

DVT - thrombus in a deep vein with inflammation Thrombus: clot formed in vessel

Embolus: thrombus that moves through blood stream **Thrombophlebitis:** inflammation associated with a clot

Occlusion can be partial or total

Risk For: VIRCHOW'S TRIAD any one of the three can cause DVT

Alteration of blood flow (venous stasis – slow flow)

blood flow is reduced, as in HF or shock; when veins are dilated, as with some medication therapies; and when skeletal muscle contraction is reduced: immobility, paralysis of extremities, or anesthesia; bed rest

Vascular injury

Damage to the intimal lining of blood vessels creates site for clot formation. Direct trauma: fractures, sx, dislocation; diseases of veins, and chemical irritation of the vein from IV medications or solutions.

Hypercoagulability *hemoconcentrated, ↑ platelets*

Withdrawal of anticoagulants, oral contraceptives, blood dyscrasias (abnormalities), pregnancy (↑ clotting factors)

S&S

- Could be asymptomatic
- Dull ache, tenderness
- Pain
- Cramping
- Erythema below site of DVT
- Warmth below site of DVT
- Edema below site of DVT

*normal platelet count
150,000 - 400,000*

Lab & Diagnostic

- D Dimer, if positive then *(measures fibrin breakdown - coagulation)*
- ESR, if positive then *(blood test)*
- Venous Duplex, if positive then
- Venogram, invasive, most definitive *(inject dye)*

Assessment

- Look for signs & symptoms
- Measure affected extremity daily

Interventions

- Initial bedrest
- Activity
- Leg exercises
- Antiembolism stockings
- Sequential Compression Devices ?
- IVF
- Medications Heparin, lovenox

drip 1.5 - 2.5 x baseline => Coumadin (to go home) => PT/INR levels good, taken off heparin

** Big PE -> blue from waist up.*

Complications

- PE
- CVA
- Reoccurring DVT
- Venous stasis ulcers *↓ circulation ↓ O₂*

Pulmonary embolism obstruction (total or partial) of pulmonary artery or branches by a thrombus
Originates in venous system (DVT) or right side of the heart (Afib) or arm esp pts with cath
other: air, fat, amniotic fluid, and septic (from bacterial invasion of the thrombus).
alveolar receives little or no blood flow, **gas exchange is impaired or absent in this area.**
In addition, clots release stuff that cz regional blood vessels and bronchioles to constrict.
Refrts: ↑ pulmonary vascular resistance, ventilation-perfusion imbalance.

Lower lobes most frequently affected cuz have higher blood flow

Small Emboli may go undetected, or vague transient symptoms.

Gradual reduction in the cap. bed and pulmonary HTN.

EKG may show right ventricular hypertrophy from pulmonary HTN.

Massive Emboli pt collapse, shock. Death in > 60% of pts

Risk Factors for Pulmonary Embolus

Venous Stasis (slow flow) Thrombophlebitis, immobilization, Varicose veins, Spinal cord injury

Hypercoagulability Injury/Sx, Tumor, Increased platelets

Venous Endothelial Disease Thrombophlebitis, Vascular disease, Foreign bodies (IV/central venous catheters)

Disease cuz have above three, DM, COPD, HF (esp afib)

Other Predisposing Conditions Advanced age, Obesity, Pregnancy (amniotic fluid), Oral contraceptive
History of previous thrombophlebitis, pulmonary embolism

S&S Hallmarks

Sudden onset of unexplained dyspnea

Tachypnea

Tachycardia

S&S Other

Cough: may be dry, clear or blood tinged

Chest pain: sudden and pleuritic

Crackles, Fever, Anxiety, Apprehension

Accentuation of the pulmonic heart sound

Change in mental status secondary to hypoxemia.

COMPLICATIONS

Pulmonary Infarction/Hypertension

- Pulmonary infarction: death of lung tissue occurs with medium or large sized pulmonary vessels are occluded, when there is insufficient collateral blood flow or there is preexisting lung disease is present.
- Pulm HTN occurs when more than 50% of the area of the normal pulmonary bed is compromised.
- A single PE will not result in pulmonary hypertension.
- Pulmonary hypertension occurs when there is dilation and hypertrophy of the right ventricle from multiple PEs!

Lab & DIAGNOSTIC

Gold Standard for dx for PE: Spiral CT (also called helical) newest and most accurate

Also Perfusion scanning: injection of a radioisotope. **Ventilation Scanning:** inhales radioactive gas (xenon). pt must be able to ventilate, may be omitted for intubated patients Pulmonary Arteriogram, w/ contrast, determines location and size of clot

Looking for source of emboli: venous doppler, duplex scanning which is both doppler and ultrasound, Platelets to dx dyscrasias, venogram (phlebogram) Invasive, definitive, shows clots and collateral circulation

Also Coagulation studies PTT PT INR cuz pt w/ need anticoag therapy Also EKG CBC ABG

THERAPY - conservative - mild PE

All patients - O2 based on ABGs, BR, Pain relief, EKG

Anti-coag.: Initially Heparin. Unless has dyscrasias, hx of hemorrhagic CVA, neurologic conditions or hepatic dysfunction
IV Bolus, then drip. Monitored for INR 1.5-2.5. LMWHeparin for bleeders (SQ only, in abd)

* Protamine Sulfate is Antidote

Then Coumadin-warfarin (blocks vit K dependent clotting factors) (not for preggers) for 9-12 months or forever

* Vit K is antidote

Therapy - aggressive- severe PE compromised

Thrombolytics, risk of SE/AE - severe bleeding (not for med-surg) meds: Urokinase, Streptkinase, Reteplase, TPA

Restores hemodynamic stability, BUSTS clots.

Not for CVA < 2mos, < 10days post op, recent child birth, trauma, or severe HTN (risk of hemorrhagic stroke - sm vessels in brain burst)

Last ditch effort - Pulmonary Embolectomy for arterial embolus > 50%, high mortality due to pt put on cardiopulmonary bypass

Prevention

Wal for pts who are bedridden, immobile, dehydrated, DM, genetic issues, Hx of DVT and So: early mobility, TEDS, SCDs, exercise, foot pump Prophylaxis meds: ASA, Heparin, LMWH, warfarin

Intocaval Filter device (green filters), in vena cava. Complications: air embolism, improper placement, migration to distal vein, trapped platelets or occlusion of vena cava (venous congestion)