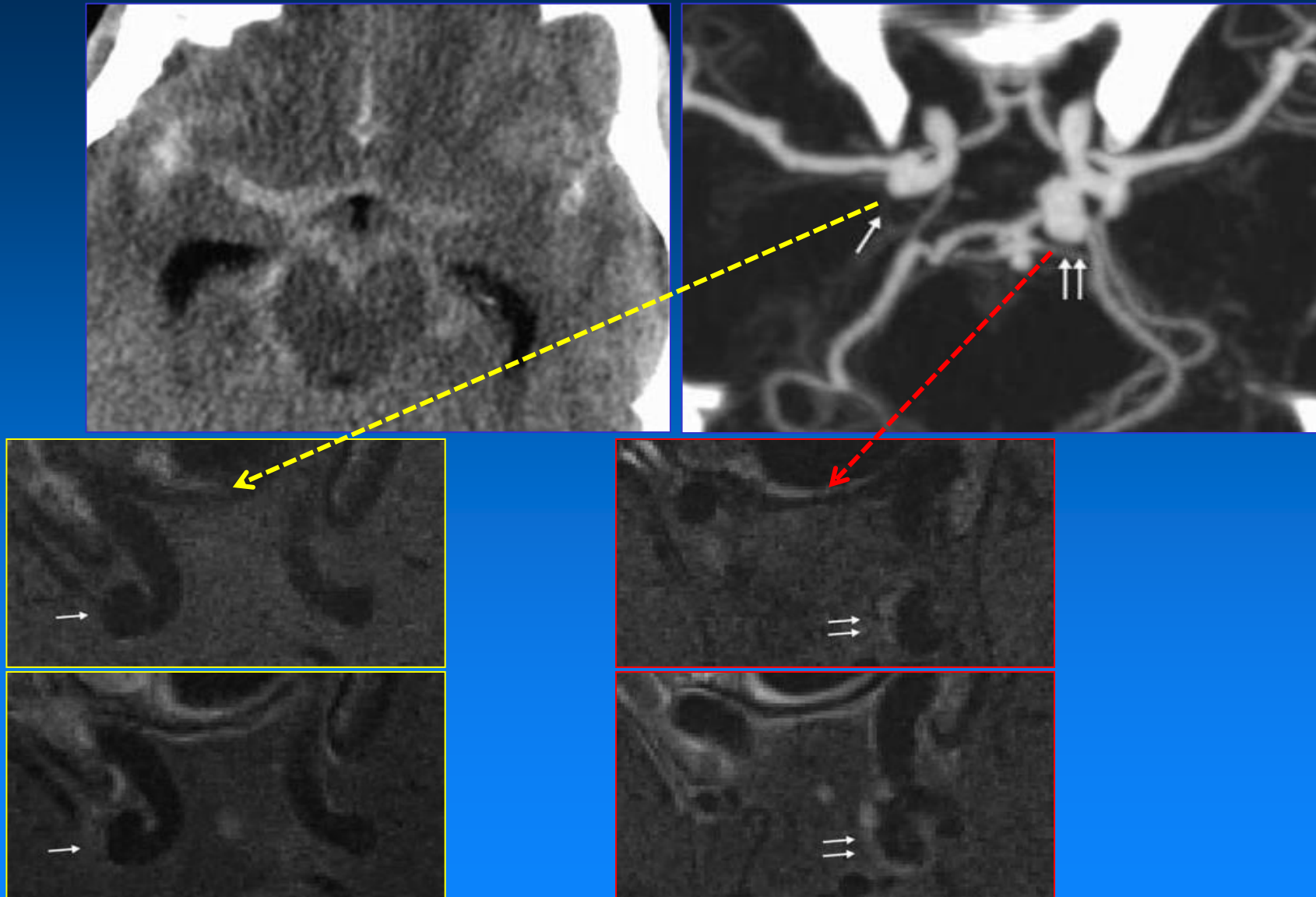
EMORRAGIA SUBARACNOIDEA



EMORRAGIA SUBARACNOIDEA

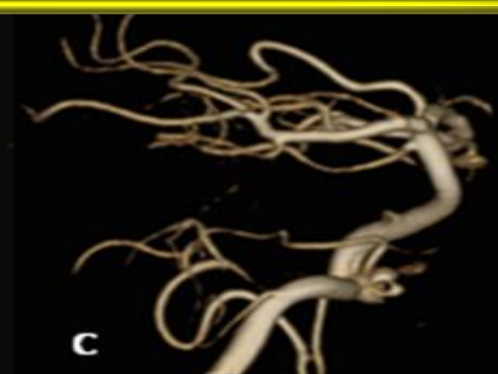
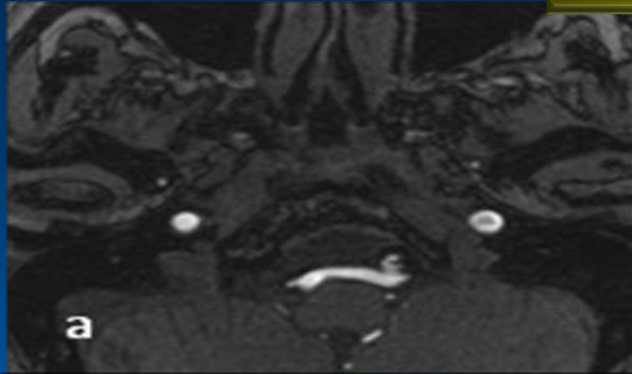


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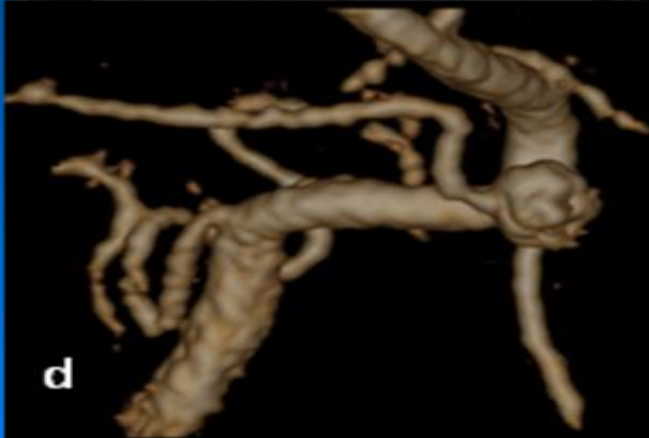


Charles C. Matouk, et Al.: Vessel wall Magnetic Resonance Imaging identifies the site of rupture in patients with multiple intracranial aneurysms: proof of principle. *Neurosurgery* 72:492–496, 2013

EMORRAGIA SUBARACNOIDEA



TOF

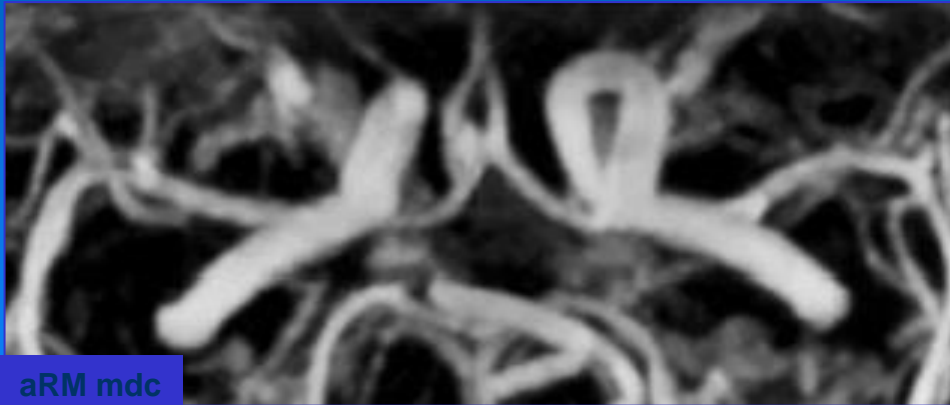
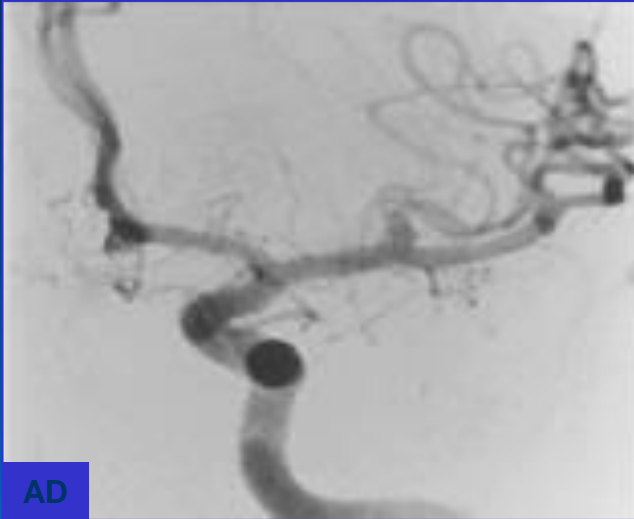


CEMRA



TOF m.d.c

EMORRAGIA SUBARACNOIDEA

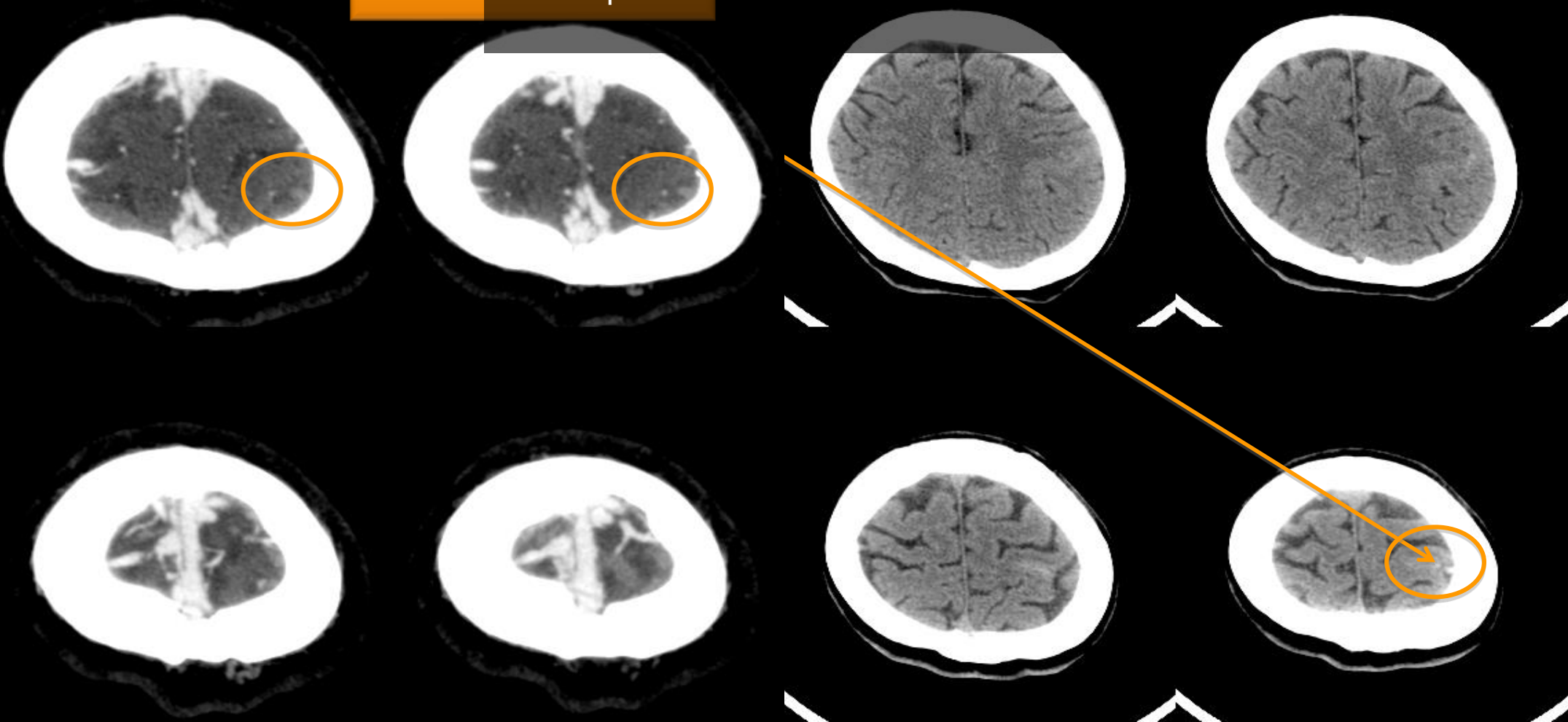


- ✓ minore perdita di segnale
- ✓ minore suscettività magnetica
- ✓ minore tempo
- ✓ maggiore volume
- ✓ definizione piccoli vasi

✓ 44 anni, donna

✓ Cefalea

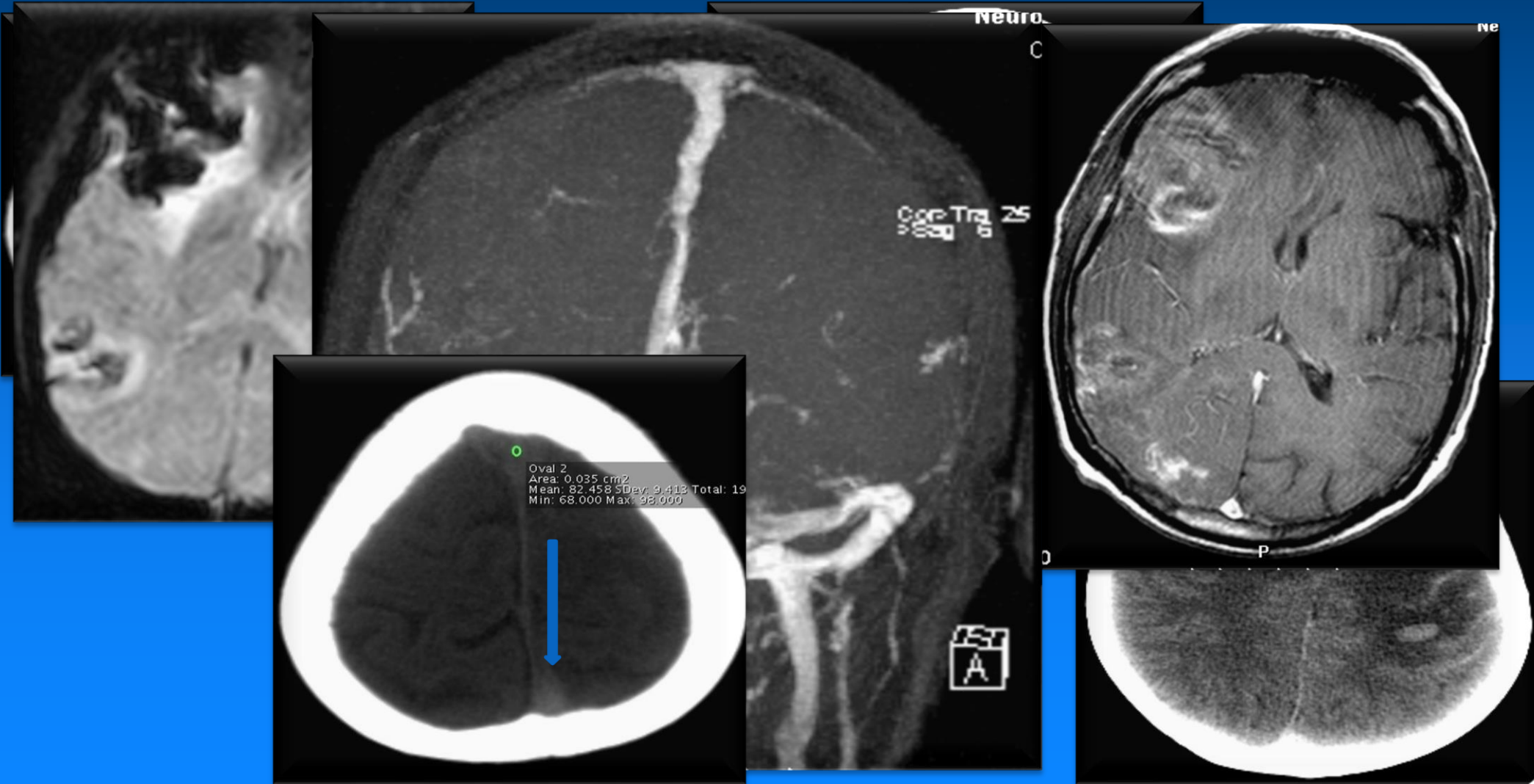
✓ **"CORD STON"** Sospetta ipertensione intracranica
idiopatica



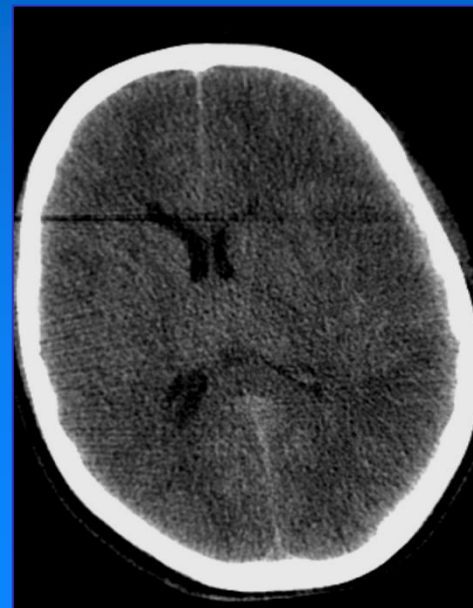
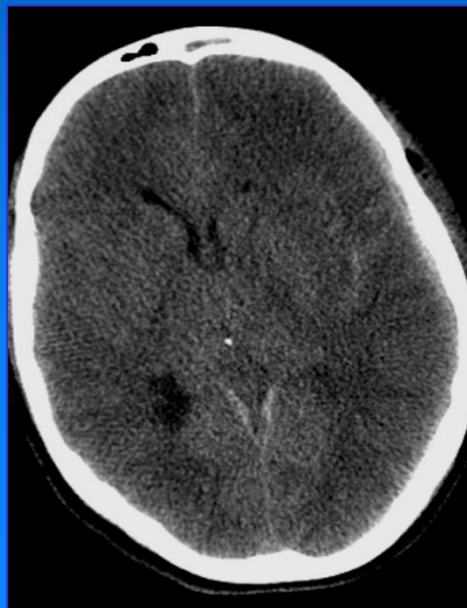
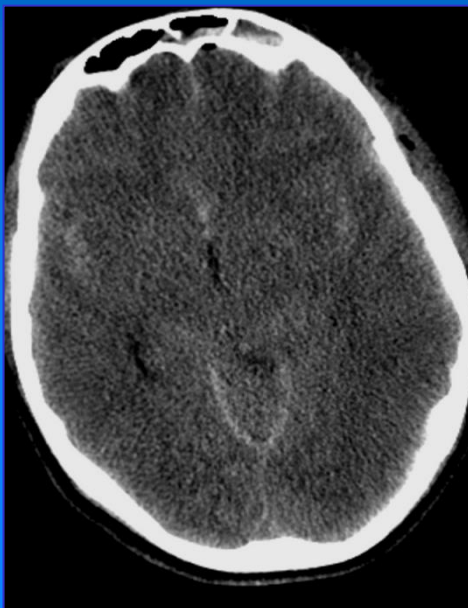
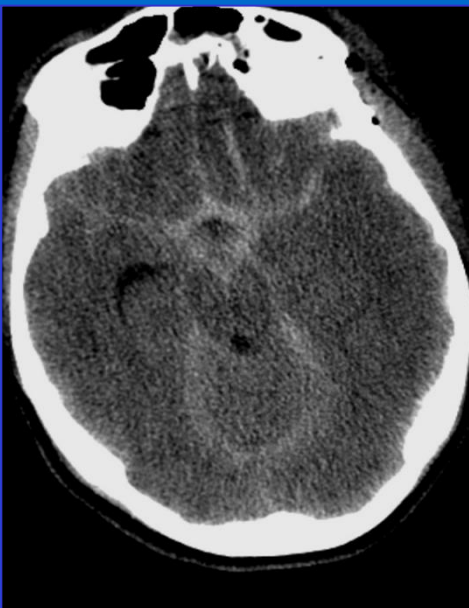
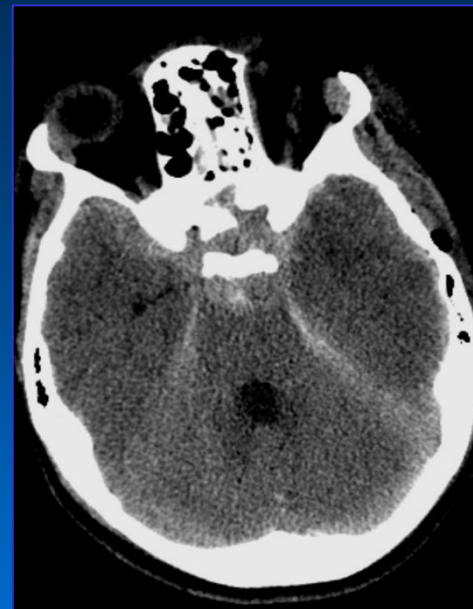
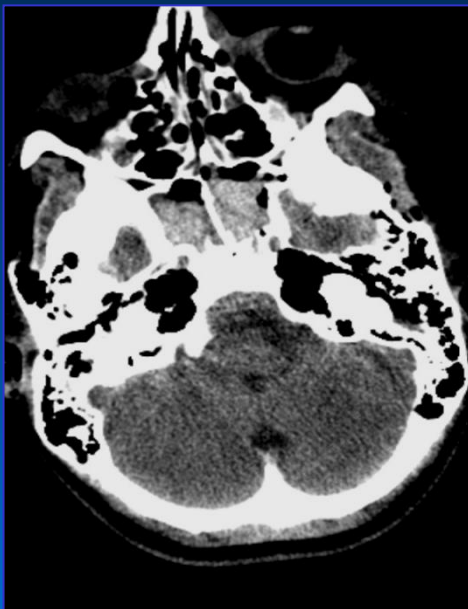
EMORRAGIA INTRACEREBRALE

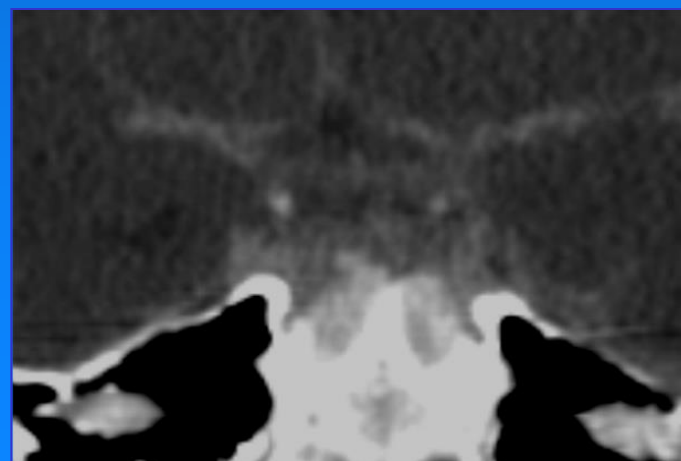
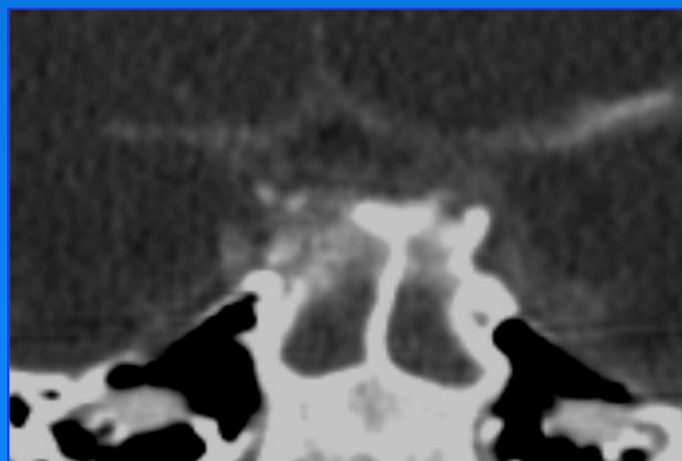
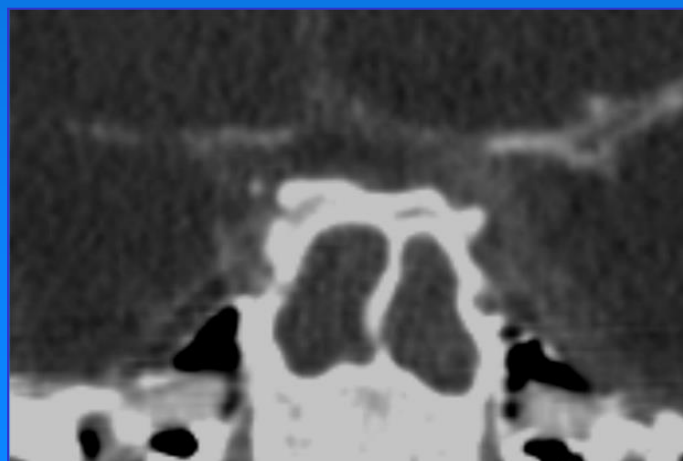
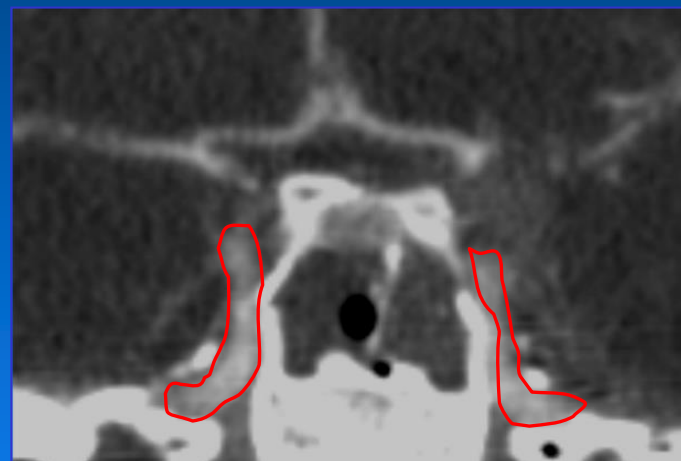
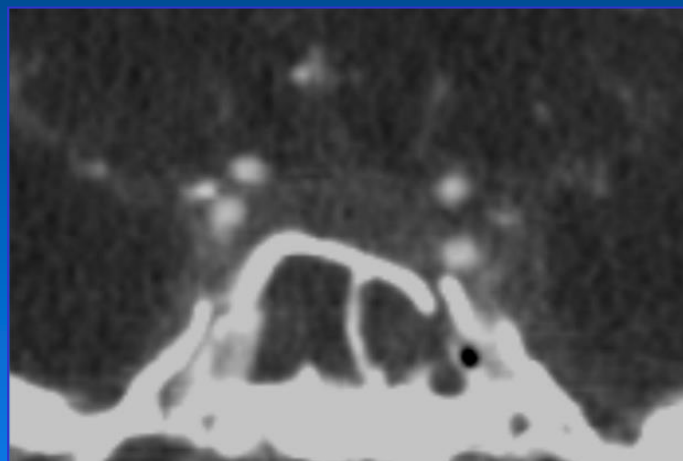
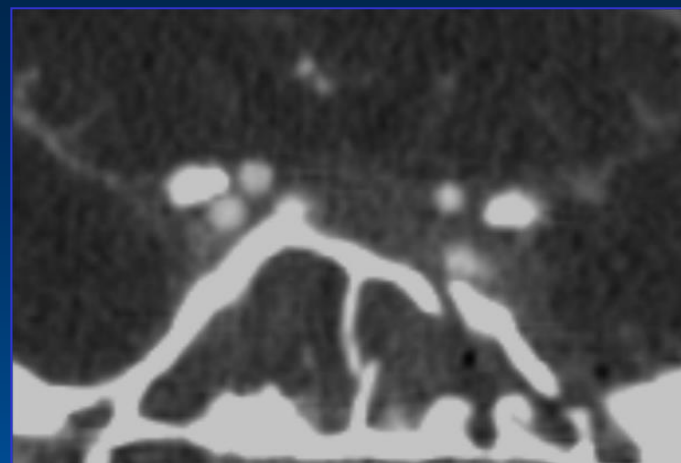
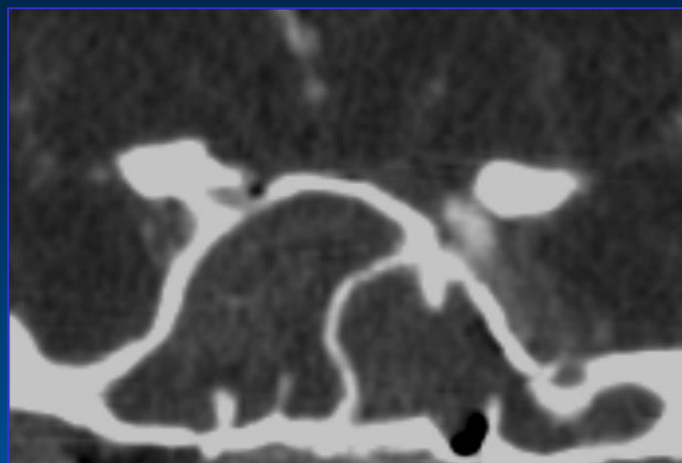
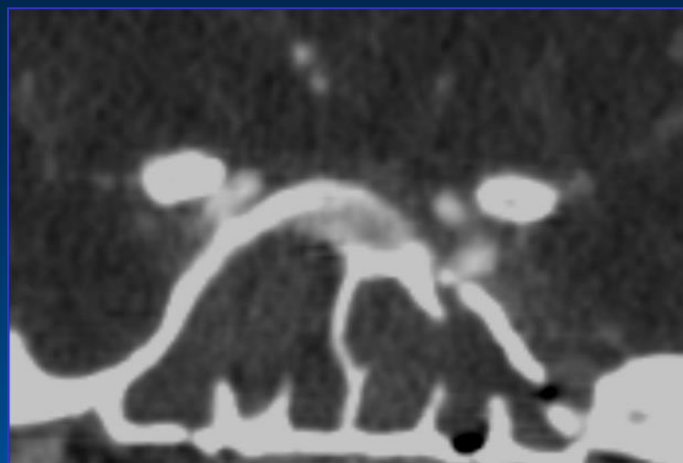
TROMBOSI
SENI VENOSI

- Sofferenza parenchimale focale con infarcimento emorragico
- Cortico-sottocorticale
- Non corrispondente a territori vascolari
- Visibilità di trombo nel seno

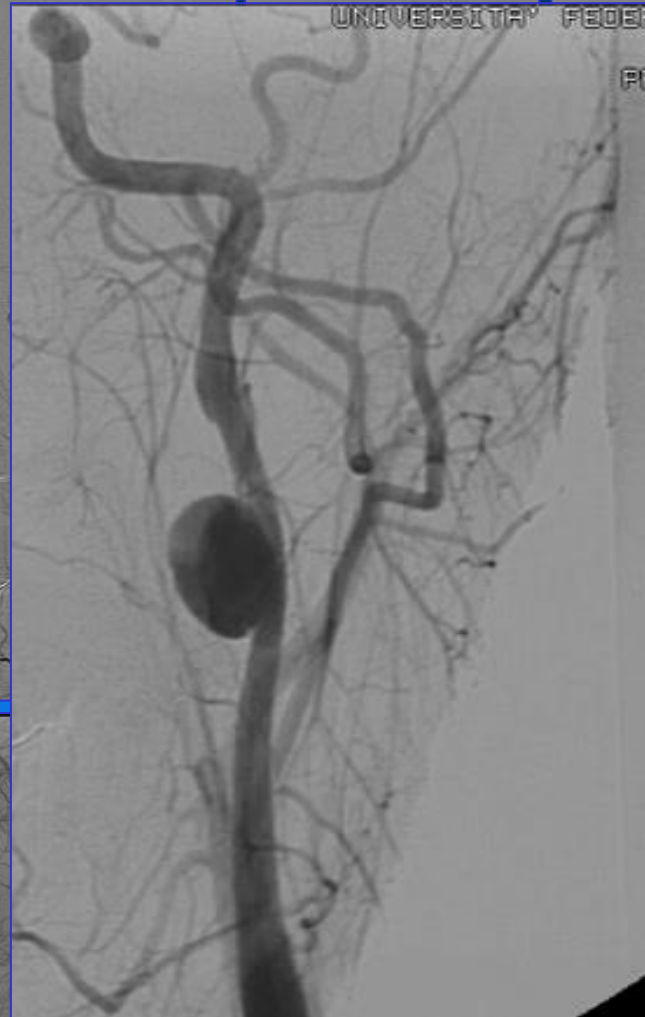


EMORRAGIA SUBARACNOIDEA





EMORRAGIA SUBARACNOIDEA





GRAZIE!!



VINCENZO D'AGOSTINO



