Chapter 27
Drugs for Coagulation Disorders

Hemostasis

- Complex process involving multiple steps
- Involves large number of enzymes and clotting factors
- Final product is a fibrin clot that stops blood loss

Clotting Process

- Blood-vessel injury causes vessel spasm (constriction)
- Platelets are attracted to and adhere to injured area
- Aggregation of platelets forms plug
  - Formation of insoluble fibrin strand and coagulation (coagulation cascade)
  - Normal clotting occurs in six minutes

Coagulation Cascade

- Intrinsic or extrinsic pathways lead to formation of fibrin clot.
  - Injured cells release prothrombin activator.
  - Prothrombin activator changes prothrombin to thrombin.
  - Thrombin changes fibrinogen to fibrin.
  - Fibrin forms insoluble web over injured area to stop blood flow.
Fibrinolysis

- Clot removal
- Initiated by release of tissue plasminogen activator (tPA)
  - TPA converts plasminogen to plasmin
  - Plasmin digests fibrin strands – thus, circulation is restored
  - Regulated so unwanted clots are removed and fibrin is left in wounds

Diseases of Hemostasis

- Thromboembolic disorders
  - Caused by thrombi, emboli
- Thrombocytopenia
- Bleeding Disorders
  - Hemophilia
  - Von Willebrand’s disease

Action of Coagulation Modifiers

- Inhibiting specific clotting factors
- Dissolving fibrin
- Inhibiting platelet function

Anticoagulants

- Prevent formation of clots
  - Inhibit specific clotting factors in coagulation cascade
  - Diminish clotting action of platelets
  - Both ways increase time it takes to form clots
Thrombolytics

- Dissolve life-threatening clots

Hemostatics

- Promote formation of clots
  - Inhibit removal of fibrin

Lab Tests That Measure Coagulation

- Used for diagnosing and treating coagulation disorders
  - Whole-blood clotting time
  - Prothrombin time (PT)
  - International normalized ratio (INR)
  - Thrombin time

Lab Tests That Measure Coagulation (continued)

- Activated partial thromboplastin time (aPTT)
- Liver-function tests
- Bleeding time
- Platelet count

Role of Nurse

- Monitoring of client's condition
- Providing client education
- Obtaining medical, surgical, drug history
- Ascertaining lifestyle and dietary habits
- Obtaining description of symptomology and current therapies

Anticoagulants

- Most serious side effect to assess is bleeding
- To assess internal bleeding
  - Monitor CBC, lumbar pain, abdominal bulging, guaiac tests on stool
- Essential for patient safety to monitor coagulation studies
Anticoagulants (continued)

- Bleeding risk increases during transition from heparin to warfarin
  - Do not give warfarin to pregnant clients
  - Heparin, low-molecular-weight heparin can be given to pregnant clients
  - Monitor intake of vitamin K–rich foods; limit intake of garlic

Anticoagulants

- Prototype drugs: heparin (parenteral) and warfarin (oral)
- Mechanism of action: to inhibit specific clotting factors to prevent formation or enlargement of clots
- Primary use: to prevent thrombi from forming or enlarging, prevent formation of clots in veins, treat thromboembolic disorders
- Adverse effects: abnormal bleeding

Antiplatelet Agents

- Monitor for bleeding
  - Risk increases if given with anticoagulants
  - Prolonged pressure needed to control bleeding at puncture sites
  - Monitor for gastrointestinal upset with aspirin and Ticlid
  - May increase menstrual bleeding

Thrombolytics

- Assess for exclusions to therapy
- Monitor baseline coagulation studies
- Monitor level of consciousness, for symptoms of cerebral hemorrhage
- Observe for reperfusion arrhythmias
- Teach client about increased risk of bleeding

Hemostatics

- Monitor for clotting
- Administer intravenously; monitor site closely
- Assess for myopathy and myoglobinuria (reddish brown urine)
- Teach client to report symptoms of clotting or bleeding
- Do not take aspirin

Heparin Animation

Click here to view an animation on the topic of heparin.
Antiplatelet Drugs

- Aspirin, ADP receptor blockers
- Glycoprotein Ib/IIa receptor antagonists
- Agents for intermittent claudication

Antiplatelet Drugs (continued)

- **Prototype drug:** (ADP receptor blocker) clopidogrel (Plavix)
- **Mechanism of action:** to alter the plasma membrane of platelets so they cannot aggregate
- **Primary use:** to prevent thrombi formation after a stroke or myocardial infarction (MI)
- **Adverse effects:** abnormal bleeding

Thrombolytics

- **Prototype drug:** alteplase (Activase)
- **Mechanism of action:** to convert plasminogen to plasmin, which digests fibrin and dissolves clot
- **Primary uses:**
  - To dissolve existing clots
  - To treat acute myocardial infarction, deep vein thrombosis
  - To treat cerebrovascular accident, pulmonary embolism, arterial thrombosis
  - To clear IV catheters

Thrombolytics (continued)

- **Adverse effects:** abnormal bleeding; contraindicated in patients with bleeding disorder or who have had recent trauma or surgery

Hemostatics

- **Prototype drug:** aminocaproic acid (Amicar)
- **Mechanism of action:** to prevent fibrin from dissolving
- **Primary use:** To promote formation of clots by preventing and treating excessive bleeding from surgical sites
- **Adverse effects:** May cause hypercoagulation with concurrent use of estrogens and oral contraceptives

Anticoagulants

- Prevent thrombi from forming or enlarging
- **Prototype drugs:** heparin (parenteral) and warfarin (oral)
- **Mechanism of action:** To inhibit specific clotting factors to prevent formation or enlargement of clots
- **Primary use:** To prevent formation of clots in veins, to treat thromboembolic disorders
Antiplatelet Drugs

- Aspirin, ADP receptor blockers
- Glycoprotein IIb/IIIa receptor antagonists
- Agents for intermittent claudication

Antiplatelet Drugs (continued)

- Prolong bleeding time by interfering with aggregation of platelets
  - **Mechanism of action:** To alter the plasma membrane of platelets so they cannot aggregate
  - **Primary use:** To prevent thrombi formation after stroke or myocardial infarction

Thrombolytics

- Used to dissolve existing clots (myocardial infarction, cerebrovascular accident)
  - **Mechanism of action:** To convert plasminogen to plasmin, which digests fibrin and dissolves clot
  - **Primary use:**
    - To treat acute myocardial infarction, deep vein thrombosis
    - To treat cerebrovascular accident, pulmonary embolism, arterial thrombosis
    - To clear IV catheters

Hemostatics

- Used to promote the formation of clots
  - **Mechanism of action:** To prevent fibrin from dissolving
  - **Primary use:** To prevent and treat excessive bleeding from surgical sites

Anticoagulation Drug Therapy

- Assessment
  - Obtain complete health history
    - Surgeries; drug therapy, including herbal
    - Note intake of vitamin K-rich foods and garlic
  - Assess coagulation studies initially and through therapy
Anticoagulation Drug Therapy (continued)

- Nursing diagnoses
  - Risk for injury (bleeding)
  - Activity intolerance (contact sports)
  - Ineffective tissue perfusion
  - Impaired tissue integrity
  - Risk for infection
  - Deficient knowledge, related to drug therapy

Anticoagulation Drug Therapy (continued)

- Planning
  - Client goals and expected outcomes
    - Client has reduction in blood coagulation.
    - Client verbalizes understanding of anticoagulant therapy.

Anticoagulation Drug Therapy (continued)

- Implementation
  - Monitor for adverse clotting reactions and skin necrosis
  - Cautious use in specific populations
  - Monitor for bleeding

- Evaluation
  - Client will experience reduction in coagulation
  - Client will verbalize understanding of anticoagulant therapy

Thrombolytic Drug Therapy

- Assessment
  - Obtain complete health history (note possible exclusions to drug therapy)
  - Obtain vital signs
  - Assess lab values
Thrombolytic Drug Therapy

(continued)

• Nursing diagnoses
  – Risk for injury (bleeding)
  – Ineffective tissue perfusion
  – Deficient knowledge, related to drug therapy

Thrombolytic Drug Therapy

(continued)

• Planning
  – Client goals
    • Experience dissolving of preexisting blood clot(s)
    • Demonstrate understanding of drug’s action

Thrombolytic Drug Therapy

(continued)

• Implementation
  – Start IV lines, arterial line, or Foley catheter prior to beginning therapy
  – Monitor vital signs frequently
  – Prevent injury, assess neurovascular and cardiovascular status frequently
  – Monitor lab values

Thrombolytic Drug Therapy

(continued)

• Evaluation
  – Client’s lab values reflect that preexisting blood clots have dissolved
  – Client accurately describes drug side effects and precautions

Anticoagulants

Table 27.2 Anticoagulants

Antiplatelet Agents

Table 27.3 Antiplatelet Agents
### Thrombolytics

**Table 27.4 Thrombolytics**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Indication</th>
<th>Dose Form</th>
<th>Duration</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>rt-PA</td>
<td>Acute myocardial infarction</td>
<td>I.V. bolus then infusion</td>
<td>24-48 hours</td>
<td>Bleeding, allergic reactions</td>
</tr>
<tr>
<td>Streptokinase</td>
<td>Acute myocardial infarction</td>
<td>I.V. injection</td>
<td>24 hours</td>
<td>Bleeding, allergic reactions</td>
</tr>
</tbody>
</table>

### Hemostatics

**Table 27.5 Hemostatics**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Indication</th>
<th>Dose Form</th>
<th>Duration</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warfarin</td>
<td>Venous thrombosis</td>
<td>Oral suspension</td>
<td>24 hours</td>
<td>Hemorrhage, bleeding</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Platelet aggregation inhibition</td>
<td>Oral tablet</td>
<td>24 hours</td>
<td>Gastrointestinal bleeding</td>
</tr>
</tbody>
</table>

*Please note: The above tables are simplified representations and do not include all data available in the original source.*