



Radiology Of Brain Diseases - Part 1

Objectives

1. Intracranial hemorrhage.
2. Brain ischemia.
3. Intracranial tumors.
4. Intracranial infections.

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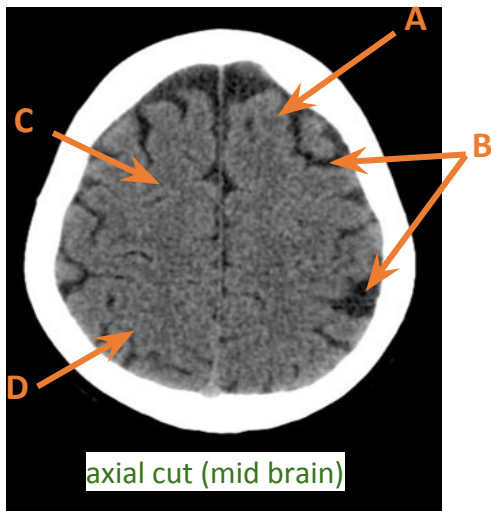
Color Coding

Important | Notes | Extra

Editing
File

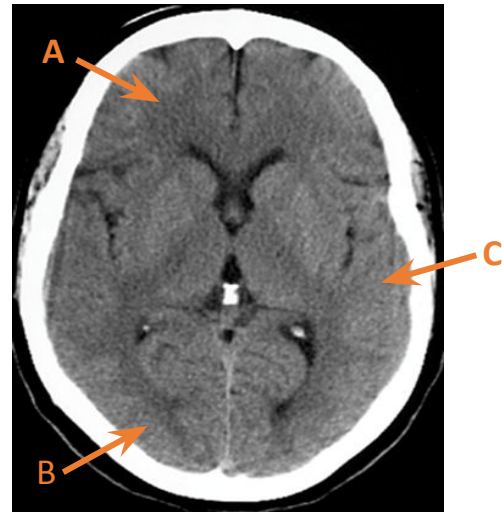


Anatomy: [Click here to review the anatomical planes!](#)



axial cut (mid brain)

- A- Gyrus.
- B- Cerebral Sulci.
- C- Frontal Lobe.
- D- Parietal Lobe.



- A- Frontal Lobe.
- B- Occipital Lobe.
- C- Temporal Lobe.

هنا نزلنا تحت شوي

- **How to differentiate between the frontal and parietal lobe?** By the central sulcus.
- **What is in front of the central sulcus?** Precentral gyrus.
- **What is the main function of it?** Motor.



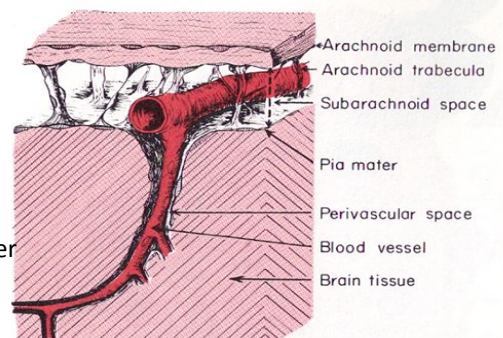
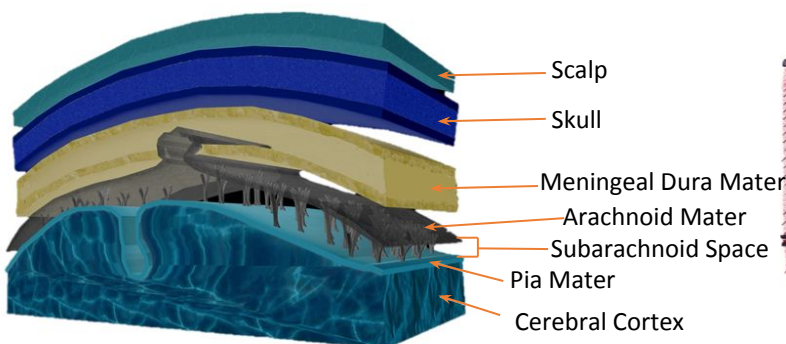
نزلنا
زيادة

- A- Midbrain.
 - B- Cerebellum (Vermis).
 - C- Basal Cistern (interpeduncular cistern) →
- In which space?** subarachnoid space.



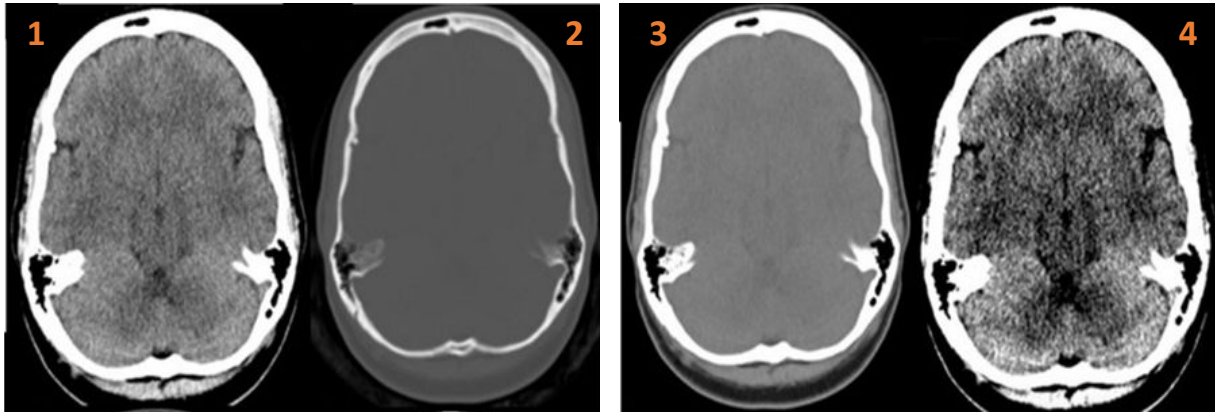
- A- Pons.
- B- Cerebellum.

نزلنا أكثر



[Quick arterial anatomy from doctor's notes!](#)

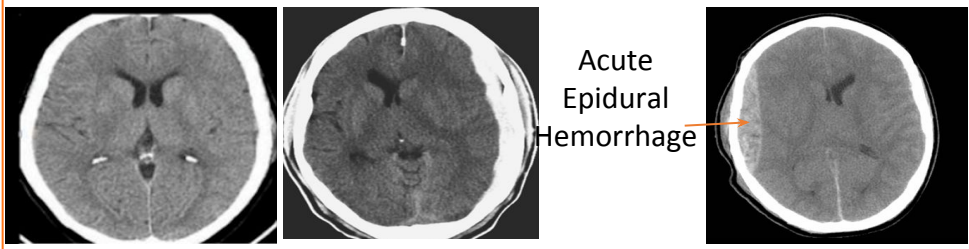
Windowing:



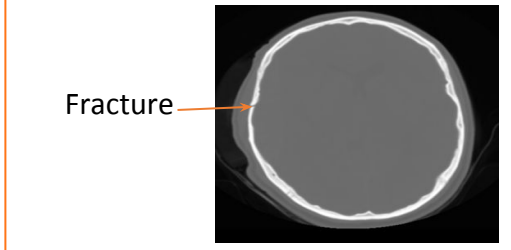
1- Brain window (W80, L40).	3- Subdural/Soft tissue window (W260, L80).
2- Bone window (W3000, L500).	4- Stroke window (W40, L40).

W= width. L= level. (window related)

Brain Window

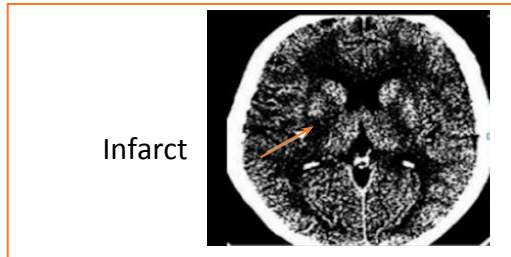


Bone Window



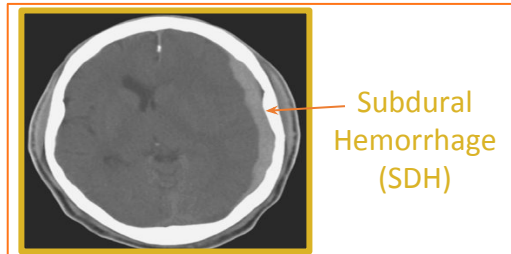
Bone window: for the bone pathology and fractures.

Stroke Window



Stroke window: same the brain window but more contrasting and narrowed (gray white matter differentiation).

Subdural/tissue Window



Subdural window: you can't see the soft tissue clearly only black and white.

Intracranial Hemorrhage:

1- Epidural Hematoma (EDH).

2- Subdural Hematoma (SDH).

3- Subarachnoid Hemorrhage (SAH).

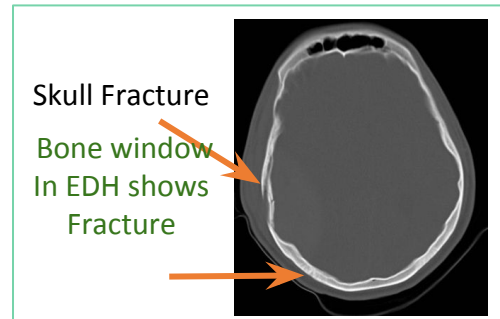
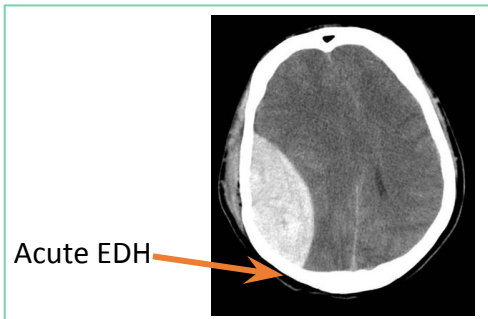
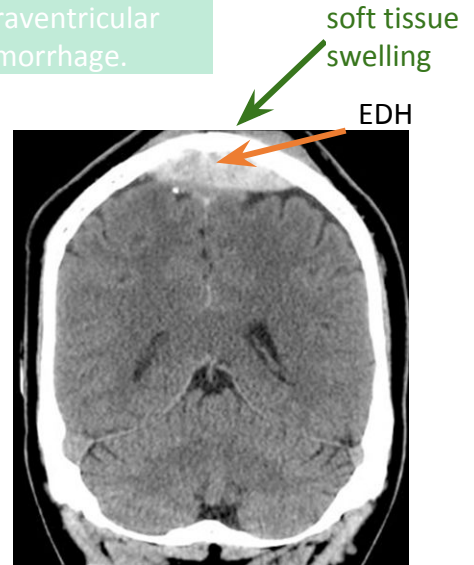
4- Parenchymal Hemorrhage.

5- Intraventricular Hemorrhage.

1- Epidural Hematoma (EDH):

It is a lentiform (biconvex) collection between the dura and skull.

- Almost always traumatic.
- Associated with skull fracture.
- Typically arterial in nature, MCA mostly but could be from venous sinuses.
- It doesn't cross sutures but crosses midline (It means it doesn't go subcutaneously but it can cross from right to left hemisphere). the most common site is the MCA, because the weakest bone in the skull is the temporal bone.



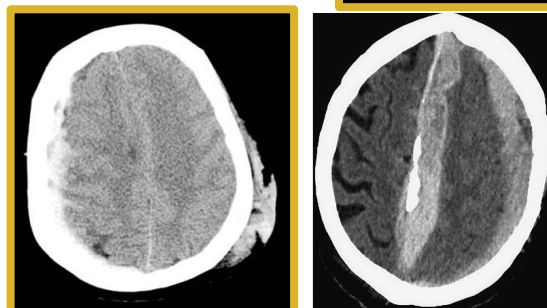
2- Subdural Hematoma (SDH):

Crescentic collection between the dura and arachnoid.

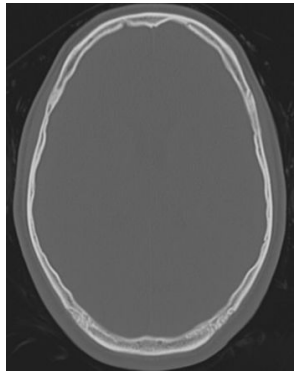
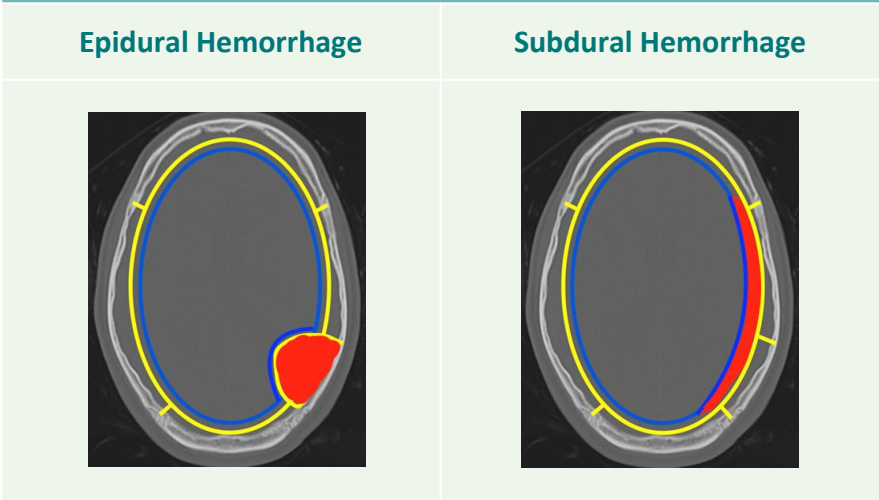
- Usually caused by trauma.
- Typically venous in nature.
- It does not cross midline.



شكل هلالی



Acute Subdural Hemorrhage



Normal

Yellow is **Dura**, Blue is **Arachnoid**



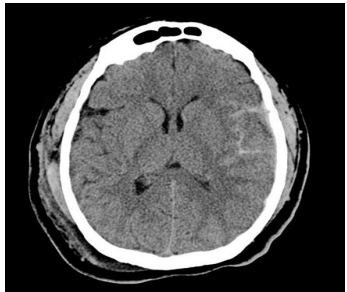
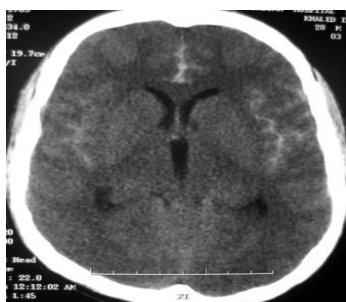
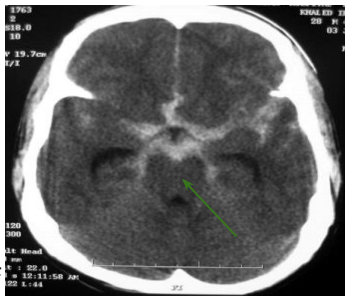
في حال مازال أحد. يعاني. في. حفظ. ترتيب. السحايا
 دورا تجلس على الأريكة لتأكل الفطيرة

Dora (**Dura**) sits on the chair (**Arachnoid**) to eat the pie (**Pia**).

3- Subarachnoid Hemorrhage (SAH):

Collects between the arachnoid and pia.

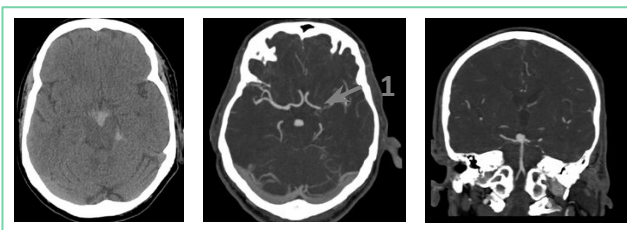
- Trauma is the most common cause of subarachnoid hemorrhage (SAH).
- **Aneurysm rupture is the most common cause of non-traumatic SAH.**
- No cause of SAH is seen in up to 20% of cases.
- Clinically, non-traumatic SAH presents with **thunderclap** headache and **meningismus**.
- **It's described as the worst headache ever!!**
- It mimics meningitis but without fever so, they describe it as chemical meningitis.



Notice the star shaped bleeding! → the blood accumulates in the sulci and basal system
STAR OF DEATH

How to confirm it?
 CT-Angiogram.

Aneurysmal SAH



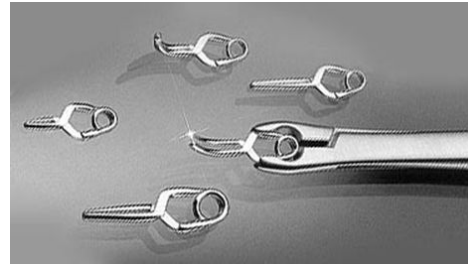
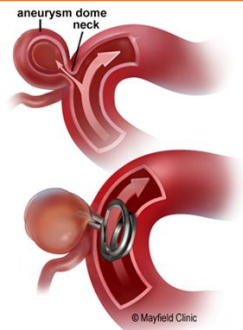
Basilar Tip Aneurysm
 (5% of aneurysms)

1- Notice the prominent basilar tip!

Treatment	Details	
Surgical	Surgical Clipping	Temporary Artery Occlusion
Endovascular	Coiling Stent-assisted coiling	Flow Diverter Stenting

Intracranial Hemorrhage:

Surgical Clipping

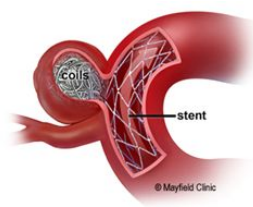


They take hours in this procedure and they have to take off the bone and they clip it.

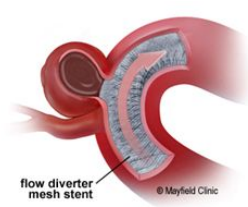
Endovascular



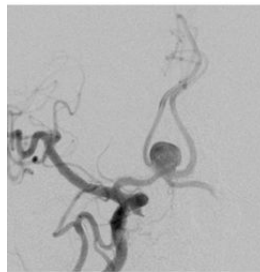
Coiling



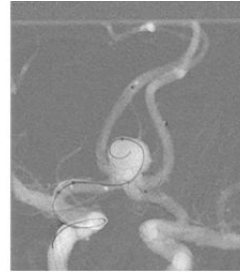
Stent-assisted
coiling



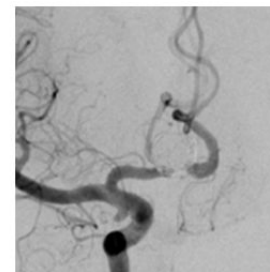
Flow Diverter
Stenting



Before



During



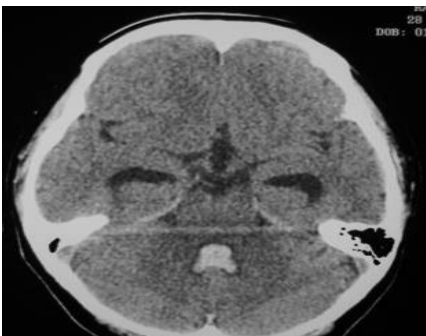
After

Done by radiologists, from the groin into the femoral artery and then abdominal aorta, arch of aorta, subclavian and then vertebral artery. We use the stent if we have wide aneurysmal neck.



[3 Ways Doctors Can Treat Your Brain Aneurysm](#)

4- Intraventricular Hemorrhage: Most common cause: trauma



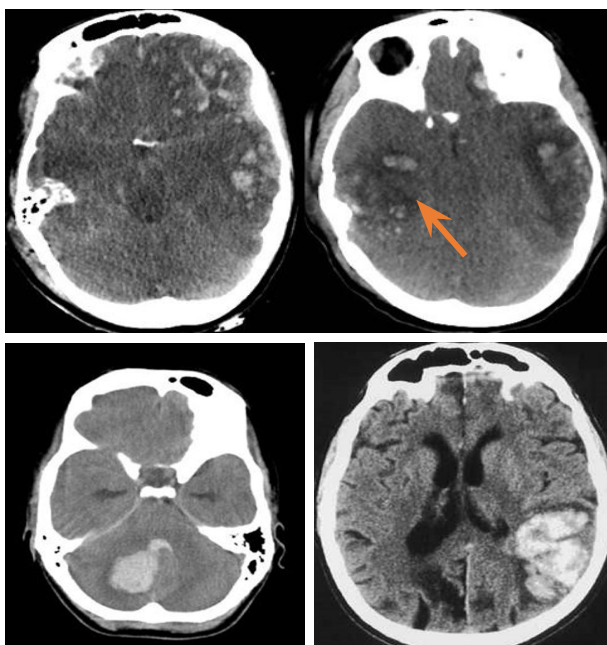
Hyperdense. It clears up eventually with the CSF, through this pathway:

From arachnoid plexus in lateral ventricles, CSF flows to the third ventricle then down to the aqueduct of Sylvius into the fourth ventricle. From the 4th ventricle it passes through three small openings into the subarachnoid space. CSF is absorbed through blood vessels over the surface of the brain back into the bloodstream. Some absorption also occurs through the lymphatic system.

Intracranial Hemorrhage:

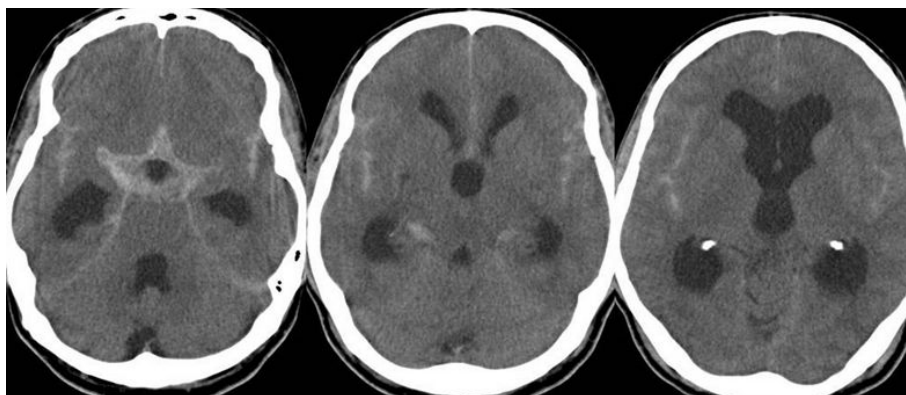
5- Parenchymal Hemorrhage:

- Can be caused by trauma.
- **Other causes include:**
 - Hypertension (cerebellum, pons, basal ganglia).
 - AVM (arteriovenous malformation).
 - Cerebral amyloid angiopathy (elderly patients, above 80, usually asymptomatic, usually the radiological feature is that it appears in one big lobe).



Intracranial Hemorrhage Complications:

- Acute Hydrocephalus: Causes increased ICP and herniation



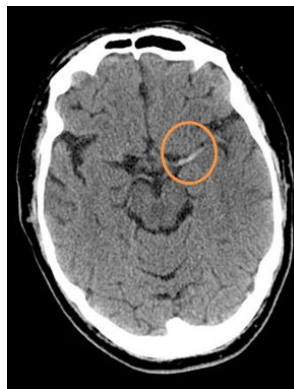
Brain Ischemia:

- Ischemic Stroke:



A CT of head was taken **immediately after** ischemic stroke

Normal head CT



A CT of head was taken during **Hyperacute phase** it is clinical diagnosis, we perform radiology only to distinguish whether it is hemorrhage or ischemia

Hyperdense sign means Clot

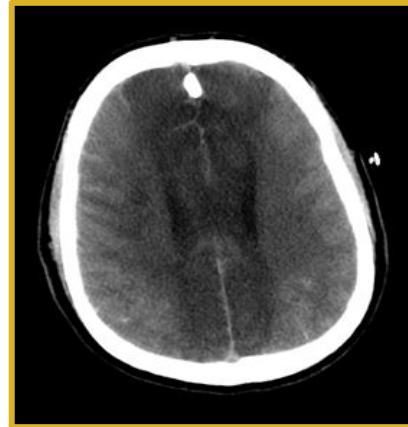
Brain Ischemia:

It is important to understand the abnormality so you can easily recognize any picture.

- Ischemic Stroke:

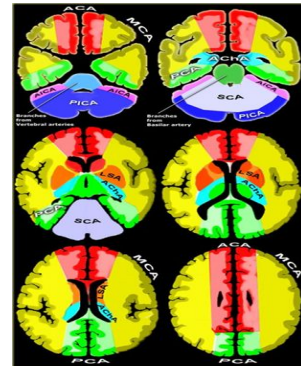
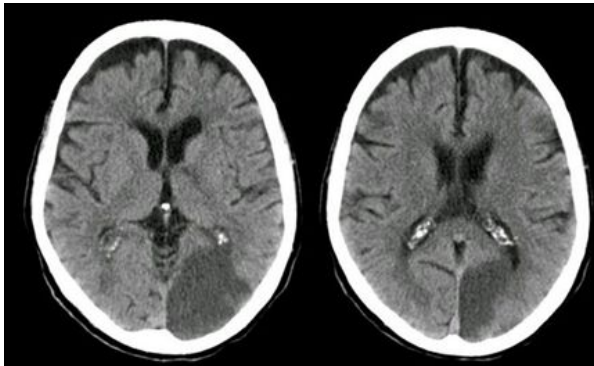


Middle Cerebral Artery (MCA)



Bilateral anterior cerebral artery ischemia

Anterior Cerebral Artery (ACA)



Posterior Cerebral Artery (PCA), complications: either:

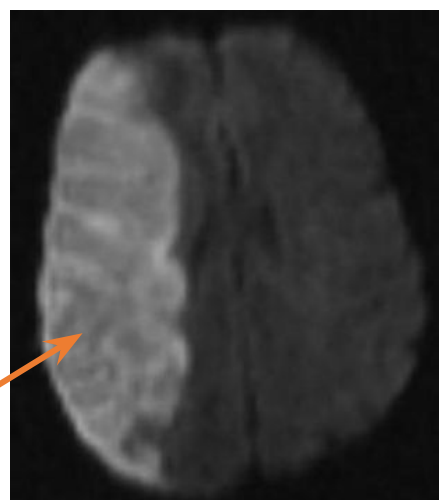
-hemorrhagic transformation → usually they die .

or: malignant stroke (edema) → Hemicraniectomy (عشان نخفف الضغط skull نشيل جزء من ال)

- Imaging of Ischemic Stroke:



CT Scan



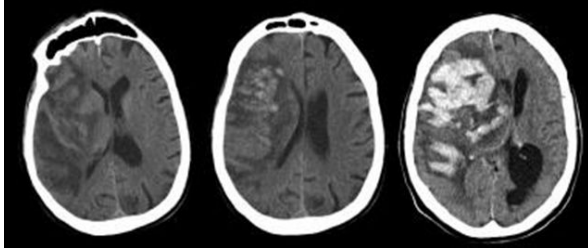
MRI



Brain Ischemia:

- Ischemic Stroke Complications:

Hemorrhagic transformation

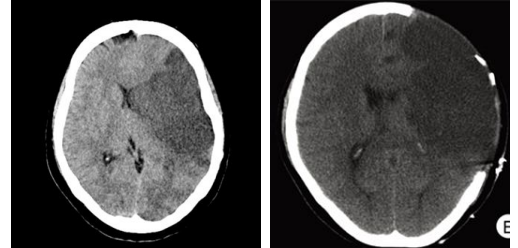


A 24 hours after onset

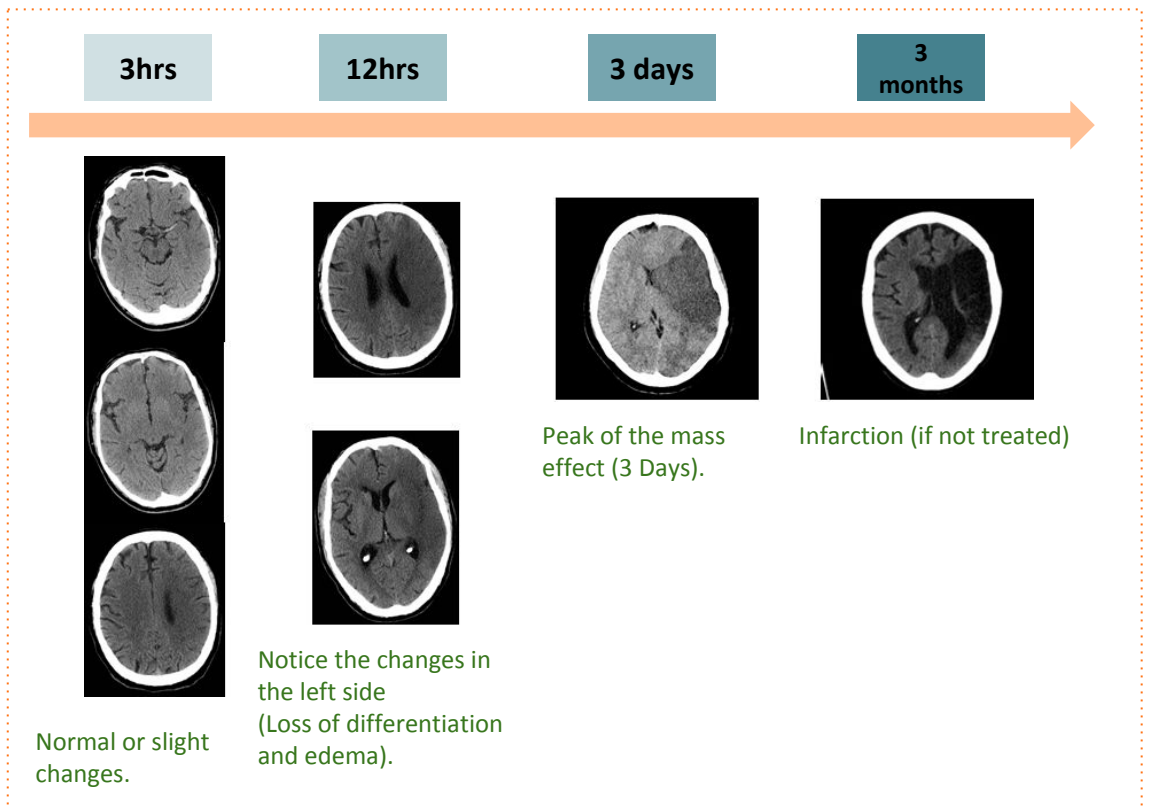
Next day

A few hours after
(Mid-line shift)

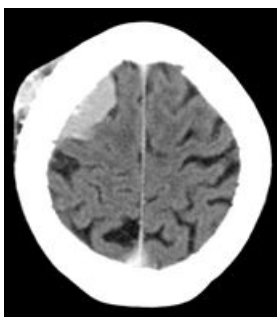
Malignant Stroke



Decompressive craniectomy

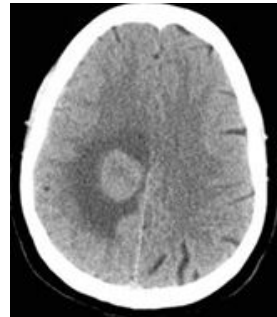


Intracranial Tumors:



Extra-axial masses:

- Meningioma.
- Cranial nerve schwannoma.
- Metastasis.

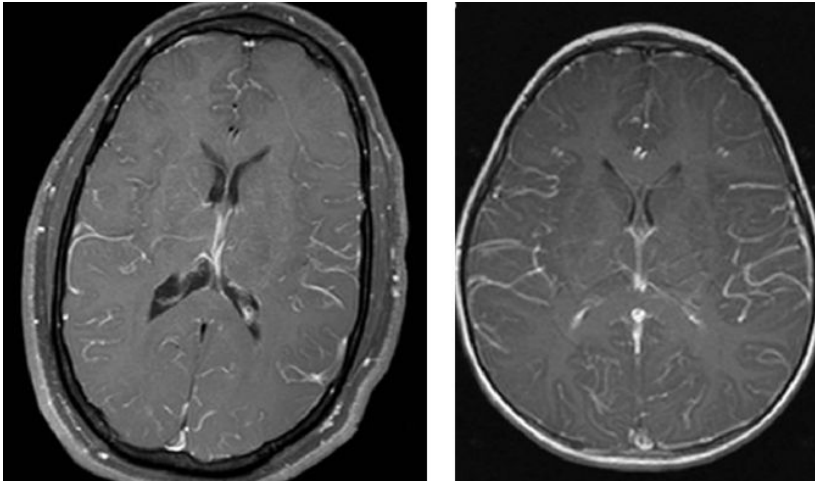


Intra-axial masses:

- Metastasis.
- Glioblastoma.
- Astrocytoma.

Intracranial Infections:

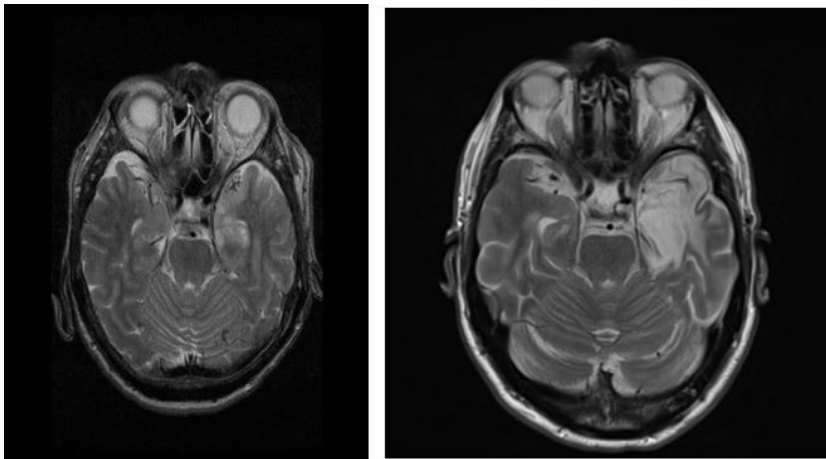
1- Bacterial Meningitis:



- Headache.
 - Fever.
 - Neck stiffness.
- On imaging (**Enhancing meninges**)

Neuroimaging can identify conditions that may predispose to bacterial meningitis. In addition, identification and monitoring of complications of meningitis.

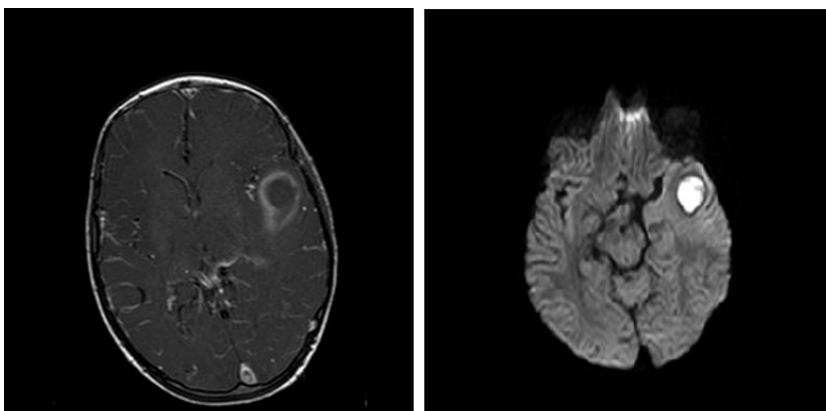
2- Herpes Encephalitis:



- Headache.
 - Fever.
 - Decreased level of consciousness.
- On imaging (**Abnormal signal in the temporal lobe**)

It affects the Temporal lobe , Where it Hides? in Trigeminal ganglia.

3- Brain Abscess:



- Headache.
- Fever.
- On imaging (**Ring-enhancing lesion**).

usually associated with congenital heart disease in young children. It may occur at any age but is most frequent in the third decade of life.



Summary

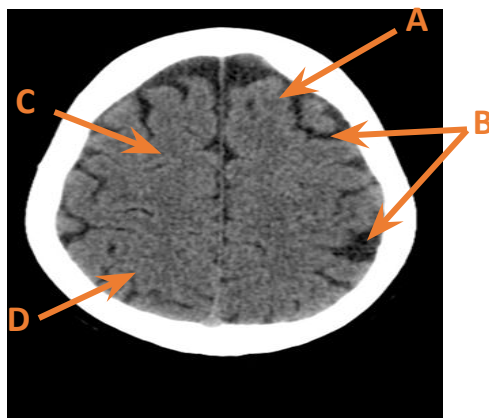
Intracranial Hemorrhage	Cause	Shape	Note
Epidural hematoma (EDH)	<ul style="list-style-type: none"> - Fracture. - Usually arterial. 	Biconvex	Does not cross the brain suture
Subdural hematoma (SDH)	<ul style="list-style-type: none"> - Truma. - Usually venous. 	Crescent	Doesn't cross midline
Subarachnoid hematoma (SAH)	<ul style="list-style-type: none"> - Trumatic (most common). - Non traumatic rupture aneurysm. 	Star	Accumulate in the sulci or the basal system
Intraventricular and parenchymal bleed	<ul style="list-style-type: none"> - Truma. - Hypertension. - AVM. 		

Intracranial Infections	Symptoms	Notes
Bacterial Meningitis	<ul style="list-style-type: none"> ● Headache. ● Fever. ● Neck stiffness. 	-
Herpes Encephalitis	<ul style="list-style-type: none"> ● Headache. ● Fever. ● Decreased level of consciousness. 	Affects the Temporal lobe.
Brain Abscess	<ul style="list-style-type: none"> ● Headache. ● Fever. 	Ring-enhancing lesion.

Questions

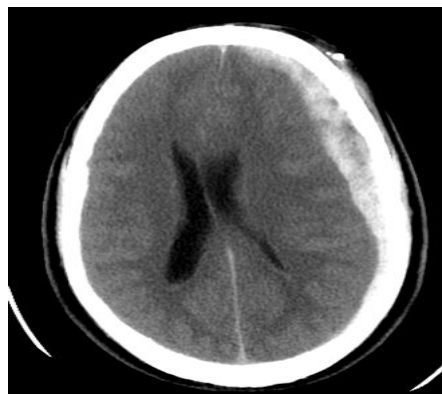
1- What is the Letter C in this Brain CT?

- A- Cerebral sulci.
- B- Gyrus.
- C- Frontal lobe.
- D- Parietal lobe.



2- What is the diagnosis in this Brain CT?

- A- Acute SDH.
- B- Acute EDH.
- C- Acute SAH.
- D- Herpes Encephalitis.

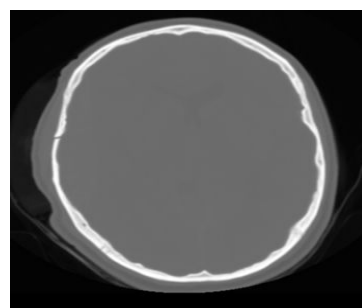


3- If there is a Clot in Brain CT, it will appear as what?

- A- Hyperdense.
- B- Hypodense.

4- Regarding this Brain CT, which statement is correct?

- A- Stroke window shows infarction.
- B- Brain window shows fracture.
- C- Bone window shows fracture.



Answers:
1-C
2-A
3-A
4-C

WE NEED
YOUR
FEEDBACK