Anticoagulation Therapy – 2022

Anticoagulation Therapy

- Prophylaxis
  - Prevent formation of a thrombus
- Treatment of existing clot
  - Prevent enlargement
  - Prevent new clots from forming
  - Does NOT dissolve an existing clot

Normal Clotting Mechanisms: Hemostasis

- The arrest of bleeding
  - Vascular response
  - Platelet plug formation
  - Development of the fibrin clot on the platelet plug by plasma clotting factors
  - Clot retraction and dissolution

Vascular response

- Immediate local vasoconstrictive response of injured blood vessels
- Reduces leakage of blood from the injured vessel by reducing vessel size
- Vasoconstriction gives time for platelet response and plasma clotting factors to be triggered.

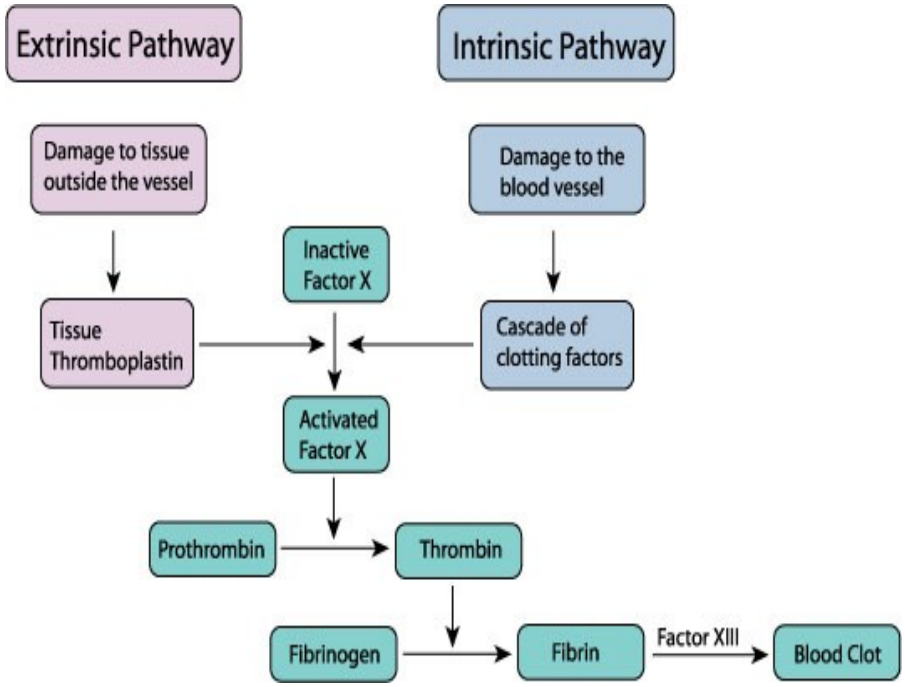
Platelet plug formation

- Activated by exposure to interstitial collagen from the injured blood vessel
- Platelet stickiness is called adhesiveness.
- Formation of clumps termed “aggregation” or “agglutination”
- Platelets facilitate the reactions of the plasma clotting factors

Plasma clotting factors

- Labeled with both names and Roman numerals (Table 29-2)
- Always present in circulation in inactive forms until stimulated to initiate clotting through one of two pathways
- Form a visible fibrin clot on the platelet plug
- Two pathways of clotting
  - Intrinsic pathway is activated by collagen exposure.
    - Damage to a blood vessel
  - Extrinsic pathway is initiated when tissue factor or tissue thromboplastin is released from injured tissue.
    - Tissue injury, burn, etc.
  - Thrombin is the most powerful enzyme in the coagulation process because it converts fibrinogen to fibrin, an essential component of a blood clot.

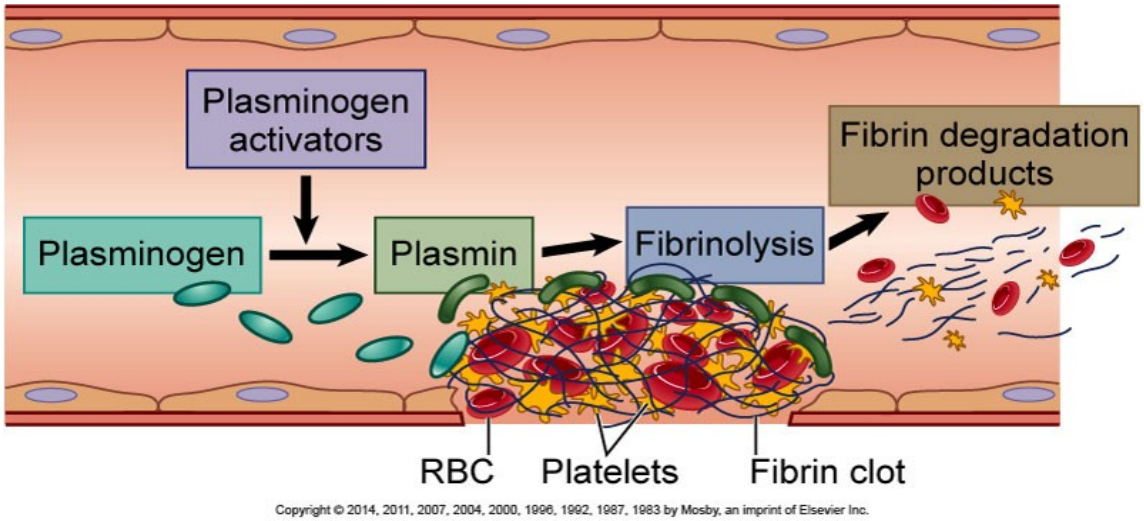
Coagulation Cascade



Clot Retraction and dissolution

- Anticoagulation, the reverse of clotting, helps keep blood fluid.
- Anticoagulation occurs by two means.
    - Antithrombins: Interfere with thrombin
        - Endogenous heparin, Protein C, Protein S
    - Fibrinolysis: Process that results in dissolution of the fibrin clot

Fibrinolytic System



Drug Therapy

- Anticoagulants (Table 37-10) pg. 817
  - Thrombin Inhibitors (direct and indirect)
  - Factor Xa Inhibitors
  - Vitamin K Antagonists (VKA's)
- Thrombolytics ("Clot busters")

Anticoagulants: Indirect Thrombin Inhibitors

<u>Heparin Sodium (Unfractionated Heparin)</u>

- Potentiates action of antithrombin III
- Blocks conversion of prothrombin to thrombin and fibrinogen to fibrin
- Prevents further extension of existing clots and new clots from forming
- Does NOT break down existing clots

Who should receive Heparin?

- For prophylaxis and tx of thromboembolic disorders-DVT, PE
- Thromboembolic complications associated with afib
- Dialysis
- Patency of IV devices
- Prevents clotting in arterial and cardiac surgeries
- STEMI and NSTEMI
- Unstable Angina

Heparin Sodium: Sub-q Route

- VTE Prophylaxis
  - 5000 units q8-12h
- Antidote: Protamine Sulfate
- Administration:
  - Rotate injection sites
  - Change needle before injection
  - No injections within 2 inches of umbilicus
  - Do not massage
  - Monitor <u>*platelets*</u>
  - Cross-check dose with a co-worker (if facility requires)
    - Not required at Beebe Healthcare, but still a good idea (high alert med)

Heparin Sodium: Continuous IV (Per protocol)

- MD to order
- Patient's current weight in kg needed
- IV drip concentration
  - Usually 25,000 units Heparin in 250ml D5W or NS (100 units/ml)
- Baseline lab work required prior to starting infusion!

- PTT (aPTT), CBC, PT/INR
- Always use IV Pump!
- Antidote: Protamine Sulfate
- Therapeutic Range
  - Anti Xa (0.3-0.7 IU/ml)
  - Measured 6h after Heparin drip started and q6h until in therapeutic range for two draws
  - Dose adjusted if pt.'s range out of normal
  - PTT monitored per MD preference (but protocol currently based off of Anti Xa)
- CBC and platelets every 3 days

Complication of Heparin Therapy: Heparin Induced Thrombocytopenia (HIT)
- Severe immune drug reaction
- Decreasing platelet count
- Increasing thrombosis
- HIT: Diagnosis
  - Decreased platelet count
  - Anti-Xa decreases despite continuing increased doses of Heparin
  - Antibody can be detected in blood
- Treatment
  - **Stop Heparin ASAP** -- Tell patient it is ALLERGY!
  - Treat complications from clots

Anticoagulants: Indirect Thrombin Inhibitors

Enoxaparin (Lovenox): Low-Molecular Weight Heparin (LMWH)
- Impairs normal hemostasis and inhibition of factor Xa
- Produces anticoagulation
- *Prophylactic dose*: 30 – 40 mg sub-q daily or q 12 hours (fixed dose)
  - Bariatric patients could be ordered up to 60 mg q12 hours
- *Treatment dose*: 1 – 1.5 mg/kg sub-q daily or q 12 hours (weight based)
- Alternate injection sites b/t left & right anterolateral and left & right posterolateral abdominal wall ("love handles")
- *Don't expel air bubble in syringe!

Benefits of enoxaparin (Lovenox) vs. Heparin
- More predictable response and longer half-life
- Fewer bleeding complications
- CBC & plats before initiating
  - No need for daily lab work
- Pt. (or family) can self-administer
- Antidote: Protamine Sulfate

Who should receive Lovenox?
- Prevention of DVT post-op (hip or knee surgery; abdominal or bariatric surgery)
- Prevention of long-term DVT in nonsurgical acute illness
- Tx of ACS: unstable angina, non Q-wave MI, STEMI
- Acute DVT with or w/out PE
- Management of VTE during pregnancy

Anticoagulants: Direct Thrombin Inhibitors

- Binds with thrombin, prevents its function
- Produces anticoagulation; Prevents development of thrombus
- Good for patients with Heparin allergy
  - bivalirudin (Angiomax)
    - Given continuous IV via protocol
    - Monitor PTT
  - dabigatran (Pradaxa)
    - PO
    - Check PT, PTT initially but recurrent monitoring not needed
    - Antidote: Idarucizumab (Praxbind)

Anticoagulants: Factor Xa Inhibitors

- Inhibits factor Xa, stopping coagulation cascade
- Check CBC, renal function tests initially (no routine coagulation studies needed)
  - fondaparinux (Arixtra) – Sub-q
  - rivaroxaban (Xarelto) – PO
  - apixaban (Eliquis) – PO
- Antidote: andexanet alfa (Andexxa) (very expensive!)

Anticoagulants: Vitamin K Antagonists

warfarin (Coumadin)

- Interferes with hepatic synthesis of Vit K-dependent coagulation factors
  - Depletes II, VII, IX, X
- Prevents further extension of clot, new clot formation, and secondary thromboembolic complications
- Long-term use
- Takes 48-72 hours to be effective
- May be started while client still on heparin or enoxaparin (Lovenox)
  - When INR is therapeutic, other med is discontinued
- Antidote: Vitamin K

Monitoring warfarin (Coumadin)

- *Monitor INR*
- INR therapeutic values (pg. 754, Table 33 in diagnostics book):
  - 1.5-2.0 DVT prophylaxis
  - 2.0-3.0 DVT/orthopedic surgery/afib
  - 2.5-3.5 PE
  - 3.0-4.0 prosthetic heart valve prophylaxis
- Monitored daily, weekly, monthly
- Dosage may change daily dependent upon labs

Administering Warfarin (Coumadin)

- Given PO
- Take at the same time daily
- Avoid antiplatelet drugs and/or NSAIDs
- Many interactions with food/drugs/herbals (pg. 818)

- Diet – keep intake of Vitamin K rich foods consistent

Nursing Considerations: All Anticoagulants

- Notify provider of any abnormal lab values or assessments
  - Unusual bleeding or bruising
  - Think head to toe
- Minimize injections (especially IM)
- Prevent injury !

Patient Teaching: Anticoagulants

- Purpose and action of med
- Interactions
- When to call primary healthcare provider
  - Bleeding
- Lab work needed
- Diet
- Safety
- Medic Alert Bracelet