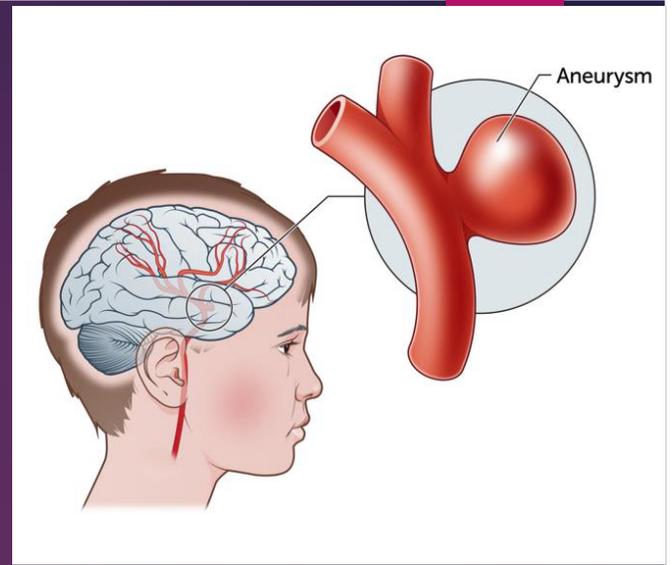


CVS module - 2

Aneurysm and D.V.T

↳ abnormal dilatation of the vascular wall



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16-11-2025

Aneurysms

- ▶ Aneurysms are localized, irreversible dilatation of blood vessel lumen that exceeds the diameter of the adjacent normal segment. ↓
(out-pouching)

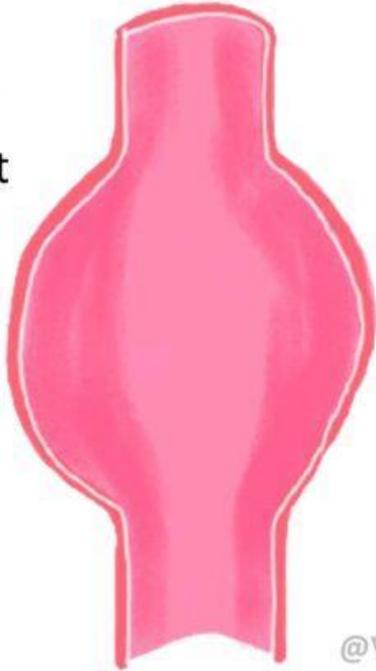
- ▶ "True" aneurysms:

Involve all three layers of the artery (intima, media, and adventitia), include:

- atherosclerotic and congenital vascular aneurysms.
- ventricular aneurysms resulting from transmural myocardial infarctions.
↳ Full thickness
- false aneurysm: *doesn't involve the 3 layers
↳ healing by fibrosis
↳ contraction & relaxation of ventricle leads to aneurysm formation
↳ contraction & relaxation of ventricle leads to aneurysm formation
- results when a wall defect leads to the formation of an extravasascular hematoma that communicates with the intravascular space.

True aneurysm

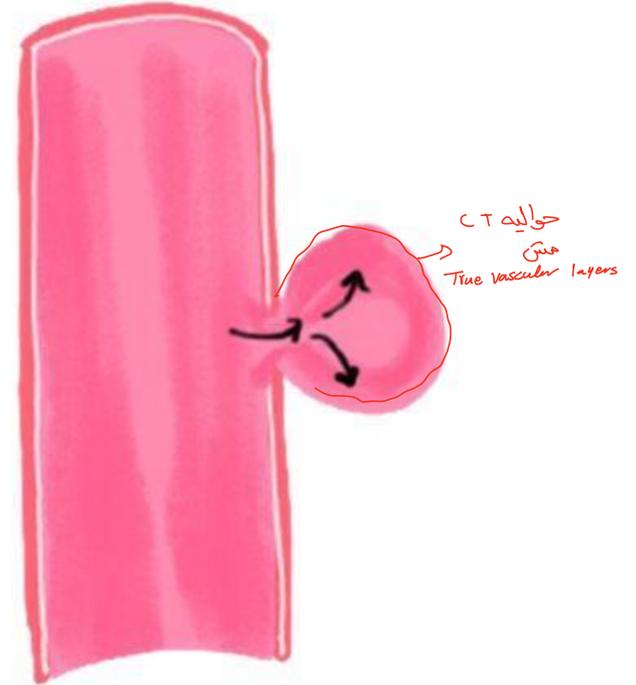
involves all the layers of an intact (but attenuated) arterial wall or the thinned ventricular wall of the heart



@VijayPatho

False aneurysm

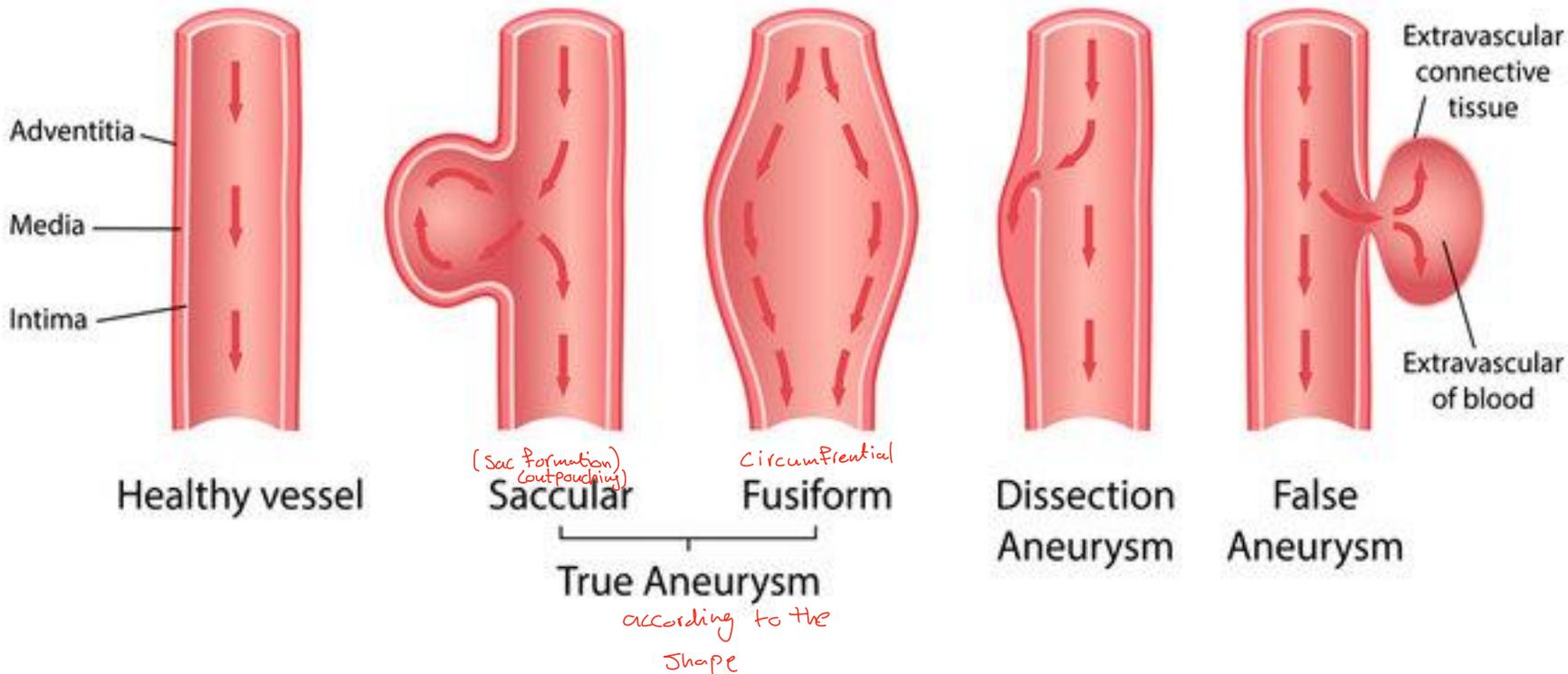
defect in the vascular wall leading to an extravascular hematoma that freely communicates with the intravascular space



"Pseudo aneurysm"



Types of Aneurysm



“True” aneurysms are classified into:

▶ Saccular aneurysms:

- are discrete outpouchings ranging from 5 to 20 cm in diameter, often with a contained thrombus.

→ stasis
↓
High Viscosity of blood
abnormal BVs

propagating
fibrin



abnormal BVs high Viscosity of blood

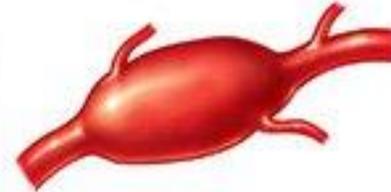
▶ Fusiform aneurysms :

- are circumferential dilations up to 20 cm in diameter; these most commonly involve the aortic arch, the abdominal aorta, or the iliac arteries.

Fetal condition: rupture



Saccular Aneurysm



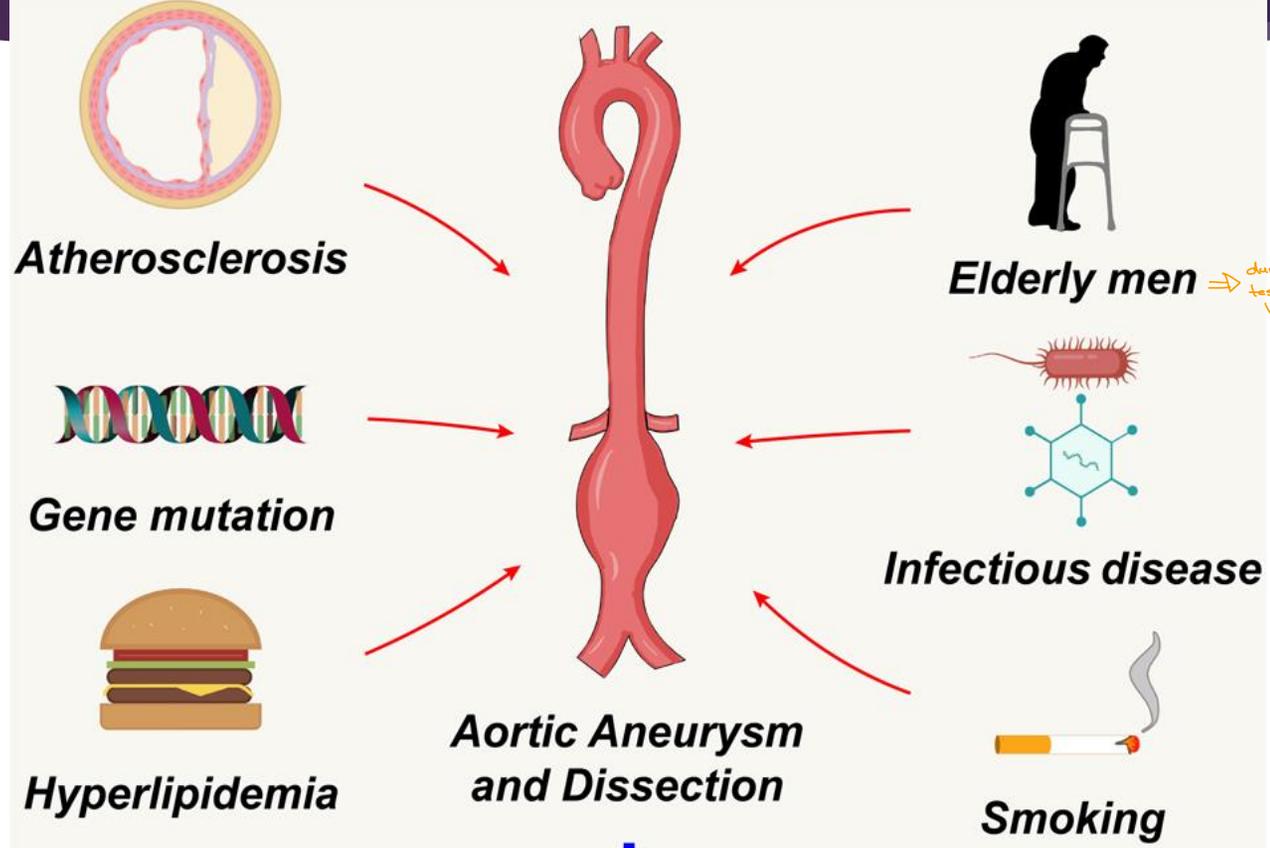
Fusiform Aneurysm

Risk factors

$$P = \frac{\text{Force}}{\text{Area}}$$

* المساحة مقلت ← الضغط تقل
 * لكن لظهور في Stasis (كمية الدم زائدة) يقل ضغط الدم في الـ intima ولكن تقل tear

Dissection: tear of the intima due to high pressure because of the stasis



In female → High progesterone protect her from aneurism
 thus after menopause female & male are equally predisposed

⇒ due to high testosterone level

Pathogenesis

✓ Inadequate or abnormal connective tissue synthesis:

- mutations in TGF- β receptors result in defective elastin and collagen synthesis.

- Loss of SMCs or change in the SMC synthetic phenotype: e.g. in :
Atherosclerosis, systemic hypertension , both of them leading to ischemia resulting in SMC loss as well as aortic “degenerative changes” . \Rightarrow weaken BV wall

\rightarrow how it cause ischemia?

1. narrowing the lumen
2. \downarrow Blood Supply \rightarrow ischemia

\rightarrow how it cause ischemic?

1. abnormal BF
2. abnormal veins wall

✓ Excessive connective tissue degradation:

- Increased matrix metalloprotease expression by macrophages in atherosclerotic plaque.

\rightarrow Cause destruction of the extracellular matrix component

release

Clinical examples

- ▶ Marfan syndrome result from defective synthesis of the scaffolding protein fibrillin and progressive loss of elastic tissue leading to dilation.

له بجل base بيتربط عليها elastic tissue

No fibrillin → No elastic tissue → defective CT → defective BV wall

- ▶ Ehlers Danlos syndrome result from defective in type III collagen synthesis leading to aneurysm formation.

No collagen → weak wall → aneurysm



Histologically, these changes are collectively called cystic medial degeneration, although no true cysts are formed

→ Fragmented elastic layers

→ Normal / regular layers

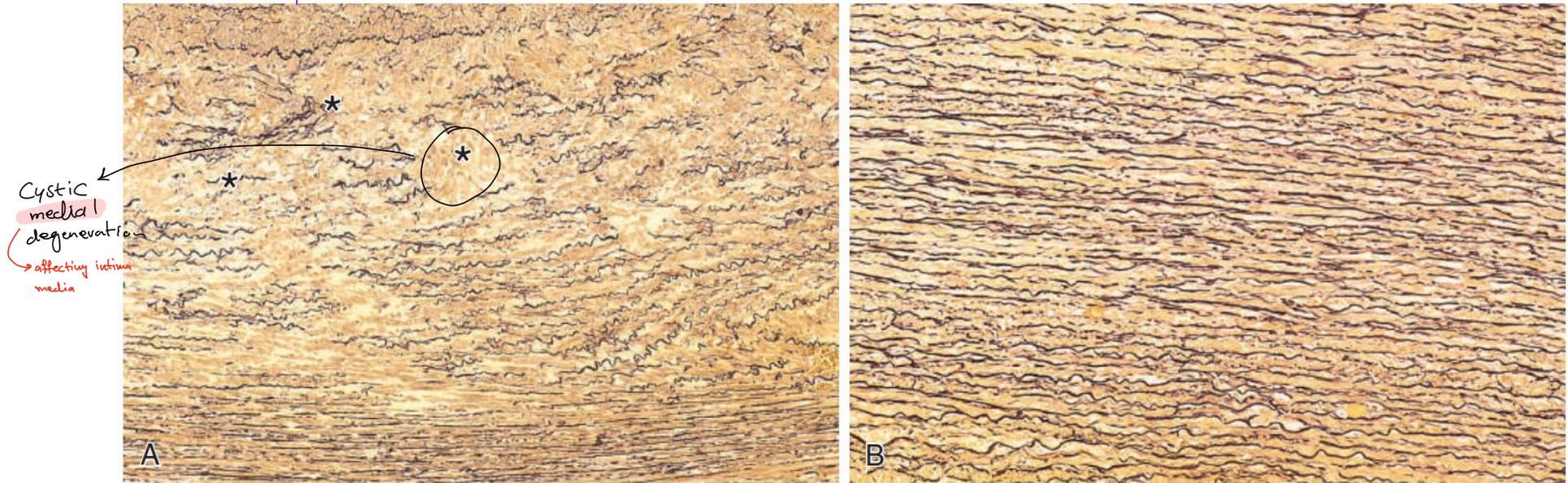


Fig. 10.18 Cystic medial degeneration. (A) Cross-section of aortic media from a patient with Marfan syndrome, showing marked elastin fragmentation and areas devoid of elastin that resemble cystic spaces (*asterisks*). (B) Normal media for comparison, showing the regular layered pattern of elastic tissue. In both (A) and (B), elastin is stained black.

Abdominal Aortic Aneurysm (AAA)

- ▶ Usually occur as a consequence of atherosclerosis , involving abdominal aorta (typically occur between the renal arteries and the aortic bifurcation)and common iliac arteries.
- ▶ Abdominal aortic aneurysms (AAAs) occur more frequently in old smoker male (more than 50 years).
↳ BVs walls become weaker with age
- ▶ In the majority of cases, AAA results from ECM degradation mediated by proteolytic enzymes released from inflammatory infiltrates in atherosclerotic lesions.

MORPHOLOGY

- ▶ The aneurysmal sac usually contains bland, laminated, poorly organized mural thrombus, which can fill much of the dilated segment, usually extensive atherosclerosis is present.



- * Autopsy
- * thick cell wall
- * narrow lumen

→ atherosclerosis

deposited thrombus

(Clot) $\xrightarrow{\text{stasis}}$

lumen

Mycotic thoracic aortic aneurysm (MTAA)

- ▶ Mycotic thoracic aortic aneurysm (MTAA) is an aneurysm of the aorta caused by infection of the vessel tissue through microbial inoculation of the diseased aortic endothelium. It is most commonly caused by bacteria or fungi.
- ▶ The vascular intima usually is highly resistant to infection. However, intimal integrity is defected either due to:
 - Embolization of a septic embolus, usually as a complication of infective endocarditis
 - Extension of an adjacent suppurative process
 - Direct infection of an arterial wall by circulating organisms. → ^{في حالات الـ} Sepsis

الفرق بين thrombus و embolus
thrombus: جلطة عينية
embolus: جلطة متحركة
→ يحدث في البداية التي تكون هي thrombus

Thoracic Aortic Aneurysm

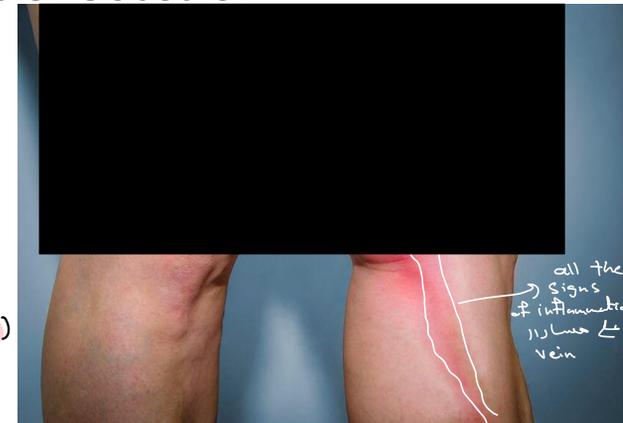
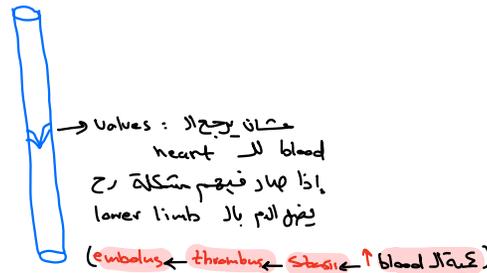
- ▶ Usually associated with hypertension, bicuspid aortic valves, and Marfan syndrome.
tricuspid (قلب) التريبي
turbulent BF
- ▶ These aneurysms manifest with the following signs and symptoms:
 - Compressive symptoms such as Respiratory or feeding difficulties due to airway or esophageal compression, respectively.
 - Persistent cough from irritation of the recurrent laryngeal nerves
 - Pain caused by erosion of bone (i.e., ribs and vertebral bodies)
 - Aortic dissection or rupture

Thrombophlebitis and Phlebothrombosis

inflammation in vein

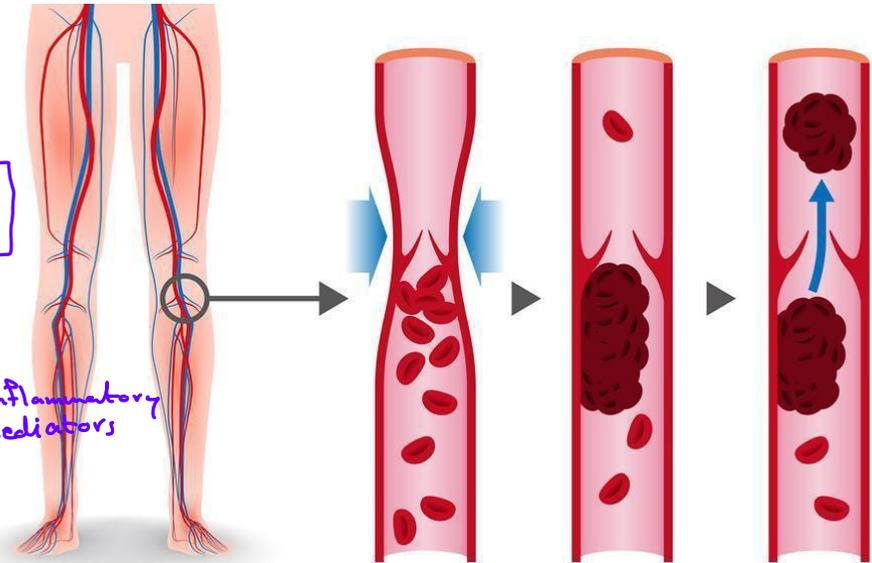
thrombus in vein

- ▶ Thrombophlebitis is a condition in which inflammation of the vein wall has preceded the formation of a thrombus (blood clot).
- ▶ Phlebothrombosis is the presence of a clot within a vein, unassociated with inflammation of the wall of the vein.
- ▶ Thrombosis of deep leg veins (DVT) accounts for more than 90% of cases of thrombophlebitis and phlebothrombosis.



Risk factors

- ▶ prolonged immobilization.
- ▶ congestive heart failure (venous pooling)
- ▶ pregnancy.
 - ↳ hormonal effect
 - ↳ mechanical cause → ↑ gravity → baby + (heavy) placenta
- ▶ oral contraceptive use. → hormonal effect
- ▶ malignancy
 - ↳ Compression
 - ↳ (the worst) paraneoplastic syndrome
- ▶ obesity.
 - ↳ compression
 - ↳ hyperlipidemia → central obesity → ↑↑ inflammatory mediators
- ▶ male sex.
 - ↳ ↓ estrogen
- ▶ age over 50 years. → weak valves



Signs and symptoms

- Hotness.
- Tenderness.
- Redness.
- Swelling.



- ❑ In many cases, the first manifestation of thrombophlebitis is a pulmonary embolus (serious clinical complication of DVT, resulting from fragmentation or detachment of the venous thrombus).

**Most occur in female in last months or after labor because of high compression*

- Lab: D-DIMER? *fragmentation of fibrinogen*
- Treatment?

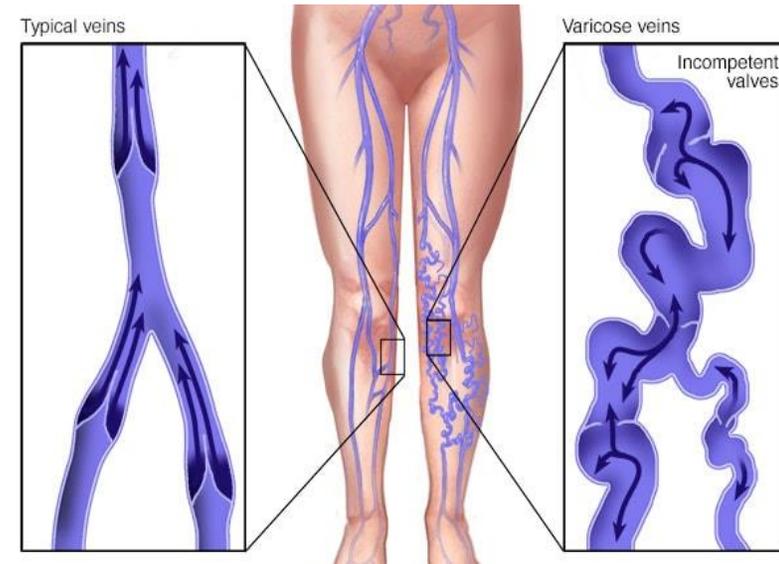
Varicose Veins of the Extremities

(الدوالي)

- ▶ abnormally dilated tortuous veins produced by chronically increased intraluminal pressures and weakened vessel wall support.
- ▶ The superficial veins of the upper and lower leg typically are involved.

⇒ tortous , dilated veins

- ▶ Risk factors:
 - Obesity.
 - Pregnancy.
 - Familial.



Clinical Features

- ▶ Clinical Features of Varicose dilation result from venous valves incompetent :
- ▶ Lower-extremity stasis.
 - Congestion,
 - Edema with secondary ischemic skin changes, including stasis dermatitis and ulcerations, poor wound healing and superimposed infections.
 - Pain.
 - Thrombosis.



Varicosities of Other Sites

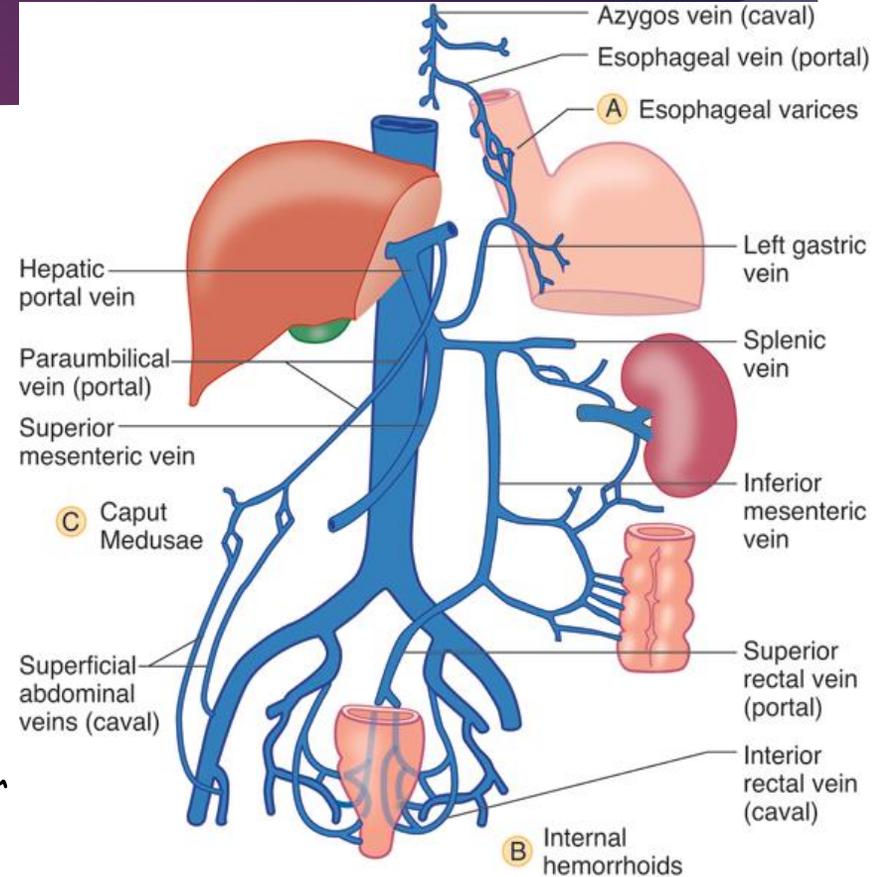
- ▶ Liver cirrhosis related varices:
 - Gastroesophageal junction.
 - Rectum (forming hemorrhoids)
 - Periumbilical veins forming a caput medusae.

liver cirrhosis → portal hypertension

↓
 كاسد يفتح
 collateral
 في
 systemic
 circulation

gastroesophageal
 Junction ←
 (hemoptysis)
 bloody vomiting

←
 oozing
 (ضعف في الأوعية الدموية)
 weak BVs



حَسْبِيَ اللَّهُ لَا إِلَهَ
إِلَّا هُوَ عَلَيْهِ
تَوَكَّلْتُ وَهُوَ
رَبُّ الْعَرْشِ
الْعَظِيمِ .