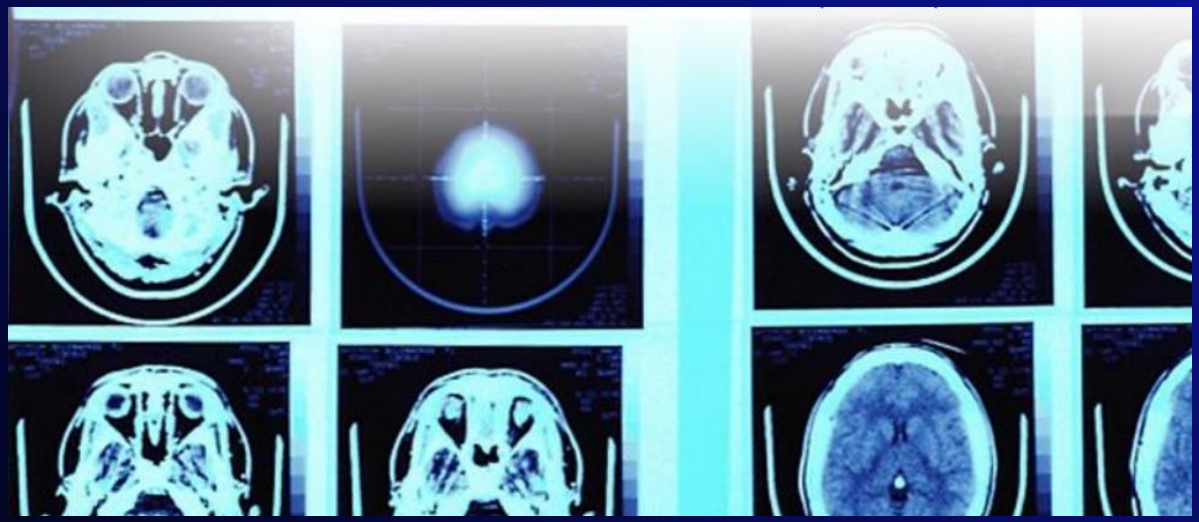
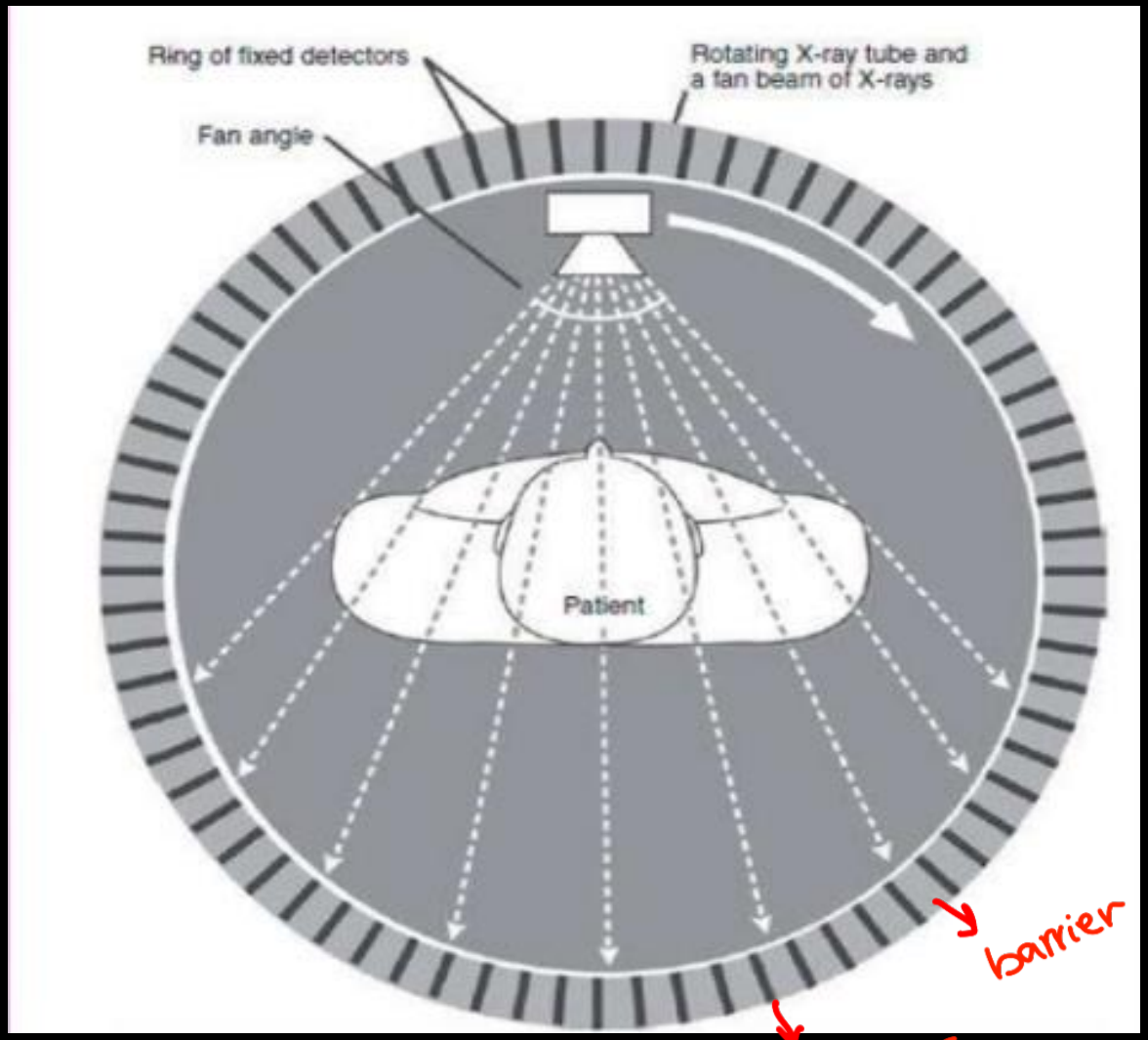
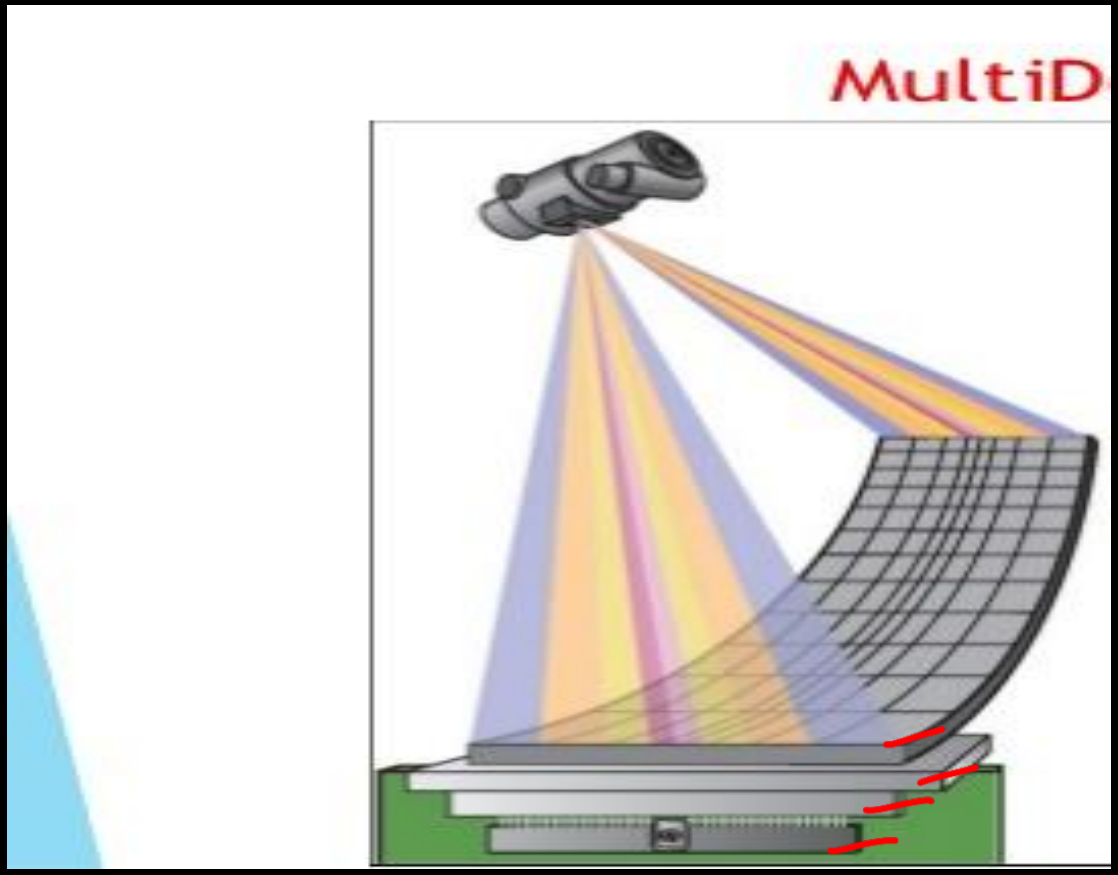
Introduction to Head CT Imaging



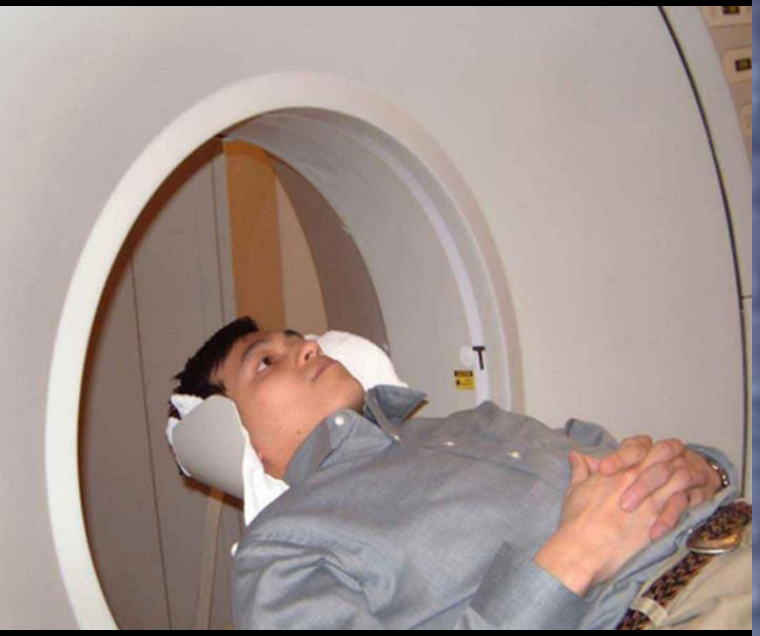

gantry

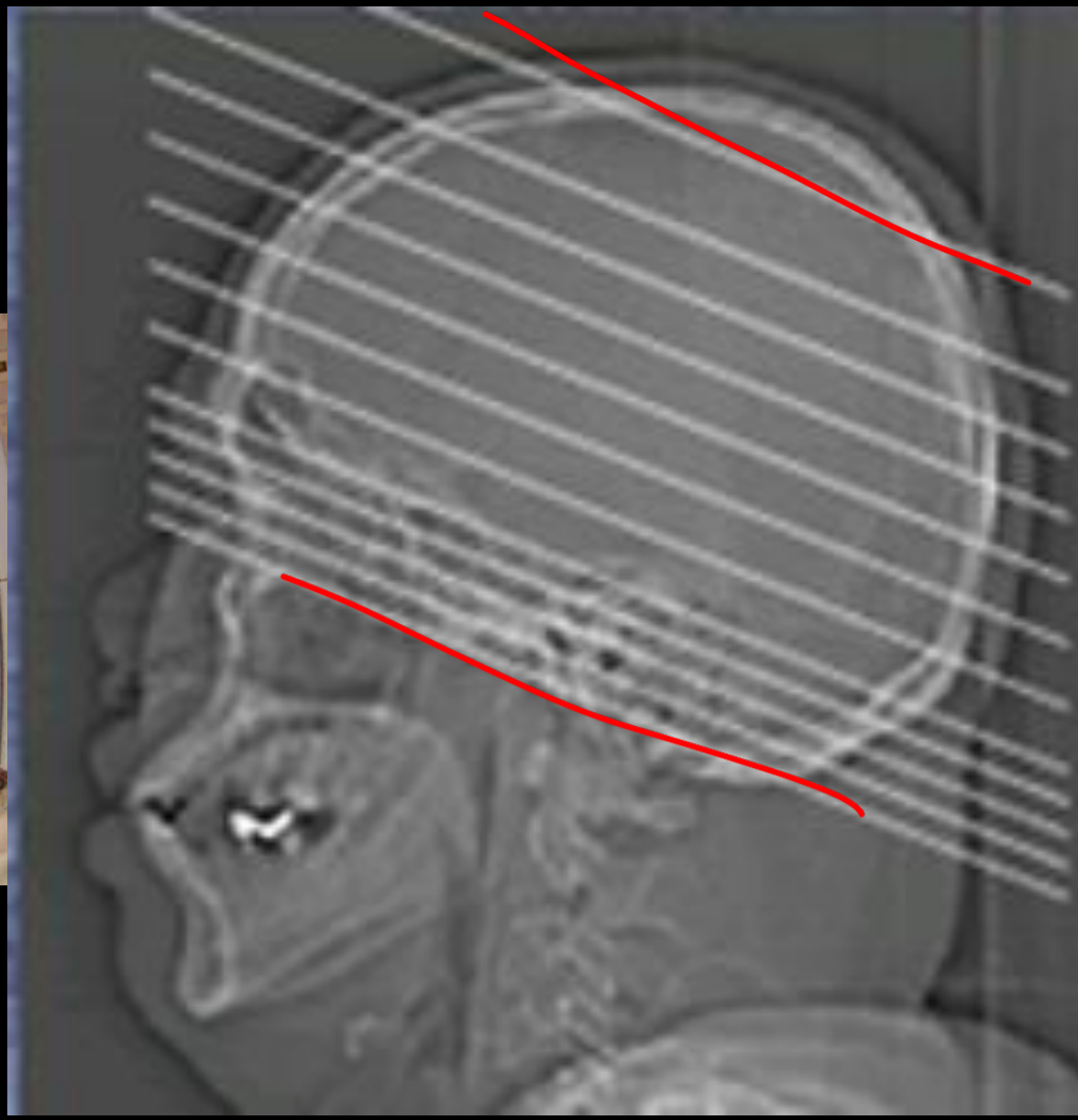

Ring of fixed detectors
Rotating X-ray tube and a fan beam of X-rays
Fan angle
Patient
barrier
detecter solid / gas

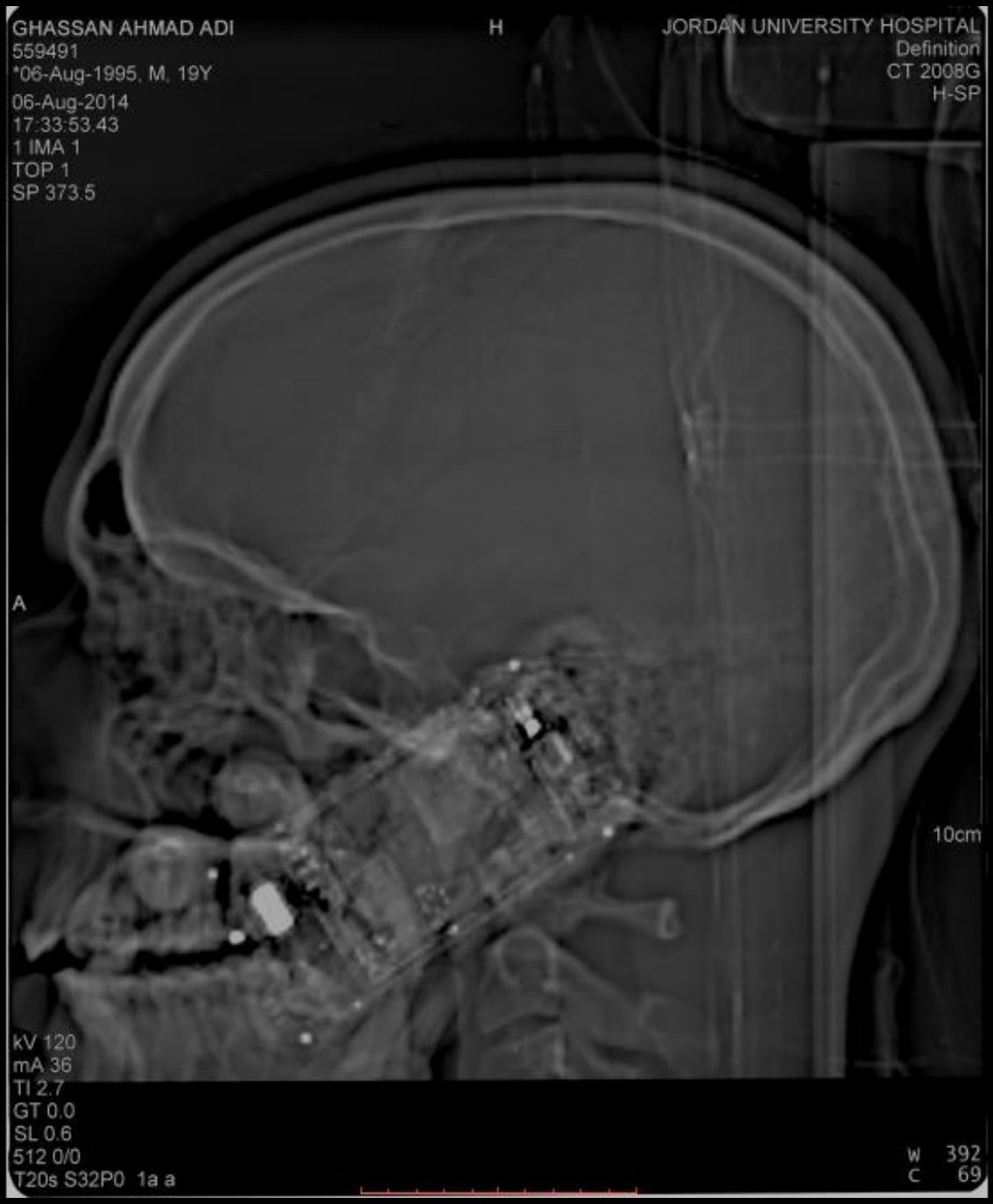
Multidetector CT scan



use green cannula usually



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JORDAN UNIVERSITY HOSPITAL
Definition
CT 2008G
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A
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SL 0.6
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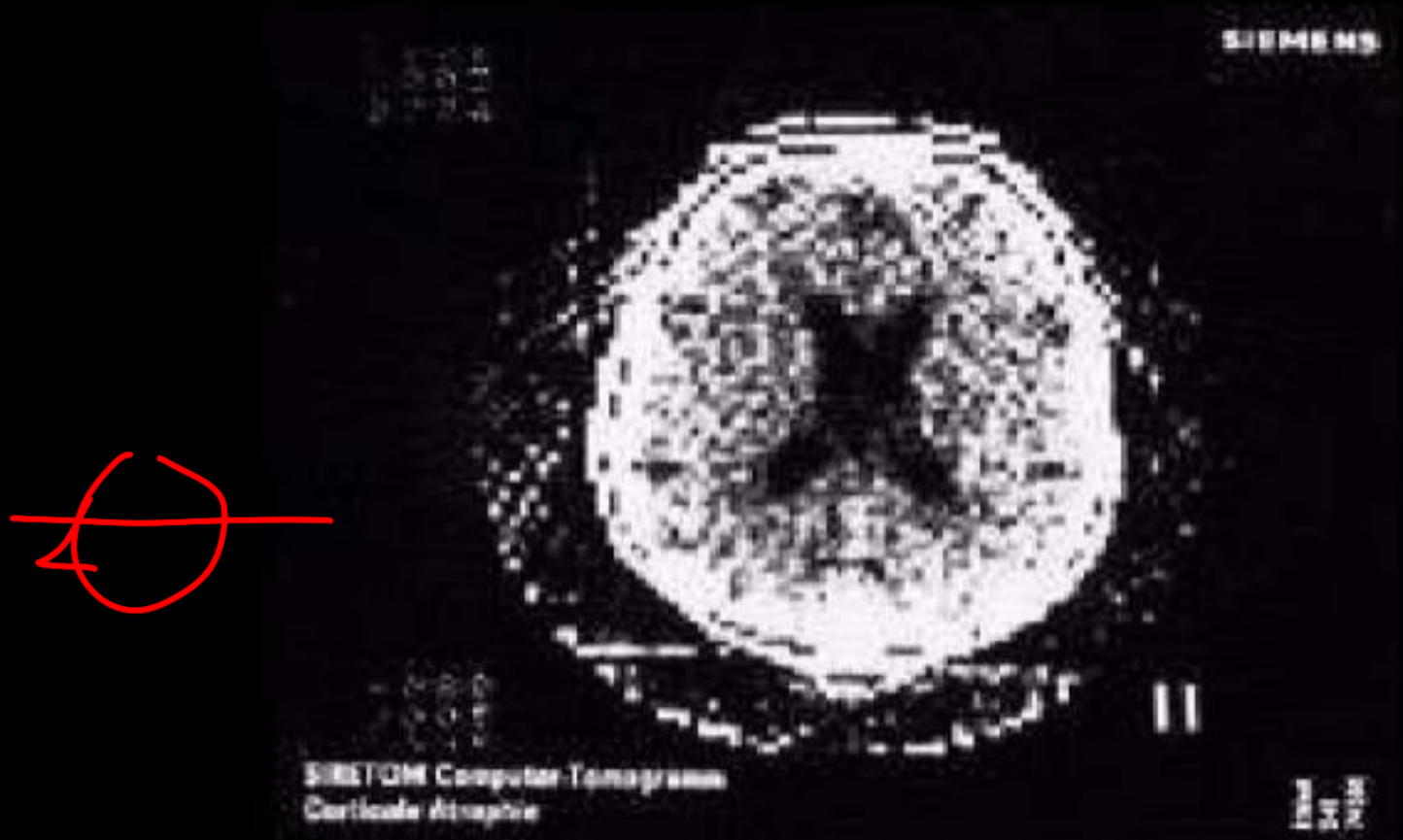
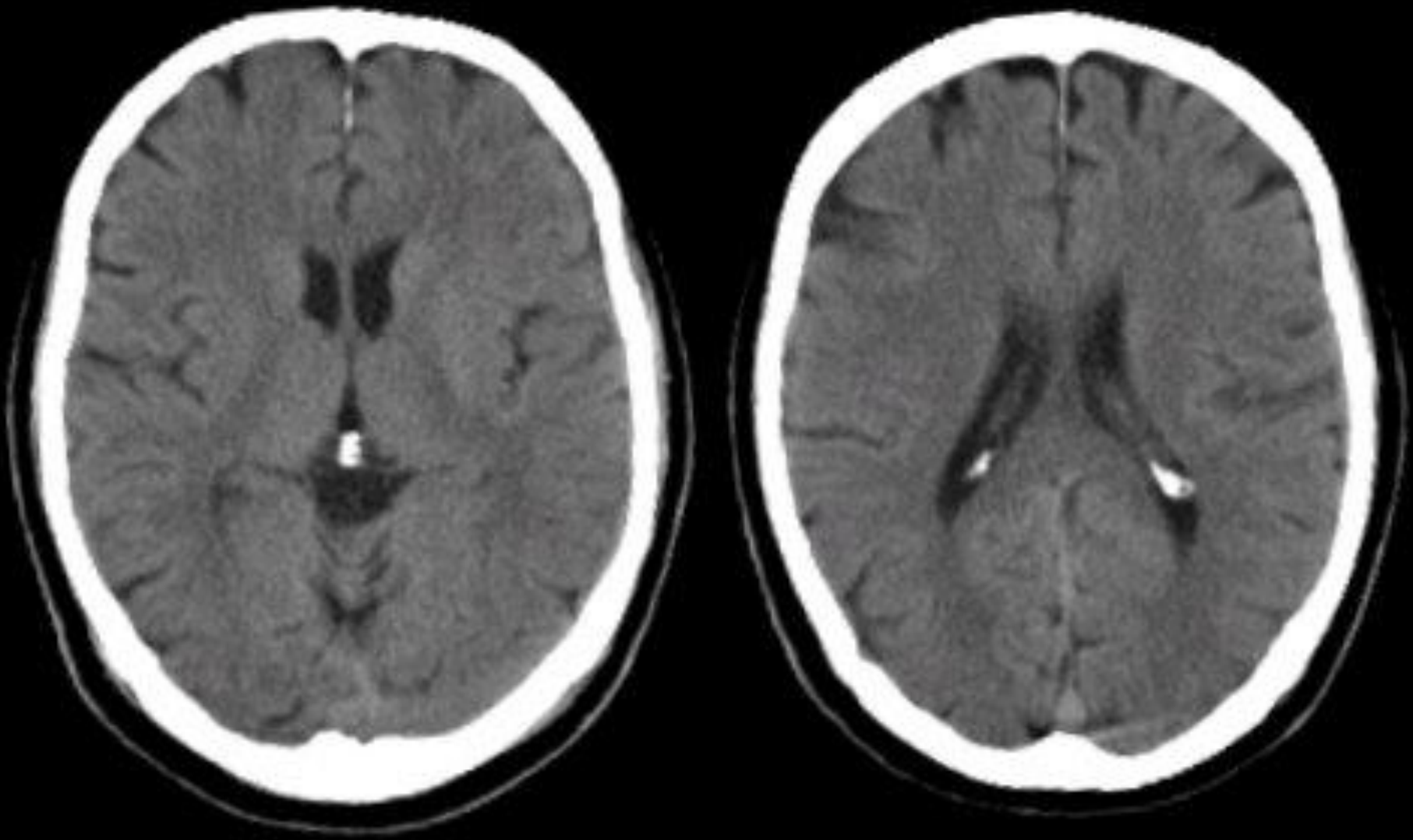
W 392
C 69



Original axial CT image from the dedicated Siretom CT scanner circa 1975. This image is a coarse 128 x 128 matrix

High resolution brain CT



CT vs. MRI

	CT	MRI
Obtained	X-ray beam	Magnetic fld
Bone	Bright	Dark
Cost	$330	$900
Plane	Axial	3-D
Technique	Adjust window	T1, T2, Pd
Length	10-20 minutes	30-60 min
Opening	Wide doughnut	Long, narrow

Advantages to CT

- Costs less than MRI
- Better access
- Shows up acute bleed
- A good quick screen
- Good visualization of bony structures and calcified lesions (bright)

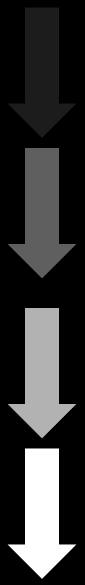
Disadvantages to CT

- Resolution
- Beam-hardening artifact
- Limited views of the posterior fossa and poor visualization of white-matter disease

CT density

"HU"

Black



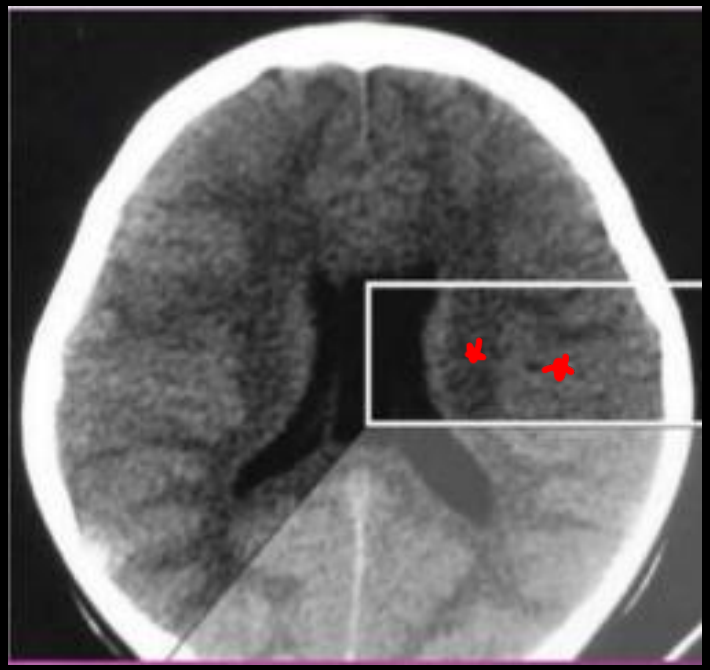
White

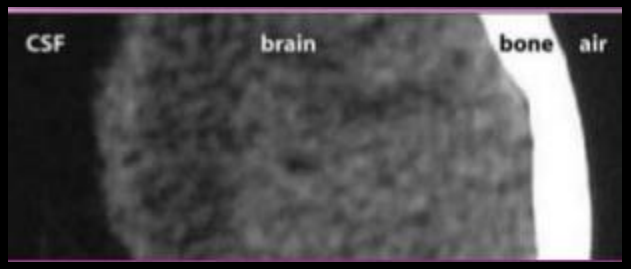
Structure/ Tissue	Hounsfield units
Air	-1000 to -600
Fat	-100 to -60
Water	0
CSF	+8 to 18
White matter	+30 to 41
Gray matter	+37 to 41
Acute blood	+50 to 100
Calcification	+140 to 200
Bone	+600 to 2000
metal	**+1000-+10000**

hypodense

] iso - opposite to anatomy
gray matter looks brighter
white matter looks darker

hyperdense

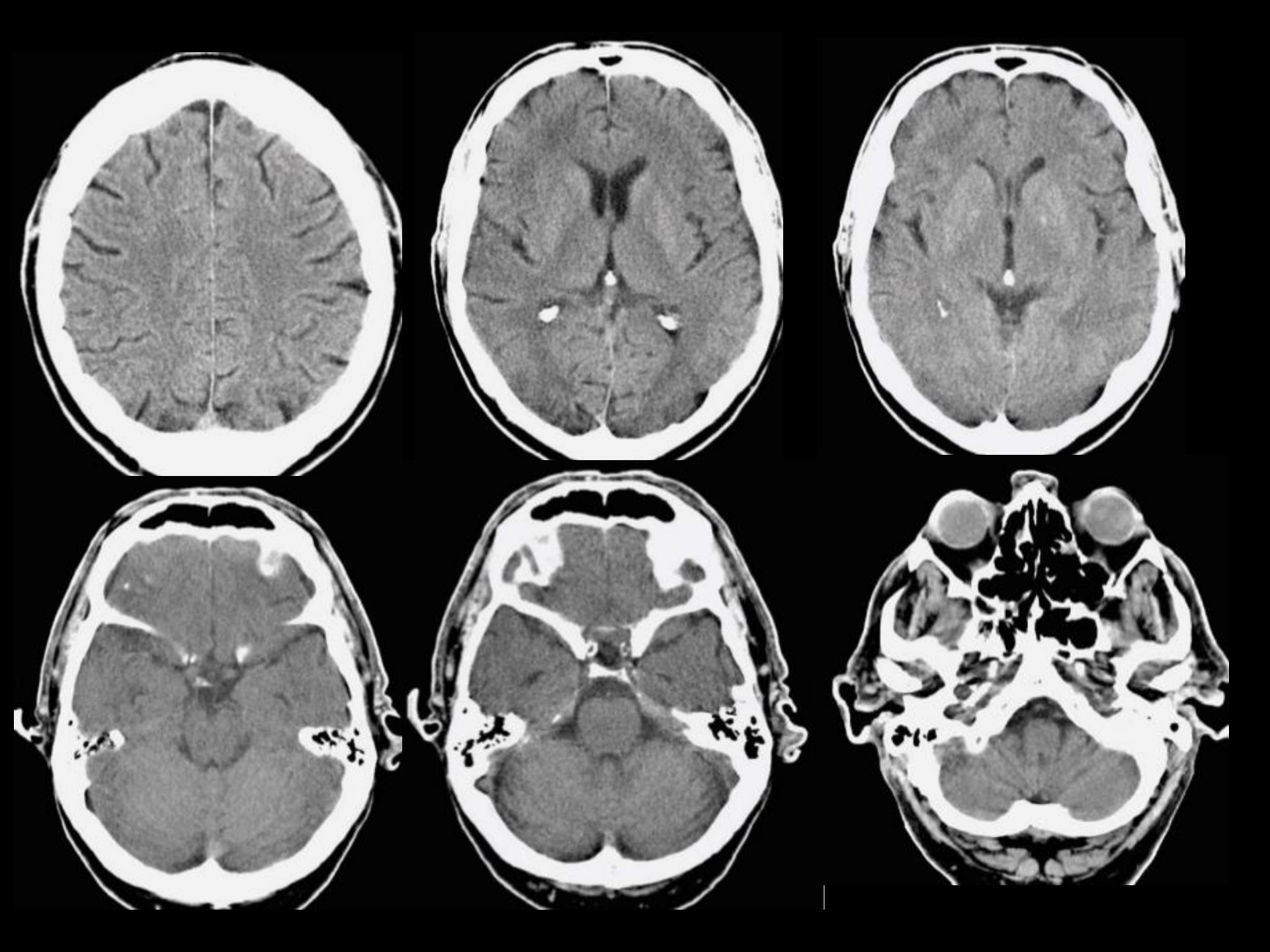




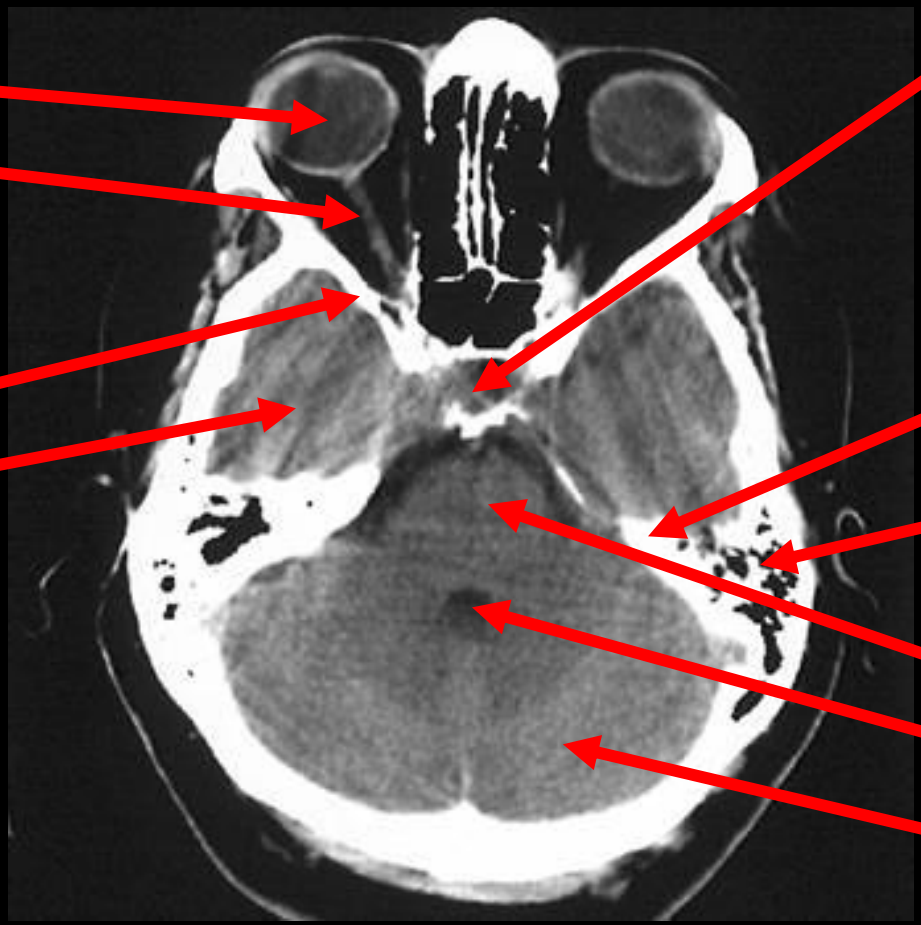
= gray-white matter differentiation

Normal brain CT scan report :

No brain focal lesion
No midline shift
No hydrocephalus ↑CSF



Normal Brain anatomy



Eye

Optic nerve

Sphenoid bone

Temporal lobe

Sella turcica (contains pituitary gland)

Petrous bone

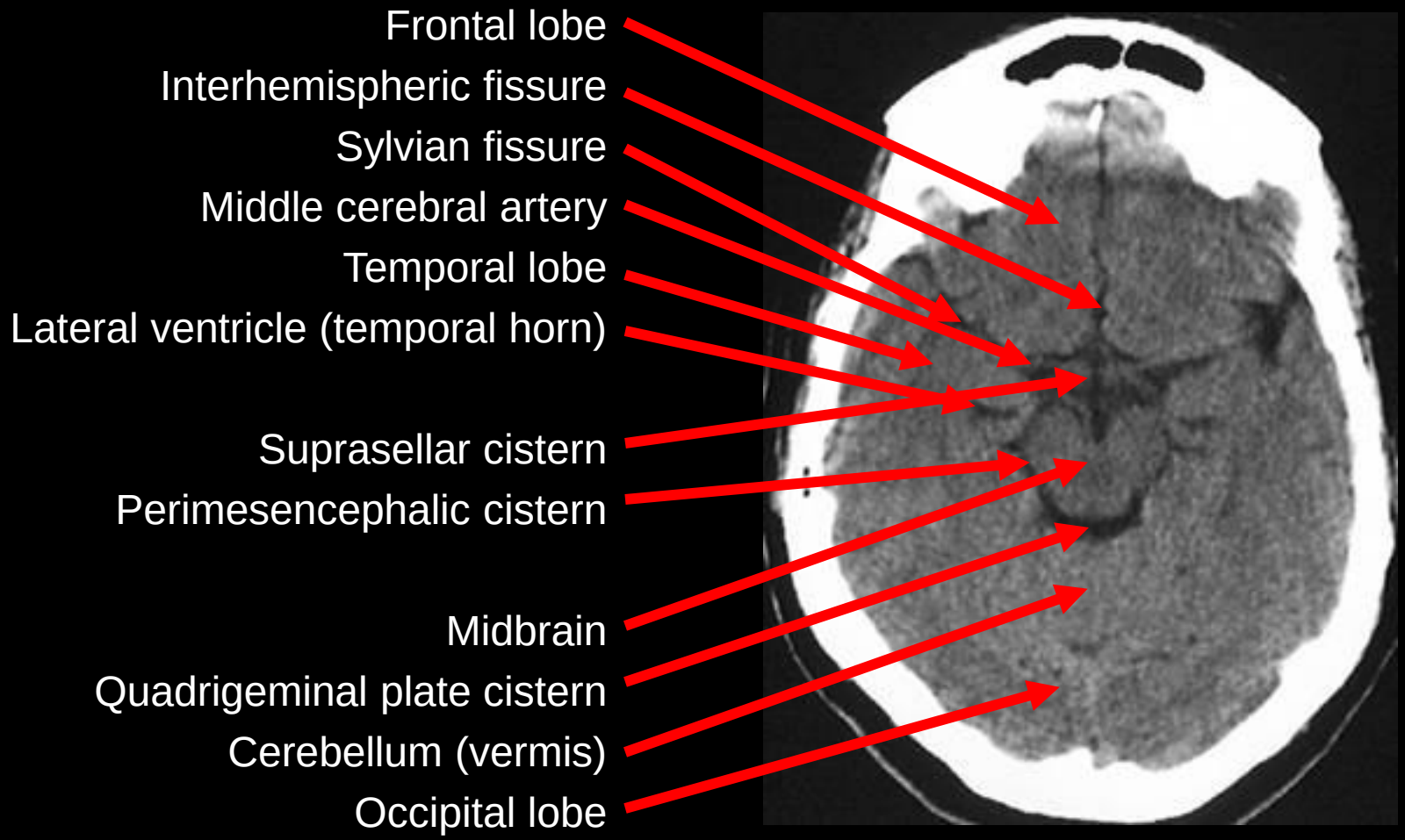
Mastoid air cells

Pons

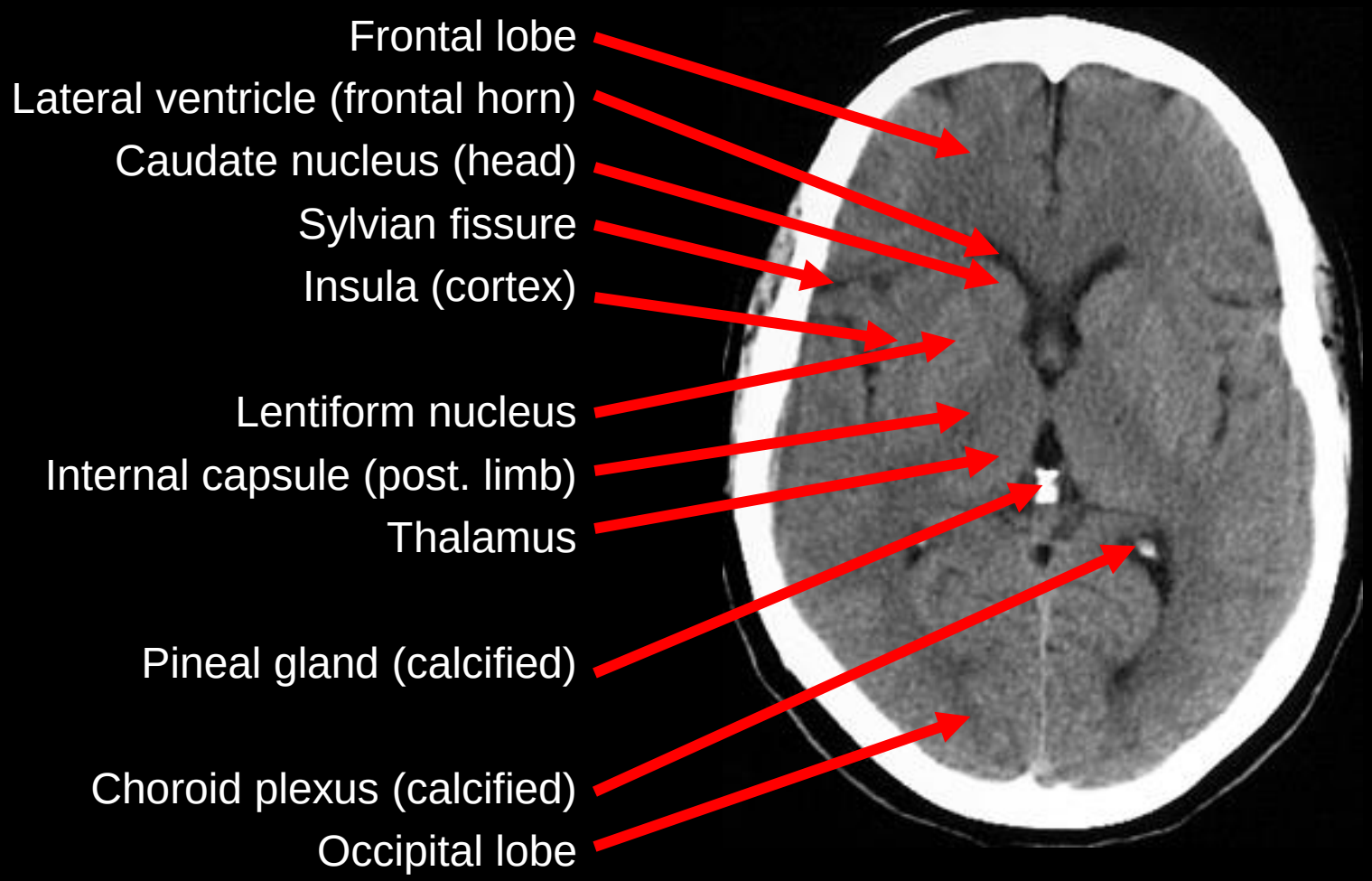
4th ventricle

Cerebellum

Normal Brain Anatomy



Normal Brain Anatomy



Brain Radiology Report

Look for:

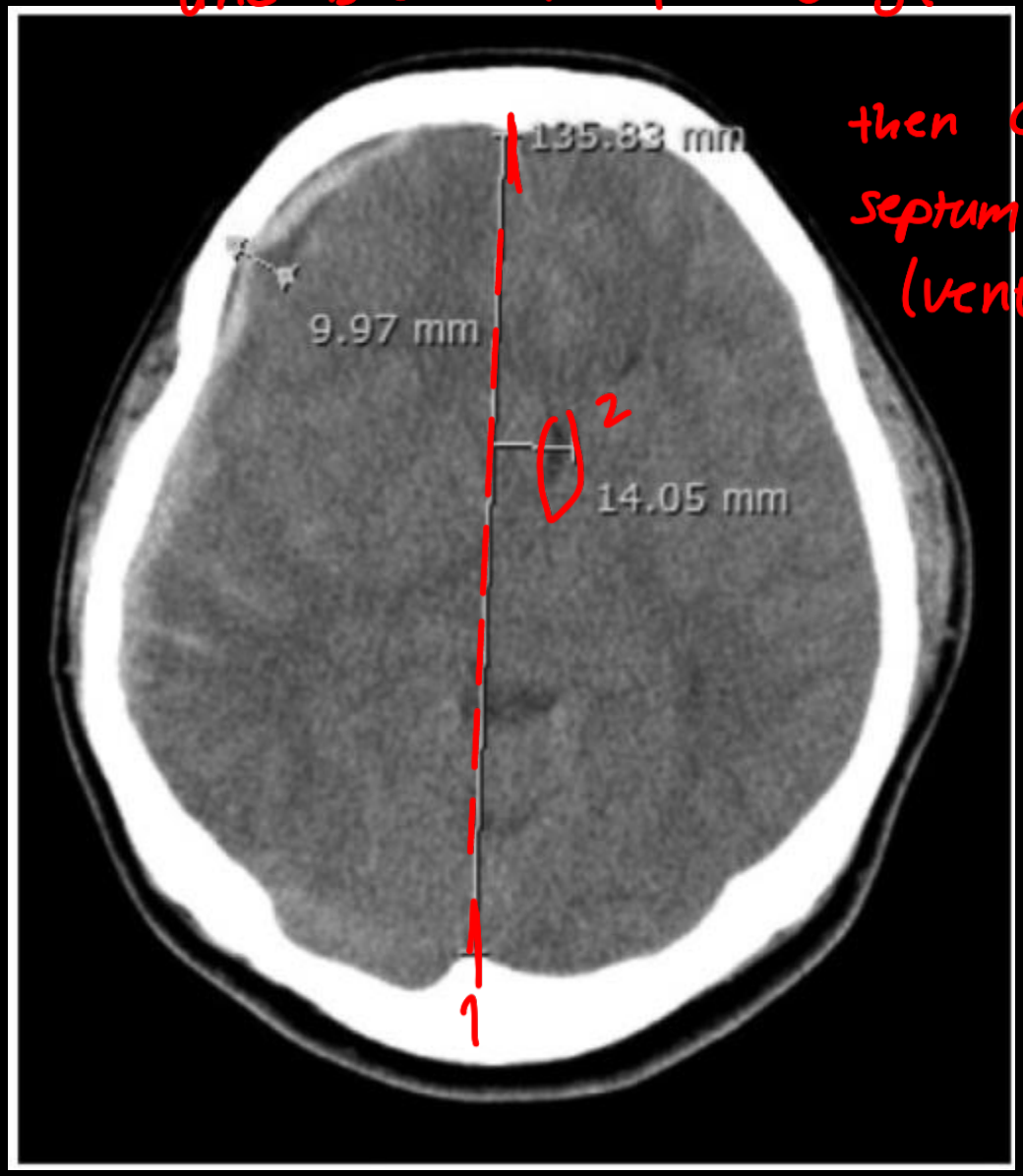
Brain focal lesions

Midline shift

Dilated ventricular system (Hydrocephalus)

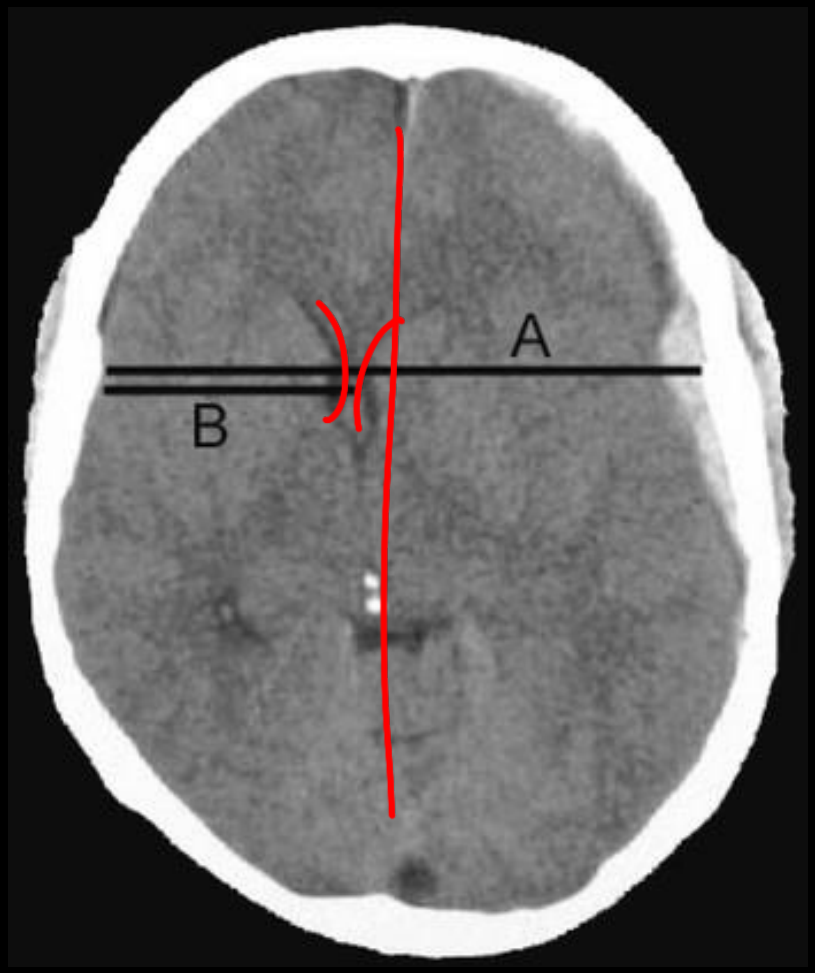
Midline shift

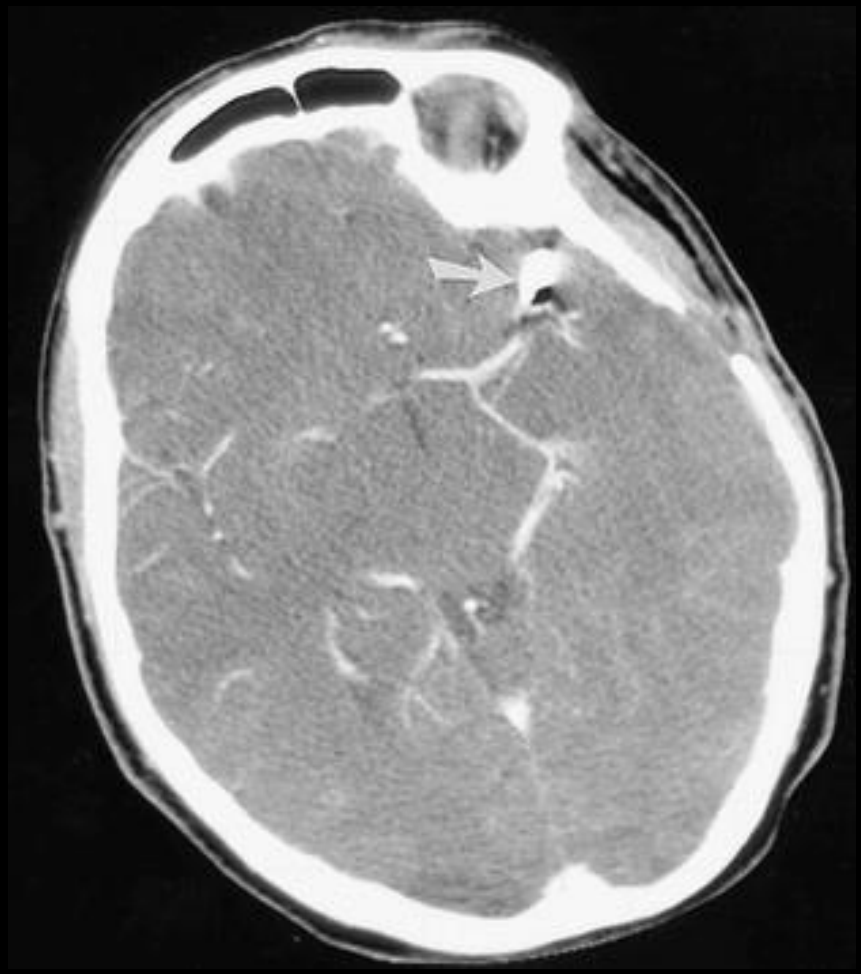
draw line between the origin of two falks



then compair with septum pellucidum (ventricles)

Midline shift v/s positional tilt

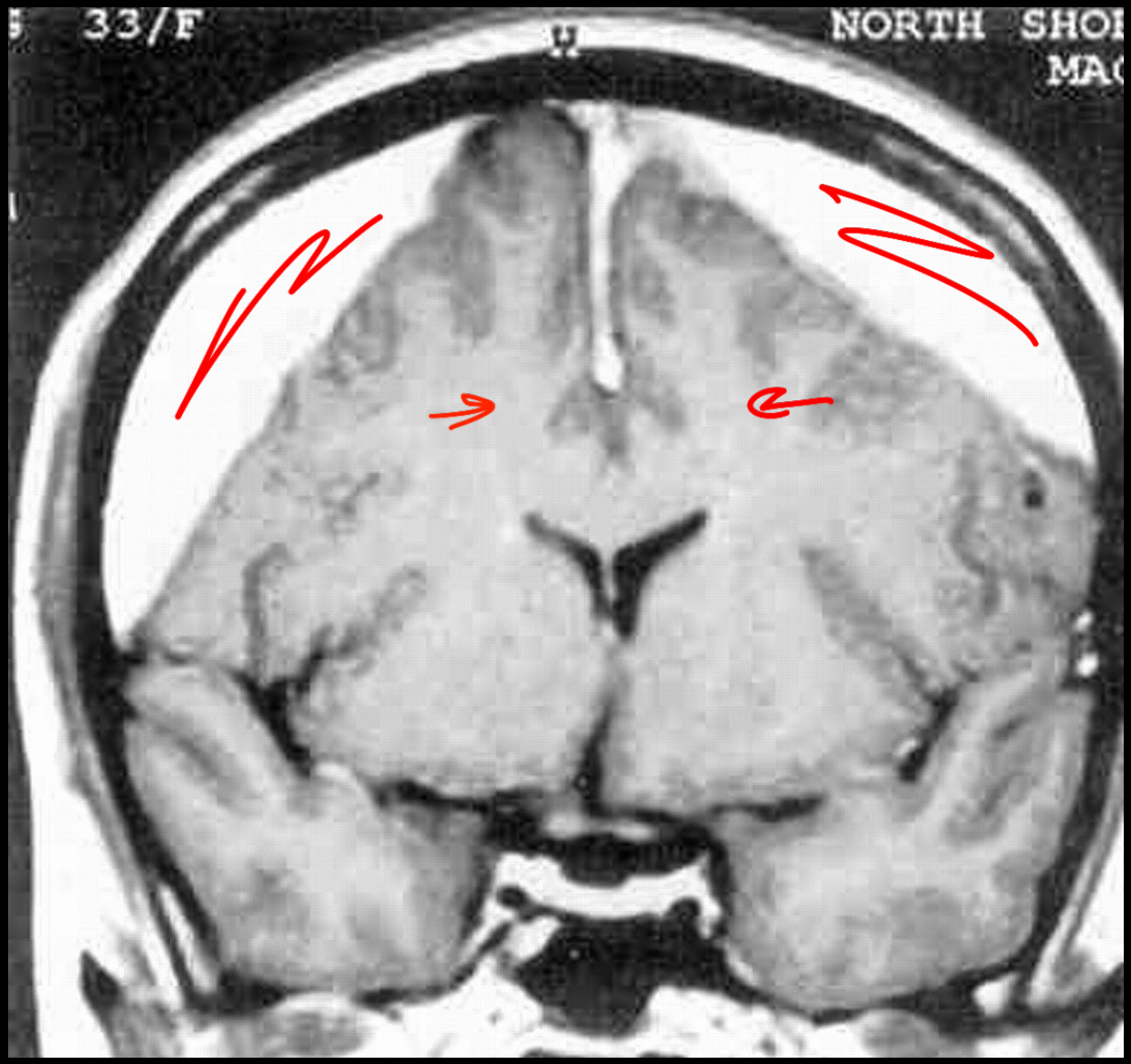




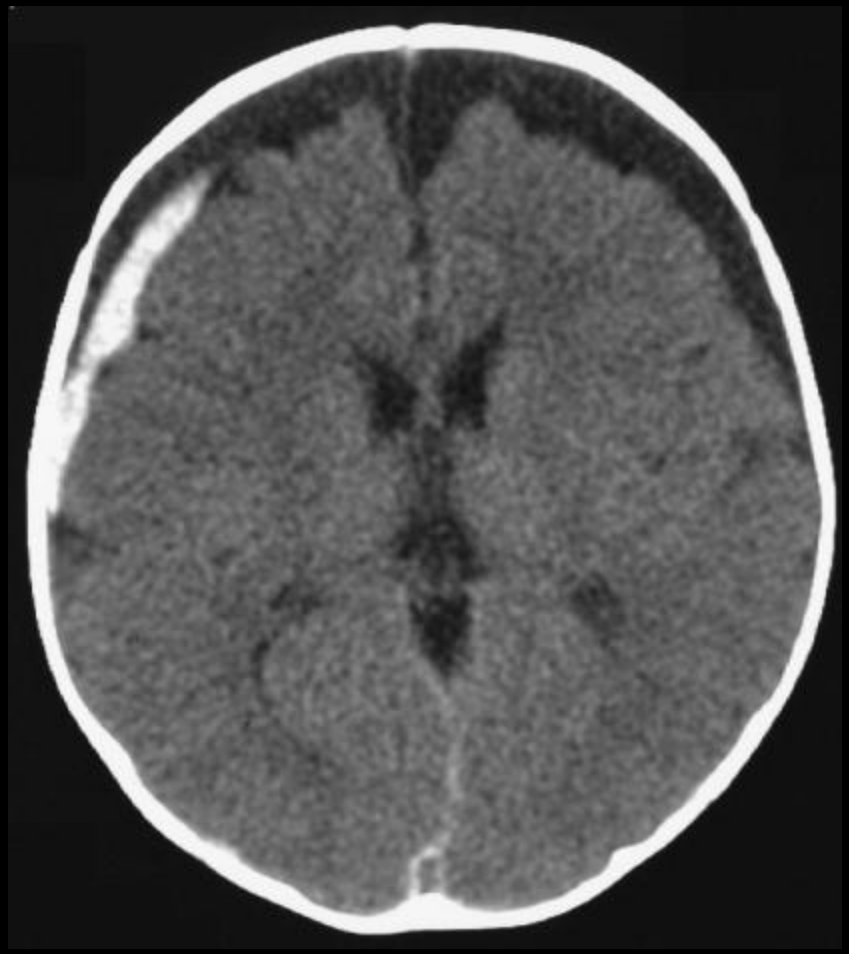
Not always there is midline shift (MLS) , there could be pathologies that don't cause MLS

When it may not appear ?

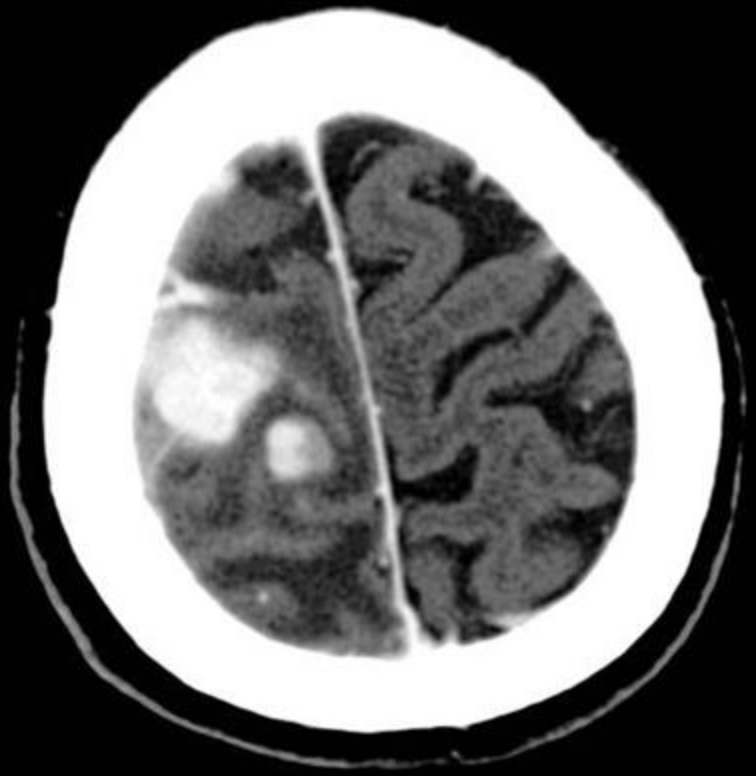
1) Bilateral



- 2) Small



3) Lesion that are high up near the vertex



2

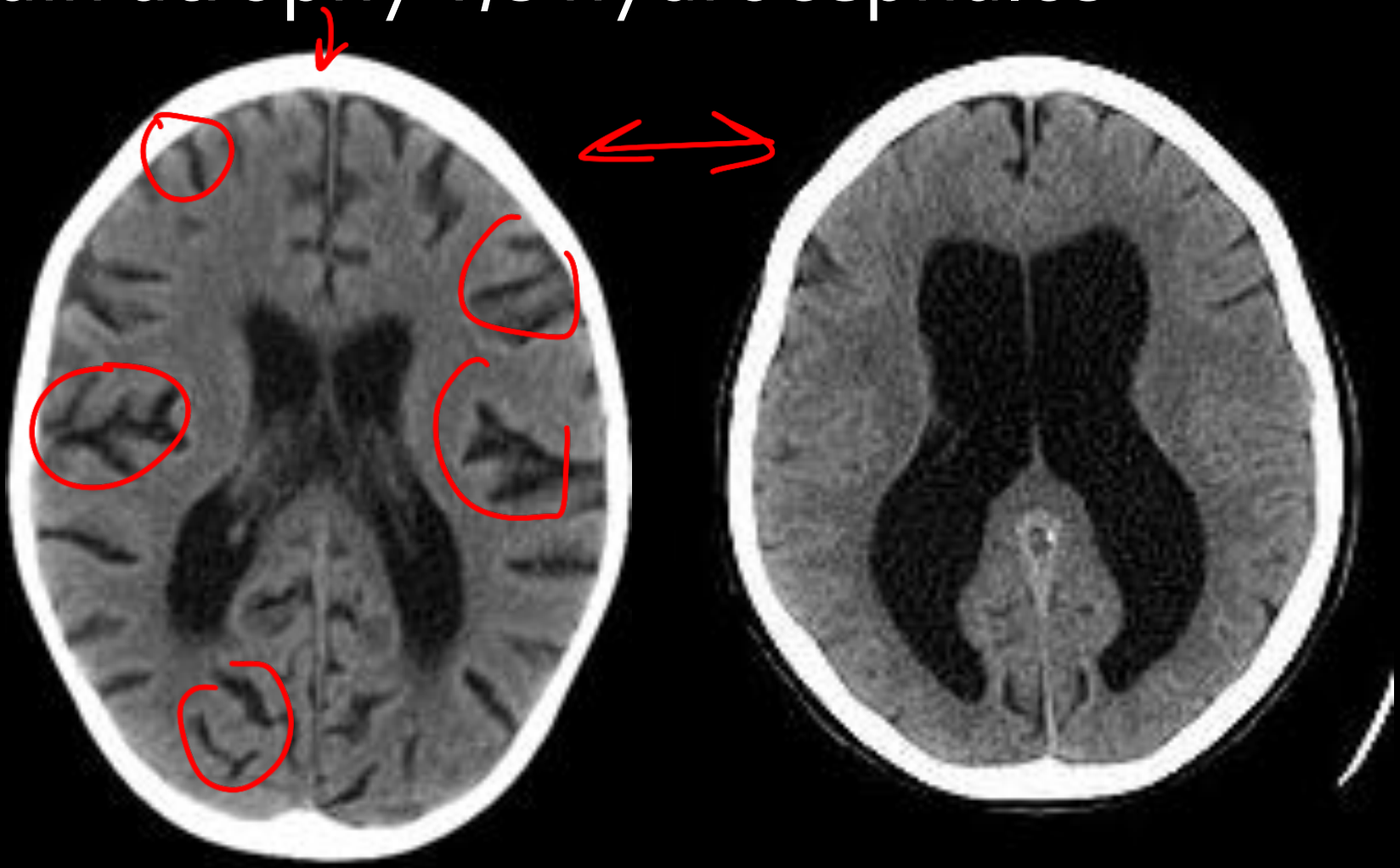
Ventricular Dilatation (hydrocephalus)

Ex vacuo dilatation: due to diffuse brain atrophy

Hydrocephalus : communicating and non communicating

both has dilated ventricles but each from different cause

Brain atrophy v/s hydrocephalus



3

Brain focal leison

Abnormalities divided into :

- Intraventricular
- Intra-axial (Intra paranchymal)
- Extra-axial (between tissue - Bone)
- Intra-osseous
- 4. Scalp

are there ?

Skin - connective tissue ...

fat - vessels - lymph - nerves

1. paranchyma (intraaxial)

what cells are there?

glial cells - neuronal - vessels

1. Astrocytes 2. Oligodendrocytes 3. Microglia 4. Ependymal

Not there ?

Meninges

2. Intra ventricular

are there ?

Epyndemal - choroid plexus

Not there ?

lymphatics - even without having meninges meningioma may present intravent. originating from _____ ?

3. extra axial

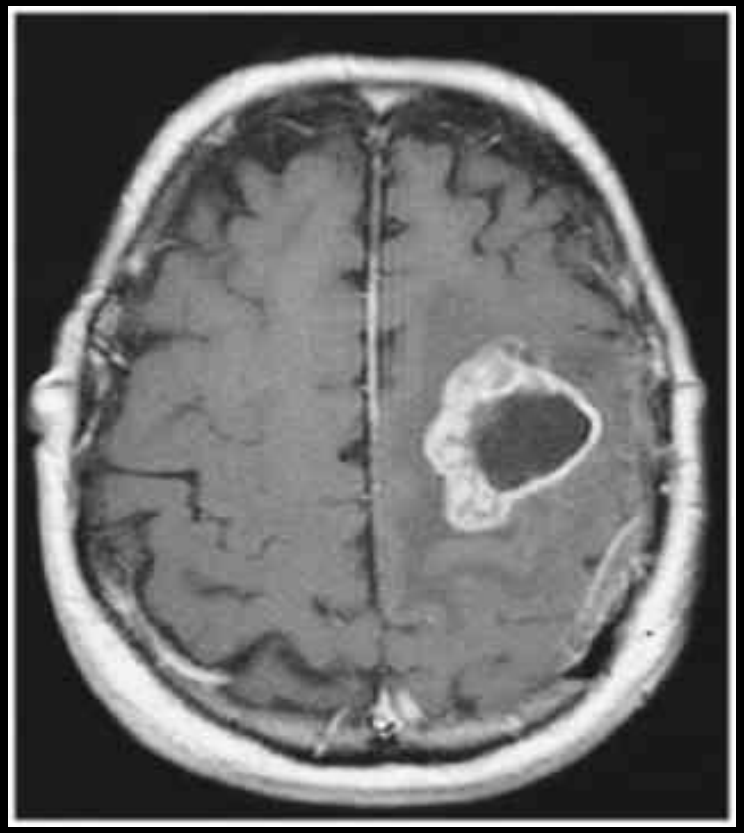
are there?

meninges - vessels

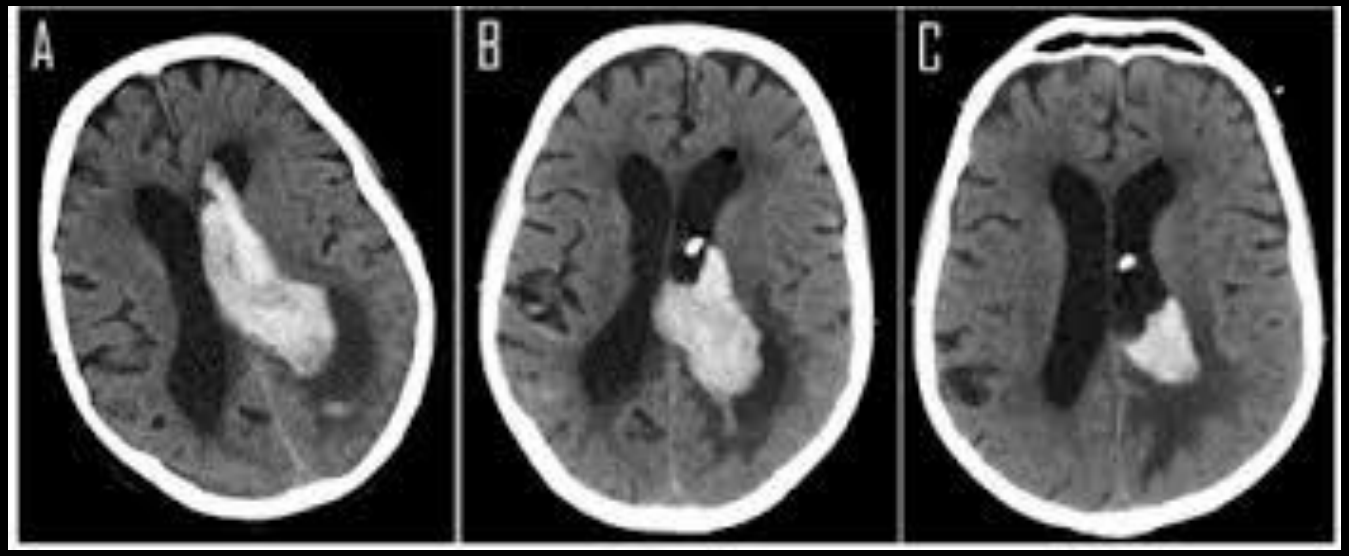
Not there ?

pranchymal - primary lymphoma

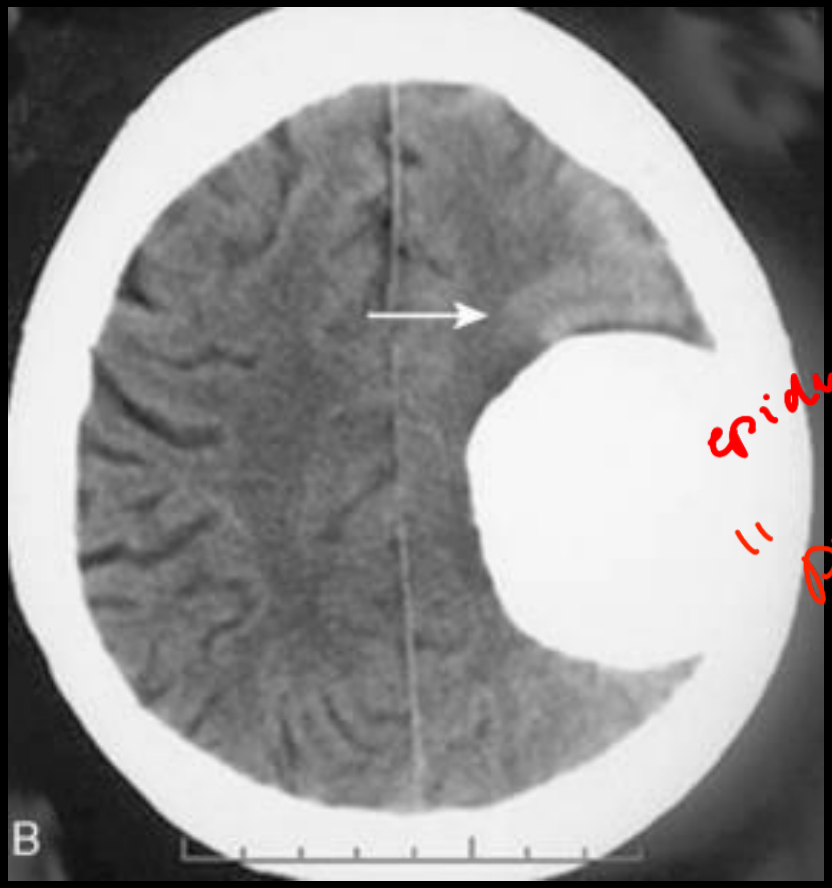
Intra-axial



Intraventricular



Extra-axial

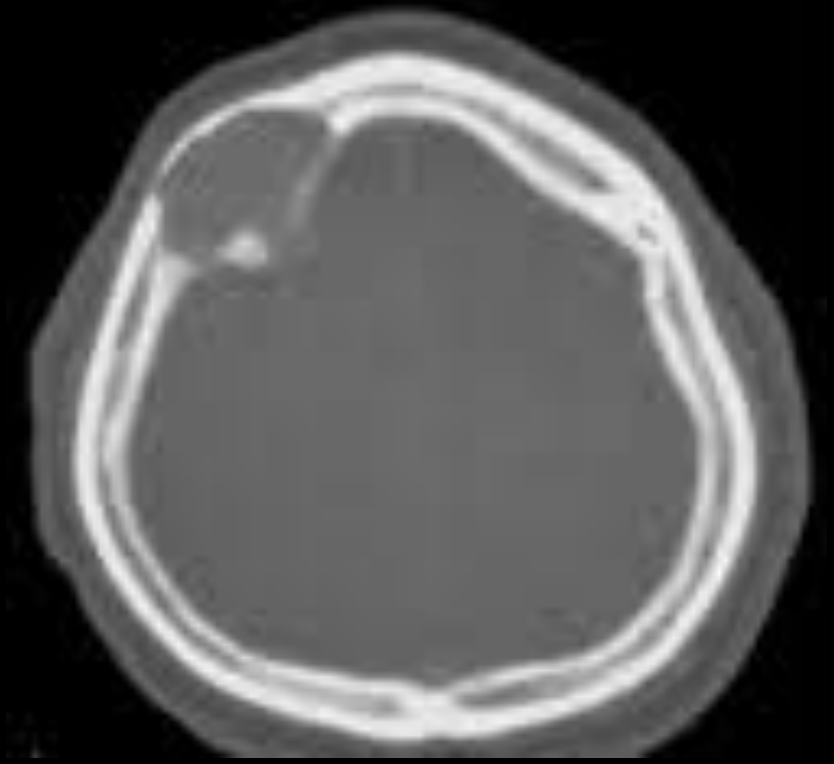


epidural

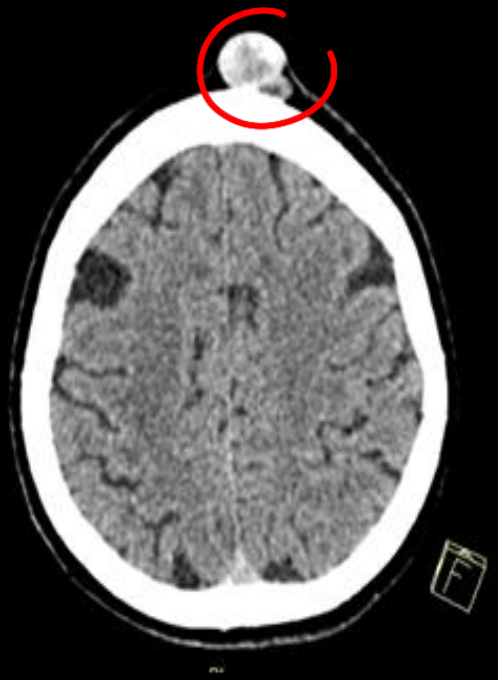
" pregnant women sign "

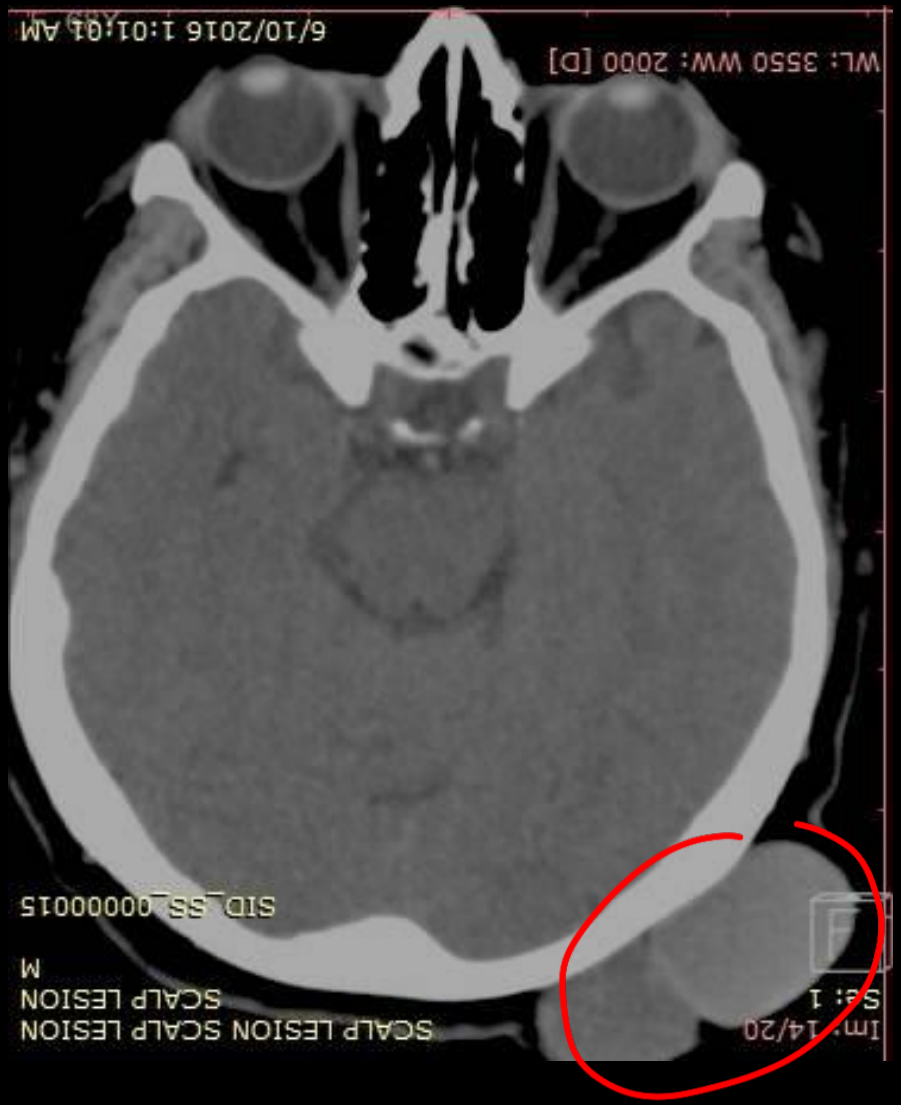
Intra-osseous

inside the bone



Scalp

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Brain Pathology - CT

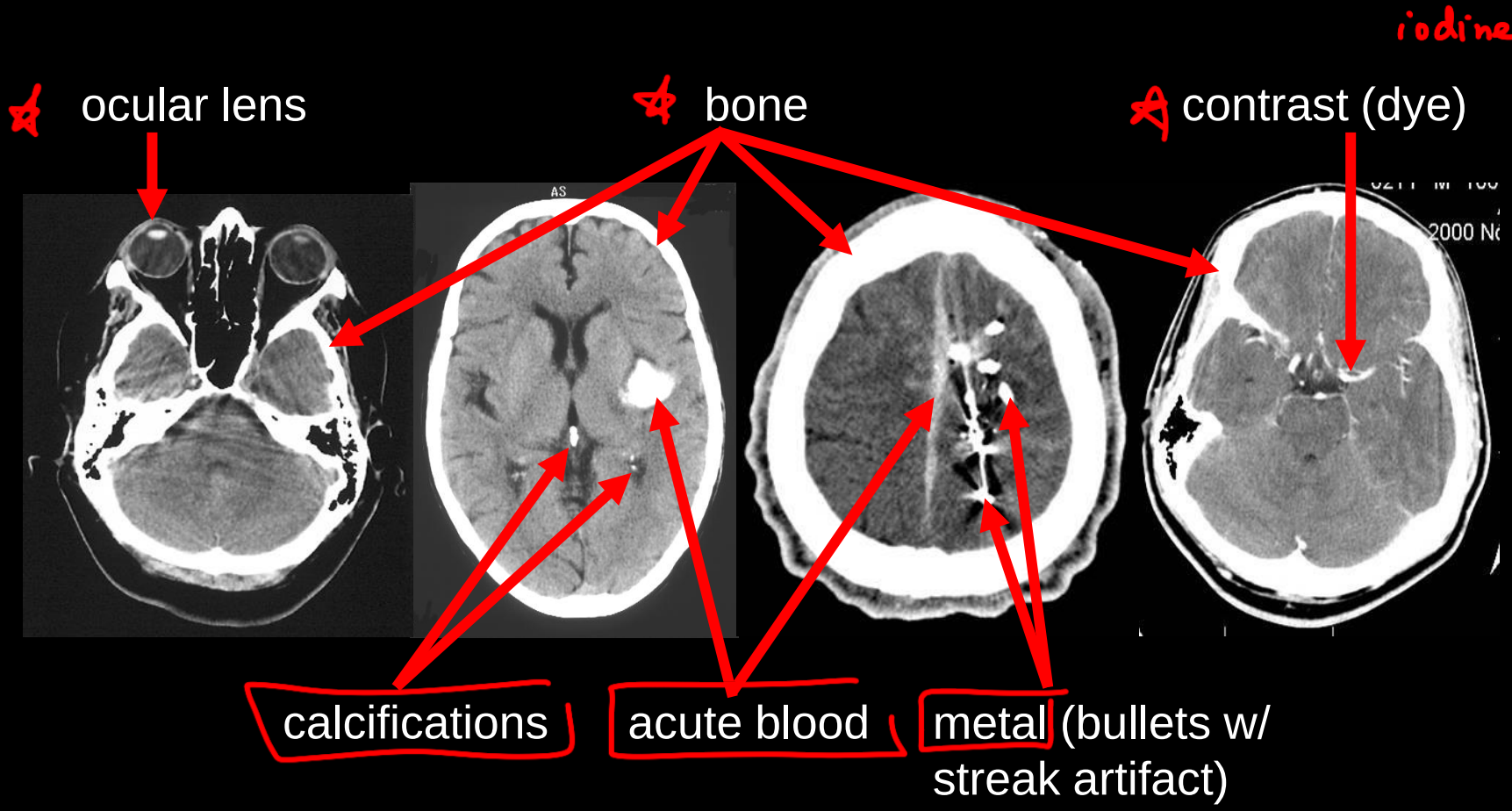
Brain pathology could be divided to two type according to their density on CT:

1- Hyperdense lesions

2- Isodense lesions

3- Hypodense lesions

Hyperdense things on CT



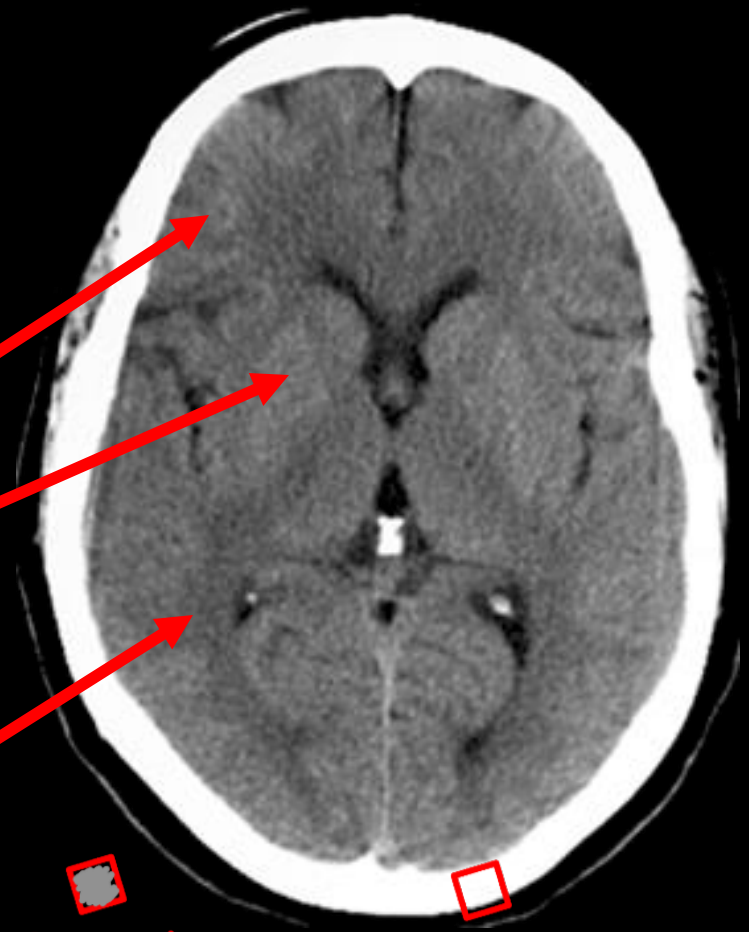
Isodense things on CT

- *Note that white matter is less dense than gray matter and therefore: white matter is darker than gray matter*

Gray matter (cerebral cortex)

Gray matter (basal ganglia)

White matter



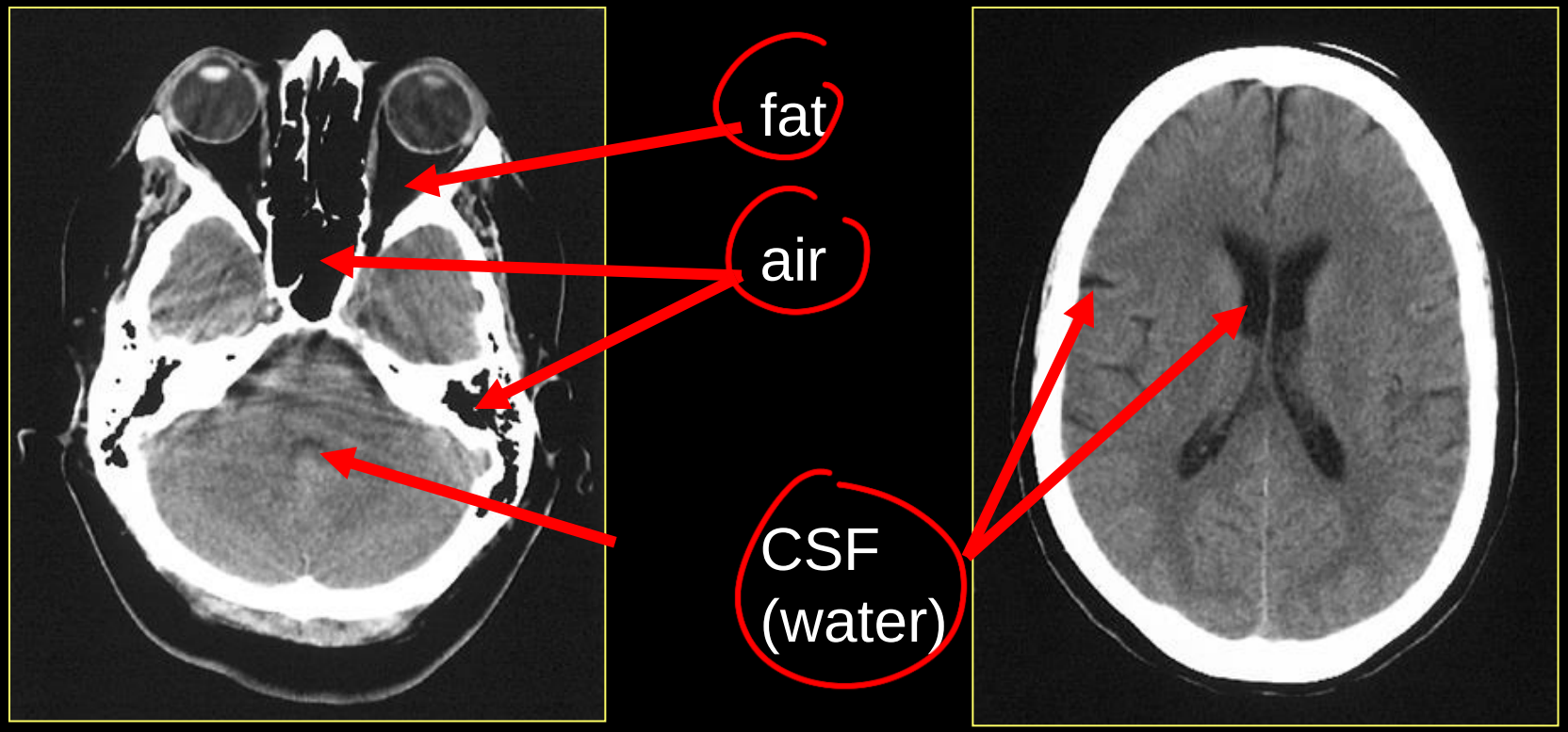
Black

White matter

Gray matter

White

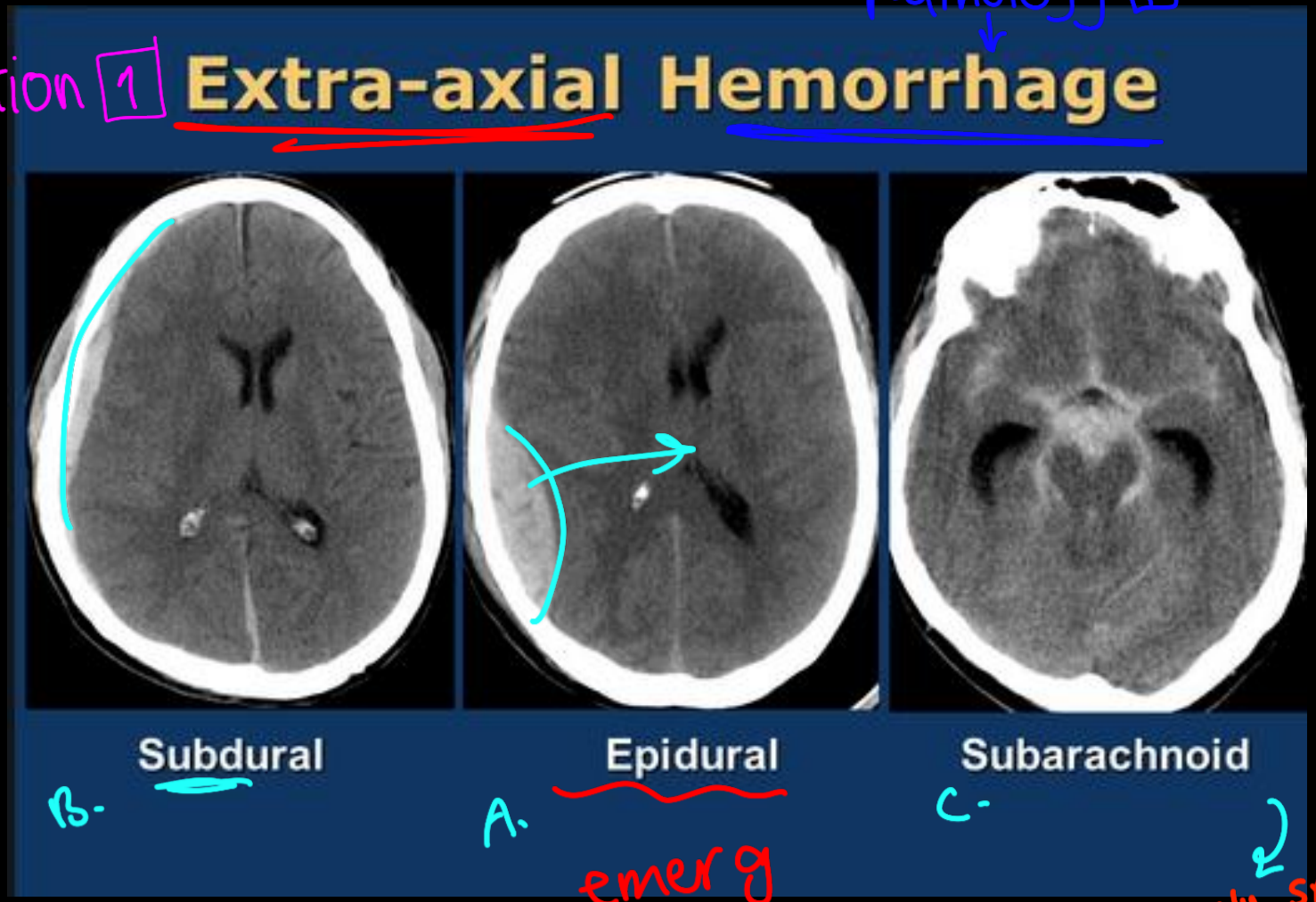
Hypodense things on CT



We have different Pathologies of the focal lesions in different LOCATIONS

Pathology II

location 1



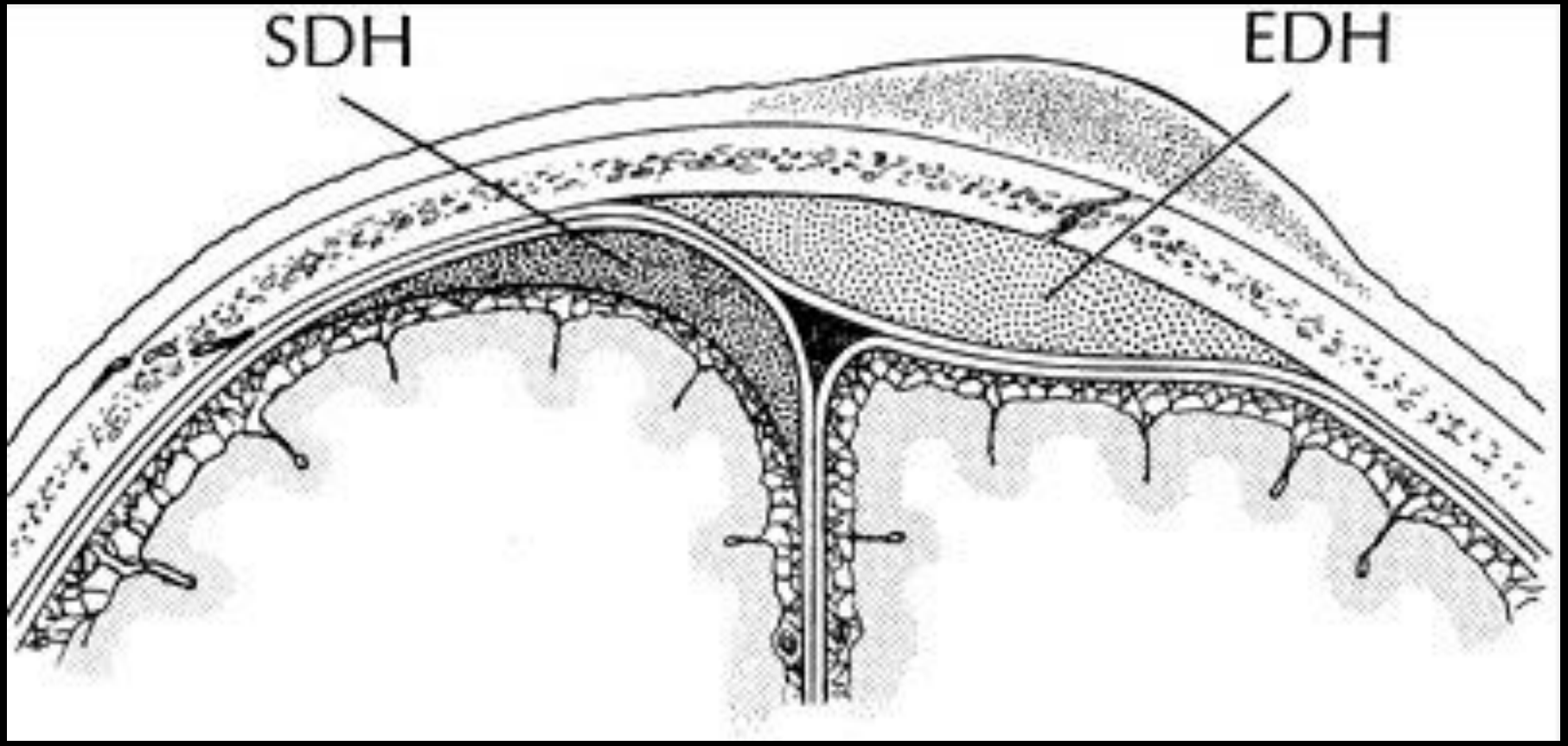
B.

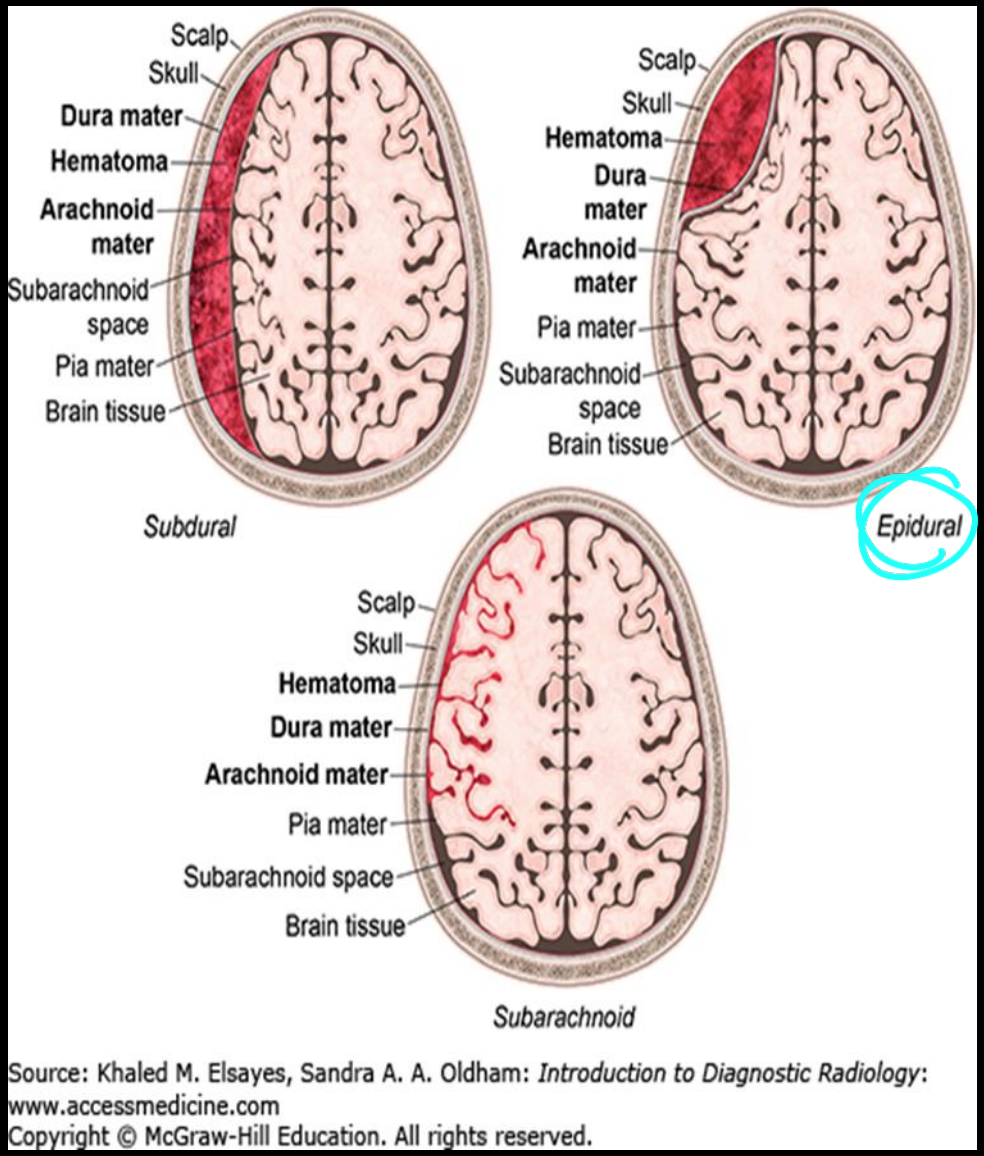
A.

emerg

C.

only space has CSF


SDH
EDH



Source: Khaled M. Elsayes, Sandra A. A. Oldham: *Introduction to Diagnostic Radiology*: www.accessmedicine.com

Commonly in middle menigial artery

A. Epidural hematoma (EDH)

Most common cause

- **Mechanism:** low-velocity blunt trauma to the head
- **Types:**
- • Arterial EDH, 90% (middle meningeal artery)
- • Venous EDH, 10% (sinus laceration, meningeal vein)
  - Posterior fossa: transverse or sigmoid sinus laceration (common)
  - Parasagittal: tear of superior sagittal sinus
- Large EDHs are neurosurgical emergencies. ⚠
- Small (<5 mm thick) EDHs adjacent to fractures are common and do not represent a clinical emergency.
- 95% of all EDHs are associated with fractures.

Epidural hematoma

Imaging Features

Arterial EDH:

more common

- 95% are unilateral, **temporoparietal**
- Biconvex, lenticular shape
- Does not cross suture lines

respects Sutures

- May cross dural reflections (falx tentorium), in contradistinction to subdural hematoma (SDH)
- Commonly associated with skull fractures

.

Venous EDH

- More variable in shape (low-pressure bleed)
- Often requires delayed imaging because of delayed onset of bleed after trauma

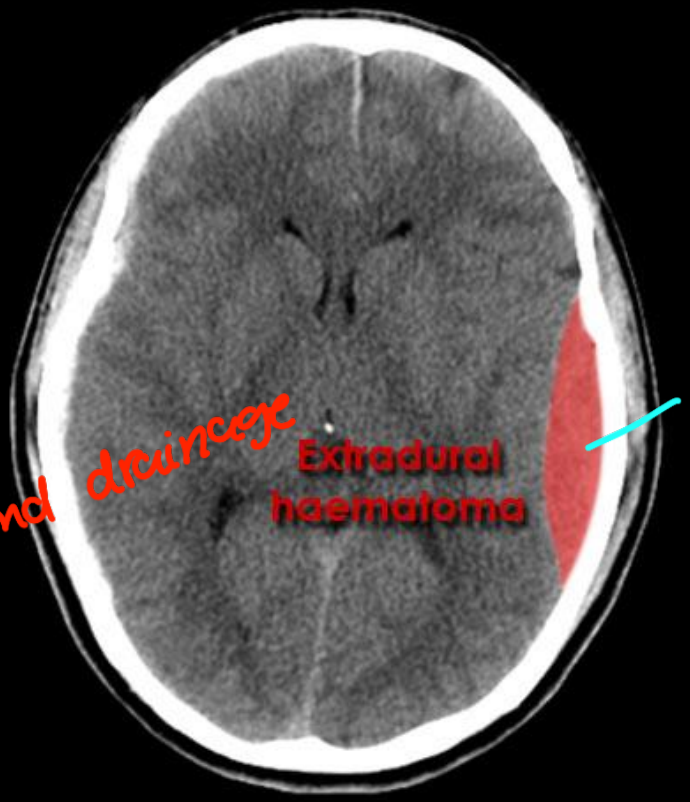
Epidural hemorrhage

Origin: Arterial (middle meningeal artery) – associated with skull fracture

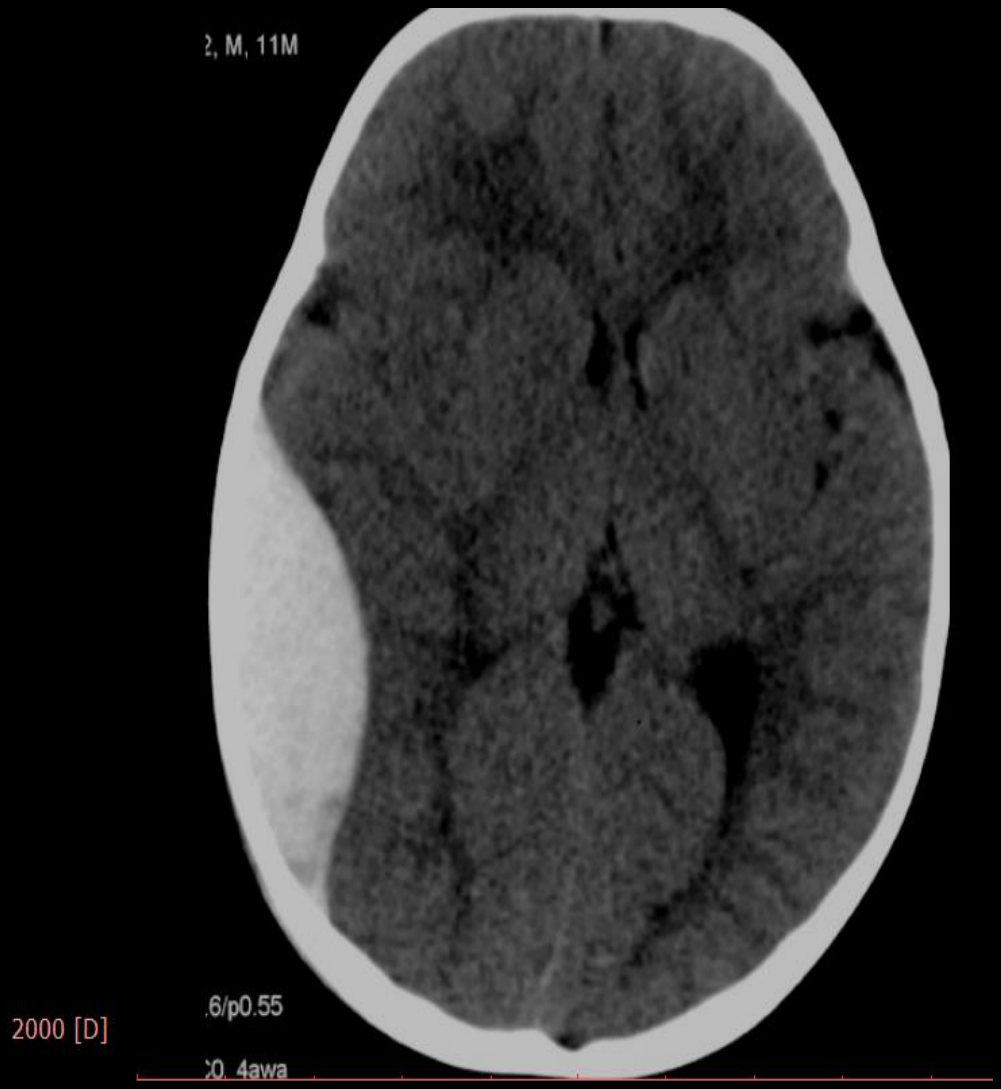
Lens in shape

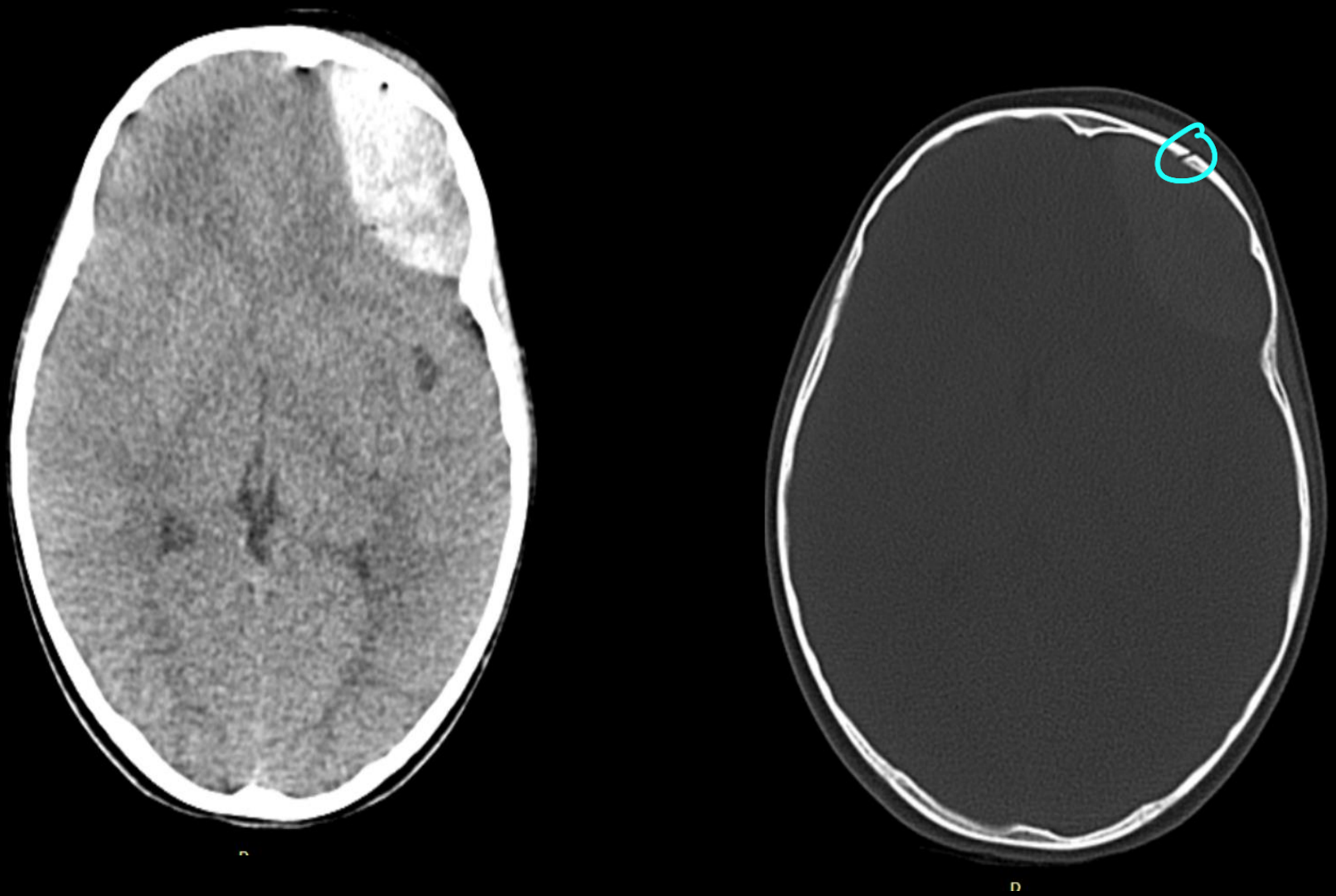
Treatment: surgical - Craniotomy

dangerouse ! risk of clotting due to the absence of CSF and drainage

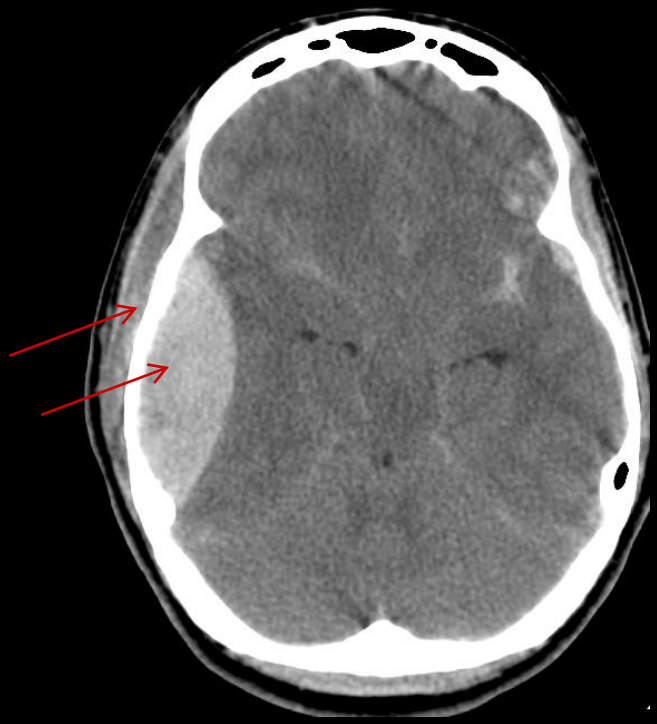


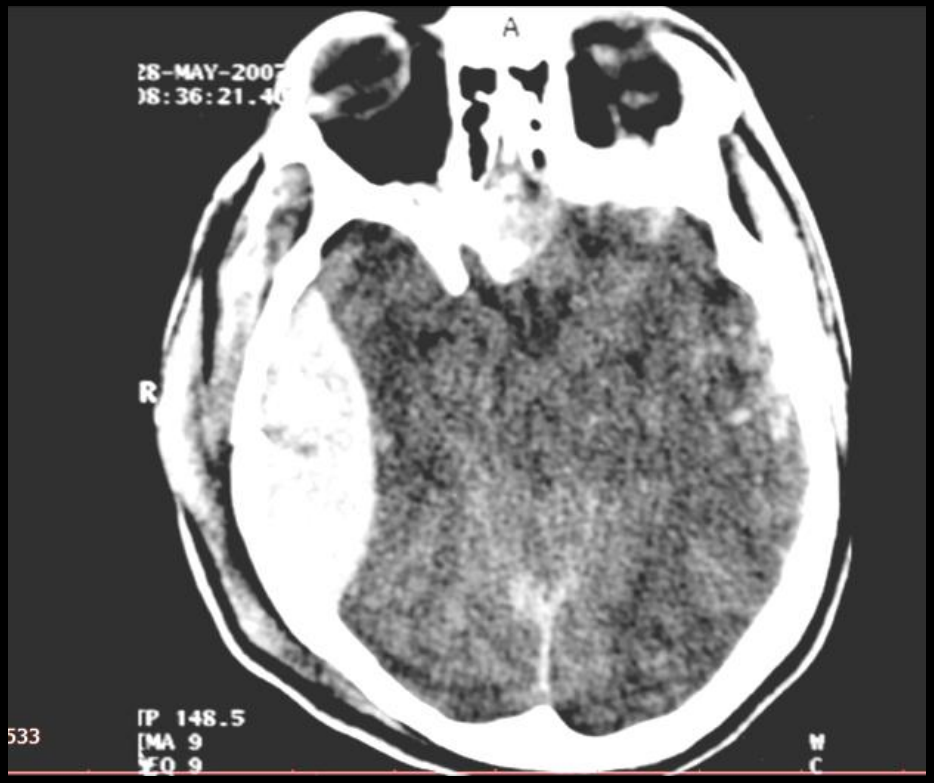
Acute epidural hemorrhage



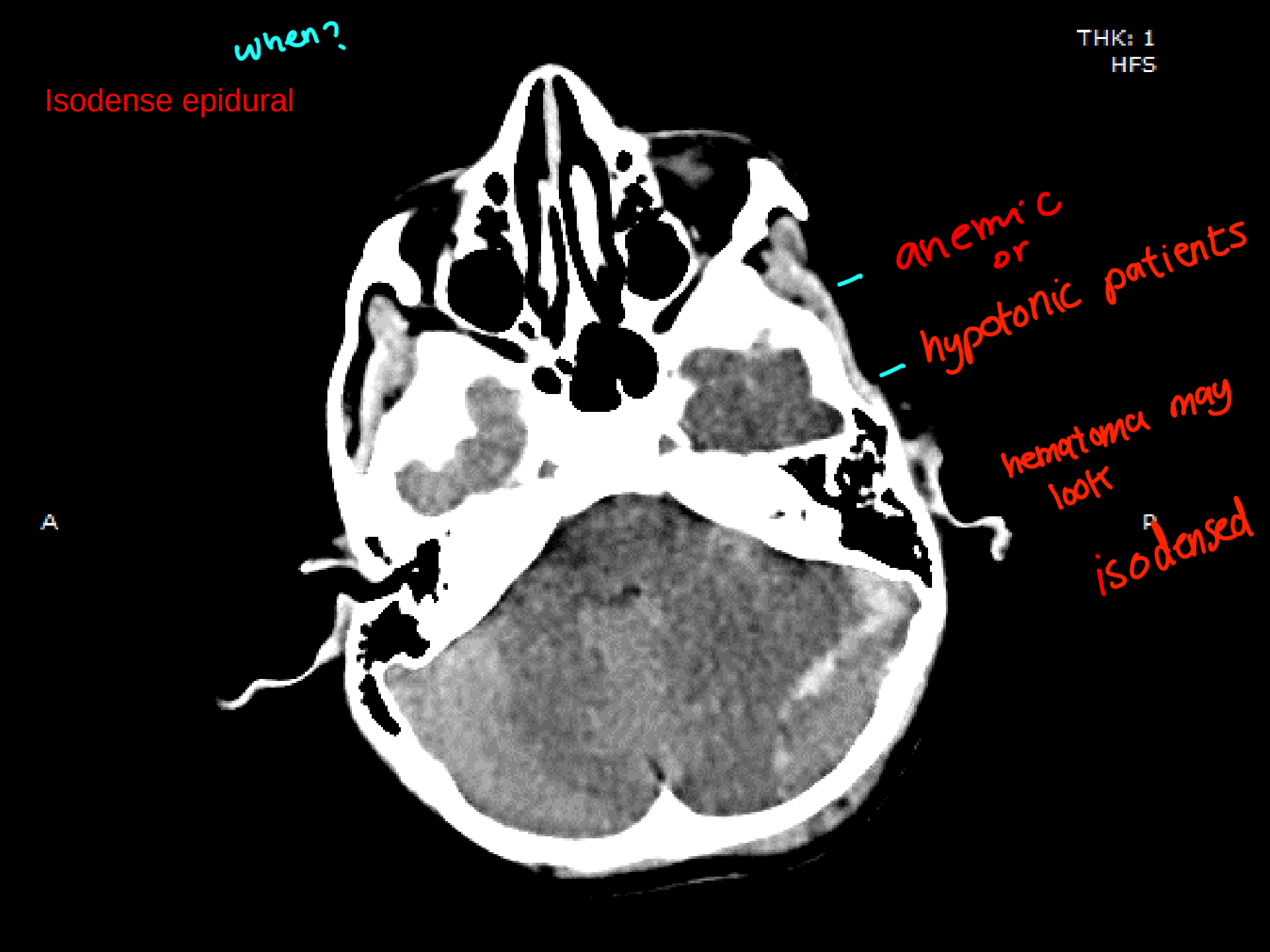


Acute epidural hemorrhage with overlying fracture

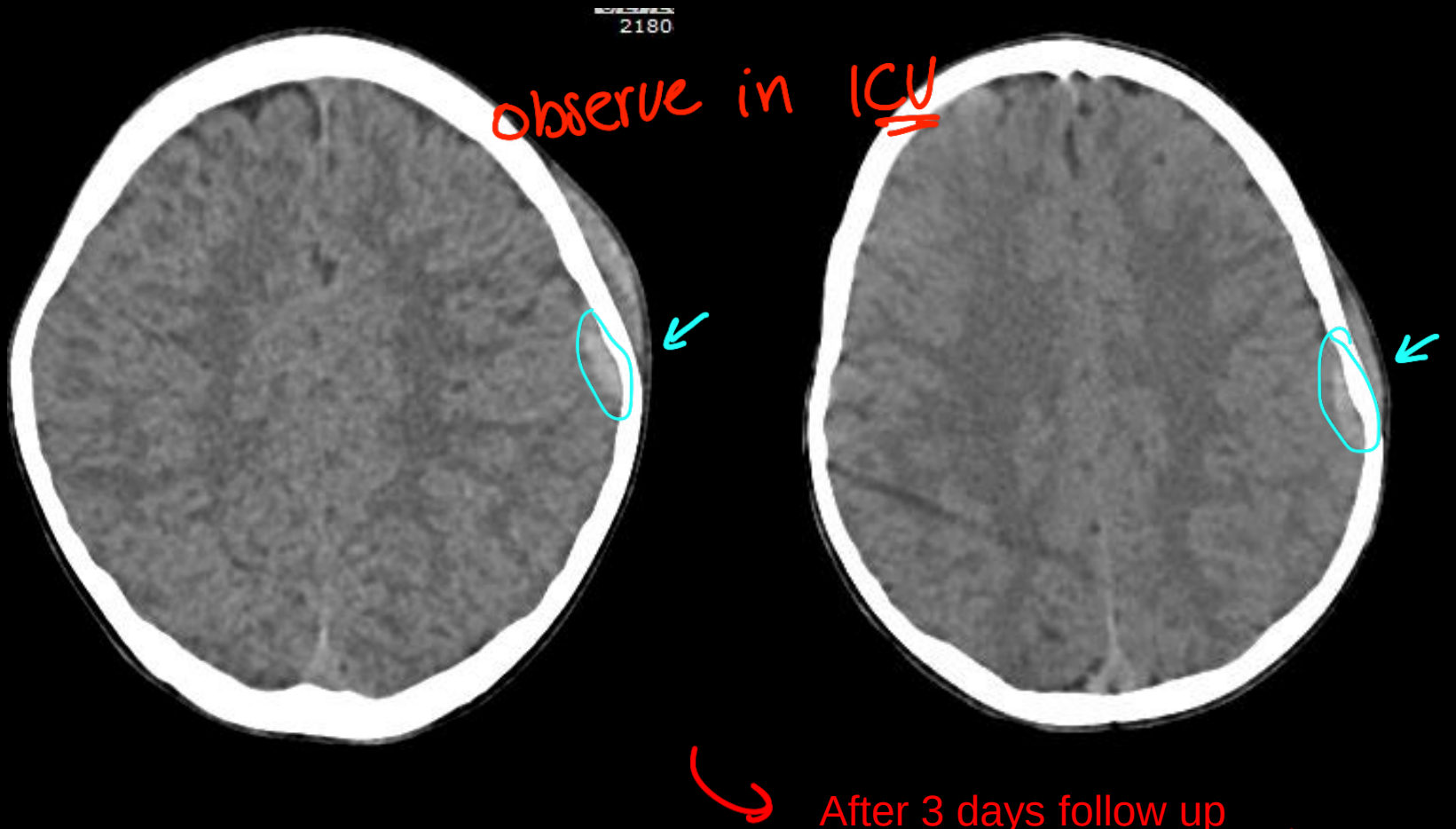




Note the soft tissue swelling adjacent to the hematoma explaining the mechanism of the injury


when?
Isodense epidural
THK: 1
HFS
anemic or hypotonic patients
hematoma may look isodensed
A
R

if small one



observe in ICU

After 3 days follow up

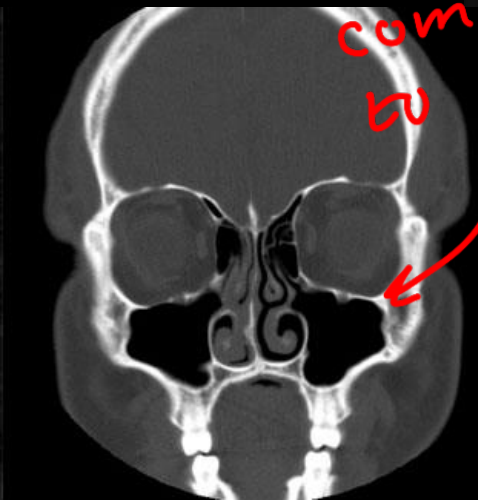
same or less
we discharge

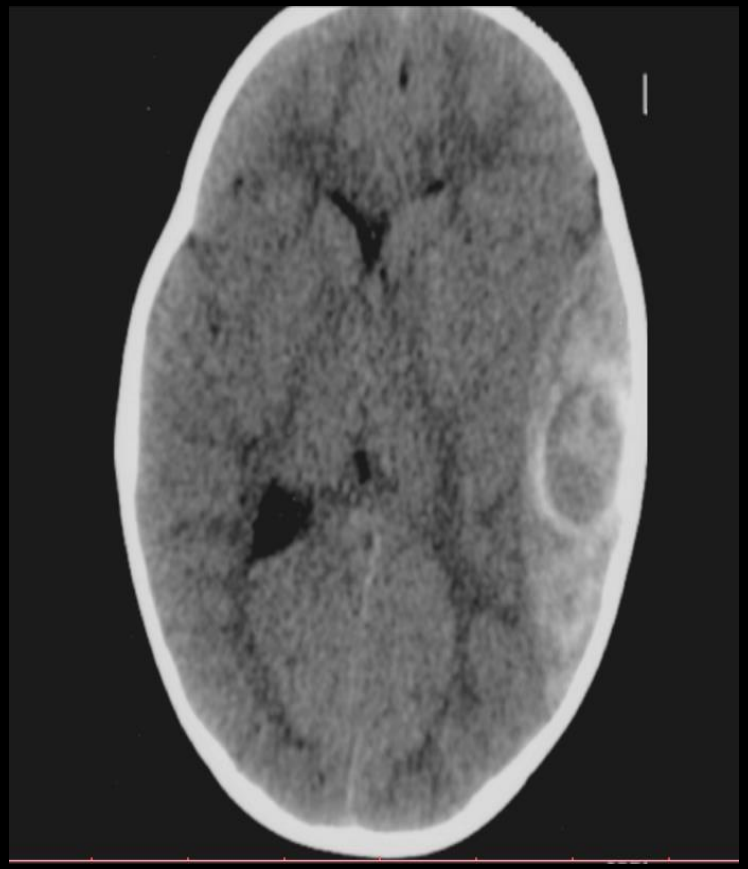
(hyperdensity with spot of hypodensity)

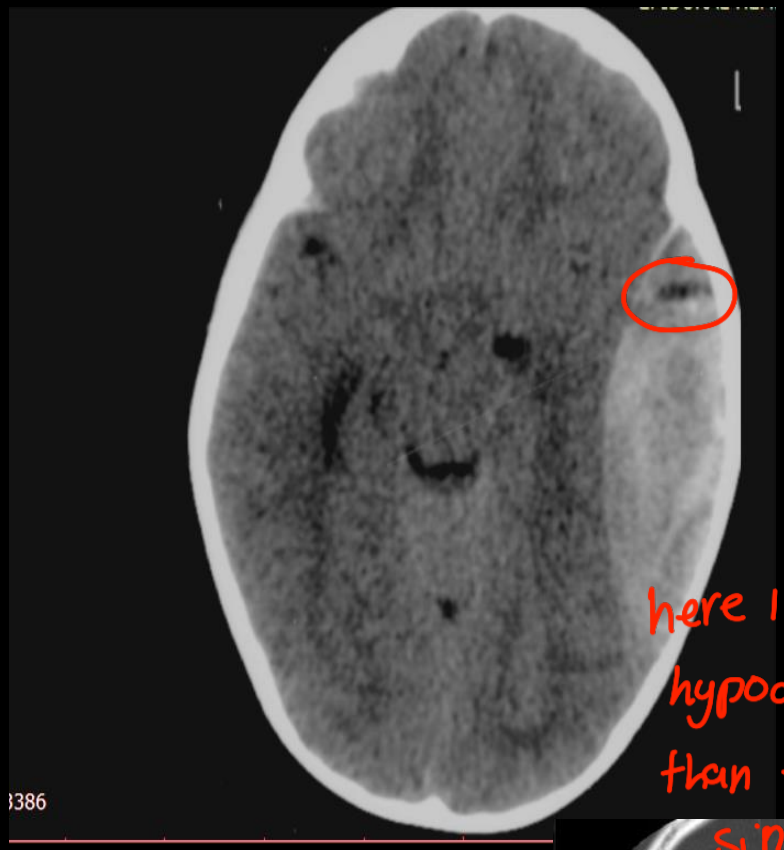
The epidural with hypodensity :

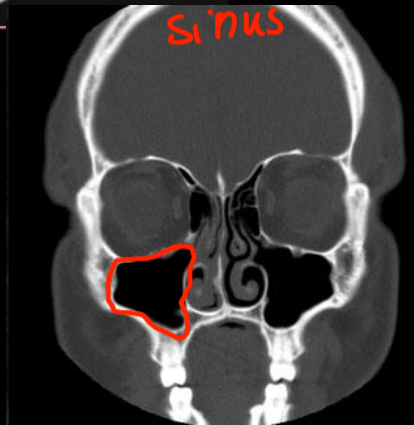
- Clotting
- Pneumocephlus
- whirl sign

Pneumocephlus

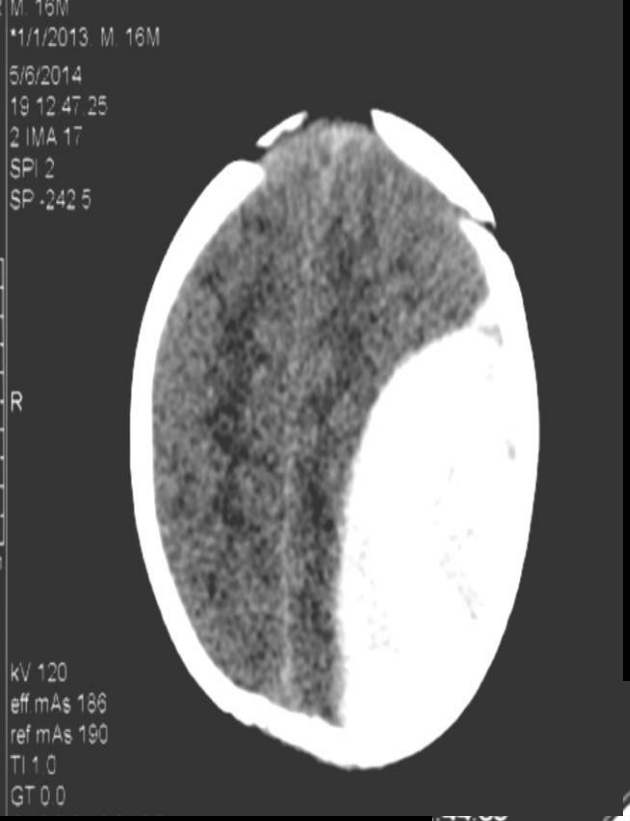




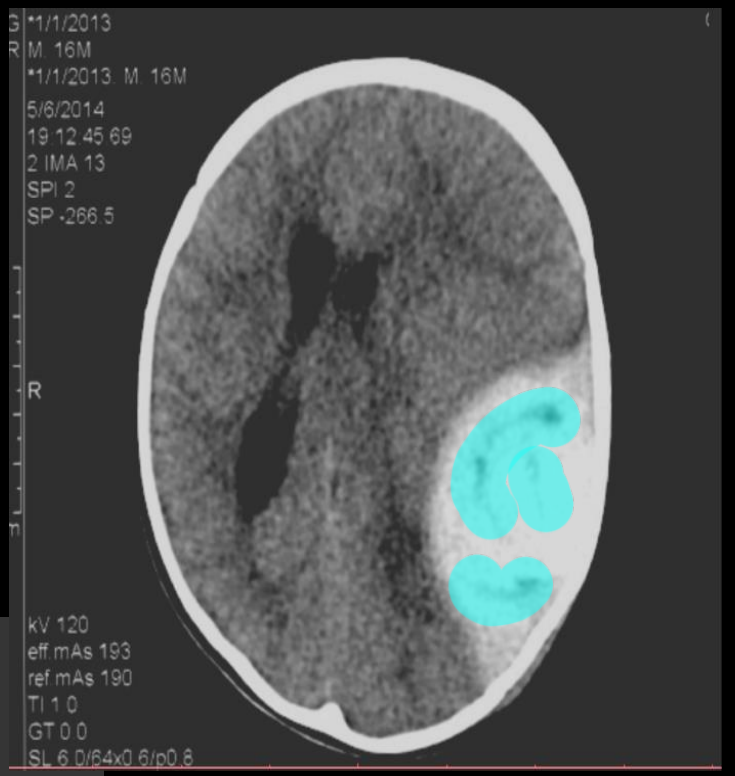


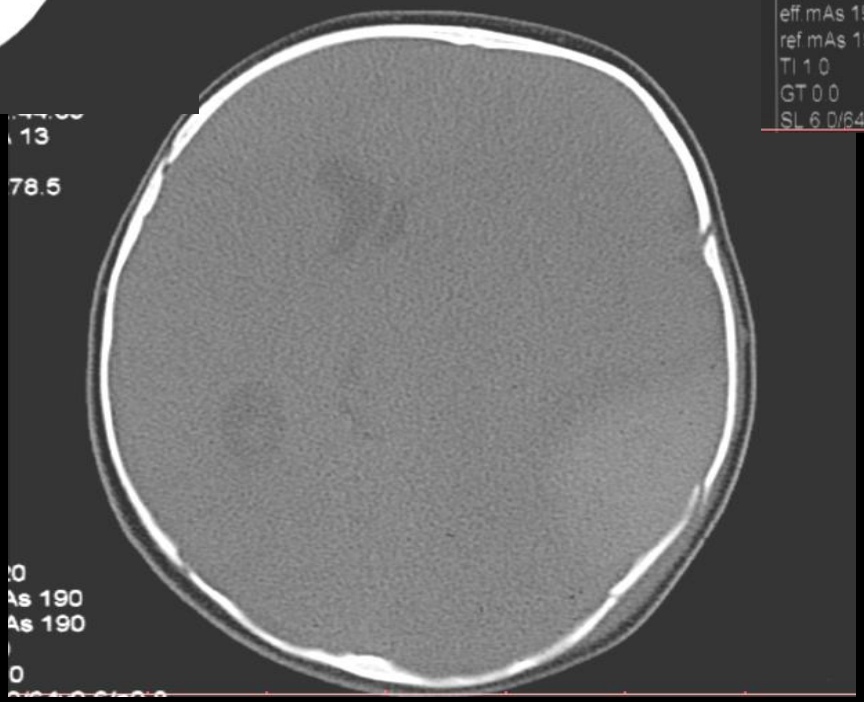


Clotting



whirl sign



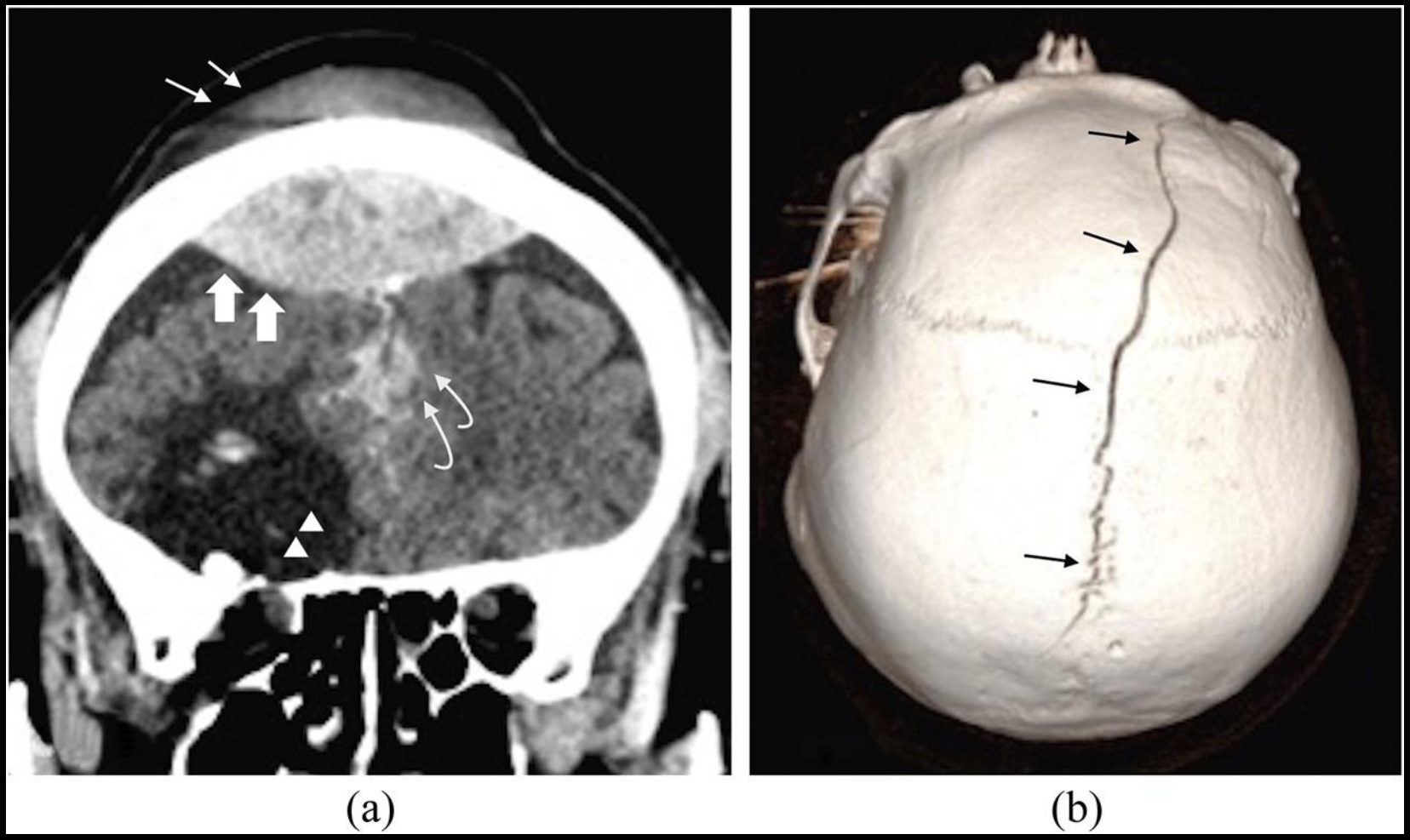


liner hypo density

⇓

Active ongoing bleeding

- or called Subacute bleeding


(a)
(b)

B-

Subdural hematoma (SDH)

MOST common cause

Mechanism: caused by traumatic tear of bridging veins (rarely arteries).

In contradistinction to EDH, of skull fractures.

Common in infants (child abuse; 80% are bilateral or interhemispheric) and elderly patients (20% are bilateral).

veins

Subdural hematoma (SDH)

Imaging Features

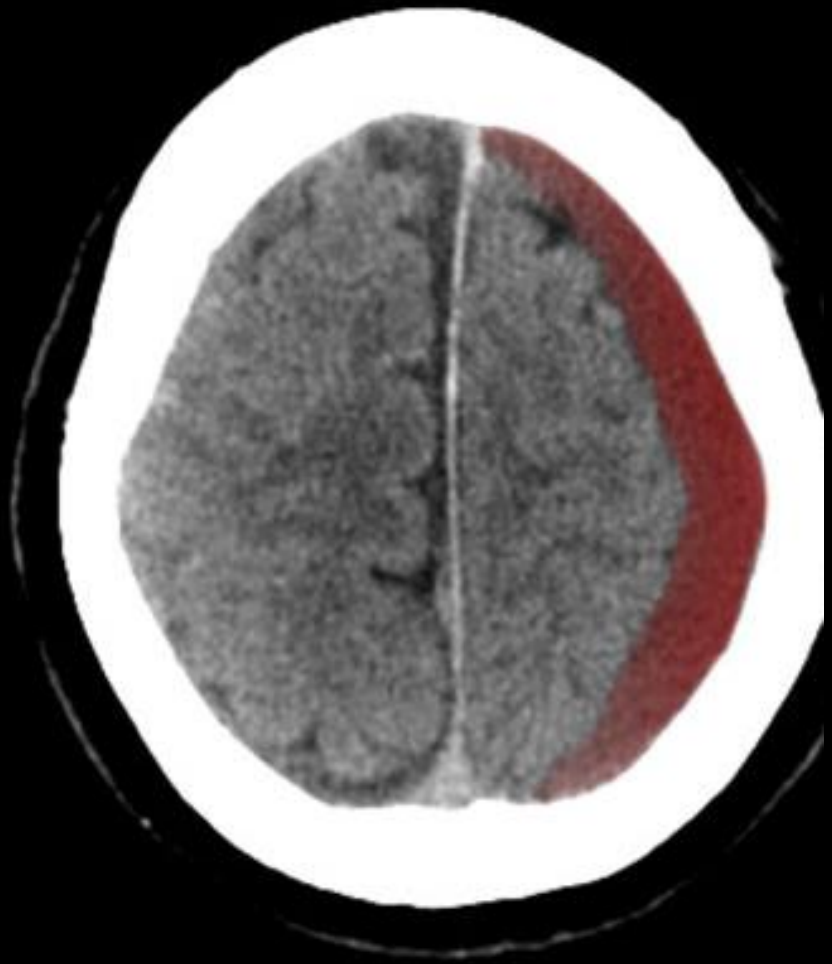
- 95% supratentorial (in cerebeli)
- Crescentic shape along brain surface
- Crosses suture lines
- Does not cross dural reflections (falx, tentorium) respect falxs
  - we see widening anel whitening of falx !!
- MRI > CT particularly for:
  - Bilateral hematomas
  - Interhemispheric hematomas
  - Hematomas along tentorium
  - Subacute SDH

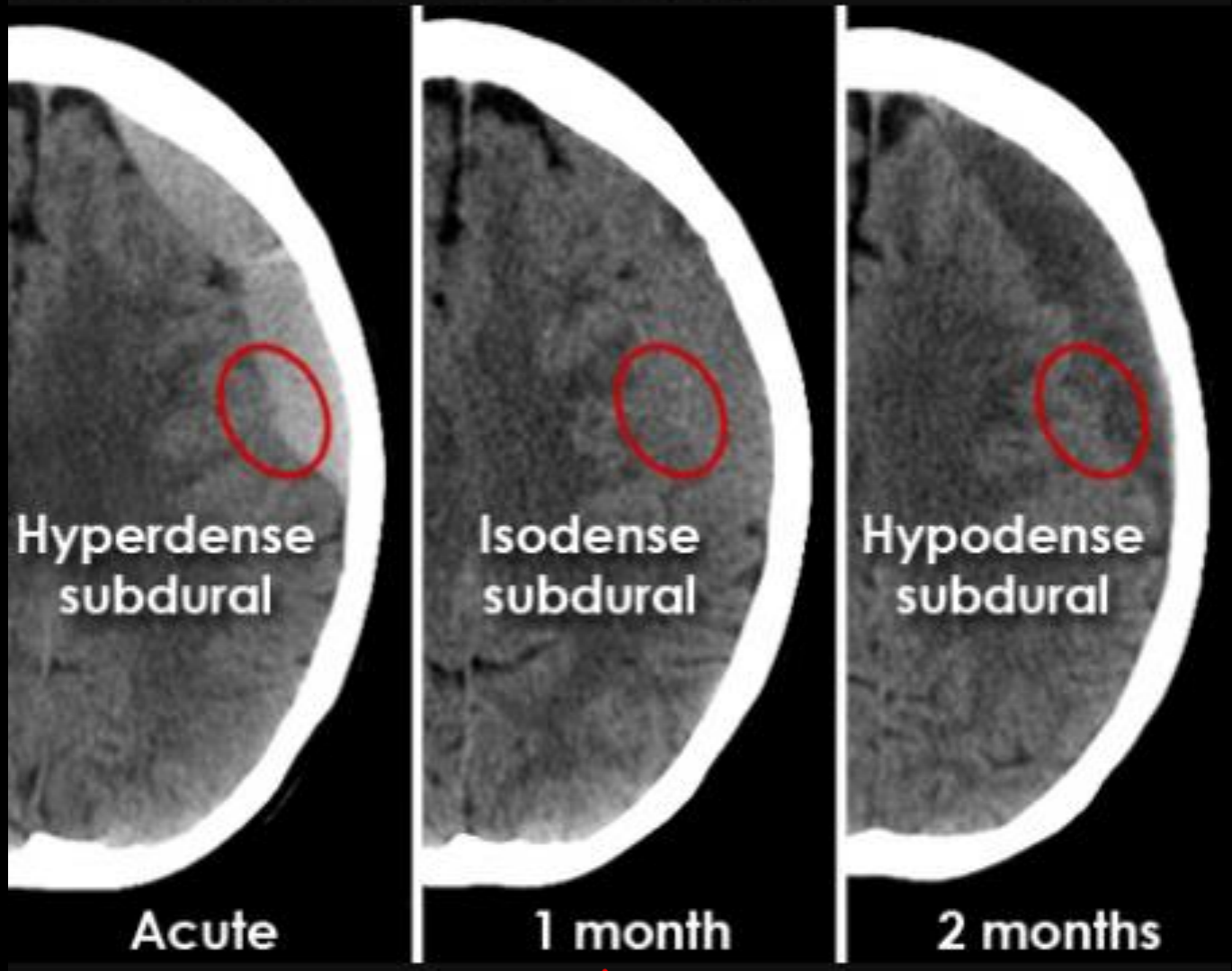
Subdural hemorrhage

Origin: Venous

Treatment: Burr hole , Surgical

Cresent (semilunar) in shape




Hyperdense subdural
Isodense subdural
Hypodense subdural
Acute
1 month
2 months
Subacute
Chronic

Stages of Subdural hemorrhage

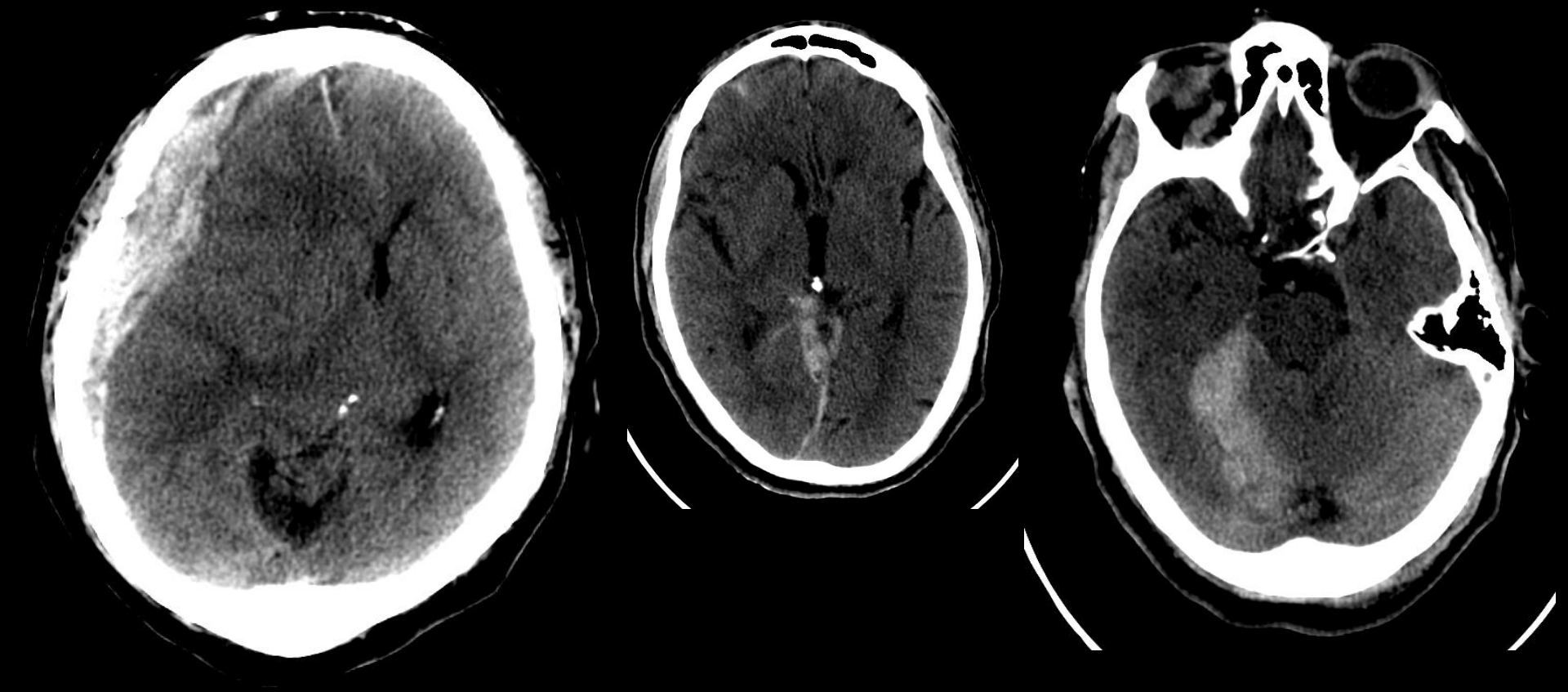
(time)

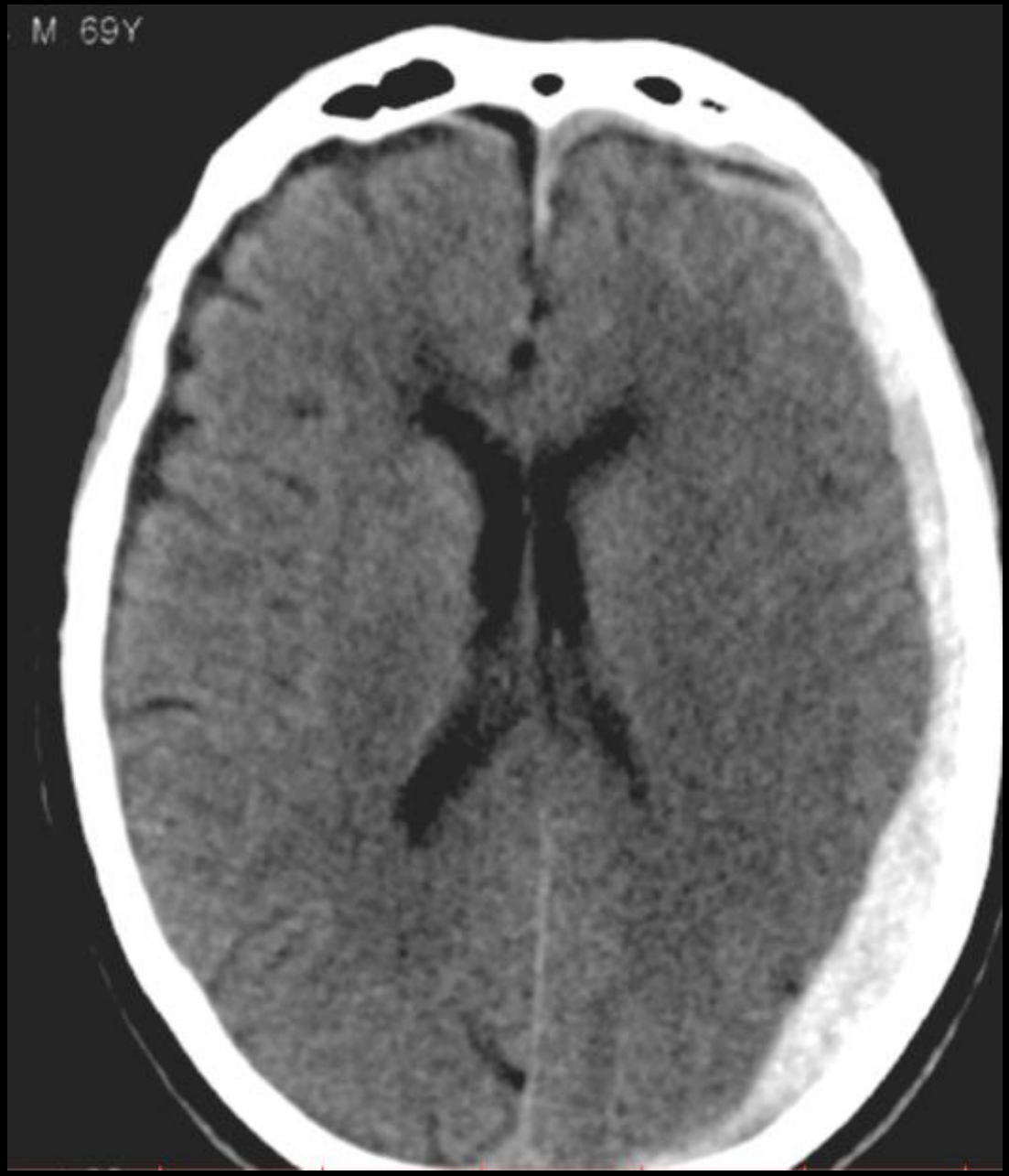
Stage of hemorrhage	Appearance	Blood product
		↓ degredation of blood
Acute (days)	Hyperdense	Oxyhemoglobin Deoxyhemoglobin
Subacute (Weeks)	Isodense	Methemoglobin (Intracellular and extracellular)
Chronic (months)	Hypodense	Ferritin Hemosiderin

methemoglobin inside intact blood vessel is called Intracellular methemoglobin

methemoglobin leaks out ruptured blood vessels is called extracellular methemoglobin

Acute Subdural Hematoma



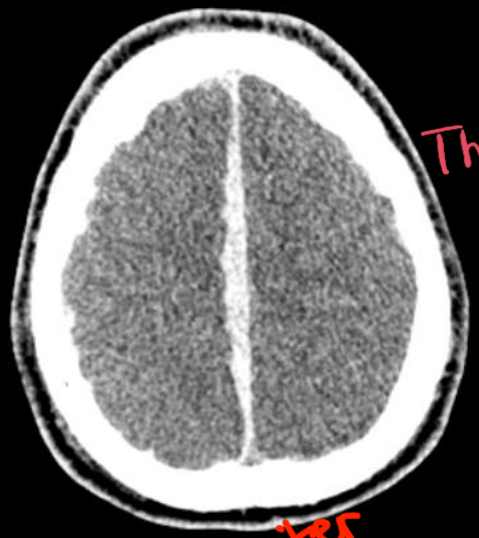

M 69Y

Subdural: The hemorrhage respects the falxs

↓

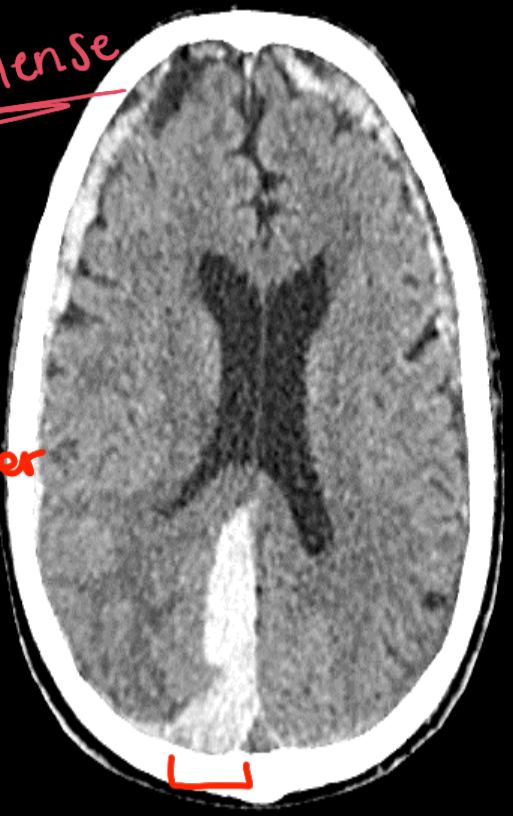
So

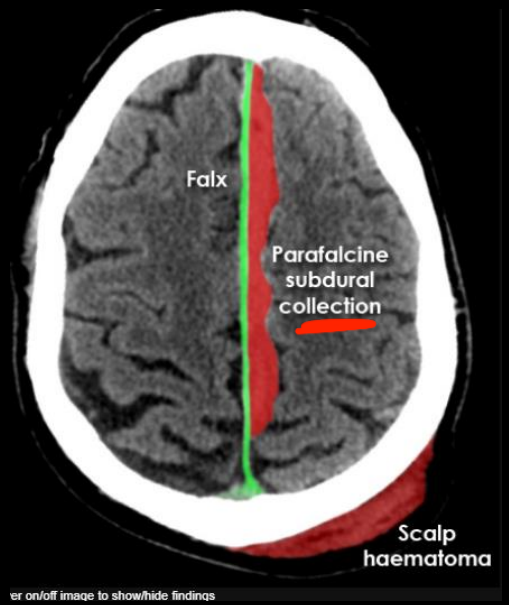
The falx becomes hyperdense and Thick



whiter

wider

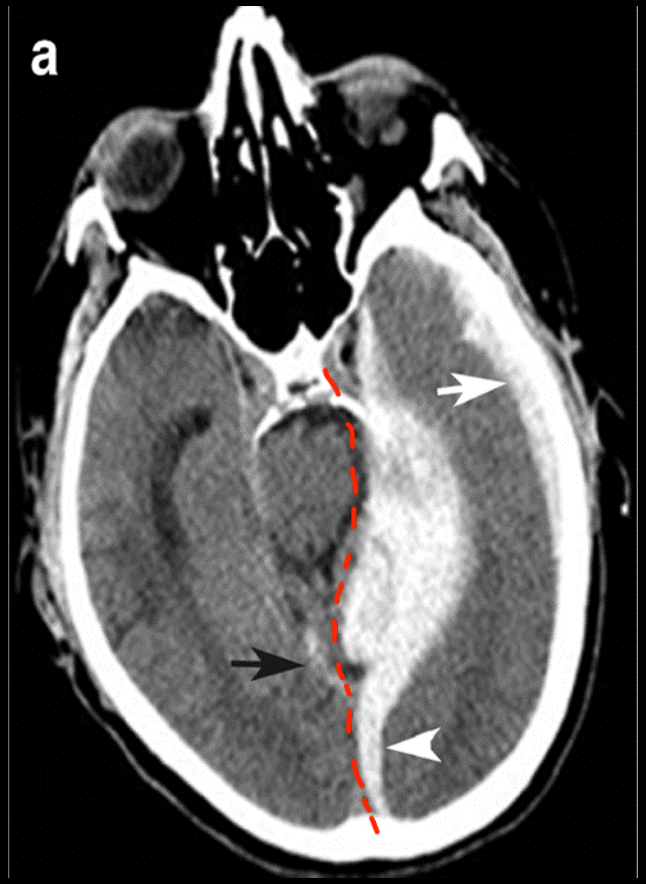




er on/off image to show/hide findings

Compressed 11:1
IM: 63 SE: 2

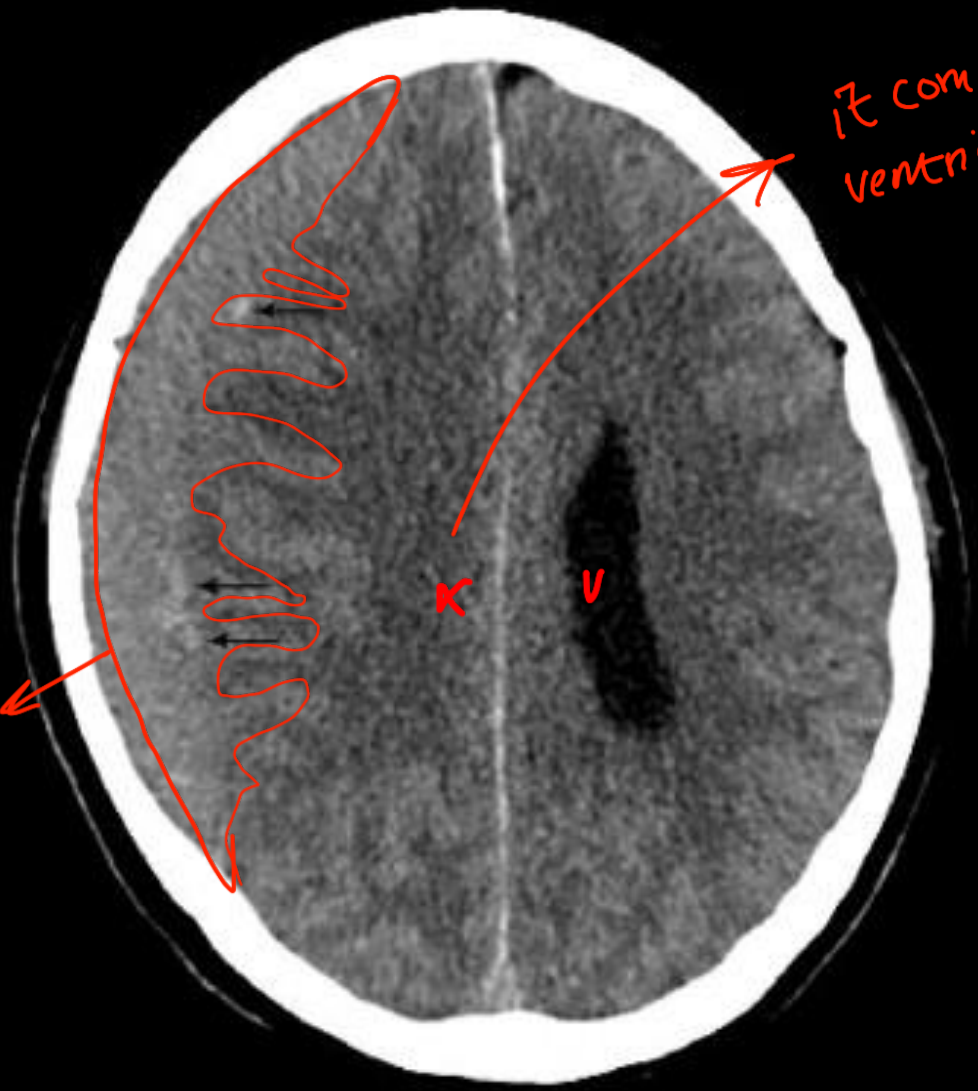
cm

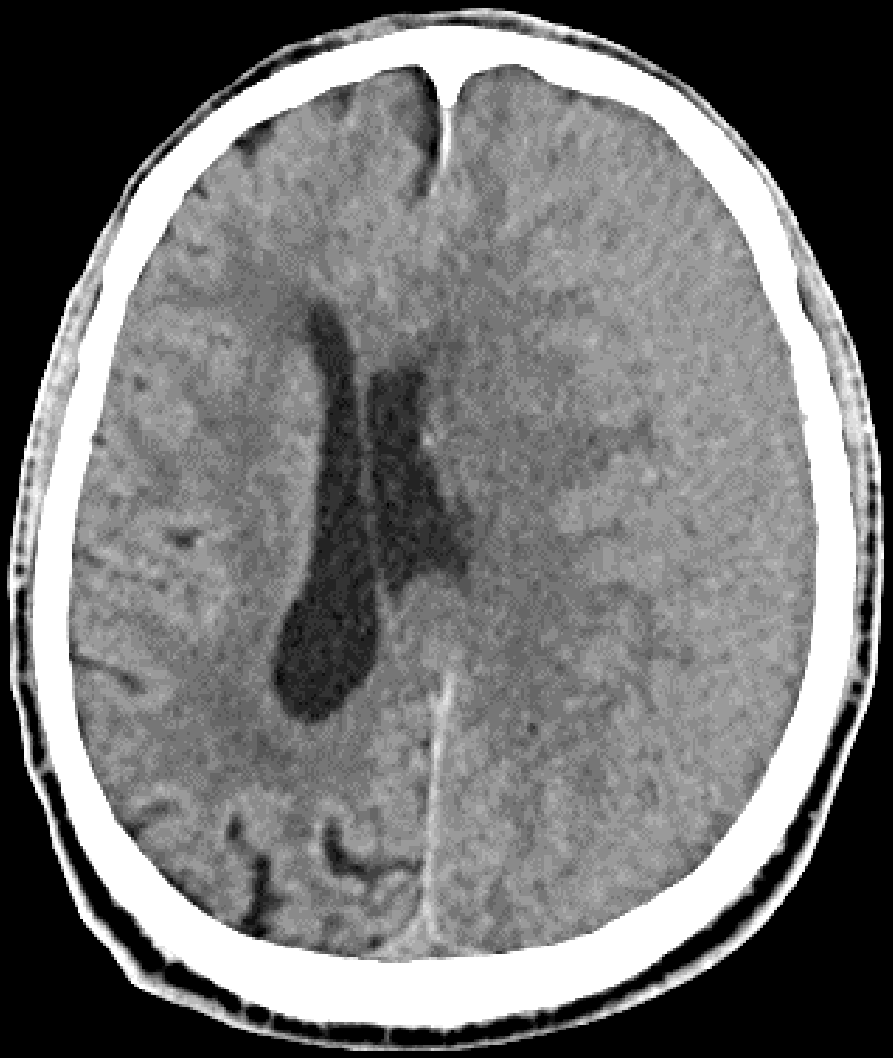


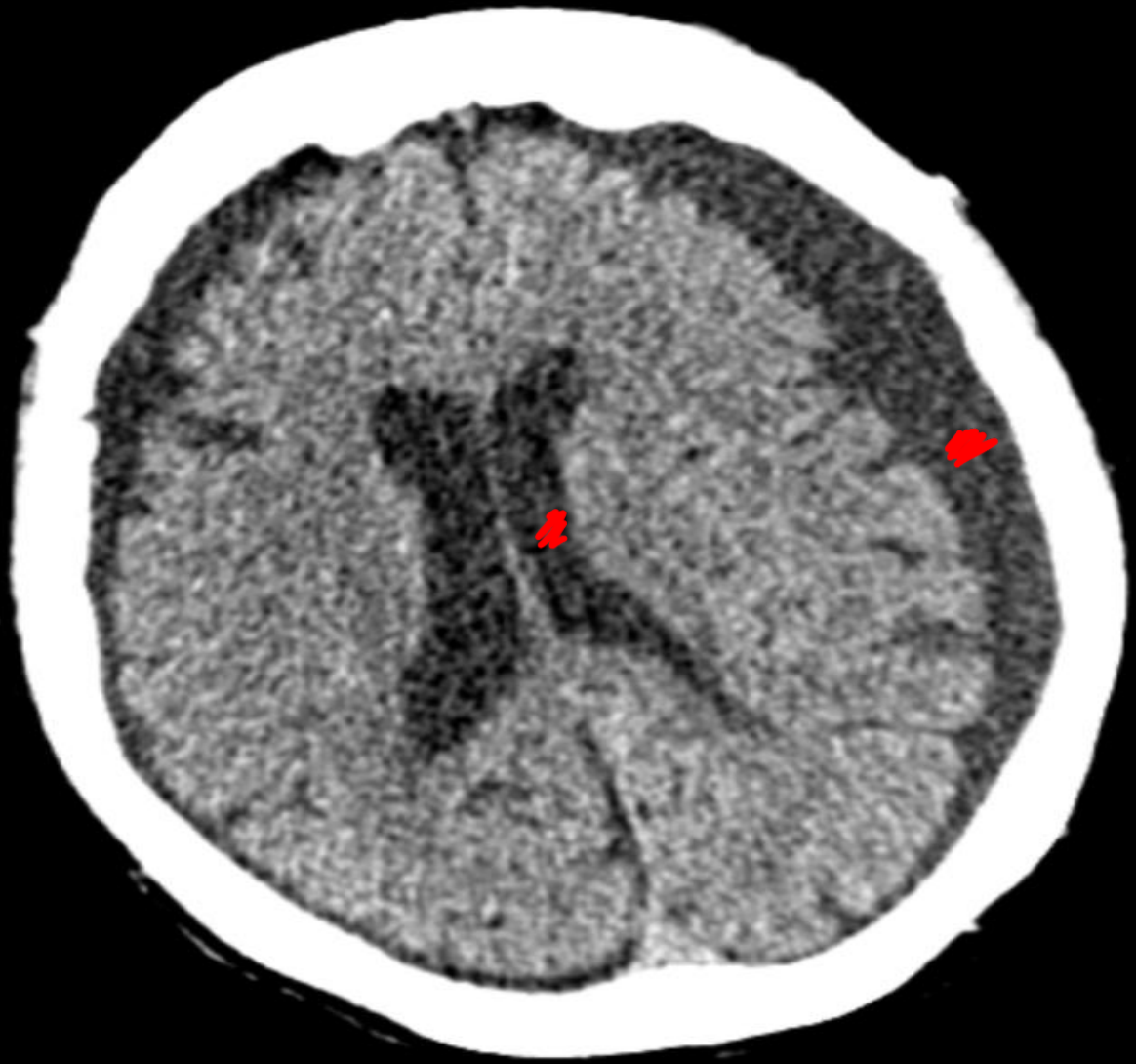
respecting falx

+ also respects tentorium

Subacute Subdural Hemorrhage

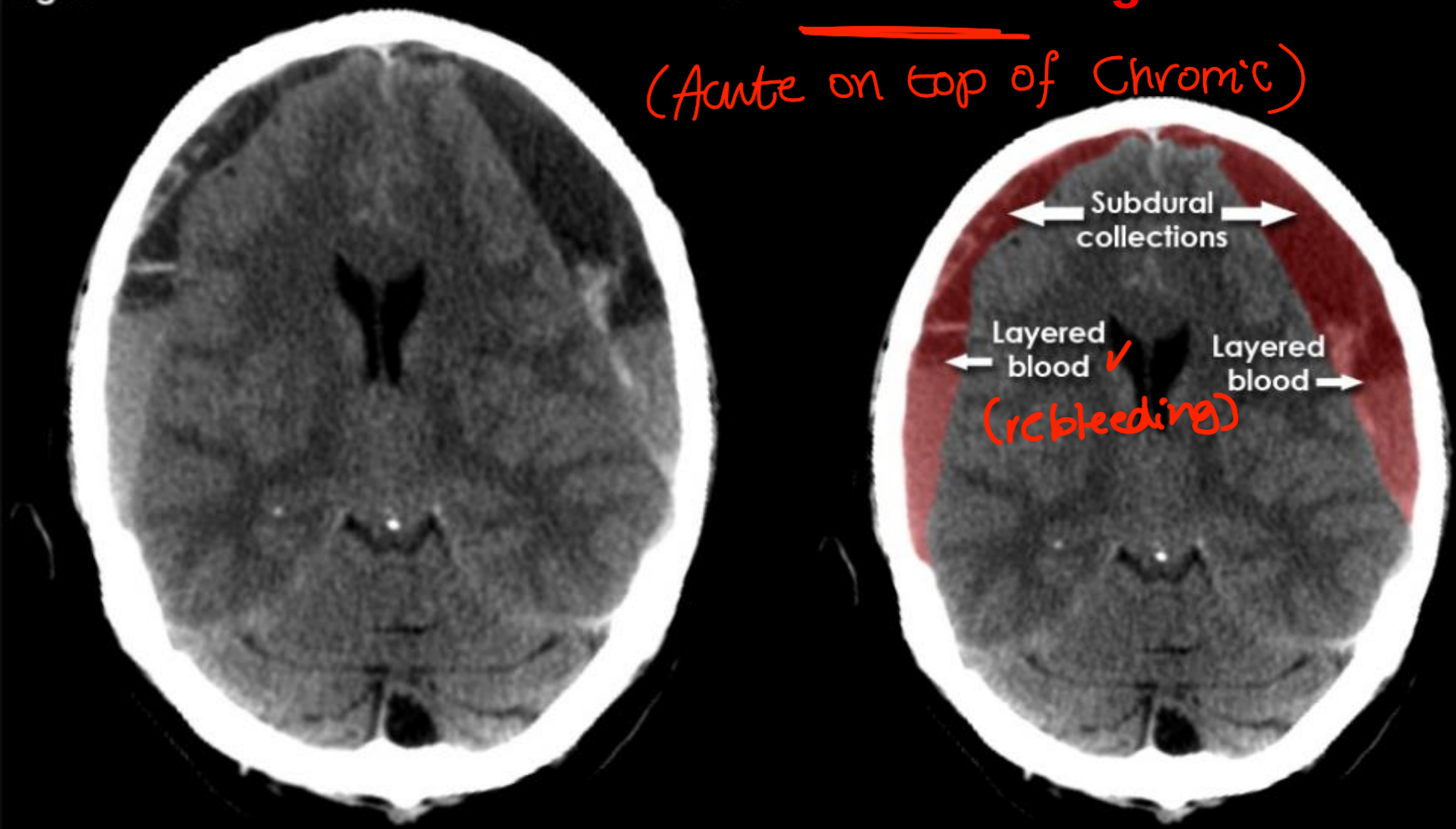



midline
shift

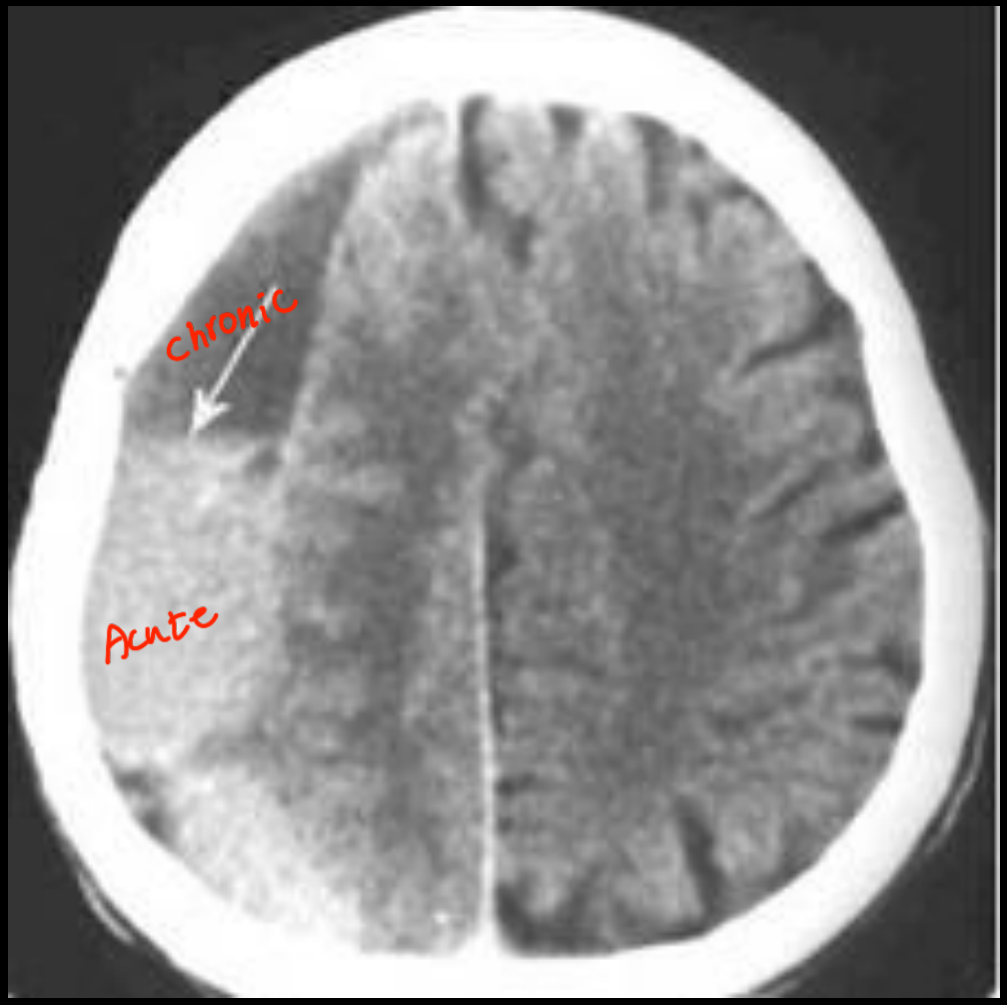


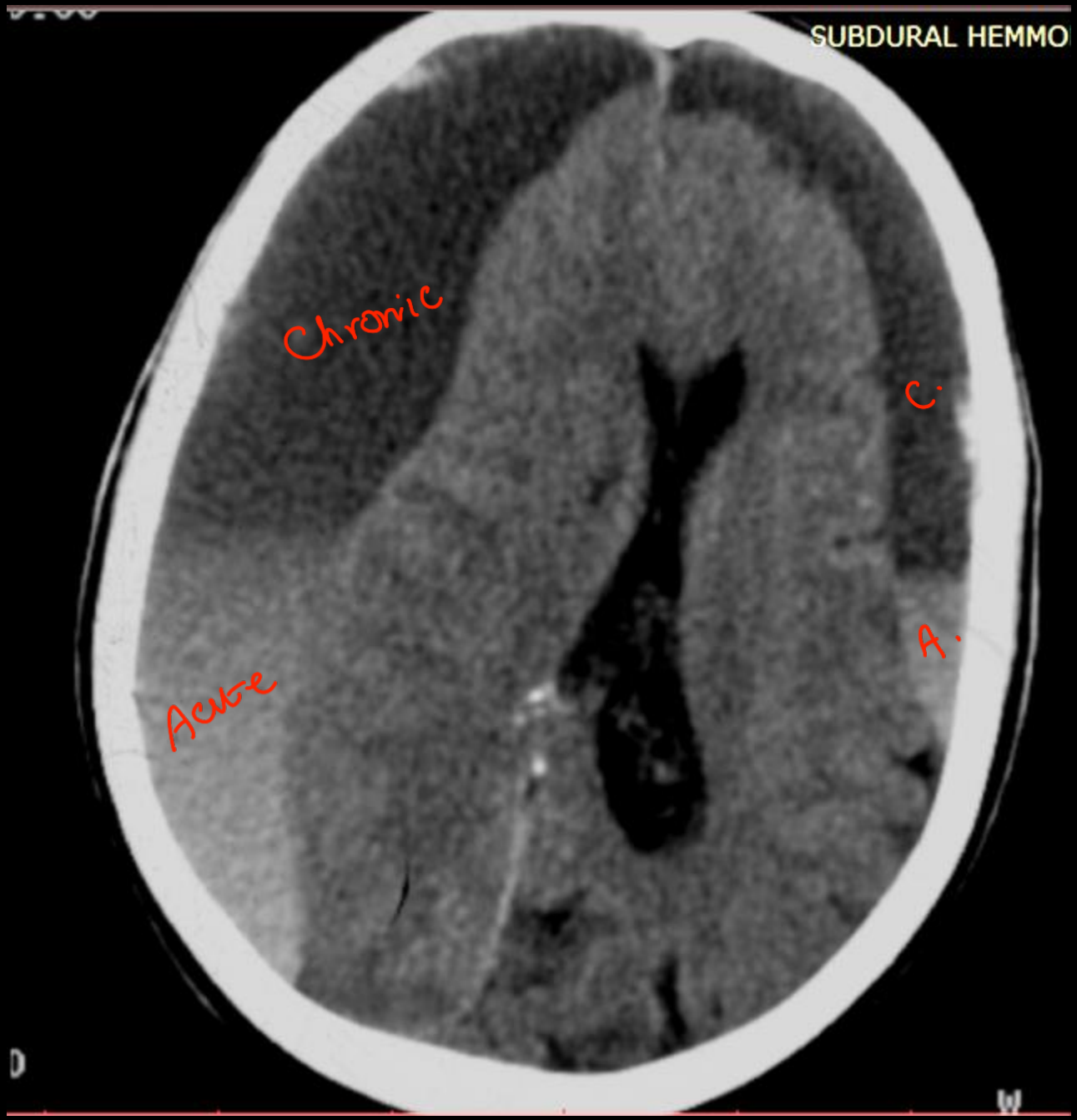
Chronic SDH with rebleeding

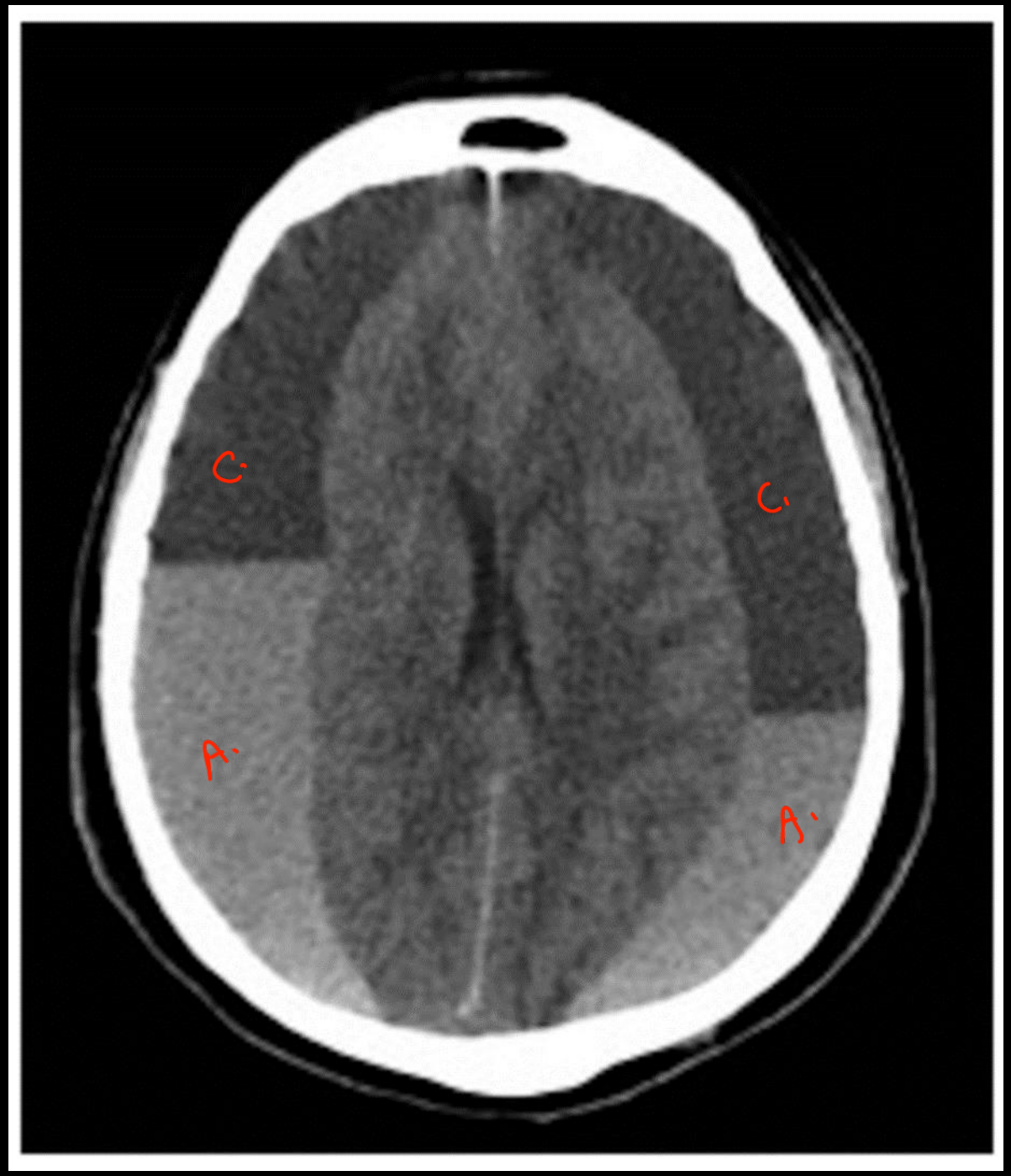
(Acute on top of Chronic)



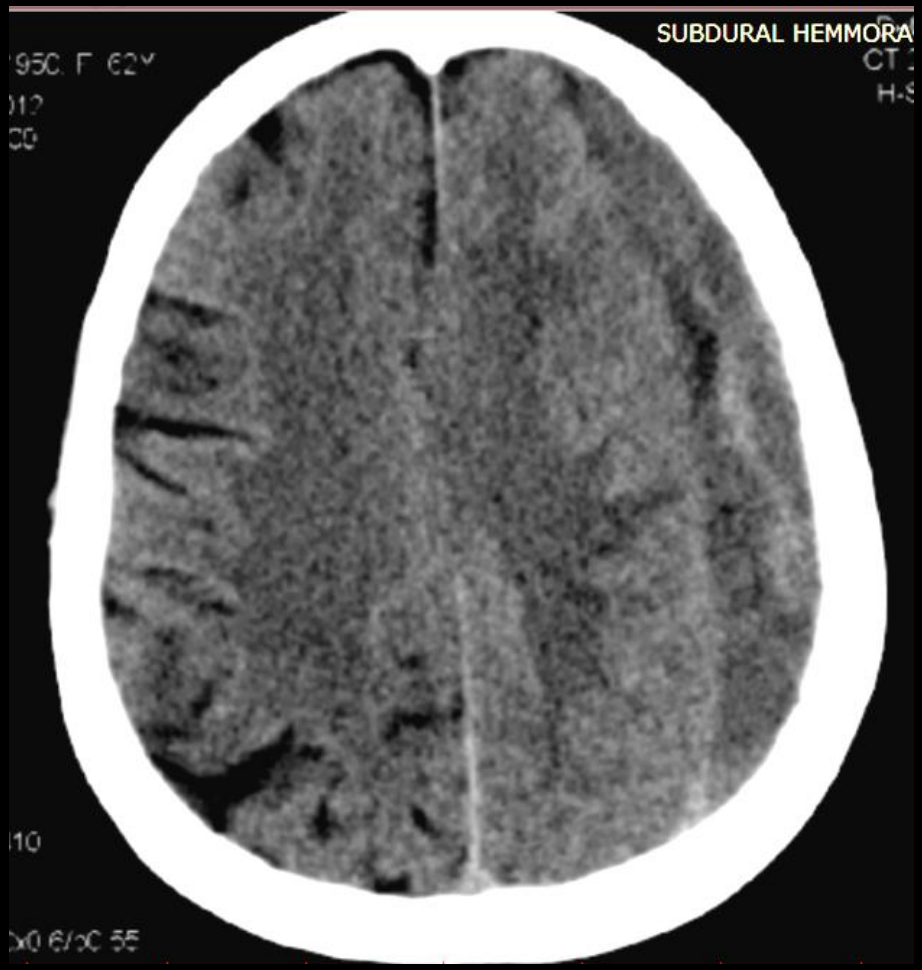
Acute on top of chronic Subdural Hemorrhage



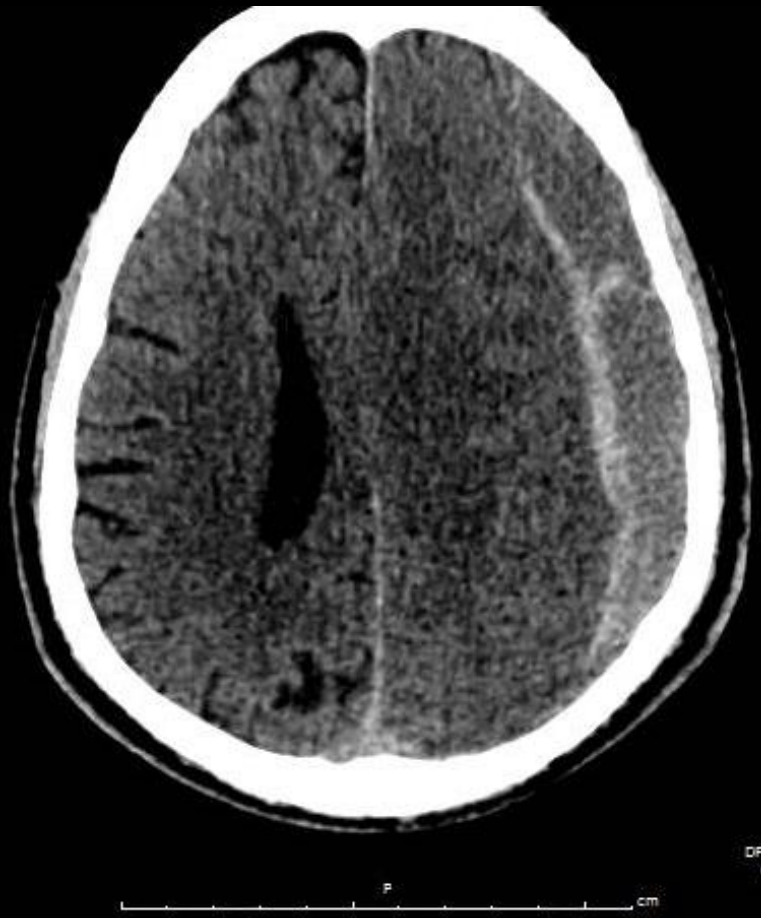

SUBDURAL HEMMO
Chronic
C.
A.
Acute
D


C.
C.
A.
A.

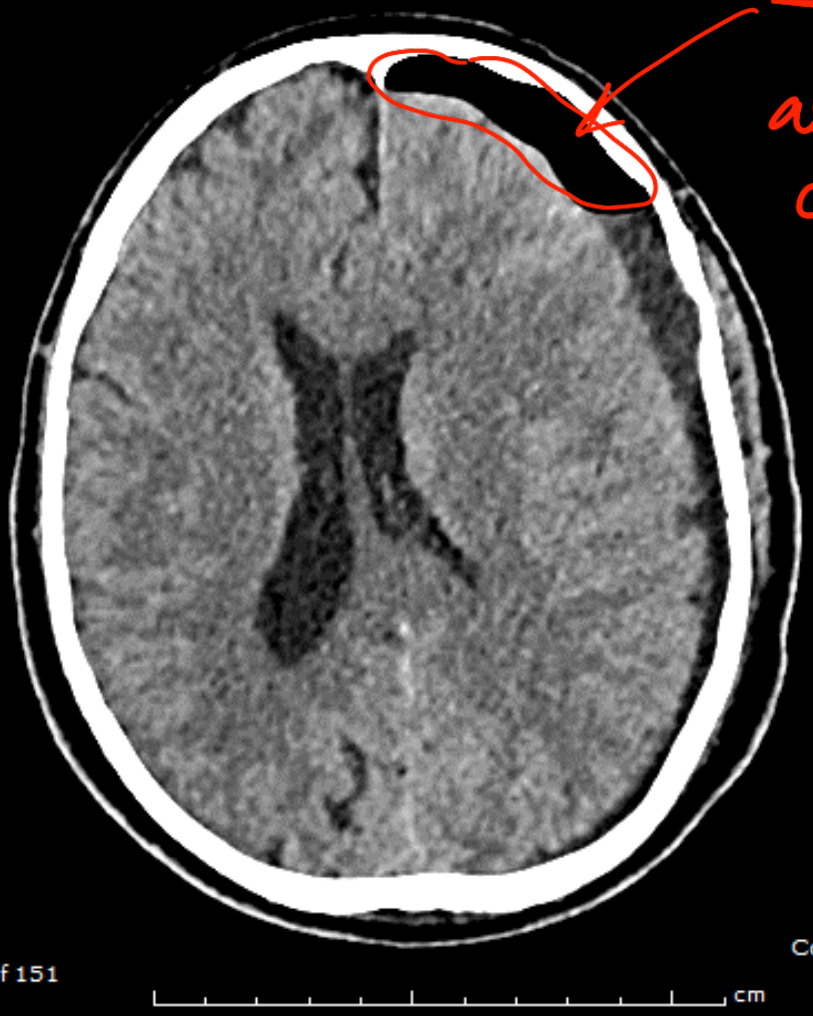
Hyperacute component

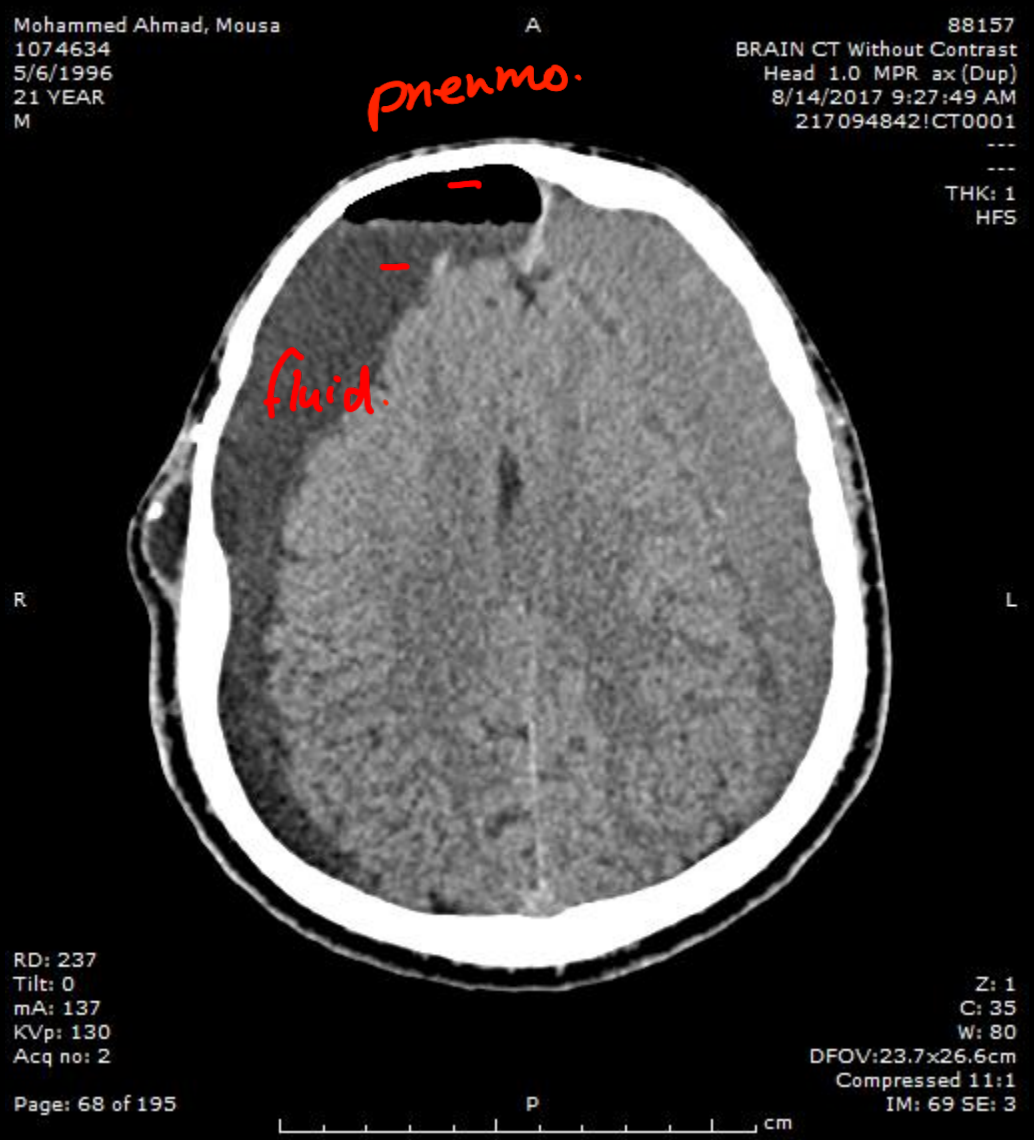


The less dense blood (grey) is not due to a chronic haematoma, it is hyperacute blood which has not yet had time to clot


LOC: -29.10
THK: 1
HFS
L
C: 57
W: 80
DFOV:22.4x22.4cm
Compressed 11:1
IM: 114 SE: 4
P
cm

Subdural hematoma with pnemocephlus




Mohammed Ahmad, Mousa
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21 YEAR
M
A
88157
BRAIN CT Without Contrast
Head 1.0 MPR ax (Dup)
8/14/2017 9:27:49 AM
217094842!CT0001

THK: 1
HFS
pneumo.
fluid.
R
L
RD: 237
Tilt: 0
mA: 137
KVp: 130
Acq no: 2
Page: 68 of 195
P
cm
Z: 1
C: 35
W: 80
DFOV:23.7x26.6cm
Compressed 11:1
IM: 69 SE: 3

C.

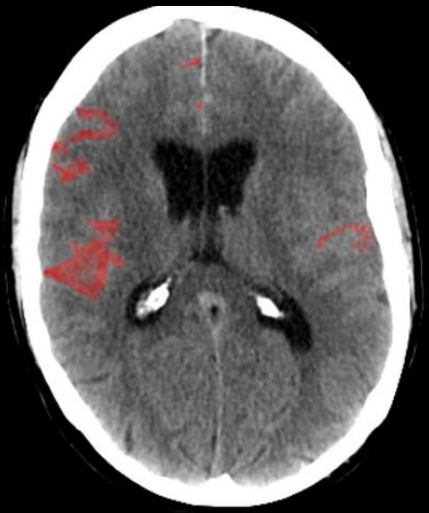
Subarachnoid hemorrhage

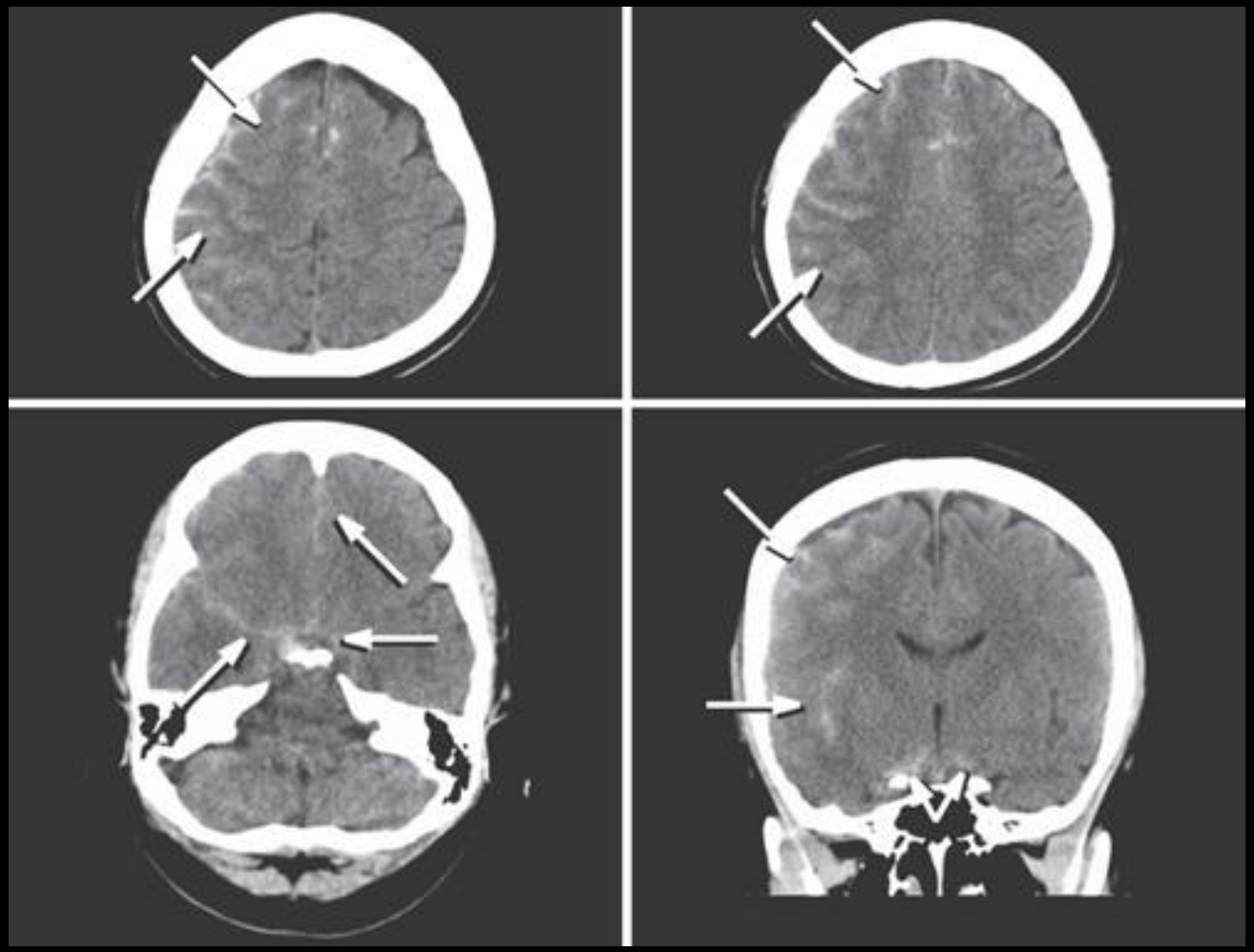
Mechanism:results from injury to small subarachnoid vessels or extension of intraparenchymal hemorrhage beyond the pial limiting membrane and into the subarachnoid space.

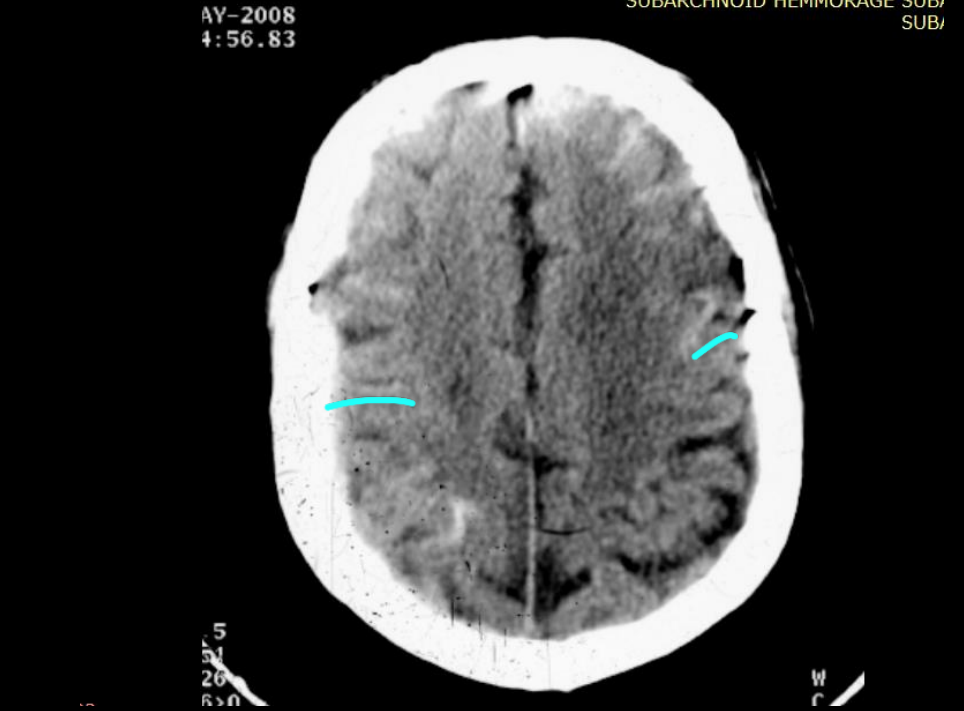
Most common cause is ruptured anenrysme

CT: SAH appears as areas of high-density conforming to the shape of the cerebral sulci and basal cisterns.

- Subarachnoid Hemorrhage : post trauma or ruptured aneurysm



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SUBARCHNOID HEMMORAGE SUB
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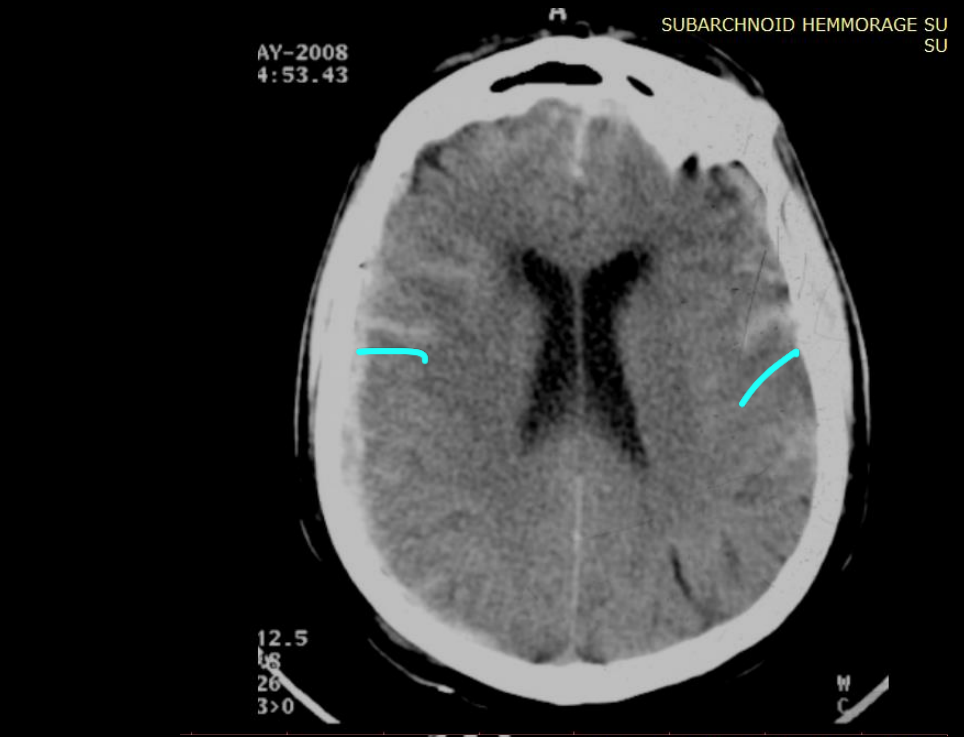
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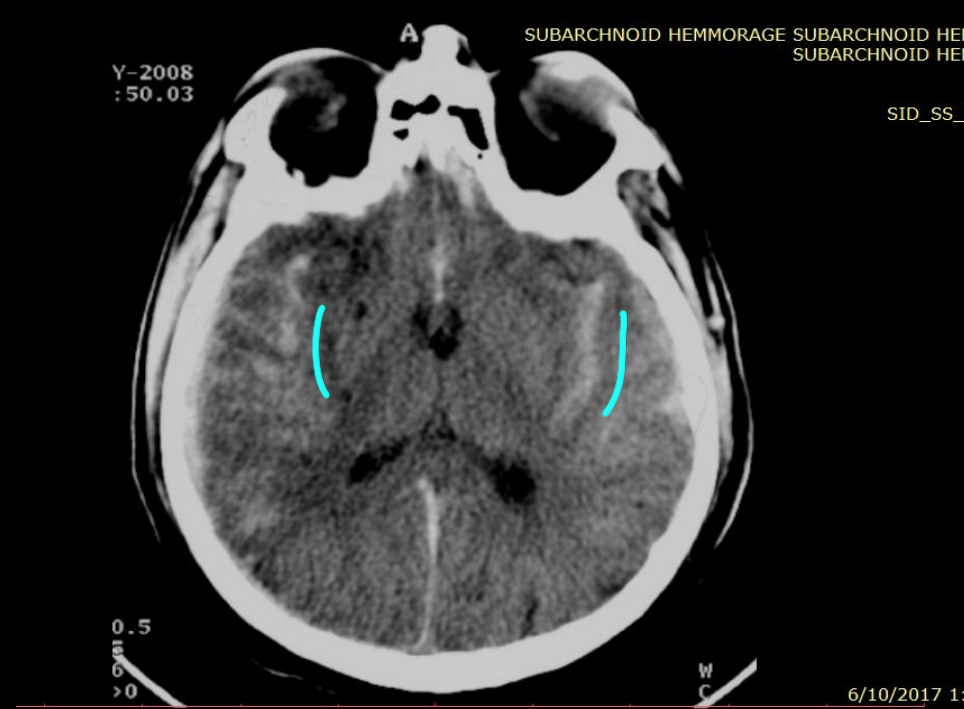
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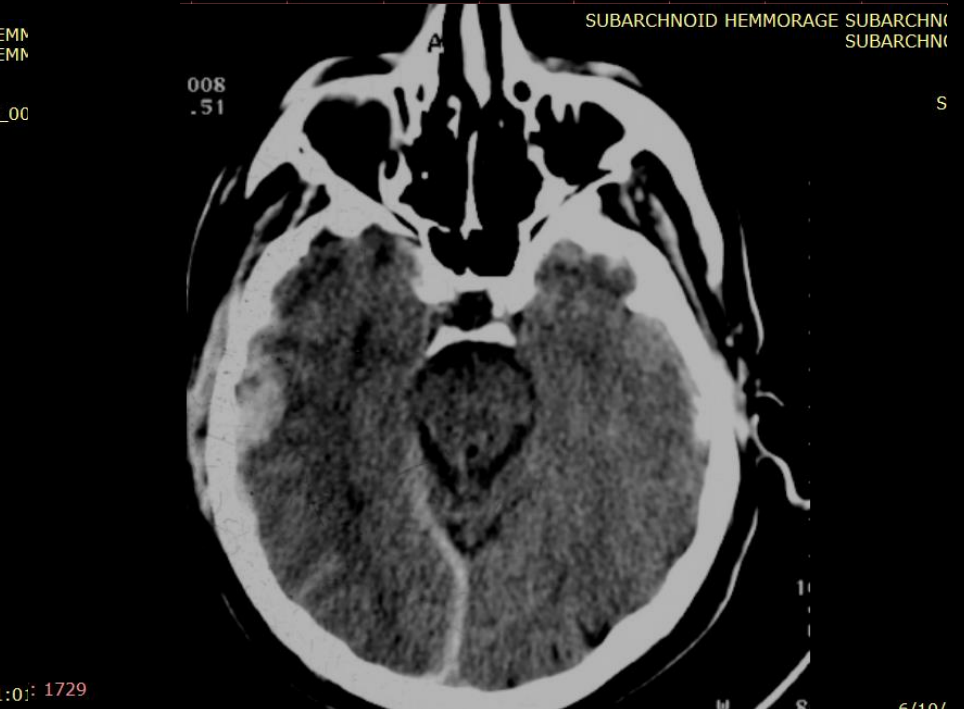
008
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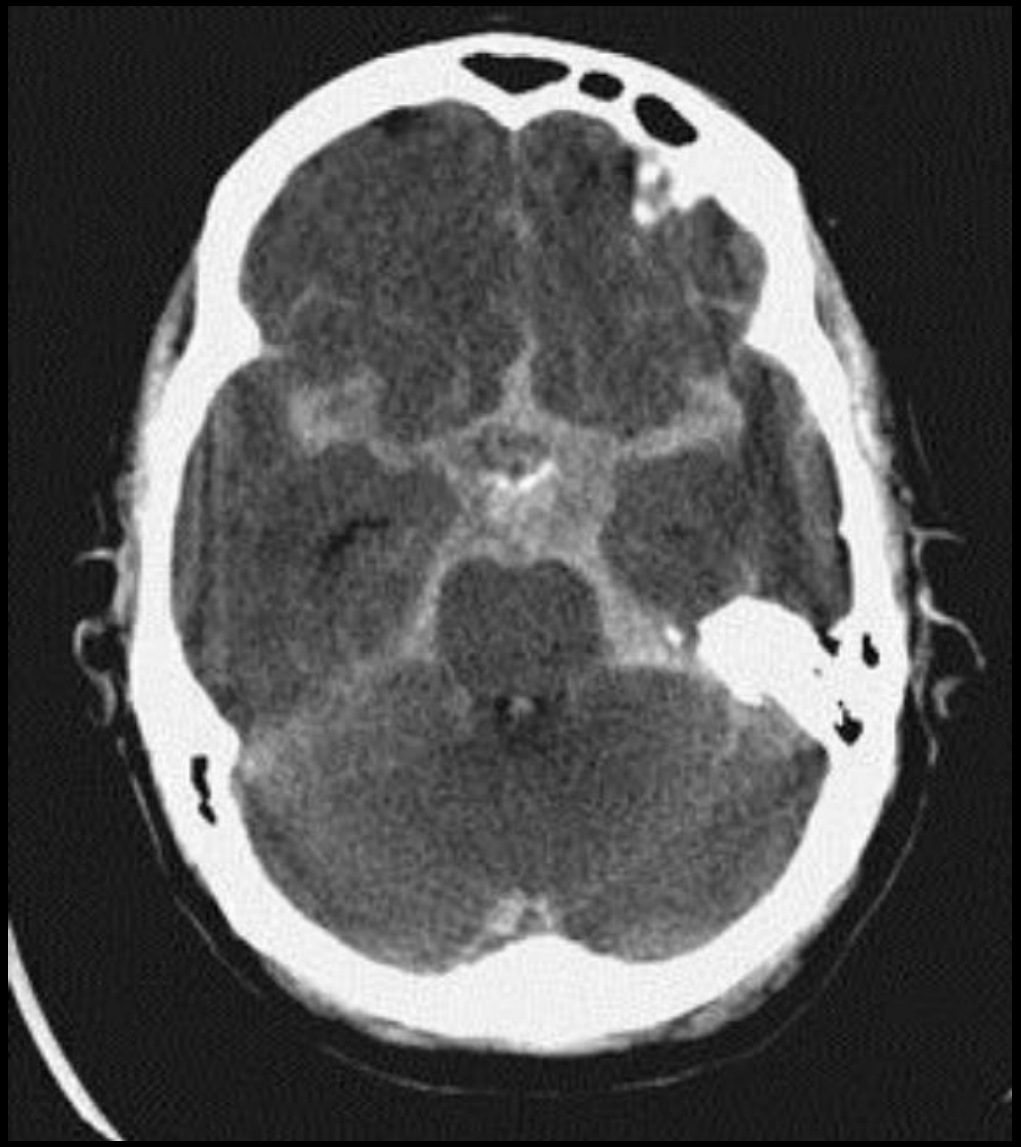
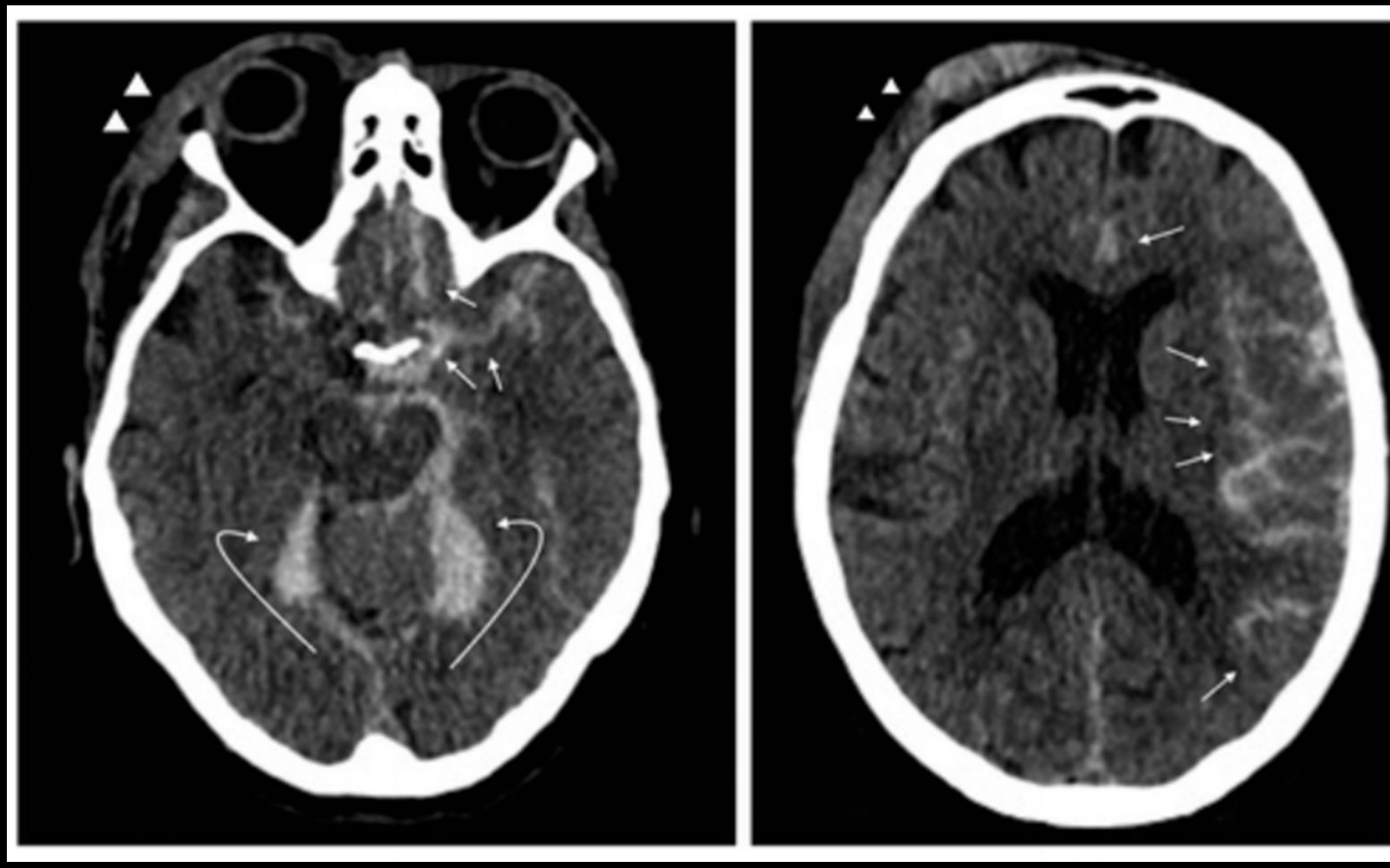
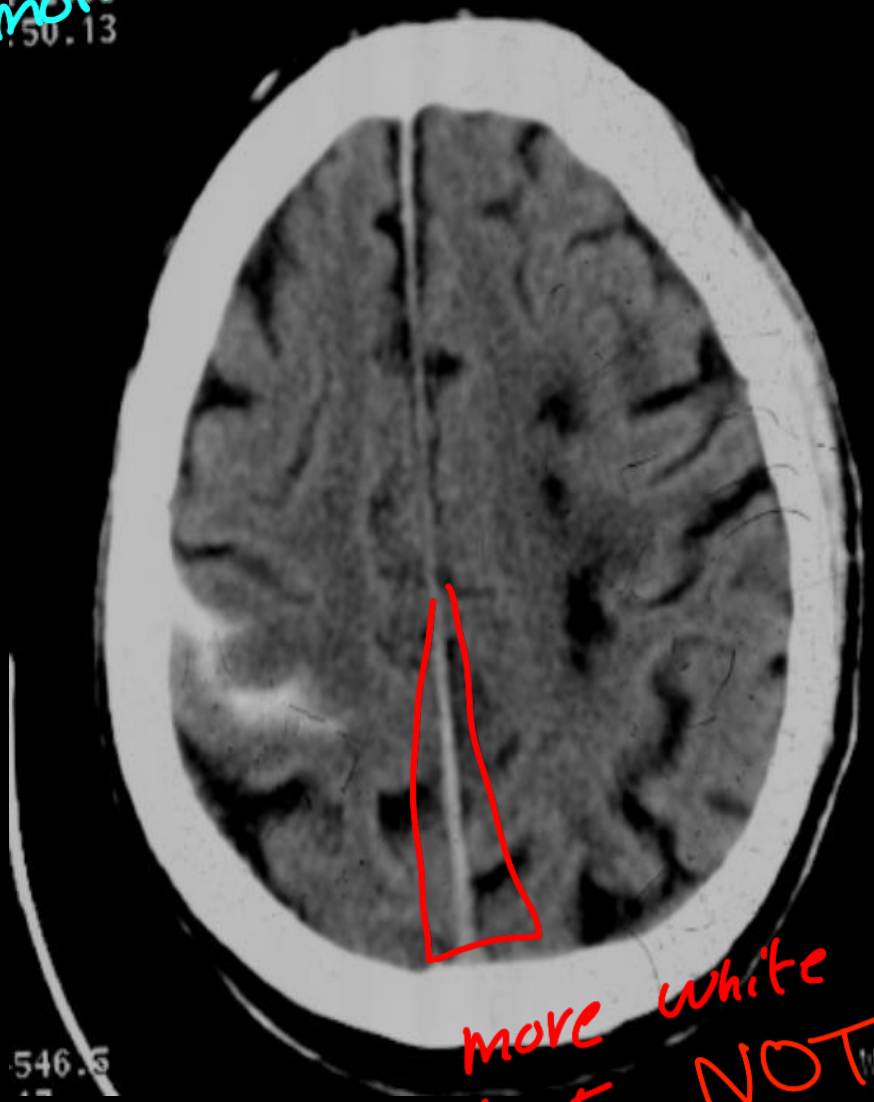
SUBARCHNOID HEMMORAGE SUBARCHN
SUBARCHN
S





This is sing of Subarch. hemorrhage

why ?,



more white but NOT THICITER !.

location 2

Intraventricular hemorrhage

Mechanism:

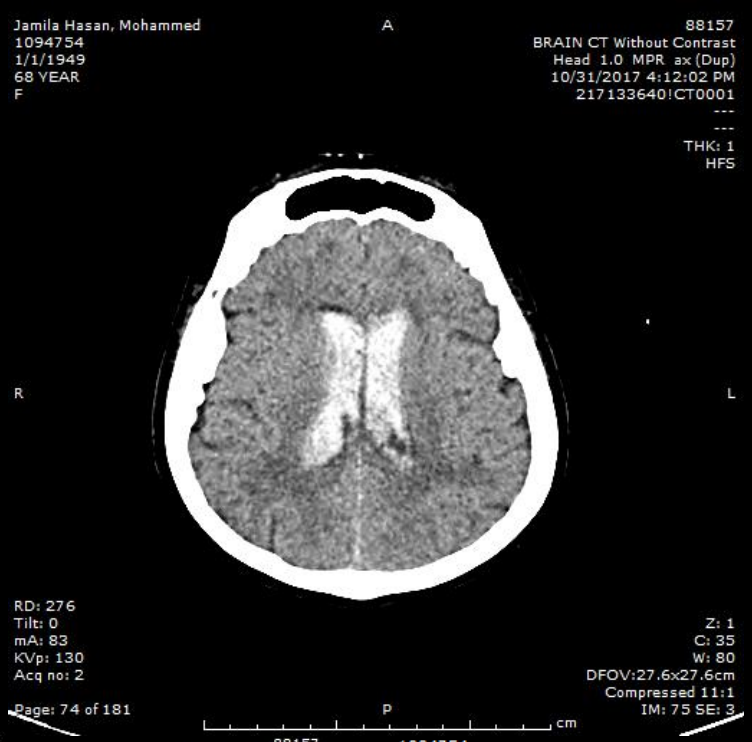
- result from shearing of the choroid plexus or subependymal veins along the surface of the ventricles,
- an extension of a parenchymal hematoma into the ventricles,
- by retrograde flow of blood from a SAH into the ventricular system .

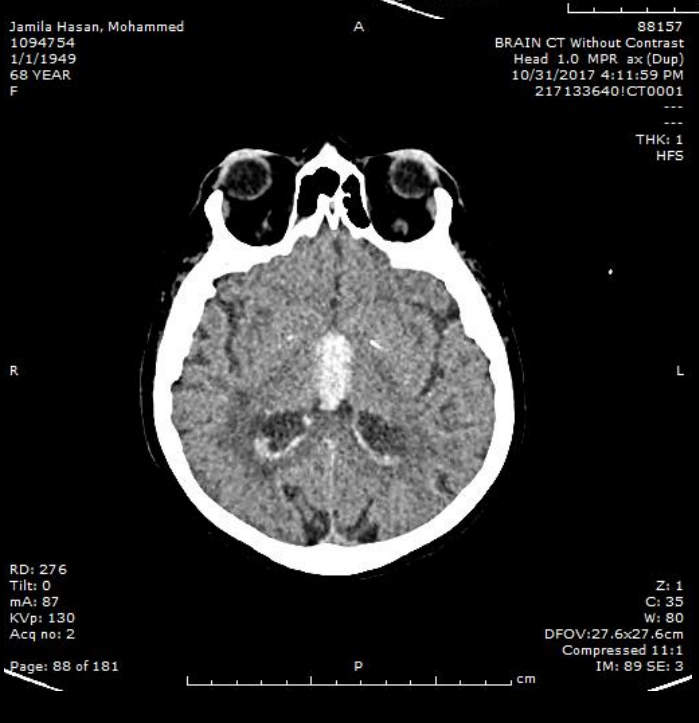
Patients with IVH can develop complications including hydrocephalus and even ependymitis

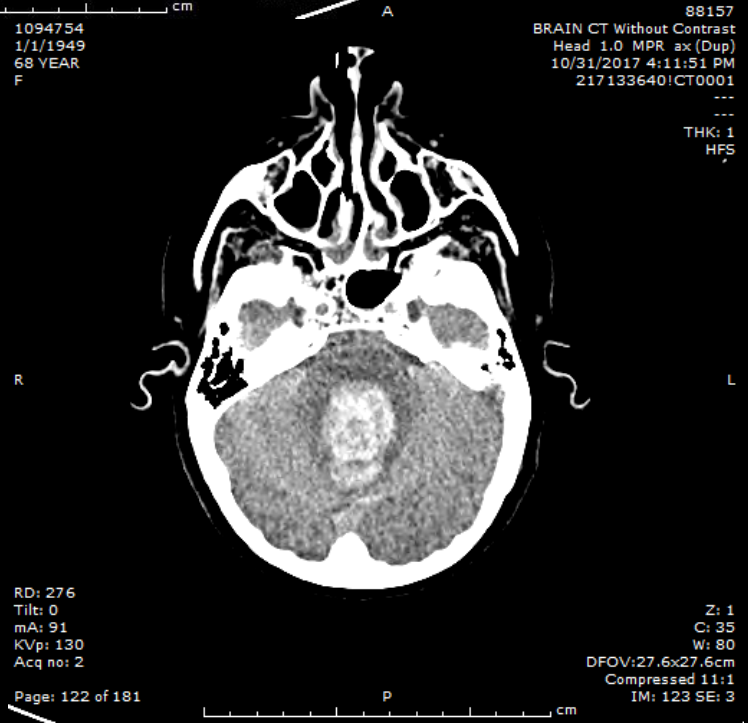
Imaging features:
On CT, IVH is most commonly seen as hyperdense collections that layer within the occipital horns .

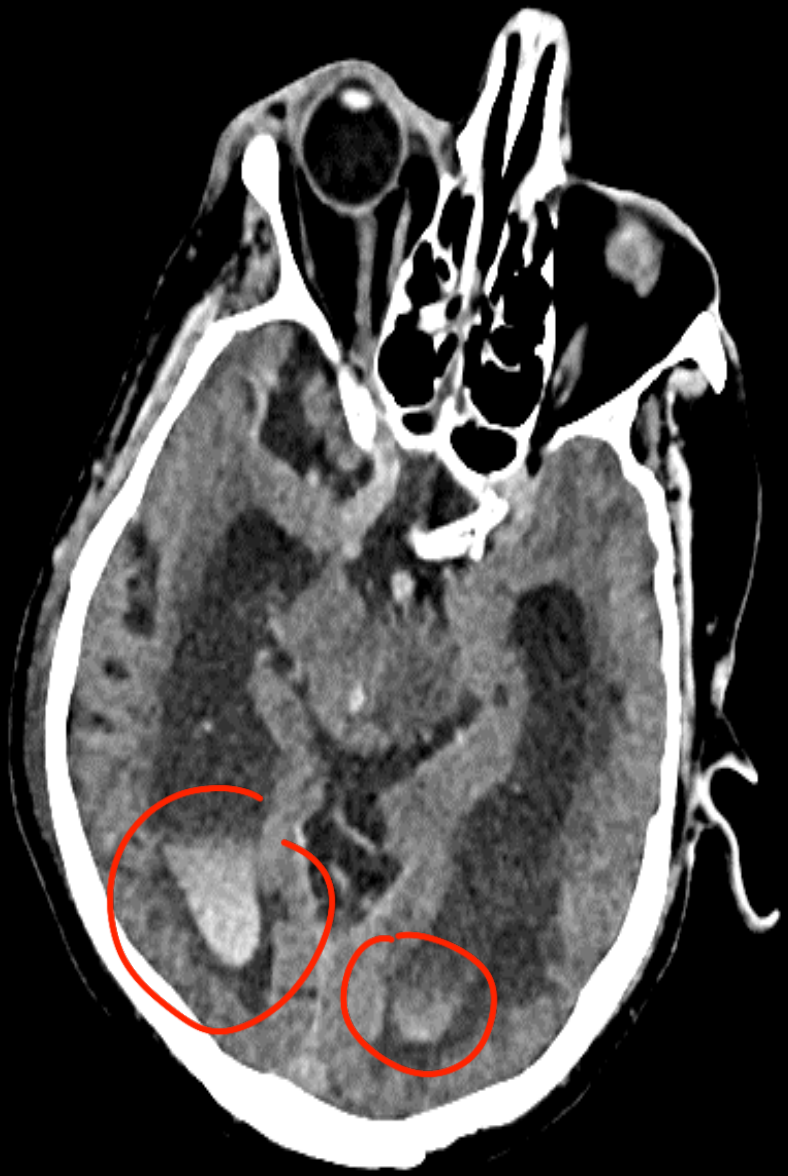
bad prognosis

Intraventricular hemorrhage









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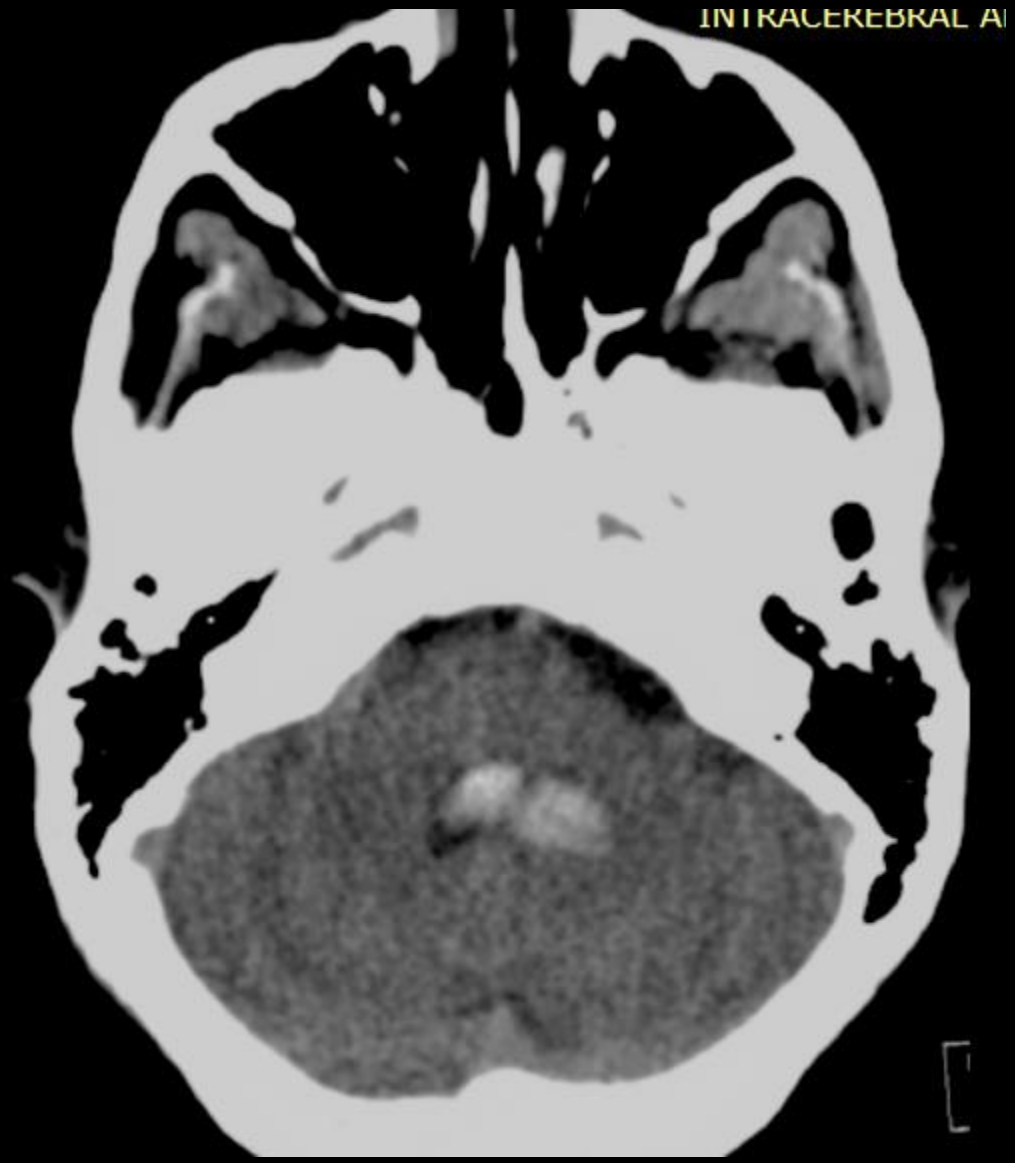
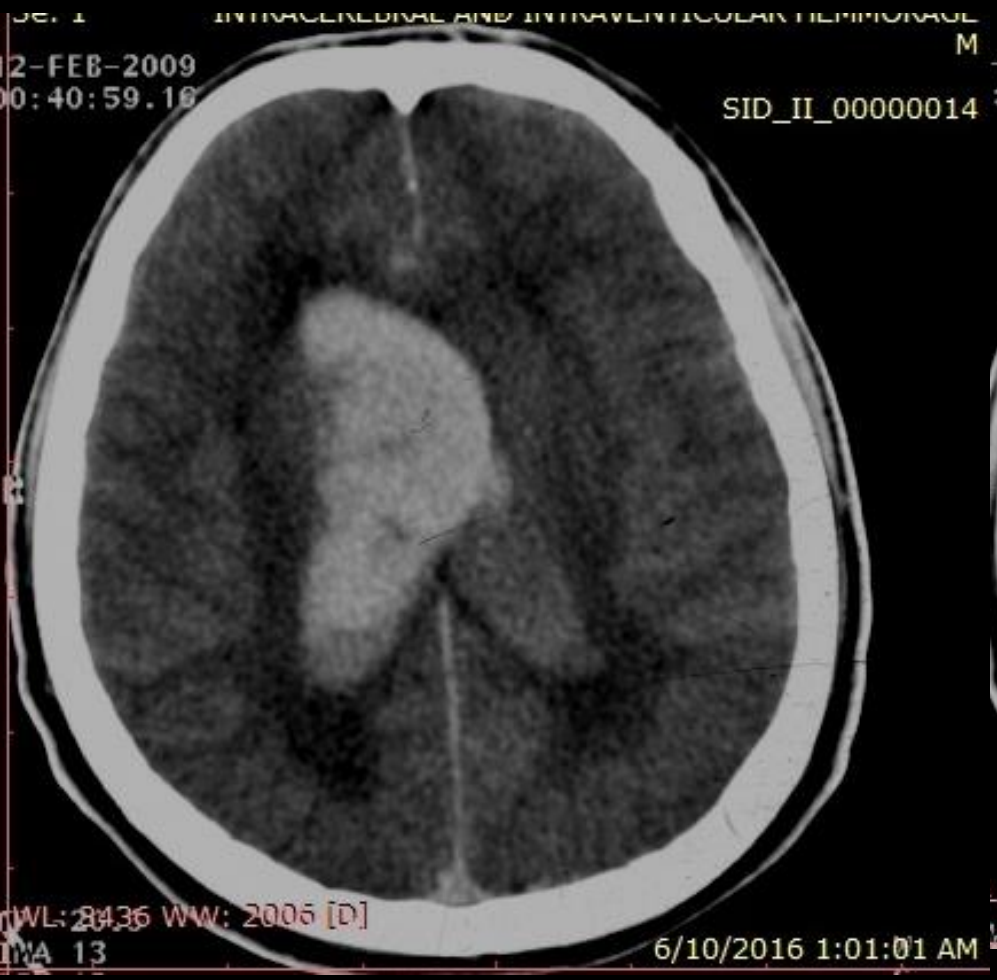
IM: 76 SE: 3


INTRACEREBRAL A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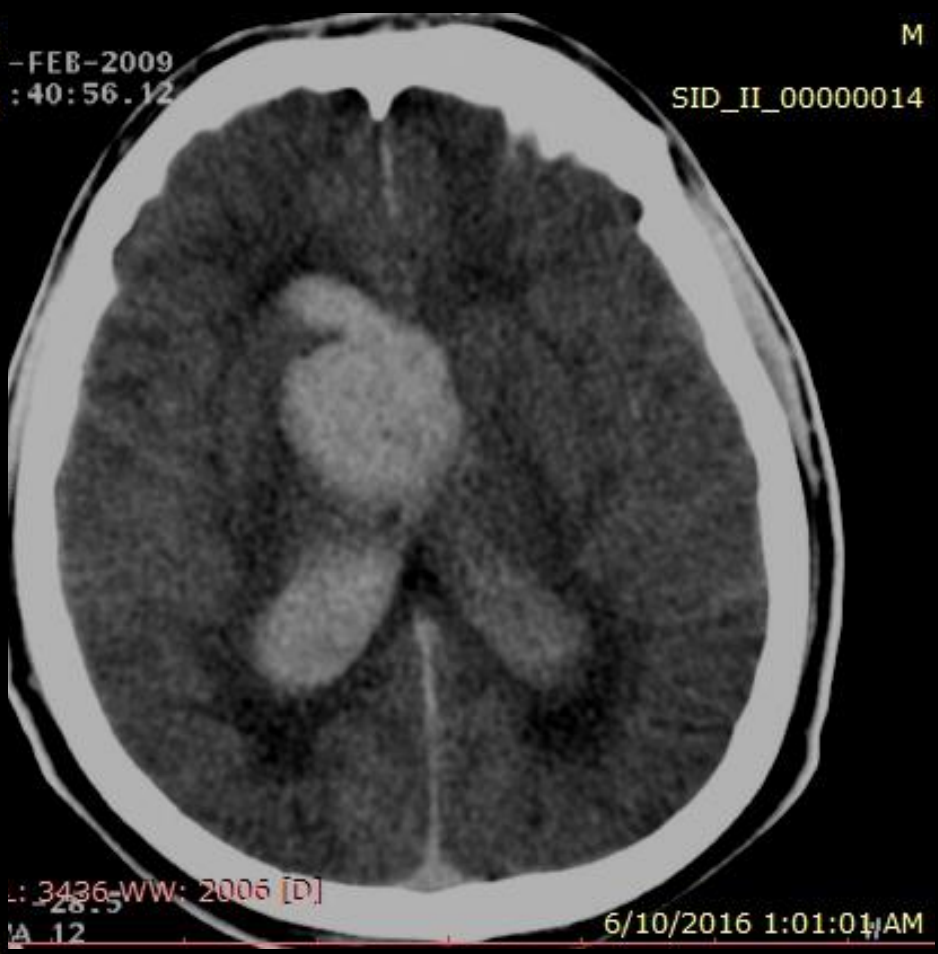
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-FEB-2009
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: 3436 WW: 2006 [D]
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6/10/2016 1:01:01 AM

location 3

Primary intra-axial injuries

Includes:

Diffuse axonal injury

Cortical contusion ~~ass~~

Intracerebral hematoma

Brain stem injury

Most common cause is hypertension

Cortical contusion

Mechanism: when the brain forcibly impacts the irregular surface of the overlying skull, which typically occurs at (coup injury) or opposite (contrecoup) the site of blunt trauma.

Contusions frequently contain hemorrhagic foci ranging in size from punctate cortical surface petechiae to much larger confluent regions of hemorrhage occupying an entire lobe.

Cortical contusion

Imaging Features

Multifocal and bilateral, usually involving the superficial grey matter.

Location:

Anterior temporal lobes, 50% (adjacent the petrous bone and posterior to the greater *sphenoid wing)*

Frontal lobes, 30% (superior to the cribriform plate, orbit roof and lesser sphenoid wing)

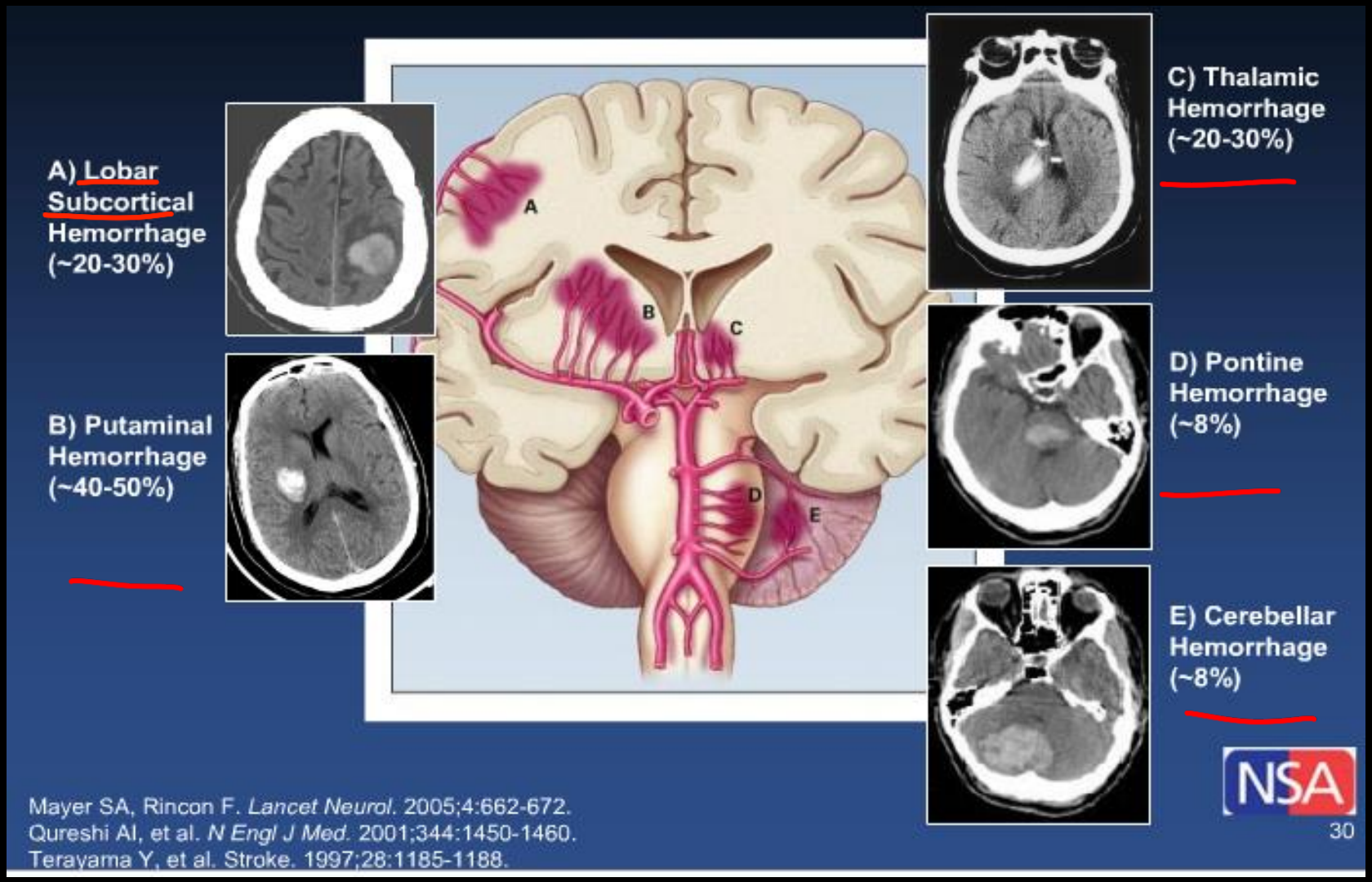
CT appeared as irregular hyperdense foci at gyral surfaces with associated areas of surrounding vasogenic edema

Intraparenchymal hematomas

Mechanism: result from injury to intraparenchymal arteries or veins secondary to rotational strain or penetrating trauma .

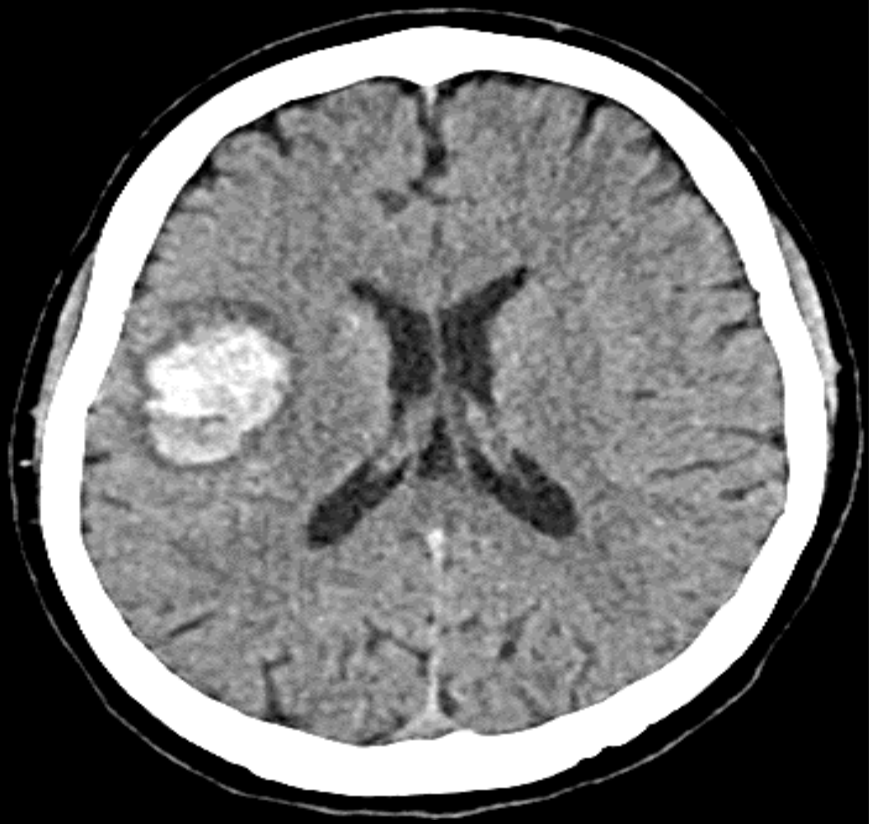
Intraparenchymal hematomas are usually located **deeper** in the brain parenchyma compared with cerebral contusions, but hematomas may also develop from a superficial cortical contusion.

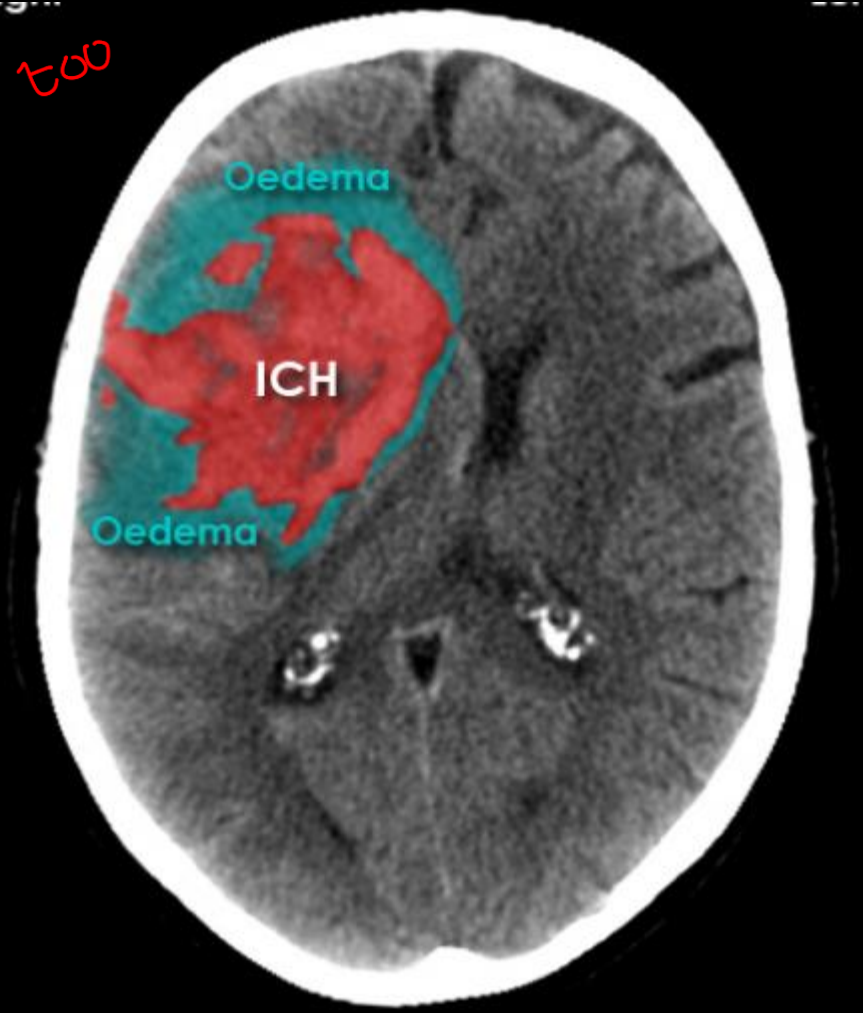
intracerebral hemorrhage



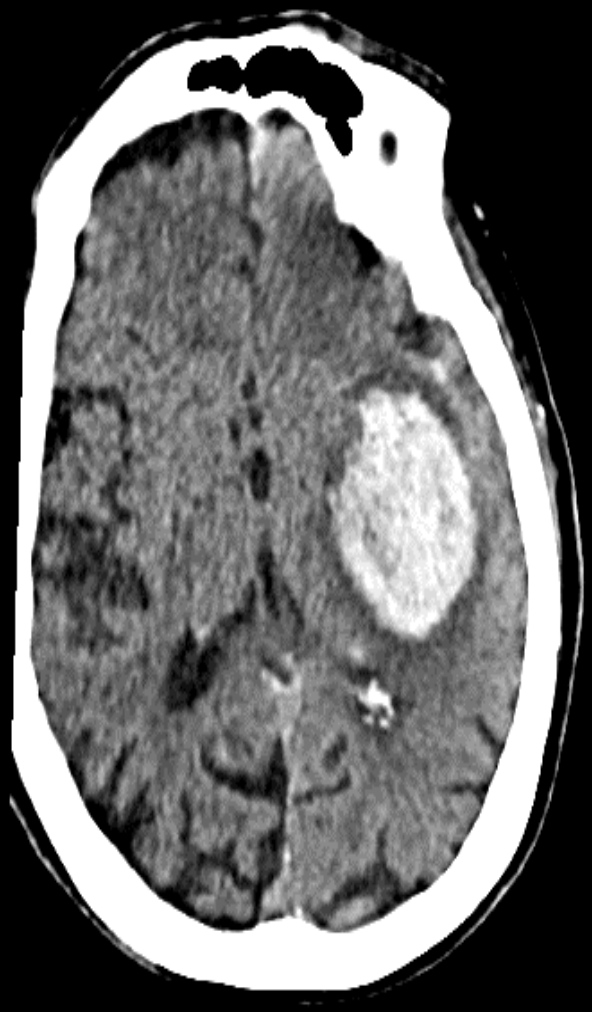
Mayer SA, Rincon F. *Lancet Neurol.* 2005;4:662-672.
Qureshi AI, et al. *N Engl J Med.* 2001;344:1450-1460.
Terayama Y, et al. Stroke. 1997;28:1185-1188.

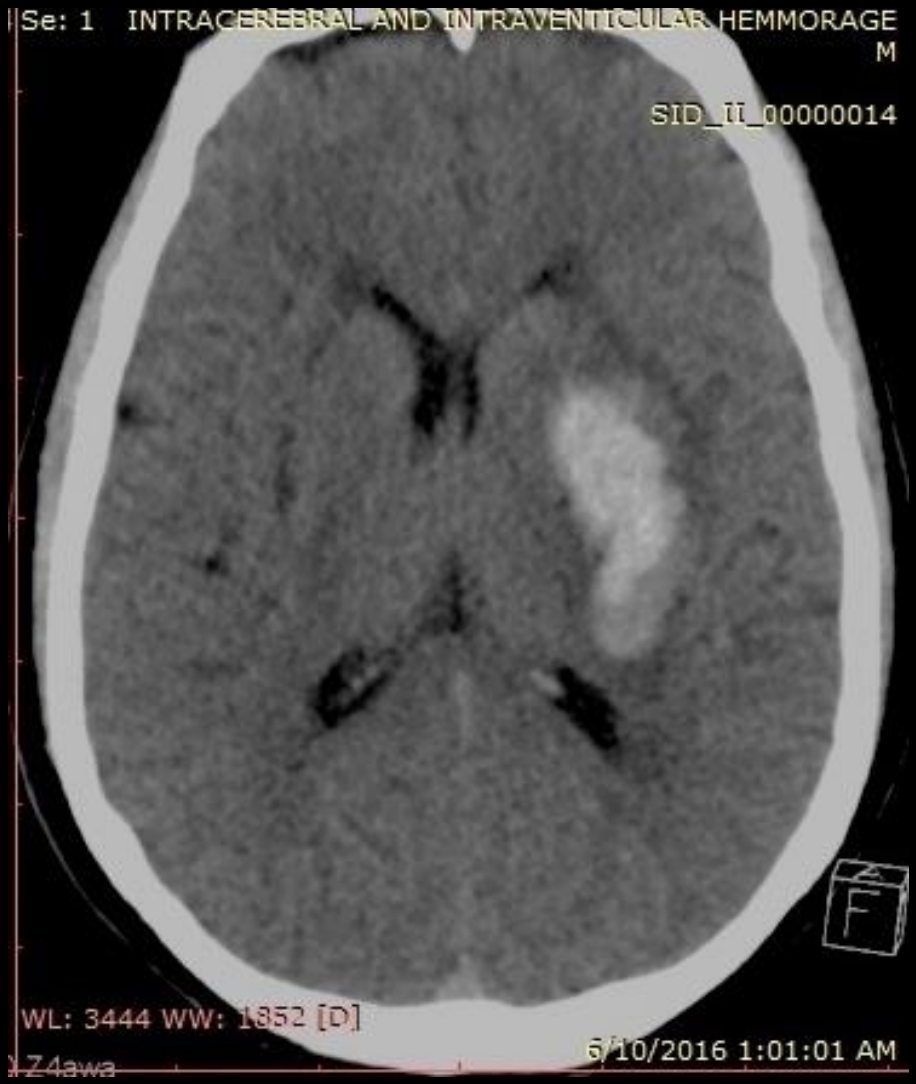
* edema in Intraparenchymal too





acute putamenal haematoma




Se: 1 INTRACEREBRAL AND INTRAVENTICULAR HEMMORAGE
M
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WL: 3444 WW: 1852 [D]
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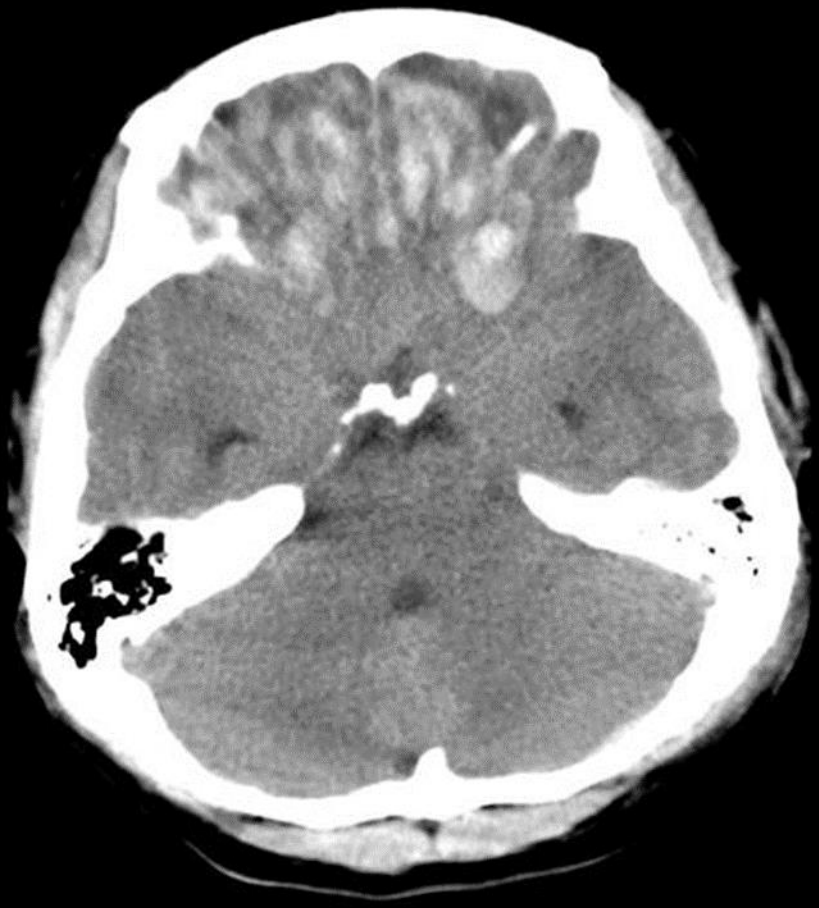
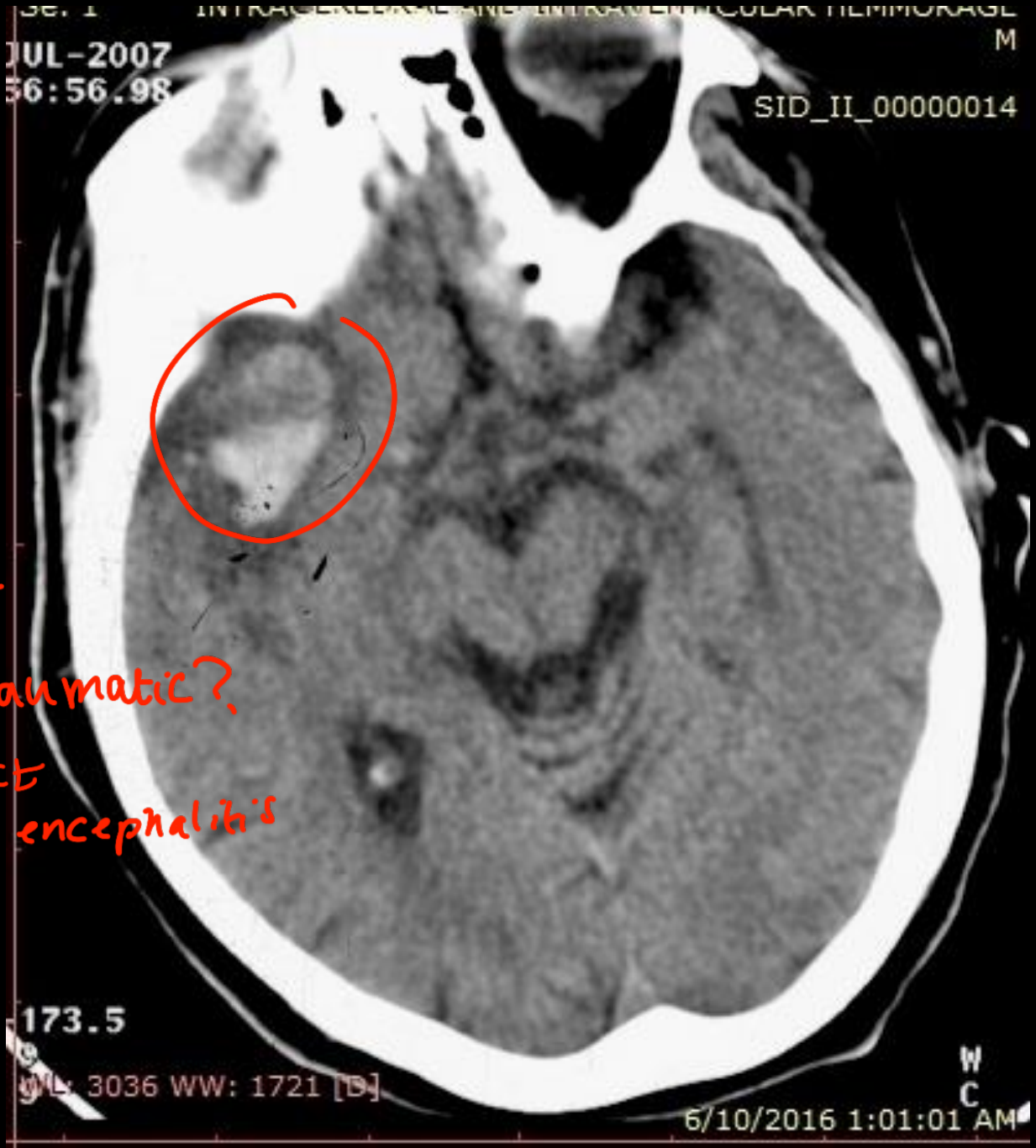
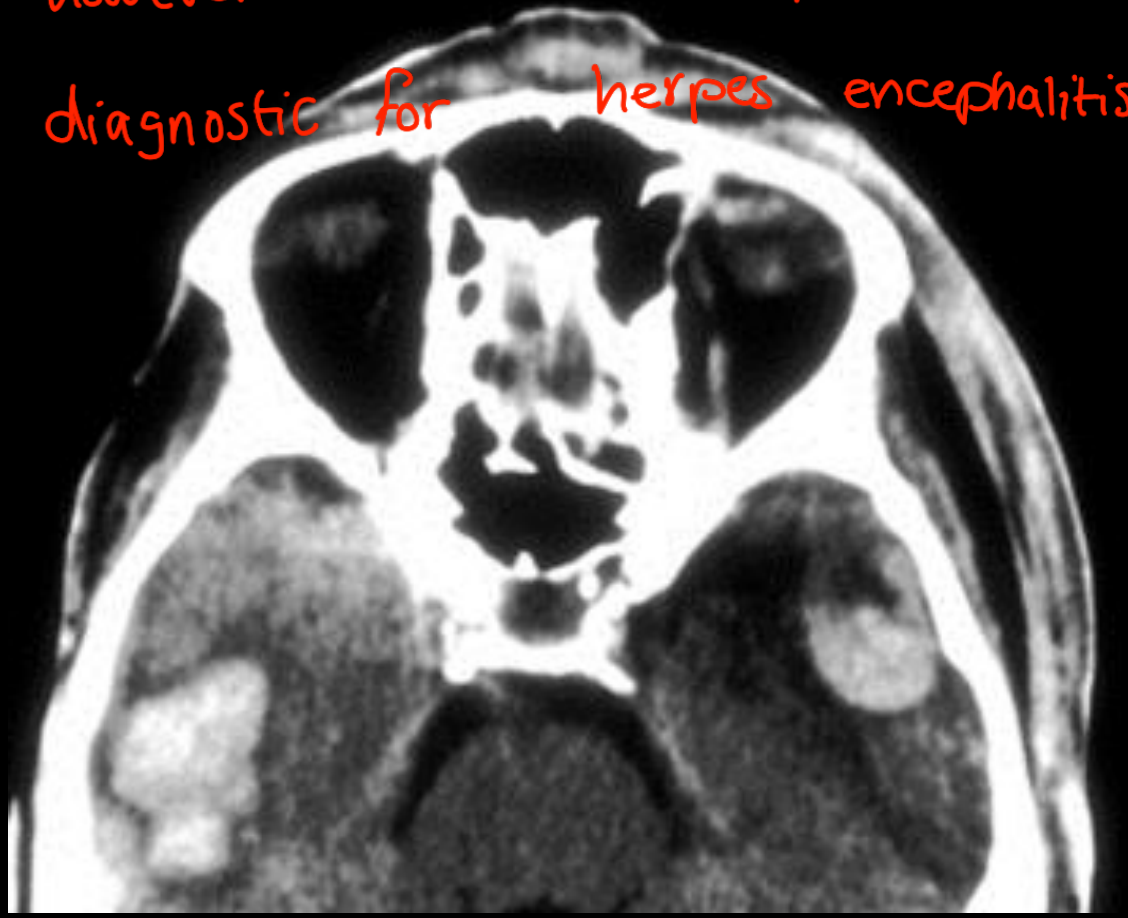
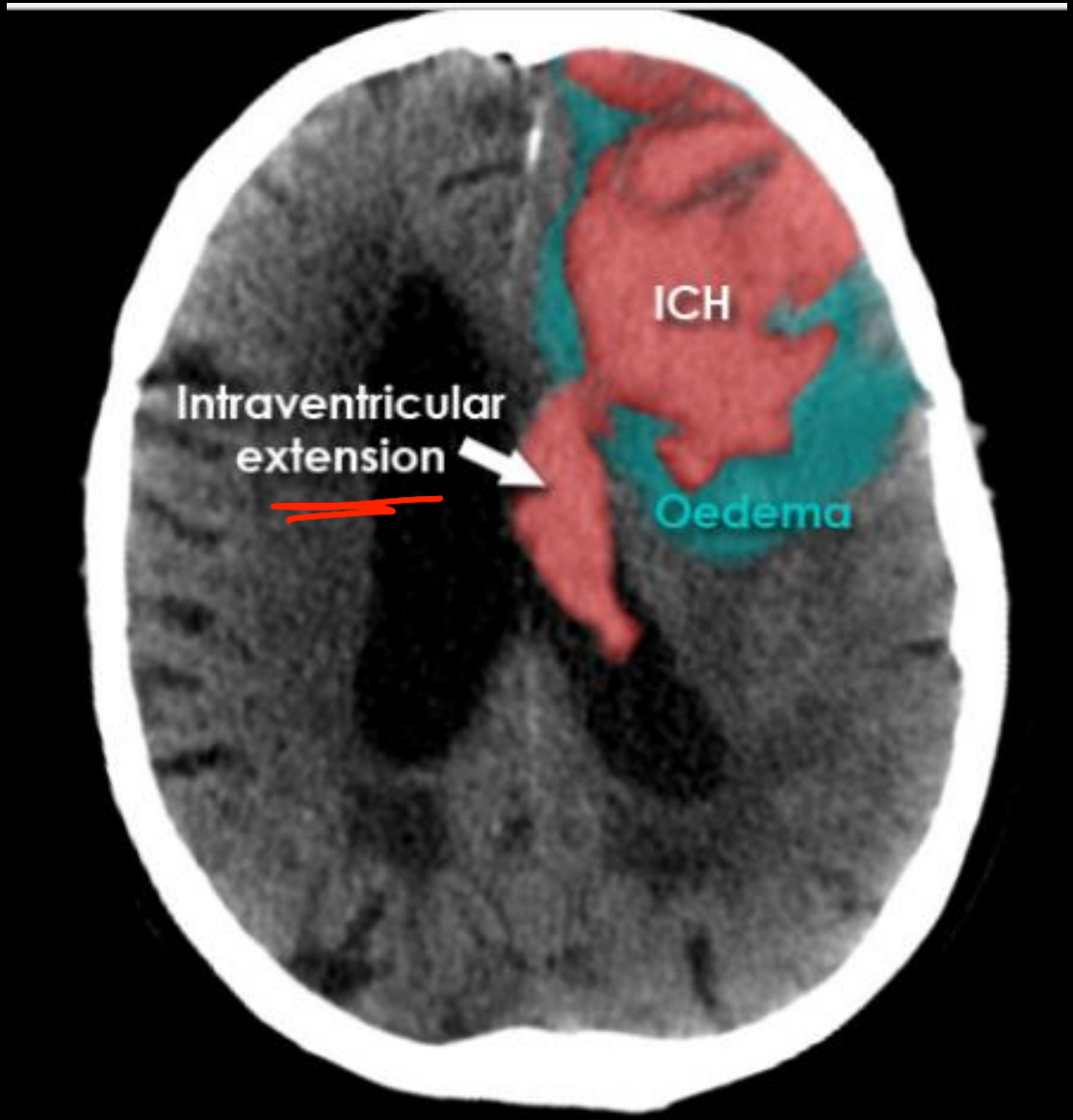


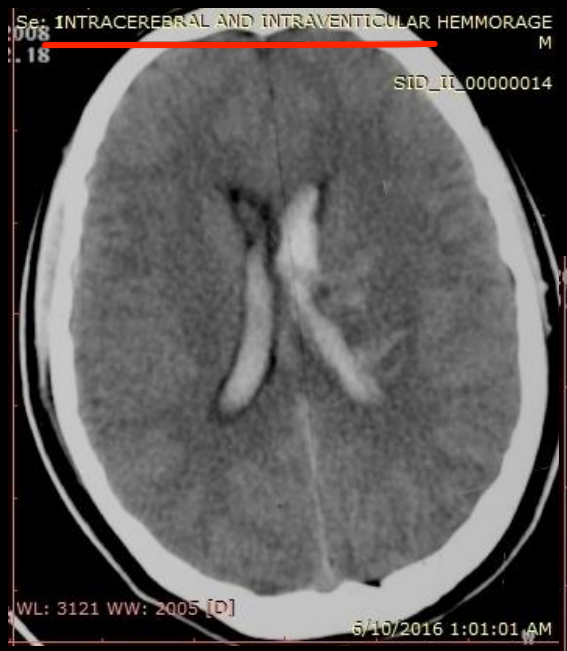


+ unilateral temporal in non-traumatic?
- suspect herpes encephalitis

- however bilateral temporal hematoma is diagnostic for herpes encephalitis + indicates very advanced stage




ICH
Intraventricular extension
Oedema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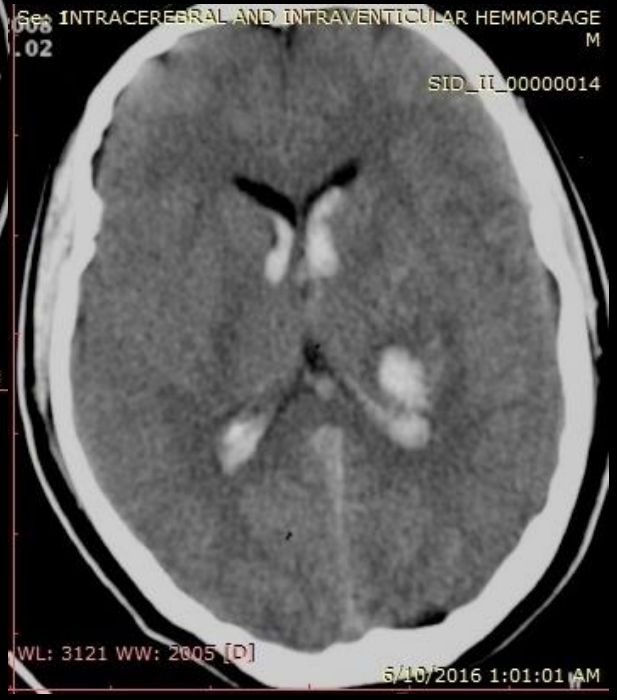
WL: 3121 WW: 2005 [D]
6/10/2016 1:01:01 AM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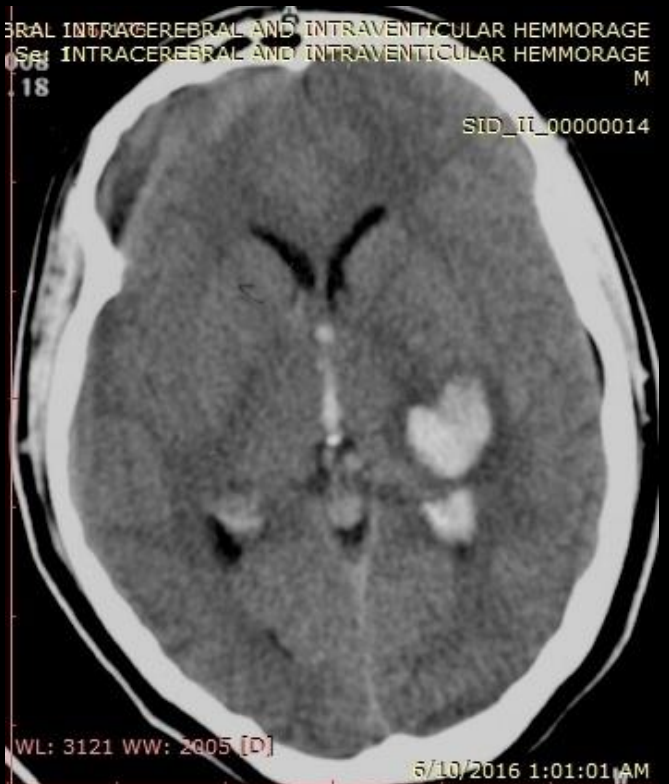
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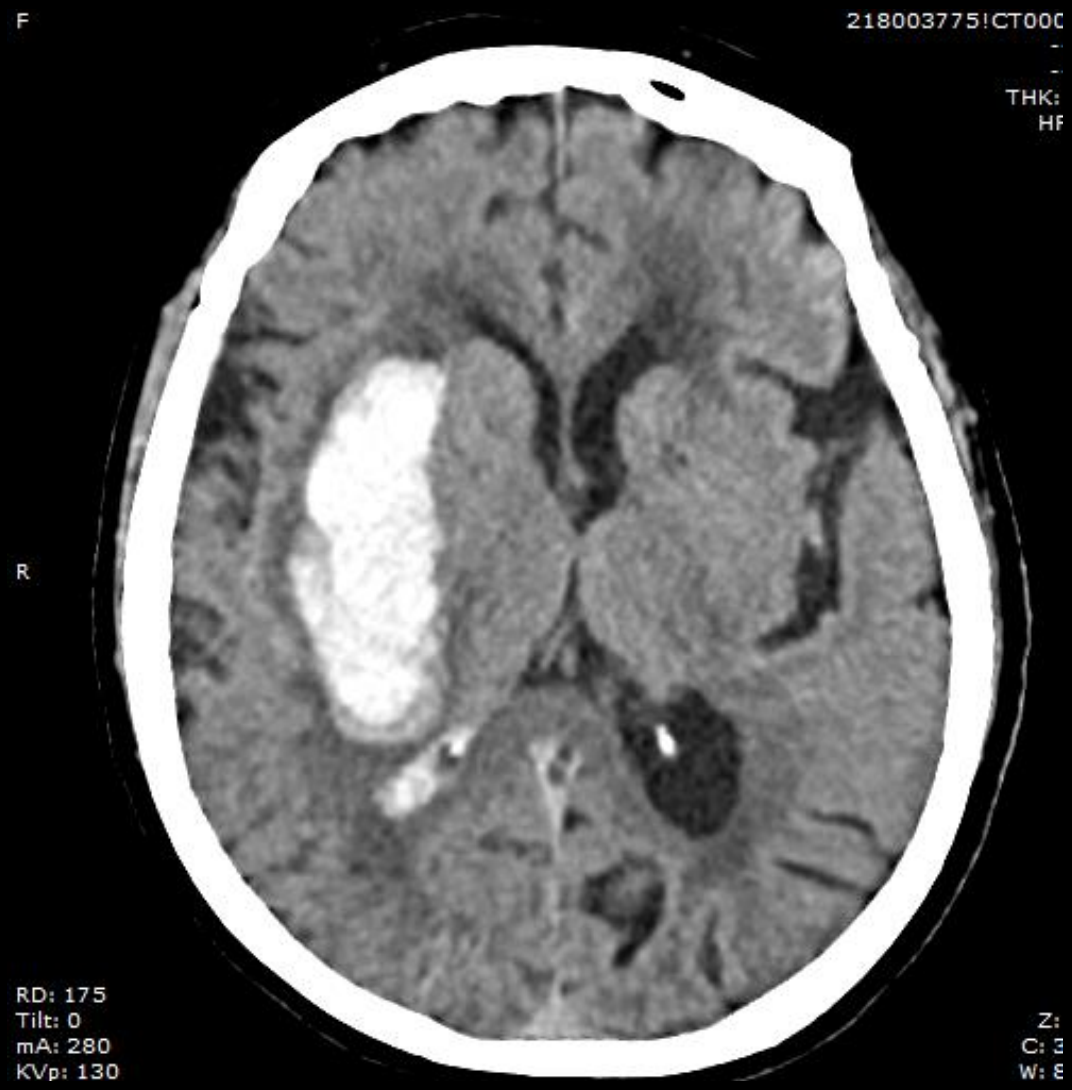
WL: 3121 WW: 2005 [D]
6/10/2016 1:01:01 AM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R
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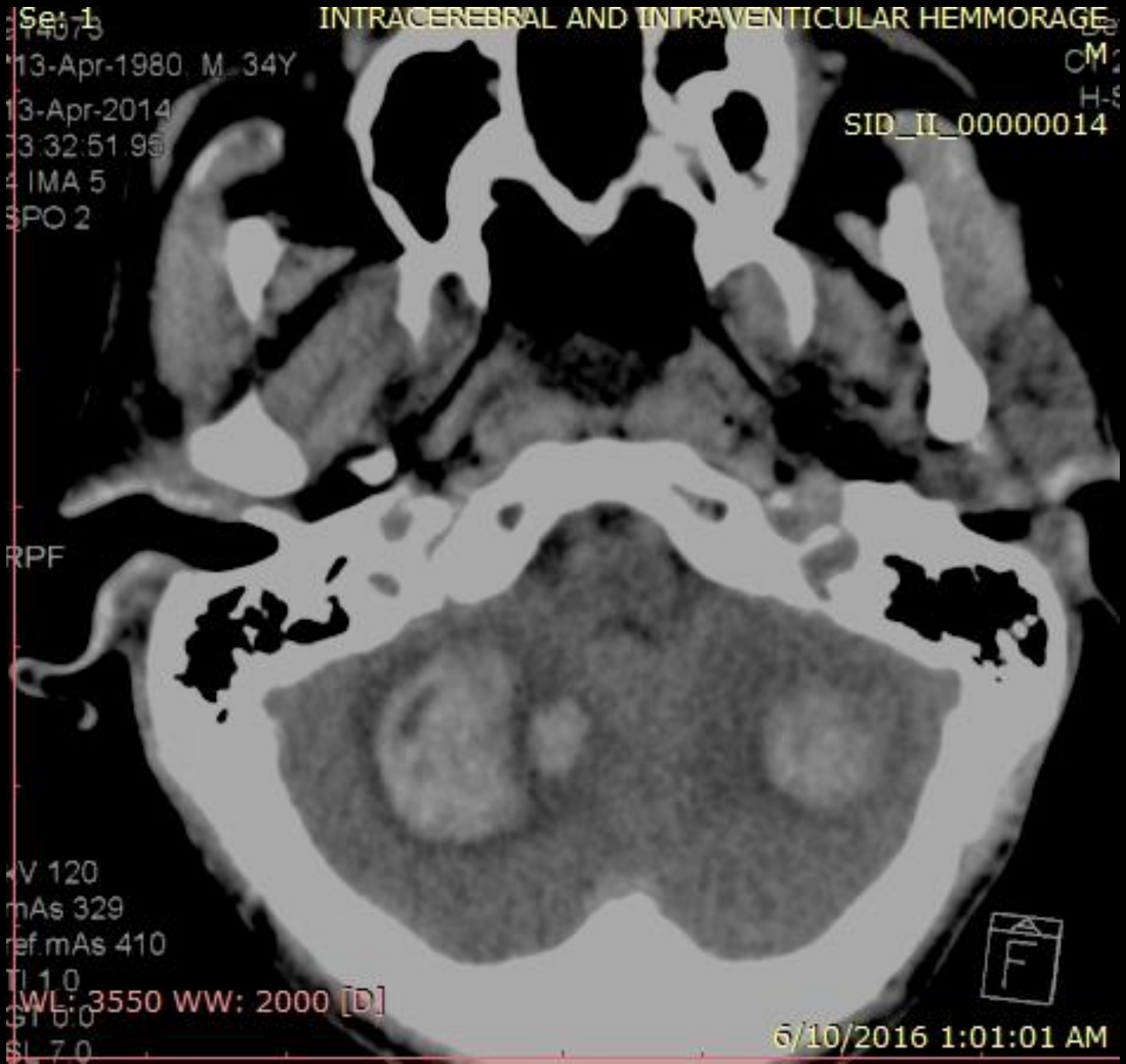
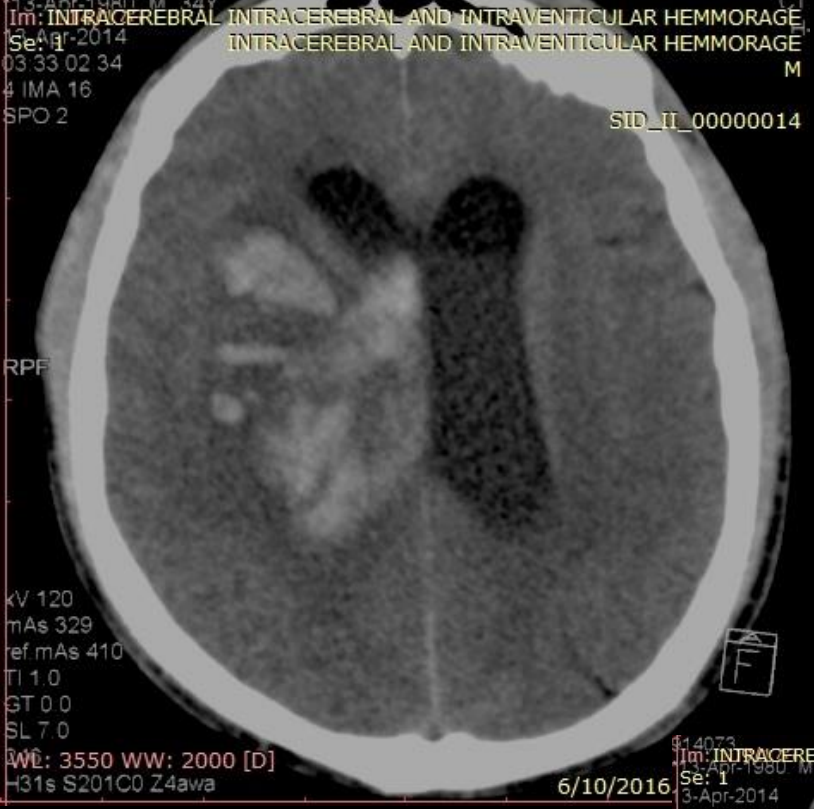

Se: 1
INTRACEREBRAL AND INTRAVENTICULAR HEMMORAGE
13-Apr-1980 M 34Y
13-Apr-2014
SID_II_00000014
IMA 5
PO 2
RPF
V 120
mAs 329
ef.mAs 410
WL: 3550 WW: 2000 [D]
6/10/2016 1:01:01 AM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Se: 1
INTRACEREBRAL AND INTRAVENTICULAR HEMMORAGE
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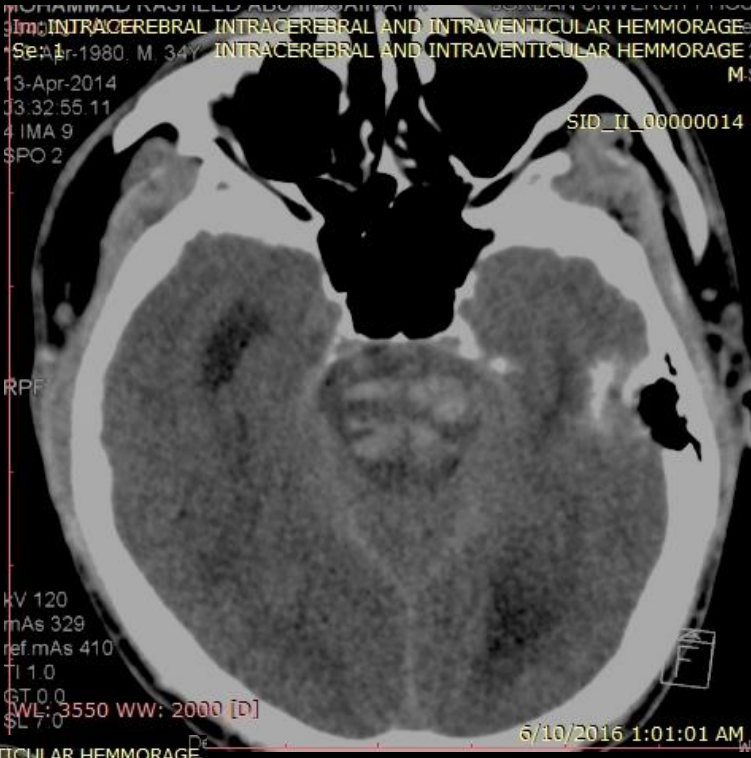
SID_II_00000014
RPF
kV 120
mAs 329
ref.mAs 410
WL: 3550 WW: 2000 [D]
6/10/2016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kV 120
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ref.mAs 410
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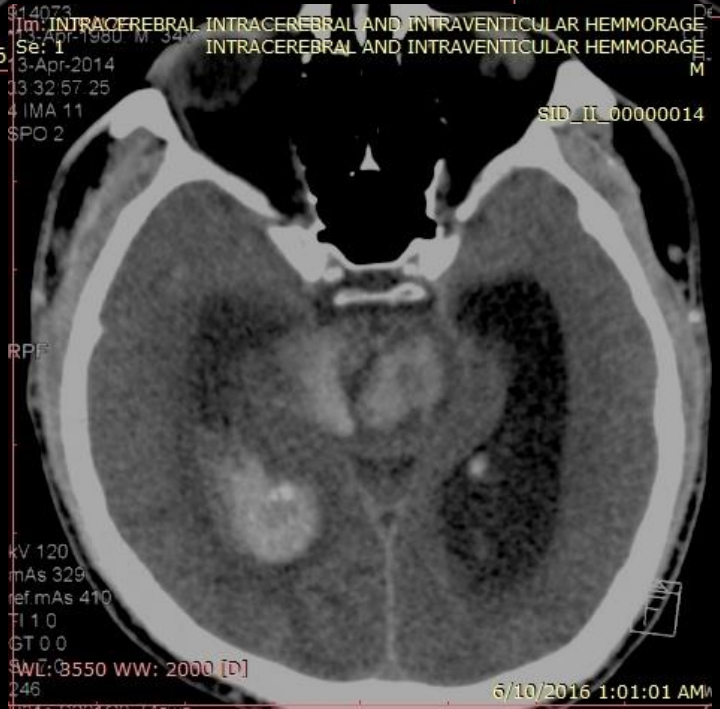
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M
SID_II_00000014
RPF
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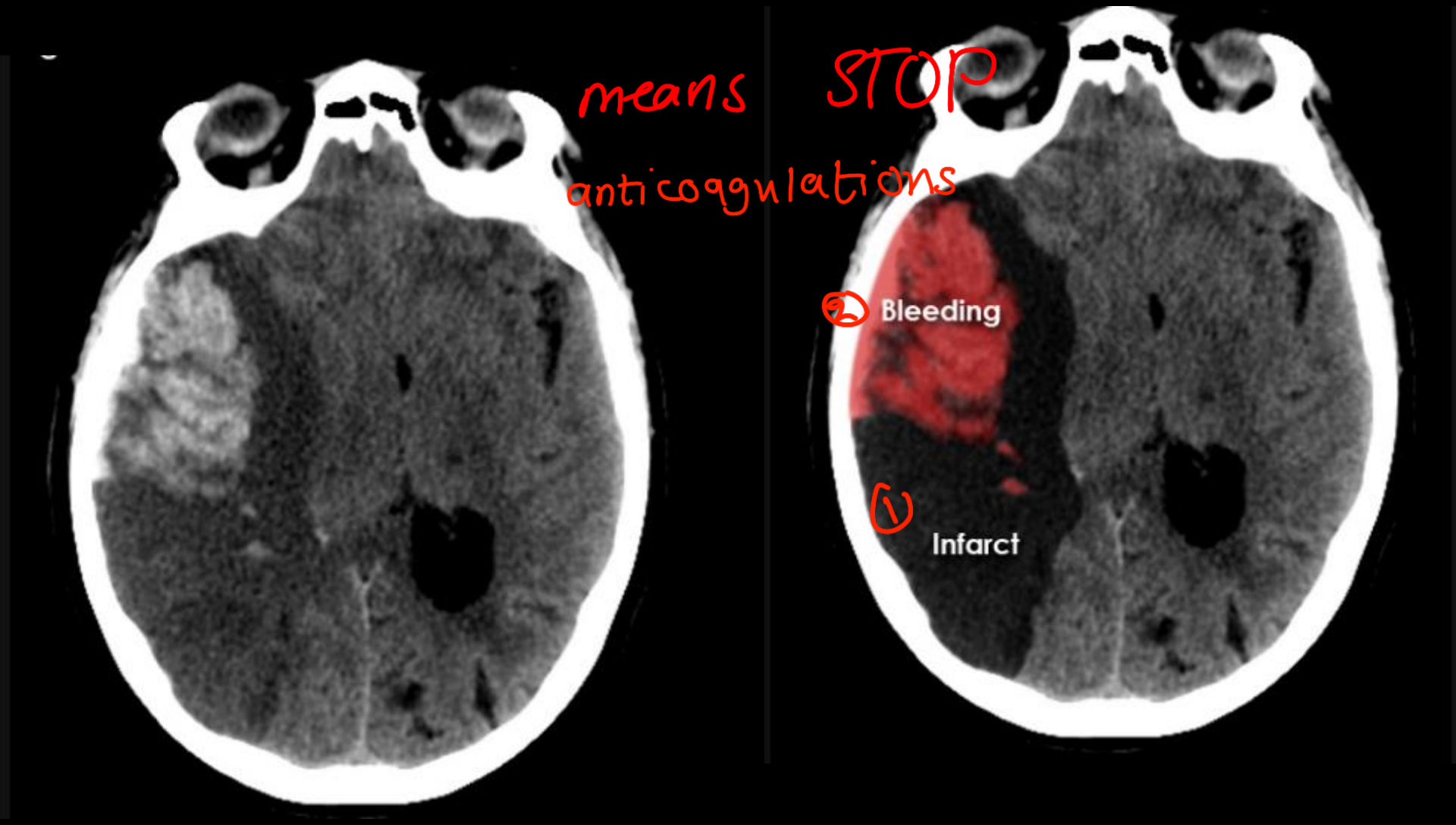
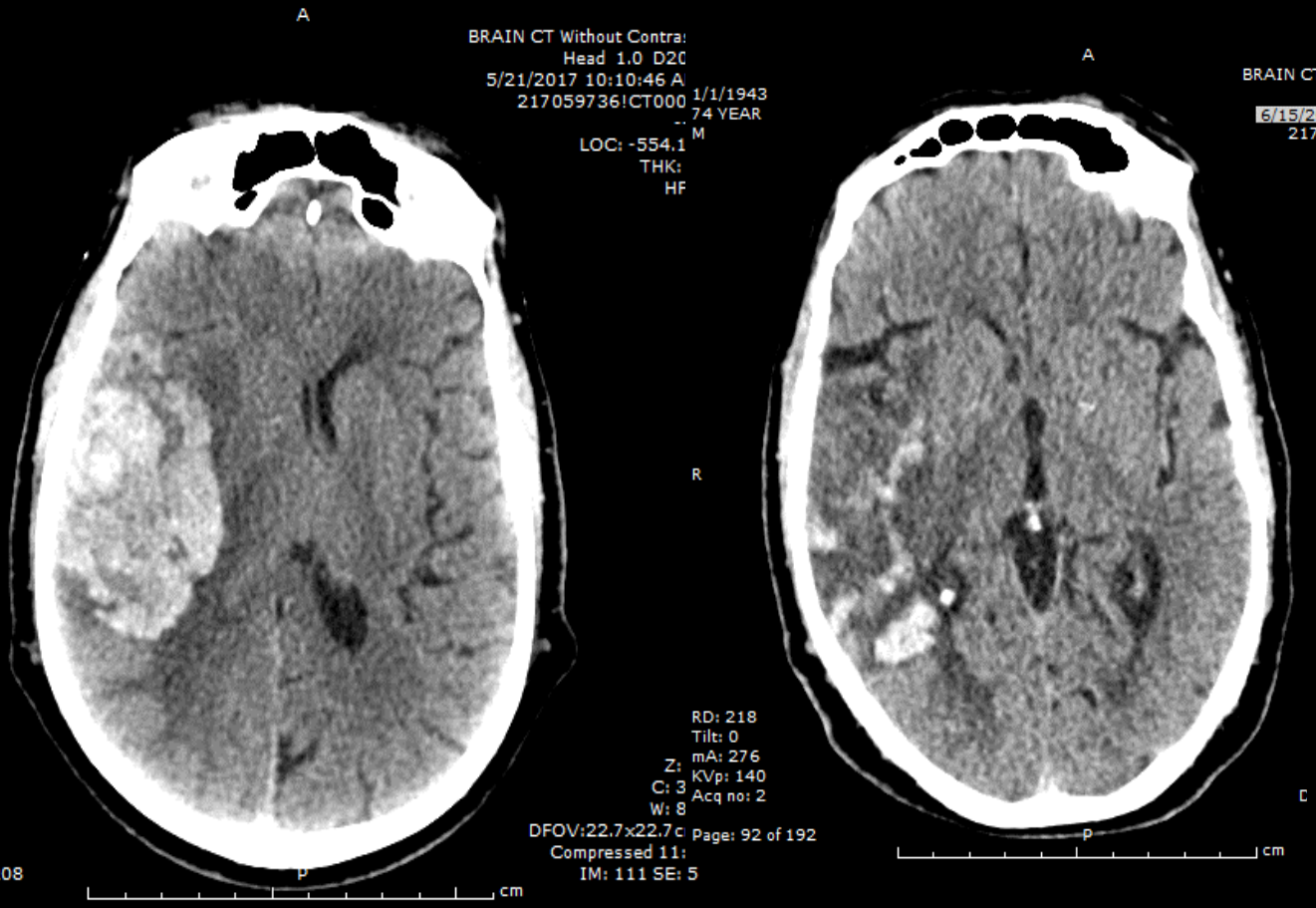
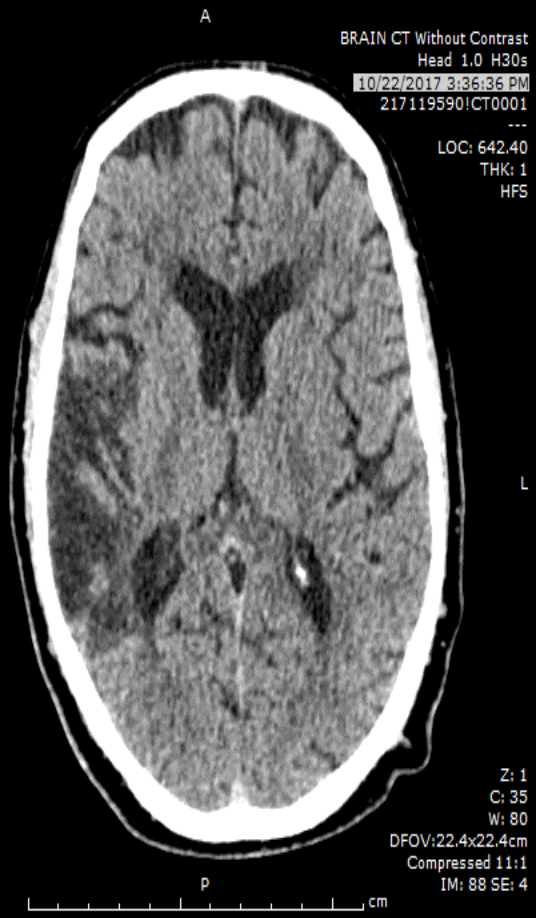
mAs 329
ref.mAs 410
WL: 3550 WW: 2000 [D]
6/10/2016 1:01:01 AM

Infarct with haemorrhagic transformation

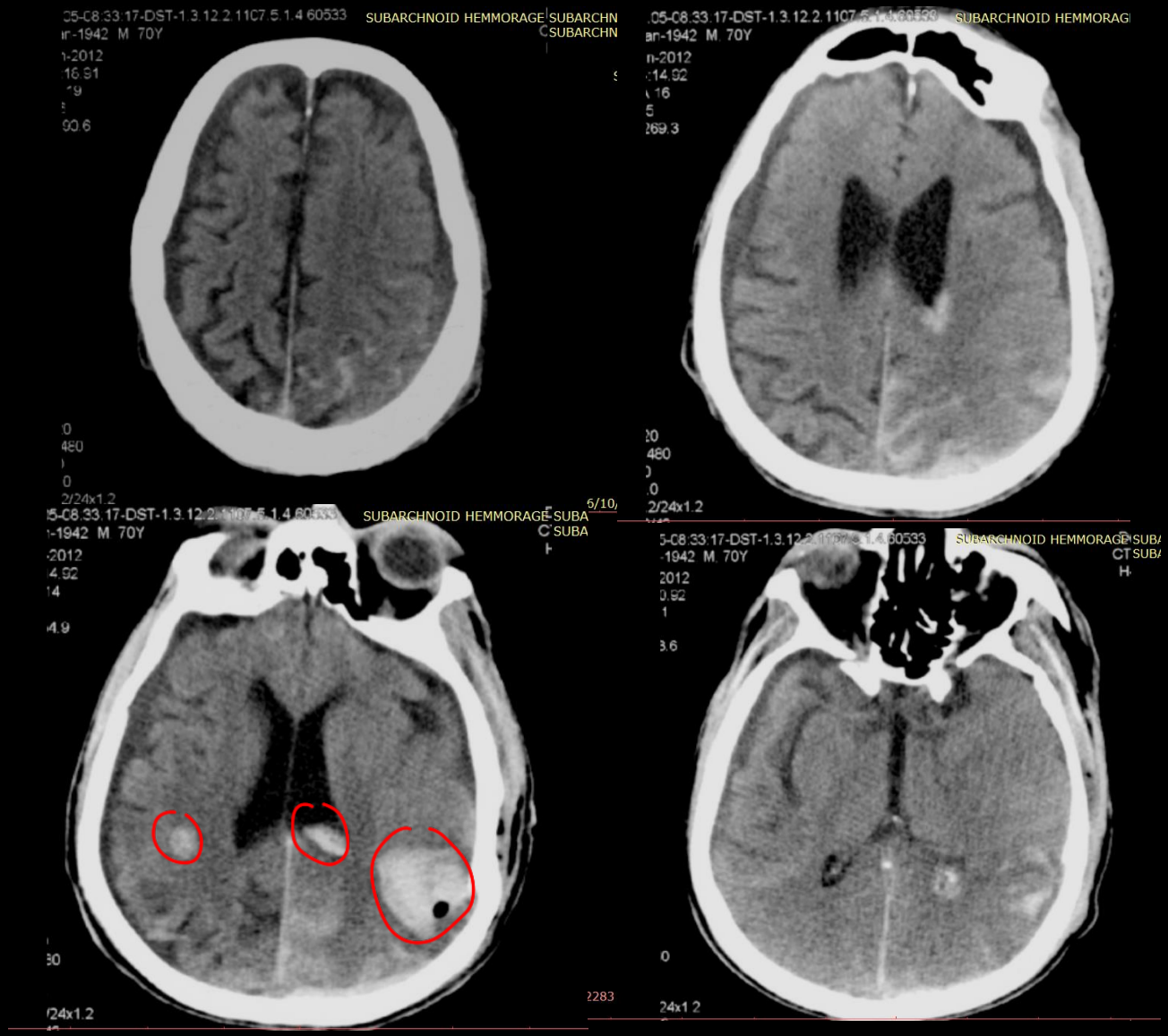




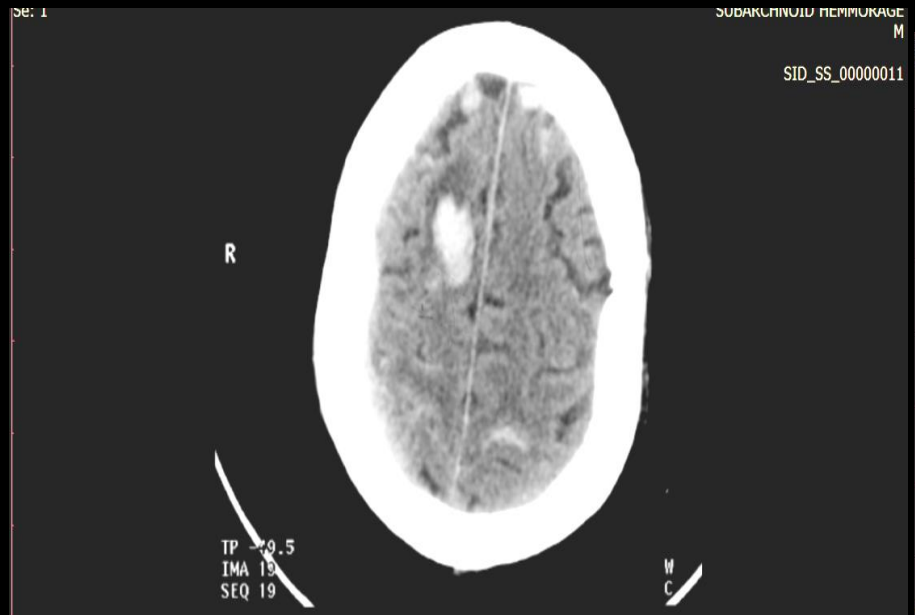


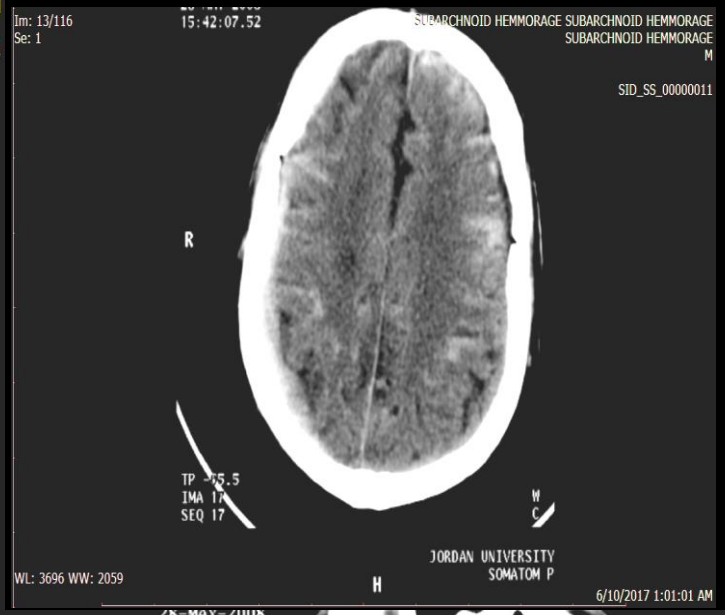
Degradation of blood products with time ✓

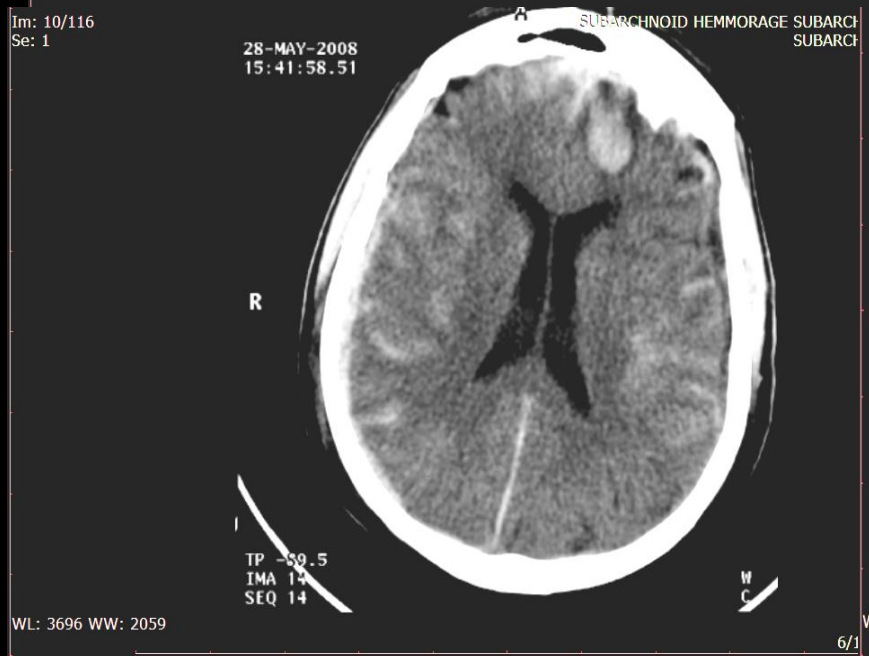
Different types of hemorrhage in the same patient

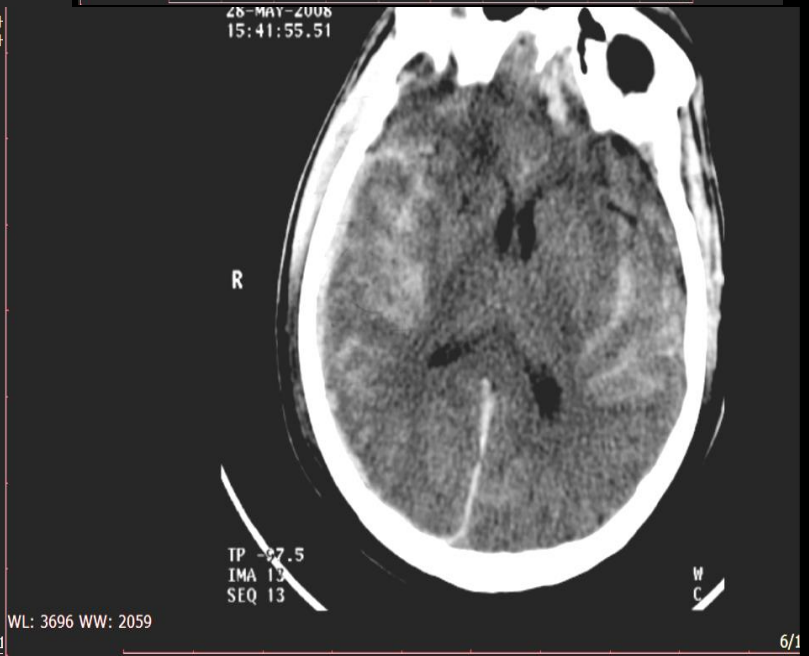


Another example









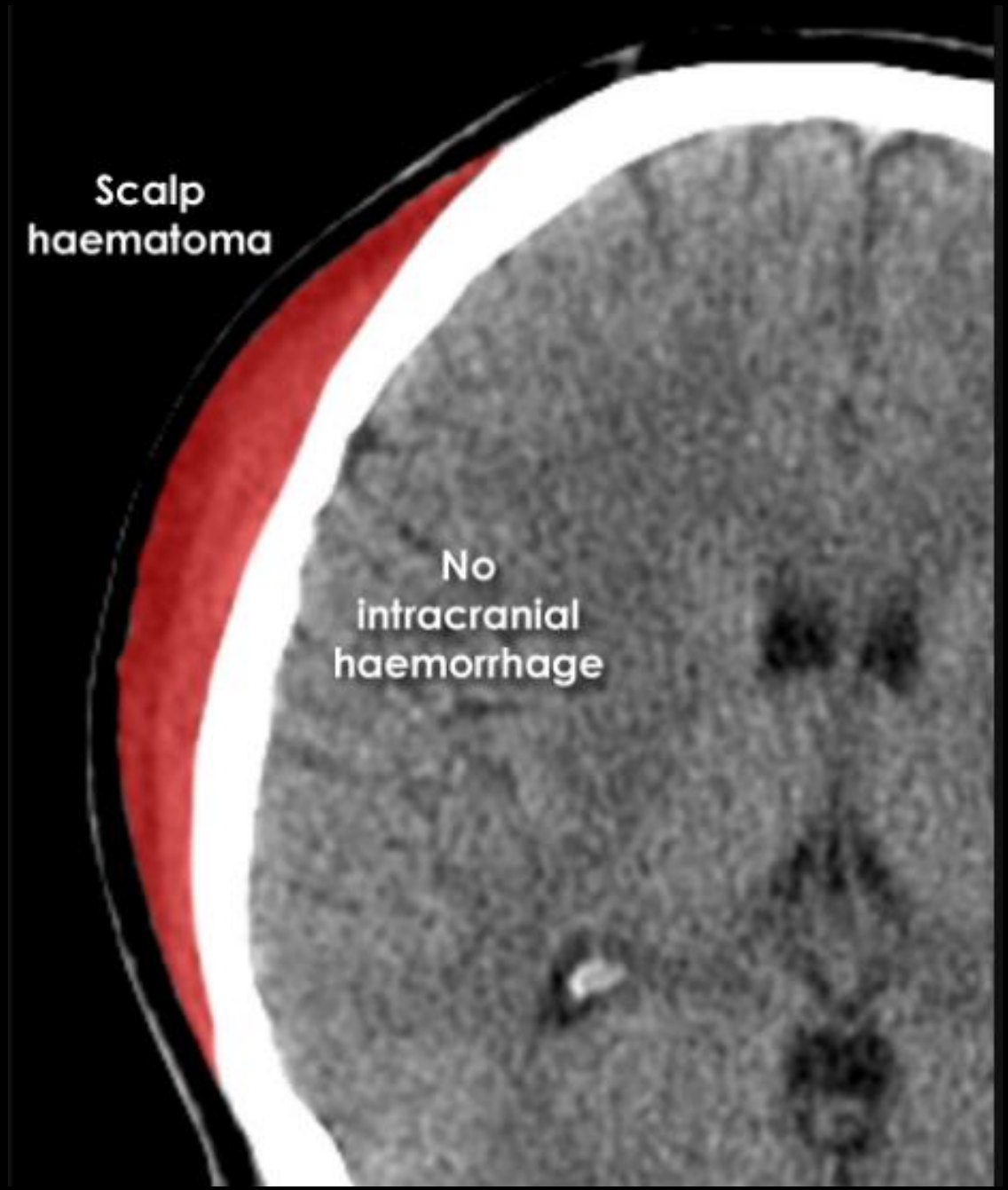
location (4) scalp hematomas

can be

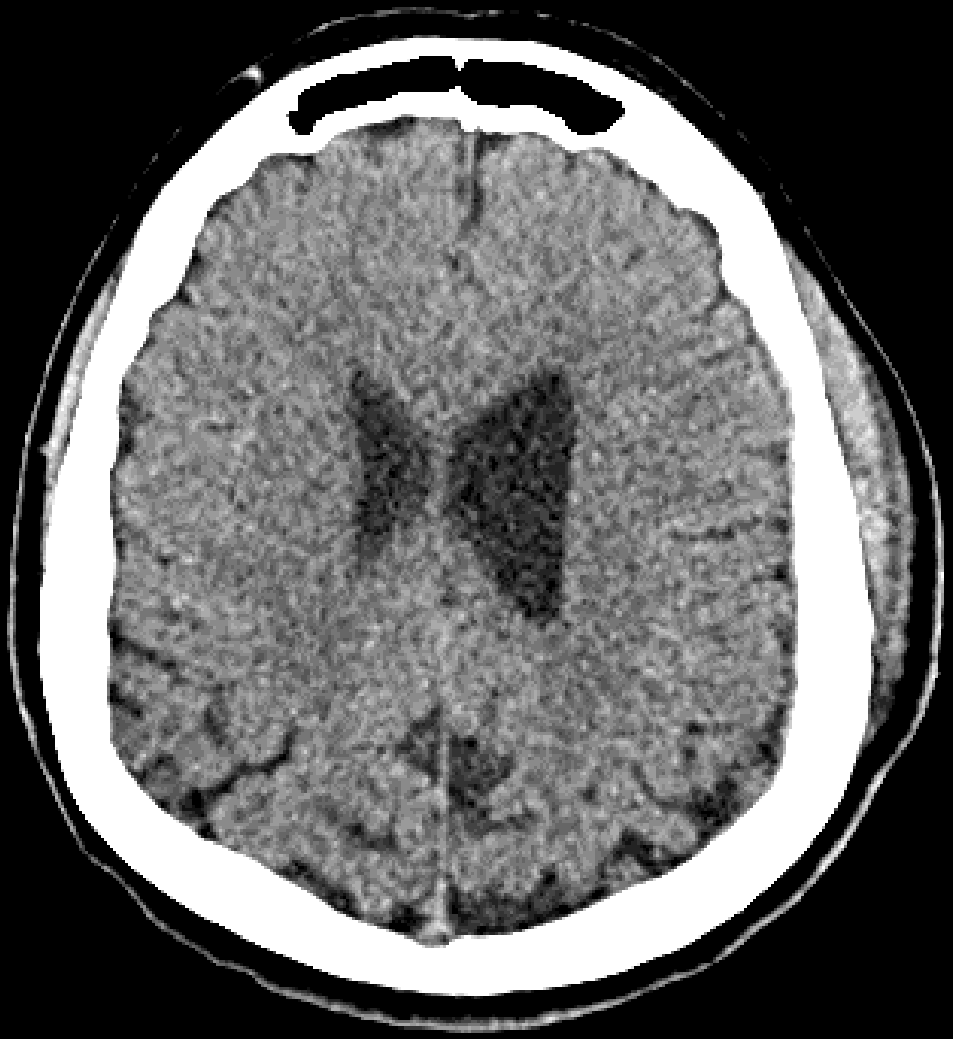
↓

1. Cephalohematoma

Traumatic subperiosteal haematomas of the skull that are usually caused by birth injury. They are bound between the periosteum and cranium, and therefore cannot cross sutures. Being bound by a suture line distinguishes them from subgaleal haematoma, which can cross sutures.


Scalp
haematoma
No
intracranial
haemorrhage

Cephalo-hematoma



2

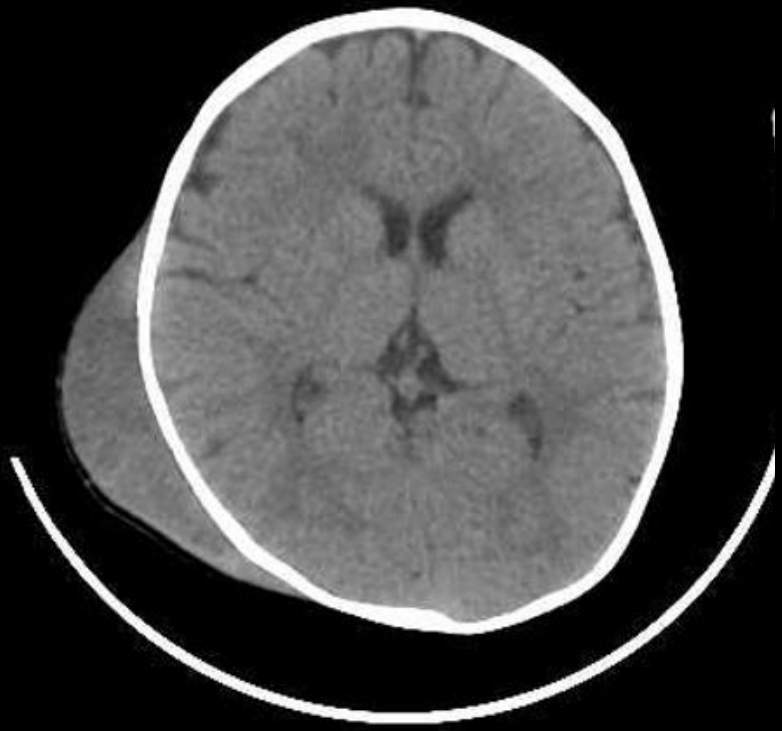
or can be

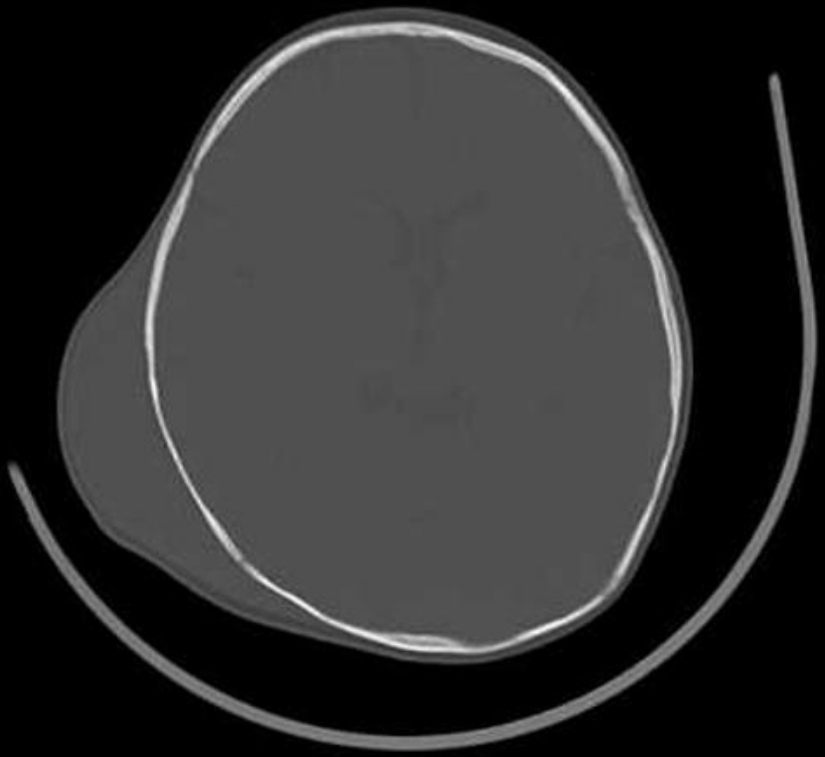
Subgaleal hematoma

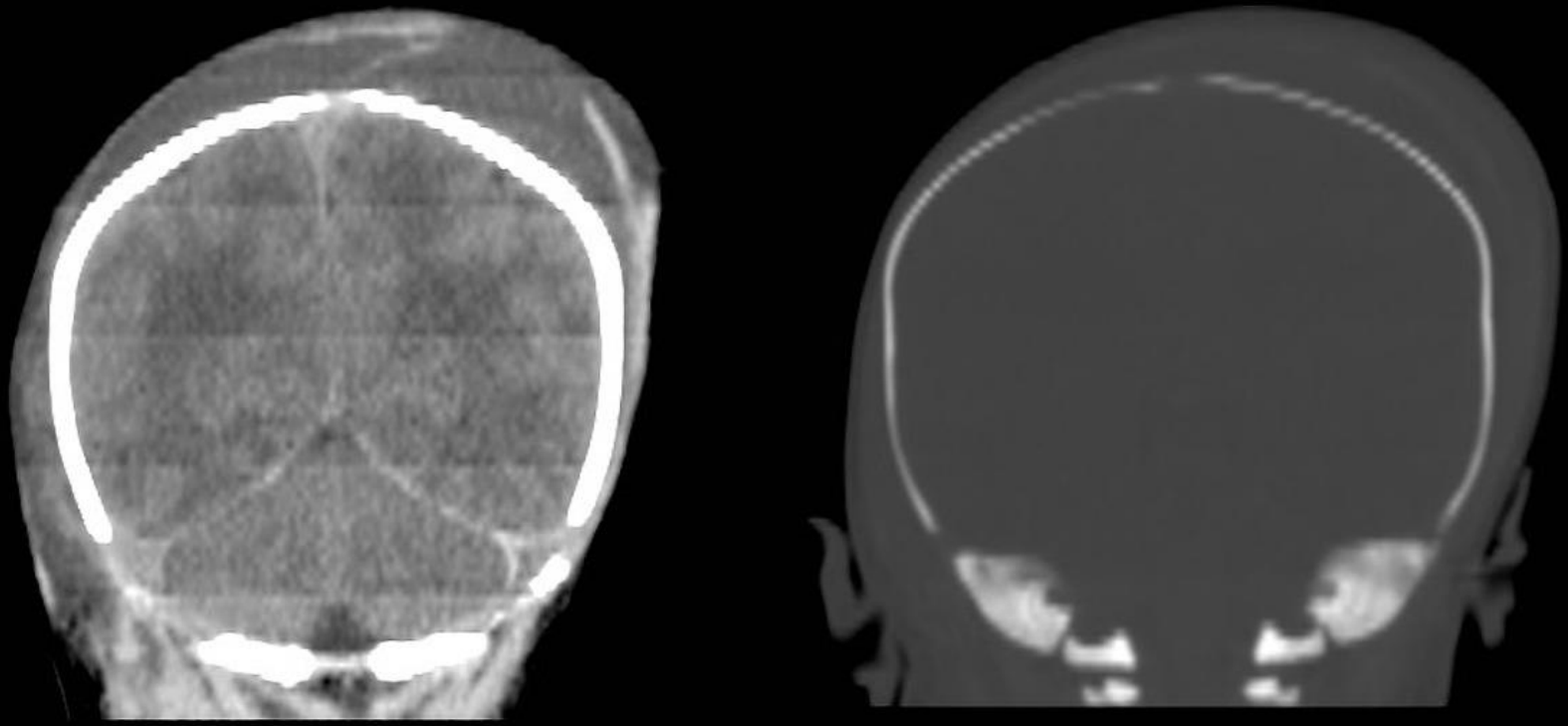
Describes scalp bleeding in the potential space between the periosteum and the galeal aponeurosis. It is a rare but possibly lethal emergency.

Bleeding occurs as a result of rupture to emissary veins which drain the scalp veins into the dural sinuses

Due to being superficial to the periosteum, subgaleal haematomas are able to cross suture lines and surround the entire skull.

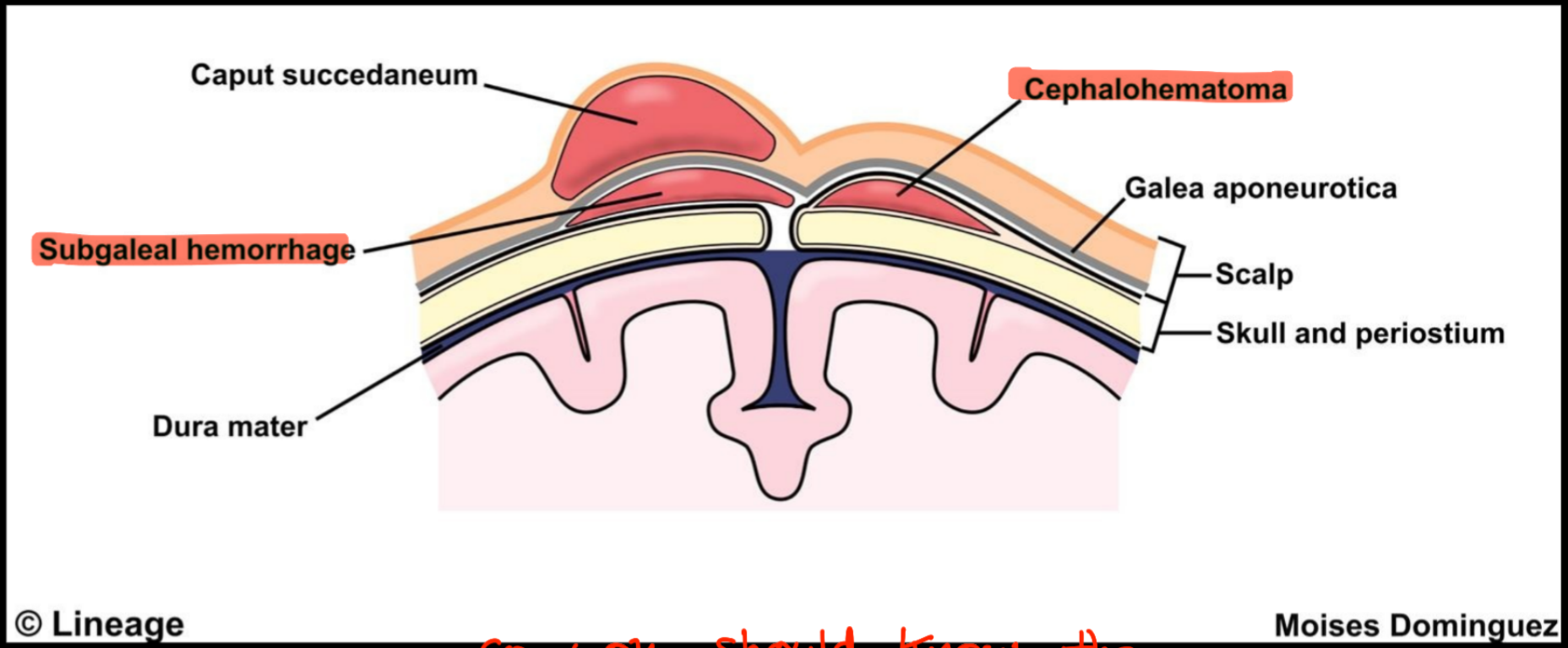






* extra

Cephalohematoma Vs Subgaleal hematoma



so you should know the LOCATION of each and which CROSSES SUTURES

pathology [2]

Calcification

- Normal variation
- Pathological :

1- AVM

2- Infection (congenital in pediatrics)

3- Tumors

4 – metabolic

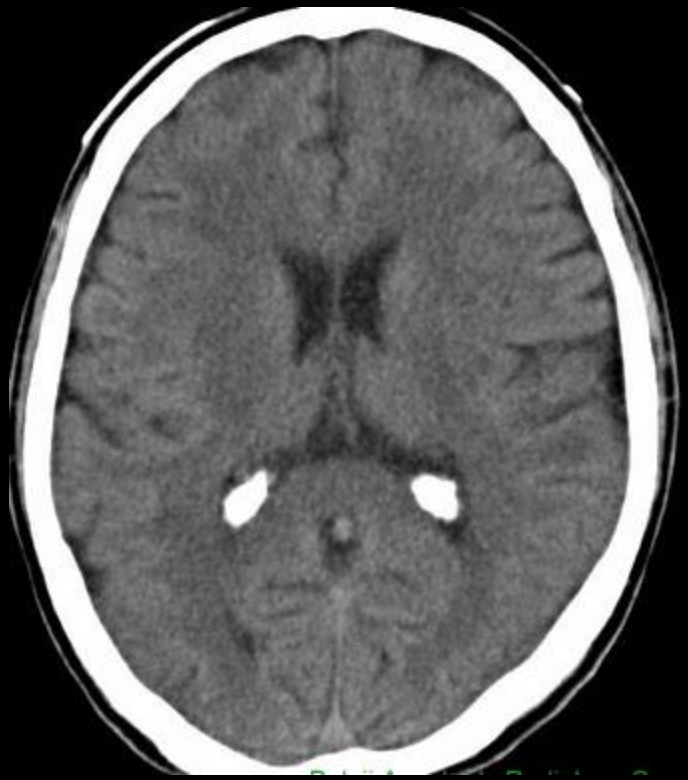
Calcification

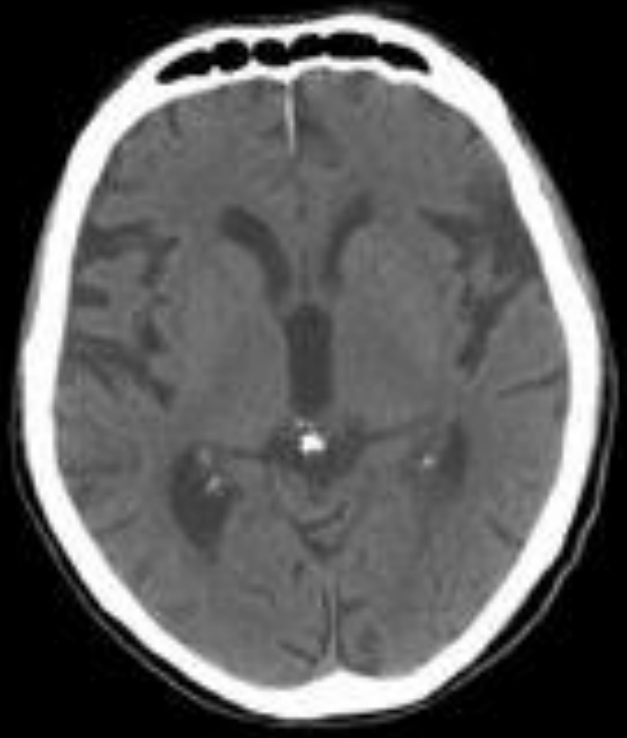
1- Normal variation/ normal aging

1) elderly → basal ganglia , vascular calcifications ,Choroid plexus , Pineal gland , dentate nuclues , calcified falx .

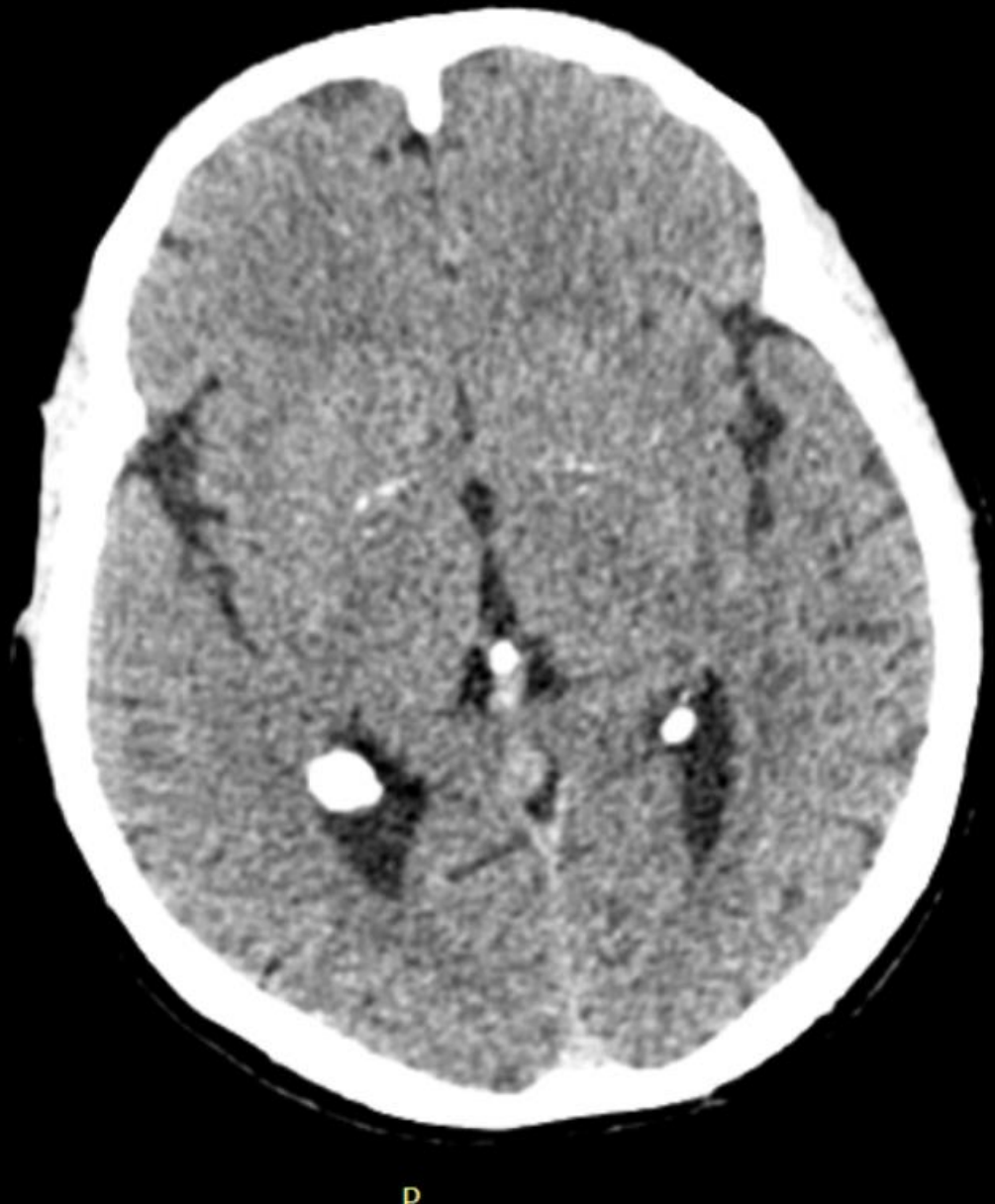
2) young → choroid plexus + pineal gland + falx

Choroid plexus and Pineal gland

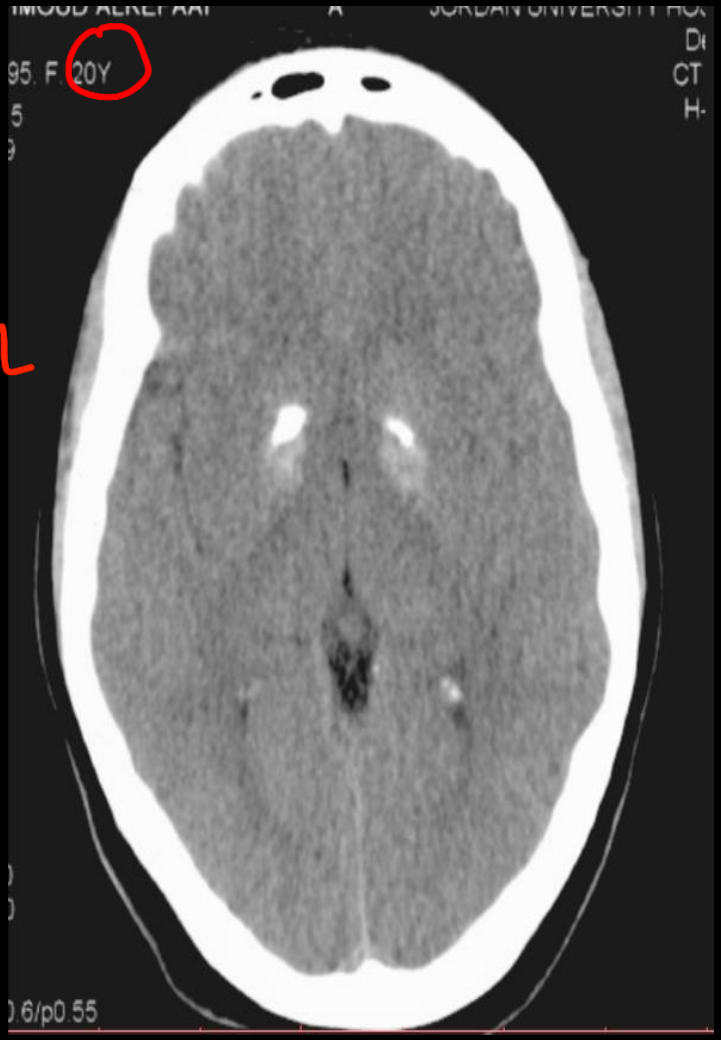




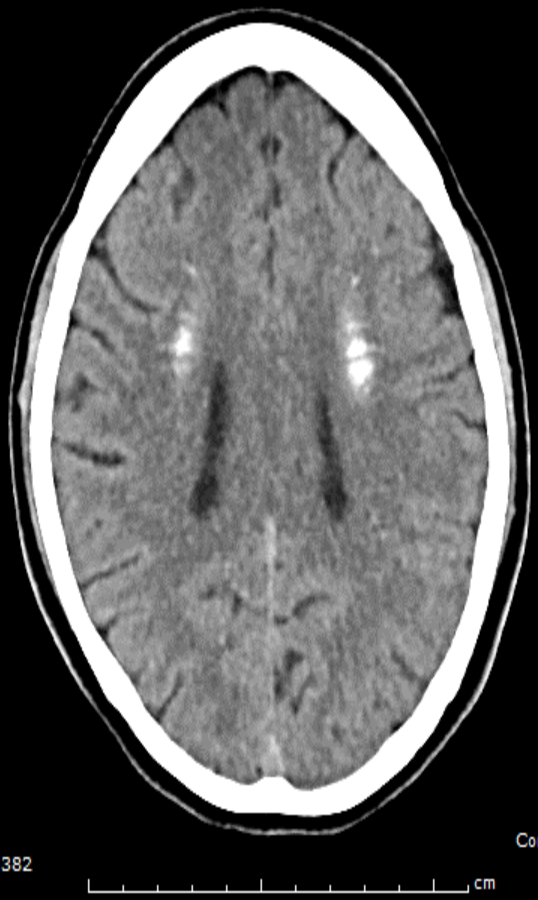
Basal ganglia



Basal ganglia



in young this
is NOT NORMAL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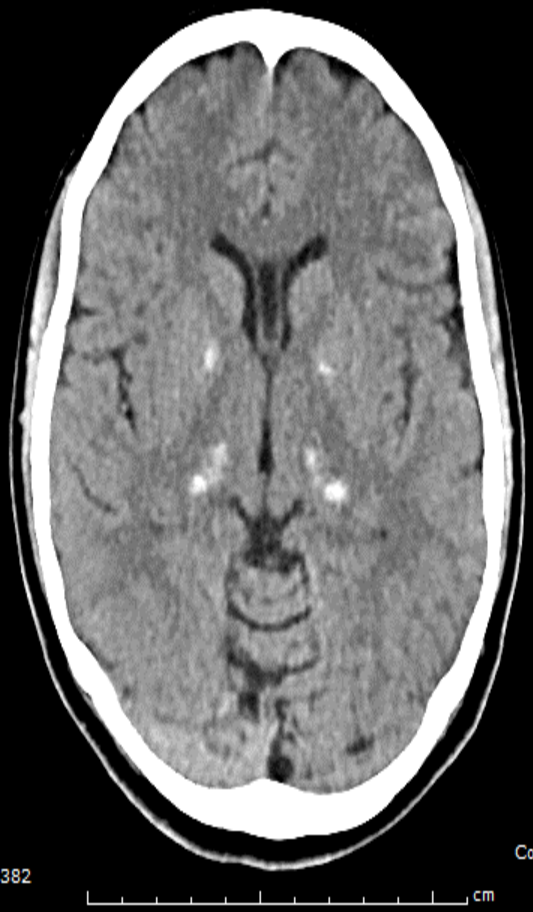
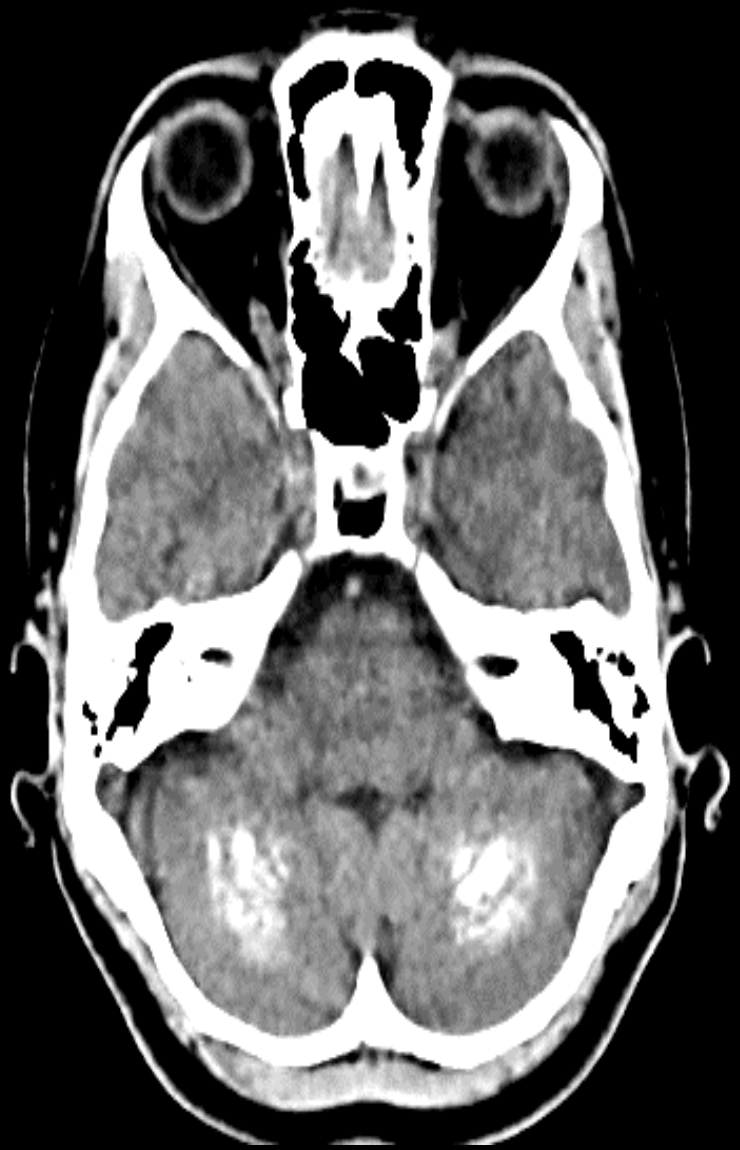
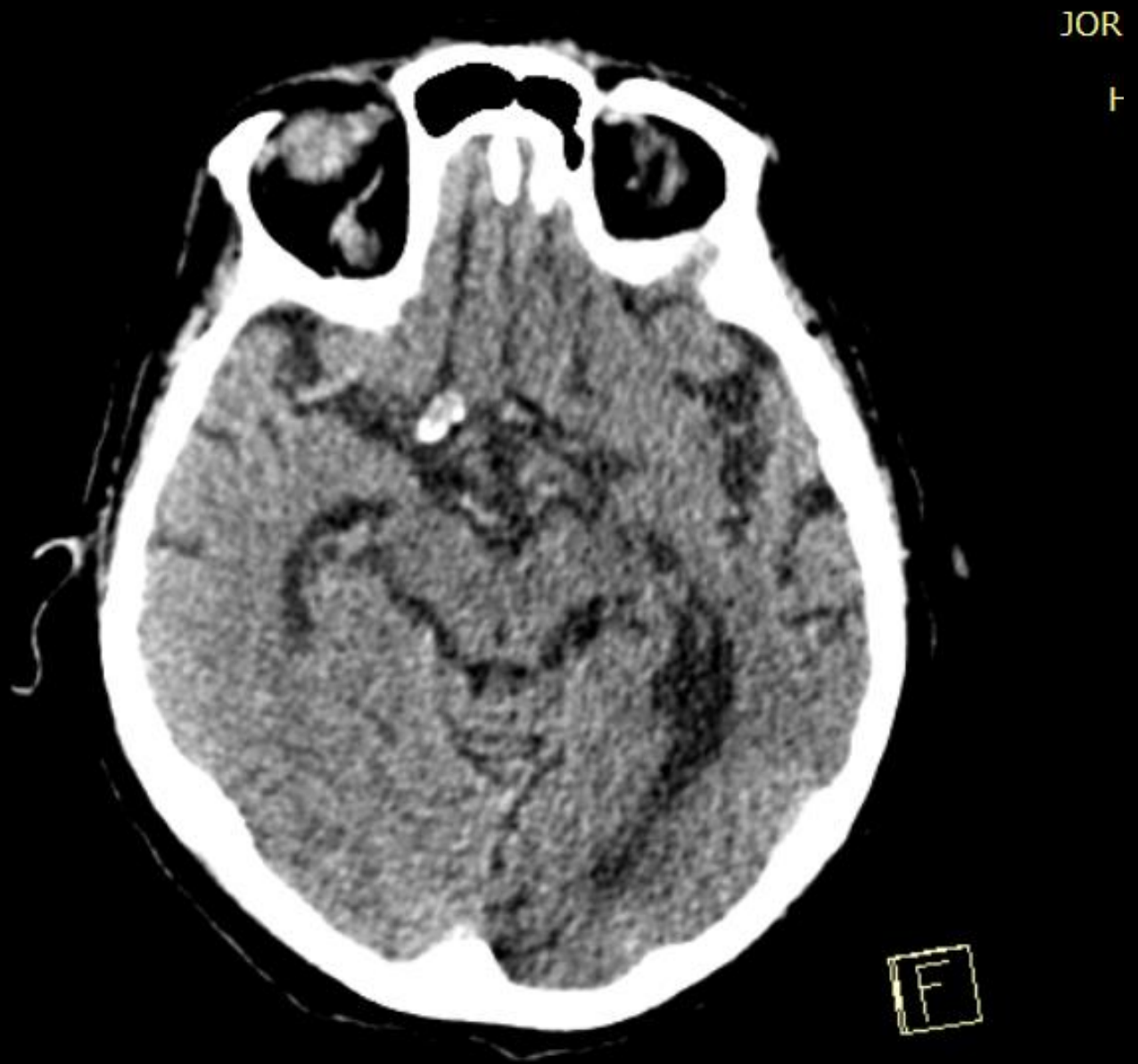
Compressed 11:1
IM: 65 SE: 3
cm


Page: 129 of 382
Compressed 11:1
IM: 91 SE: 3
cm

Dentate nucleus



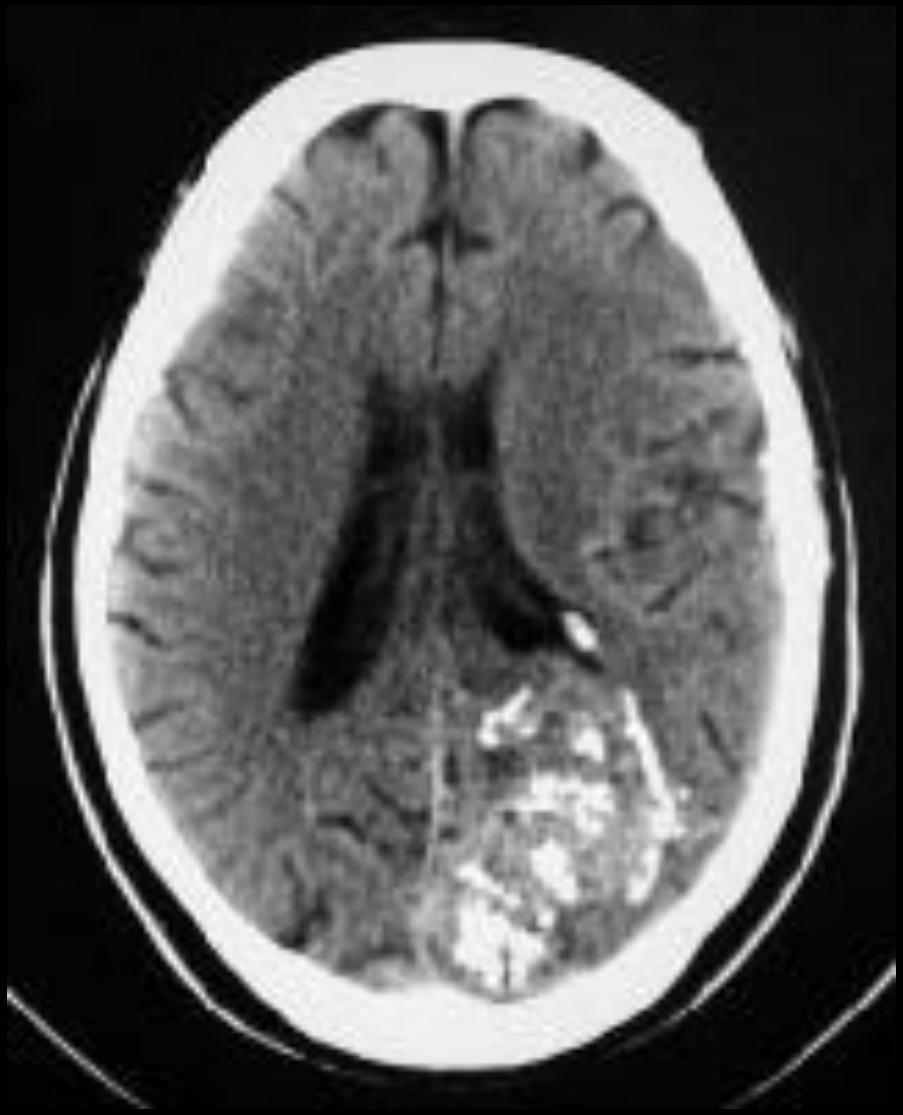
vascular calcification



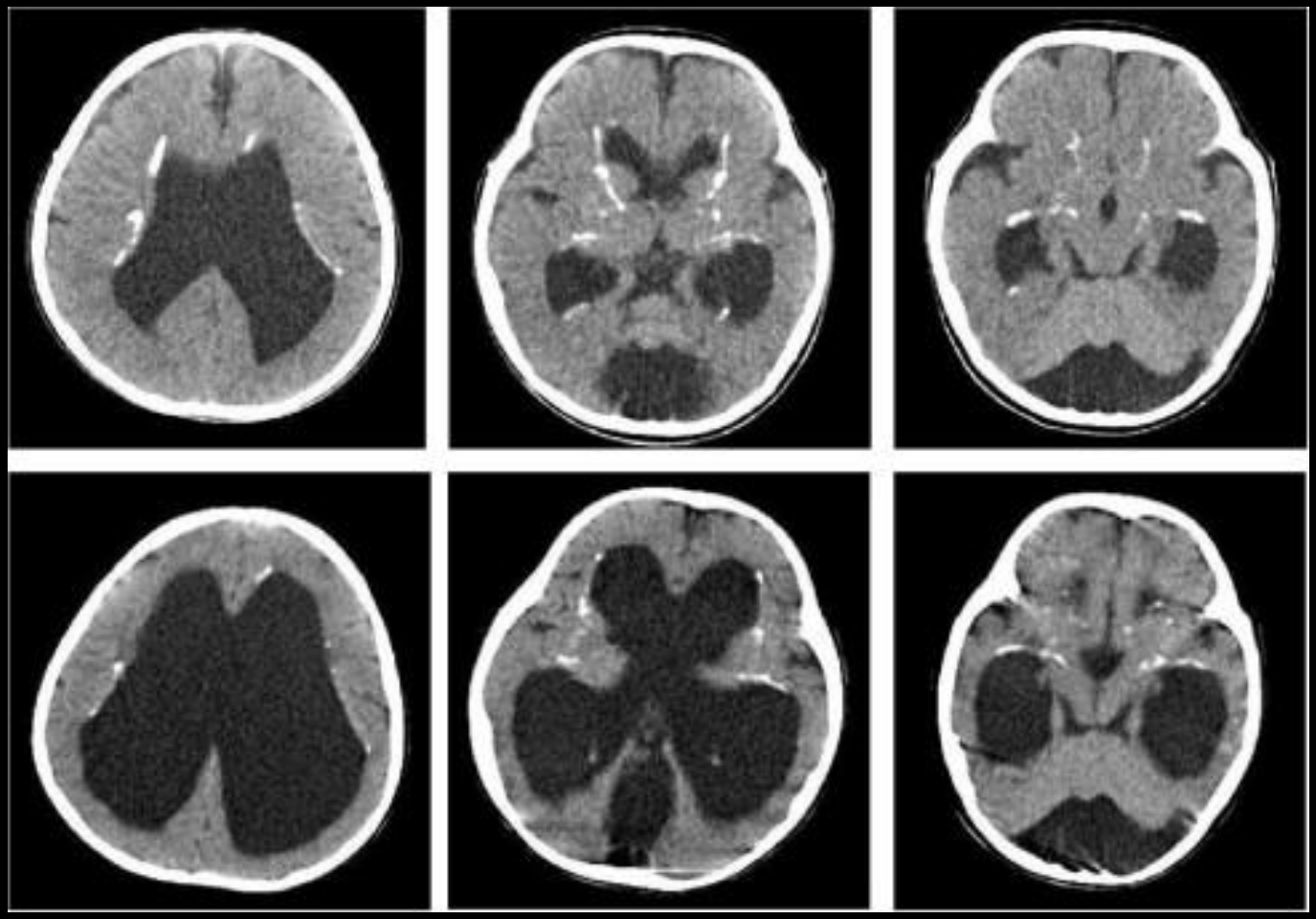
Pathological Calcification

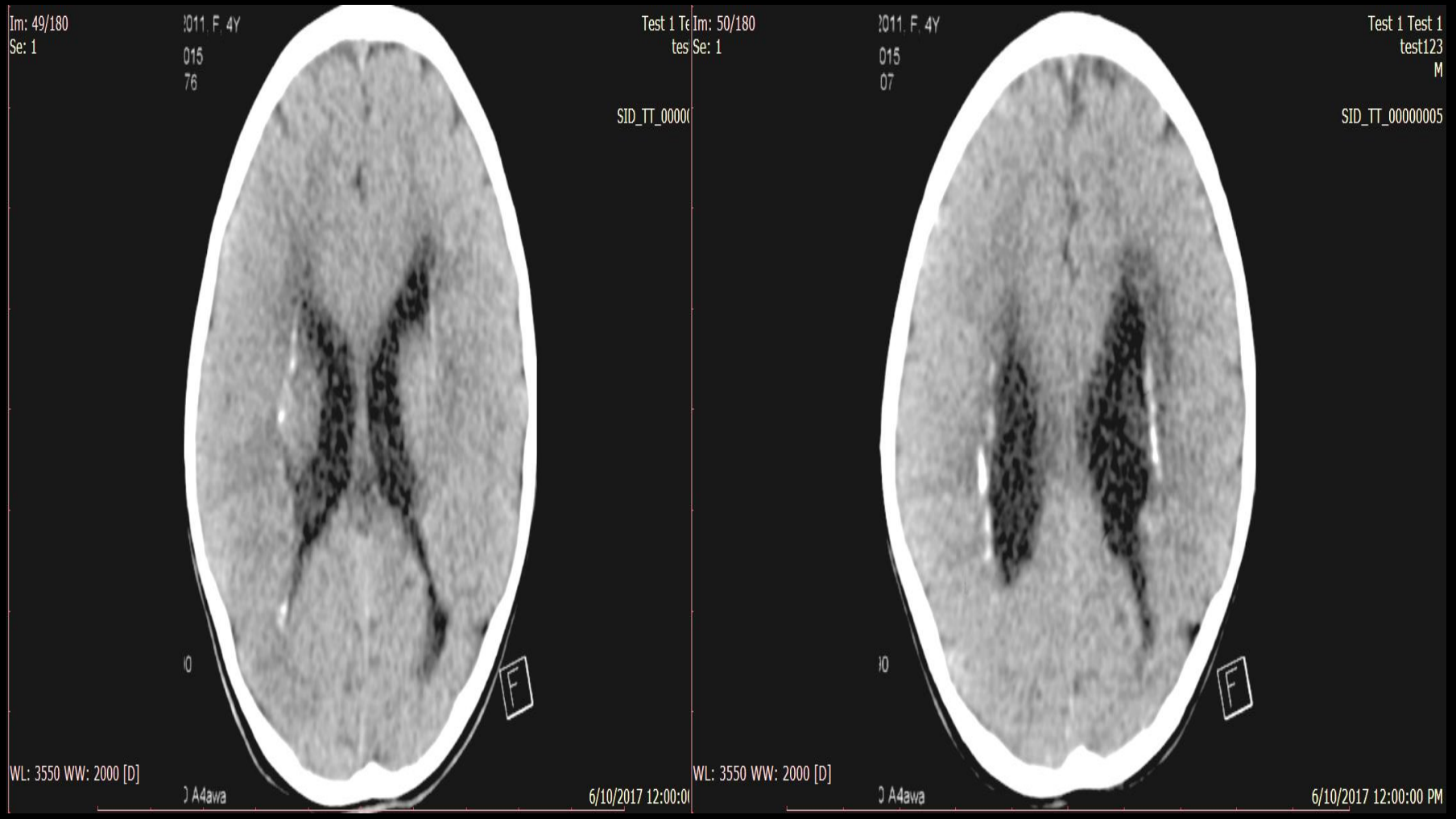
AVM

arterio-venous malformations



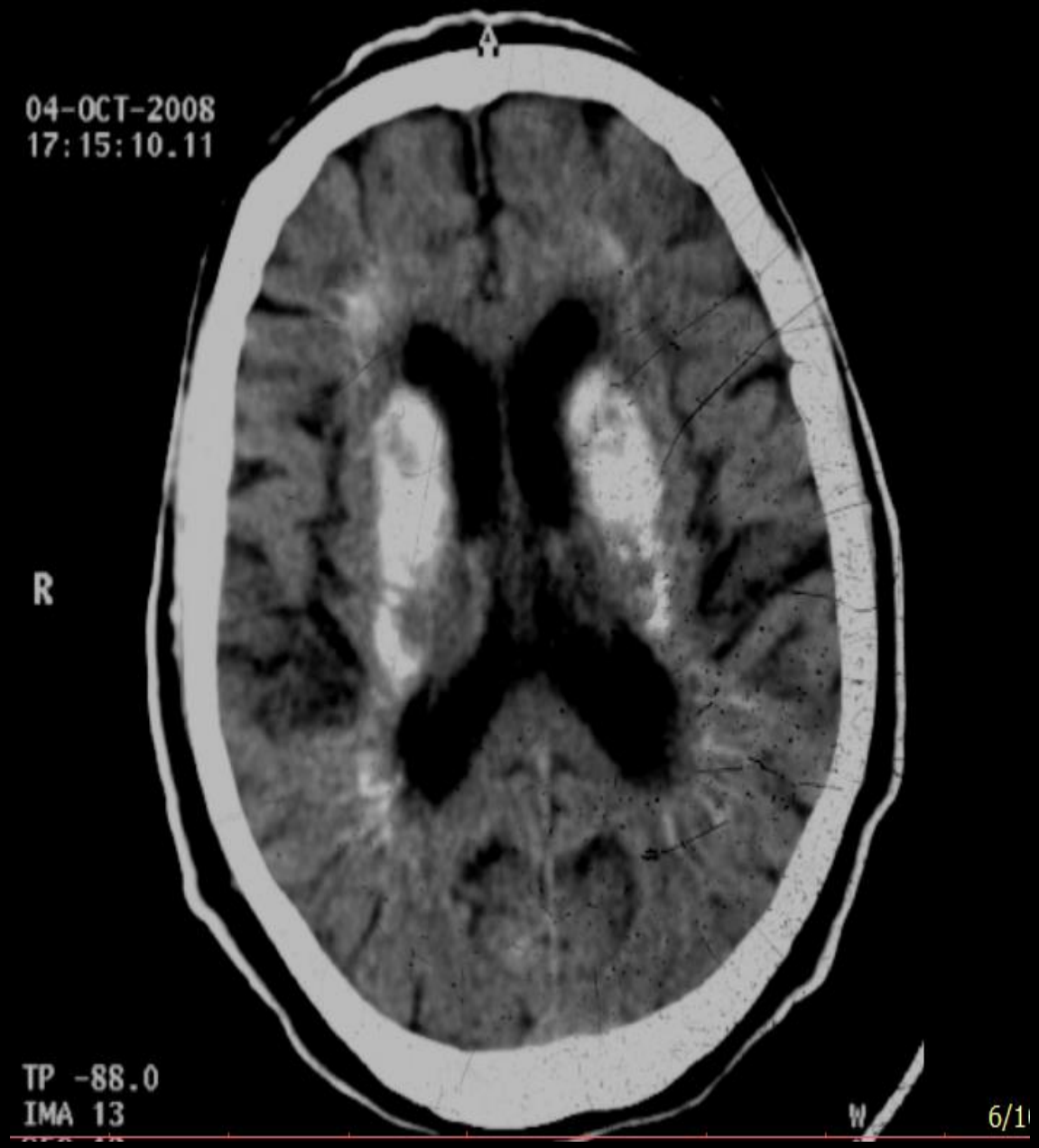
Infection (congenital) : TORCH

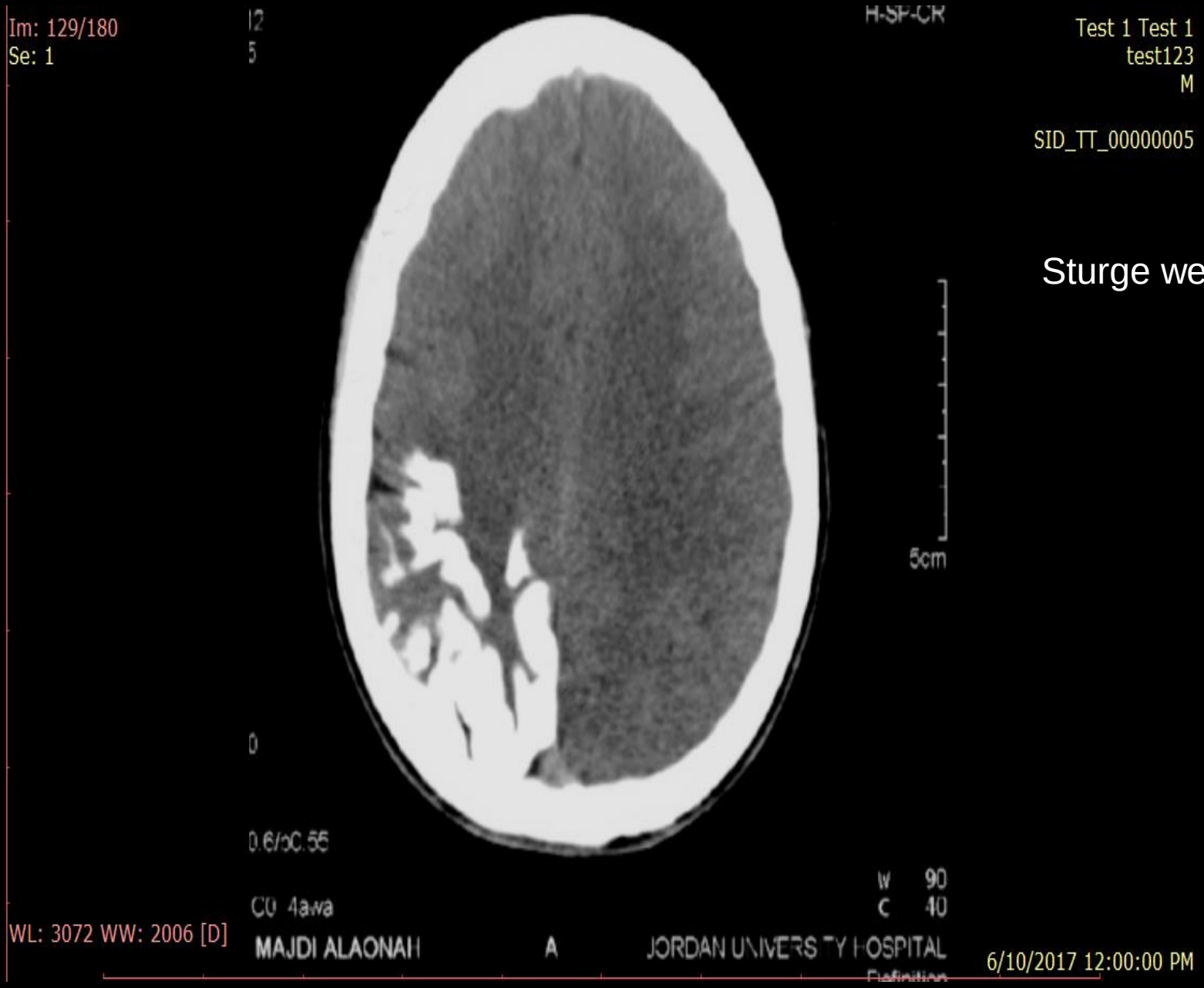




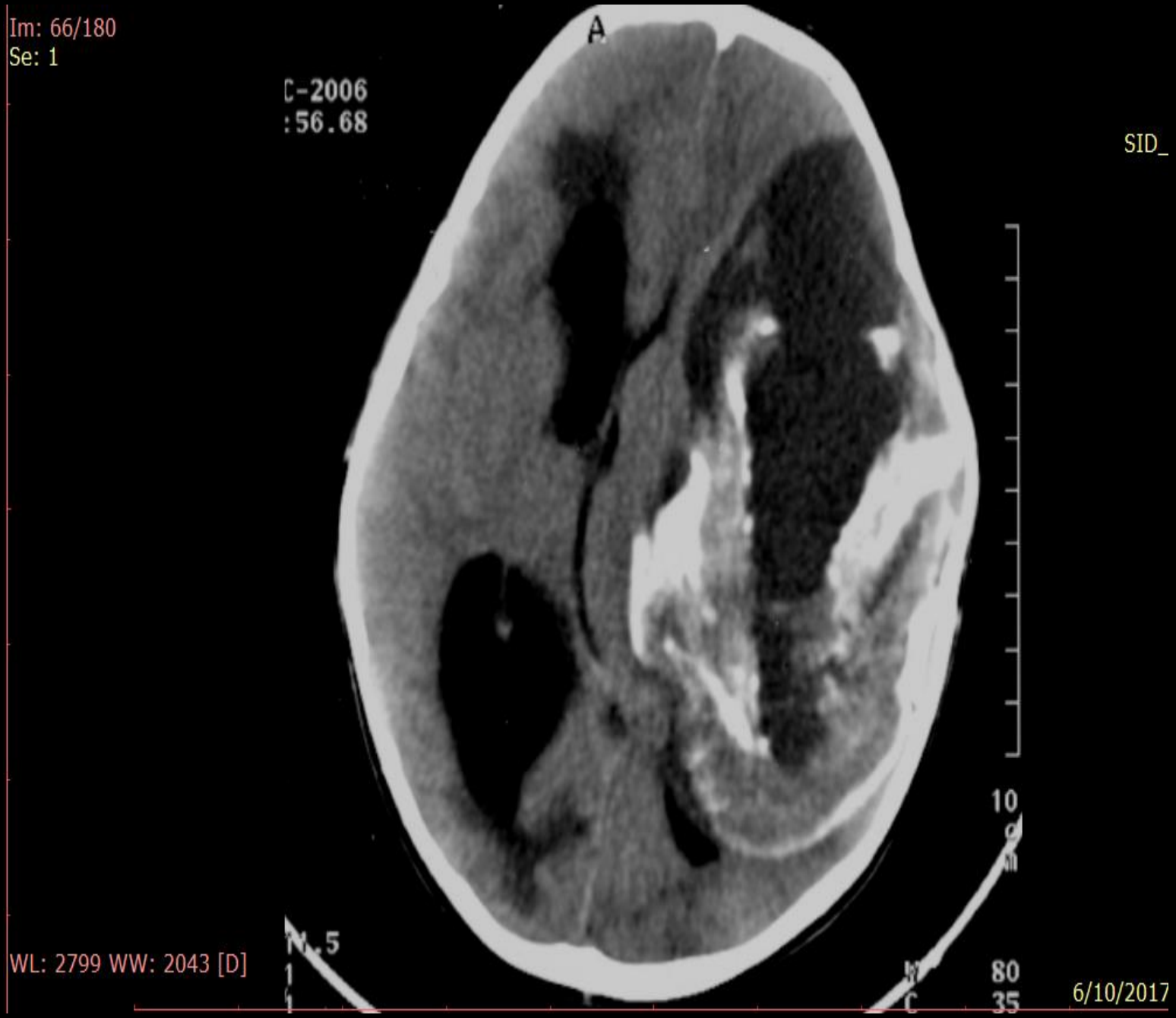
bilateral periventricular calcifications

metabolic





Sturge weber



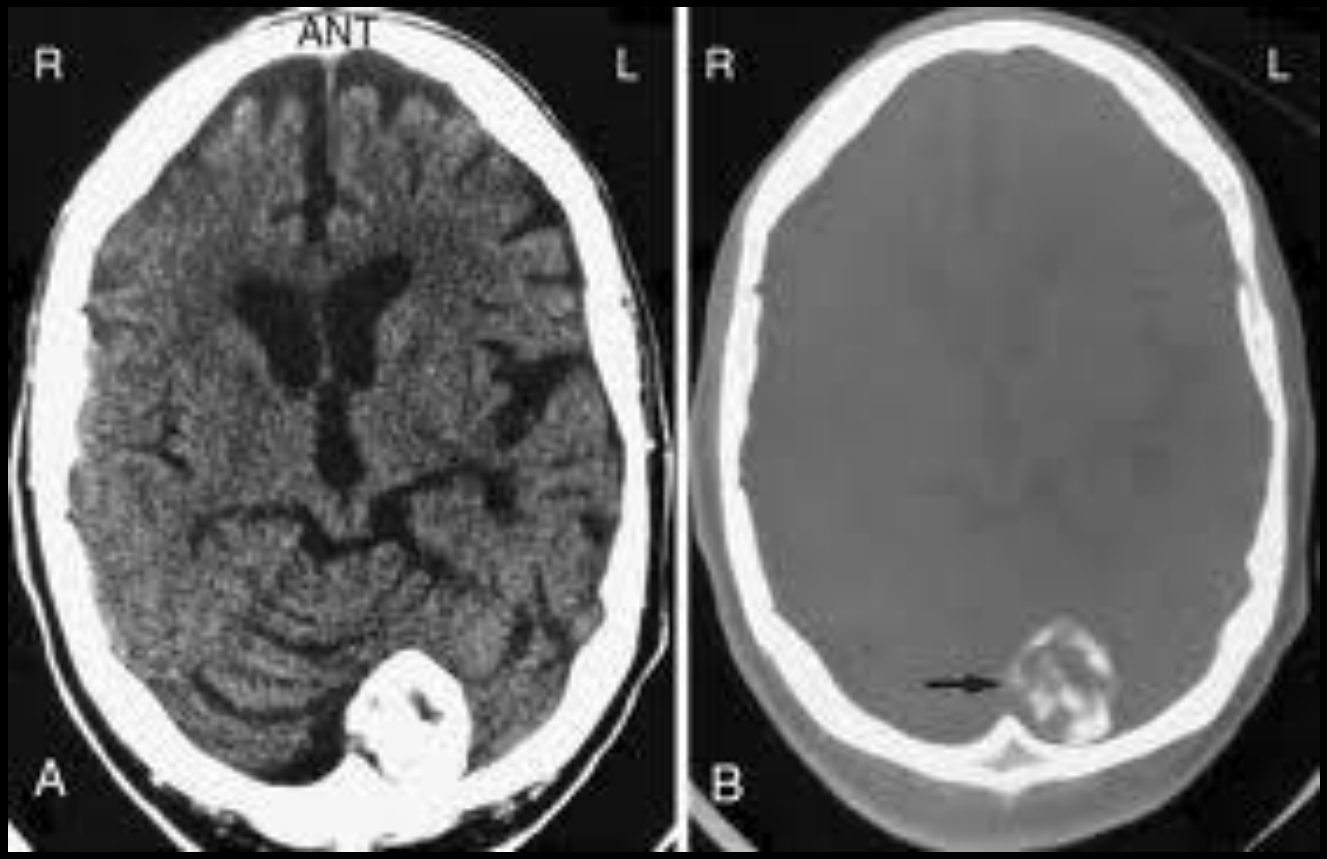
Tumor

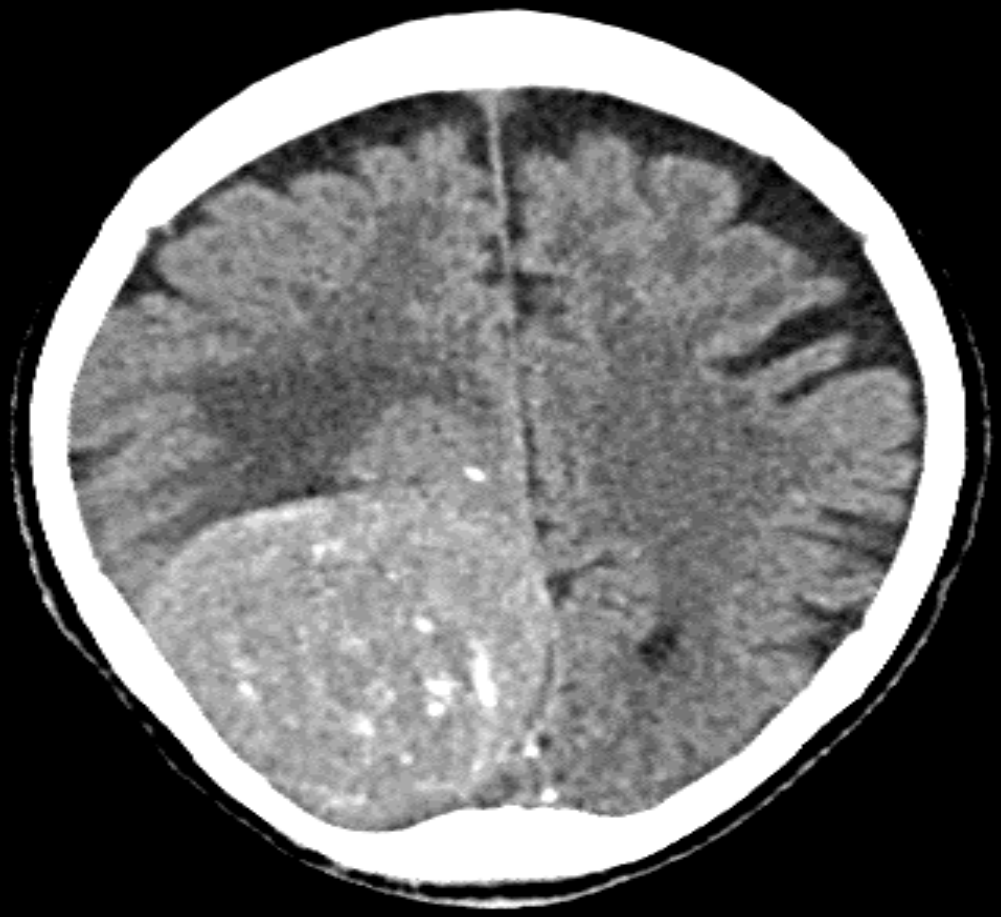
Tumors that usually calcifies :

+ Most commonly the benign ones.

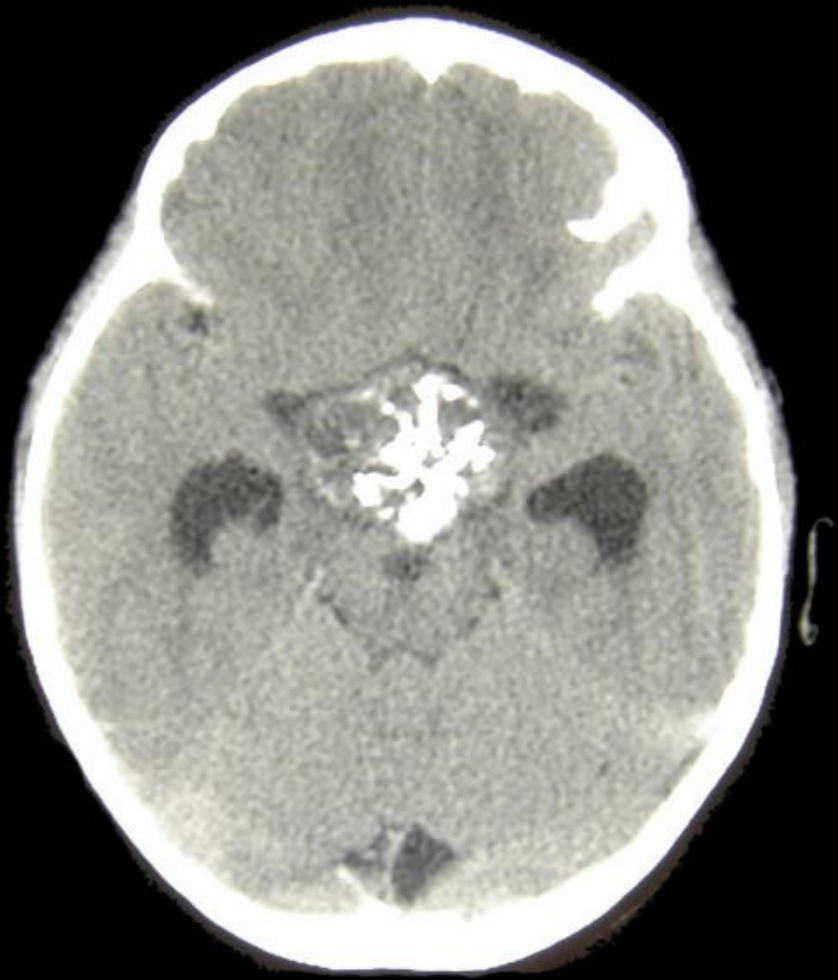
- Meningioma
- Craniopharangioma
- Low grade astrocytoma
- Oligodendroglioma

Meningioma




219
P

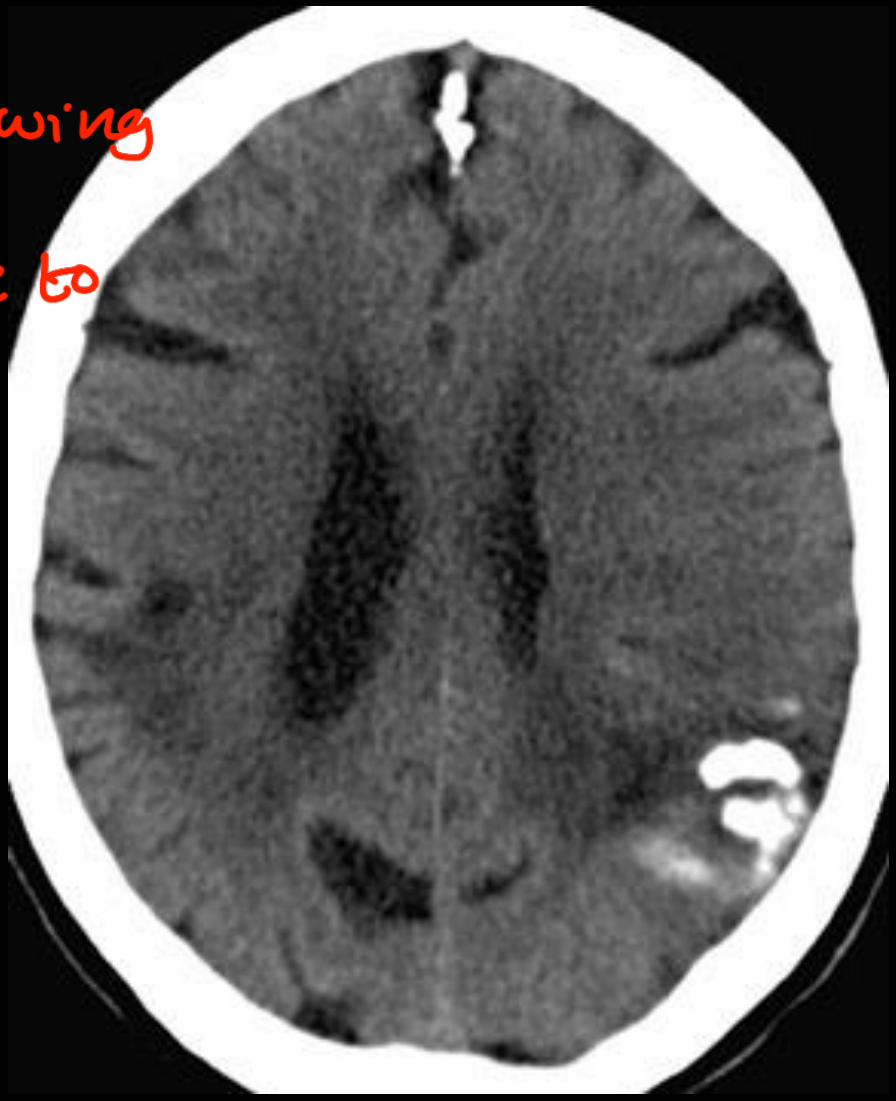
Craniopharangioma



Low grade Astrocytoma

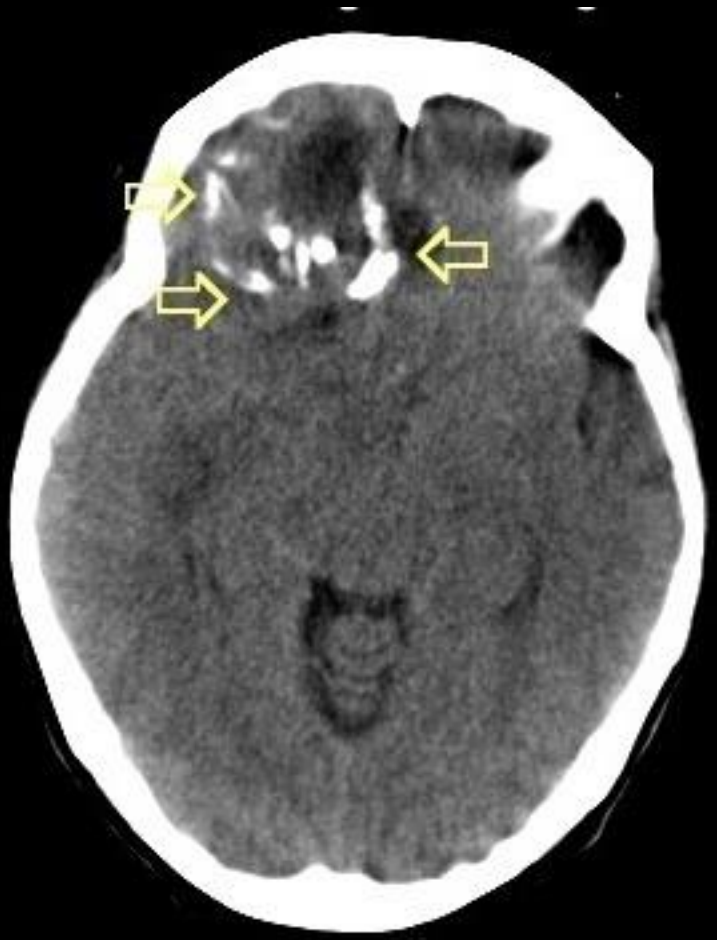
means
Slow growing

so there's time to
Calcifie



Oligodendroglioma

Most common primary tumer to calcifie



typical:

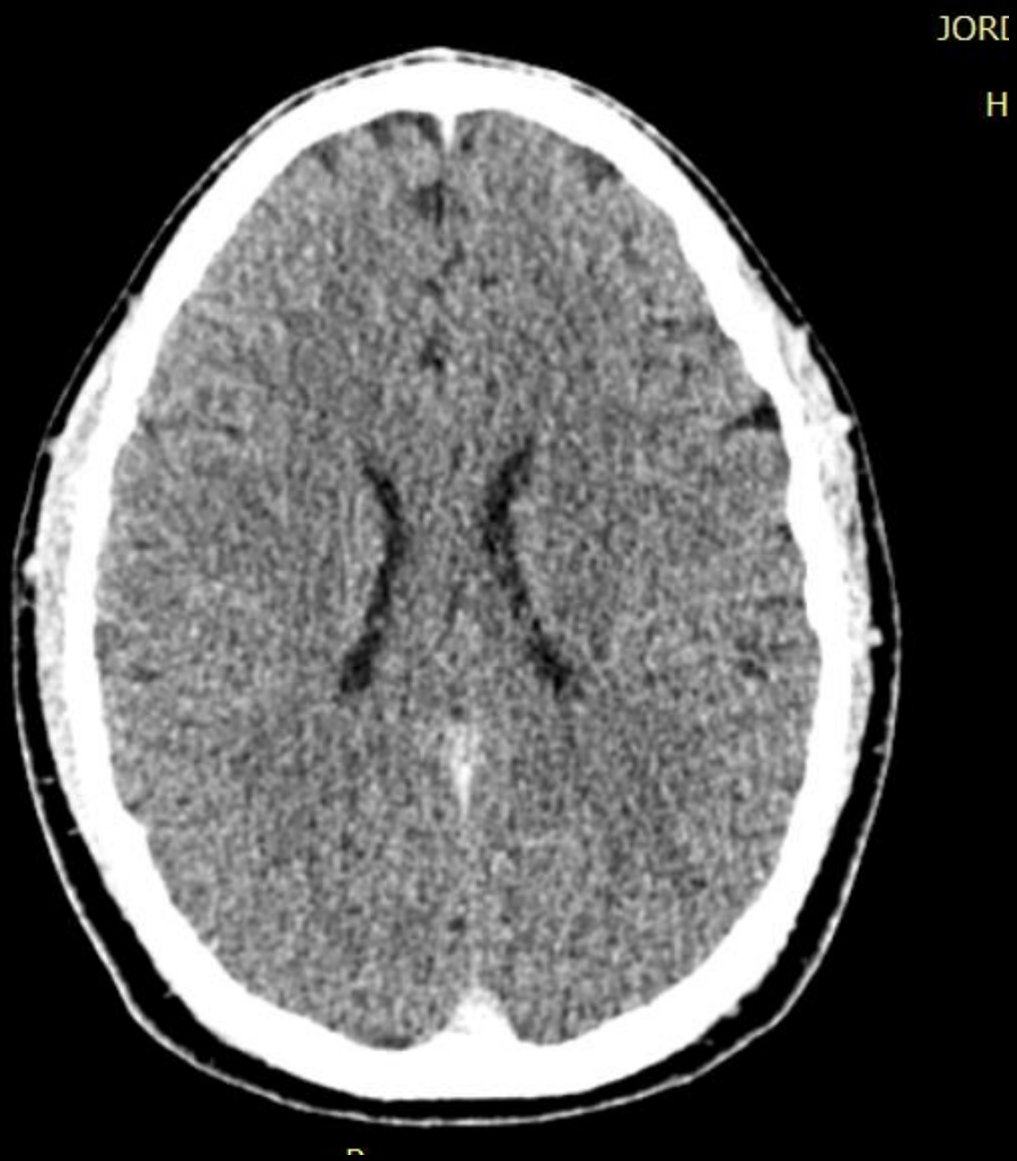
young age

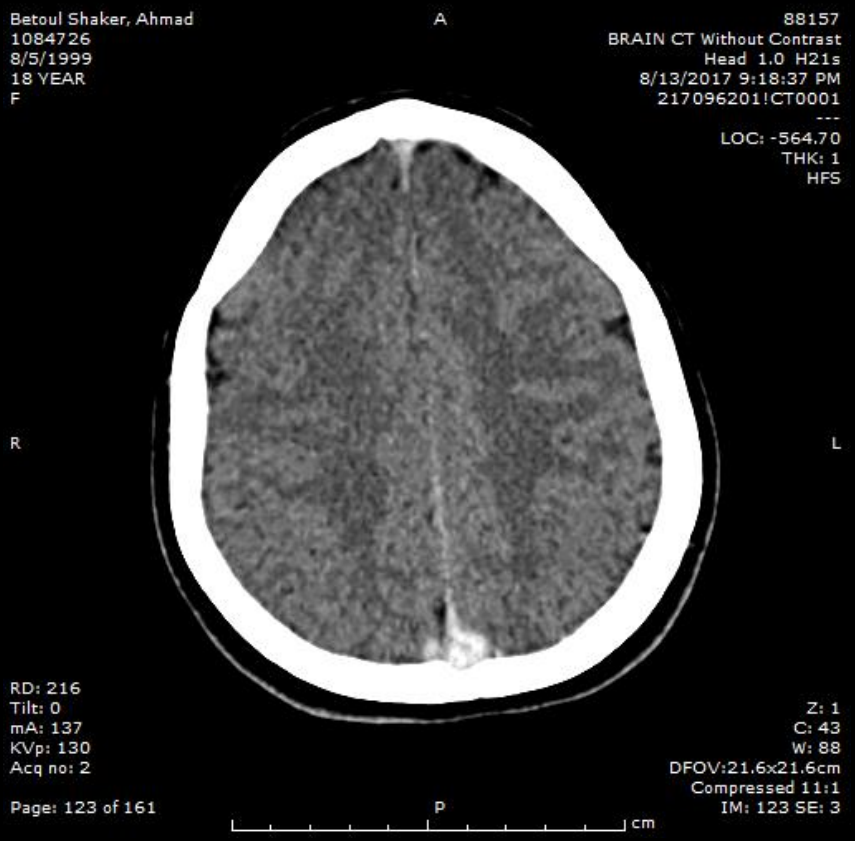
+

in frontal lobe

Thrombosed cerebral venous sinuses

Thrombosed cerebral venous sinuses

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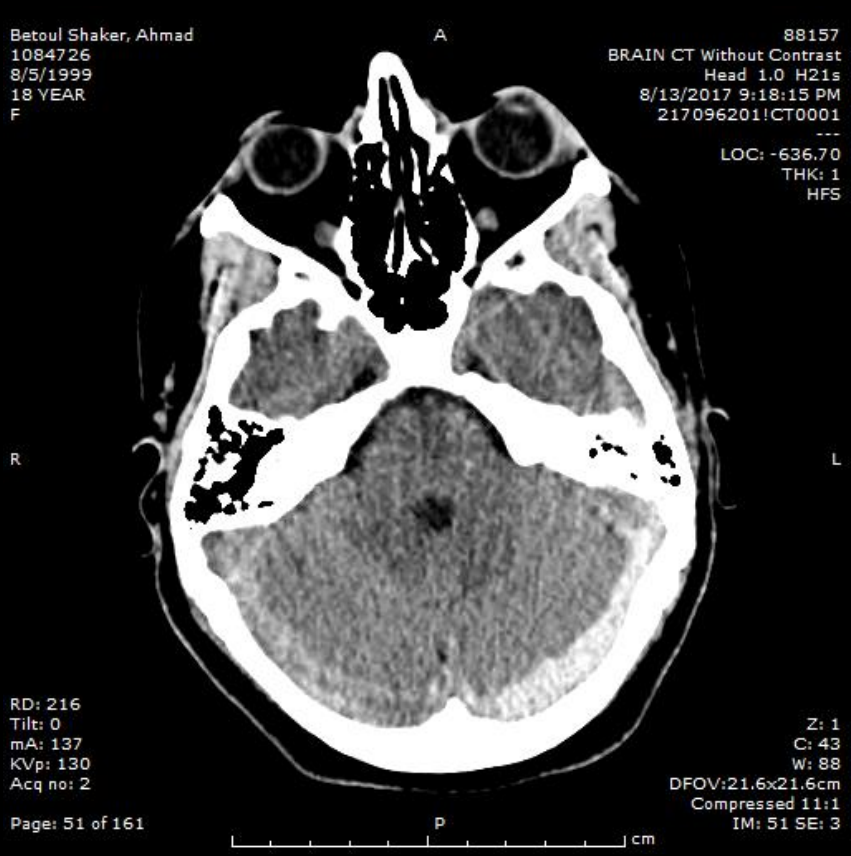
1084726
8/5/1999
18 YEAR
F
A
88157
BRAIN CT Without Contrast
Head 1.0 H21s
8/13/2017 9:18:37 PM
217096201!CT0001

LOC: -564.70
THK: 1
HFS
R
L
RD: 216
Tilt: 0
mA: 137
KVp: 130
Acq no: 2
Page: 123 of 161
Z: 1
C: 43
W: 88
DFOV:21.6x21.6cm
Compressed 11:1
IM: 123 SE: 3
P
cm


Betoul Shaker, Ahmad
1084726
8/5/1999
18 YEAR
F
A
88157
BRAIN CT Without Contrast
Head 1.0 H21s
8/13/2017 9:18:15 PM
217096201!CT0001

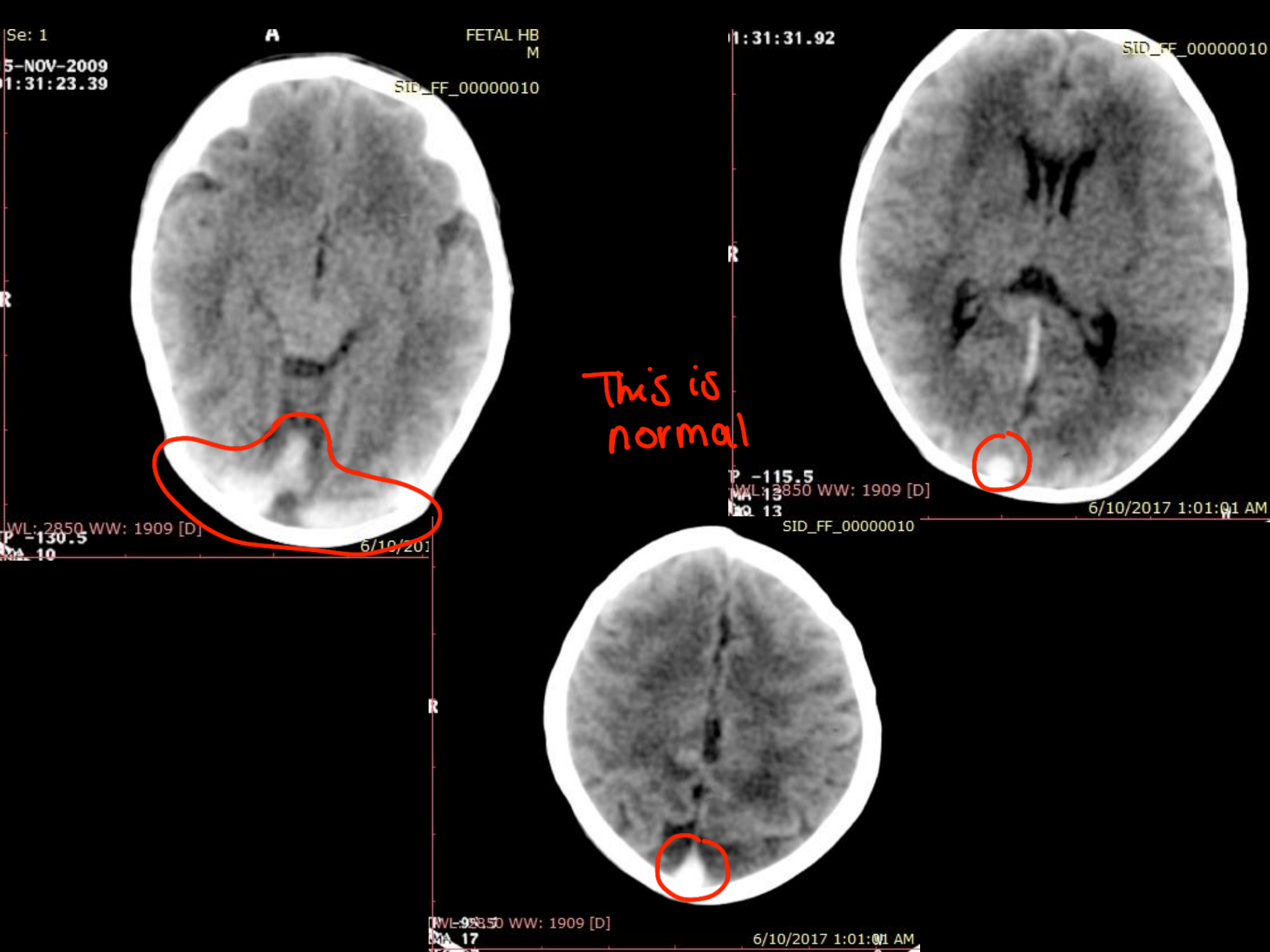
LOC: -636.70
THK: 1
HFS
R
L
RD: 216
Tilt: 0
mA: 137
KVp: 130
Acq no: 2
Page: 51 of 161
Z: 1
C: 43
W: 88
DFOV:21.6x21.6cm
Compressed 11:1
IM: 51 SE: 3
P
cm

Fetal HB

in neonates

Hb present in the first two mounths of life

it appeares hyperdence on CT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FETAL HB
M
5-NOV-2009
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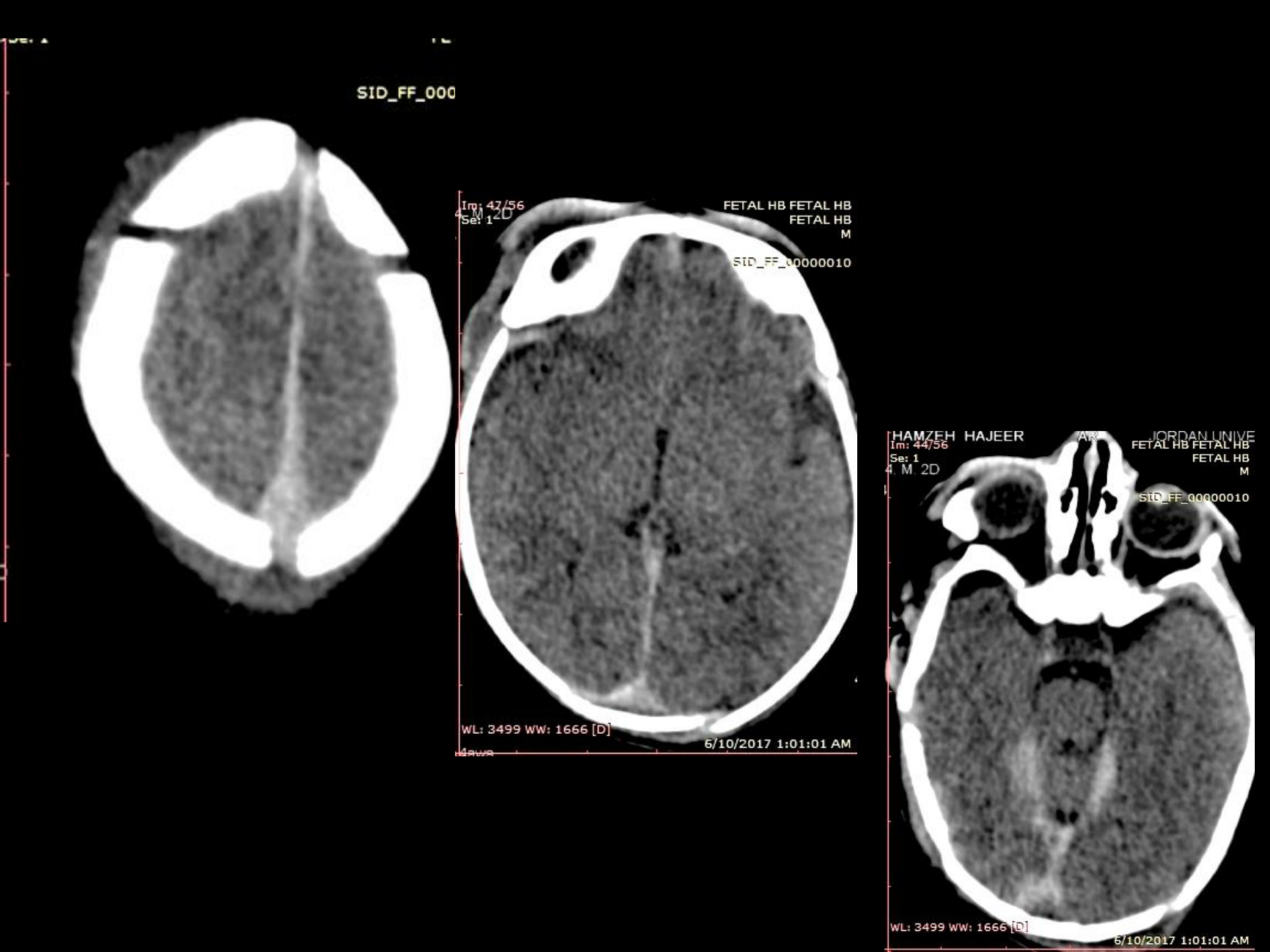
WL: 2850 WW: 1909 [D]
-130.5
10
1:31:31.92
SID_FF_00000010
-115.5
WL: 2850 WW: 1909 [D]
13
6/10/2017 1:01:01 AM
SID_FF_00000010
This is normal
WW: 1909 [D]
17
6/10/2017 1:01:01 AM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FETAL HB
M
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6/10/2017 1:01:01 AM
HAMZEH HAJEER
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Se: 1
4 M 2D
JORDAN UNIVE
FETAL HB FETAL HB
FETAL HB
M
SID_FF_00000010
WL: 3499 WW: 1666 [D]
6/10/2017 1:01:01 AM

Contrast enhancing lesions

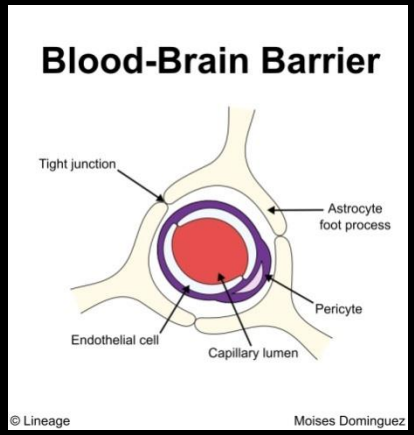
Benign

Malignant

When there is breakage in BBB , there will be enhancement

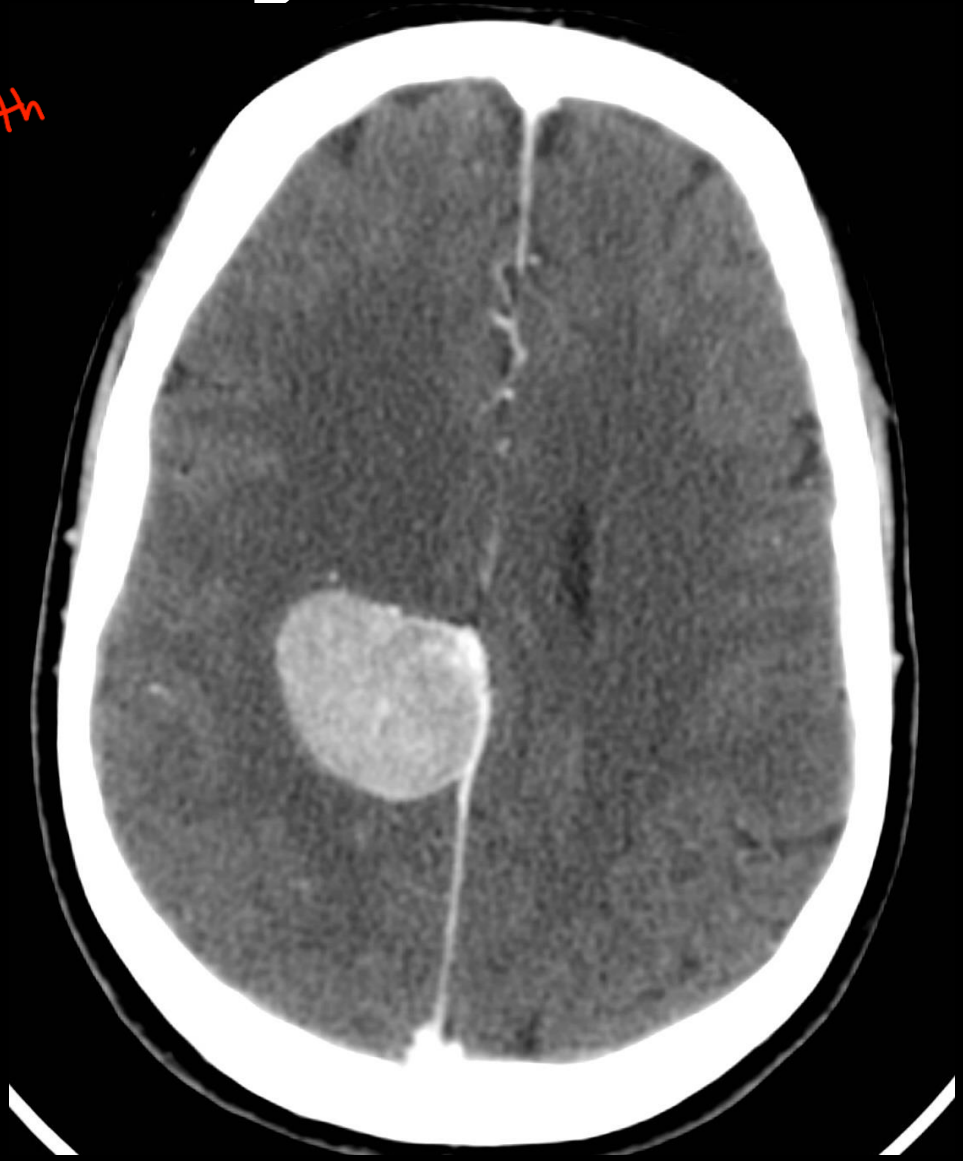
Structures that normally enhance(they have no BBB) :

pineal gland , pituitary gland and choroid plexus



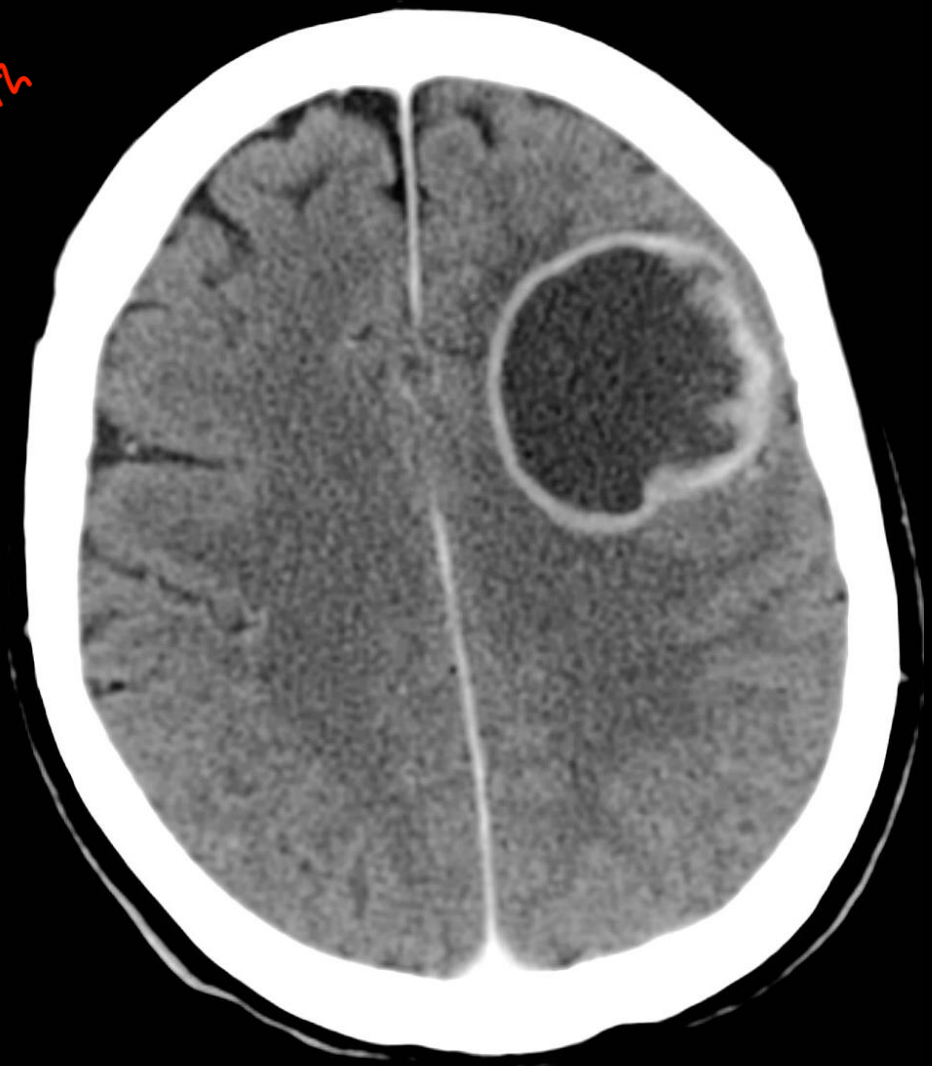
Benign: Meningioma

it inhances with contrast



Benign: Abscess

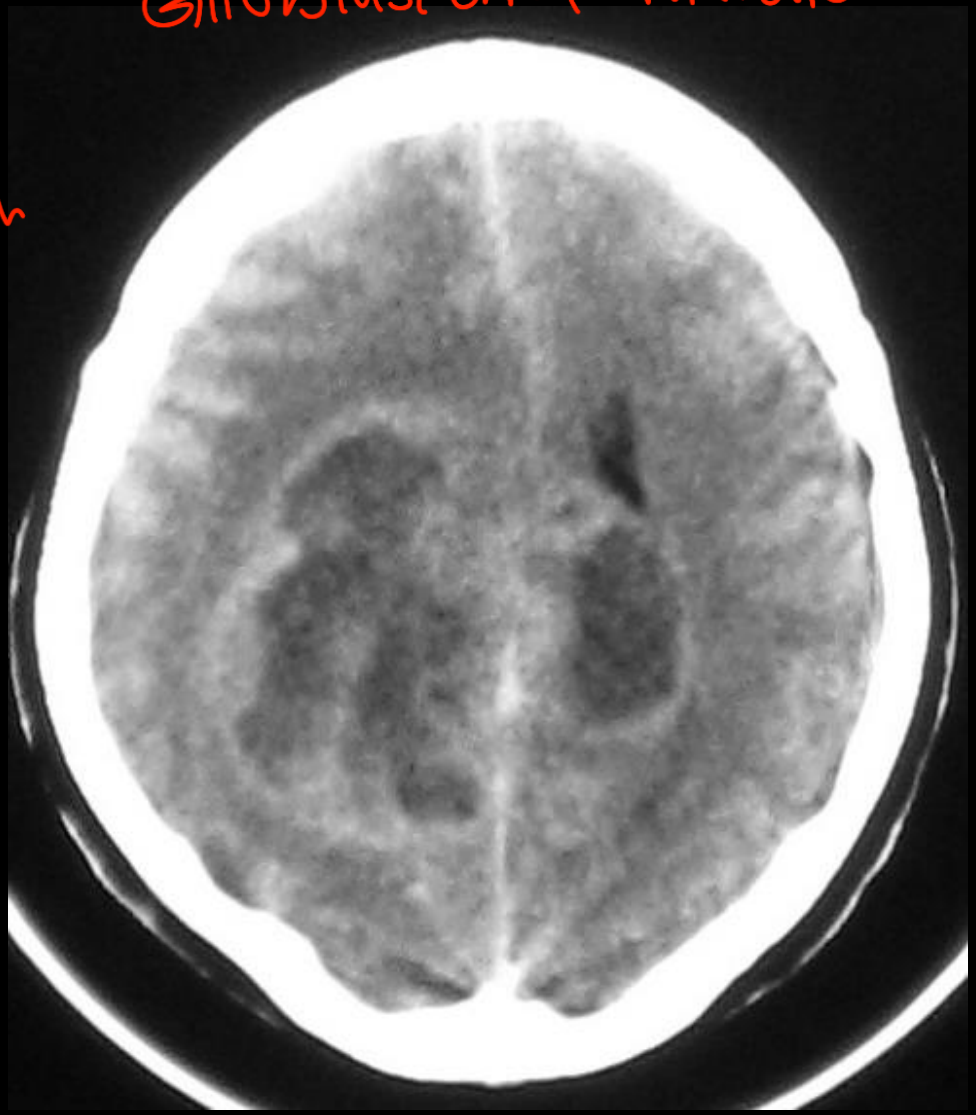
it inhances with contrast

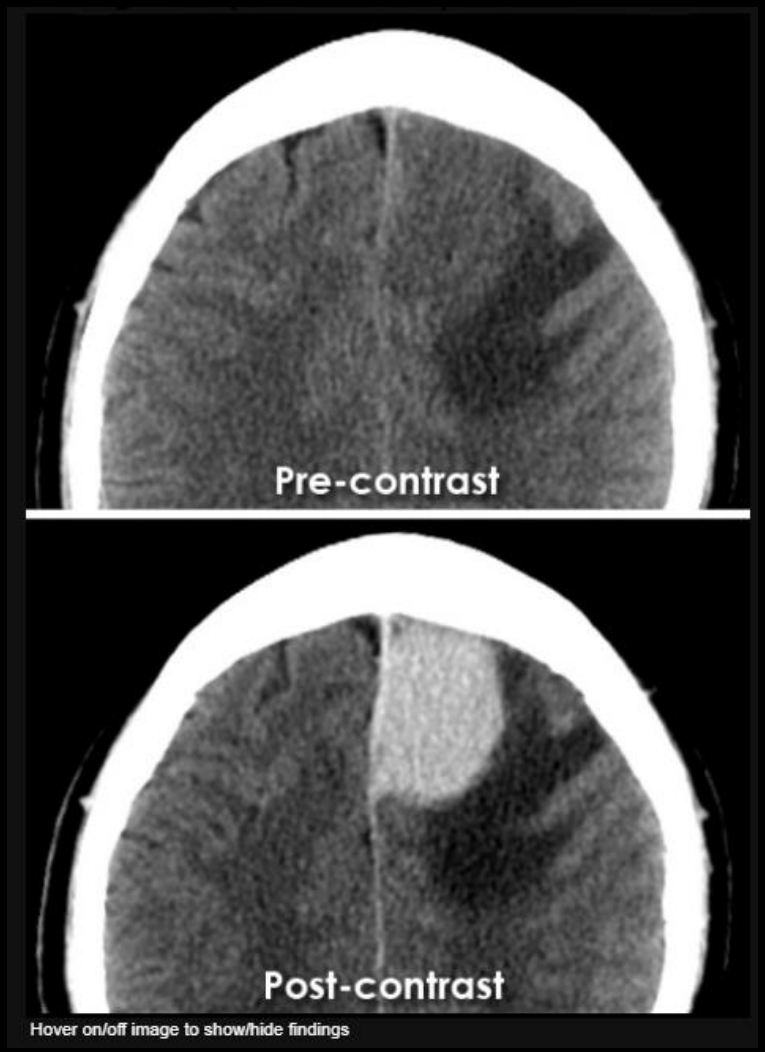


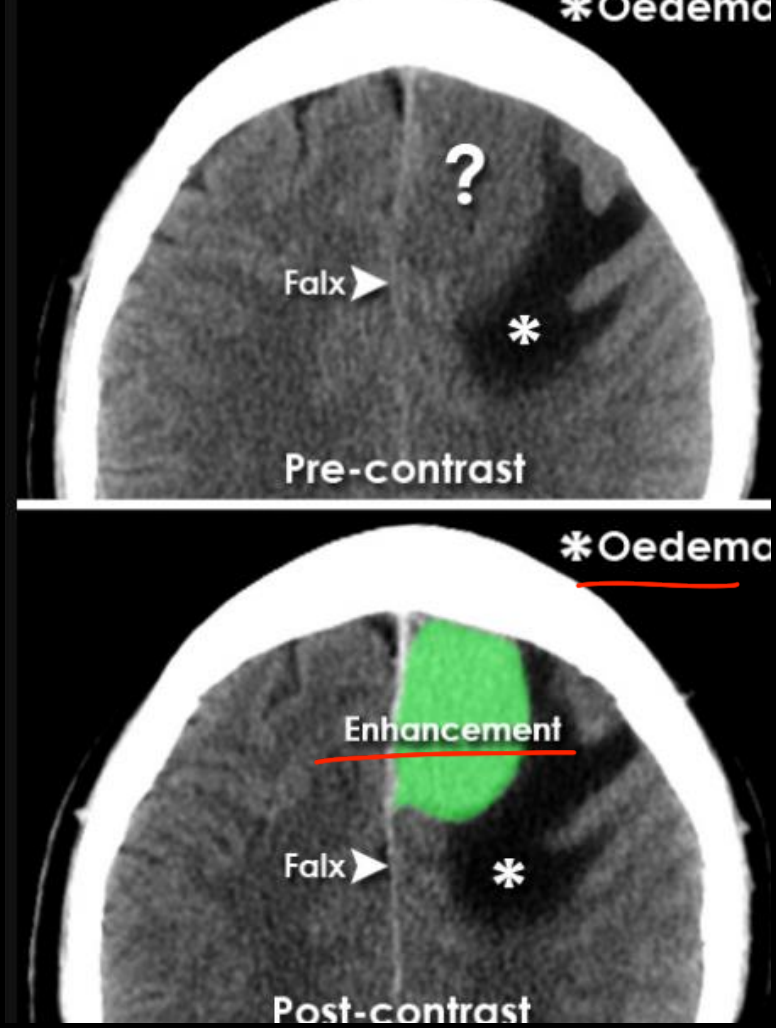
Malignant : GBM

Glioblastoma multiforme

it inhances with contrast







Before contrast is given this meningioma is barely visible
Post-contrast it enhances brightly and its location next to the meningeal surface (falx) is clearly seen
Cerebral oedema - black area next to the meningioma (**asterisk**) - is a finding often associated with a large meningioma

Hypodense Lesions:

1- Fluid

2- air

3- Fat

Hypodense Lesions:

Fluid:

CSF: normal v/s hydrocephalus

Edema: vasogenic v/s cytotoxic

Diffuse brain edema

Necrotic tissue: tumor v/s abscess (in gray)

Edema 1. focal

↳ (V)asogenic (in white matter)

caused by breakdown of BBB

⚠ ↳ cytotoxic (in white + gray matter)

caused by (V)ascular occlusion

the 2 Vs don't come together (the Vascular occlusion doesn't happen in Vasogenic edema)

2. diffused

why do I need to differentiate between the causes?

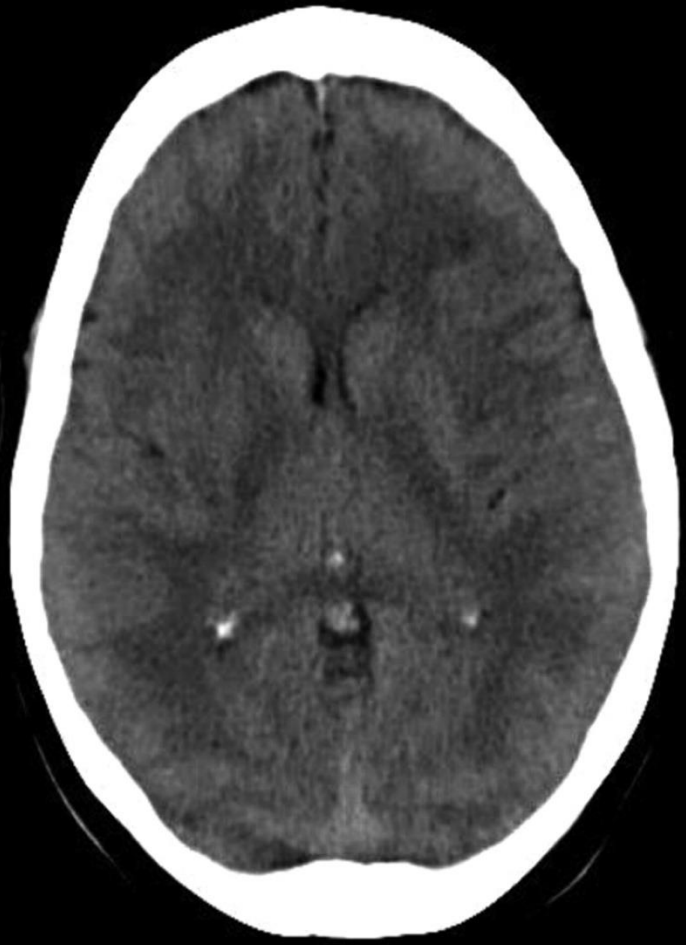
↳ it affects Management

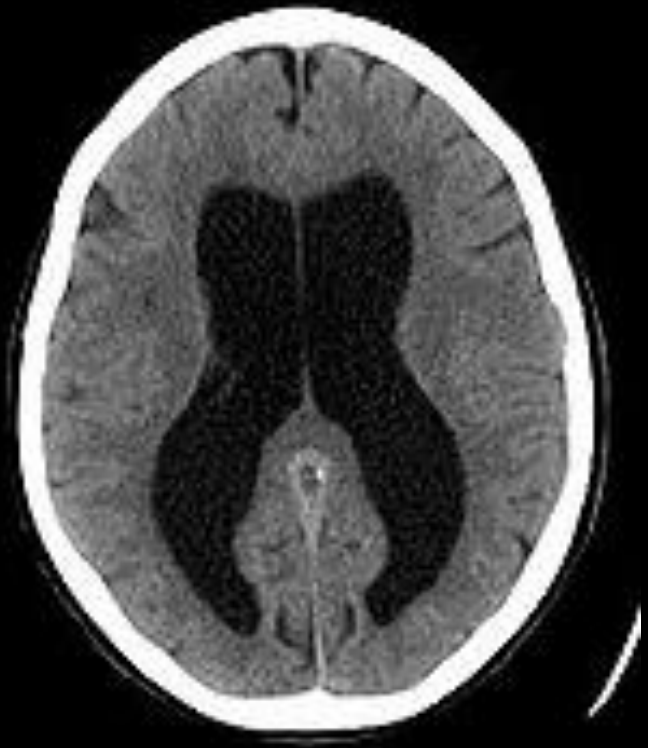
eg- cytotoxic → give anticoagulation

vasogenic → steroids

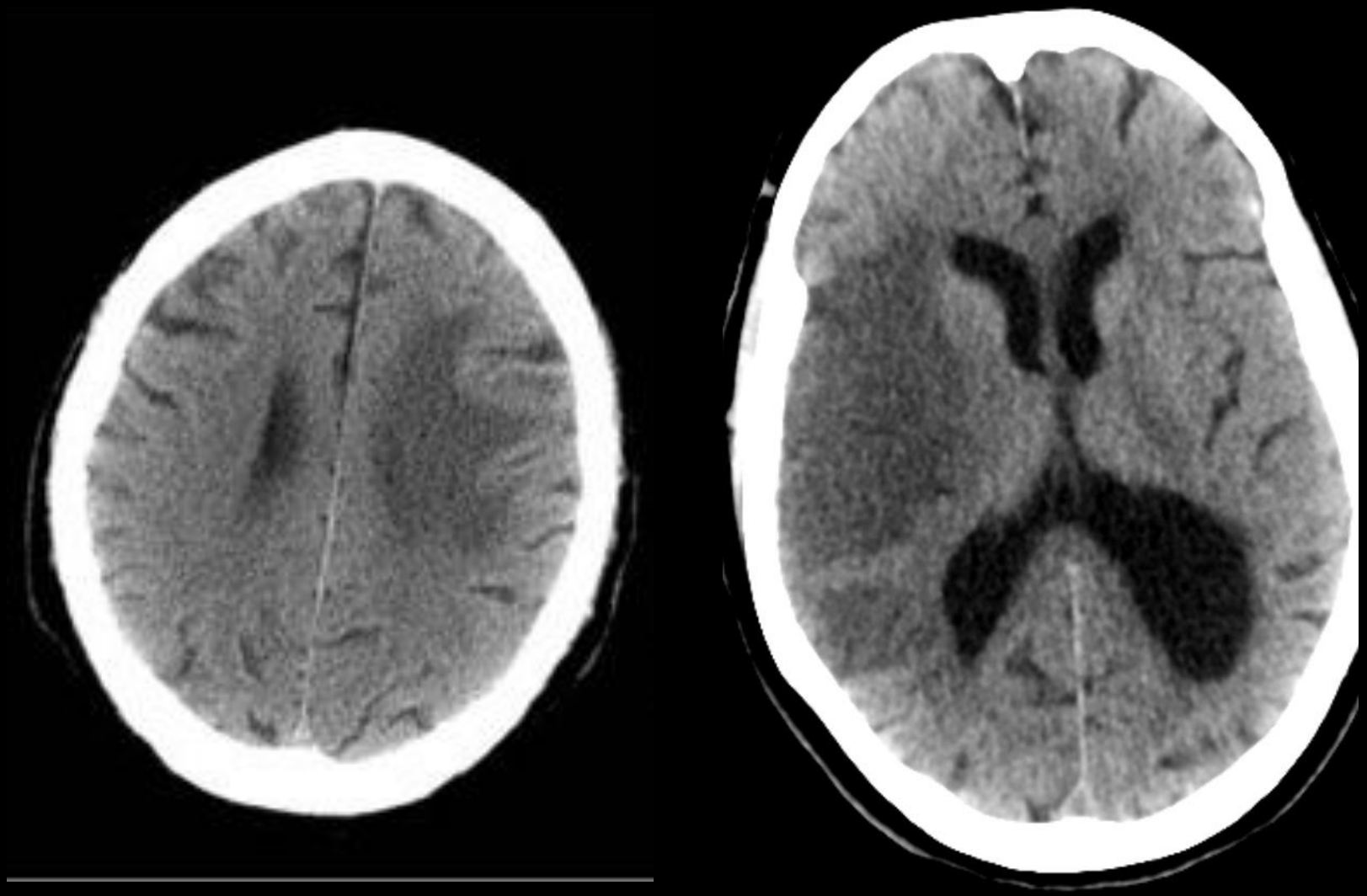
abscess → antibiotics without anticoagulation

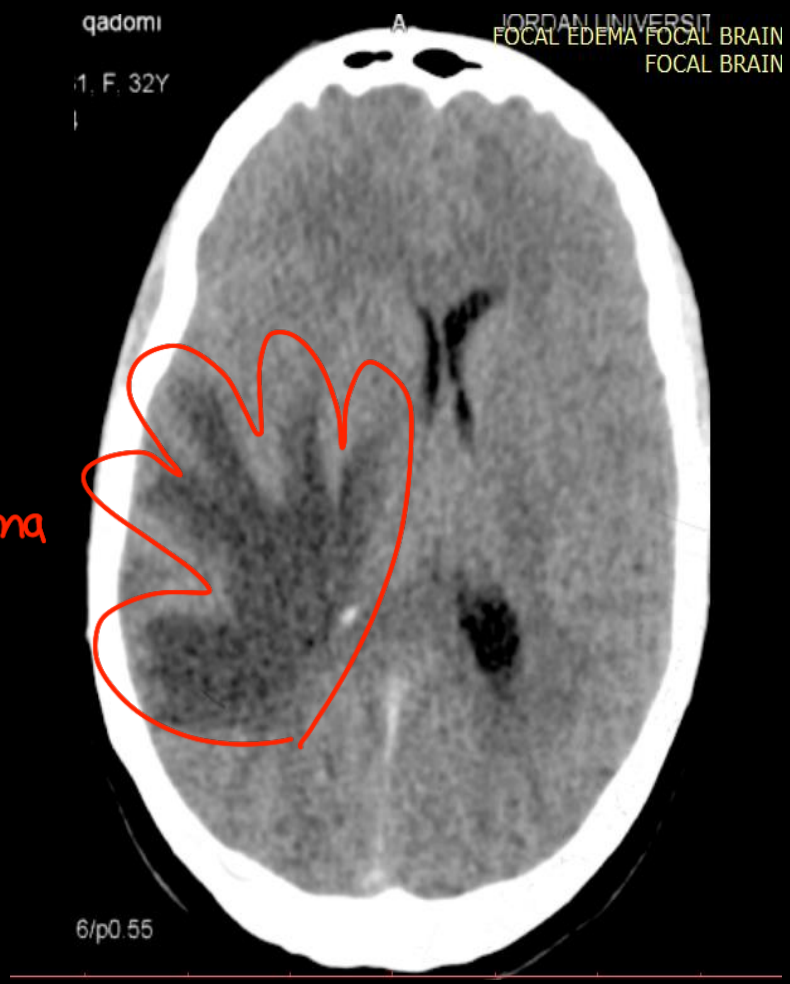
CSF: normal v/s hydrocephalus





Edema: vasogenic v/s cytotoxic
Mass lesion v/s infarction



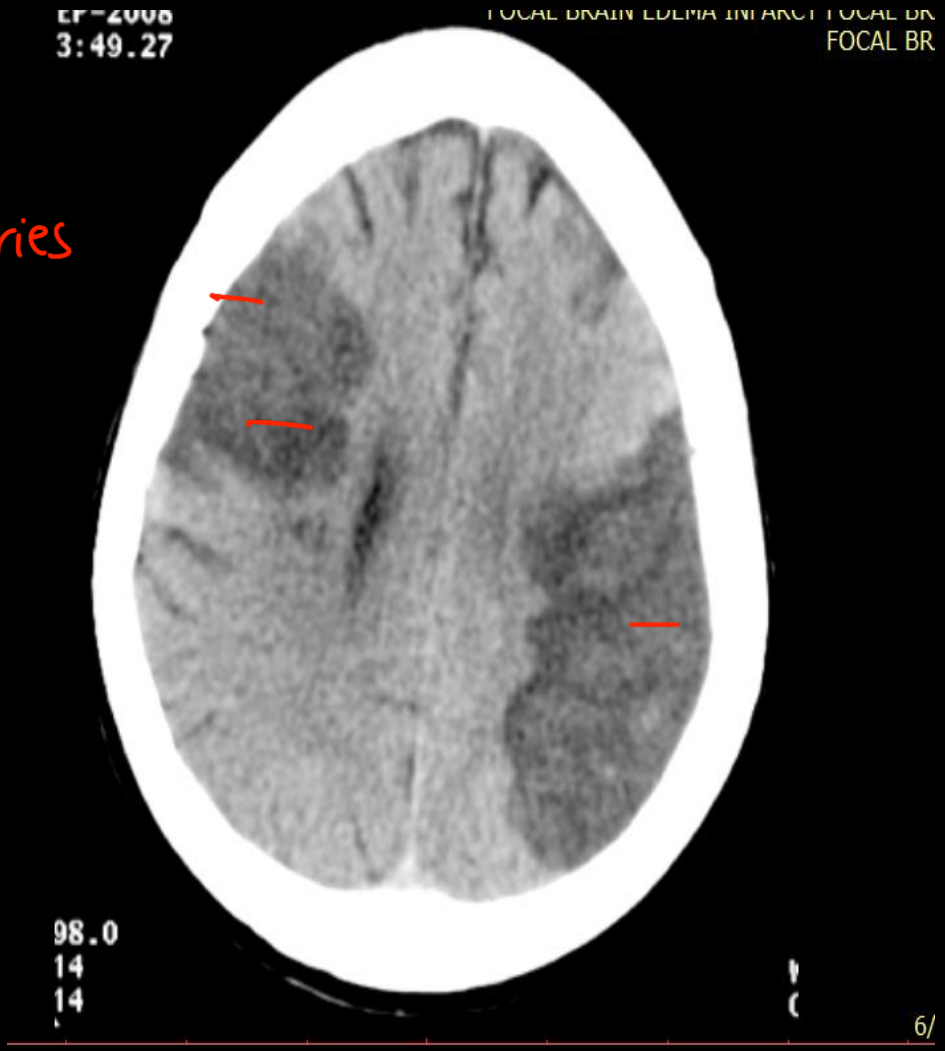


hand

" interdigitation edema sign "

Vasogenic edema

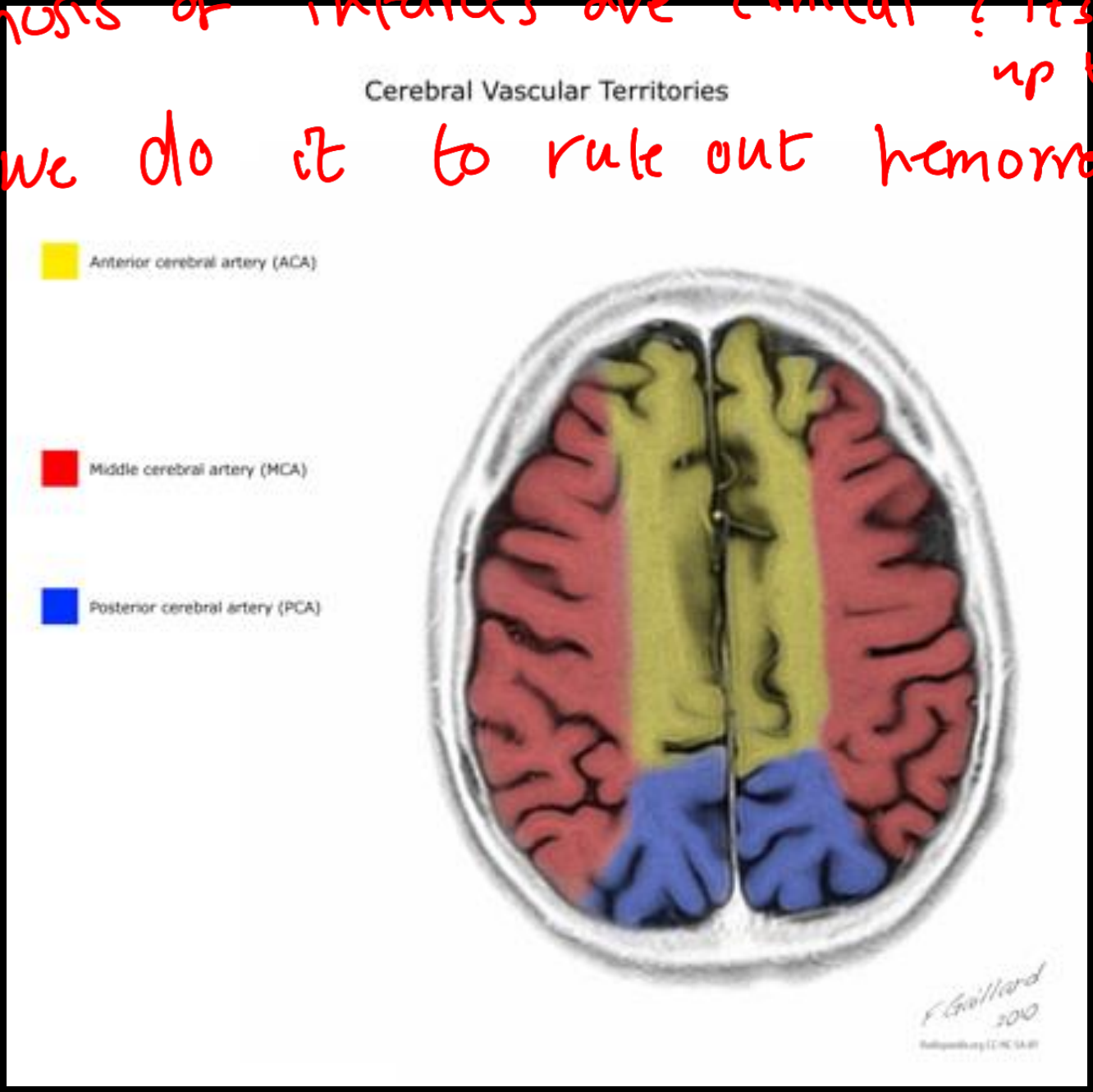
with territories



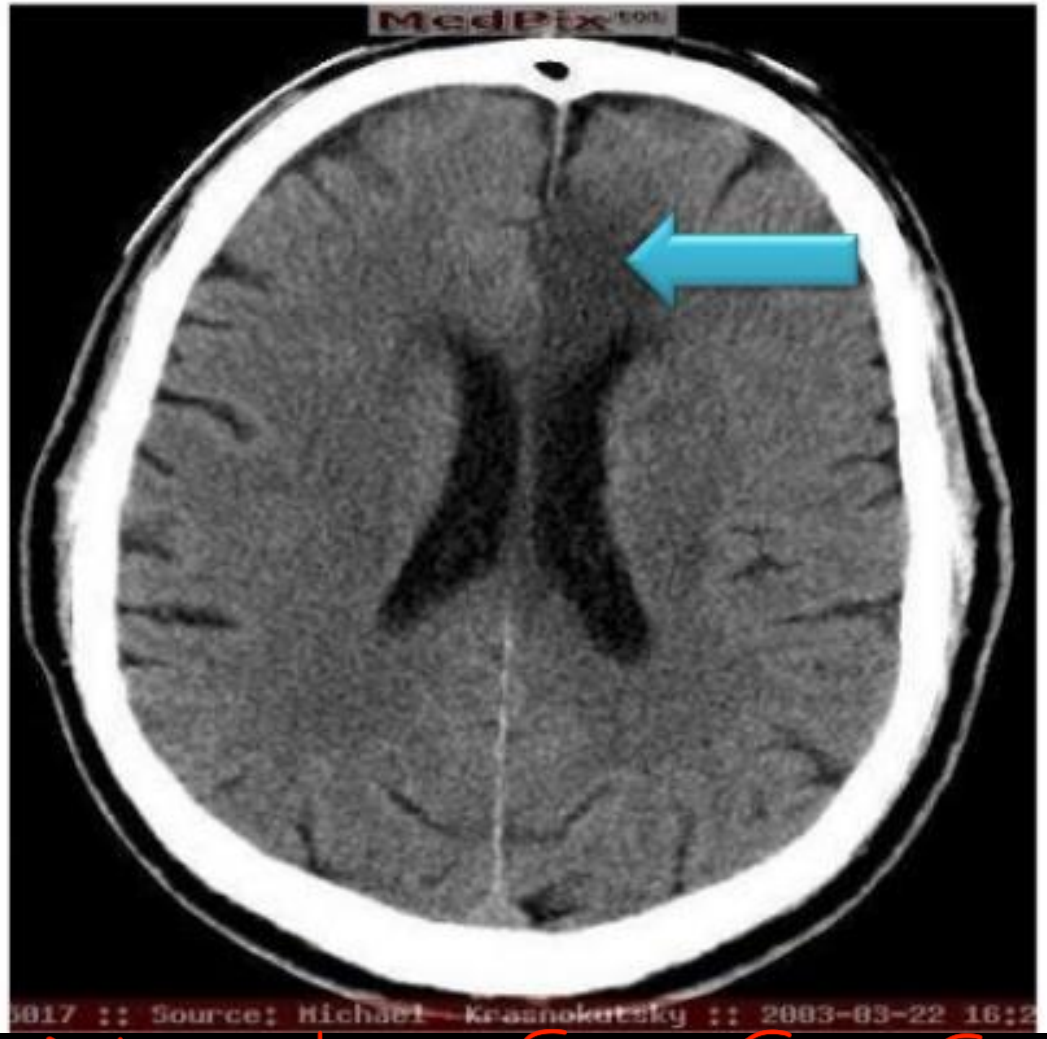
→ Cytotoxic edema

diagnosis of infarcts are clinical ; its normal up to 24h

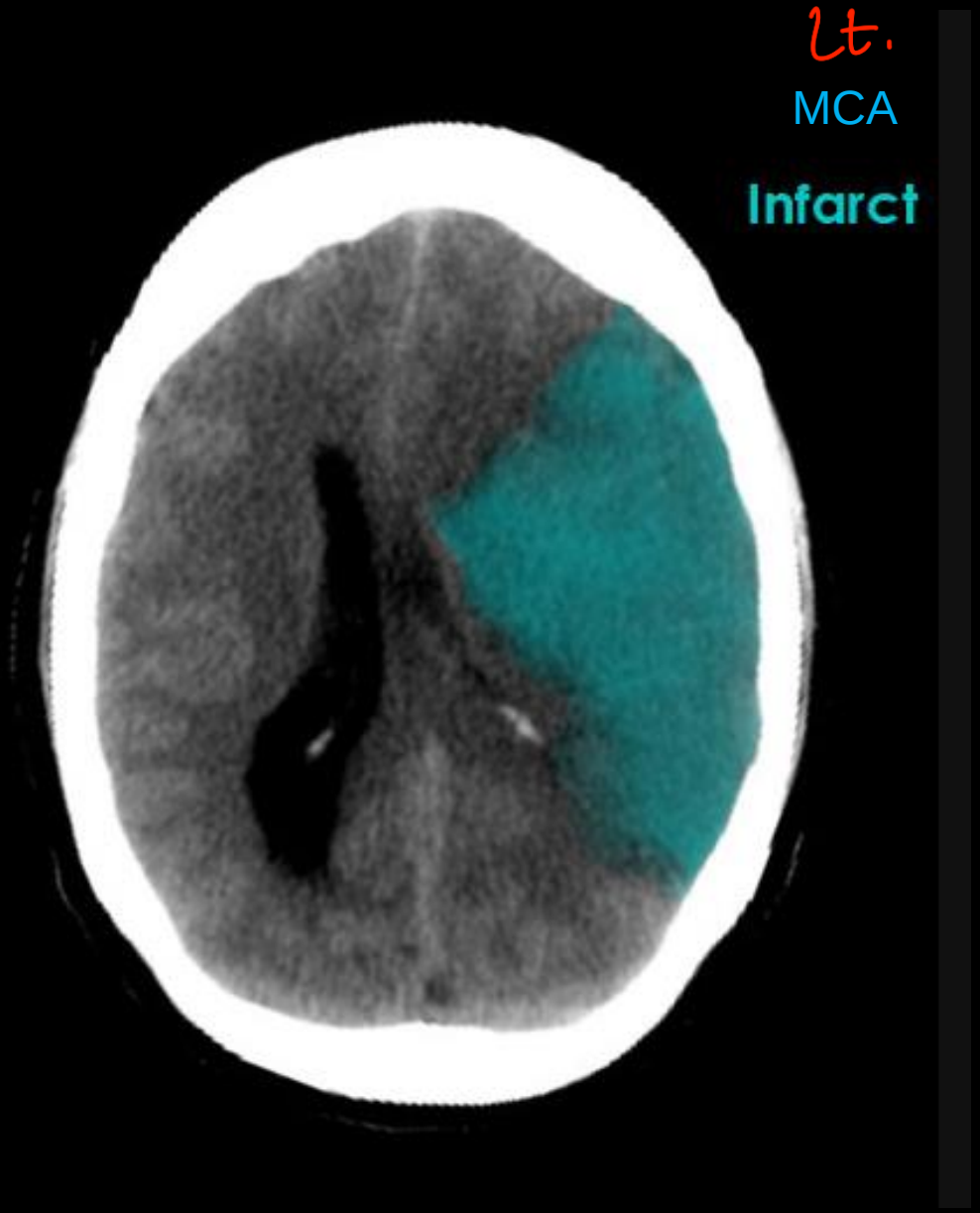
we do it to rule out hemorrage

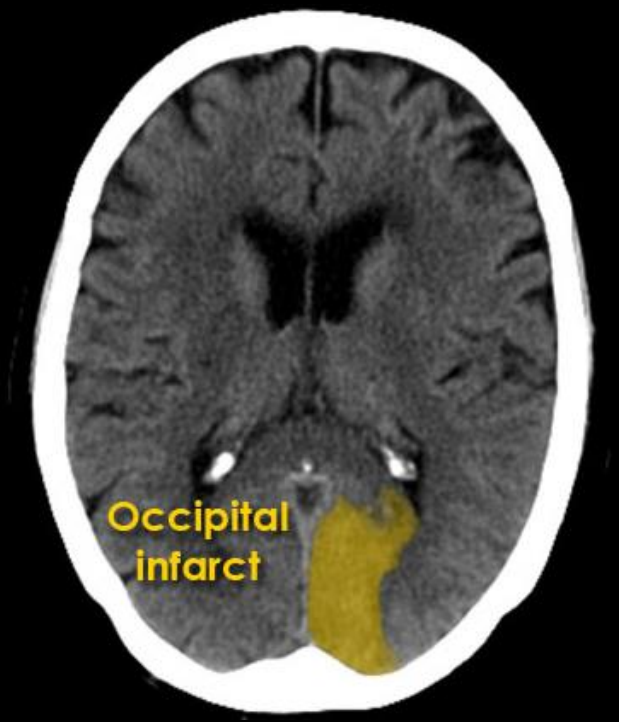


Lt. ACA INFARCT

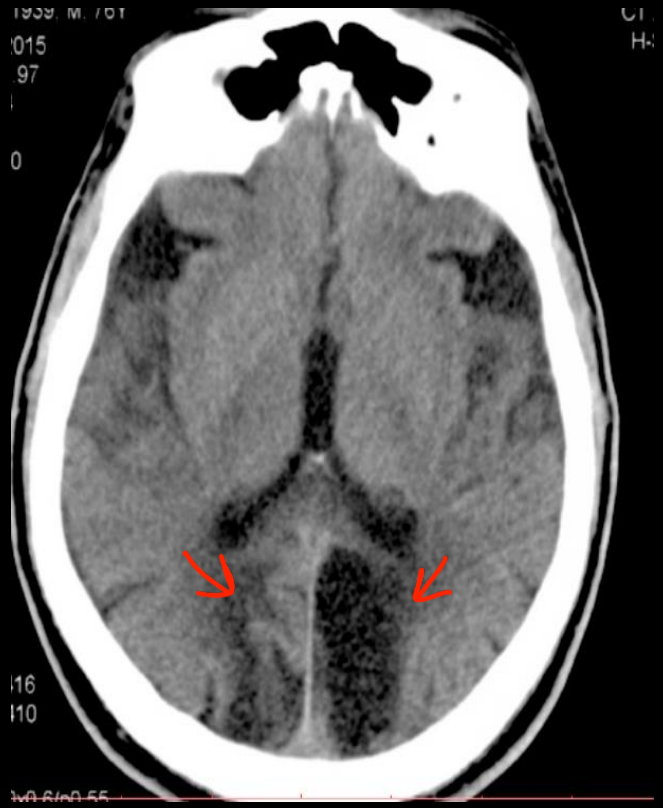


MENTION The SIDE OF ARTERY


Lt.
MCA
Infarct

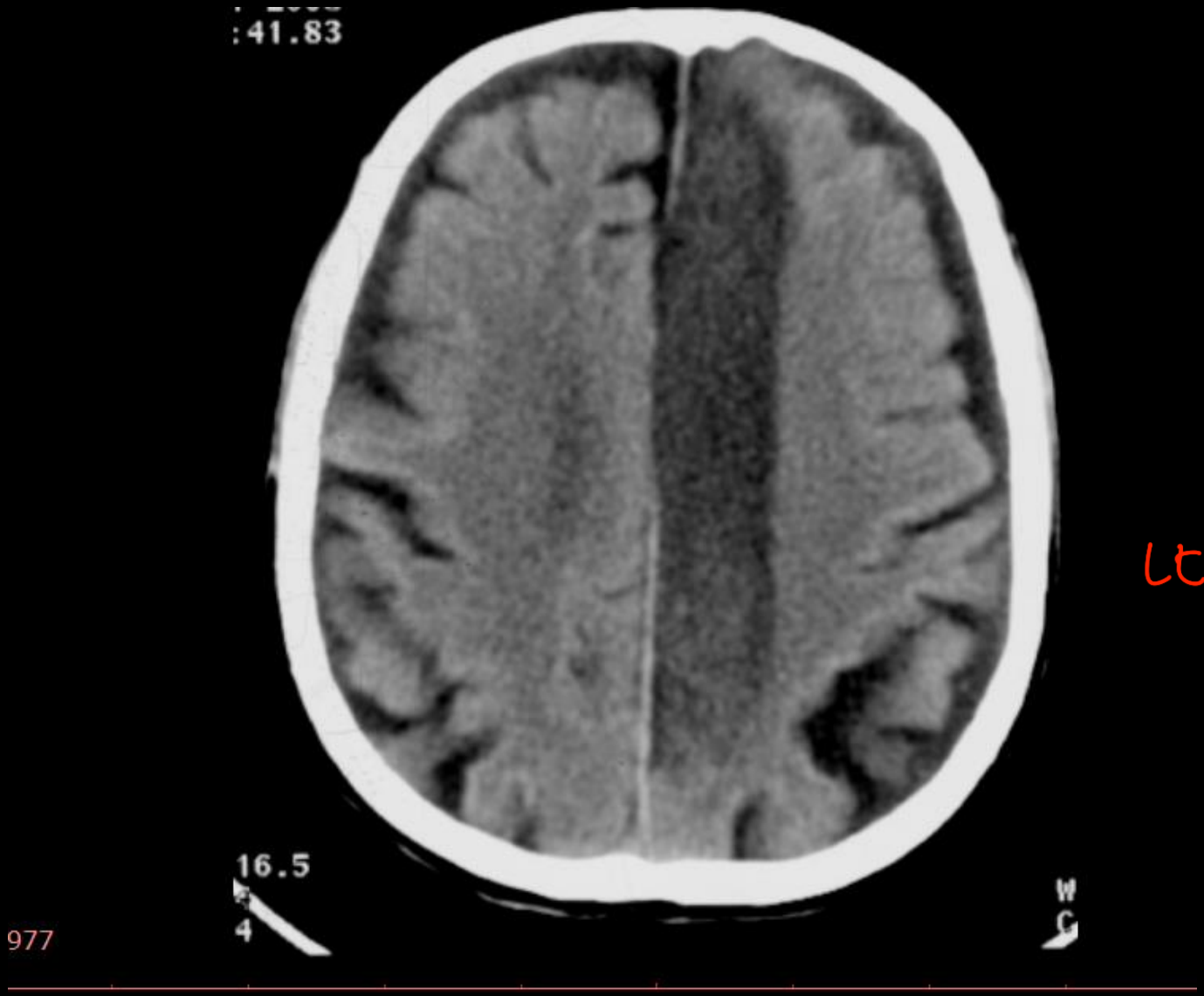


Lt

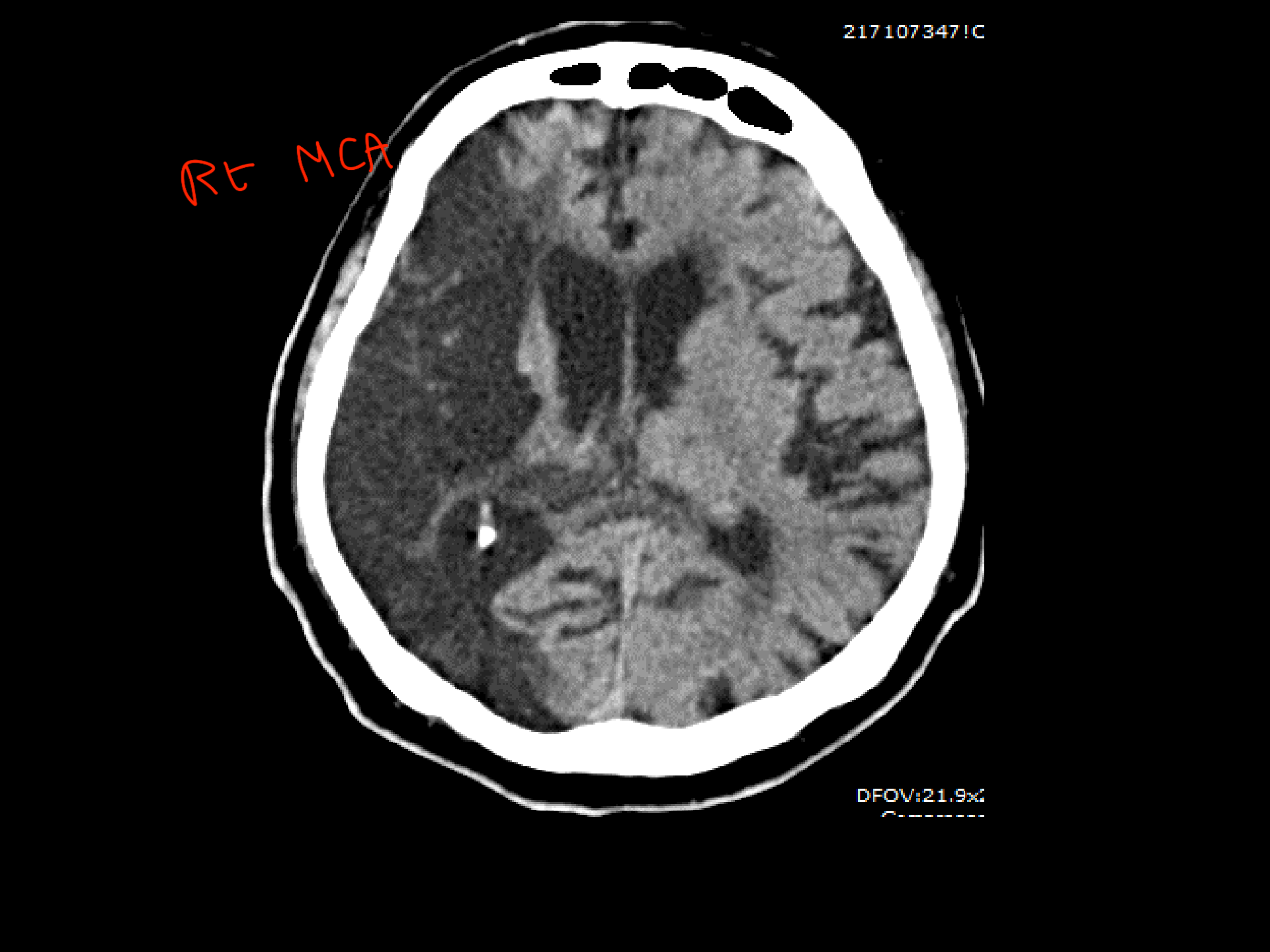


Bilateral
posterior

PCA infarct



Lt ACA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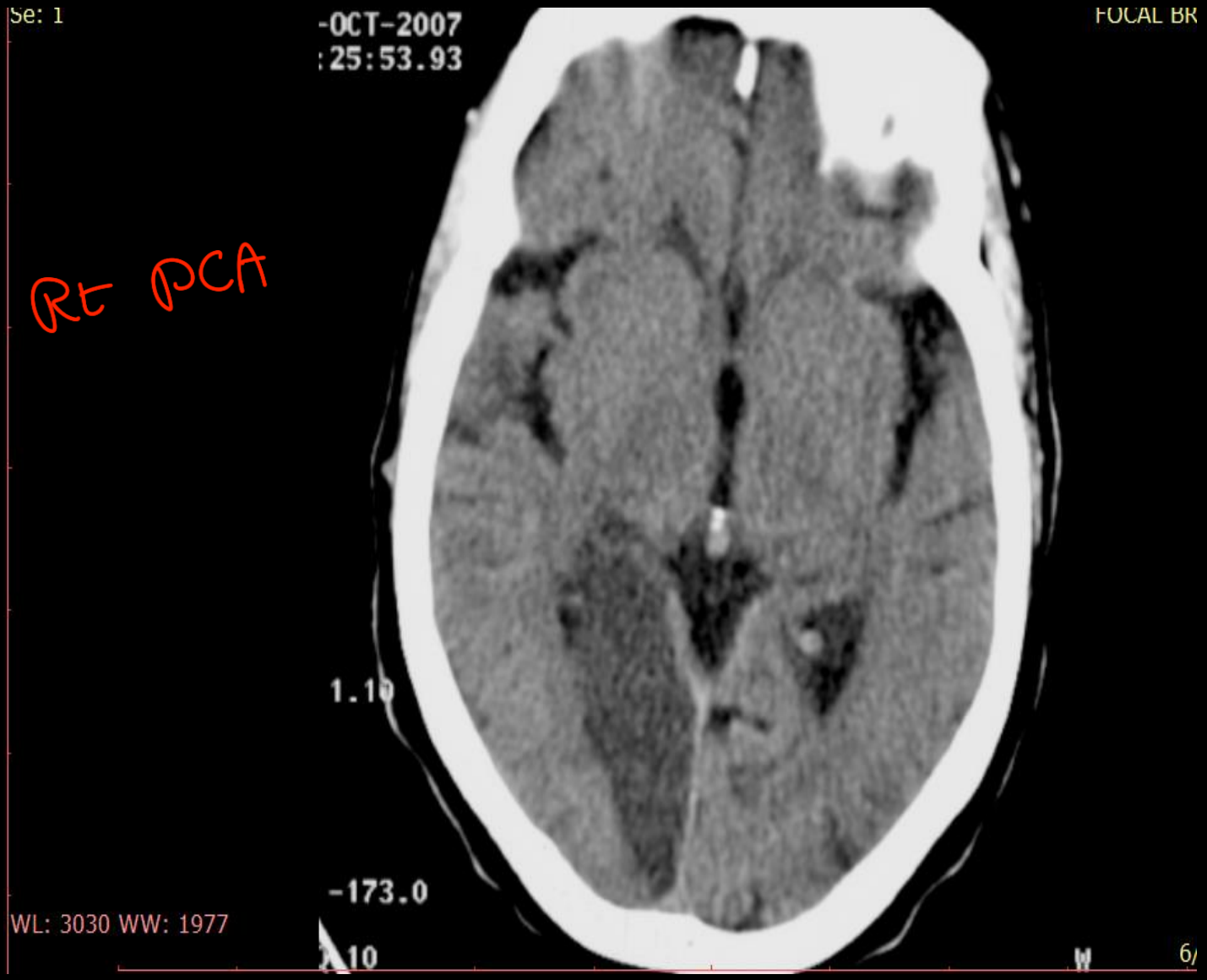
Rt MCA
DFOV:21.9x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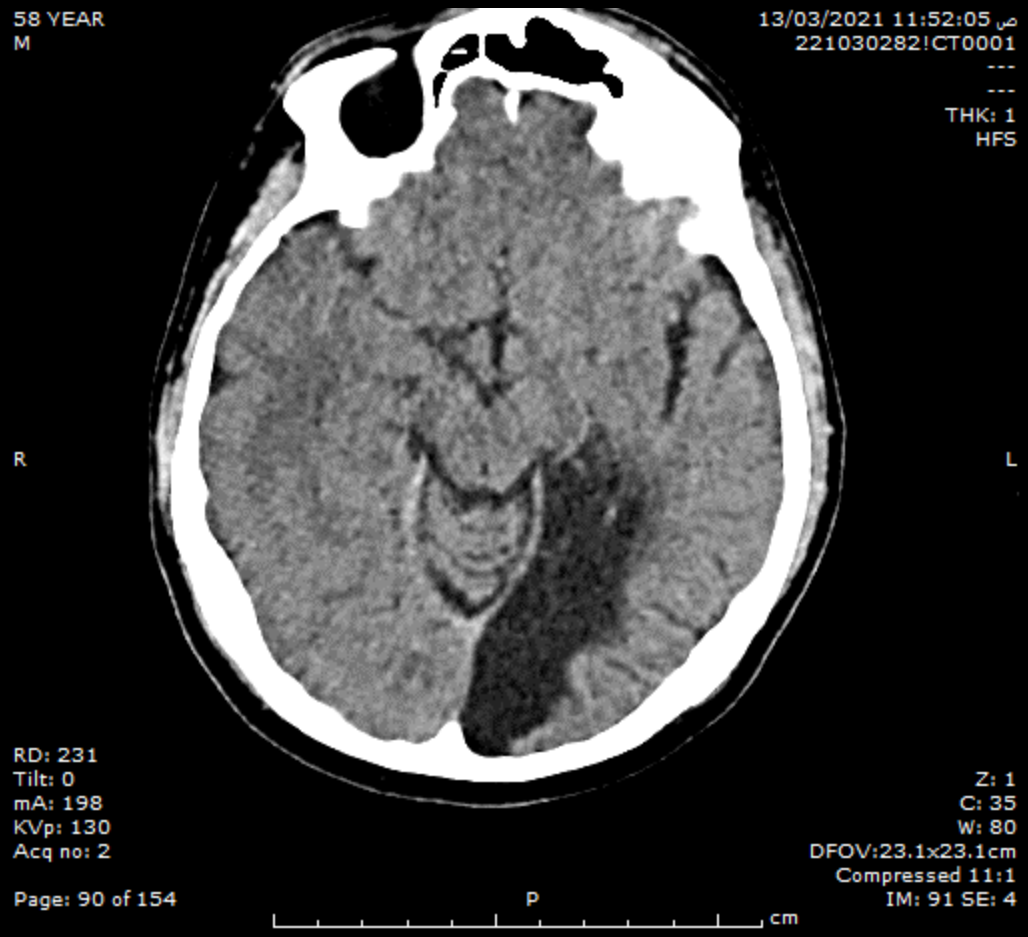
FOCAL BR
Rt PCA
1.10
-173.0
WL: 3030 WW: 1977
10
W


58 YEAR
M
13/03/2021 11:52:05 ص
221030282!CT0001

THK: 1
HFS
R
L
RD: 231
Tilt: 0
mA: 198
KVp: 130
Acq no: 2
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P
cm
Z: 1
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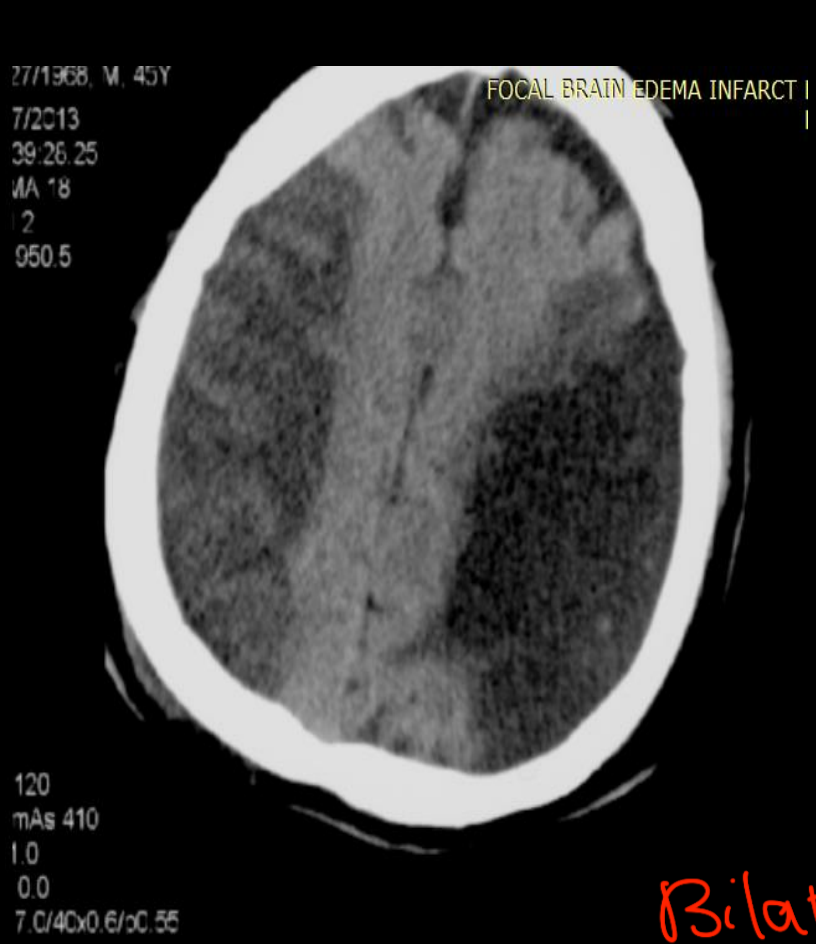
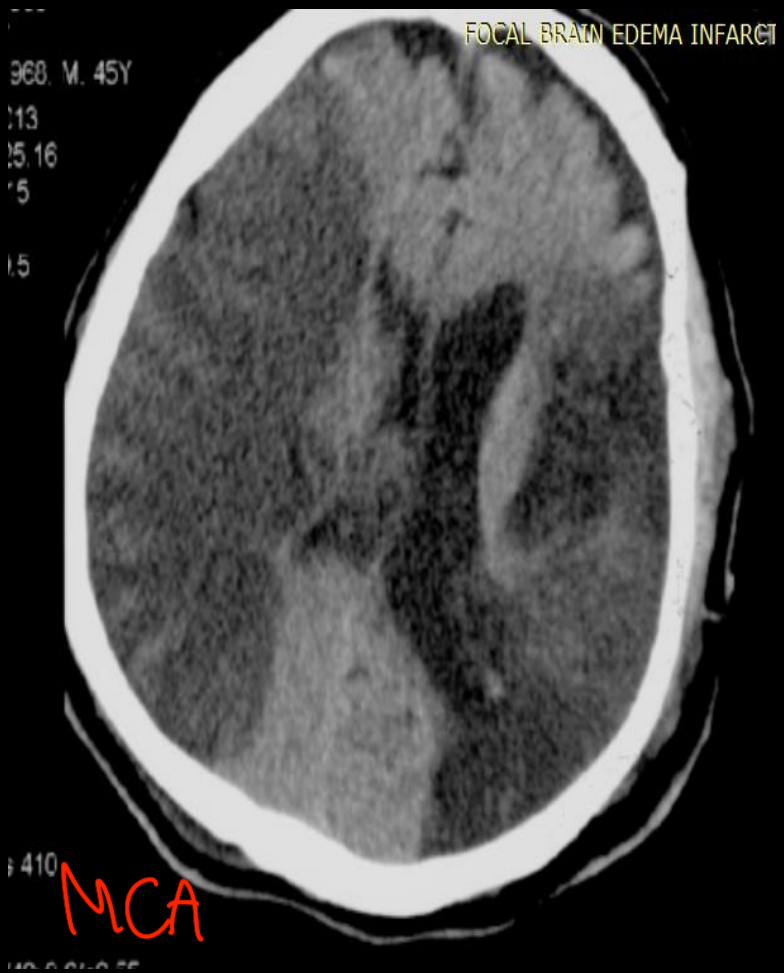
IM: 91 SE: 4

Lt PCA



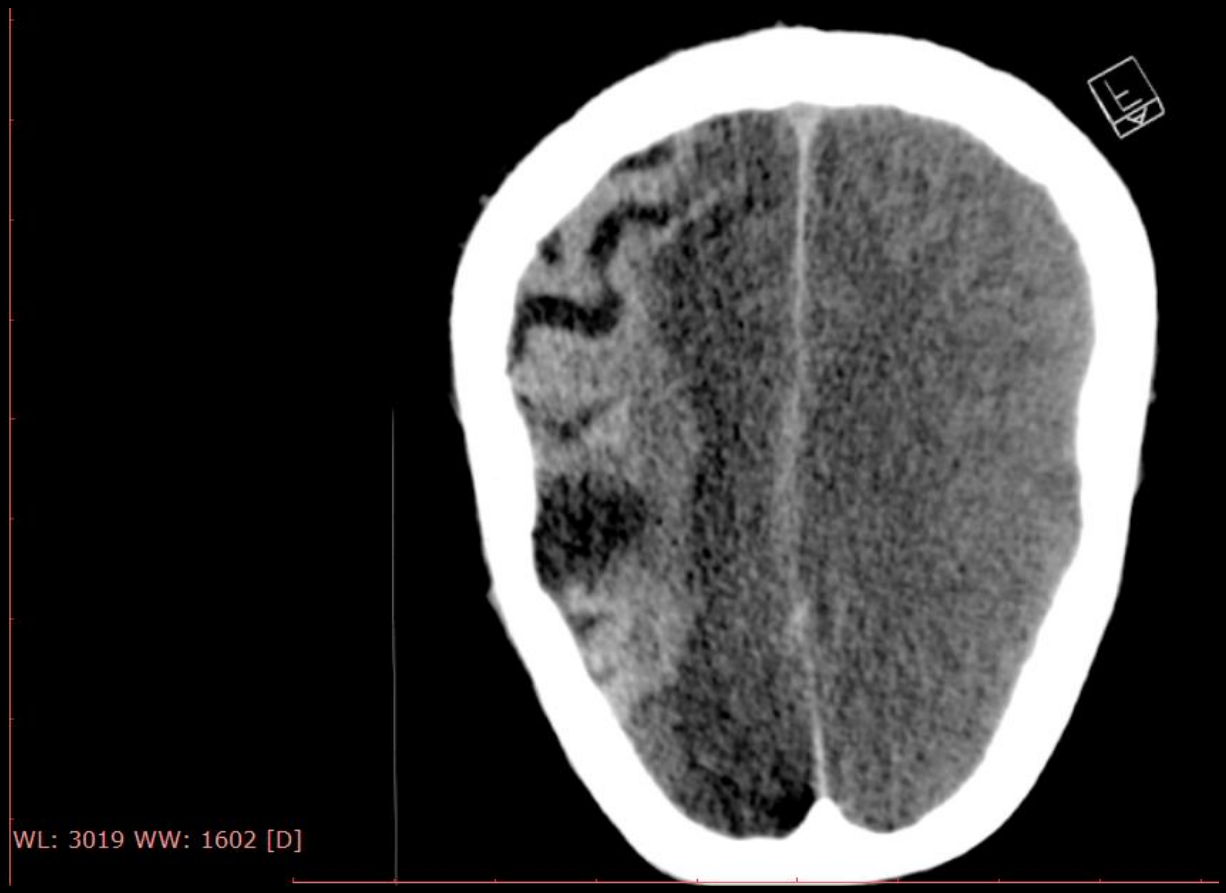


Bilateral MCA

The main aim of doing CT scan of pt with clinical finding of cerebral infarctio IS NOT to see the infarction BUT to look for

HEMORRHAGE

& brain CT can be normal up to 72 h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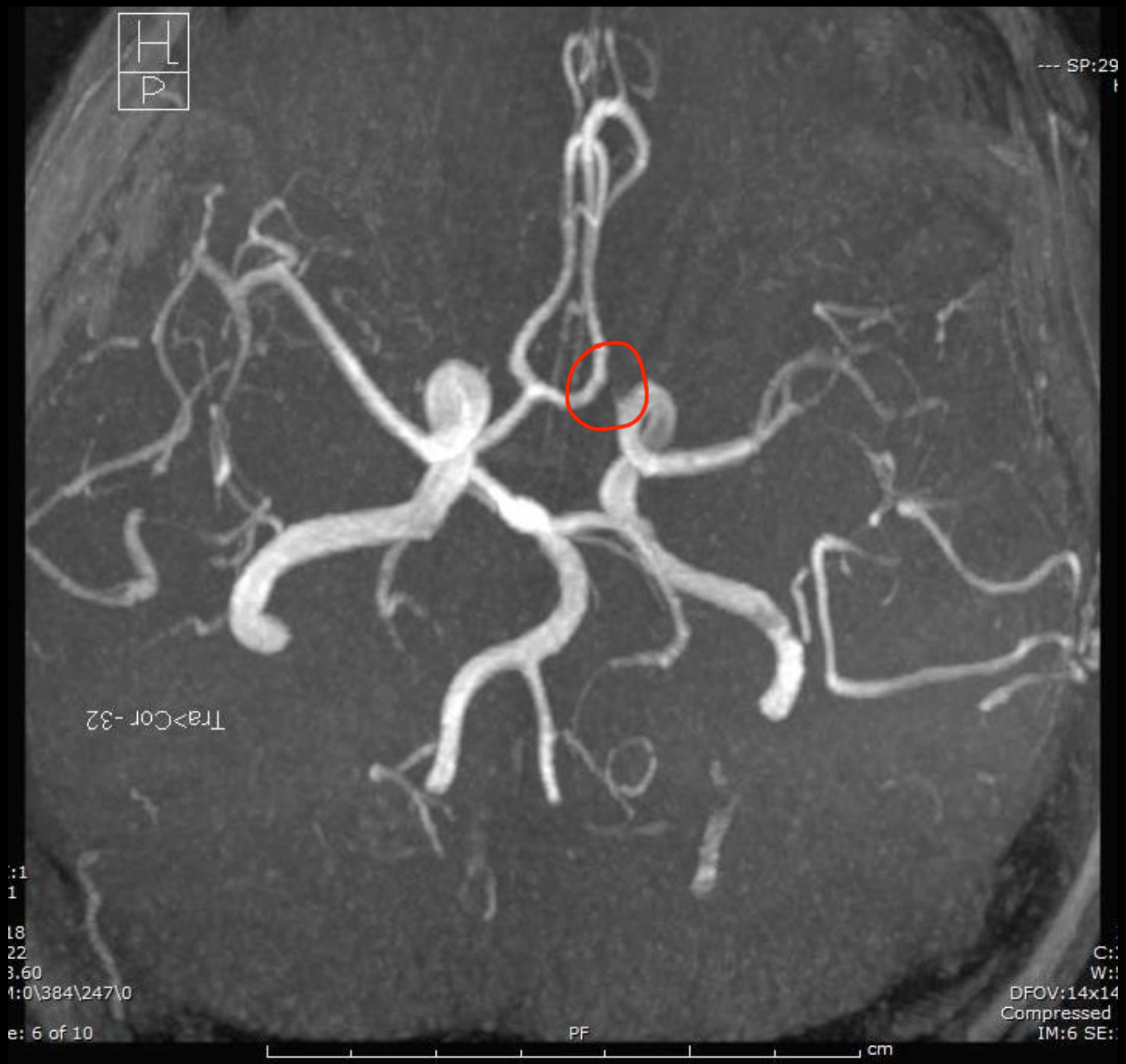
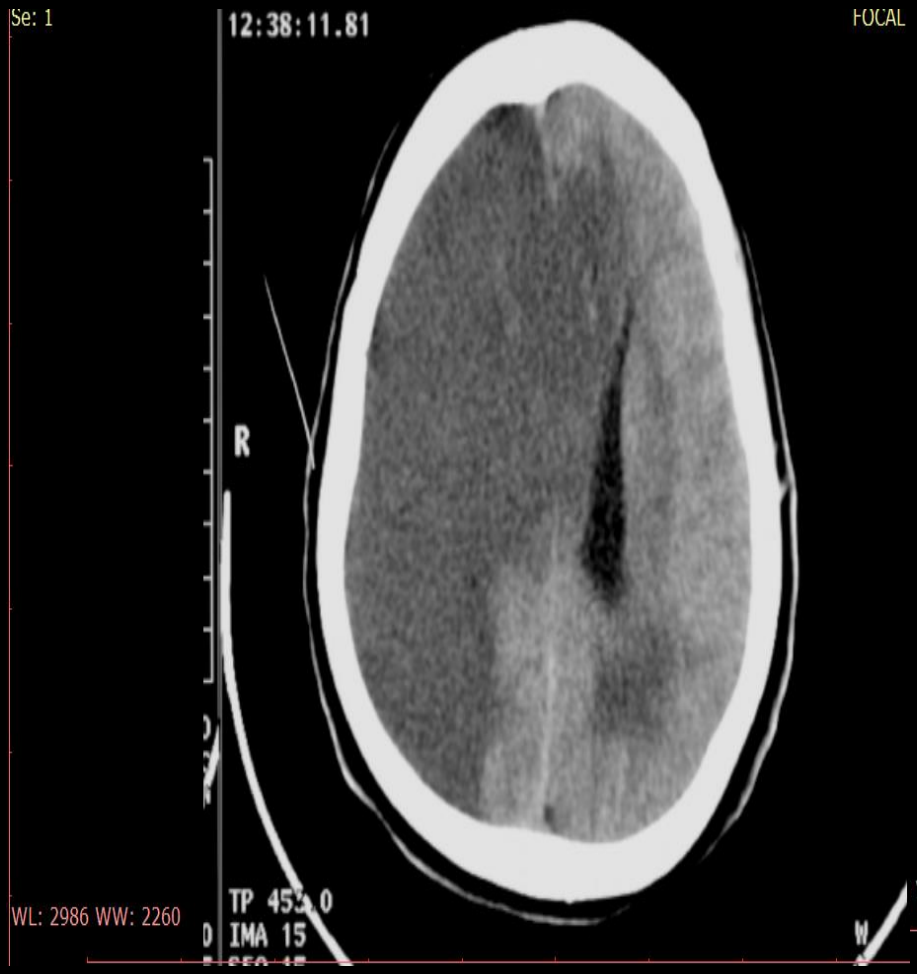
Right

Left

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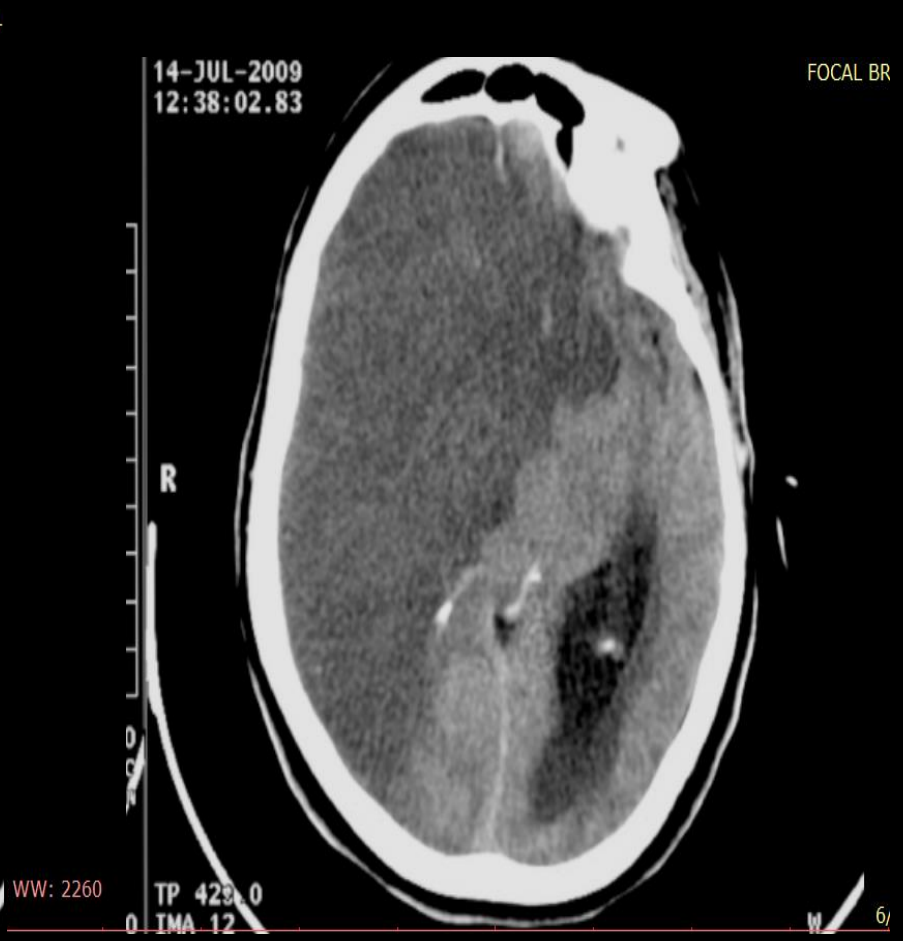
FOCAL
R
WL: 2986 WW: 2260
TP 453.0
IMA 15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R
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TP 429.0
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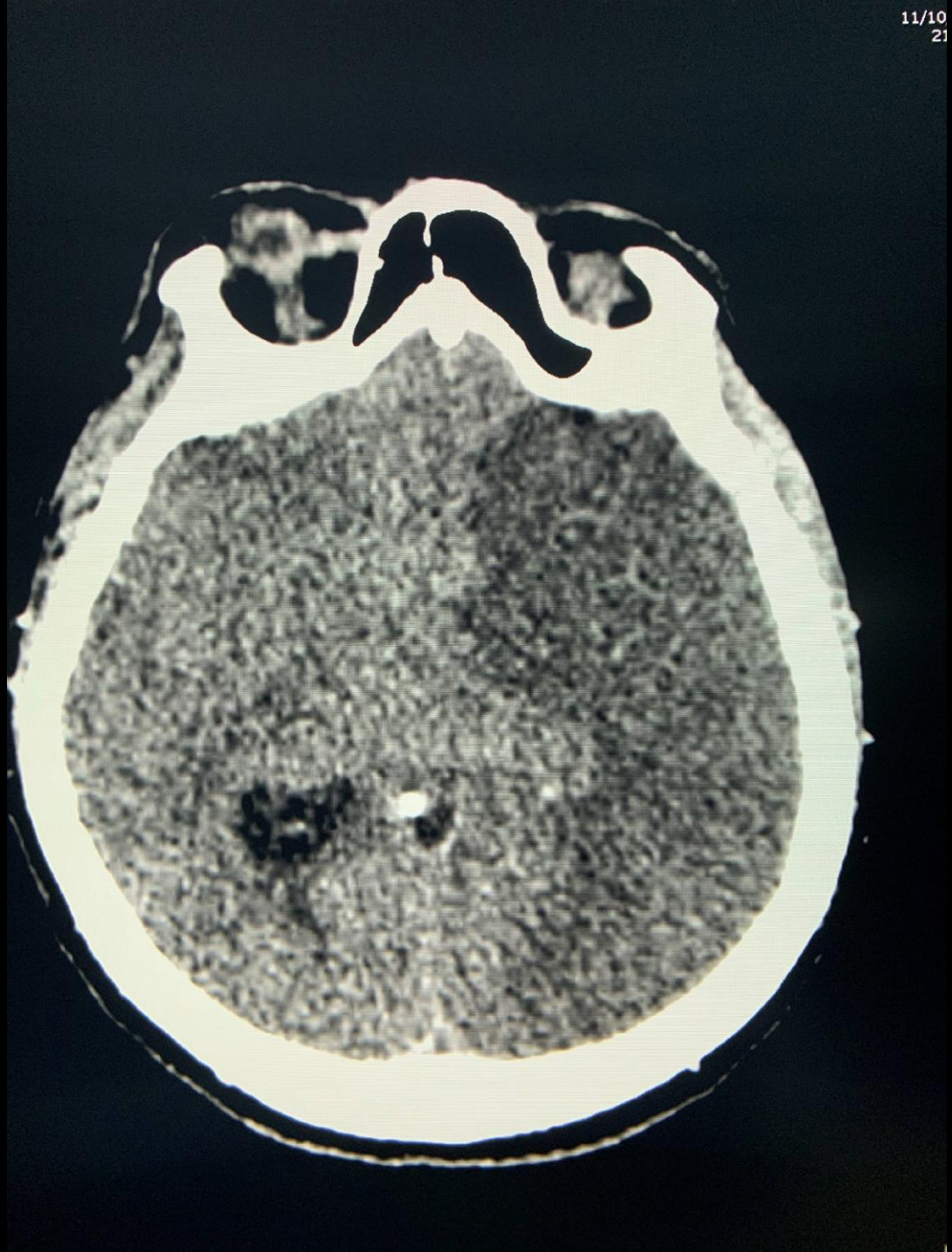
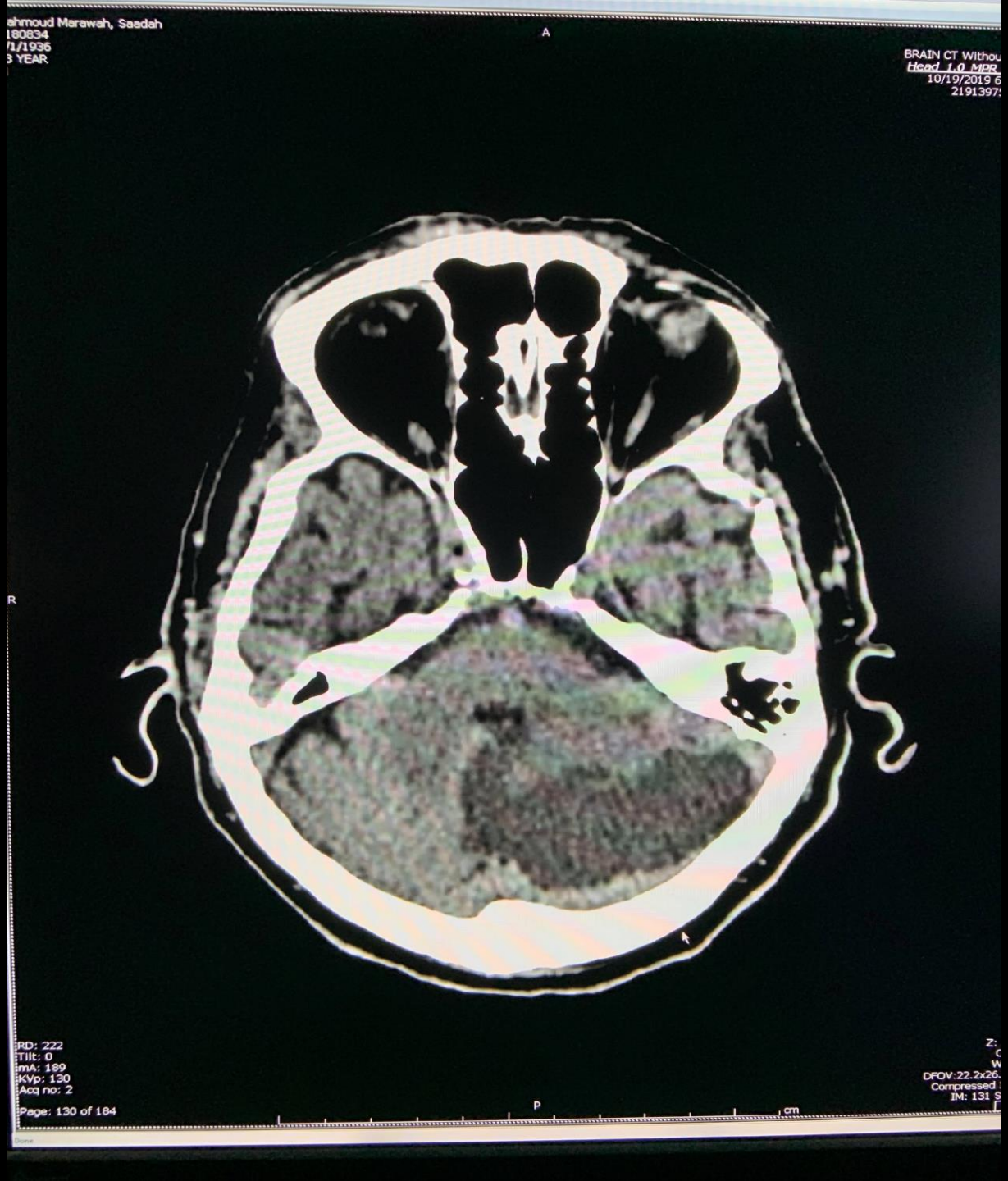

11/10
21


ahmoud Marawah, Saadah
180834
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3 YEAR
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BRAIN CT Withou
Head 1.0 MPR
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2191397
R
RD: 222
Tilt: 0
mA: 189
kVp: 130
Acq no: 2
Page: 130 of 184
P
cm
Z:
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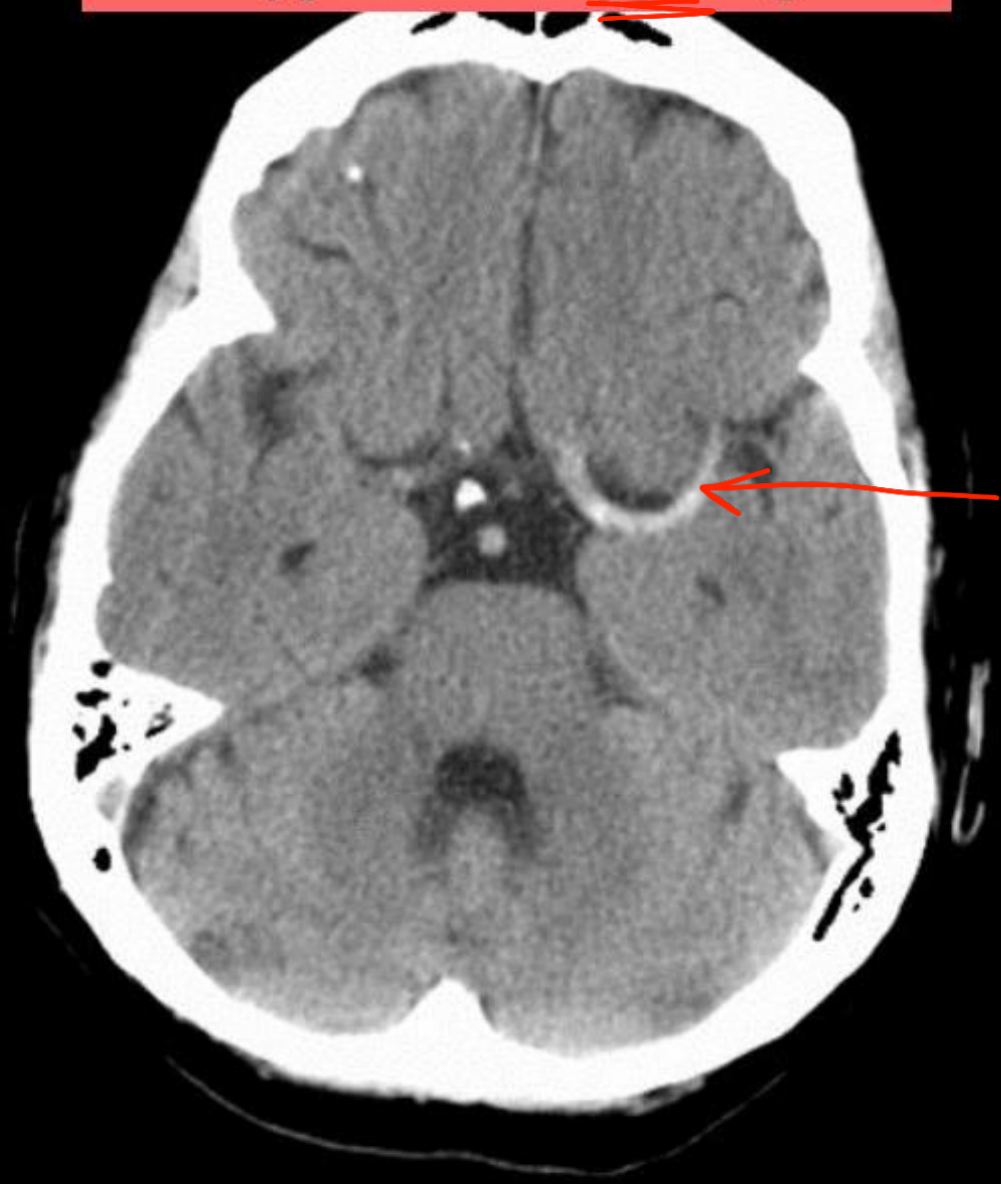
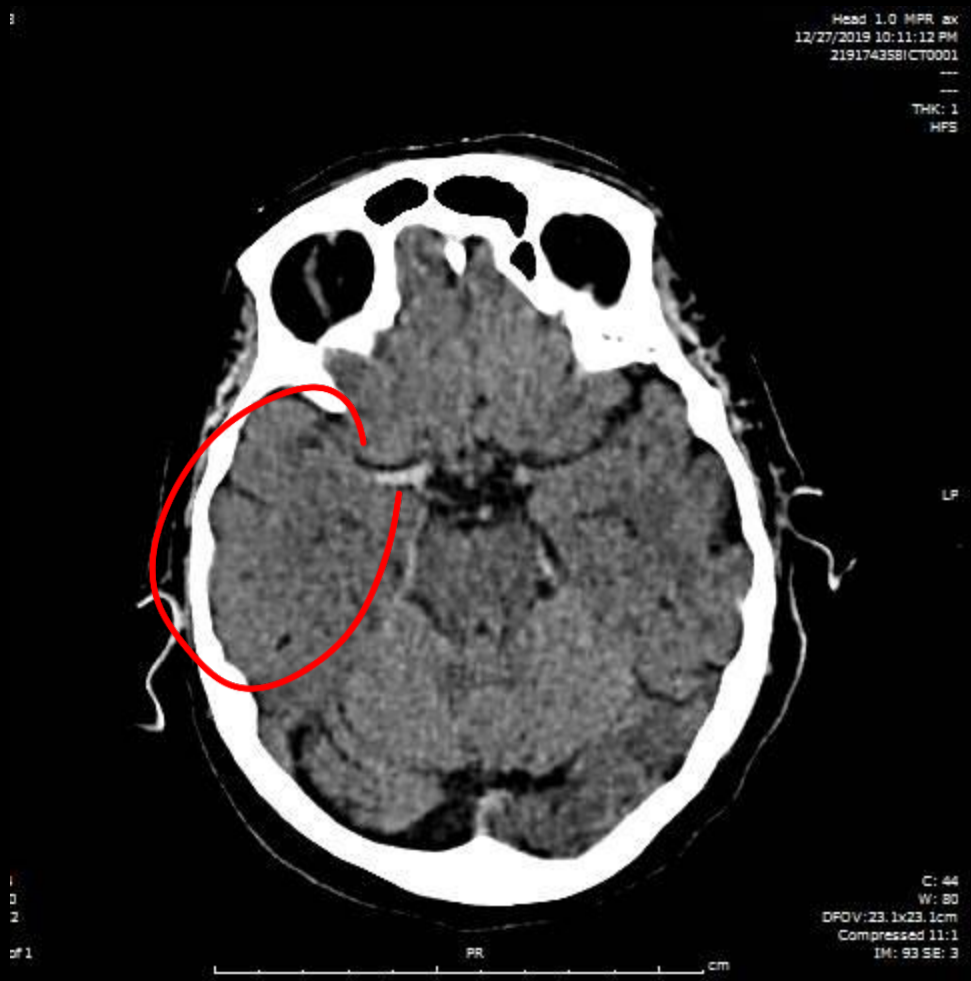
Compressed
IM: 131

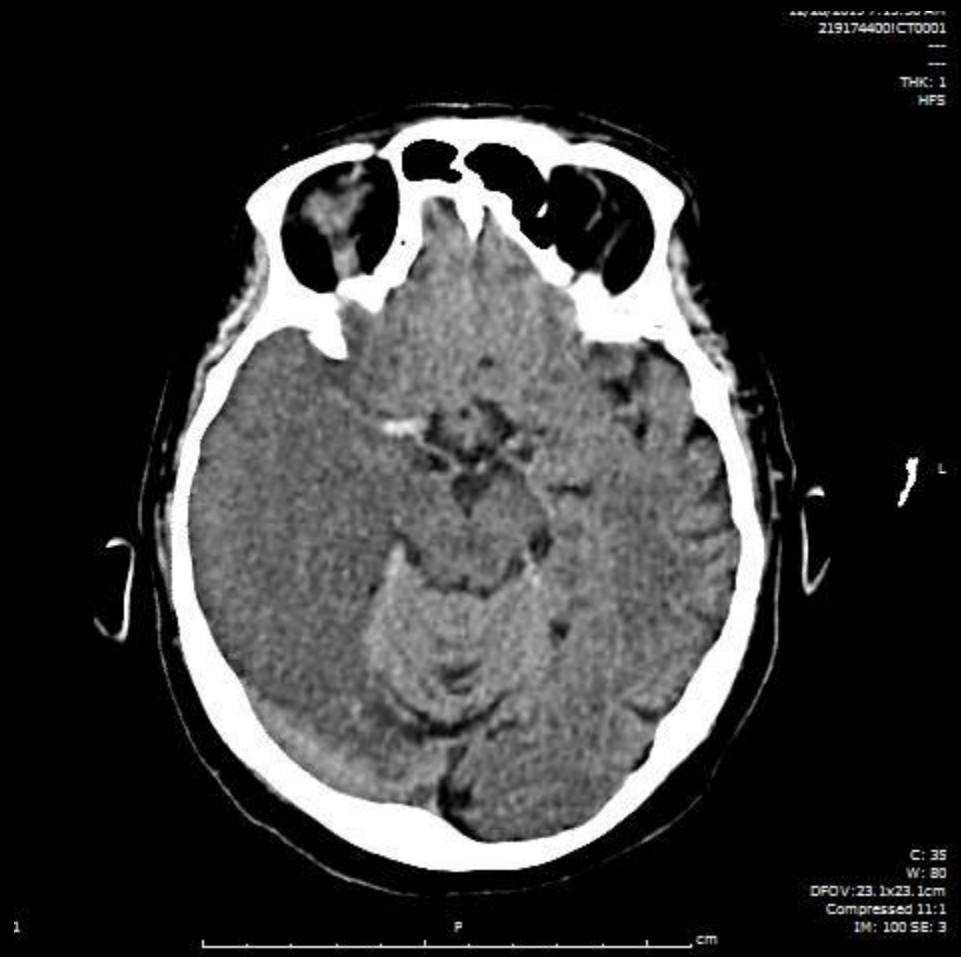
Hyperdense MCA sign

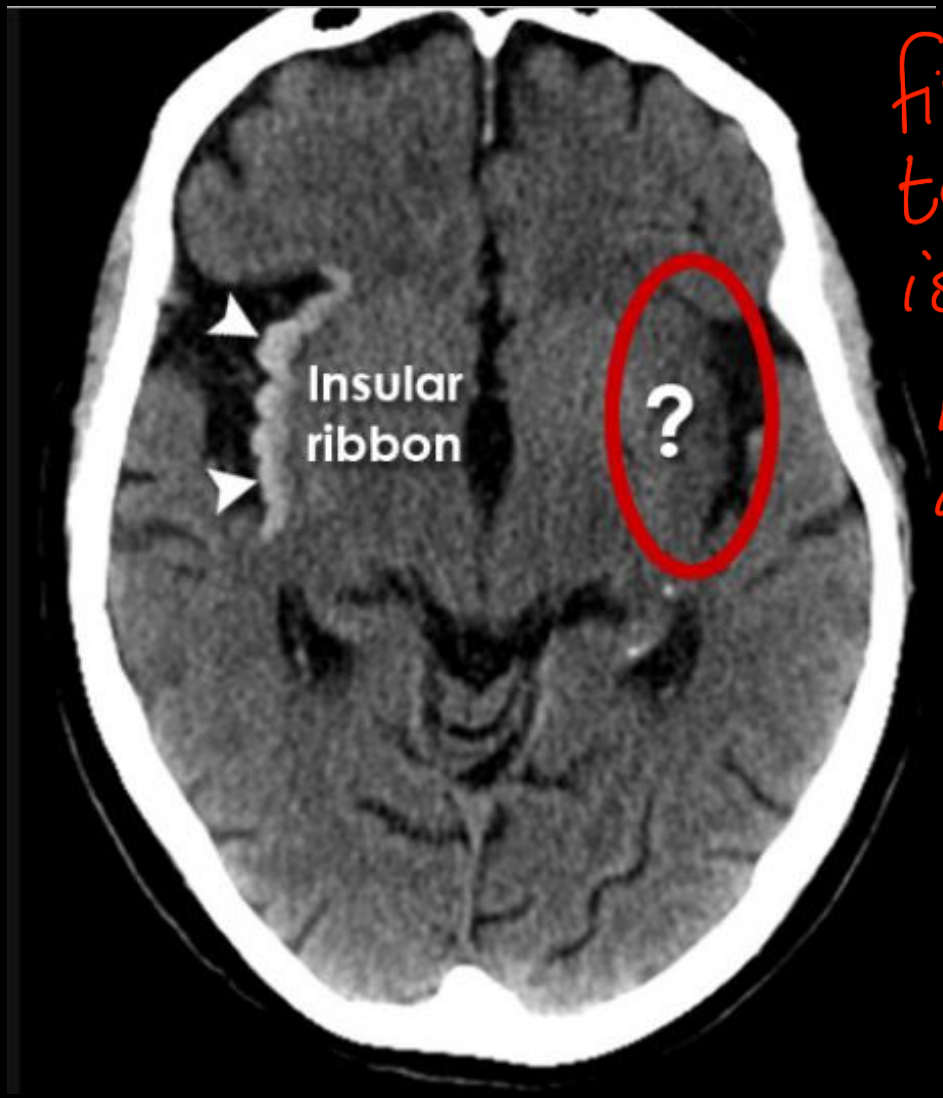


Hyperdense MCA sign



After 24 hours of the hyperdense MCA

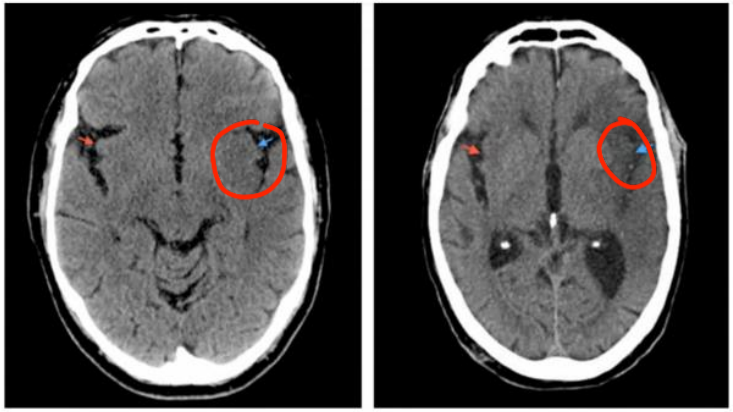




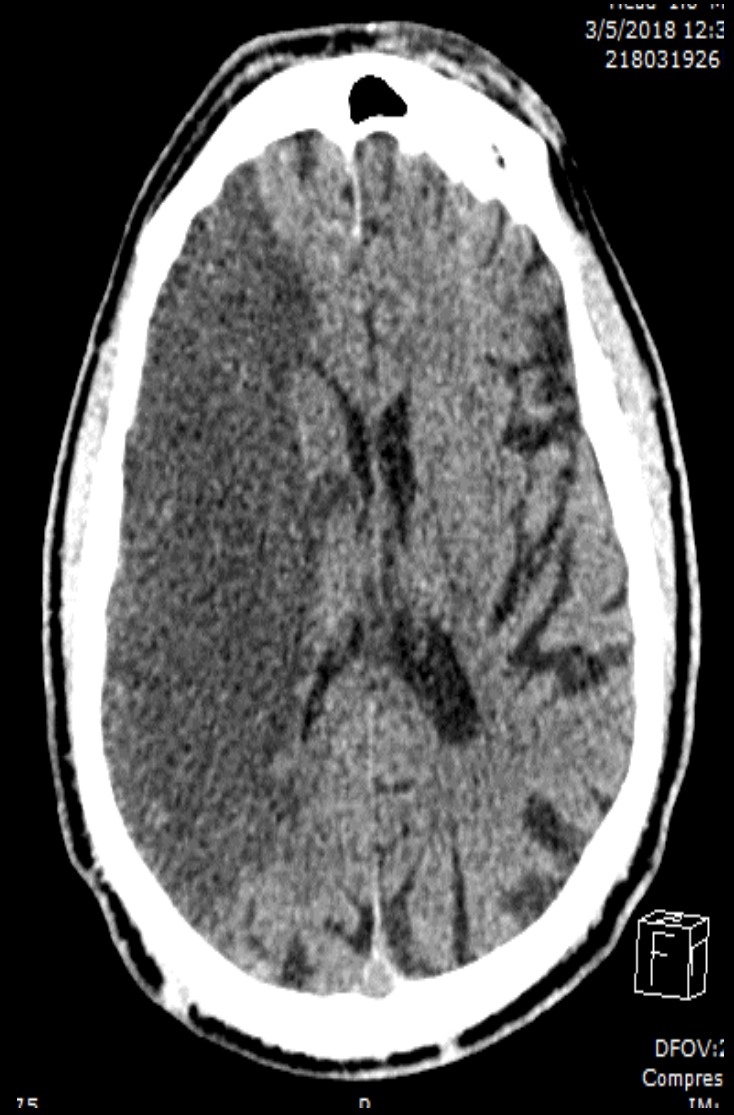
first area to has changes is insula ; its the first area MCA supplies

Insular Ribbon Sign on Left

- Loss of the normal insular cortex grey-white differentiation



<4 hours >4 hours


3/5/2018 12:3
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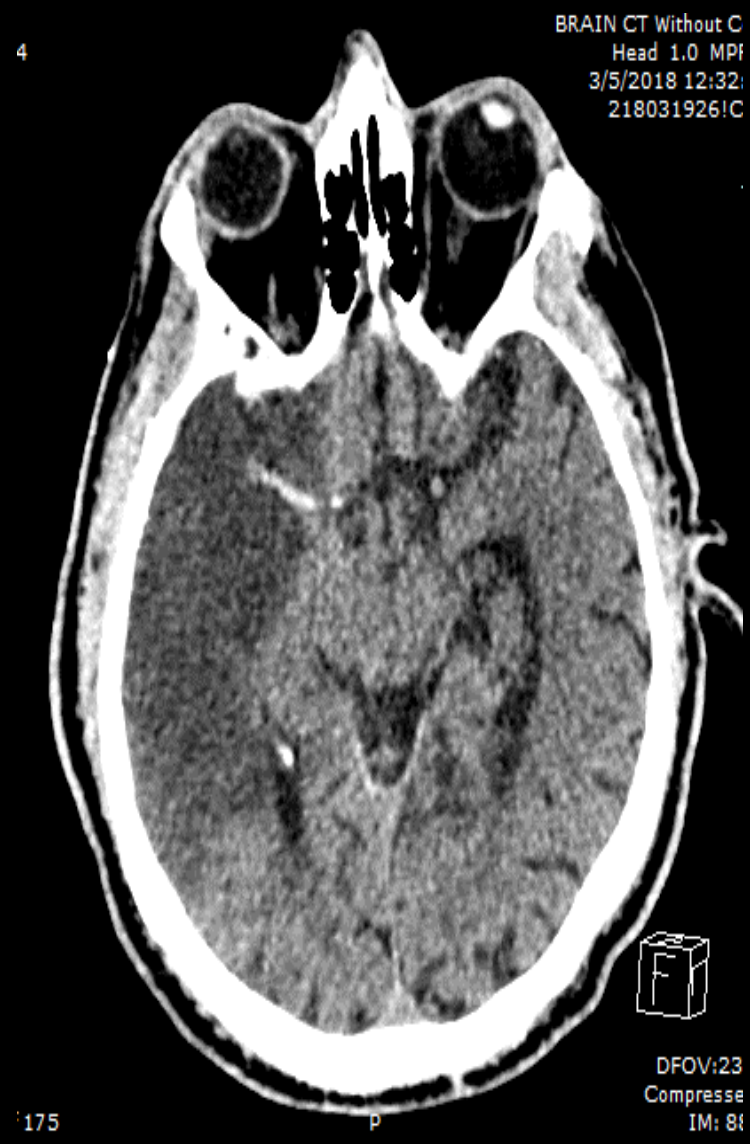
4
BRAIN CT Without C
Head 1.0 MPF
3/5/2018 12:32
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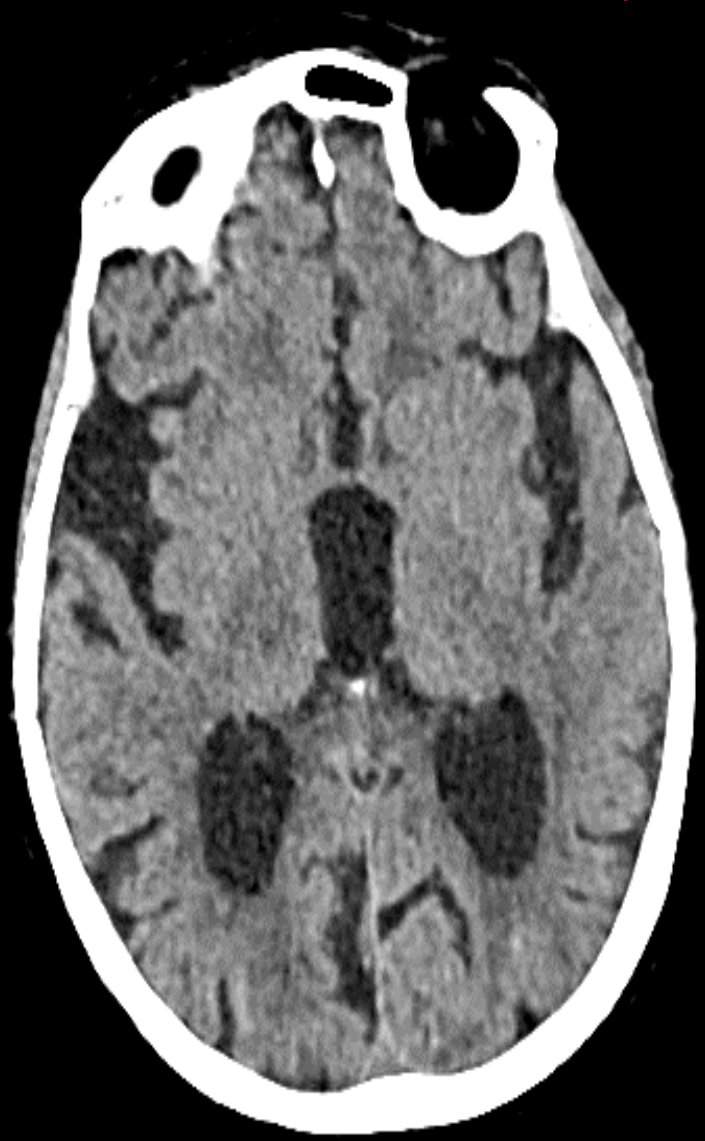
175
P
DFOV:23
Compresse
IM: 8

Insular ribbon sign

16/5



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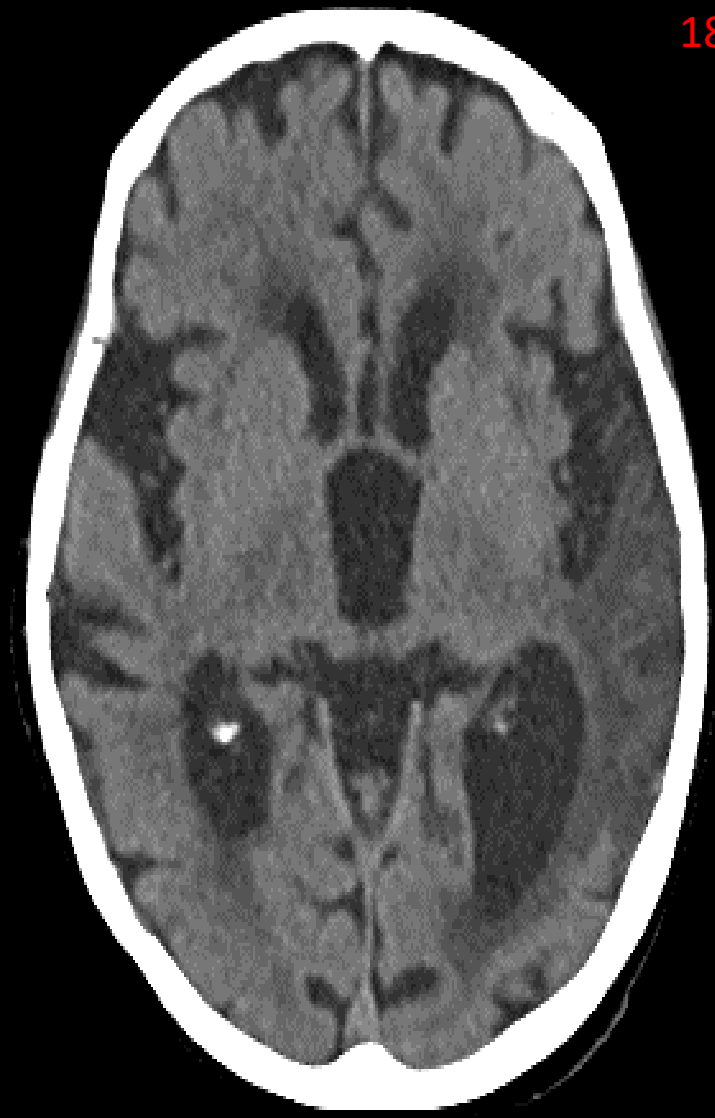
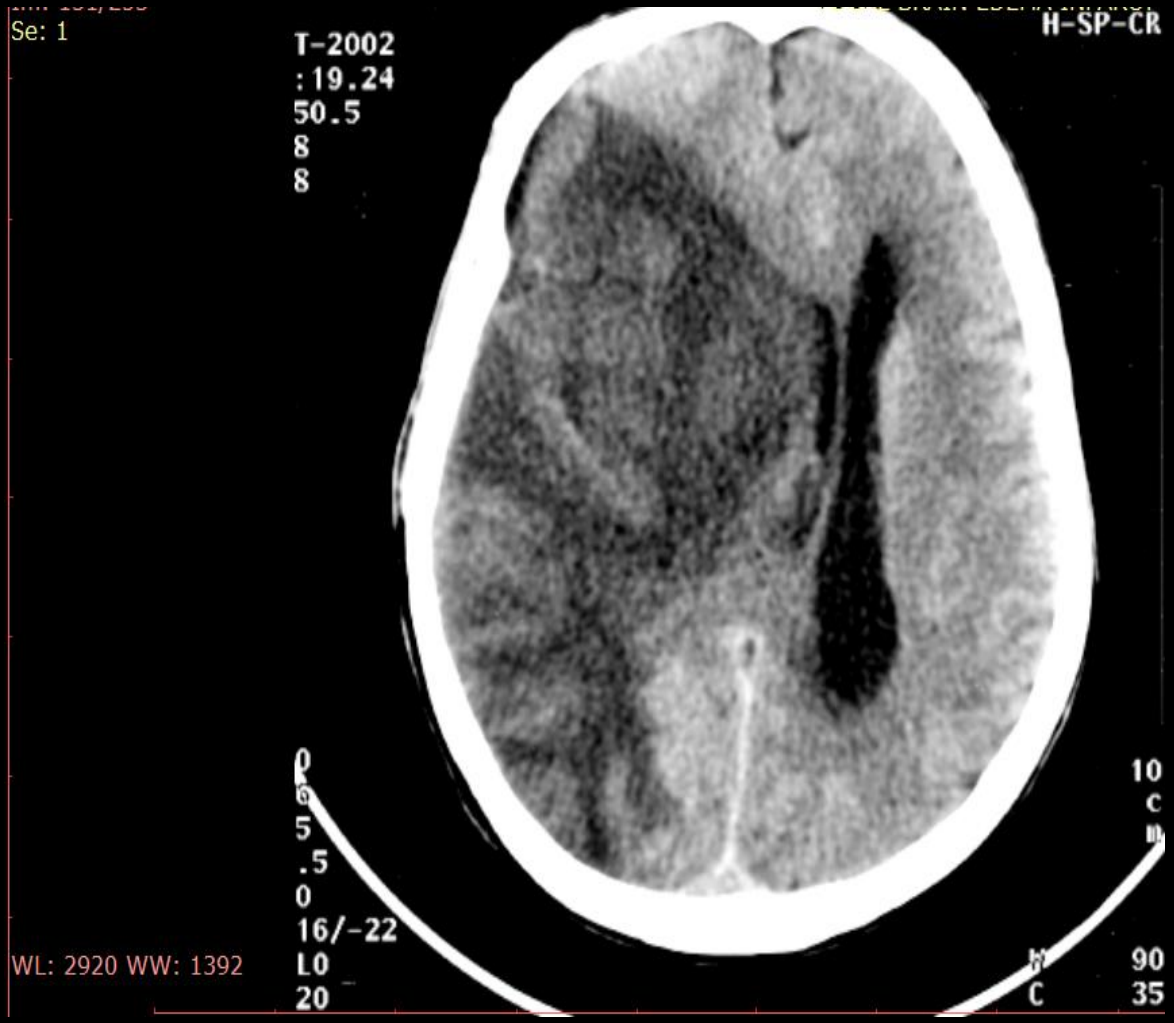
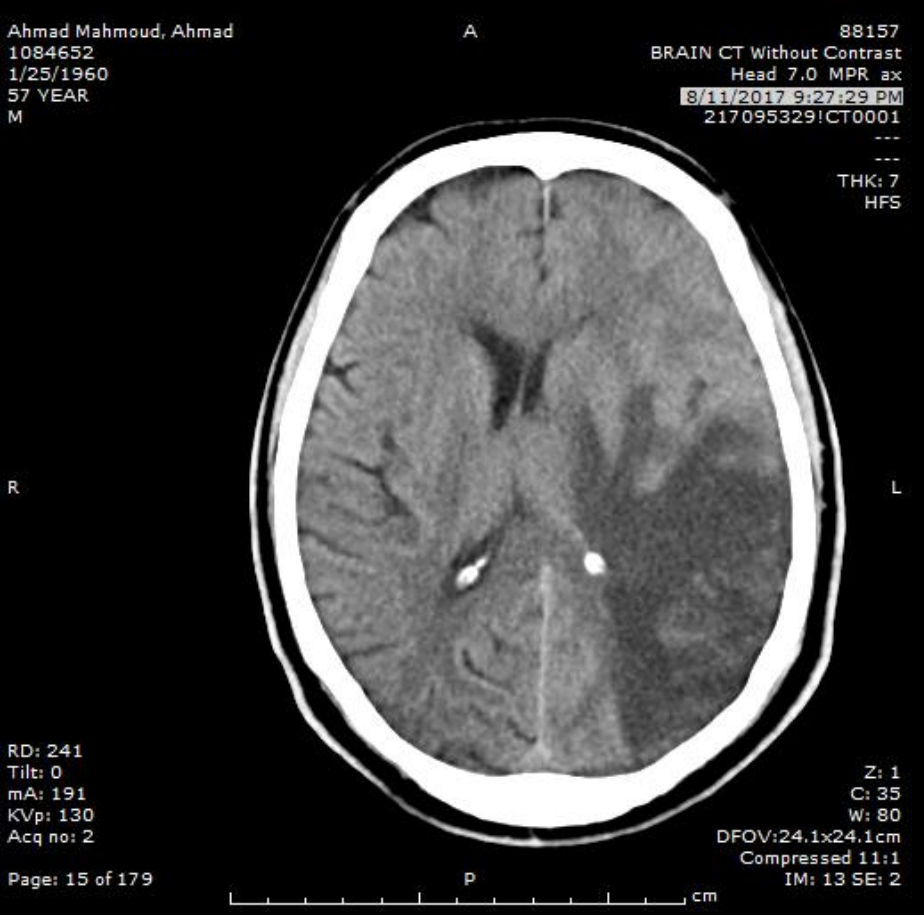
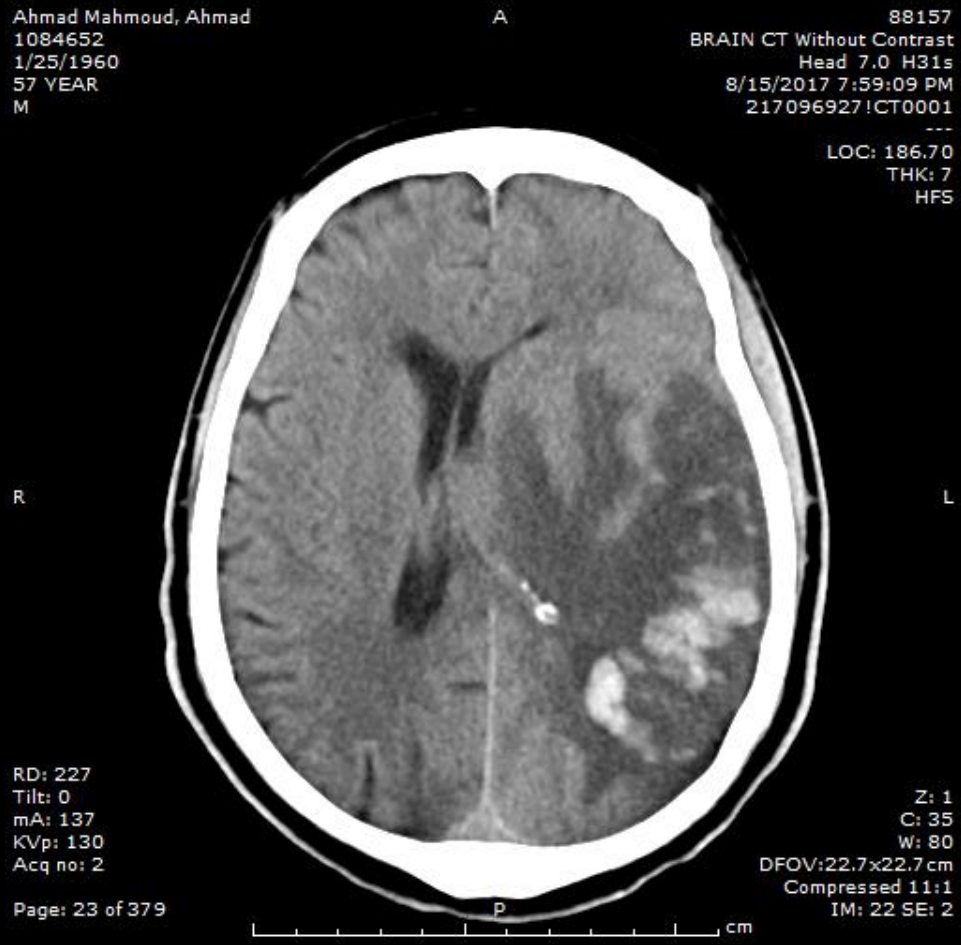


Extensive edema with midline shift



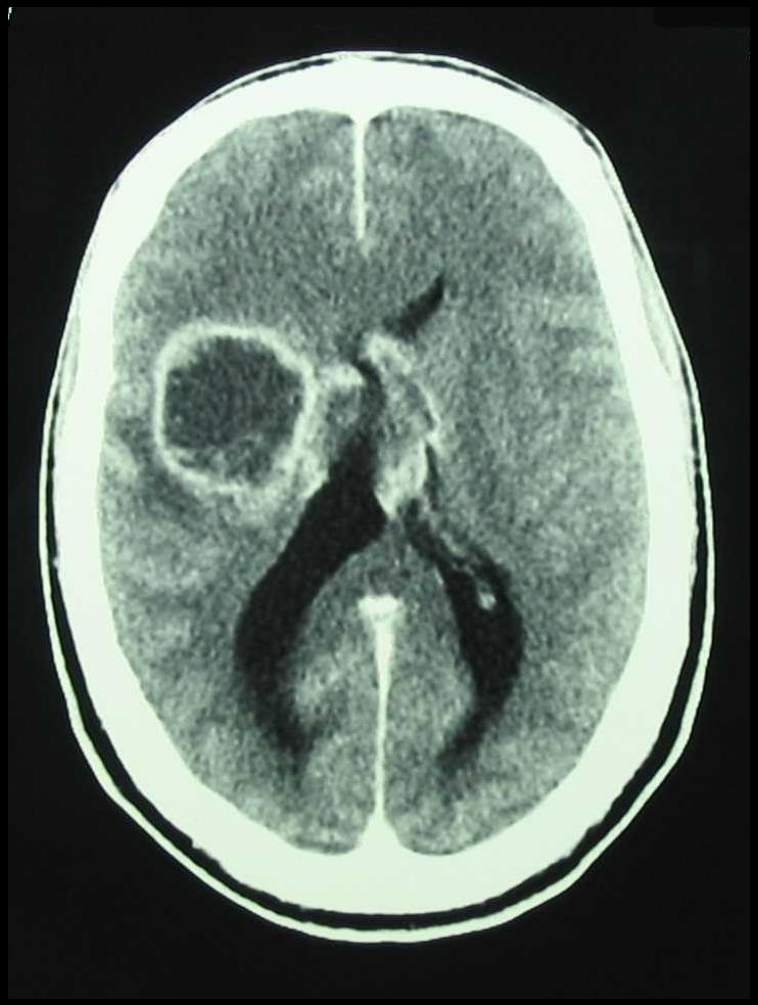
Hemorrhagic transformation

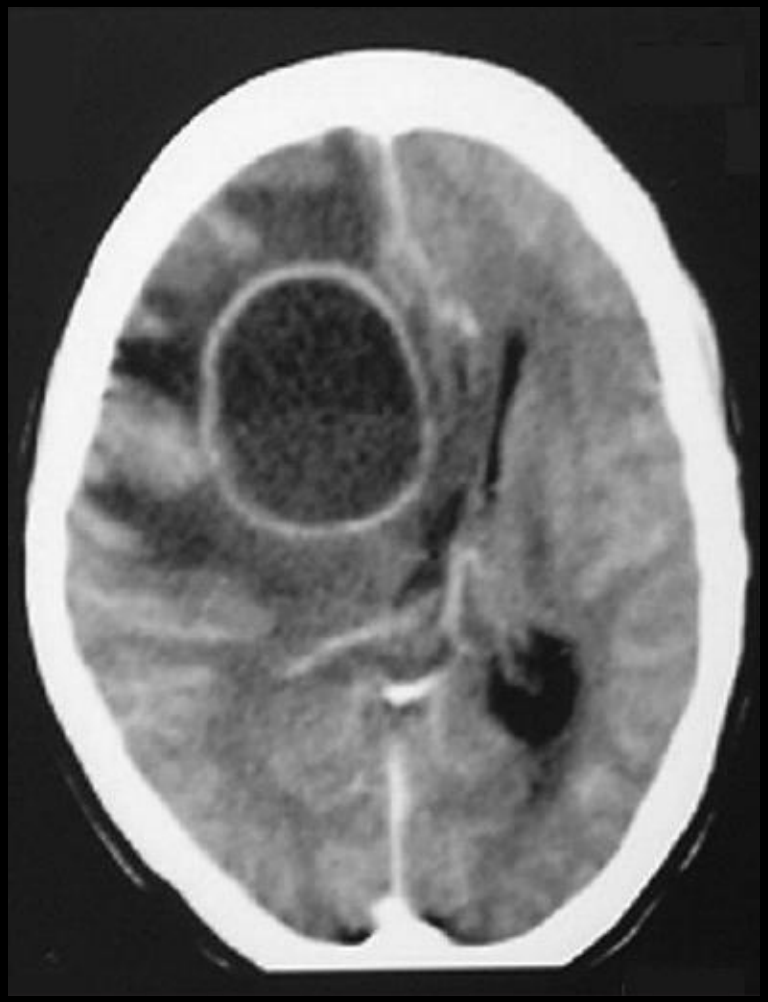


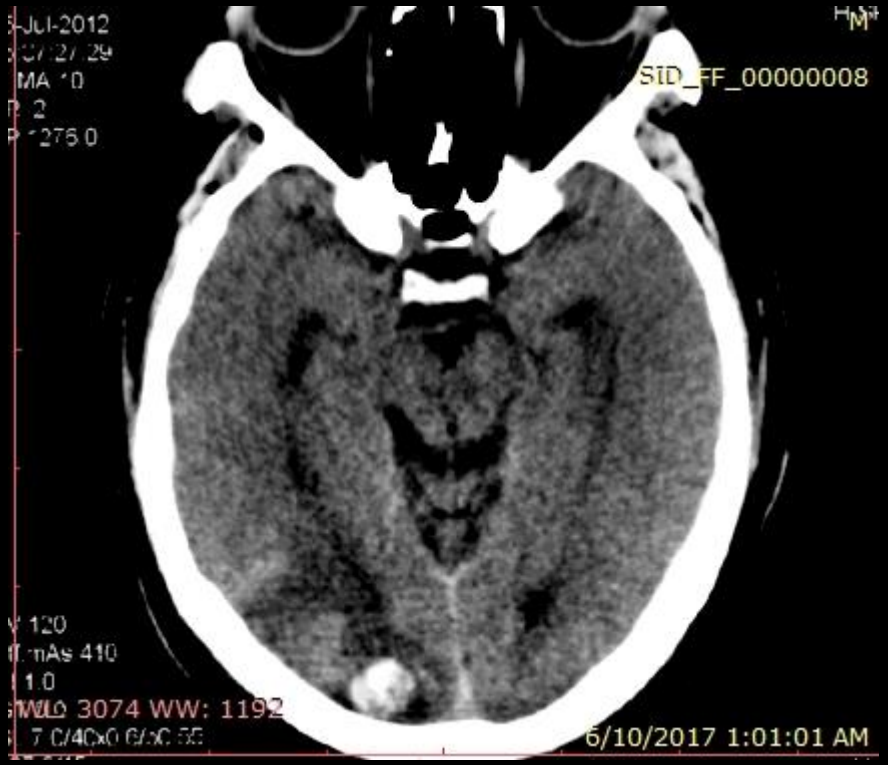


→ Vasogenic edema

Necrotic tissue: tumor v/s abscess



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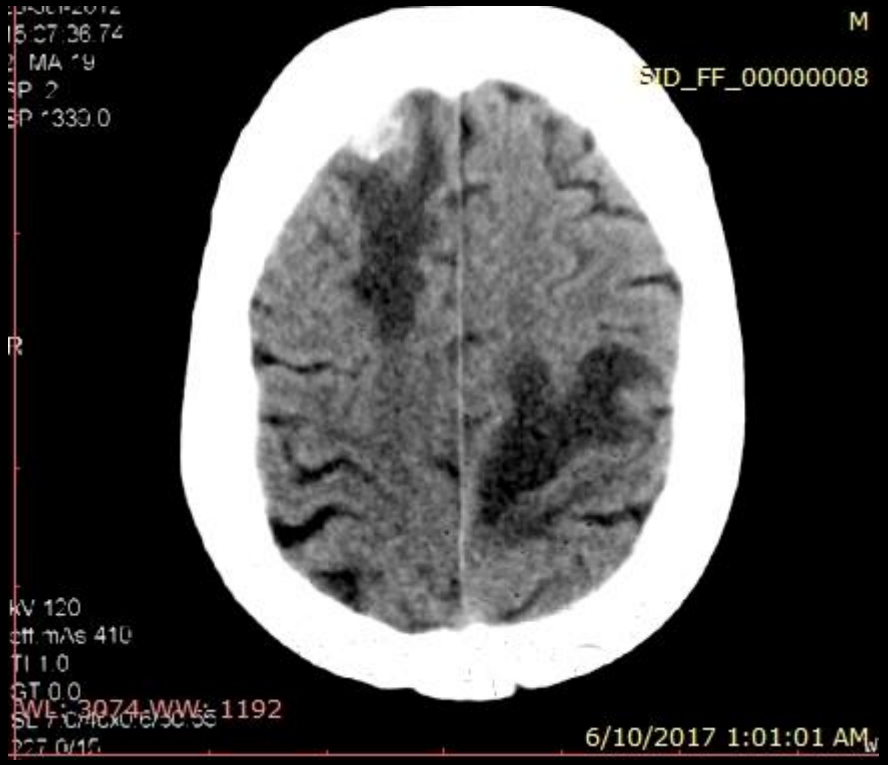
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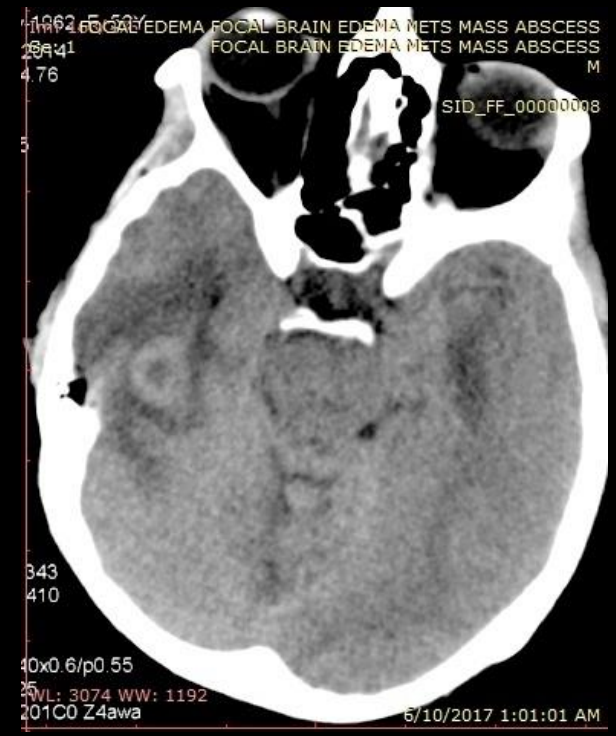
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FOCAL BRAIN EDEMA METS MASS ABSCESS
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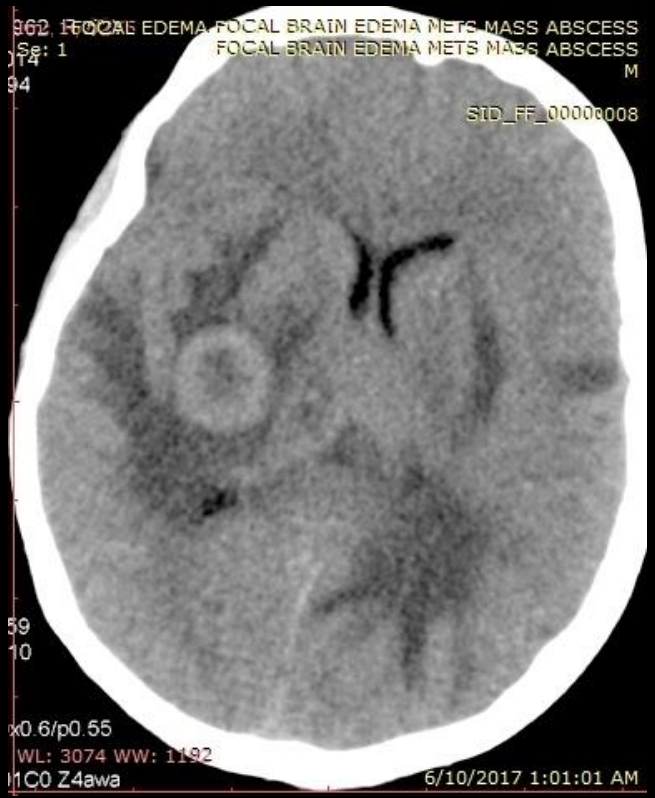
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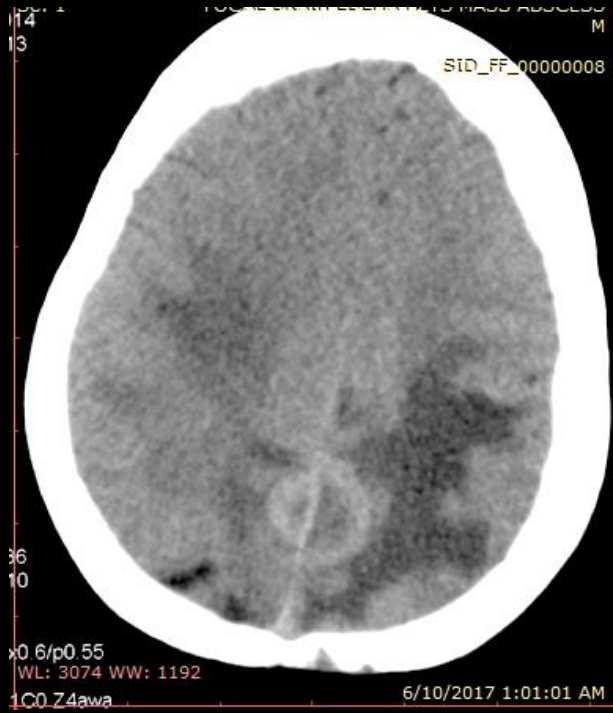
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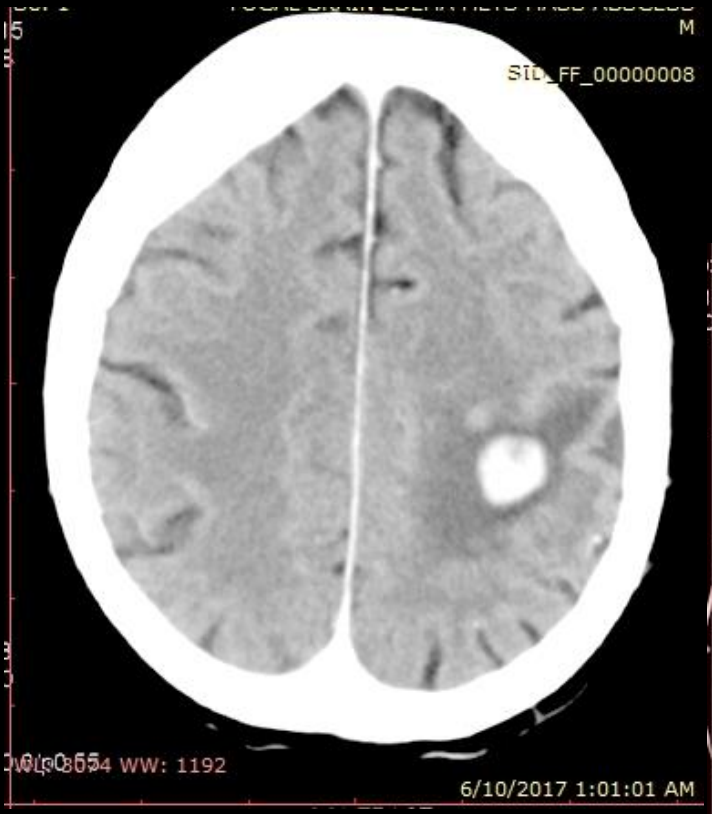
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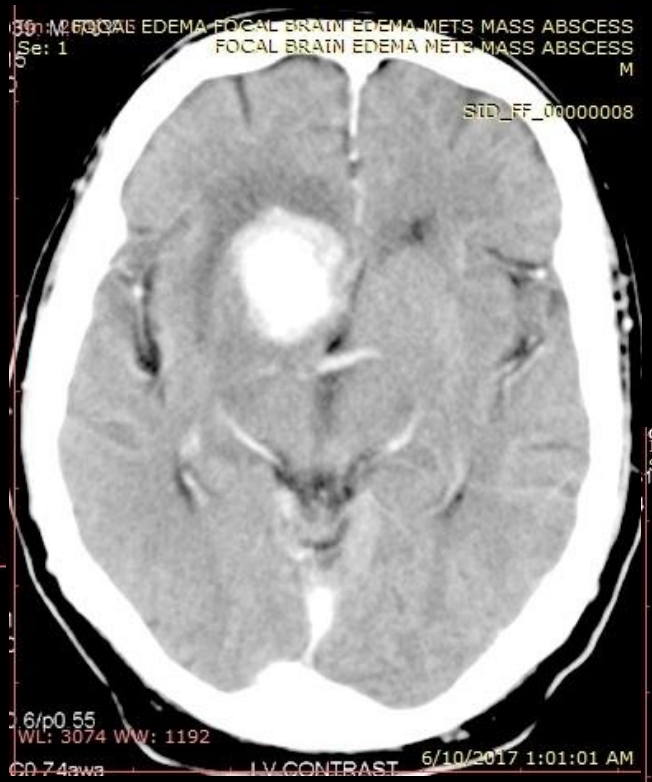
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WL: 3074 WW: 1192
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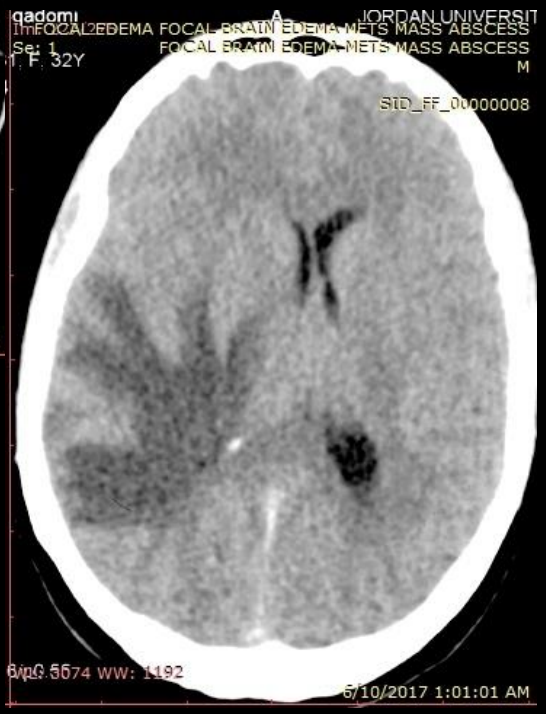
6/10/2017 1:01:01 AM


JORDAN UNIVERSIT
FOCAL BRAIN EDEMA METS MASS ABSCESS
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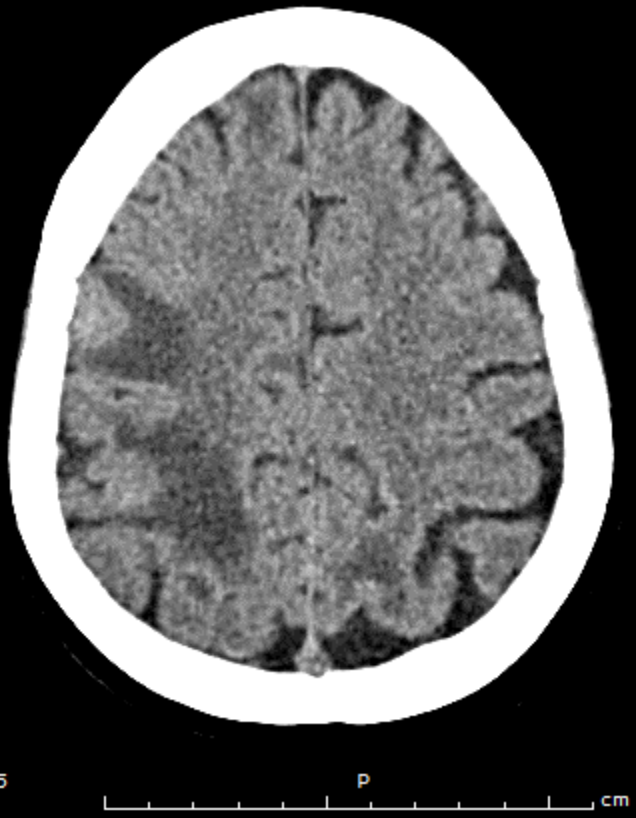
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R
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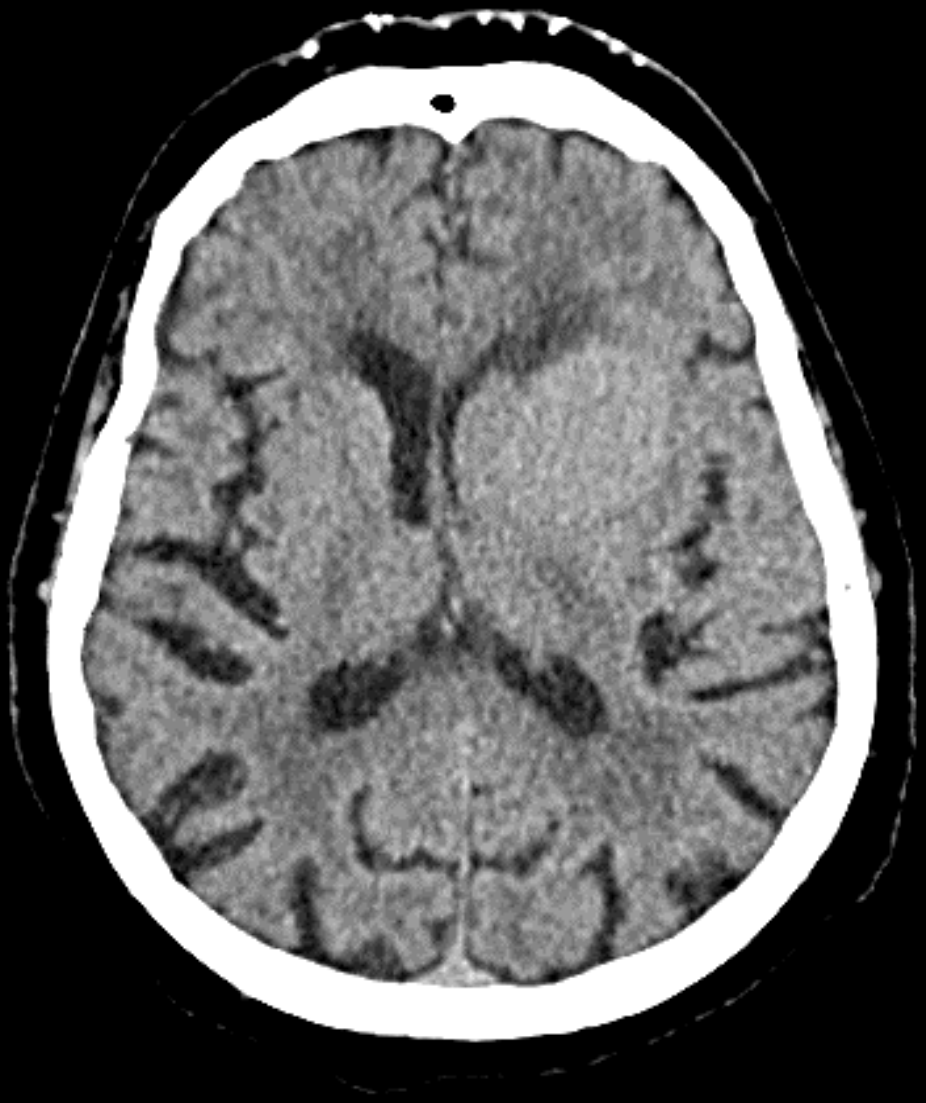

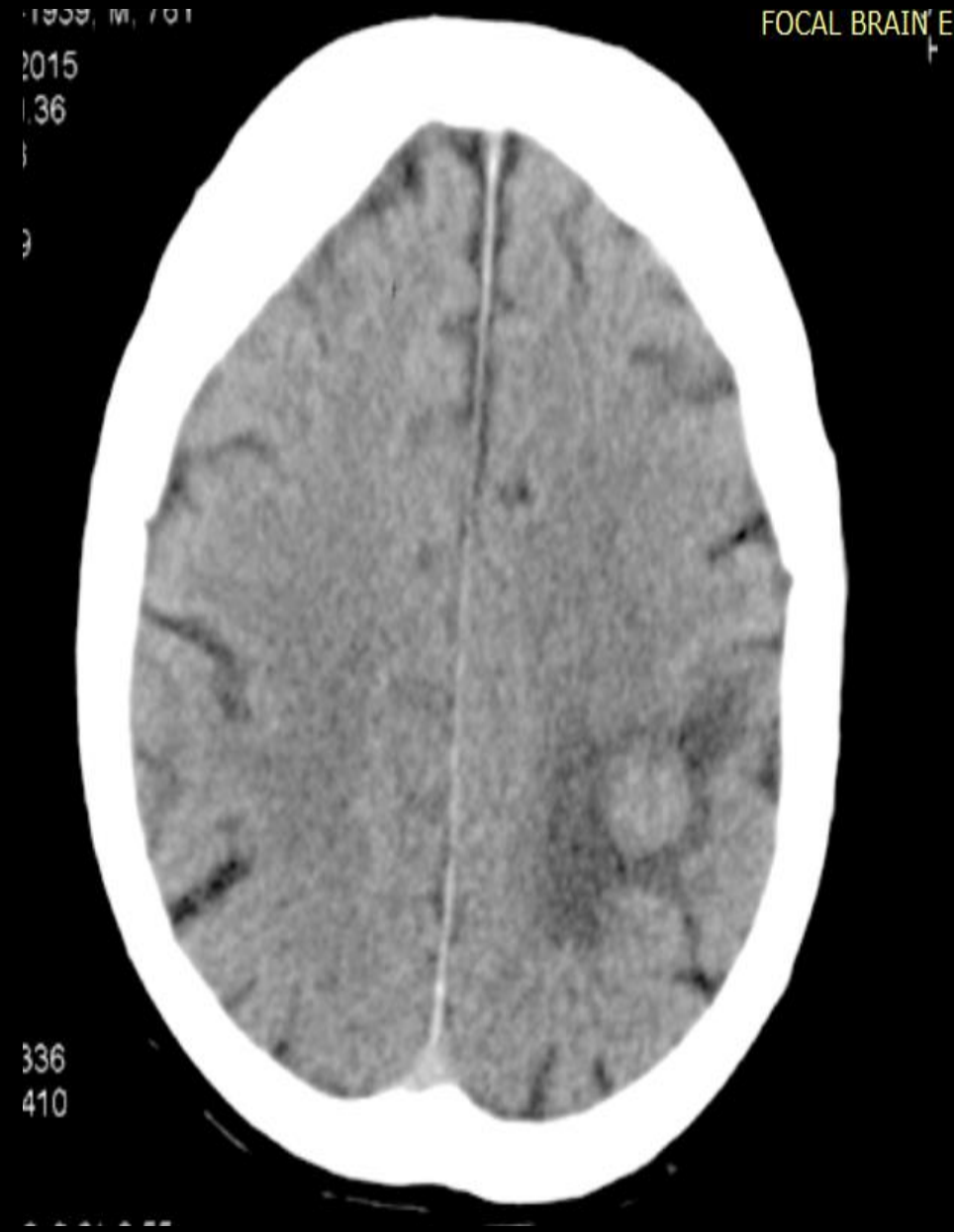
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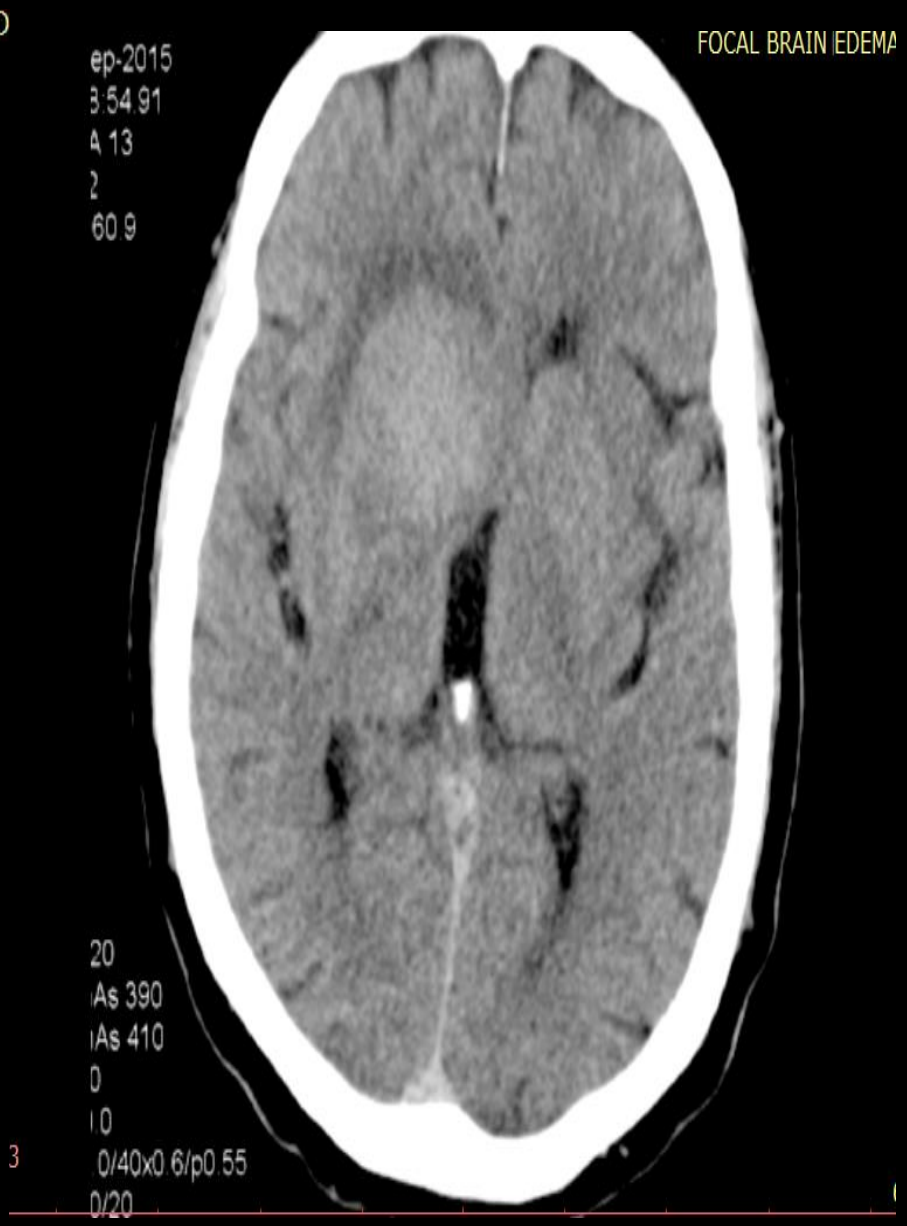
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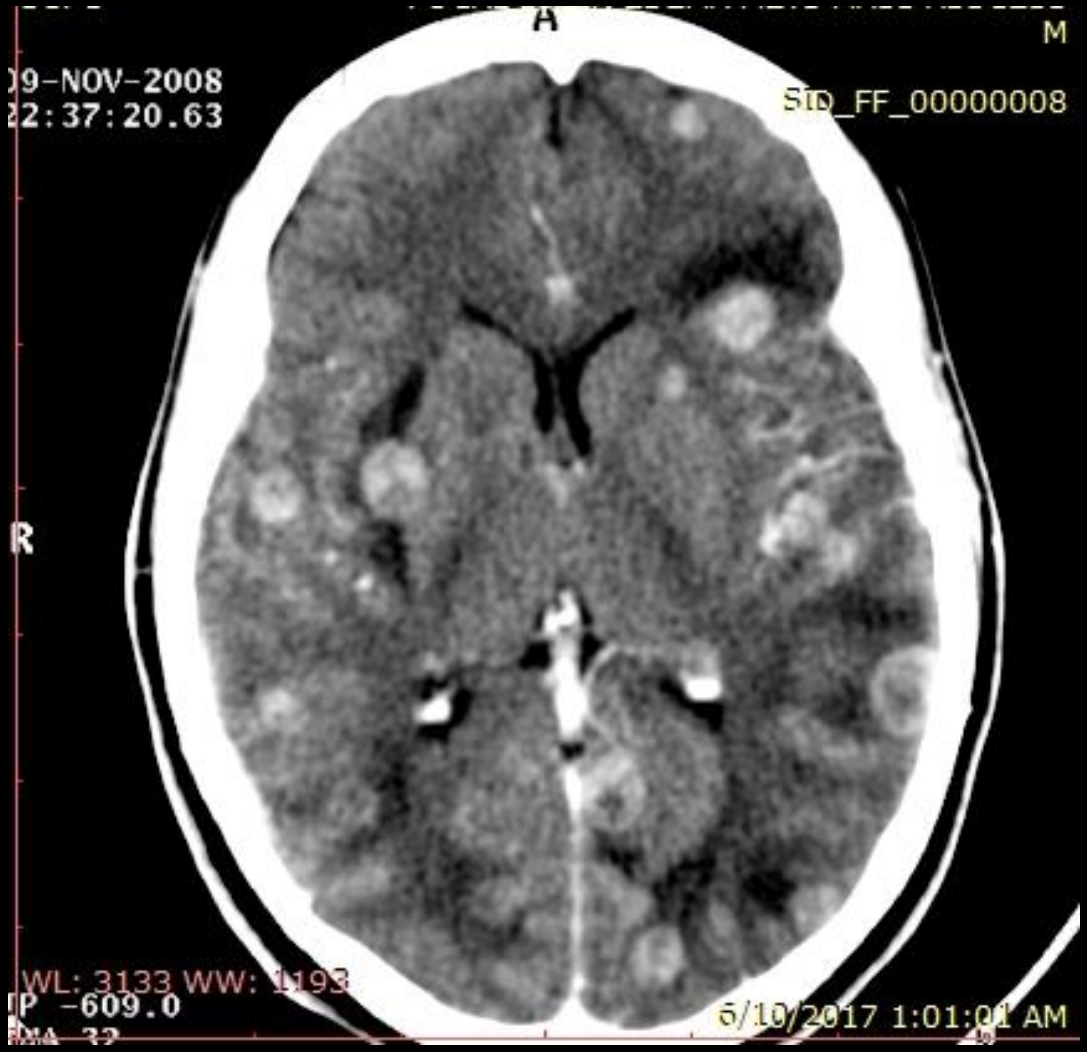
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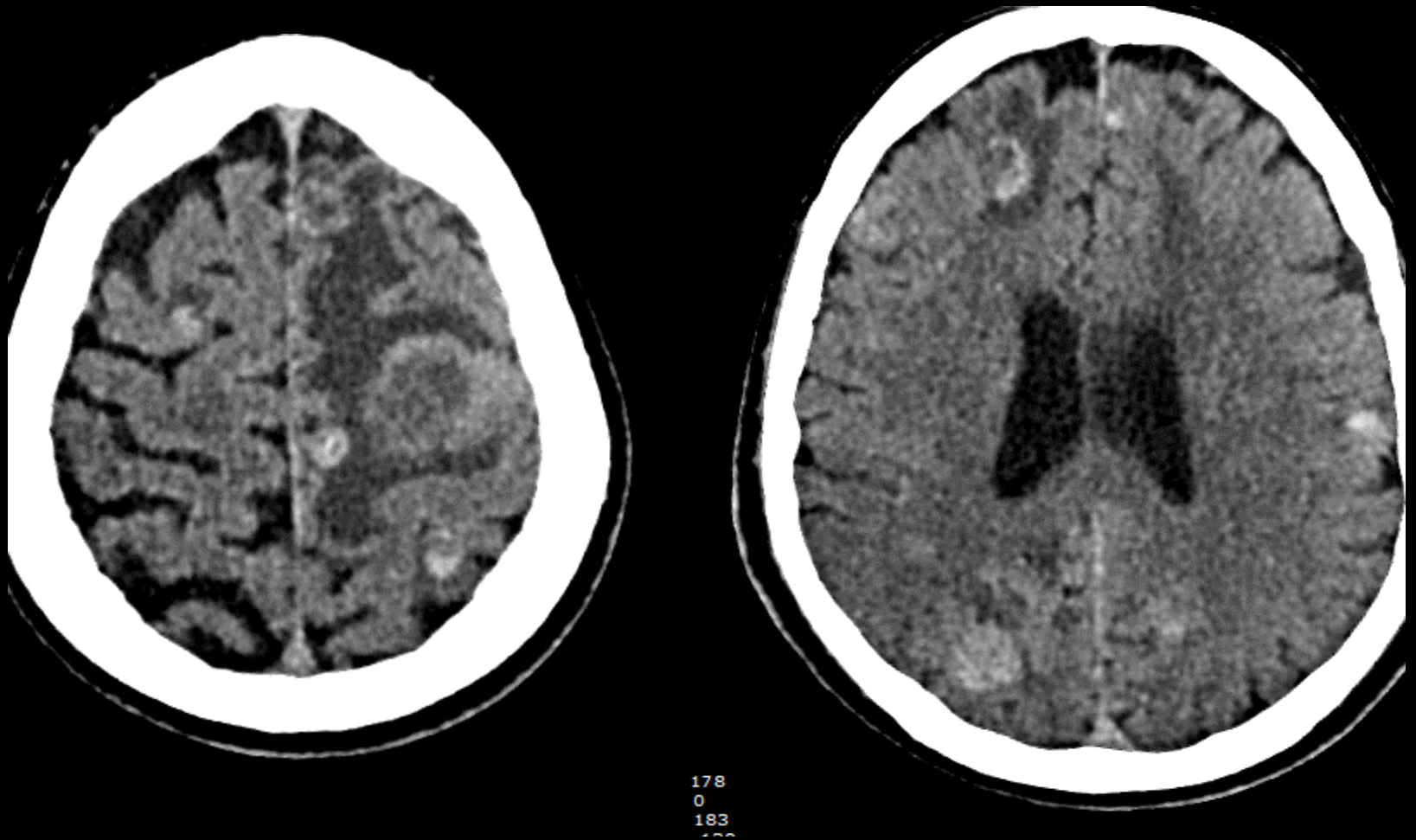
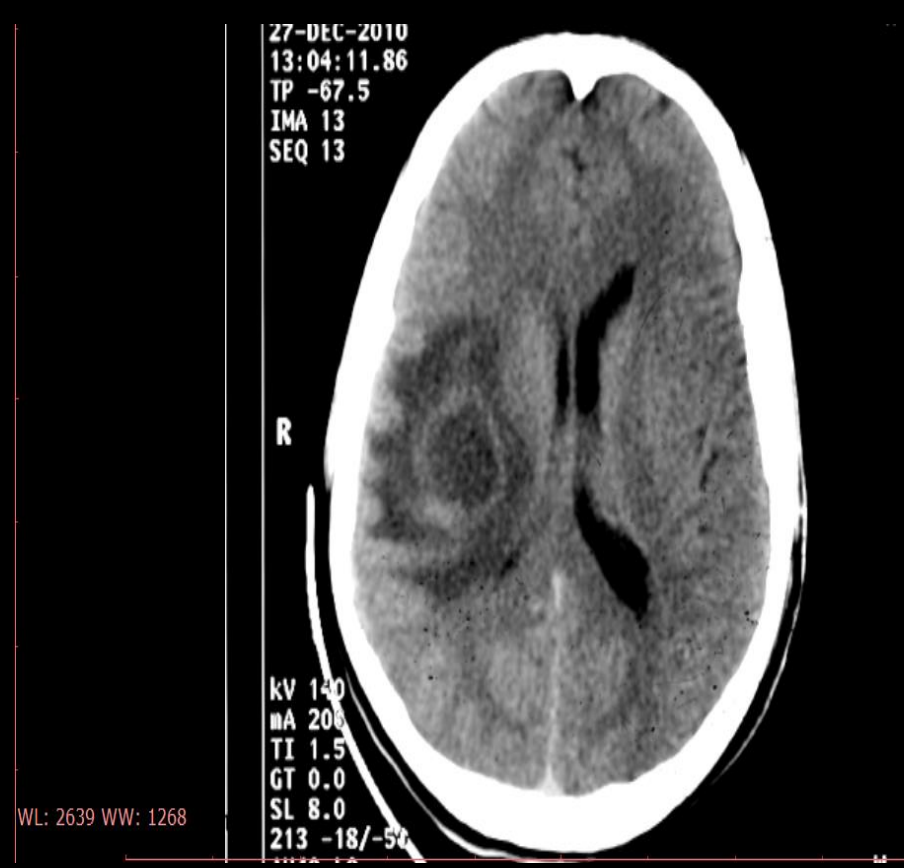
Heamorrahgic metastasis

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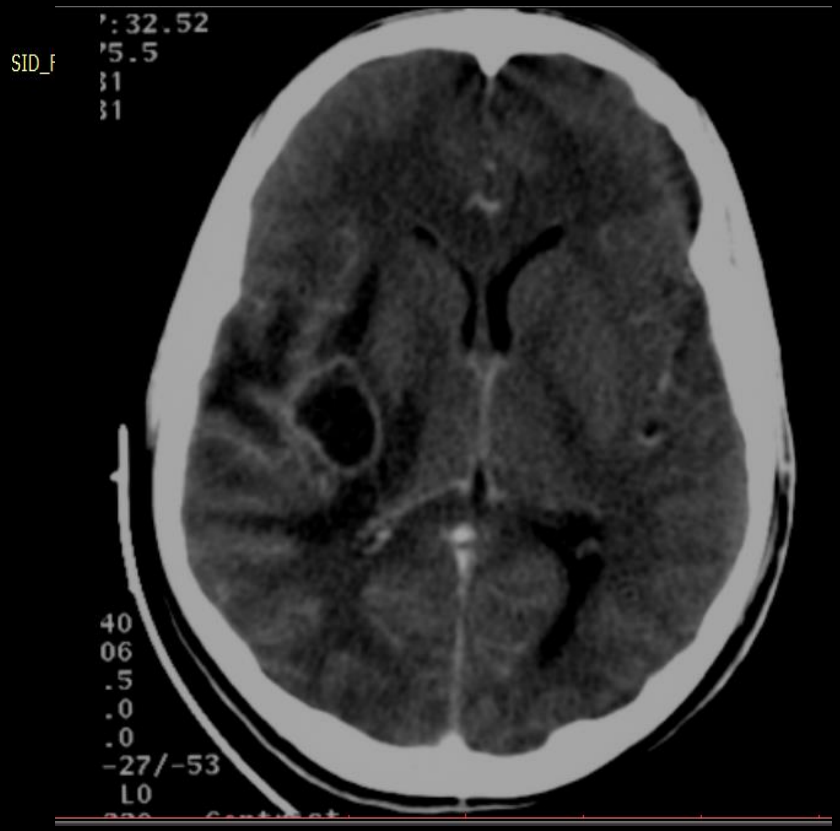
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Diffuse brain edema

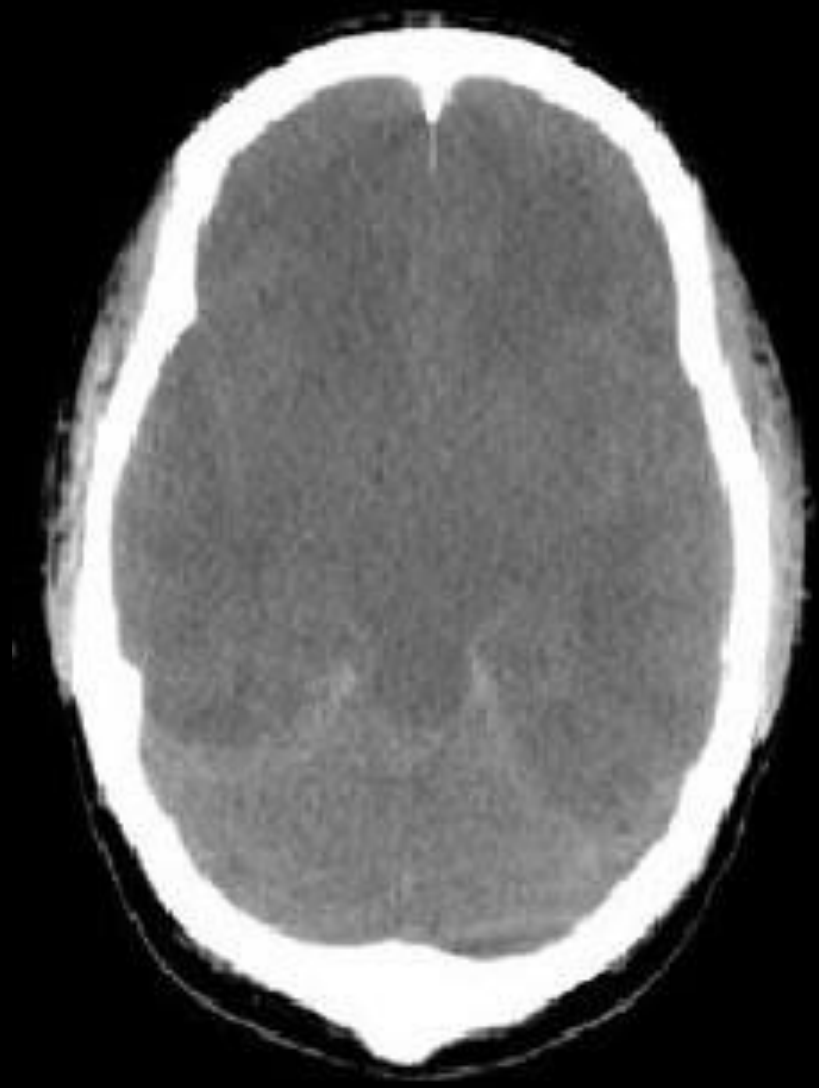
- Traumatic
- medical or nontraumatic
  - es. drug induced

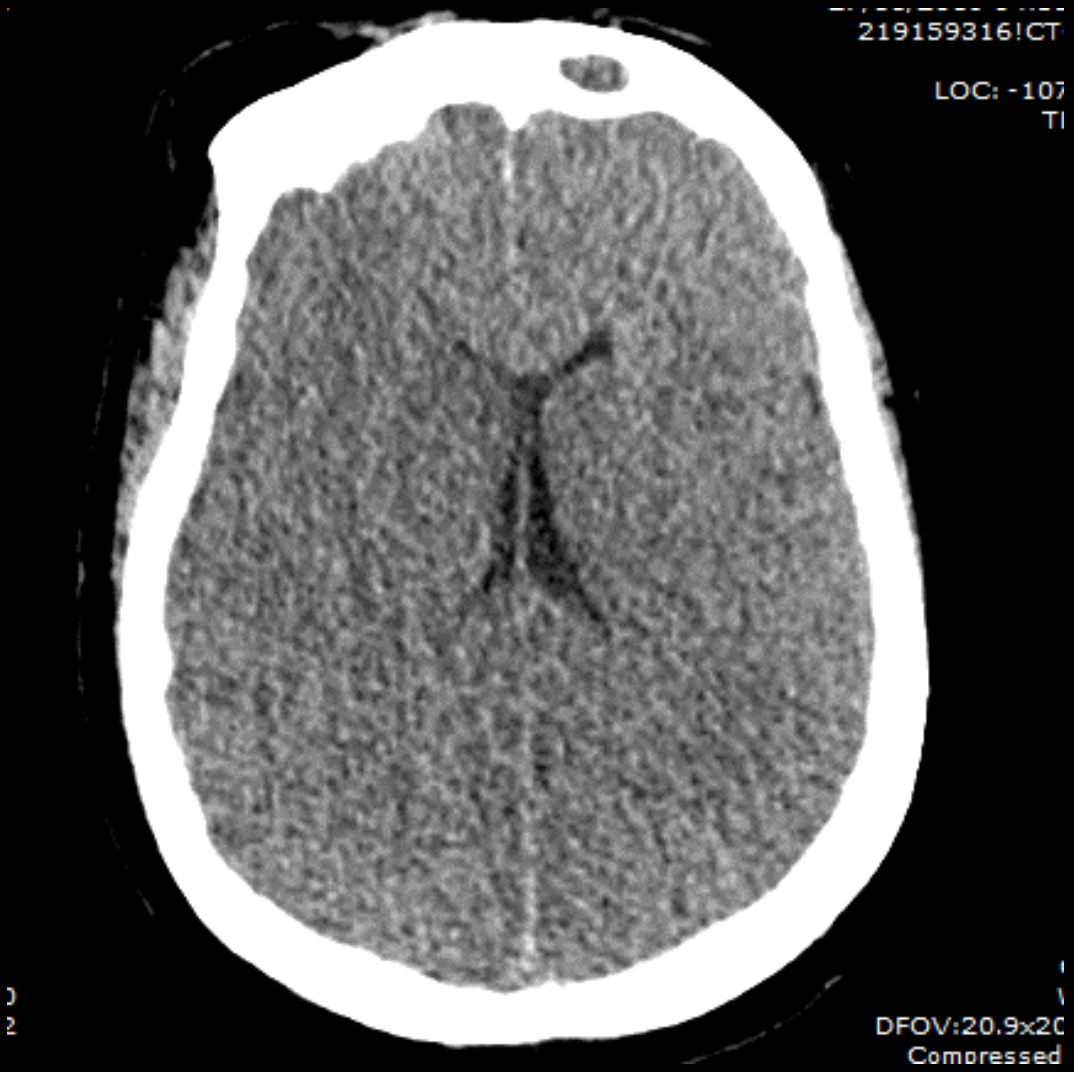
Signs of diffuse brain edema due to medical causes :

Diffuse brain hypodensity
Diffuse loss of grey white matter differentiation
Effacement of sulci (loss)
Small ventricles
Effacement of basal cistern (loss)
Pseudo SA sign

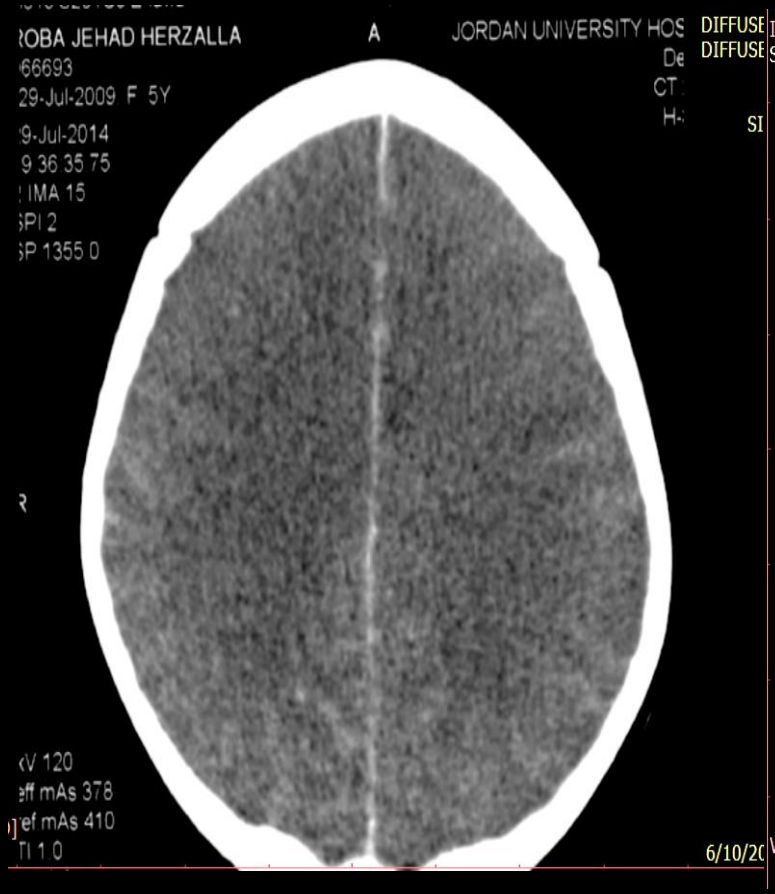
Diffuse brain edema

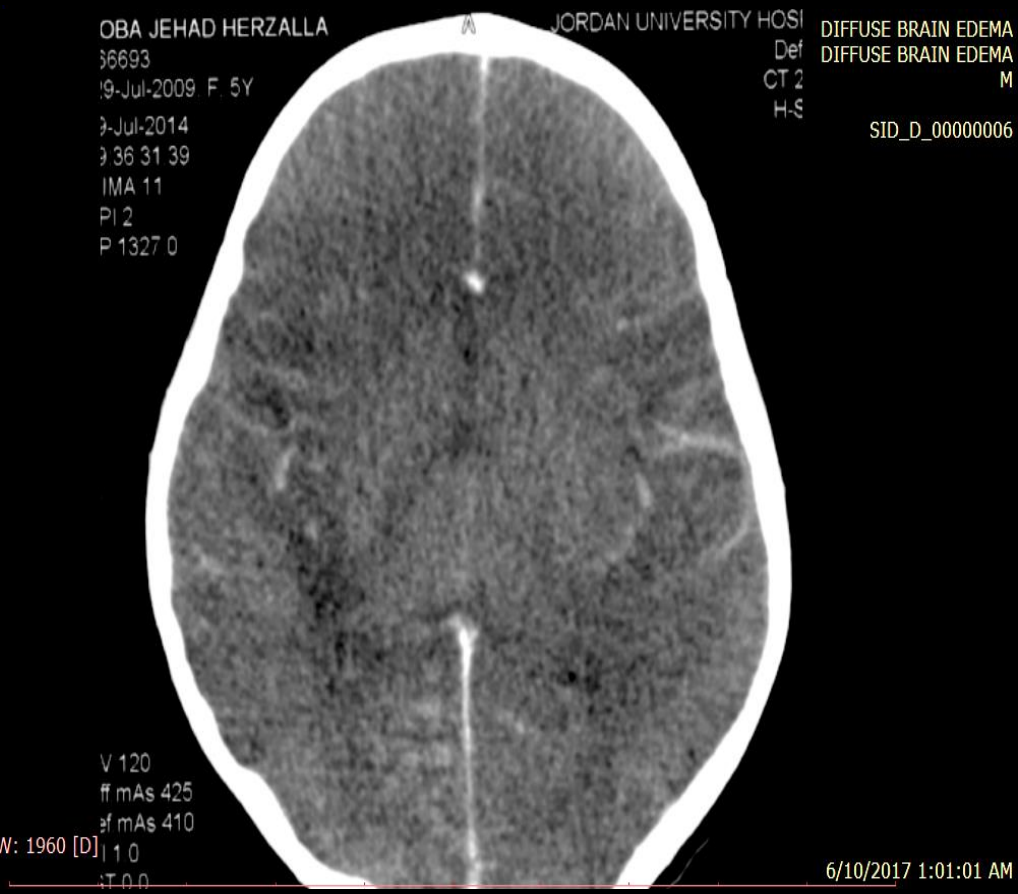
- increase brain hypodensity
- loss of gray white matter differentiation
- Effacement of the sulci
- Effacement of basal cisterns




219159316!CT
LOC: -107
TI
DFOV:20.9x20
Compressed

Since the brain becomes hypodensed (darker), the falxs looks whiter compaired to the brain





- this looks like the sign of subarachnoid hem.

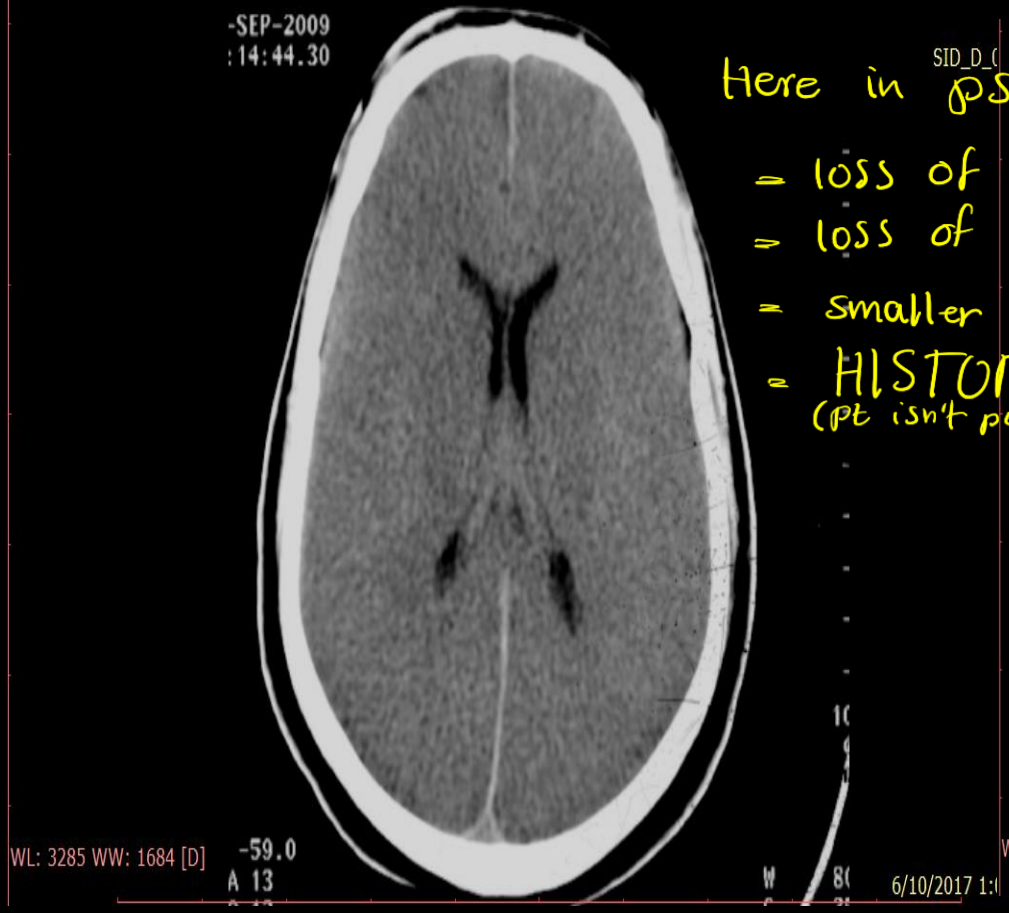
"whiter not thicter falxs" so we called it ↓

Pseudo-subarachnoid sign

How to differentiate between subarach. sign and pseudo ?

Here in pseudo we have other signs :

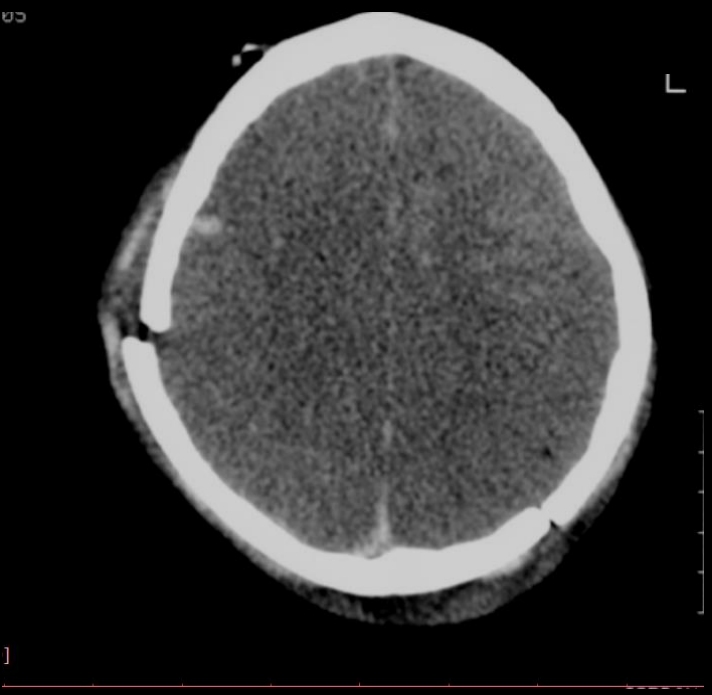
- loss of spaces
- loss of w-G differentiation
- smaller ventricles
- HISTORY
  (Pt isn't post traumatic)

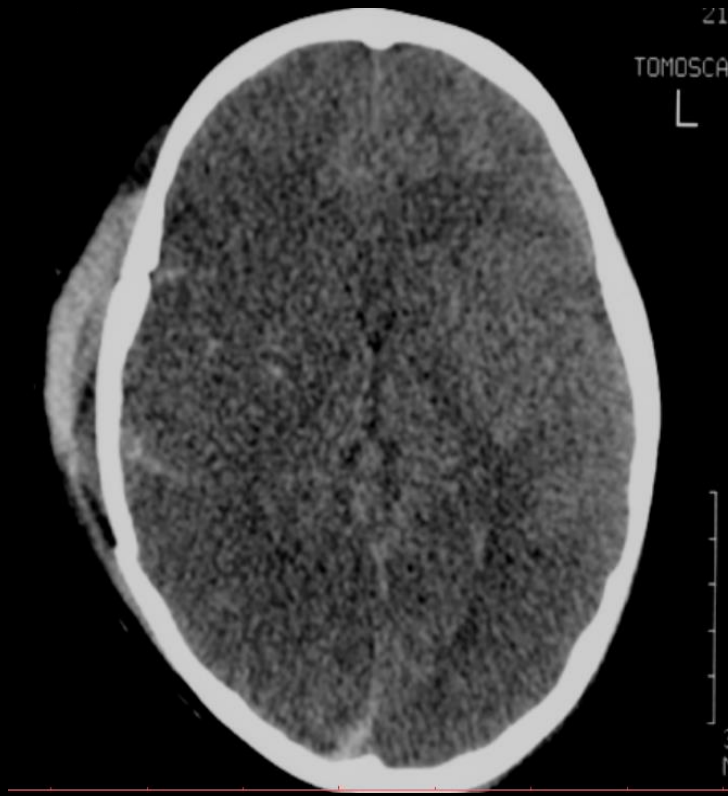


Traumatic Vs Medical → Symmetrical

↓

- we have other signs of trauma (fractures)
- asymmetrical
- Cann't apply pseudosubarach. sign

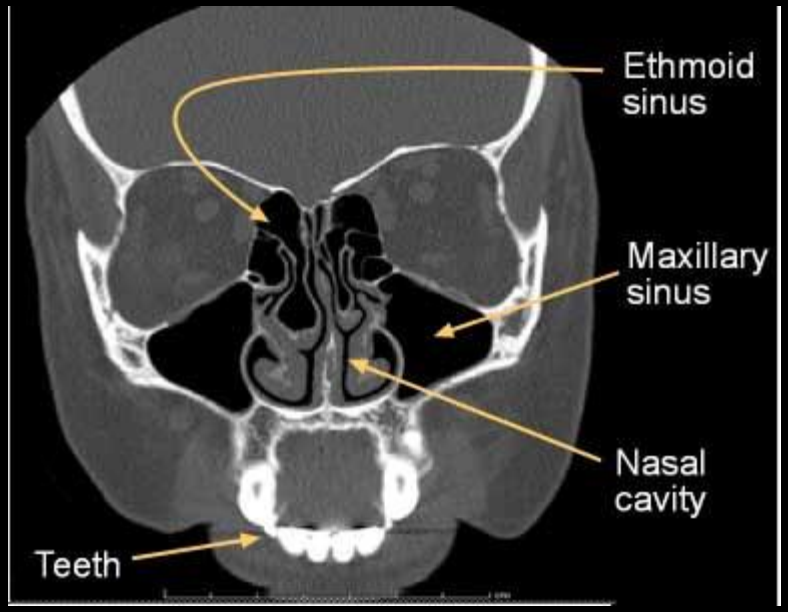




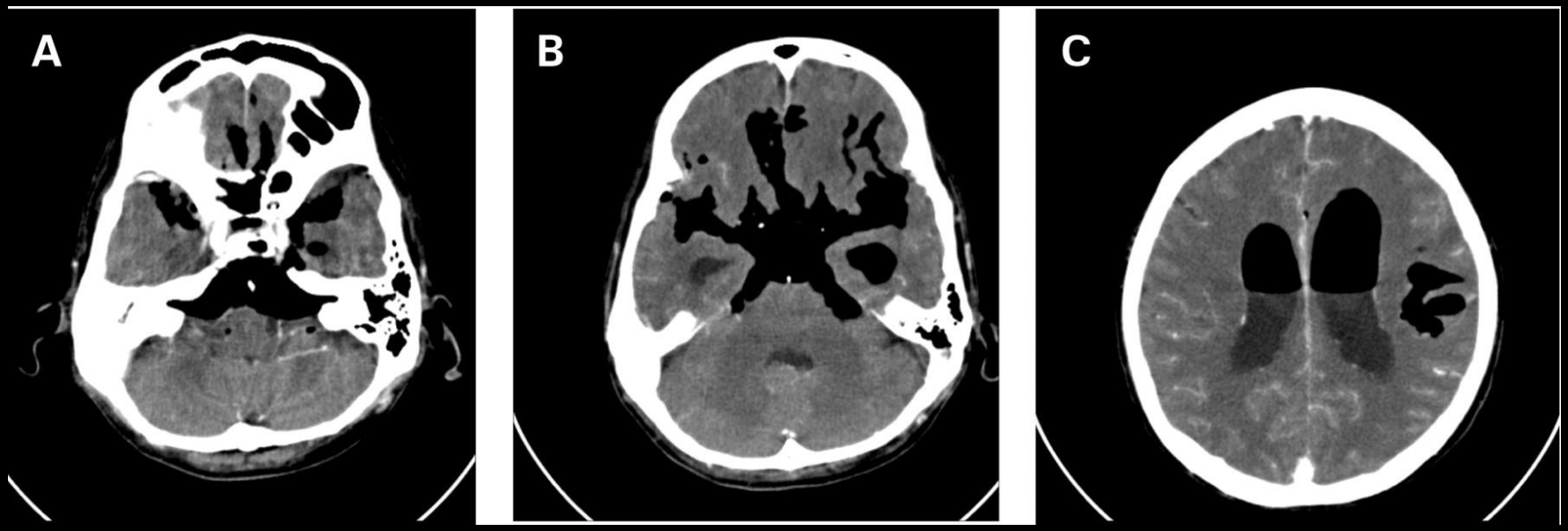
Hypodense Lesions:

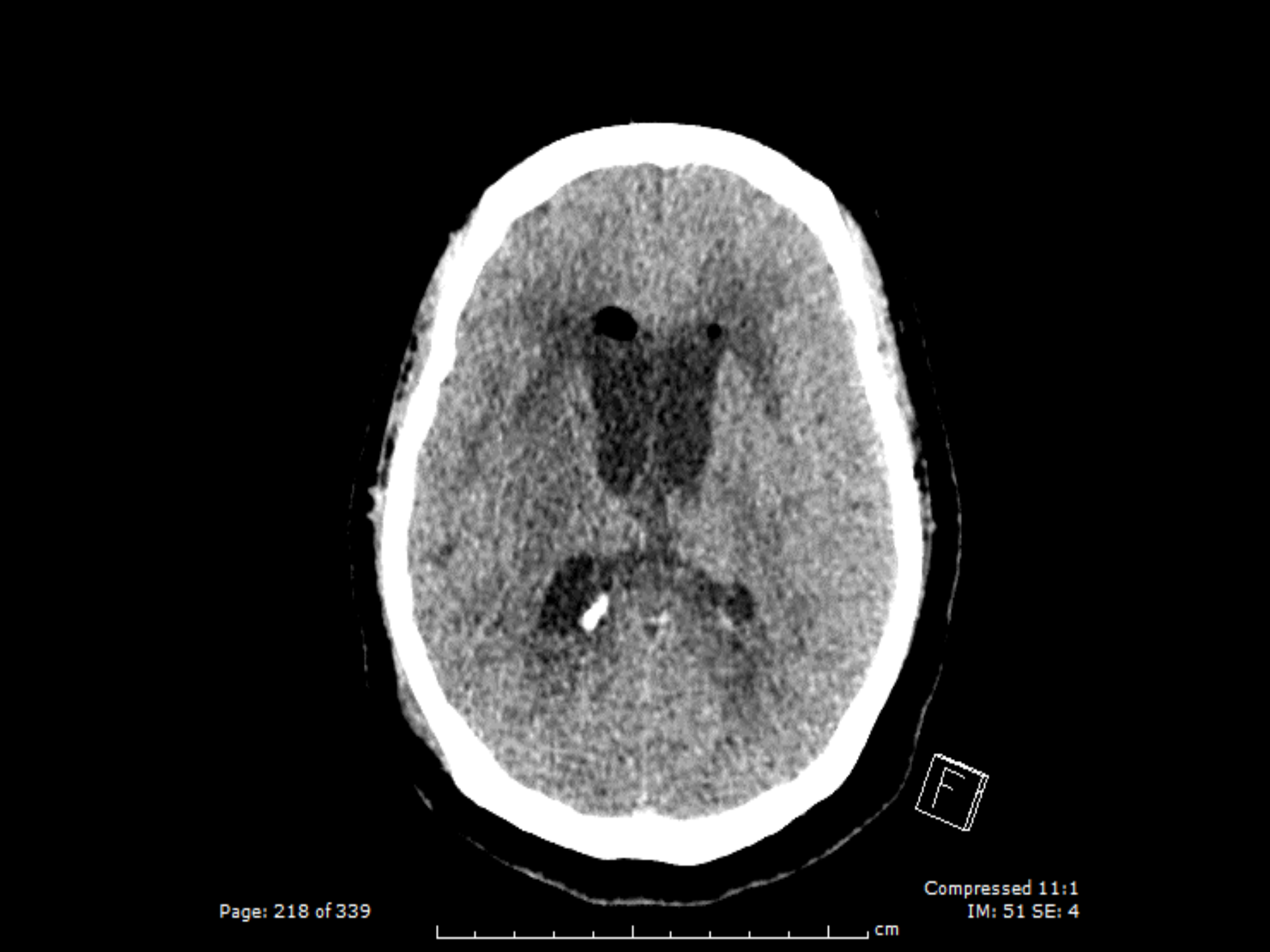
Air:

Normal : sinuses



Abnormal: Pneumocephalus (post Sx or post trauma)

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Page: 218 of 339
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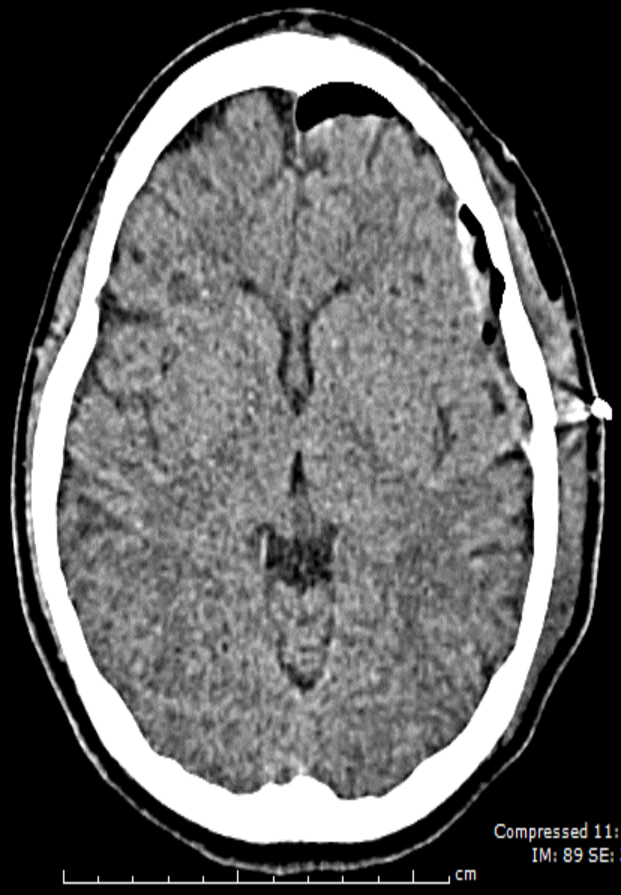

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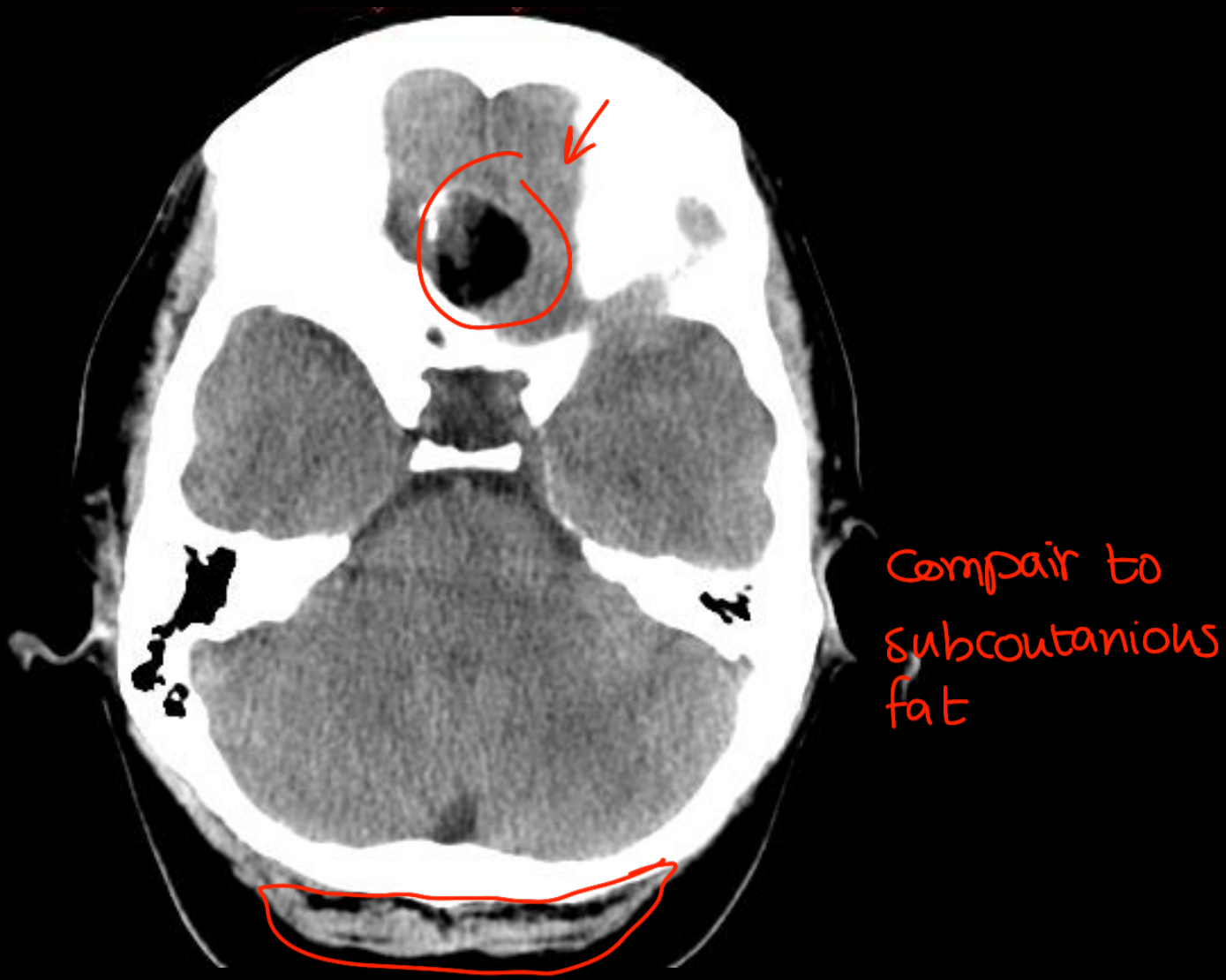
Hypodense Lesions:

Fat:

Lipoma, dermoid cyst

Dermoid Cyst



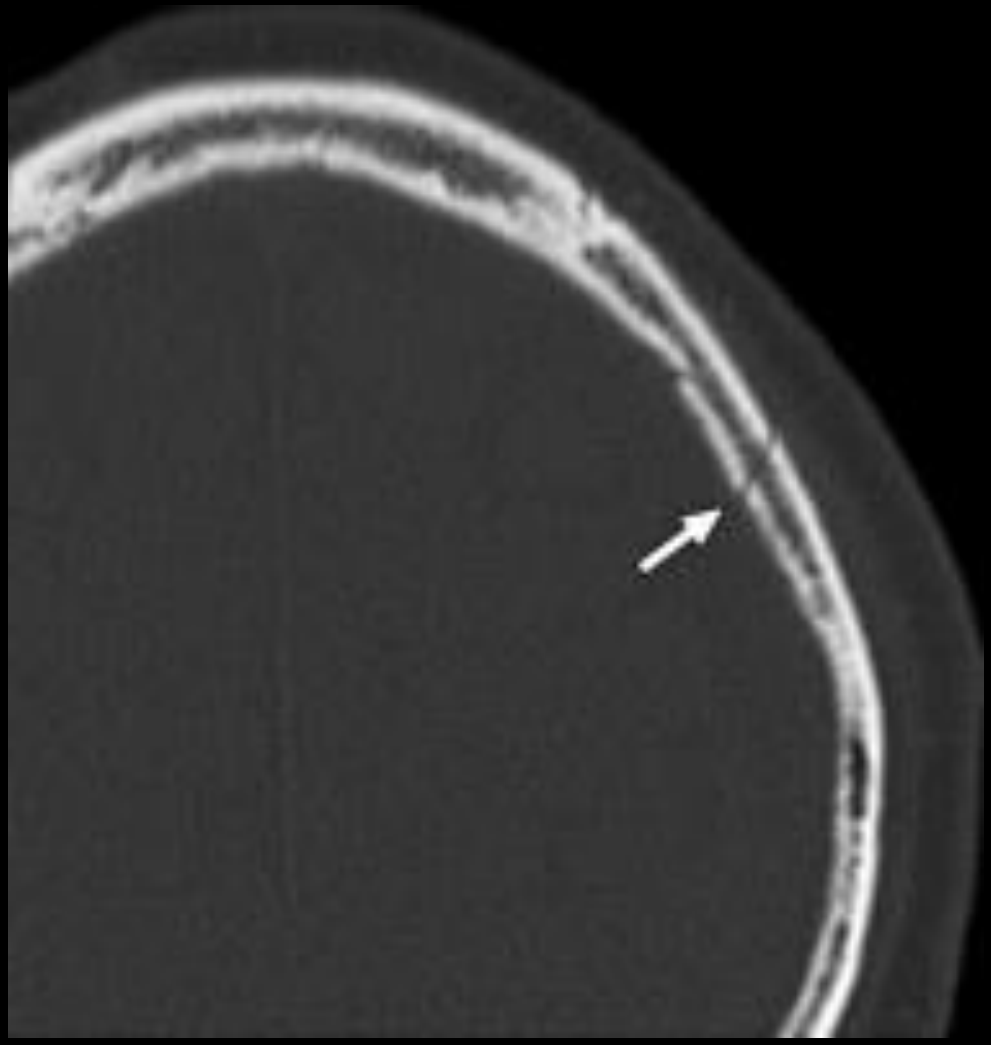
Skull Fractures

Linear

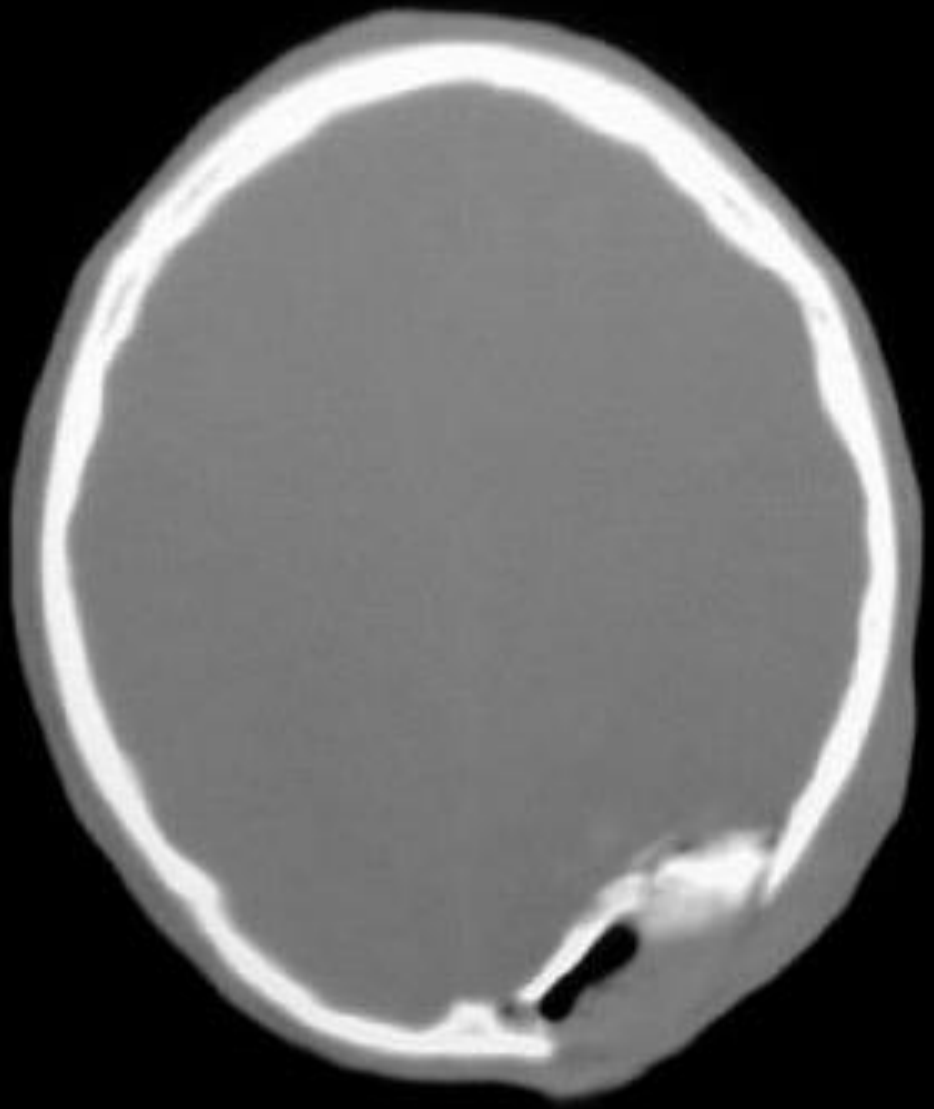
Depressed

Growing Fracture

Linear Fracture

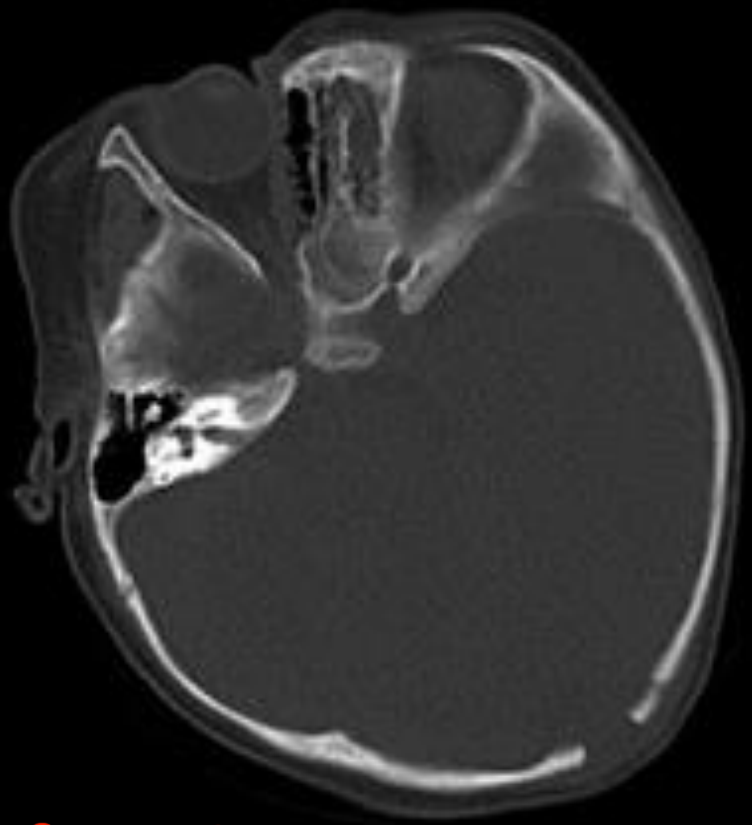


Depressed Fracture

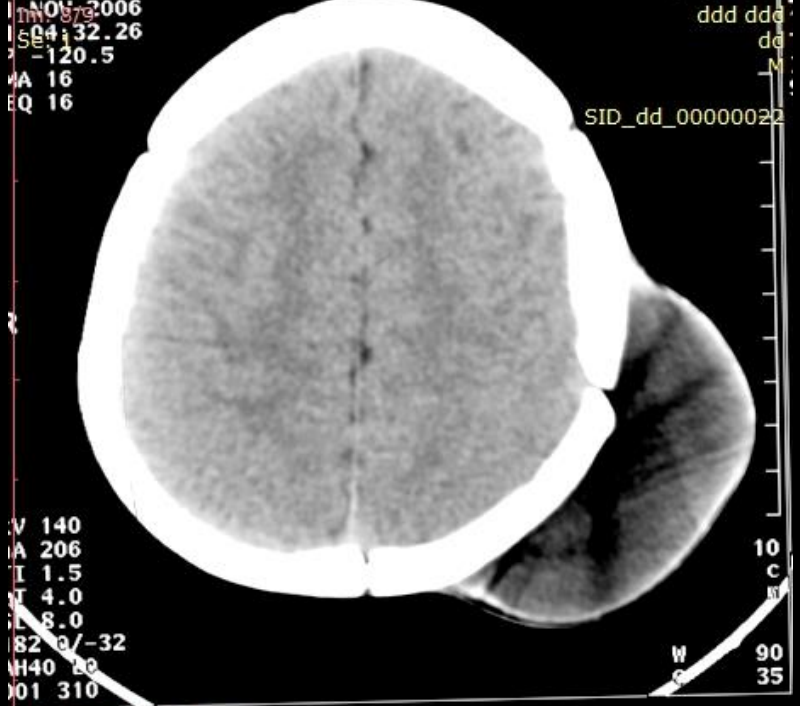


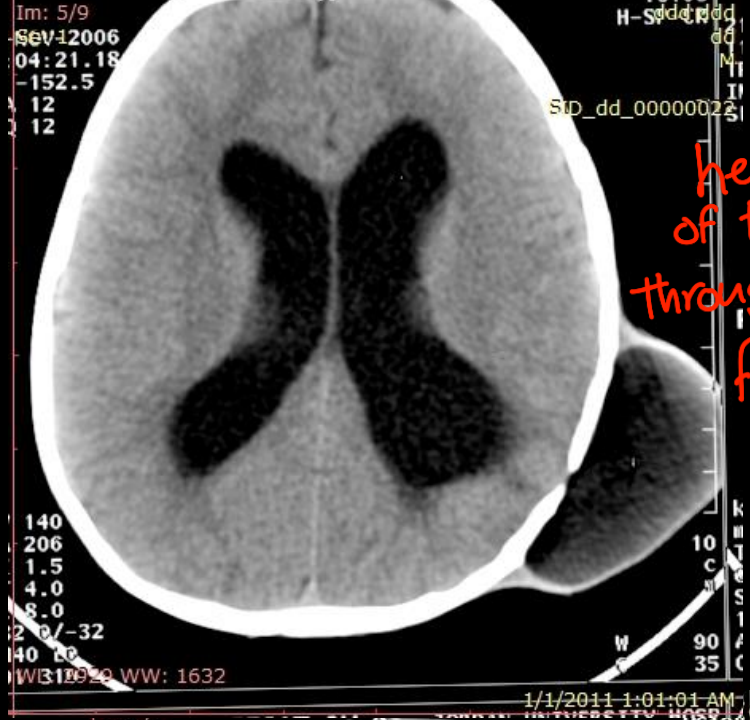
Growing Fracture

in Children

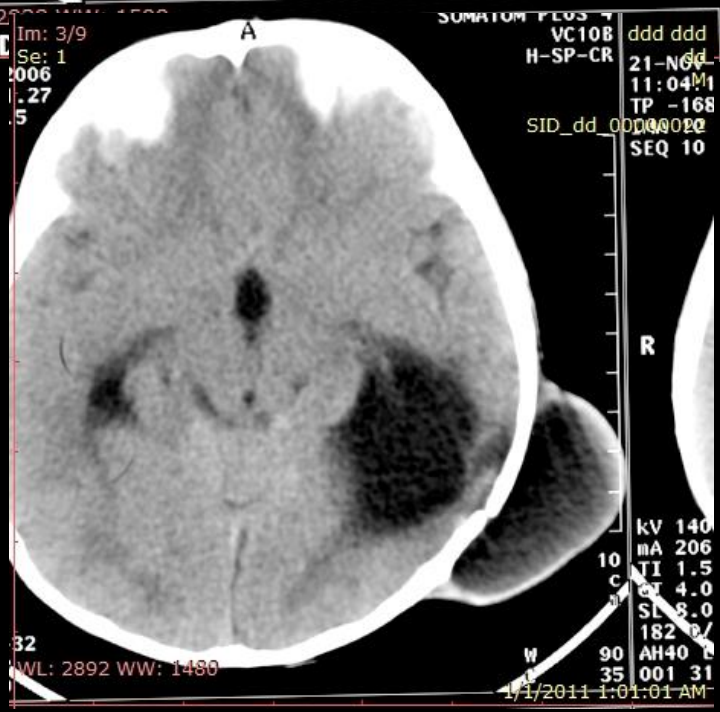


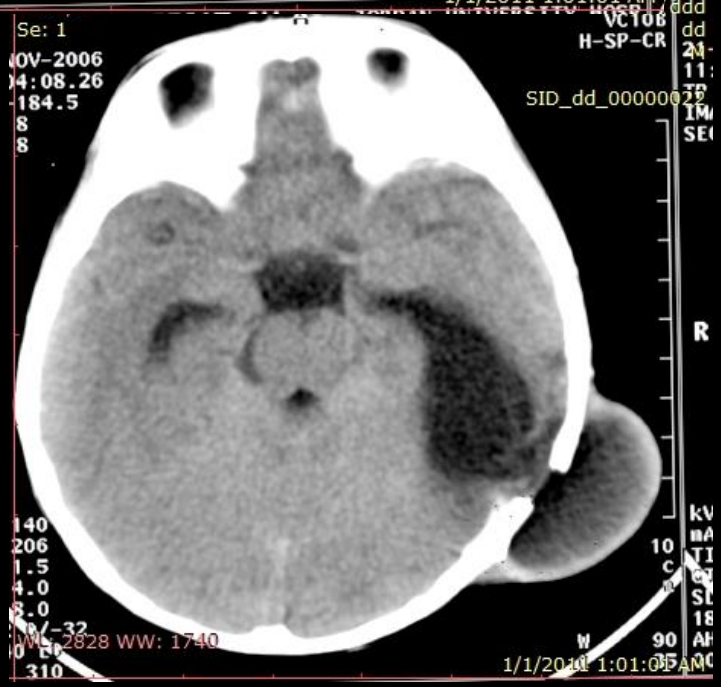
a complication can happen is leptomeningeal cyst

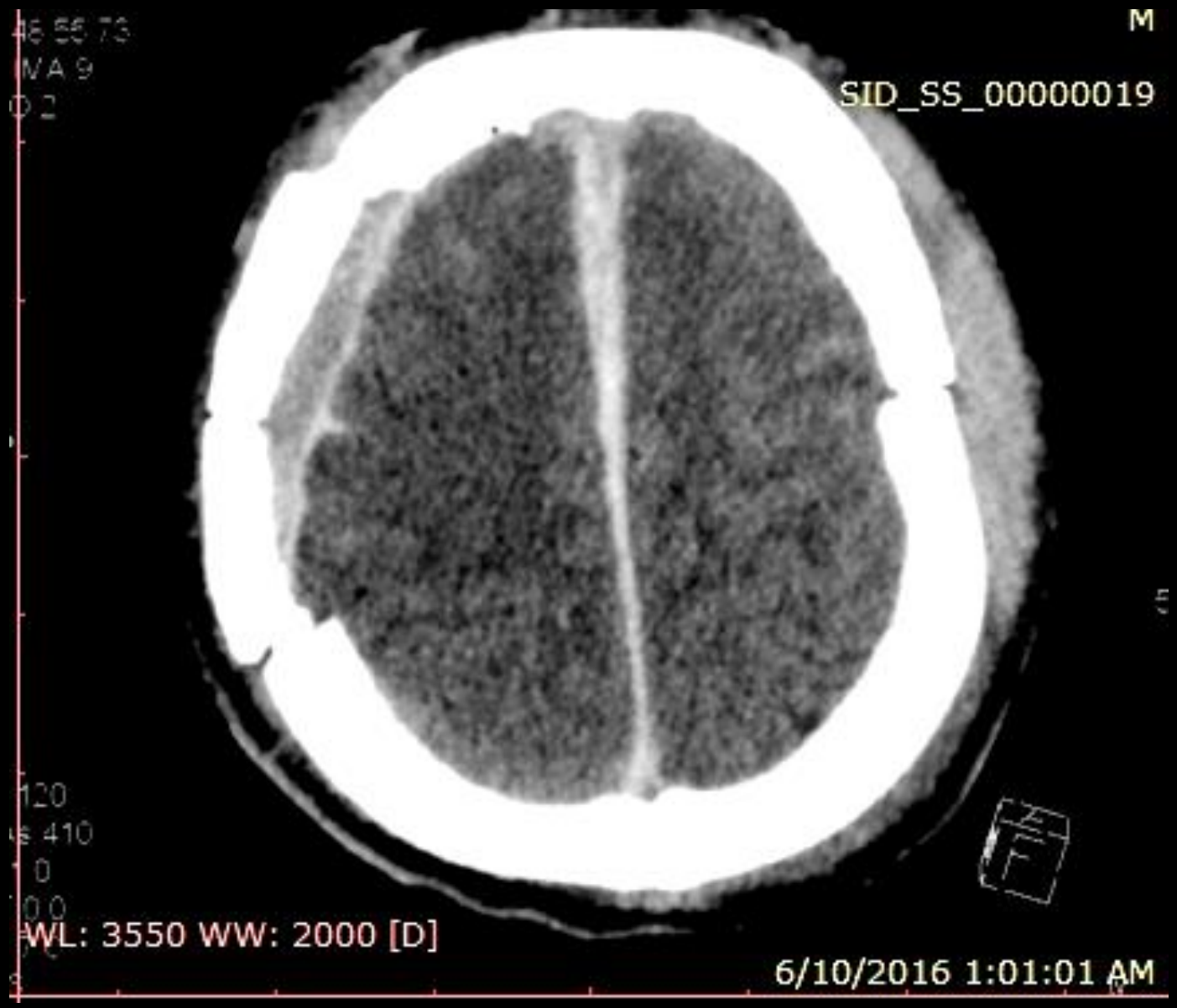




herniation of the meninges through the growing fracture causes this cysts



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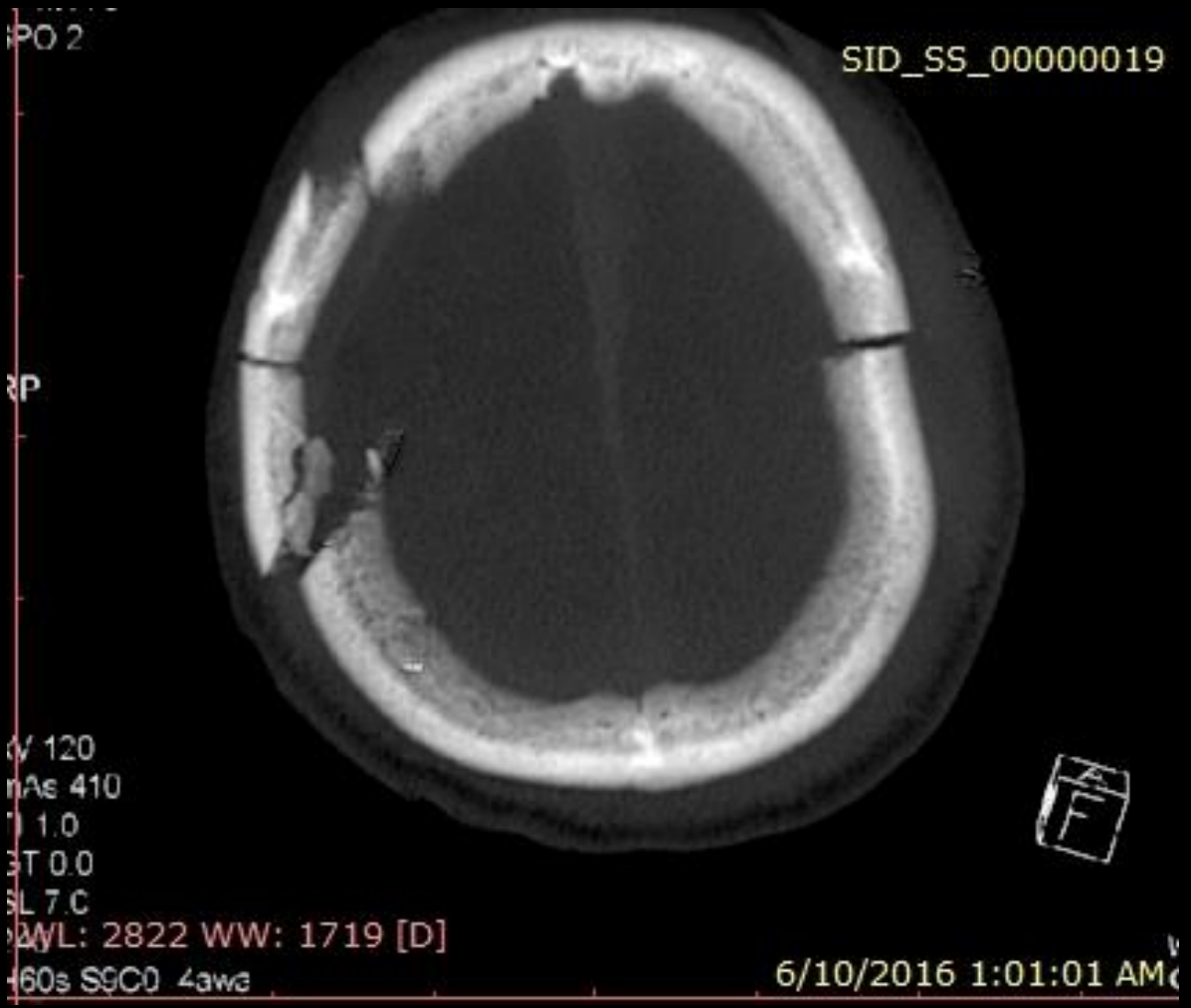
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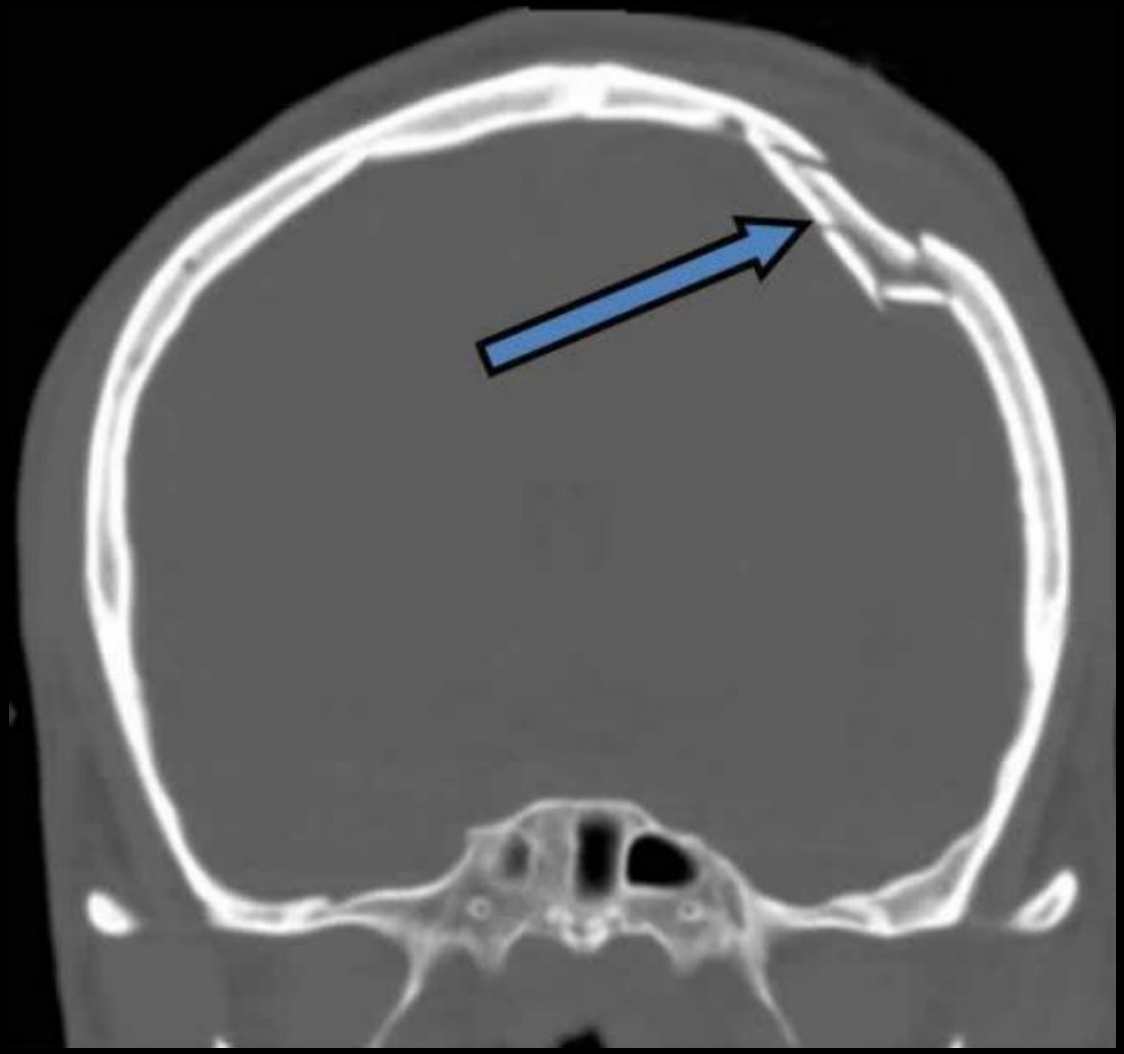

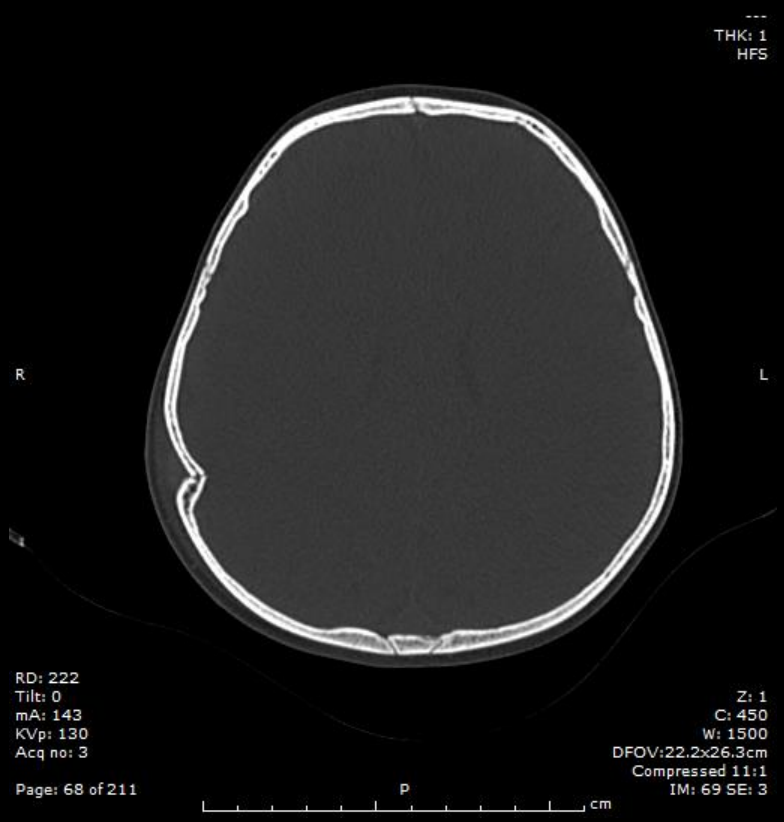
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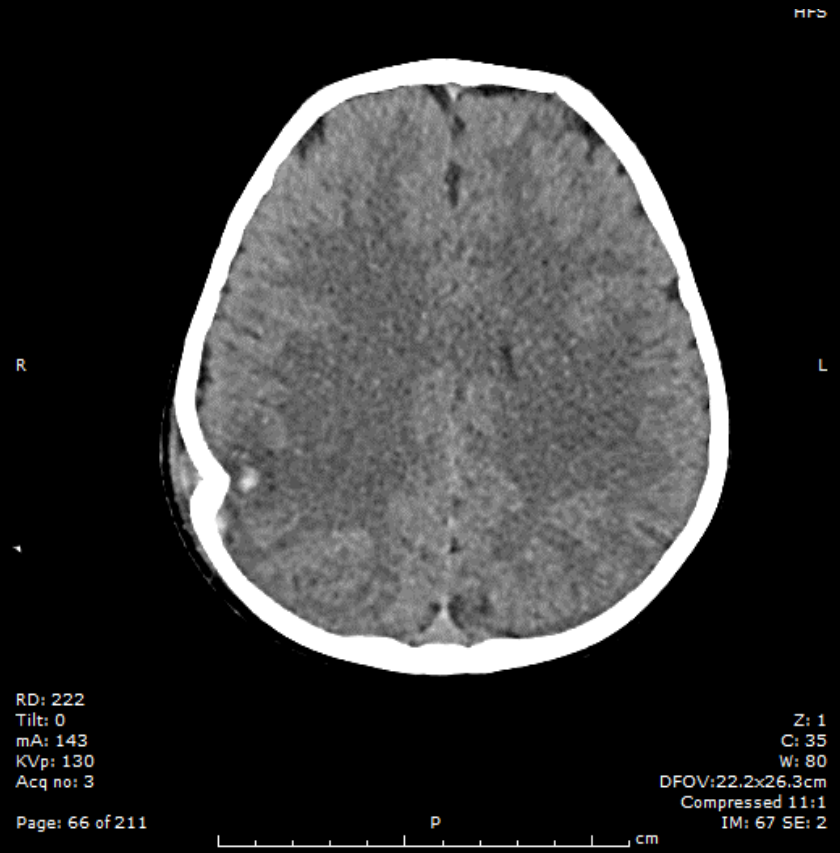
cm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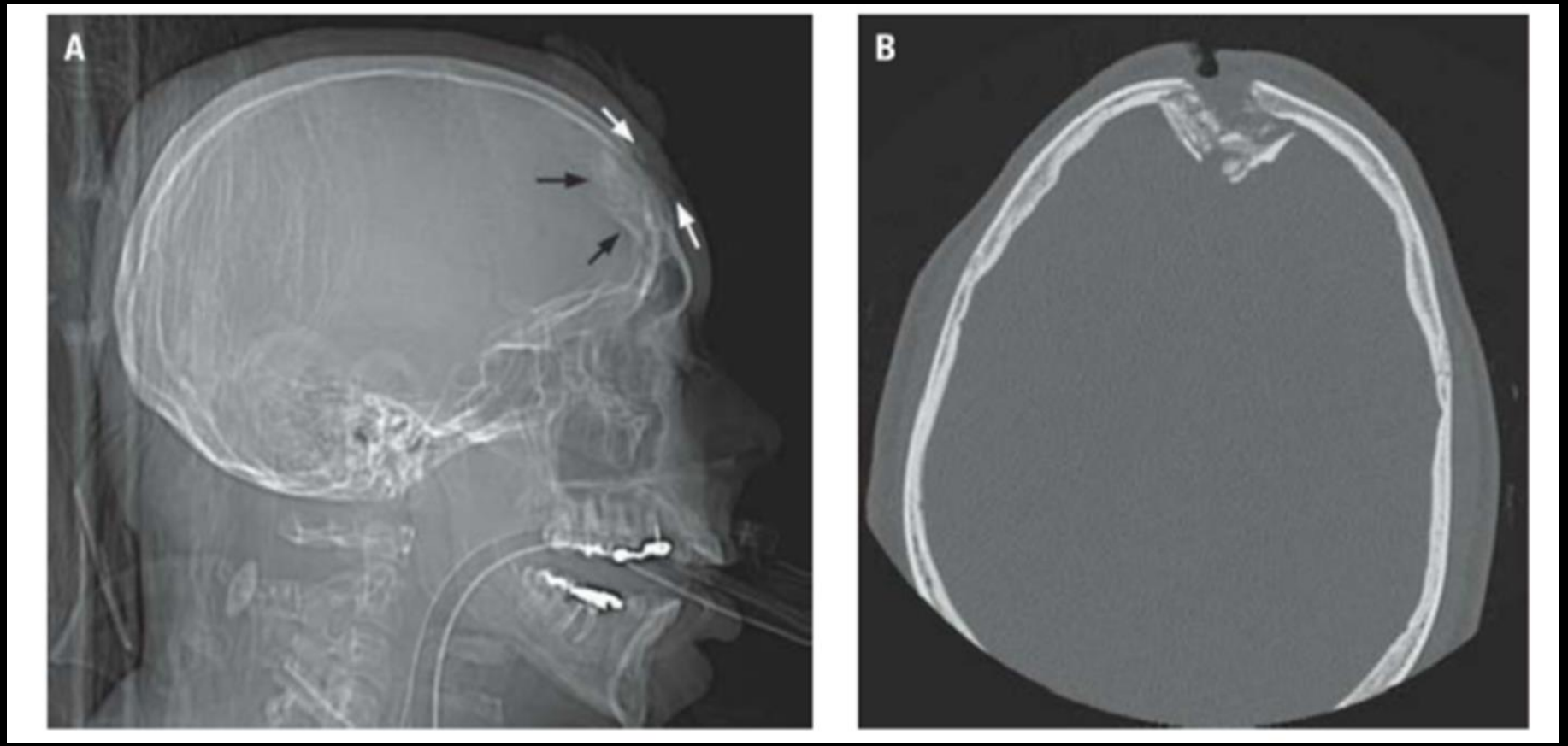
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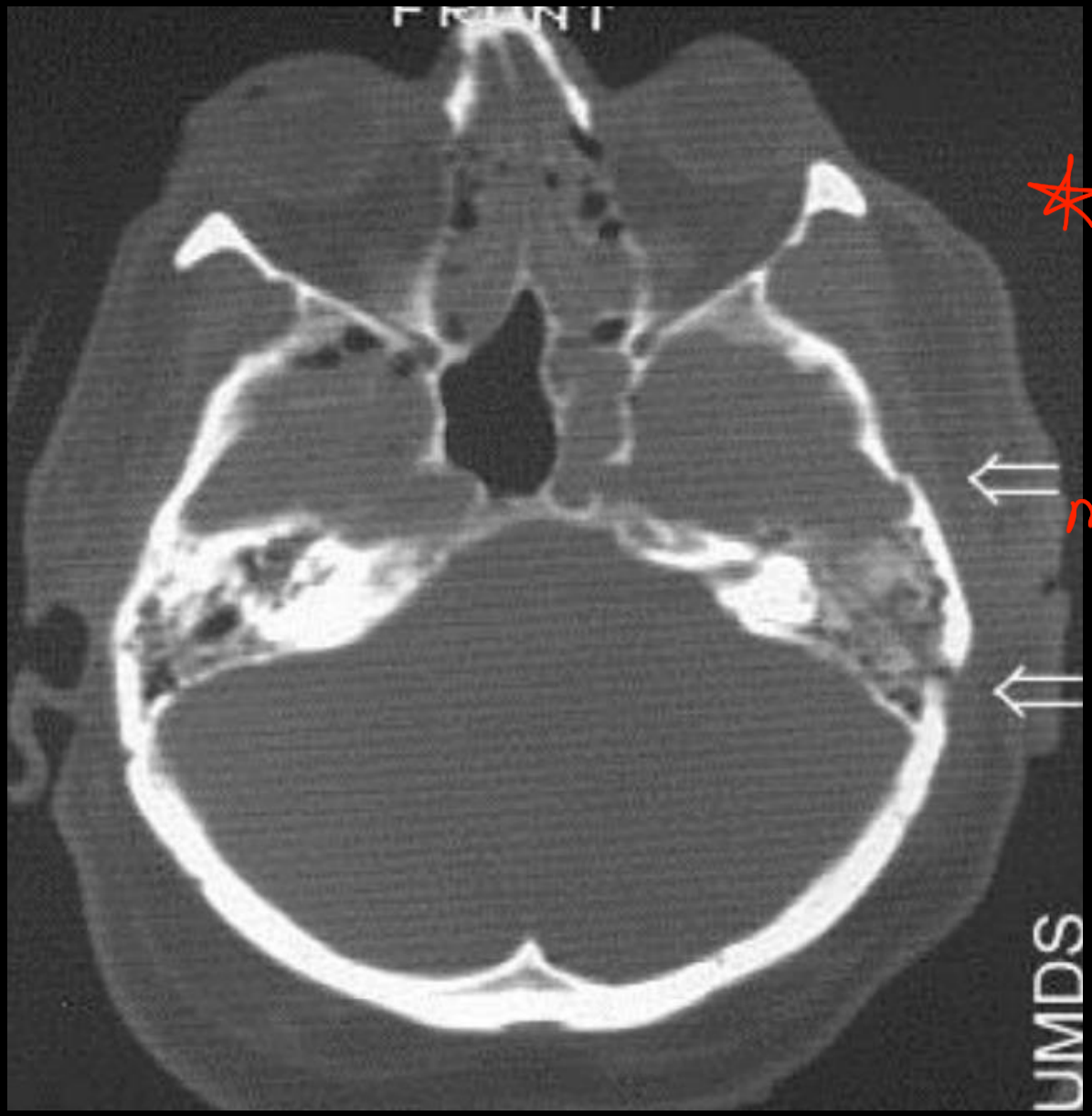
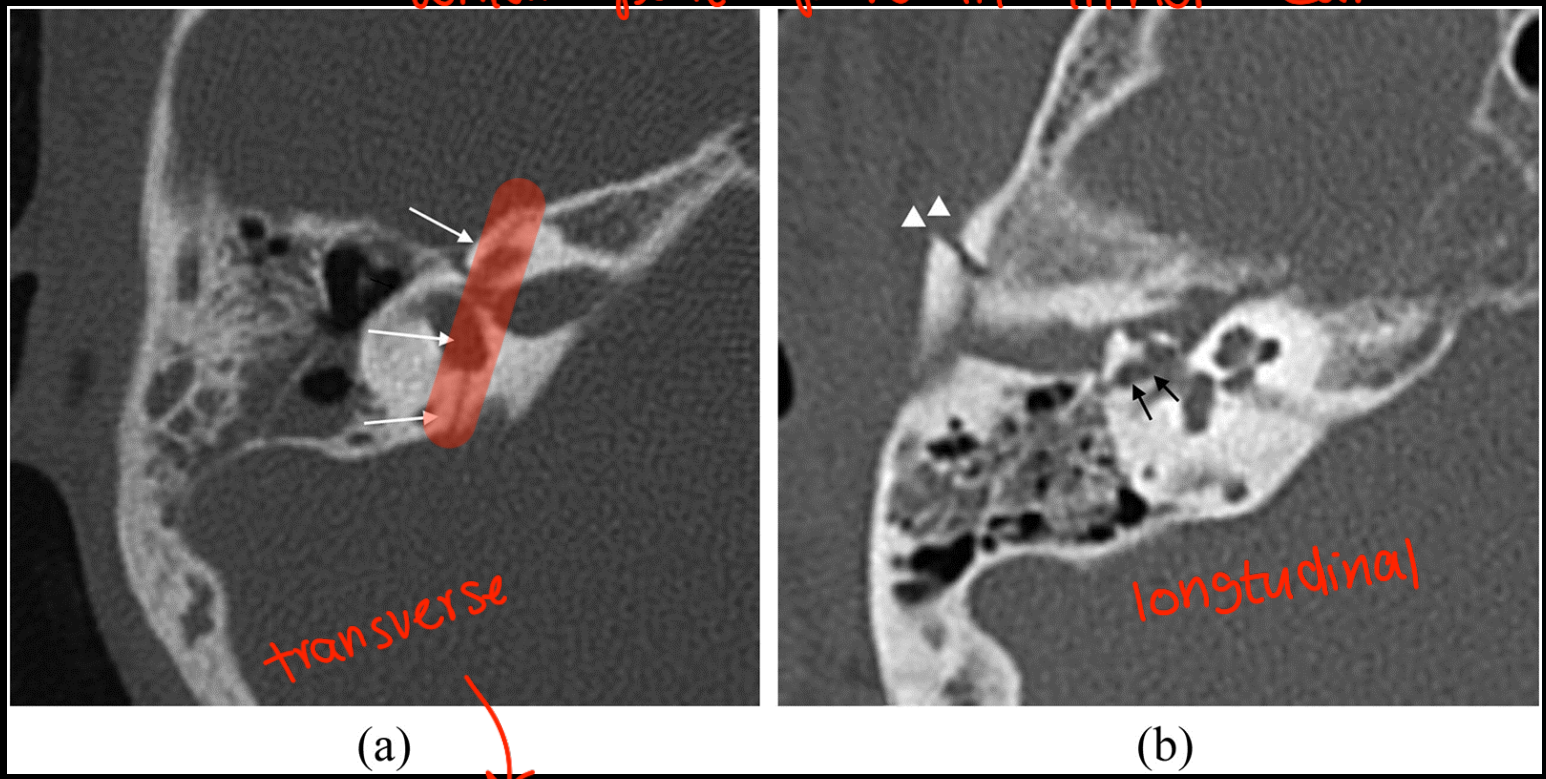


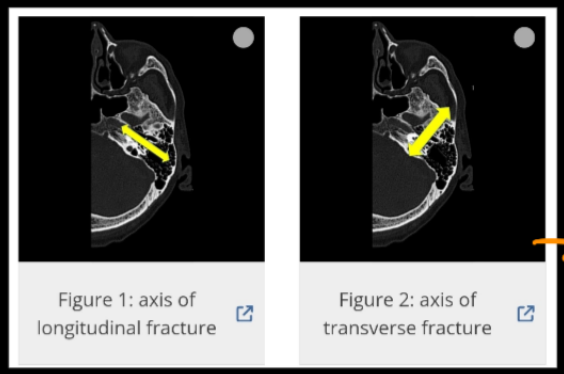
** ??

CSF
leak
may happen

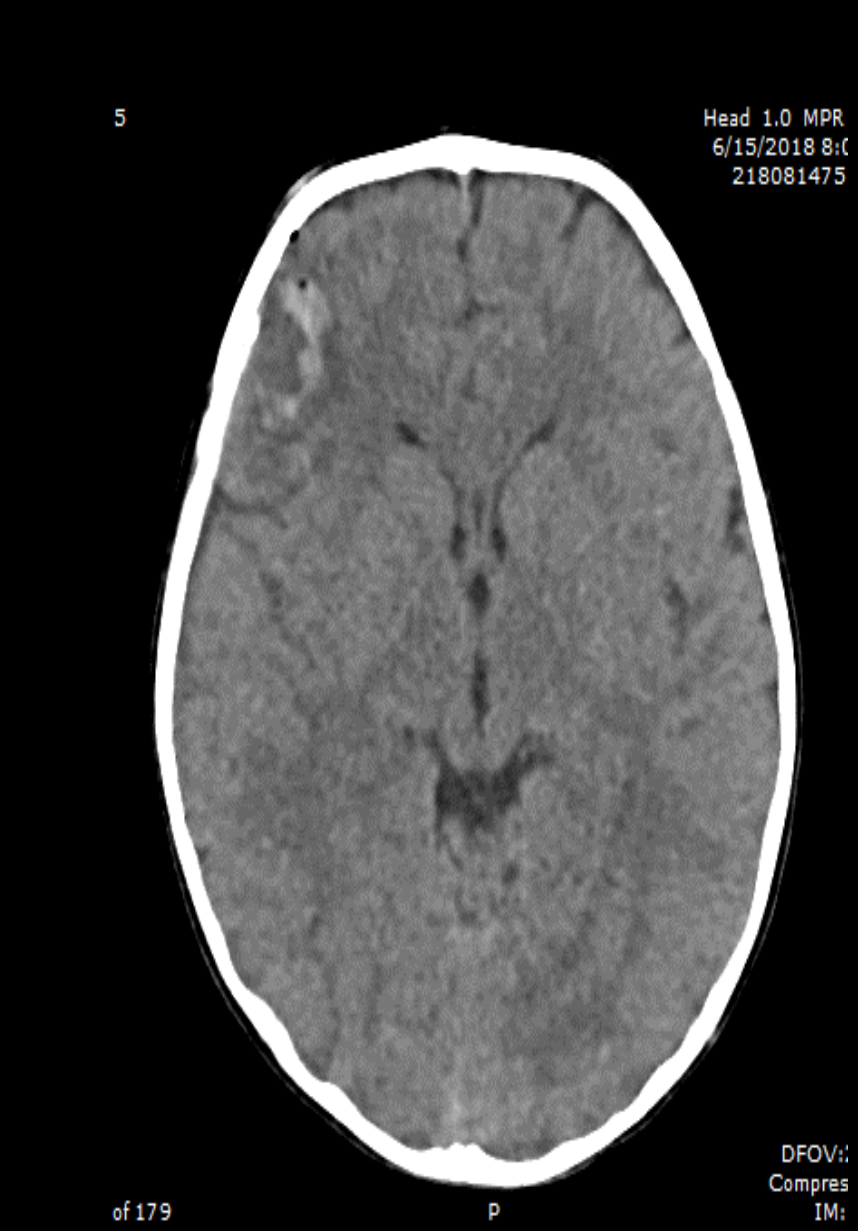
fracture in temporal bone which participate in inner ear



well cause deafness



→ we mean longtudinal or transverse to the long axis of the petrous temporal bone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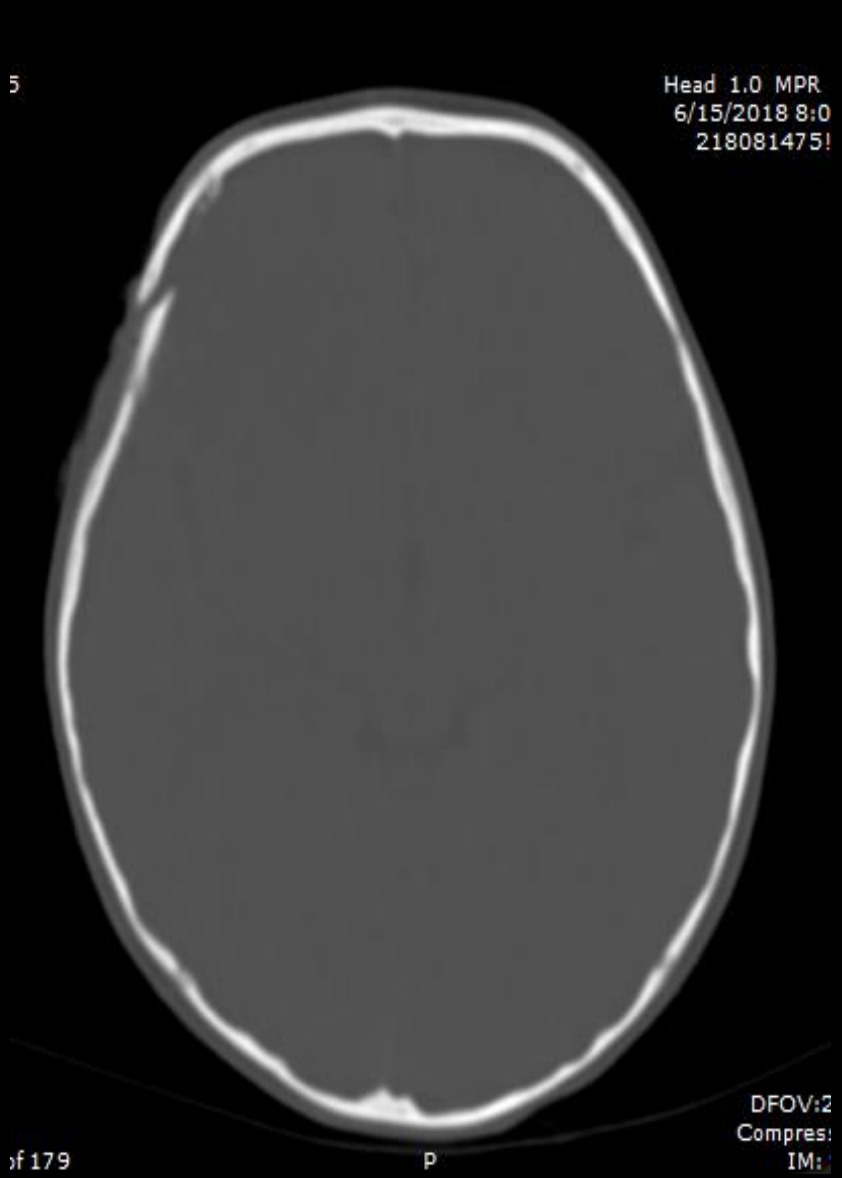
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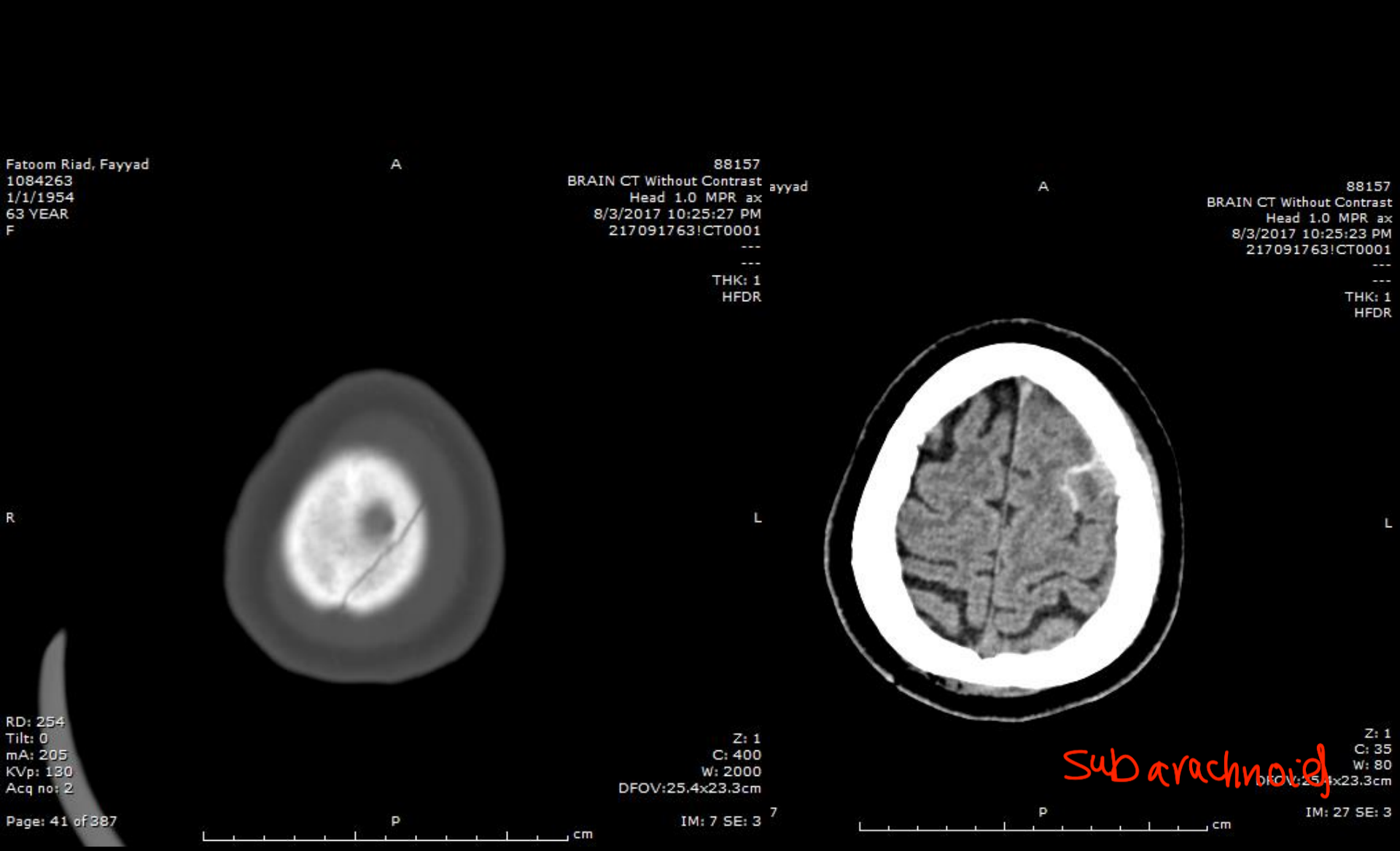
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Page: 41 of 387
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THK: 1
HFDR
L
Z: 1
C: 35
W: 80
DFOV:25.4x23.3cm
IM: 27 SE: 3
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cm
Subarachnoid


THANK YOU