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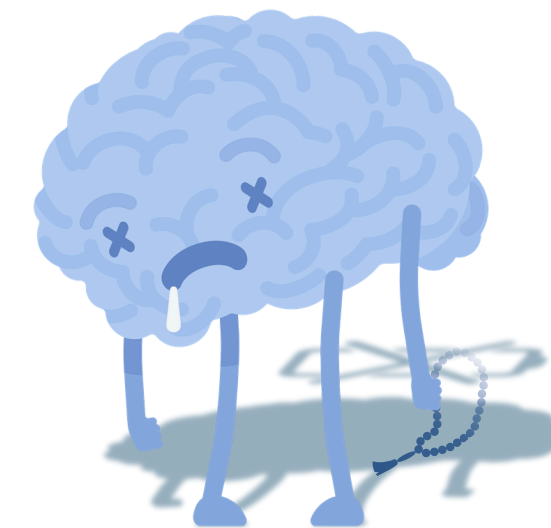
Lecture 1

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Pathology Mind Maps

Intracranial Hemorrhage



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This file contains the lecture material presented through mind maps to make the information clearer, more organized, and easier to follow. It is designed to simplify studying and make revision more effective.

**We truly hope you find it beneficial.
If it helps you in any way, please remember us in
your prayers.**

Best of luck in your studies❤️!

Causes of intracranial hemorrhage

Non Traumatic

→ Primary brain parenchymal hemorrhage (hypertension)

→ Cerebral amyloid angiopathy الداء النشواني

→ Ruptured Aneurysms تمدد كيسية دموي

→ Vascular malformation

→ Vasculitis

→ **Rarer Causes** : Bleeding disorders /Drug related(anti-coagulants)
Cocaine use /Tumors- encroach on a vessel and cause bleeding.

Traumatic

→ Head injury

→ Traumatic parenchymal injury

→ Brain injury

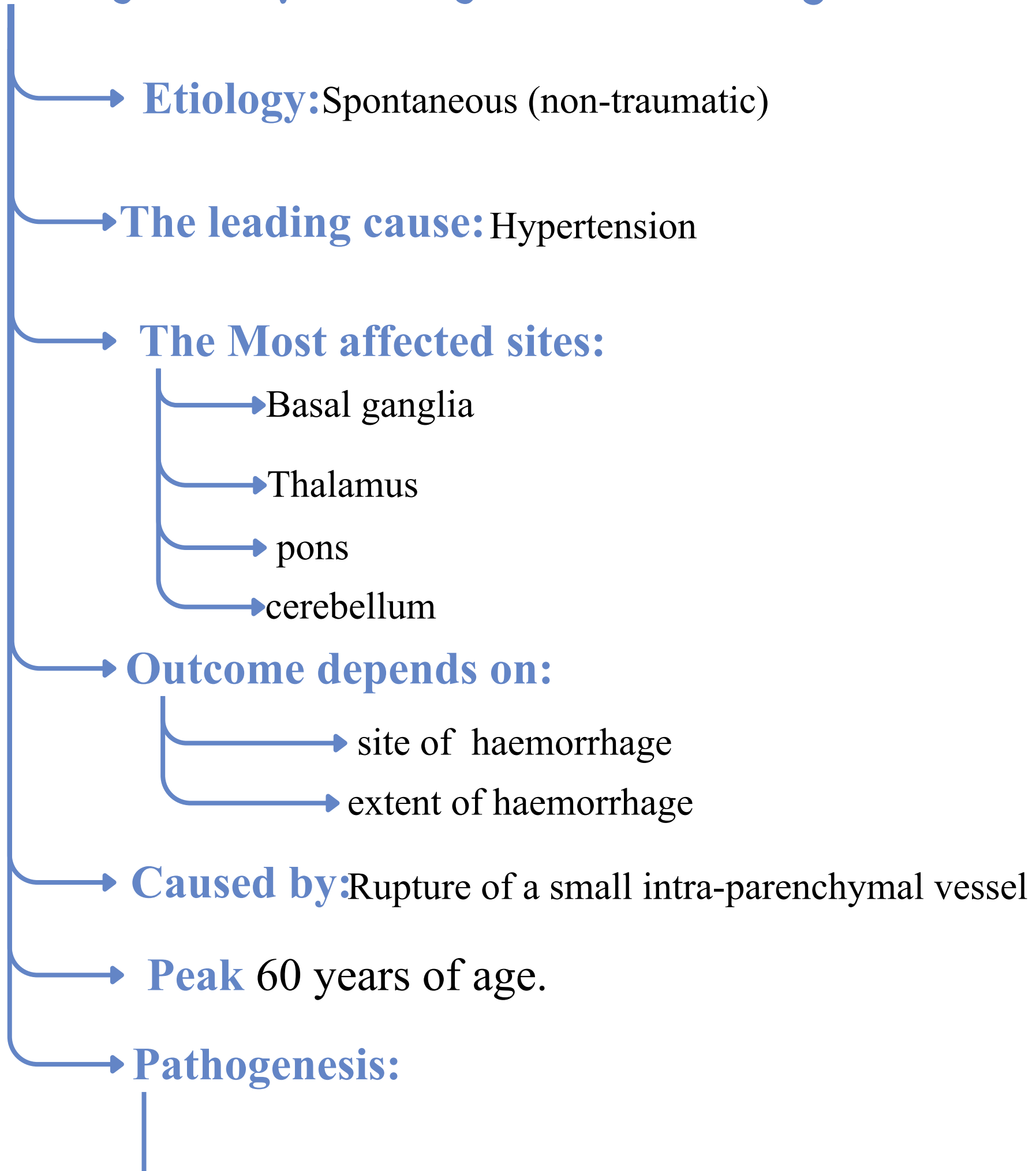
→ Traumatic vascular injury: • Epidural
• Subdural
• Subarachnoid
• intraparenchymal

→ IMP NOTES:

- Trauma to CNS causes **mortality or disability**
- Outcome depends on **extent of trauma** and **site** affected.
- Spinal cord trauma >can cause severe disability.
- Brain stem trauma>can be fatal

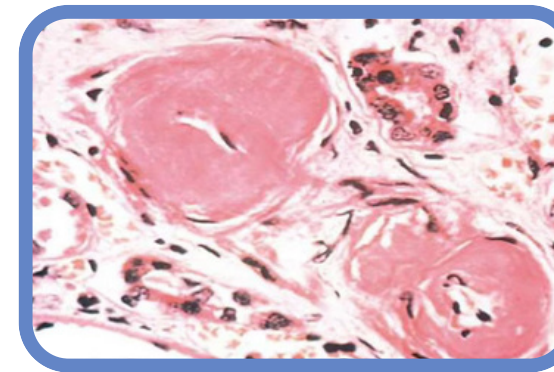
Primary brain parenchymal haemorrhage

اللهم صلّ على محمد، وعلى آل محمد، كما صليت على إبراهيم، وعلى آل إبراهيم، إنك حميد مجيد، اللهم بارك على محمد، وعلى آل محمد، كما باركت على إبراهيم، وعلى آل إبراهيم، إنك حميد مجيد



→ **Hyaline Arteriolosclerosis:**

This results in **weak arterioles**, so the arterioles can rupture especially if there is *sudden or sustained* increase in blood pressure.



Homogeneous pink hyaline thickening with luminal narrowing and loss of underlying structural detail

→ **Charcot- Bouchard micro aneurysms:**

Minute aneurysms can form because of the weak vascular walls and these also can rupture.

→ **Symptoms:** 1. neurological symptoms related to the area affected 2. symptoms of increased intracranial pressure

→ **Morphology:**

→ Extravagated blood



→ With time.. Resolution and cavity formation



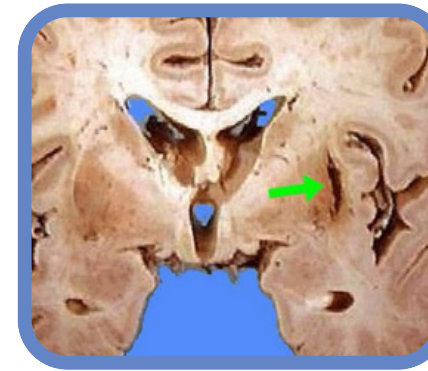
→ **Hypertension Effects:**

→ **Massive intracranial haemorrhage**

→ **Acute hypertensive encephalopathy(edema)**

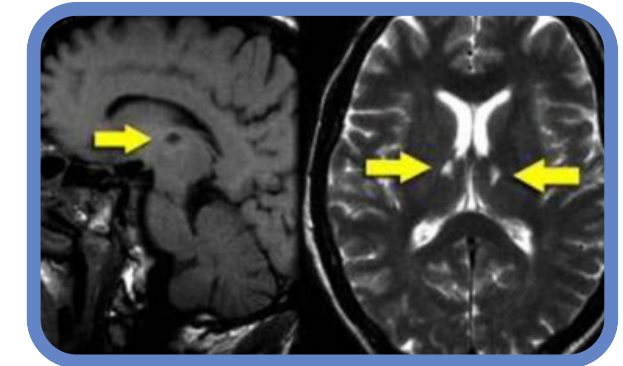
→ **Vessel rupture in hypertension:**

- Small penetrating vessels may rupture.
- Cause small haemorrhages (**slit haemorrhages**).



→ **Lacunar infarcts:**

- Small infarcts, mostly in deep grey matter (basal ganglia and thalamus), internal capsule, deep white matter and pons.
- Caused by occlusion of penetrating branches of a large cerebral artery.
- Effect: depends on site



Vasculitis

→ **Etiology:** **inflammation** of the blood vessel wall > weakens the vessel wall so it can rupture and cause hemorrhage.

→ **Causes:**

→ **Infectious arteritis:** • previously seen with **syphilis** and **TB**.
• Now in association with: **CMV**, **herpes**, **aspergillosis**..... immunosuppression

→ **Polyarteritis nodosa**

→ **Primary angiitis of CNS:** cause diffuse **encephalopathy** with cognitive dysfunction.

Cerebral amyloid angiopathy:

→ **Etiology:** **Amyloid deposition** in the walls of arteries > Causes weakness in vessel wall

→ **Morphology:** Bleeding usually in the lobes of cerebral cortex (**lobar hemorrhage**)

→ **Amyloidosis:** - Deposition of **extracellular fibrillary proteins**

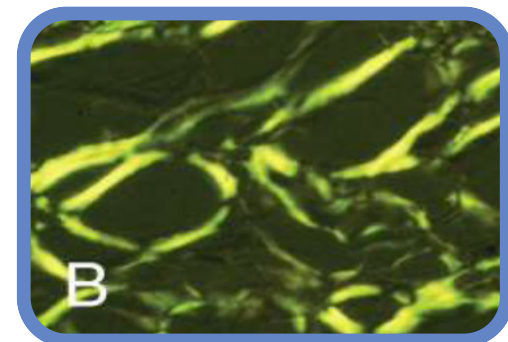
- These abnormal fibrils are produced by the aggregation of **misfolded proteins** (which are soluble in their normal folded configuration).

- Amyloid is deposited in the extracellular space in various tissues and organs of the body

- These **fibrillary proteins** are responsible for tissue damage and functional compromise

→ **By electron microscope:** -All types of amyloid consist of **continuous, non-branching** fibrils with a diameter of approximately 7.5 to 10 nm.

-With a cross- β -pleated sheet conformation



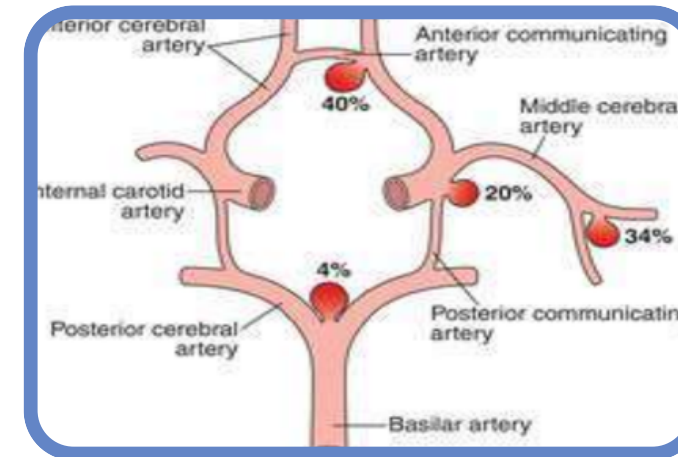
Congo red stain

اللَّهُ لَا إِلَهَ إِلَّا هُوَ الْحَيُّ الْقَيُّومُ لَا تَأْخُذُهُ سِنَةٌ وَلَا نَوْمٌ لَهُ مَا فِي السَّمَاوَاتِ وَمَا فِي الْأَرْضِ مَنْ ذَا الَّذِي يَشْفَعُ عِنْدَهُ إِلَّا بِإِذْنِهِ يَعْلَمُ مَا بَيْنَ أَيْدِيهِمْ وَمَا خَلْفَهُمْ وَلَا يُحِيطُونَ بِشَيْءٍ مِنْ عِلْمِهِ إِلَّا بِمَا شَاءَ وَسِعَ كُرْسِيُّهُ السَّمَاوَاتِ وَالْأَرْضَ وَلَا يَئُودُهُ حِفْظُهُمَا وَهُوَ الْعَلِيُّ الْعَظِيمُ

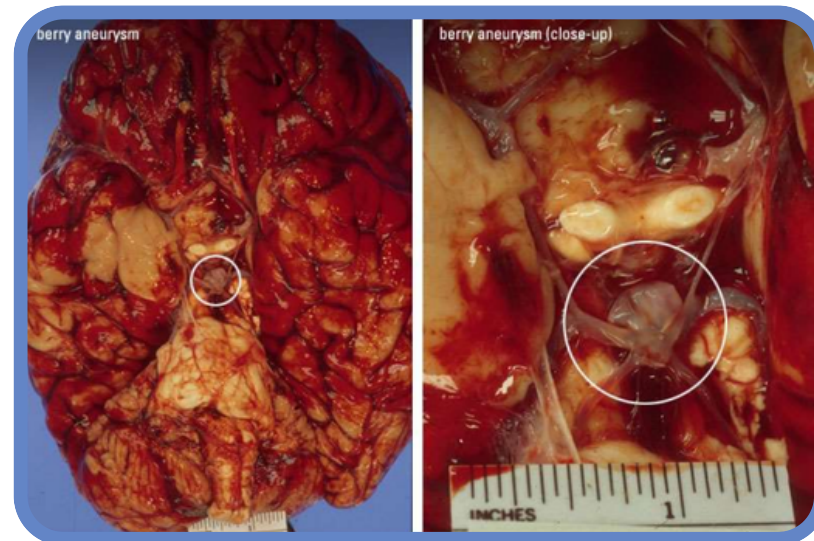
Ruptured berry aneurysm

→ Berry aneurysm:

- **Etiology:**
- 90% in the **anterior circulation**
 - Near **major** arterial branching points
 - Multiple in 20 – 30 % of cases



- **Morphology:** Thin walled outpouching of an artery



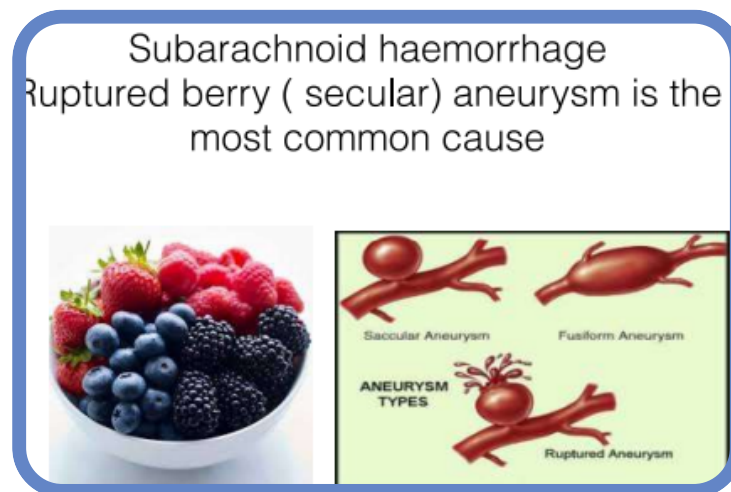
- **Caused by:** Rupture happens usually due to **increased intracranial pressure.**

- **Symptoms:**
- Sudden severe **headache** followed by **loss of consciousness**
 - 25-50% die
 - Survivors: risk of recurrent bleeding

→ The final result:

→ **Brain paranchyma hemorrhage**

→ **Subarachnoid hemorrhage:** • **Most common** cause is ruptured berry aneurysm.
• Other causes: vascular malformations, trauma, tumours, haematological disturbances.



Vascular malformations

→ **Arteriovenous malformations**

- **Most common type** of vascular malformation • **Males** more than females
- Present at **10-30 years** of age • Symptoms: seizures and intracranial hemorrhage

→ **Cavernous malformations**

→ **Capillary telengectasia**

→ **Venous angioma**



Morphology :

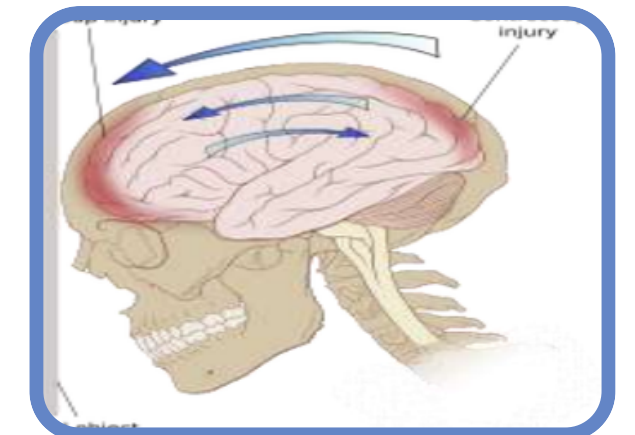
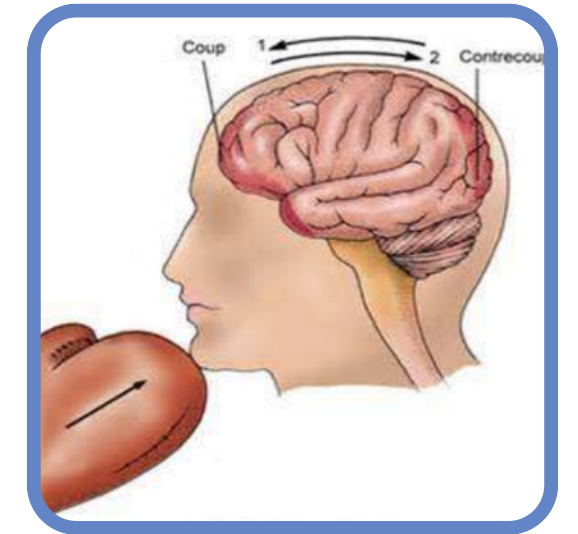
Network of disorganised vascular channels

Head injury

- **Etiology:**• Blunt or penetrating.
 - Open or closed.
- **Severe brain damage can occur without external signs of head injury**
- **Morphology:** Lacerations and even skull fractures are not necessarily associated with brain damage

Traumatic parenchymal injury

- **Etiology:** When an object impacts the head:
 - **coup injury:** Injury of brain at site of impact
 - **countercoup:** Injury opposite to site of impact
 - **Both are contusions:**
- **Note:** Repetitive episodes of trauma can later lead to neurodegenerative process e:g Alzheimer



Brain injury

Concussions:

→ **Pathogenesis:** unknown

→ **Symptoms:**

- Reversible altered consciousness after head injury in the absence of contusions
- Transient dysfunction in the form of: loss of consciousness, temporary respiratory arrest, loss of reflexes.

→ **Recovery:** is **complete** but amnesia of the episode.

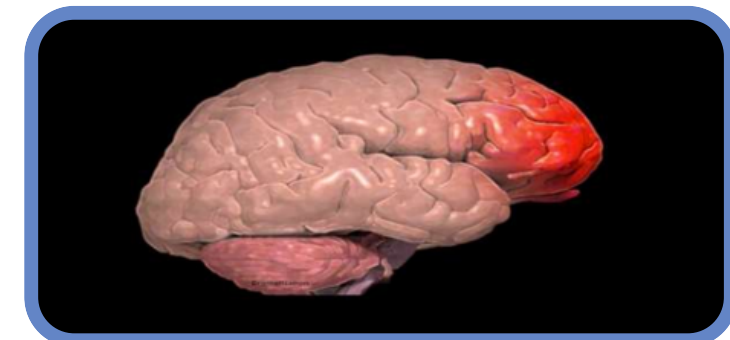
Contusion:

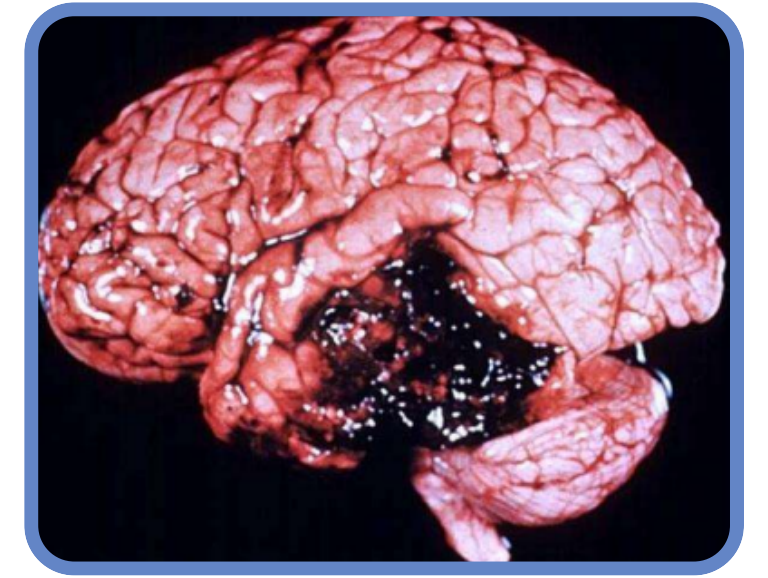
→ **Pathogenesis:** Caused by **rapid** tissue displacement , disruption of vascular channels with subsequent haemorrhage, tissue injury and edema.

→ **Affected Areas:** Common in overlying rough and irregular bone surface (orbitofrontal region, temporal lobe tips).

→ **Morphology:**

- Wedge shaped, widest aspect closest to point of impact.
- Edema and extravasated RBCs.
- Superficial aspects of cortex affected more (contrary to ischemic injury)





lacerations:

→ **Pathogenesis:** Penetrating injuries cause skull fractures and brain lacerations.

→ **Laceration:** tissue tearing and hemorrhage.

→ **Morphology:**

- Old traumatic injury: depressed, retracted, yellow brown patches involving the gyri.
- Larger lesions: cavity, resembling remote infarcts.

Diffuse axonal injury :

→ **Pathogenesis:** Brain trauma can cause subtle widespread injury to axons within the brain >
Movement of one region of the brain relative to another.. disrupt axonal integrity.

→ **Final result:** Can lead to severe irreversible neurologic deficit.

→ **Morphology:** Appear under LM as axonal swelling

Traumatic vascular injury

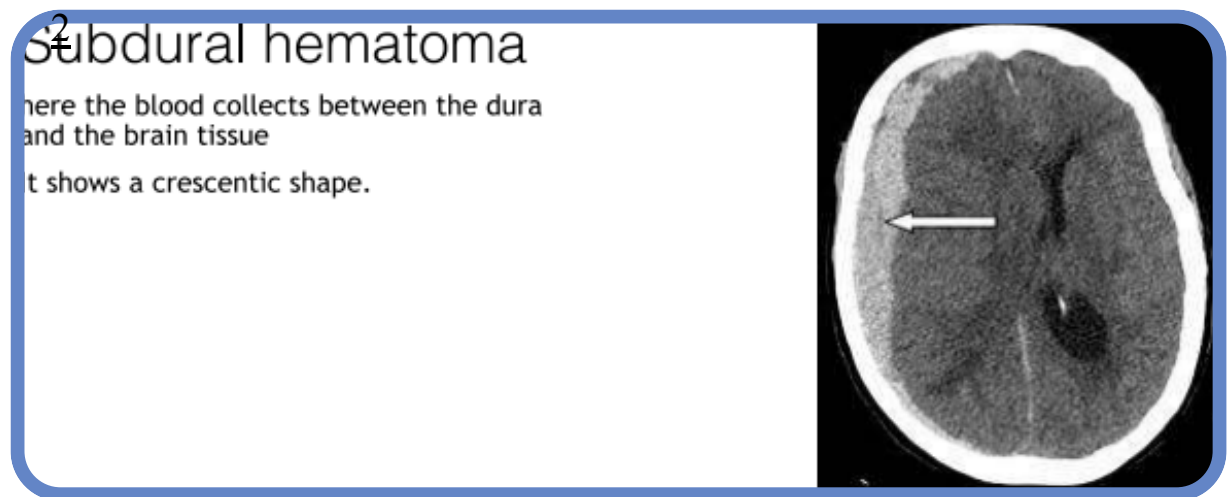
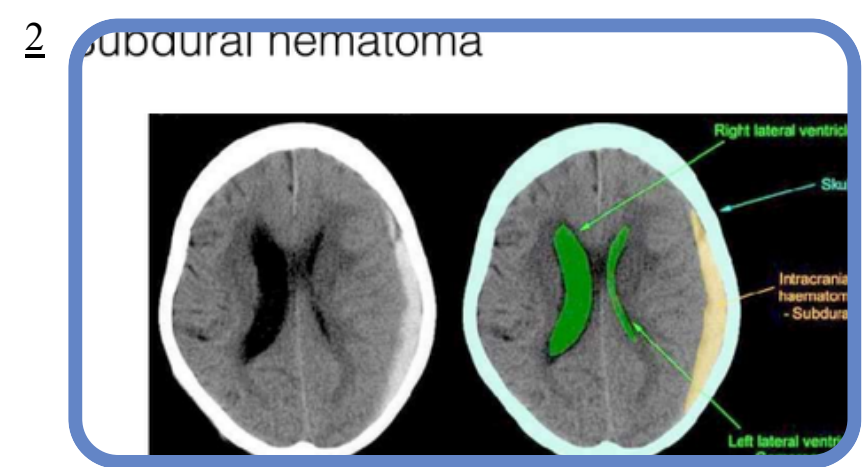
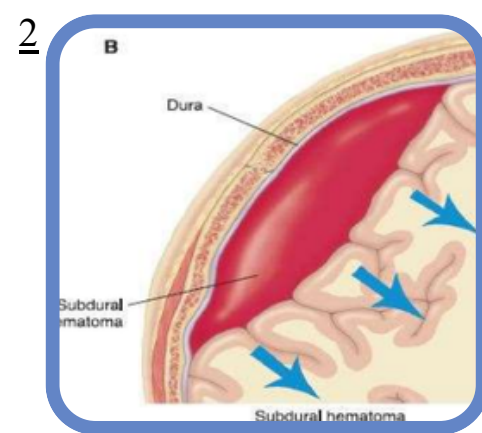
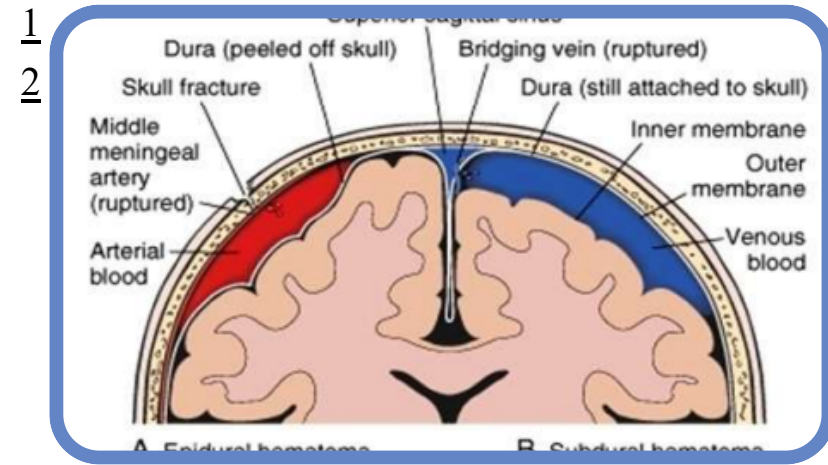
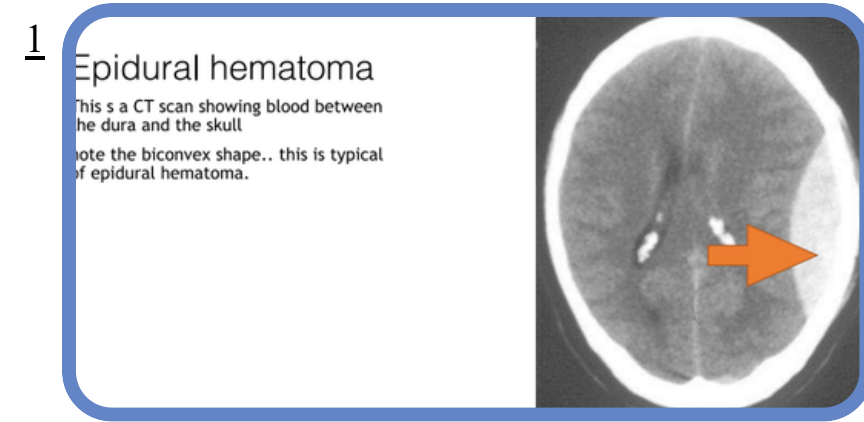
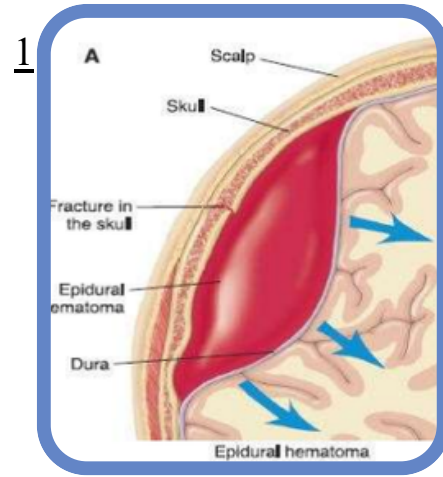
Epidural hematoma¹:

→ **Pathogenesis:** Dural vessel torn due to fracture.
Usually **middle meningeal artery** is torn.

→ **Symptoms:** Blood accumulates under arterial pressure and dissects the dura, **compressing the brain parenchyma**

Subdural hematoma²:

→ **Pathogenesis:** • Rapid movement of brain during trauma > Can tear the bridging veins
• This leads to bleeding in the subdural space



اللهم اجعل أجر هذا العمل صدقة جارية عن روح عمر عطيه عوده المرابي

• اللَّهُمَّ اغْفِرْ لَهُ وَارْحَمْهُ، وَاعْفُ عَنْهُ وَعَافِهِ، وَأَكْرِمْ نُزُلَهُ، وَوَسِّعْ مُدْخَلَهُ، وَ اغْسِلْهُ بِمَاءٍ وَتَلْجٍ وَبَرْدٍ، وَنَقِّهِ مِنَ الْخَطَايَا
كما يُنَقِّي الثَّوْبَ الْأَبْيَضُ مِنَ الدَّنَسِ.

• اللَّهُمَّ أبدله داراً خيراً من داره، وأهلاً خيراً من أهله، وأدخله الجنة، وأعدّه من عذاب القبر ومن عذاب النار.

• اللَّهُمَّ يَمِّنْ كتابه، ويسر حسابه، وثقل بالحسنات ميزانه، وثبّت على الصراط أقدامه، وأسكنه في أعلى الجنات،
بجوار حبيبك محمد صلى الله عليه وسلم.

• اللهم اغفر لحينا وميتنا وشاهدنا وغائبنا وصغيرنا وكبيرنا وذكرنا وأنثانا اللهم من أحييته منا فأحيه على
الإسلام ومن توفيته منا فتوفه على الإيمان اللهم لا تحرمنا أجره ولا تضلنا بعده.

• اللهم اغفر له وارفع درجته في المهديين، واخلفه في عقبه في الغابرين، واغفر لنا وله يا رب العالمين، وافسح
له في قبره، ونور له فيه.

• اللَّهُمَّ أنزل على أهله الصبر والسلوان وارضهم بقضائك.

اللهم لا تفجعنا بأنفسنا ولا أهلنا ولا أحبتنا، اللهم أعوذ بك من فواجع الأقدار ومن مصائب الدنيا وتقلب
حوادثها، اللهم إنا نخاف الفقد فلا تحملنا ما لا طاقة لنا به.