



AL-Mustaqbal University College

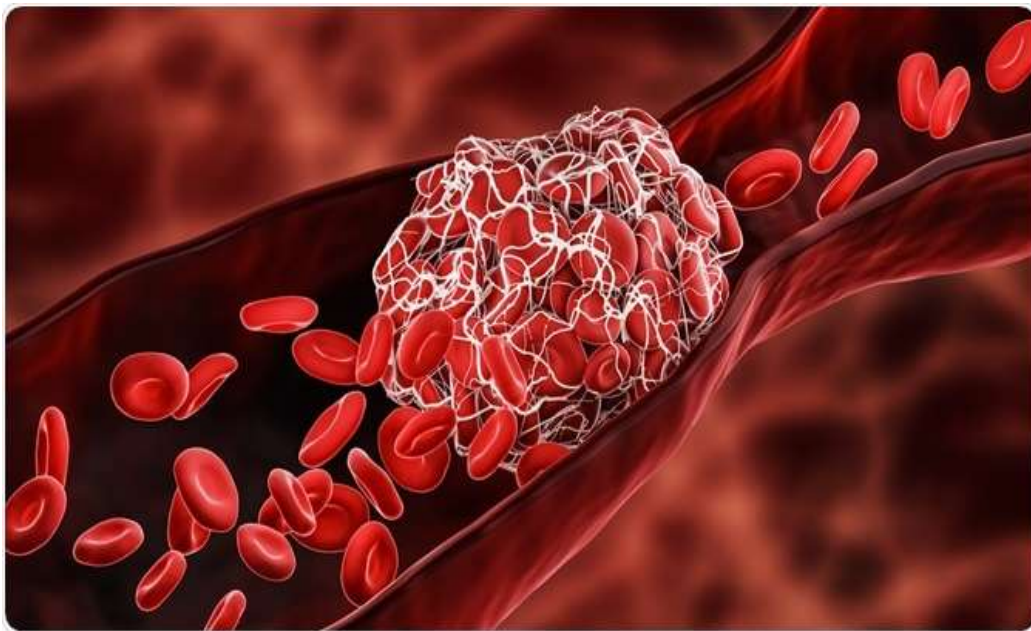
Pharmacy Department

Third stage

Practical Pathophysiology

(Thrombosis)

Lab 5



Lecturer: Noor Muhsen Jawad

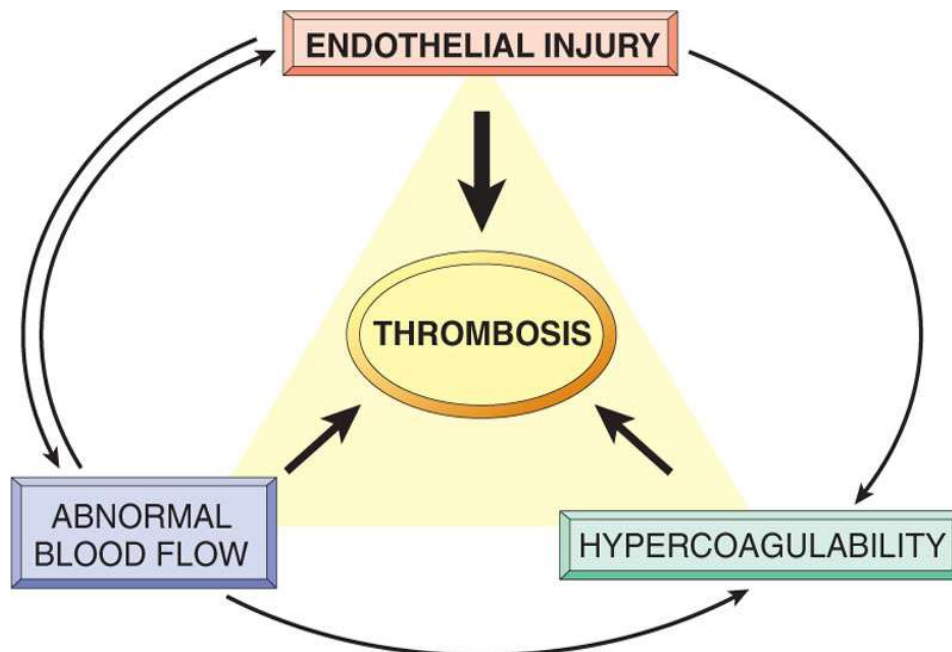
Thrombosis

Thrombosis: Is the formation of a clotted mass of blood within the cardiovascular system. The clotted mass is called as **Thrombus**.

Thrombus	Blood clot
1- Involves wall of blood vessels, formed elements of blood & blood clotting system.	1- Involves only blood clotting system.
2- Composed of platelets and fibrin.	2- Composed of fibrin only.
3- May be life-threatening.	3- Mostly lifesaving.

Rudolf Virchow Coined the terms “**Thrombosis**”

The main causes of thrombosis are given in Virchow's triad which lists **thrombophilia, endothelial cell injury, and disturbed blood flow**.



Virchow Triad

1- Endothelial injury: -

- **Trauma**
- **Bacteria-** Toxins by *Erysipelothrix*, *Streptococcus*, *Staphylococcus*, *Corynebacterium*.
- **Virus-** Hog cholera virus thrombosis in spleen
- **Parasites-** *Strongylus vulgaris* in anterior mesenteric artery of horse
- **Tumors** invading endothelium

Normal endothelium is thromboresistant, but when injured the highly thrombogenic sub endothelium is exposed and promotes adhesion of fibrin and platelets.

2- Abnormal blood flow: -

- RBC, WBC – Heavier axial stream
- Platelets – Lighter plasmatic / laminar stream.
- When blood flow slows down, platelets being the outermost in the blood stream, fall out to the periphery and stick to endothelium by virtue of their adhesive property.

 **Cause of slow blood flow** – Stasis and turbulence

- 1- Chronic venous congestion
- 2- Aged and debilitated animals
- 3- Varicose vein- nasal submucosa in cattle, scrotal plexus of horse, large veins of broad ligament of bovine uterus
- 4- Congestive heart failure

3- Hypercoagulability (Thrombophilia): -

- Increase in level of fibrinogen, prothrombin, factor VIIa, VIIIa, Xa
- Increase in number of platelets

- Decrease in levels of antithrombin III, protein C and fibrinolytin
- Hepatic disease - formation of prothrombin
- Bile deficiency in intestine - less absorption of Vit-K

Classification: -

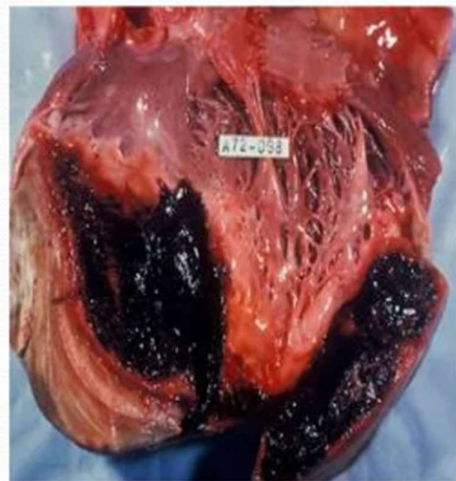
(A) According to location: -

1- Cardiac thrombus

- **Valvular thrombus**- in valves – *Erysipelothrix* infection in pig
- **Mural thrombus** – in wall of heart – *Clostridium* infection in cattle

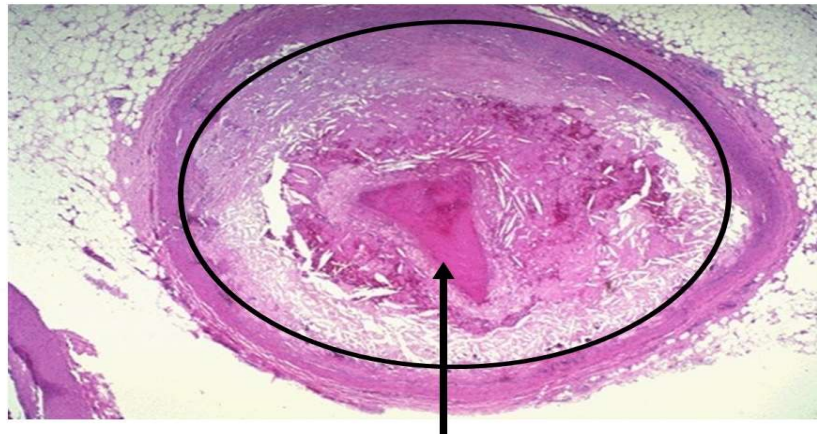


VALVULAR THROMBUS



MURAL THROMBUS

2- Arterial thrombus - *Strongylus vulgaris* in anterior mesenteric artery of horse



Arterial Thrombosis

3- **Venous thrombus** – more common in human

4- **Capillary thrombus**

5- **Lymphatic thrombus**

(B) According to location within the blood vessel: -

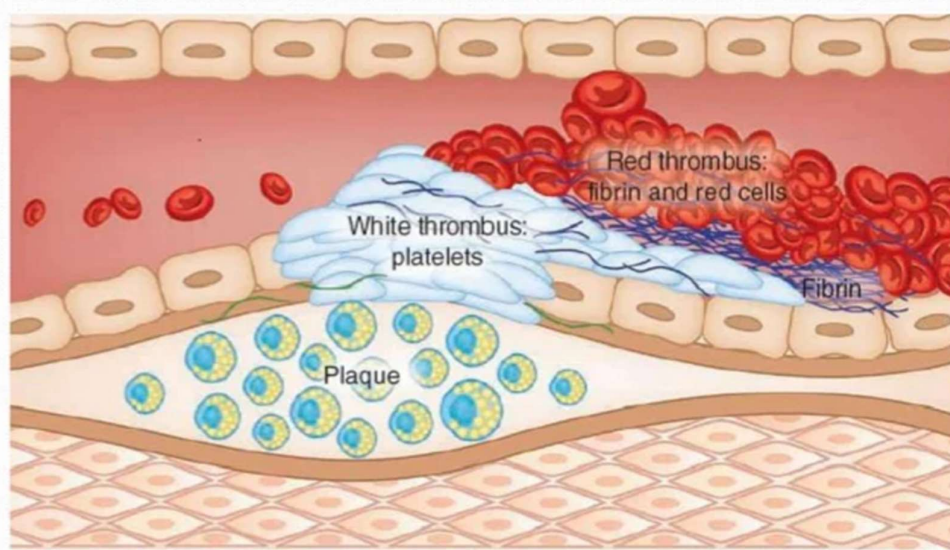
- **Lateral thrombus** – one side of BV
- **Occluding thrombus** – entire circumference of BV
- **Saddle thrombus** – at bifurcation of BV
- **Canalised thrombus** – new blood channels through the clot

(C) According to infective agent: -

- **Septic thrombus** – contains bacteria
- **Parasitic thrombus** – contains parasites
- **Aseptic thrombus** – no bacteria or parasites

(D) According to color: -

- **Pale or white thrombus** – in rapid blood flow, only platelets



WHITE AND RED THROMBI

- **Red thrombus** – in slow blood flow, fibrin attach to platelets
- **Mixed thrombus** – most common
- **Laminated thrombus** – alternate layers of white and red

Fate of thrombus: -

- **Propagation**
- **Emboli formation** – foreign body floating in the blood
- **Abcessation** – when pyogenic bacteria present
- **Dissolution** – by fibrinolytic activity
- **Organisation and recanalisation**
- **Calcification**