

(VTE)

مرض الجلطات

(venous thromboembolism)

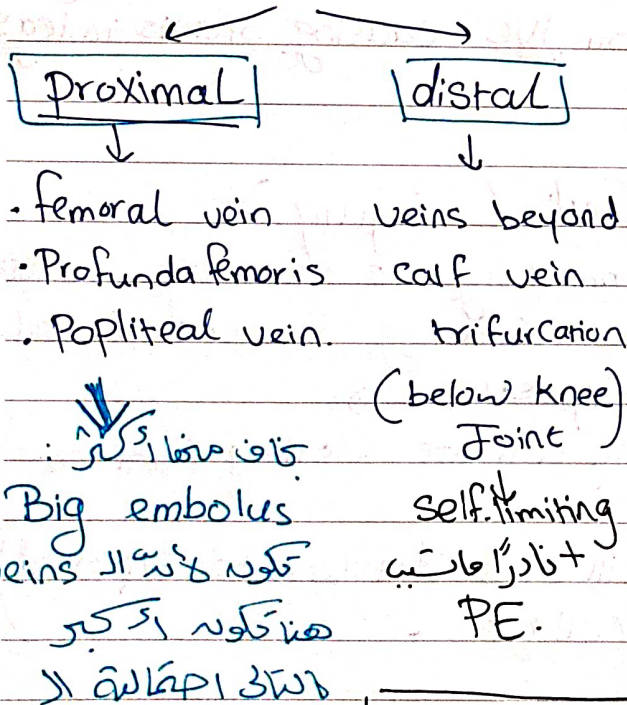
* VTE: Umbrella term that encompasses DVT + PE.

* DVT: formation of one or more blood clots in deep veins especially / typically lower extremities ...

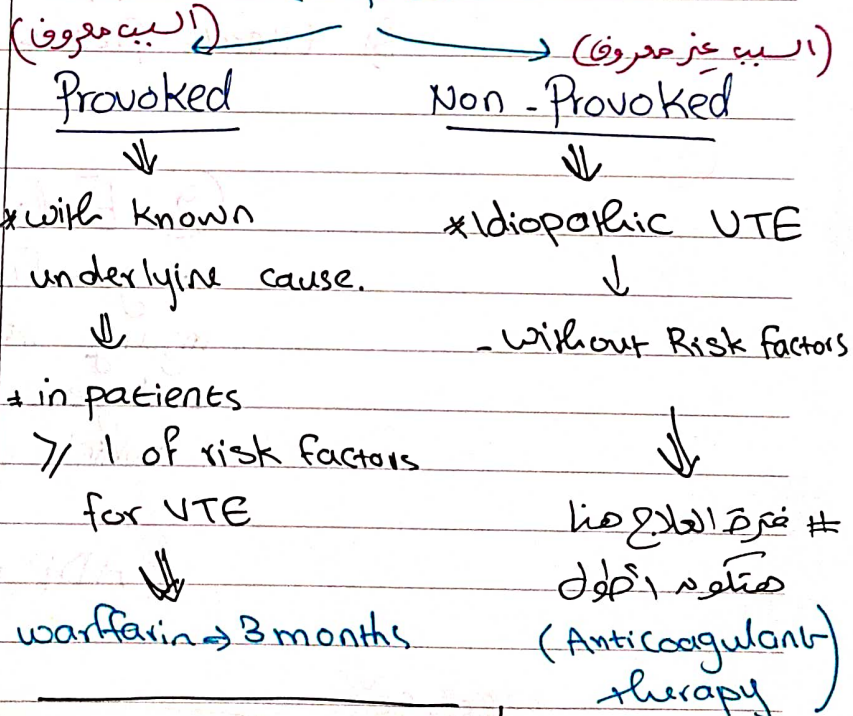
* PE: obstruction of Pulmonary artery or/and one of its branches, by thrombus that most commonly originates from Deep veins in legs / pelvis and embolizes to lungs via IVC.

↳ less commonly (cause of obstruction < fat air emboli).

DVT



VTE



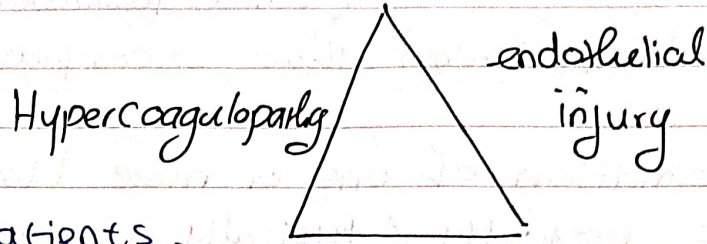
* Recurrent VTE:

Anticoagulant therapy may be needed for (long life.)

⇒ recur of VTE in patients after the completion of 1st 2 weeks of Antithrombotic drugs.

warfarin = 6 mon

Risk Factors = Virchow triad.



① Stasis :-

= bed ridden patients.

- = Recent surgery (حقوقاً) Stasis
- = Sedentary life-style.
- = Traveling.
- = Pregnancy.

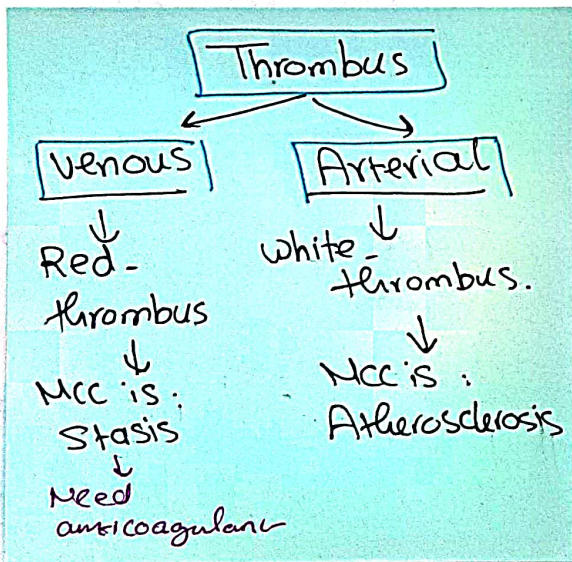
ثقل ما
يحدث مرض
عقبات
المجان
بما ذكره
Thrombi

- is hypercoagulopathy state.

- Majority occur in last trimester.

→ Pathophysiology:

- 1) ↓ Protein S
- 2) Increase (↑) in Factor VII, VIII, X, Fibrinogen.
- 3) Uterus presses on IVC causing stasis in legs.

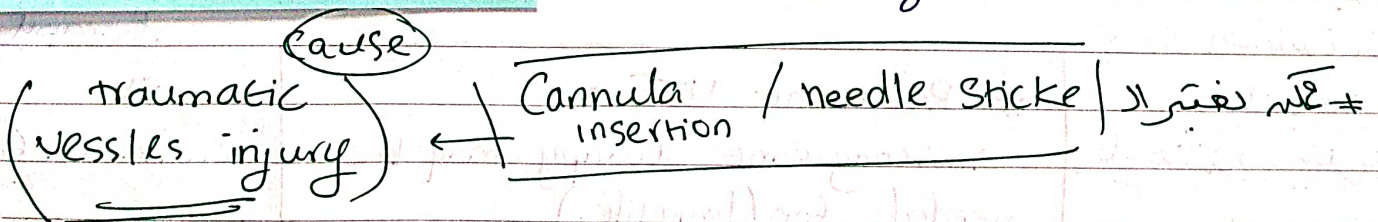


② Endothelial injury :-

Any inflammatory or traumatic vessels injury that causing subendothelial collagen exposure → which will activate clotting factors.

(ADP will bind Platelets to exposed collagen.)

Arterial
venous



↳ Trauma / Intervascular intervention.

⑧ Hypercoagulopathy state ((thrombophilia)))

(Acquired)

(A) = Rheumatology:

- 1) Lupus (venous)
- 2) Behçet disease.

(thrombosis in unusual sites) ✓

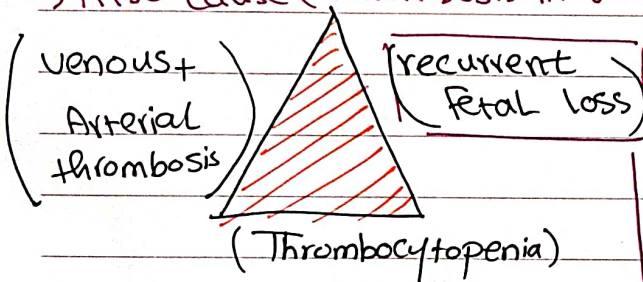
3) Anti-Phospholipid Synd.

↳ Autoimmune disease

↑ risk of thrombosis due to

Presence of Procoagulatory Ab and characterized by:

↳ Also cause (thrombosis in unusual sites) ✓



SS (recurrent miscarriage) من عجز و

Multiple repeated pregnancy loss

and vary criteria:

1) > 2 failed clinical pregnancies as determined by (US, histological) ex.

2) 3 Consecutive Pregnancy losses.

4) Systemic sclerosis (scleroderma).

(Inherited)

① Factor V Leiden (MCC)

(MC mutation)

= Protein C resistance (مقاومة بروتين C)

((Mutation in factor V

بروتين C مقاوم)

في جين (مقاومة على))

VIIIa V a
Factor

② Protein C deficiency.

③ Anti-thrombin 3 deficiency.

④ Factor B deficiency.

⑤ Hyperhomocysteinemia.

⑥ Prothrombin mutation (2nd MCC)

عائلة ال Prothrombin ، جين ال II
Factor thrombin (II) ← جين ال II

Fibrinogen → Fibrin

↳ Mutation في الجين

(Prothrombin expression)

بروتين Fibrin يزيد

↳ ↑ thrombotic events.

⑦ Methyl tetra Hydro-folate-reductase deficiency.

APS (Antiphospholipid Antibodies (aPL))

① LA (lupus anticoagulant)

② Anticardiolipin antibodies (IgG / IgM)

③ Anti-B2 glycoprotein antibodies (IgG / IgM)

Cont. ≠ Acquired thrombophilia:
B Haematological diseases.

① PCV (thrombosis in unusual sites)
= Cause venous + Arterial thrombosis
→ Causing Hypercoagulopathy state.

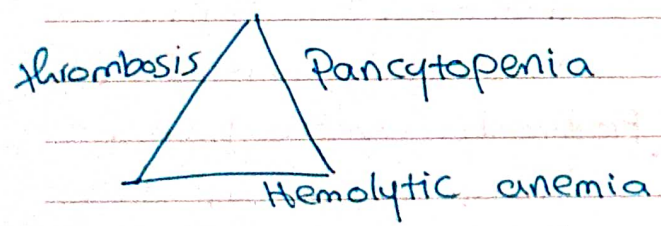
② Hyper viscosity Syndrome.

- 1) Myeloproliferative disease.
- ② essential thrombocytosis.
- 3) PCV
- 4) leukemias.

* Platelets is very high.
(normal - neutrophils)
- other cell lines Not affected (Normal WBCs, RBCs)
- Patient Completely well.

⑧ Sickle cell disease.

④ PNH (~~the~~ Paroxysmal nocturnal hemoglobinuria).



PNH: is acquired genetic defect
of haematopoietic stem cells characterized by:



Normally:

= (a membrane-bound glycosylphosphatidylinositol) anchor ⇒ (which protect RBCs against complement mediated hemolysis)

Mutation on GPI gene



→ RBCs destruction by complement + RES (Extra/intravascular)

Intra-vascular hemolysis.

cold infection
Sepsis
Night
Acidosis
(Respiratory acidosis)

c (GI)

↳ IBD → especially (UIC)

↳ (causing hypercoagulopathy state)

d (Renal disease)

↳ Nephrotic syndrome

↳ (Protein C/S & Antithrombin 3 loss)
- due to Proteinuria.

e (Malignancies)

Approx, All types of Malignancy Cause Hypercoagulopathy state. MC types are

↳ Pancreas
↳ Esophagus
↳ Lung.

May-Thurner Syndrome

↳ Compression of (Lt iliac vein) between the Rt iliac artery + lumbar vertebrae

↳ It may be considered as one of the causes of DVT.

f (Drugs)

oral
↳ Contraceptive Pills
↳ estrogen.

g (Pregnancy)

Why ??

Stasis

Compression on pelvic veins, causing stasis in lower limbs.
• DVT signification,

• Stressful event

↳ Heterozygous (carrying the gene of thrombophilia)
↳ causing Flaring

↑ Fibrinogen level

For Diagnosis

(History , Examination , investigations)
imaging

① History :-

⊛ Personal.

- Gender , Occupation , Pregnancy / Abortion.

⊛ C.C.:

Pain

Swelling

hotness

redness

cellulitis

• Site

• Onset

• Character

• Relieving

• Exacerbation

• Bilateral / uni

• Bi

uni

• Ability of movement.

1- Pregnancy

2- lupus (SLE)

3- Behçet

HPI + Past Medical.

((Ask about Virchow triads Components))

Family Hx.

• Hx. of similar complain in the family + (degree of relative)

• Hx of Pervious similar attack.

Drugs:

Ask about ~~sysp~~ symptoms of Malignancy or weight loss.
(Fever , weight loss , Anorexia , diaphoresis)

Examination :-

Local

vs.

General

1) Tenderness.

↳ Must do complete

2) Swelling. (cellulitis)

chest examination

3) redness or Pus discharge.

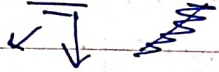
to determine if there is
PE or Not.

4) (حاجز)...

↳ (Homan's sign)

((calf pain on dorsal flexion
of the foot ...))

5) Bi / uni



5) thrombus on Bifurcation
of IVC.

6) vital sign

Investigations :-

① CBC

↳ Hgb → very High (>17.5 PCV)

↳ Platelets → thrombocytosis

thrombocytopenia.

↳ Also to see if there is Sepsis or Not (WBCs)

② Kidney Function test.

↳ For Nephrotic syndrome

↳ AKI → Prerenal (renal vein thrombosis)
cause

③ Liver Function test.

↳ Hepatic vein thrombosis (Budd chiari Syndrome)

④ PTT, INR

⑤ D-dimer

↳ sensitive but Not specific

(Mostly use for
exclusion.)

NO VTE

low

High

Cont. $\rightarrow$ (sensitive but not specific)

D-dimer ((Final degradation Product of Fibrinogen))
↳ is fibrin degradation Product that correlates with activity of coagulation + fibrinolysis.

↳ causes of ↑ d-dimer ??

- ① Pregnancy.
- ② Any thrombus in the body.
- ③ Sepsis / Any infection

why? Fibrinogen considered as acute phase reactant ($\uparrow$ in inflammation / infection)

Malignancies. Malignancy.

④ Malignancies.

Note: (-ve)

If D-dimer (Zero-Normal): I can rule out the presence of thrombosis.
For DVT or DVT.

For PE Wells score, (Wells criteria for DVT) or DVT.

↳ used to evaluate probability of DVT of lower extremities, in order to prevent unnecessary diagnostic testing in patients who unlikely to have DVT.

→ ((Its Not validated to evaluate upper extremity DVTs))

It classified the results of score

into

<u>Low Probability</u> ≈ 0 (risk $\leq 10\%$)	<u>Moderate</u> $\approx 1-2$ (risk $\approx 25\%$) 10 DNT	<u>High</u> $\approx \geq 3$ (risk $\sim \geq 50\%$) Dedimer > 500
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(Need ultrasound)

Wells score of DVT $\rightarrow$ 2
 .. (0, 2, 3) $\rightarrow$ 2
 Wells score of PE $\rightarrow$ 2

D. dinner

More specific investigations :-

as: فحص بدني (Physical exami.)

↳ Behcet } ①
 ↳ SLE } Seek genetic studies.

② Ask for ECG to exclude PE.

Imaging :

① Ultrasound $\left\{ \begin{array}{l} \text{doppler : Flow} \\ \text{doplex : Flow} \end{array} \right.$
 ② CT angiograph. (Gold standard)

③ Venogram $\rightarrow$ أشعة سينية في رجل المريض
 (Gold standard) $\rightarrow$ X-ray (مقابلة قلبية)
 (الآن هو الـ Gold standard)

④ Chest X-ray $\rightarrow$ to rule out PE.
 CT Symp $\rightarrow$ أشعة سينية في الصدر
 (CT angio)

DVT Complications: ① PE

② Post-phlebotic syndrome.

(is symptomatic
 chronic venous insufficiency after DVT.)

Chronic Thrombus $\rightarrow$ تصلب
 (dilatation in collateral veins)

dilatation of superficial veins

causing ((تورم - ب))

1) Varicose veins + Venous ulceration.

2) Atrophic changes.

(Shiny skin & loss of hair)

③ Stroke $\rightarrow$ in case of (VSD or ASD)
 ((congenital heart disease))
 IVC $\rightarrow$ Rt. atrium
 Lt. vent $\leftarrow$ Rt. ventricle
 Brain lung

((PE))

Symptoms :-

Mild

- 1) dry cough.
- 2) Pleuritic chest pain.

Moderate

- 1) Increase of Pain
- 2) dyspnea + Shortness of breath
- 3) hemoptysis

: انفجار (infarction in the area of the lung.)

Massive

- 1) Cardiovascular Compromise.
↓
Cardiogenic Shock.

Investigations :- Chest (Imaging)

① X-ray:

1 # MC Finding in PE is Normal X-ray.

2 # Hampton hump sign: (2/3/4 characteristics finding)
a wedge-shaped opacity in the peripheral lung with its base at the thoracic wall.

↳ Caused by Pulmonary infarction. (Not specific for PE)

3 # Westermark sign:

- an area of lung Parenchyma lucency ^{فوق} caused by oligemia ^{قلة الدم} secondary to occlusion of blood flow. Pulmonary artery.

4 # Fleischner sign: (Common to be seen in Massive PE)
a Prominent Pulmonary artery that caused by vessel distention due to Large Pulmonary embolus.

Non specific findings :-

- ① Atelectasia
- ② Lung collapse
- ③ Pulmonary edema
- ④ (Pleural effusion)
- ⑤ Cardiomegaly.

/ /

* Most Common Findings ??

ie 3Dinte ← Sinus tachycardia. (MC)
 1/5 1/2 1/2
 Tachycardia • T-wave inversions or Flattening.
 • Normal ECG.

• **Also:**
 AF $\xrightarrow{1}$ Rt. bundle branch block $\xrightarrow{2}$ $S_1 Q_3 V_3$: Common u⁺
 lead₁ : deep S.
 lead₃ : Abnormal Q wave.
 lead₃ : Twave inversion.

③ CT Pulmonary angiography :-

((Gold Standard)); Confirmatory imaging.

- wedge shape infarction + pleural effusion:

↳ pathognomonic for PE ..

④ Ventilation/perfusion scintigraphy: = (V/Q scan)

- Absence of Perfusion in Normally ventilated area of the lung (mismatch, which suggest PE)

⑤ ECHO : (هل نحتاج الى كود PE في ECO ؟؟ yes)

Findings :-

① / McConnell's sign:  او علامه بیتصرکوا علی ما یفهم...

- Akinasia of the mid-free Right-ventricular wall and HyperContractility of apical wall.

↳ Distinct regional RV dysfunction.

↳ Mid RV free wall - akinetic, bulging.

L₃. Normal RV apex - tethered to LV.

↳ LV apex - Hyperkinetic.

② Rt side ^{↑ Rt atrial Pressure} Hypertrophy ③ TriCuspid regurgitation.

(4) Venous ref^let
wth IVC dilation.

~~#~~ Treatment :-

① Anticoagulant

enoxaparin

5

→ Start with Heparine - or - LMWH.

(Procoagulation) → Warfarine. s.w, Pico #

→ May cause Skin Necrosis.

Vit. K antagonist

So, Heparine use for 2-3 days + Warfarine

Need 2-3 d to give the

Complete effect.

② ~~DOAC~~ DOAC

② Factor Xa inhibitor.

as: Dabigatran
edoxaban

or as: Fondaparinux.

③ Unfractionated Heparine. (UFH) (bolus + infusion.)

→ Renal Failure / inadequate
subcutaneous Absorption

③ On discharge.

→ Anticoagulant (warfarine)

Keep INR (2-3) ..

→ but if there is Hx of recurrent DVT / Provoked

Keep INR $\geq$ (2-3)

→ use for 6 month.

→ or for long life

* if there is hereditary thrombophilia

For example :-

④ Thrombolytic if there is Massive PE :-

→ Alteplase. (recombinant tissue plasminogen)
activator (tPA)

→ Streptokinase.

→ Urokinase.

⑤ IVC Filter (stent / umbrella)

indications: 1) Recurrent DVT

2) Proximal DVT + contraindications to

Anti-coagulants.
Alcator