

Brain hemorrhage maybe traumatic or spontaneous (Atrumatic)

A traumatic is more common and called hemorrhagic stroke

Stroke Symptoms sensory or motor manifestations or bulbar or pseudobulbar

Patients with rt sided weakness paralysis or parasthesia

سرین اُجانب I.C hemorrhage
تخف: hemorrhage و تعالج، فله

Non contrast C.T

نیل ما یردع بعلمه MRI أو MRV أو MRA
with Contrast

عنه تعرفو سوبب ال hemorrhage

(فقد عرفنا مثلاً aneurysm نبتخلو بعلمه بماء يصلحو
باتي ال aneurysm بماء في ما بتكون و ع)

لس
أعرفه
في

hemorrhage
أو ل

من فلاتها بنفص

مع المريض hemorrhage

أطا حاجت بدي أنكر أعلمها المريض مثلاً

Stroke مع Non Contrast C.T

ال hemorrhage يستظهر فوراً على ال C.T (hyperdense lesion)
"اللونه الأبيض"

لو صار على ال C.T لونه أسود فهذا (Ischemic + hemorrhage)

Ischemic stroke

كم ولو أول ما أجي عجلت C.T

صتبيه نورمال يعني أول 24-48 ساعة
ما بتبين

Intracranial hemorrhage

Stroke 2 types

Ischemia

(Most Common type)

good prognosis + 1.85 of Cases

and it

Maybe

embolic

Thrombotic

(atherosclerosis زير طلائ)

Carotid artery Stenosis

بيكر

ACA
PCA
MCA

hemorrhagic stroke

its Presentation is worse than Ischemic

المريض يكون unconscious

50% of Cases die within hours

Management of Ischemic Stroke

(Anti-Ischemic or anti-Thrombolytic)

physiotherapy مع

لله ال hemorrhagic stroke

كل اشي بدي أعلمه عنه

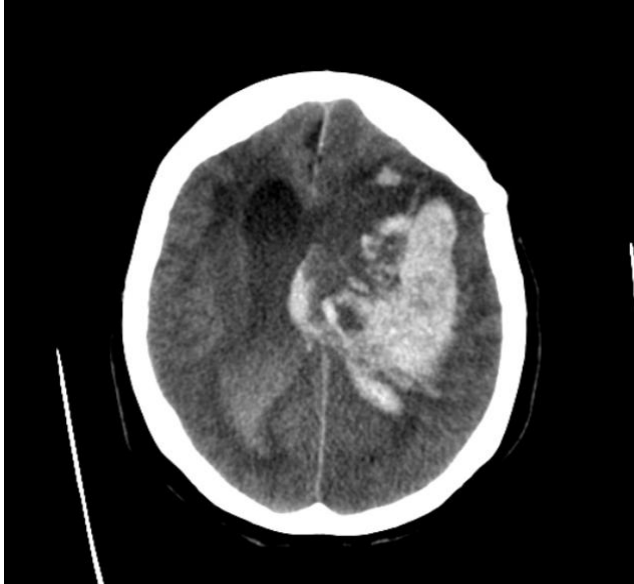
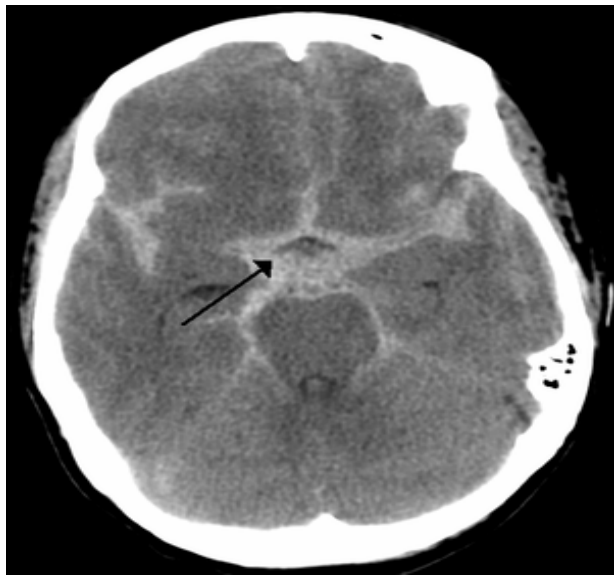
أترك ICP (عنه اعني acetazolamid معناه أقل ال cerebral edema)
(و بقده بزيادة 45°)

- This comprises:

- 1- intracerebral and cerebellar hemorrhage

- 2- subarachnoid hemorrhage

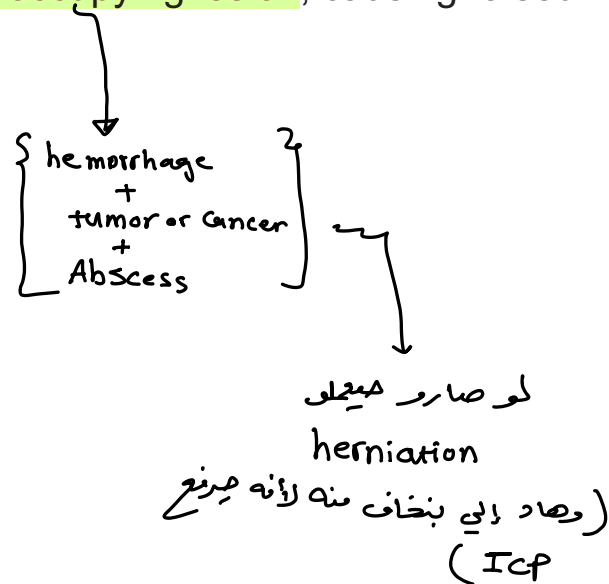
- 3- subdural and extradural hemorrhage/hematoma. } traumatic



intracerebral hemorrhage

- **Etiology**

- intracerebral hemorrhage causes approximately 10% of strokes.
- It is associated with higher mortality than ischemic stroke (up to 50%). A large hematoma may act as a **space-occupying lesion**, causing raised intracranial pressure with brain displacement and herniation.



خاصة لو كان
uncontrolled
(في صراخ)
بعض الأحيان مع
HTN
أو ارتفاع الدماء

Most
Common
Cause of
stroke
سواء
hemorrhagic or Ischemic



Hypertensive

if $\begin{cases} \text{uncontrolled} \\ \text{undignosed} \end{cases}$

- Rupture of microaneurysms (Charcot-Bouchard aneurysms, 0.8-1.0 mm in diameter) and degeneration of small, deep, penetrating arteries are the principal pathologies.
- Such hemorrhage is usually massive, often fatal, and occurs in chronic hypertension and at well-defined sites: basal ganglia, pons, cerebellum, and subcortical white matter.
- Vasopressor drugs, such as cocaine, may cause hemorrhage.
- Alcohol is also a risk factor (probably as a result of impaired coagulation/platelet function).

due to sudden elevation
of BP (sympathetic drive)
or
(emotional or Drug stress)

هاد امتراد (CAA)
مفي عتاسه ما ارض الابه

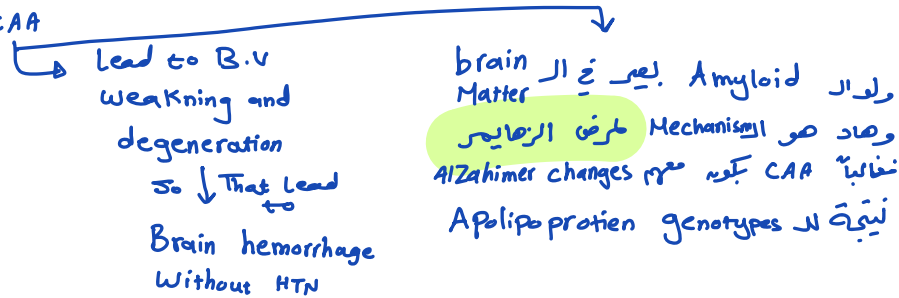
.Cerebral amyloid angiopathy (CAA)

age related (بالسنة و الثمانينات و العشر)

Deposition of amyloid-13 in the walls of small and medium-sized arteries in normotensive patients, particularly over 60 years, causes lobar intracerebral hemorrhage (especially posterior, i.e. occipital/parietal lobes), which is often recurrent.

بكره اما
في
white
ار
gray
Matter
و لوصد في
ال
vessels
بكره اسره
CAA

CAA is associated with particular apolipoprotein E genotypes (E2) and is more common in patients with Alzheimer's disease. Cerebral microbleeds are usually seen on MRI sequences sensitive to hemosiderin deposition. CAA may occasionally cause TIA-like, transient neurological symptoms.



Case) A 70-yearold Patient without any chronic illnesses + Normotensive + Sudden loss of consiousness by brain c-T ⇒ brain hemorrhage دخل ال Icu و رجع رجع و بعد شهر رجع ثاني بـ brain hemorrhage ؟ " نكره انه رجع ثاني و صر اصل " cerebral normotensive amyloid angiopathy

Secondary

Microaneurysms
in the circle of willis
related to
Anatomical or
Structural
Malformation
common in the Ant./post Communicating
arteries

- Arteriovenous malformations, cavernous, aneurysms, and dural venous thrombosis cause around 20% of intracerebral hemorrhages. Coagulopathies, anticoagulants, and thrombolysis may cause hemorrhage. Hemorrhagic transformation of a large ischemic infarct may sometimes present as a hemorrhage.

Au Malformation associated with: } hereditary hemorrhagic Telangiectasia (osler - weber - Rendu Syndrome) } AV Shunt in Nose (epistaxis) or Lung } Cerebral hemorrhage for m.f.s.

2^{ry} aneurysm associated with: } - Autosomal dominant PKD } common Cause of death in these Cases: rupture of aneurysm
- Ehlers - dahlos
- Marfan

associated
with

1. liver cyst
2. Mitral valve prolapse
3. circle of willis aneurysm

- 4. Coarctation of aorta

Subarachnoid hemorrhage

- Subarachnoid hemorrhage (SAH) means spontaneous arterial bleeding into the subarachnoid space and is usually clearly recognizable clinically from its dramatic onset.
- SAH accounts for some 5% of strokes and has an annual incidence of 6 per 100000.

Presentation

Sudden onset severe headch + Vomiting + ^{without} Motor defects

(Thunderclap headaches)

Could be benign or Malignant
(in Subarachnoid hemorrhage)

Subarachnoid hemorrhage cases

80 %	due to aneurysm
15-10 %	due to Arteriovenous Malformation
5 %	others

Subarachnoid Hemorrhage

“Worst headache of my life” •

Sudden onset symptoms •

Fever, nuchal rigidity common •

CT scan usually diagnostic •

Xanthochromia on spinal tap •

No focal deficits! •

سبب آلام مع
الزجاج
ومع
phorophobia
Meningitis
نفس

1 - Non Contrast c-T diagnostic for 98% of Cases

2 - 2% with high risk of suspicion of Subarachnoid hemorrhage

LP to look for Xanthochromia
بزرع وبنجله
to look for
Xanthochromia
مع ال hemorrhage ال RBCs نطلع ال bilirubin في ال csf



Boards & Beyond

RED FLAGS

بكونه ماله
علامة
باس

SNOOP :

Systemic signs / symptoms / disease (fever , myalgias , weight loss , history of malignancy , or AIDS)

برضو من
ال
red
flag
signs
} headach + rt. temporal Pain

Neurologic signs or symptoms
(altered mentation , seizure , papilledema , focal neurologic findings)

Onset sudden (thunderclap headache)

Older age (new onset of headache after age 50)

Pattern change from previous headaches
(especially if rapidly progressive in severity or frequency)

migraine headache
فاصة لو
حالة
بكونه عندهم risk
أكثر .

53

headach + focal Manifestations
headach + sensory Manifestations
headach + fever not respond to Antibiotic

برجع
ال
C.T

عنه آلام
استبدت
Tonsillitis
Sinusitis
pharyngitis

لأنهم برضو
بيطلع
headach + fever



Box 21.37 Underlying causes of subarachnoid haemorrhage

	(%)
Saccular (berry) aneurysms	70%
Arteriovenous malformation (AVM)	10%
No arterial lesion found	15%
Rare associations	<5%
Bleeding disorders	
Mycotic aneurysms – endocarditis	
Acute bacterial meningitis	
Tumours, e.g. metastatic melanoma, oligodendroglioma	
Arteritis (e.g. systemic lupus erythematosus)	
Spinal AVM → spinal SAH	
Coarctation of the aorta	
Marfan, Ehlers–Danlos syndrome	
Polycystic kidneys	

in → MRV
MRA

Saccular (berry) aneurysms

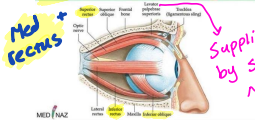
- Saccular aneurysms develop within the circle of Willis and adjacent arteries.
- Common sites are at arterial junctions:
 - 1- between posterior communicating and internal carotid artery - posterior communicating artery aneurysm
 - 2- between anterior communicating and anterior cerebral artery - anterior communicating and anterior cerebral artery aneurysm
 - 3- at the trifurcation or a bifurcation of the middle cerebral artery- middle cerebral artery aneurysm.

Most Common Site of aneurysm

Ant. Communicating artery aneurysm
Post.

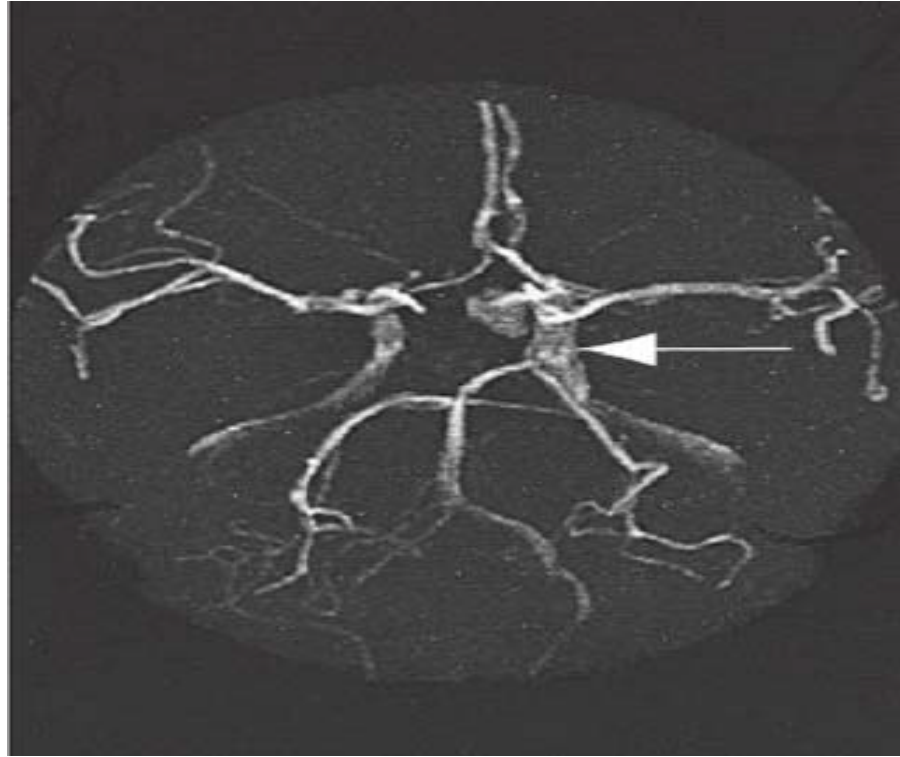
Compress optic chiasma (Pituitary adenoma / زقزي / (Craneo-pharyngeoma)) } Lead to bitemporal hemianopia with headach

Extraocular muscles nerve supply
LR6, SO4, O3
Lateral Rectus = 6th cranial nerve → Moves eye Laterally
Superior Oblique = 4th cranial nerve → Depresses eye
Others = 3rd cranial nerve
Compression on 3rd C.N. (3rd nerve Palsy) (وصاد صوال 3rd nerve Palsy)



Compress 3rd nerve
(extraocular muscles)
Supplied by Sympathic nerve

Digital subtraction angiogram: posterior communicating artery aneurysm.



Oculomotor nerve injury



Lead to (eye downward and outward)

Presentation ↗

3rd nerve Palsy →

¹²³ Cause?

① aneurysm or ② DM (Ischemia)

1- pain

Painful

Painless

2- pupil

mydriasis

not dilated
spared

3rd CN عصب العين

يعمل ال Parasympathetic

لا pupil فوسع

Compression

صخر

③

trauma

Most Common Cause

The most common nerve affected in head trauma is Abducens (6th)

- Aneurysms cause symptoms either by spontaneous rupture, when there is usually no preceding history, or by direct pressure on surrounding structures; for example, an enlarging unruptured posterior communicating artery aneurysm is the most common cause of a painful 3rd nerve palsy

AComm Aneurysm

- Headache
- Visual field defects



Bitemporal Hemianopsia
Optic Chiasm Compression
Pituitary Tumor/Aneurysm

Berry Aneurysms Associations

- ADPKD •
- Ehlers-Danlos •
- Aortic coarctation •
- Older age •
- Hypertension •
- Smoking •

PComm Aneurysm

- Unilateral headache, eye pain
- CN III palsy
 - Eye: "down and out"
 - Ptosis
- Pupil dilation – nonreactive to light

Pupil Sparing

- Is pupil normal (not dilated)? •
- If yes, pupil is spared → lesion not aneurysm •
- Pupillary constrictors easily compressed in subarachnoid space •
- If pupil is “spared” •
- Palsy often associated with DM •
- Ischemic neuropathy of CN III (small vessel disease) •
- Sometimes painful •
- Spontaneously resolves •
- “Rule of the pupil” •

Charcot-Bouchard Aneurysms

- Micro-aneurysms
- Small branches lenticulo-striate arteries
- Basal ganglia, thalamus
- Possible origin of hypertensive ICH

بہرہ نشی نعرے غصہ لستے

Arteriovenous malformation

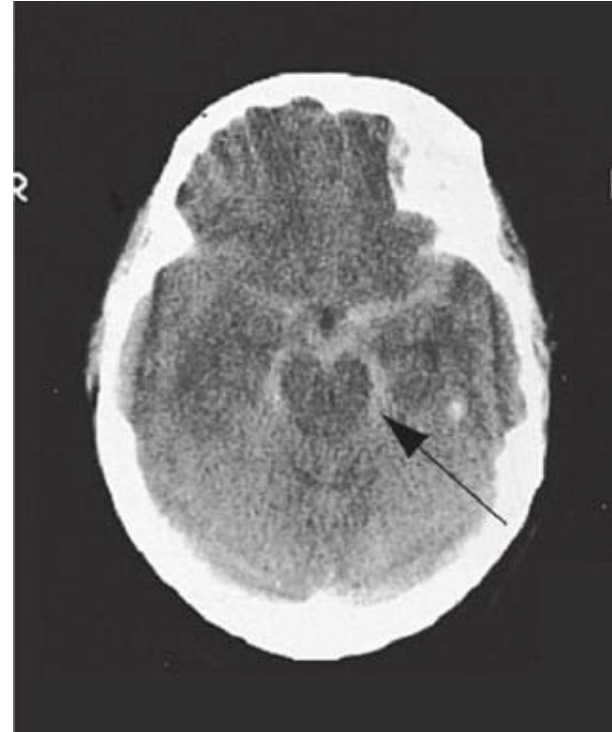
- Arteriovenous malformation (AVM) is a vascular developmental malformation, often with a fistula between arterial and venous systems, causing high flow through the AVM and high-pressure arterialization of draining veins. An AVM usually presents following a spontaneous intracerebral hemorrhage or with a seizure, often focal in onset.
- The risk of the first hemorrhage in unruptured AVMs (20% fatal and 30% resulting in permanent disability) is approximately 2-3% per year. Once an AVM has caused a hemorrhage, the risk of rebleeds is increased to approximately 10% per year.

- Cavernous hemangiomas (cavernomas) are common (0.1- 0.5% prevalence) and consist of a tangle of low-pressure dilated vessels without a major feeding artery; they are frequently symptomless and seen incidentally on imaging.
- Multiple cavernomas often have a genetic basis. Cavernomas may cause seizures. Small hemorrhages may occur but are usually low-pressure bleeds and rarely cause severe deficits. Surgical resection is rarely needed, except where the cavernoma is gradually enlarging or causing significant neurological symptoms.

vessels
colling



Magnetic resonance T2-weighted image:
symptomless frontal cavernoma
(arrowed).



Subarachnoid hemorrhage CT
showing blood around the brainstem
(arrowed).

Clinical features of subarachnoid hemorrhage

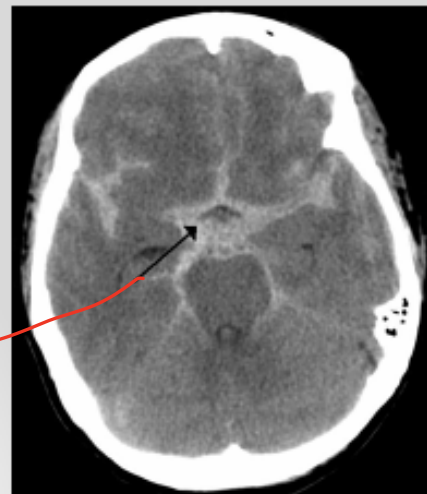
- There is a sudden, very severe headache, often occipital (mean time to peak headache 3 min). Headache is usually followed by vomiting and often by coma and death. Survivors of SAH may remain comatose or drowsy for hours, days or longer. SAH is a *possible* diagnosis in any sudden headache.
- Following major SAH, there is neck stiffness and a positive Kernig's sign.
- Papilledema is sometimes present, with retinal and/ or sub-hyaloid hemorrhage (tracking beneath the retinal hyaloid membrane). Minor bleeds cause few signs but almost invariably do cause headaches (approximately 17% of patients have small 'sentinel bleeds' in the weeks before presenting with SAH).

→ neck rigidity in
and
stiffness

- Meningitis
- Subarachnoid hemorrhage
- pharyngeal abscess

Subarachnoid Hemorrhage

Bleeding into space b/w
arachnoid & pia mater •



Star
shape
bleeding

Subarachnoid Hemorrhage

- “Worst headache of my life”
- Sudden onset symptoms
- Fever, nuchal rigidity common
- CT scan usually diagnostic
- **Xanthochromia** on spinal tap
- No focal deficits!

Subarachnoid Hemorrhage

Usually from ruptured berry aneurysms •

Most common site: anterior circle of Willis •

Branch points of AComm artery •

AVMs •

Other associations: •

Marfan syndrome •

ADPKD •

Ehlers-Danlos •

Hemorrhagic Stroke

in temporal or parietal lobe ← Intraparenchymal Bleed

- Often small arteries or arterioles
- HTN
- Anti-coagulation
- CNS malignancy
- Ischemic stroke followed by reperfusion

Non Contrast. C-T used to exclude not to diagnose hemorrhagic stroke



Manage B.P. and follow up
↑ ICP → herniation

hemorrhagic stroke علاج

① pregnancy, brain hemorrhage

② brain tumor, active gastric bleeding

③ Ischemic stroke



لو في كوكه مسطرة

Ischemic Stroke

علاج حبيب

window period

لو أجا اول 3-4 ساعات

Thrombolytic

Contraindication

لو أجا بعد 4 ساعات رفض لأنه ار clot بتغير

organized vessel wall

anti-Ischemic Management

(Aspirin)

hemorrhagic transformation

Thrombolytic Ischemic Stroke

قلب hemorrhagic stroke
وحد بالاعلى في برفق
عنه uncontrolled B.P

first 8 hours

ACE inhibitor

nitrate

BP

↓ 25% in BP

من بركة

Sites of Bleed

Intraparenchymal Bleed

- Putamen (35%) •
- Subcortex (30%) •
- Cerebellum (16%) •
- Thalamus (15%) •
- Pons (5-12%) •

محکمہ لِفوتوعم
جبراص

بس بالاذغب

hemorrhagic stroke

Managed Medically

Hemorrhage Stroke

Intraparenchymal Bleed



Putamen stroke •

Contralateral hemiparesis (IC) •

Hemisensory loss (thalamus) •

Gaze deviation toward side of bleed (FEF) •

Watch for: •

Left paralysis, sensory loss •

Eyes deviated to right •

Lacunar Stroke



Stroke at specific Site

with numbness

and Paresthesia

والتي هي الأعراض في

اليد اليسرى

Long term

Pain disorder



Boards & Beyond

متلازمة

Post Thalamic

infarction Syndrome

cerebellar hemorrhage



ataxia

in

or

vermis



trunkal ataxia

lobes



lobes ataxia

rt or

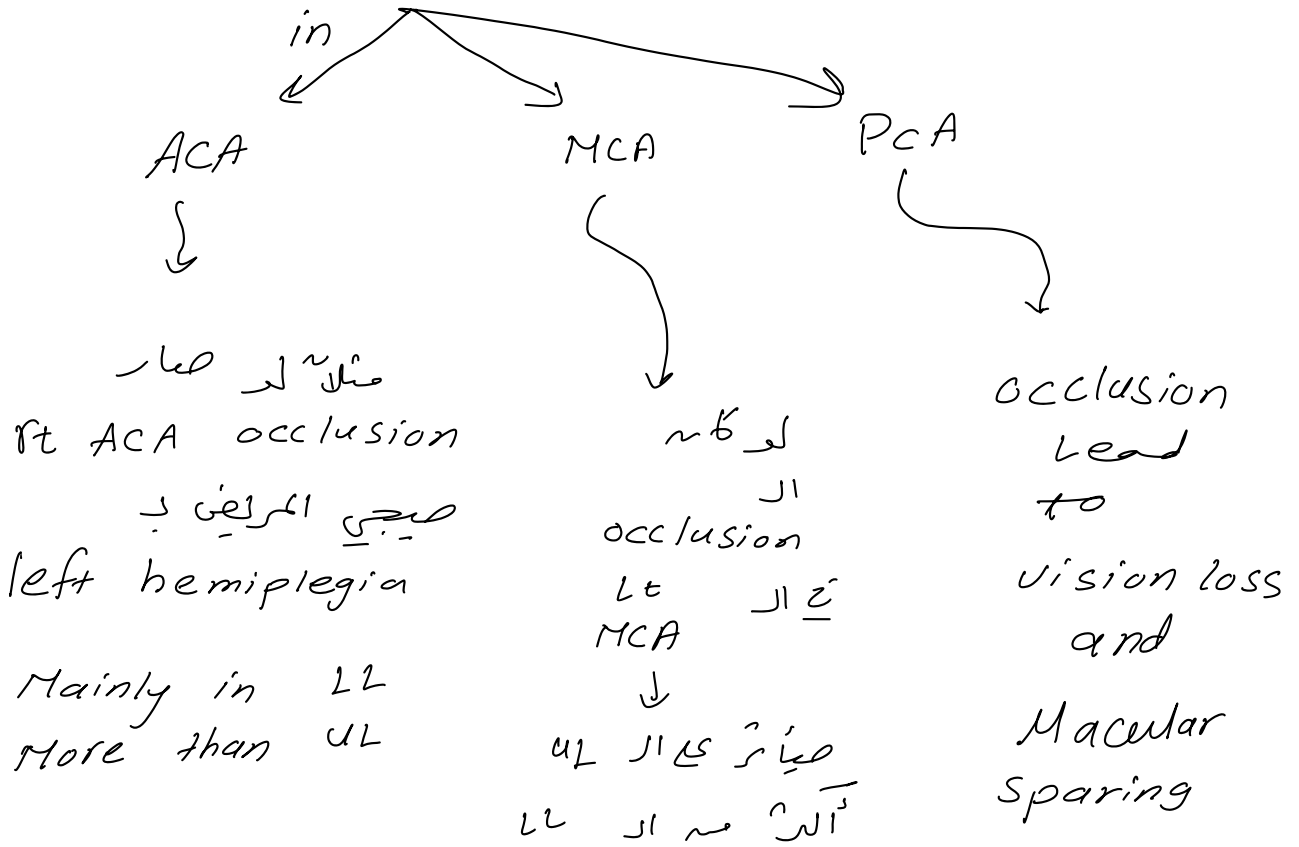
left

ataxia

Cerebral Amyloid Angiopathy

- Recurrent hemorrhagic strokes
- Beta-amyloid deposits in artery walls
 - Weak, prone to rupture
- Typically lobar hemorrhages
 - Frontal, parietal, occipital
 - Usually smaller strokes
- Contrast with HTN: Basal ganglia
- Watch for:
 - Elderly person
 - Recurrent hemorrhagic strokes

Ischemic Stroke

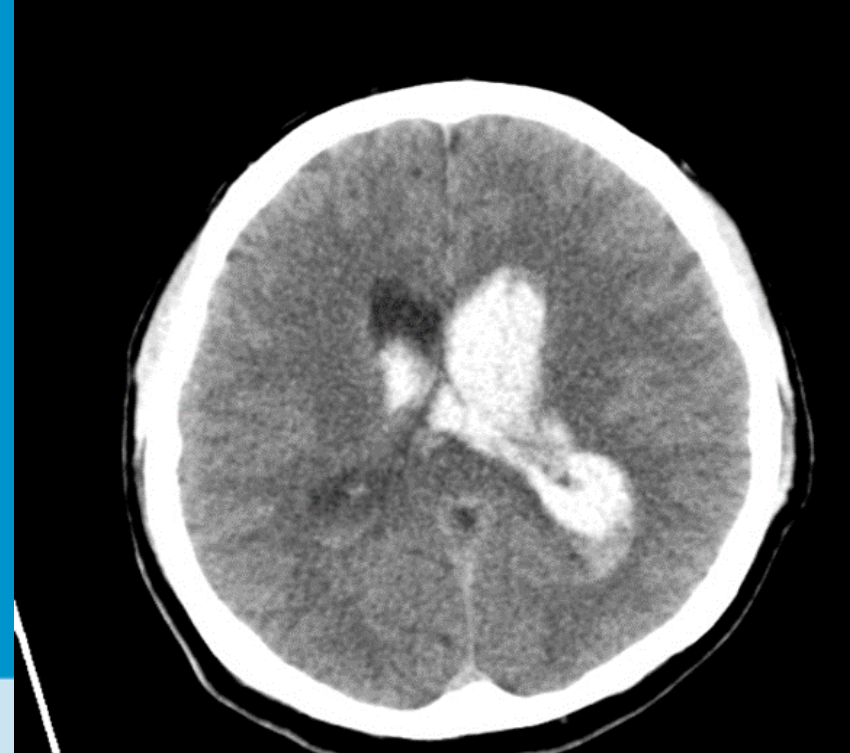


عنا من ال germinal matrix - تكونه من كلى

Intraventricular Hemorrhage

- Complication of premature birth
- Hemorrhage into lateral ventricle
- Usually first 5 days of life
- Sometimes asymptomatic
- LOC, hypotonia, loss of spontaneous movements
- Massive bleeds can cause seizures, coma

مشكلة انه يزيد Icp



Intraventricular Hemorrhage

Clot can obstruct the Foramen of Monro •

Enlargement of lateral ventricles •

Normal 3rd/4th ventricle •

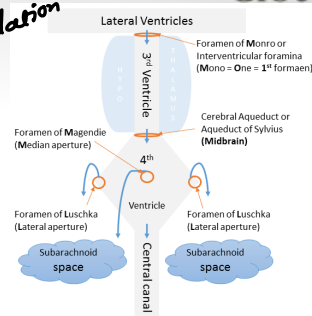
Treatment: Ventriculoperitoneal (VP) •

Germinal matrix problem •

Highly vascular area near ventricles •

Premature infants: poor autoregulation of blood flow here •

In full term infants, this area has decreased vascularity •



CSF circulation
 ← على الـ CSF
 hemorrhage
 سيحبو بـ CSF
 hydroencephalous
 2 types
 obstructive
 ↓ =
 non communicating
 as
 brain tumor
 لا يوصل
 (interventricular foramen of Monro)
 ينقطع CSF يقطع

non obstructive
 ↓ =
 communicating
 as
 = ependymoma
 ↑ CSF Production

Trumatic brain hemorrhage (traffic accident Motor accident falling down Boxing

Subdural and extradural bleeding

• Subdural hematoma

- Subdural hematoma (SDH) means the accumulation of blood in the subdural space following the rupture of a vein. This usually follows a head injury, sometimes a trivial one. The interval between injury and symptoms can be days or may extend to weeks or months. Chronic, apparently spontaneous, SDH is common in the elderly, and also occurs with anticoagulants.
- Headache, drowsiness, and confusion are common; symptoms are indolent and can fluctuate. Focal deficits, such as hemiparesis or sensory loss, develop. Epilepsy occasionally occurs. Stupor, coma, and coning may follow.

ازي شته
تبير
Confusion
بفكر
انك حارب
سepsis
بال
ولو لا
د.س.ع
د.ت
hypotension

نقطة التقاء
* Pterion (Frontal parital
temporal sphenoid)

Subdural ai
hemorrhage
(ع.ه.ت.ن)
Ant brach Middle meningeal
artery
تحتها

لغز اول
ما فيه
glucosrick
Injury to
بسر عظيم
trauma
epidural hematoma

epidural
بجى مباشرة
بعد ما يوقع

خاى

↓
hypoglycemia
سُكَّر
Symphatic
overflow
hemorrhage
→ ↑ B.P.
ارتفاع ضغط الدم

بجی لدر
انسوئیس

Subdural Hematoma

- Usually traumatic
- Rupture bridging veins
- Blood b/w dura and arachnoid space
- SLOW bleeding due to low pressure veins

← elderly
and
alcoholic

↓
عنه
بصر
مغز
brain
atrophy

غای صندھ صندھ

patient

ما بستر کر کیف انجی

drowsy

و المرفین بکونه

Subdural Hematoma

- Crescent shaped bleed
- Crosses suture lines
- Limited by dural reflections
 - falx cerebri
 - tentorium
 - falx cerebelli



Could be

acute

or

chronic

or

Sub acute

↓
within
weeks

within days

within 6 months
to
1 year

Subdural Hematoma

Risk factors •

- Old age •

- Alcoholics •

- Blood thinners •

- Brain atrophy increases space veins must cross •

- More vulnerable to rupture •

- Classic history is confusion weeks after head injury •

- Classic injury in shaken baby syndrome •

Extradural hemorrhage

- Extradural hemorrhage (EDH) typically follows a linear skull vault fracture tearing a branch of the middle meningeal artery. Extradural blood accumulates rapidly over minutes or hours. A characteristic picture is that of a head injury with a brief duration of unconsciousness, followed by improvement (the lucid interval).
- The patient then becomes stuporous; there is an ipsilateral dilated pupil and contralateral hemiparesis, with rapid trans tentorial coning.
- Bilateral fixed, dilated pupils, tetraplegia and respiratory arrest follow. An acute progressive SDH presents similarly.



Figure 21.43 Bilateral subdural haematomas. A. CT scan.
B. Magnetic resonance T1-weighted image.

Raised Intracranial Pressure

ICP

- Mass lesions (tumors) •
- Cerebral edema (large stroke, severe trauma) •
- Hydrocephalus •
- Obstruction of venous outflow (thrombosis) •
- Idiopathic intracranial hypertension •
- Pseudotumor cerebri •

Increased Intracranial Pressure

General symptoms

- Headache (pain fibers CN V in dura) •
- Depressed consciousness •
- Pressure on midbrain reticular formation •
- Vomiting •

Papilledema

- Optic disc swelling
- Due to $\uparrow$ ICP
- i.e. mass effect
- Also seen in severe HTN
- Usually bilateral
- Blurred margins optic disc on fundoscopy



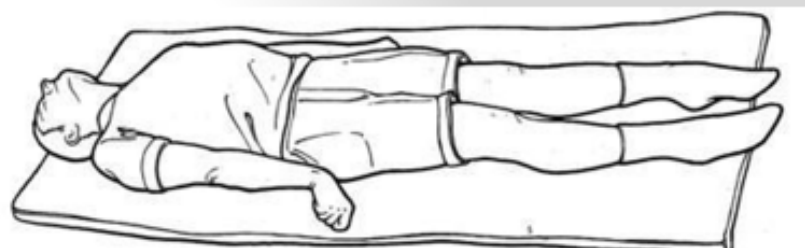
Cushing's Triad

- Hypertension •
- Bradycardia •
- Irregular respiration •

Posturing



Decorticate (arms flexed)
Cerebral Hemisphere Damage



Decerebrate (arms extended)
Brainstem Damage

بقیمہ ۱۲

neurological
state

لکھائی

ایک جاہ ۱۵

دو ای جاہ ۳

لکھائی

Glasgow Coma Scale

Three tests: eye, verbal and motor •

GCS score: 3 to 15 •

Eye (1-4 points) •

1 Does not open, 2 opens to painful stimuli, 3 opens to voice, 4 opens spontaneously

Verbal (1-5 points) •

1 No sound, 2 incomprehensible sounds, 3 inappropriate words, 4 confused, 5 oriented

Motor (1-6 points) •

1 No movements, 2 decerebrate posturing, 3 decorticate posturing, 4 withdrawal to pain, 5 localizes to pain, 6 obeys commands

Boards&Beyond

Management

14-15 → Mild head trauma → observation
13-9 → Moderate " → Non contrast CT
8 or less → Severe " → Incubation

بہتر ہے
المنع ایڈل
اور جلد
بزنس