



# ***Pathology***

***Subject*** :

***Lec no*** : lec17

***Done By*** : Hala AL Beshtawe

وَقُلْ رَبِّ زِدْنِي عِلْمًا

# Pulmonary edema : <sup>حالة</sup> manifestation for more than one disease

- ❑ Is a common clinical problem seen in **left ventricular failure (LVF)**, **renal failure (RF)**, **adult respiratory distress syndrome (ARDS)**, **pulmonary infections**, & **hypersensitivity reactions**.
- ❑ The edema tends to involve the lower lobes of both lungs.
- ❑ **Grossly** : The lungs are **heavy** (2 to 3 times their normal weight, which is 350g) & on sectioning it reveals **frothy**, or **blood-stained fluid**, consisting of air + edema fluid + <sup>air containing fluid</sup> extravasated RBC mixture.
- ❑ **Clinically** : Pulmonary edema <sup>تسبب صعوبة في التنفس بسبب نقص (O2) لأن الدم مليء بالسوائل</sup> **causes dyspnea**, interference with normal ventilatory functions of the lungs hypoxia and cyanosis & may **be fatal**.



# PULMONARY EDEMA

- ❖ is excessive liquid accumulation in the tissue and air spaces (usually alveoli) of the lungs.
- ❖ It leads to impaired gas exchange and may cause hypoxemia and respiratory failure.
- ❖ It is due to either failure of the left ventricle of the heart to remove oxygenated blood adequately from the pulmonary circulation (cardiogenic pulmonary edema), or an injury to the lung tissue directly or blood vessels of the lung (non-cardiogenic pulmonary edema).



# PULMONARY EDEMA

تحت س Left Congestive heart failure

- ❑ Pulmonary edema is often **caused by congestive heart failure**. When the heart is not able to pump efficiently, blood can back up into the veins that take blood through the lungs.
- ❑ As the pressure in these blood vessels increases, fluid is pushed into the air spaces (alveoli) in the lungs. This fluid reduces normal oxygen movement through the lungs. These two factors combine to cause shortness of breath.

## ❖ **Congestive heart failure that leads to pulmonary edema may be caused by following abd called "Cardiogenic Pulmonary odema"**

- ❑ Heart attack, or any disease of the heart that weakens or stiffens the heart muscle (cardiomyopathy)
- ❑ Leaking or narrowed heart valves (mitral or aortic valves) *stenosis*
- ❑ Sudden, severe high blood pressure (hypertension)

heart failure



## ❖ Pulmonary edema may also be caused by other causes (**non cardiogenic pulmonary edema**):

❑ Certain medicines

❑ High altitude exposure above (2500 meter above sea level )

الارتفاع الذي يتعدون قبة عالية

a fatal form of severe high-altitude illness. HAPE is a form of noncardiogenic pulmonary edema that occurs secondary to hypoxia. It is a clinical diagnosis characterized by fatigue, dyspnea, and dry cough with exertion.

In high-altitude pulmonary edema (HAPE), it's believed that blood vessels in the lungs squeeze together (constrict), increasing pressure. This causes fluid to leak from the blood vessels to the lung tissues and eventually into the air sacs.

❑ Kidney failure

❑ Narrowed arteries that bring blood to the kidneys

❑ Lung damage caused by poisonous gas or severe infection  
(inhalation of toxic substances )

❑ Major injury





Gross appearance of lung edema .Lungs are heavy& swollen.



Symptoms of pulmonary edema may include:

- Coughing up blood or bloody froth
- Difficulty breathing when lying down (orthopnea) (لا يستطيع النوم على ظهره لا يستطيع)
- Feeling of "air hunger" or "drowning" (This feeling is called "paroxysmal nocturnal dyspnea" if it causes you to wake up 1 to 2 hours after falling asleep and struggle to catch your breath.)
- Grunting, gurgling, or wheezing sounds with breathing
- Problems speaking in full sentences because of shortness of breath

يستيقظ من النوم فجأة

# Brain edema

□ May be **localized** at sites of focal injury as in **infarct**, **abscess** or **neoplasm**.

□ Or **generalized** as in **encephalitis**, **hypertensive crises**, or **obstruction** of the venous outflow

□ **Trauma** may result in **local** or **generalized** brain edema depending on the nature & extent of the injury.

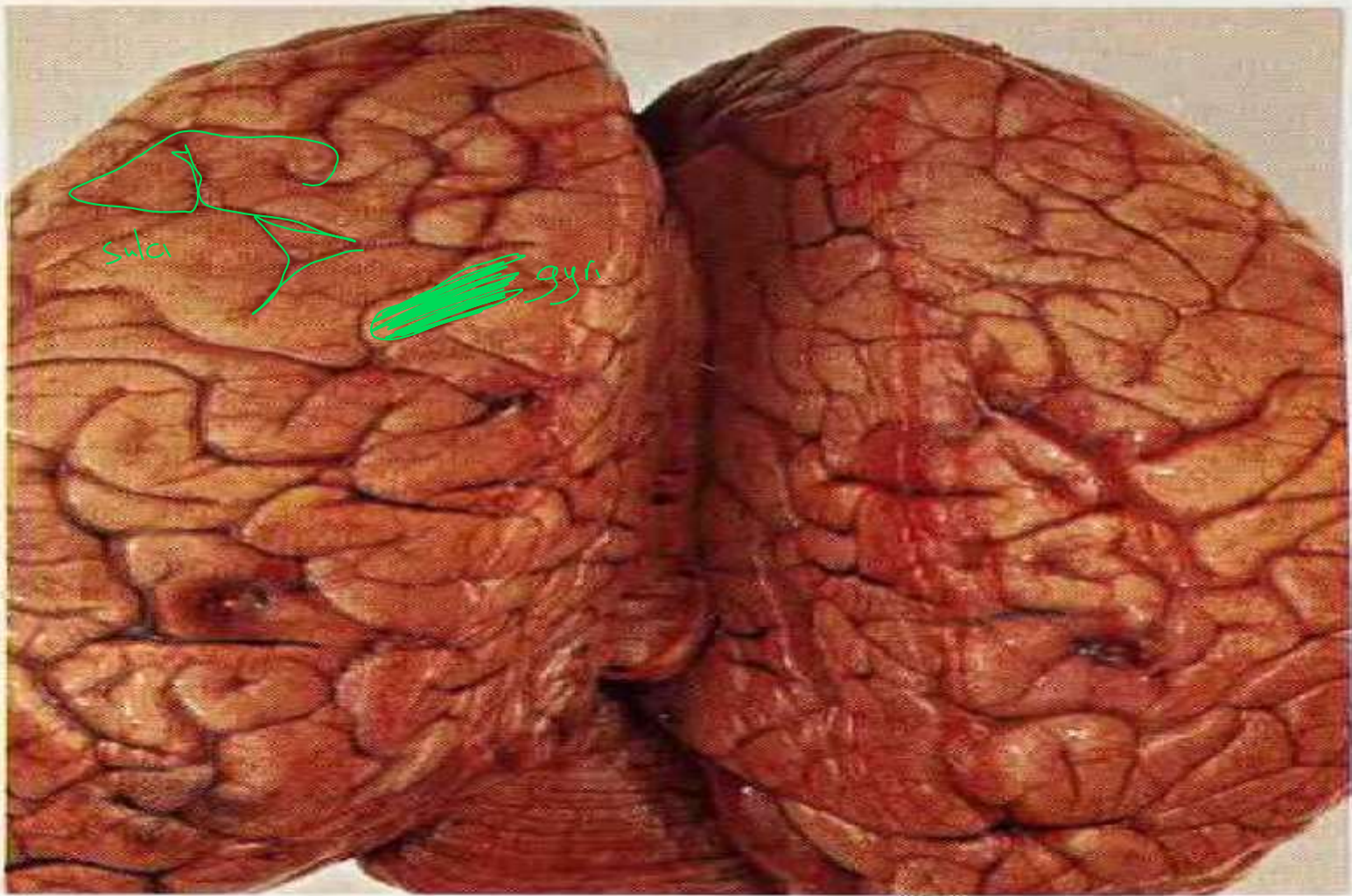
□ **Grossly** : In generalized brain edema, the brain is grossly **swollen, flattened against the unyielding skull, heavier than normal weight, showing narrowed sulci & distended gyri.**

□ **Clinically** :

Brain edema is very serious, & can be **rapidly fatal** as it causes **increased intracranial pressure (ICP) & herniation or extrusion of brain stem** through **foramen magnum**, result in compression of blood supply to medullary vital centres causing **sudden death.**

← خروج من فتحة المخ و Brain & foramen magnum





**9.81 Swelling and oedema: brain**

**Gross appearance of edema of the brain.**





Blood vessels ← → زغرف

# HEMORRHAGE (H)

- ❑ Is **extravasation of blood, due to rupture of blood vessels.**
- ❑ **Capillary H** can occur
  - (1) in chronic venous congestion (CVC) &
  - (2) in hemorrhagic diatheses, as in Hemophilia a disorders characterized by increased tendency to hemorrhage from usually insignificant injury.
- ❑ Hemorrhage or bleeding from ruptured large artery or vein\_ is almost always due to trauma, other causes include **ruptured aneurysms, inflammatory, ulcerative or neoplastic erosion of the vessel wall by tumors .**



# Hemorrhage is either:

**External H:** in which bleeding occurs to the out side from:

- ① Normal cycle uterine bleeding = menstrual bleeding الطمث
- ② Excessive or abnormal uterine bleeding = menorrhagia, ← أكثر من 9 أيام
- ③ Nose = epistaxis الأنف
- ④ lung = hemoptysis خروج الدم من (R.S)
- ⑤ Stomach = hematemesis → vomiting of blood
- ⑥ Urinary tract = hematuria → دم البول
- ⑦ Colon or rectum = bleeding per rectum دم + براز
  - Fresh red blood
  - Mixed with stool (occult blood)
  - Malena (دم متغير اللون من الدم) ← لون أحمر

Malena is a term used to denote a slow **bleeding from upper**

**gastro-intestinal tract** as in peptic ulcer leading to passage of **black stool**.  
دخول الدم في الجهاز الهضمي

Internal H. is enclosed within a

(a) tissue called hematoma. body cavities, as peritoneum, pleura & pericardial sacor joints.

← تجمع الدم في مكان معين داخل الجسم

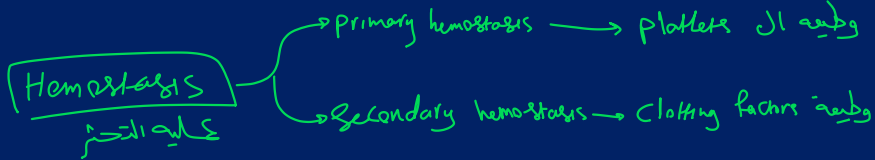


# Hematoma

تجمع الدم في جدار الأوعية الدموية  
Blood vessels

- is hemorrhage or blood accumulation in tissue.
- Hematomas may be small & insignificant (as in a skin bruise) or may accumulate excessive amount of blood e.g., rupture Atheromatous Abdominal Aortic Aneurysm resulting in massive retroperitoneal hematoma which is usually usually fatal.





الجلد → أمراض

## SKIN HEMATOMAS ARE OF THREE TYPES:

(I) **Petechiae**: are minute (1- to 2mm in diameter) hemorrhages into skin, mucous membranes, or serosal surfaces typically associated with :

- (1) Locally increased intravascular pressure.
- (2) Low platelet counts (thrombocytopenia) .

A normal platelet count ranges from 150,000 to 450,000 platelets per microliter of blood. Having more than 450,000 platelets is a condition called thrombocytosis; having less than 150,000 is known as thrombocytopenia.

### (3) Defective platelet function .

The term thrombasthenia means weak platelets. Glanzmann thrombasthenia (GT) is one of several inherited disorders of platelet function, which also include Bernard-Soulier syndrome, as well as deficiencies of platelet adhesion, aggregation, and secretion

### (4) Clotting factor deficiencies . unlikely



Petechiae, skin

( II) **Purpuras** : are slightly larger hemorrhagic spots (**3- to 5mm in diameter**) , may be associated with many of the same disorders that cause petechiae, as well as in the settings of **trauma**<sup>①</sup>, **vasculitis**<sup>②</sup> , or **increased**<sup>③</sup> **vascular fragility**.  
اصراهن يكون  
انها تحت الاوعية الدموية  
انما Blood vessels

(III) **Ecchymoses** : or bruises, are larger (**10- to 20mm in diameter**) or **even larger** subcutaneous hematomas.





Purpura .



ecchymoses .

□ The RBCs in all the above three skin hematomas are degraded & phagocytosed by macrophages, & the hemoglobin (red-blue color) is enzymatically converted into biliverdin (green), then to bilirubin (blue-green color) & eventually into  hemosiderin (golden-brown) to yellow color.

تحتوي لون

□ The above accounts for the characteristic color changes in hematomas seen, e.g., following **improper I.V. puncture**.

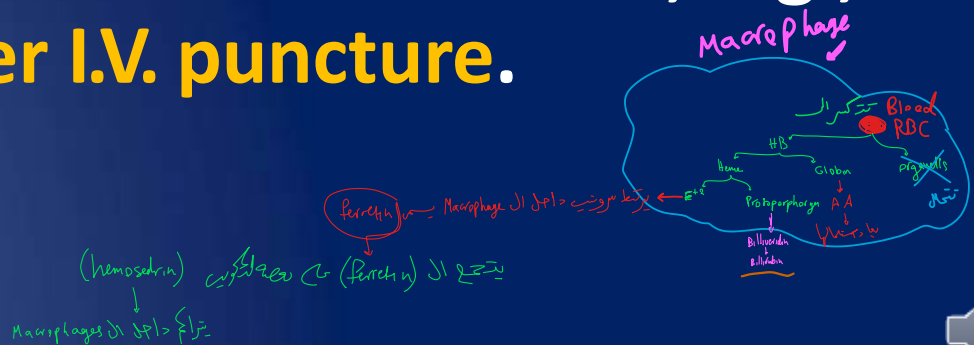
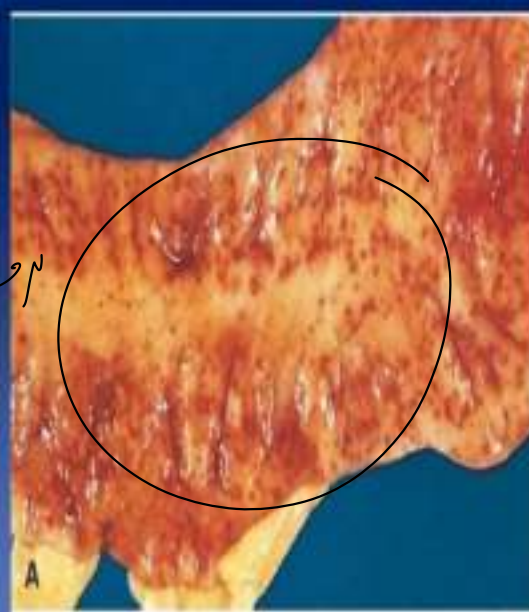


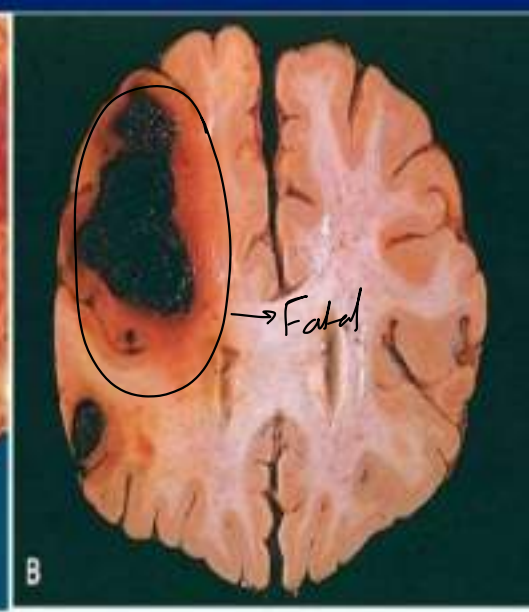


Figure : Ecchymoses .

mucus  
membran  $\text{C} \rightarrow \text{N}$



A



B

© Elsevier Kumar et al: Robbins Basic Pathology 8e - www.studentconsult.com

A- Petechial hemorrhages in colonic mucosa .  
B- Fatal intracerebral hemorrhage .



Figure : Ecchymosis caused by improper I.V. puncture .

بهر و صبح الكابولا



<sup>pleural cavity جوف = Blood تجمع</sup>  
**(b) Hemothorax, hemopericardium ,**  
**hemoperitoneum, & hemarthrosis**

<sup>Peritoneal cavity ←</sup>  
are accumulations of blood in the pleural,  
pericardial, peritoneal & joint cavities  
respectively.

<sup>(synovial) جوف ←</sup>



<sup>Carotid femponate ←</sup>

**Hemopericardium** blood in pericardial cavity

**Clinical significance of hemorrhage depends on the:**

\* گام ادا ت سر به کجه الدم المفقود کان الومع صطیر اکثر

**(I) Rate & volume of blood loss;**

Rapid removal of up to **20% of blood volume** or, slow losses of even larger amounts may have little impact in healthy adults; while greater losses, however, may result in **hypovolemic shock** .

**(II) Site of hemorrhage is important;**

Bleeding of about **40 ml of blood**, which is considered **trivial** in the **subcutaneous tissues**, is **rapidly fatal** if located in the **cerebellum** or **pons & midbrain** .

1

2

3

4) Brain stem



Figure 1 : Photograph of the hemorrhage in the pons which is rapidly fatal .

### (III) Recurrent or chronic external

**hemorrhages** *لنزات طويلا و لكن كيه قلبه*

- ❑ (e. g., menorrhagia or chronic peptic ulcer) cause loss of iron, with **subsequent iron deficiency anemia**.
- ❑ In contrast, when RBCs are retained, as in hemorrhage into body cavities or tissues, the iron can be reutilized for hemoglobin synthesis.

