DEEP VENOUS THROMBOSIS:

RISK FACTORS AND PATHOGENESIS

FM FLAME LECTURE: 93

BEMSKI 11.22.20

SWEDISH FAMILY MEDICINE RESIDENCY

LEARNING OBJECTIVES

- To understand the risk factors for developing DVTs
- To describe the pathogenesis of clotting
- Prerequisites:
  - NONE
- See also – for closely related topics
  - FLAME LECTURE 94: DVT: Presentation and Diagnosis
  - FLAME LECTURE 95: DVT: Treatment and Management
  - FLAME LECTURE 96: DVT: Complications - Pulmonary Embolism

DVT RISK FACTORS

- Virchow's Triad
  - There are three components in endothelial functioning that can lead to the development of clotting
    - Stasis (ex. alterations in blood flow)
    - Vascular endothelial injury
    - Inherited or acquired hypercoagulable state

RISK FACTORS CONTINUED

- More recent research has expanded risk factors to include the list below. Three or more of the following have been found to be present in 56% of patients at time of VTE (Spencer et al, 2006)
  - >48 hours of immobility in the preceding month
  - Hospital admission
  - Surgery
  - Malignancy
  - Infection in the past three months
  - Current hospitalization

CIRCULATORY STASIS

- Conditions that cause stasis include:
  - Atrial fibrillation
  - Left ventricular dysfunction
  - Immobility or paralysis
  - Venous insufficiency
  - Venous obstruction from tumor, pregnancy, or obesity

VASCULAR ENDOTHELIAL INJURY

- Trauma or surgery
- Venipuncture
- Heart valve disease or replacement
- Atherosclerosis
- Indwelling catheters

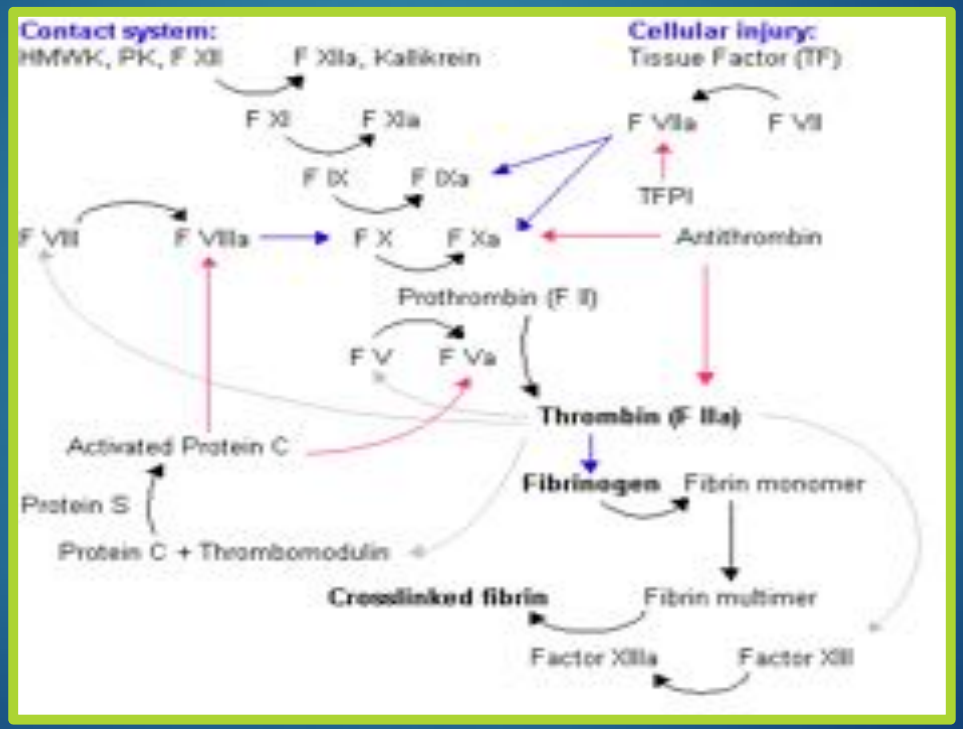
ACUIRED HYPERCOAGULABLE STATES

- Malignancy
- Pregnancy and peri-partum period
- Hormone replacement therapy
- Trauma or surgery
- Nephrotic syndrome
- Sepsis
- Smoking
- Inflammatory bowel disease

INHERITED THROMBOPHILIA

- The most common inherited hypercoagulable states are listed below
  - Factor V Leiden mutation
  - Prothrombin gene mutation
  - Protein S deficiency
  - Protein C deficiency
  - Antithrombin deficiency
- 50-60% of inherited hypercoagulable states are due to either factor V Leiden mutation and the prothrombin gene mutation

PATHOGENESIS OF CLOT FORMATION



COAGULATION CASCADE

- Intrinsic Pathway
  - Contact with negatively charged surfaces from damage to the endothelial cells leads to activation of factor XII
- Extrinsic Pathway
  - External vessel wall damage leads to expression of tissue factor (TF) which is not normally exposed. Activation of TF then activates factor X which then causes downstream activation of the rest of the extrinsic pathway.
- Both pathways converge with the activation of factor X which ultimately converts prothrombin to thrombin. Thrombin then converts fibrinogen to a fibrin clot.

IMPORTANT LINKS / REFERENCES

1. Spencer et al, The Worcester Venous Thromboembolism study. J Gen Intern Med. 2006
2. Mateo et al. Laboratory evaluation and clinical characteristics of 2,132 consecutive unselected patients with VTE. Thromb Haemost. 1997
3. Mann et al, Models of blood coagulation. Blood Cells Mol Dis 2006.