DRUGS AFFECTING BLOOD COAGULATION

Anticoagulant drugs

Specific Objectives

At the end of the class the students will be able to

- Define anticoagulant drugs
- Explain the physiology of blood coagulation
- Enlist the types of anticoagulants
- List out the indications for administration of anticoagulants.

Anticoagulant drugs

Introduction

The ability of blood to clot is important to control bleeding after an injury. But equally important is the ability to keep blood flowing when a clot is not needed, since clots within blood vessels can prevent oxygen from reaching vital organs & can cause death. Naturally God has created a clotting & anticoagulant system in our circulatory system that is why we may remain alive even there is bleeding from our body. But man is also so great he is also discovered some agents for clotting & anticoagulant of the blood to use in blood crisis let us see what is this----

Definitions

- **Anticoagulant:** An anticoagulant is a substance that prevents coagulation; that is, it **stops** blood from **clotting.**

- **Anticoagulant drugs**

  According to the American Heart Association ------anticoagulant drugs "inhibit the ability of blood to clot, or coagulate. They don't dissolve existing blood clots. They prevent new clots from forming or existing clots from getting larger."

Ct.. Definitions

- **COAGULATION---** Coagulation is a complex process by which blood **forms clots**.

- **COAGULANT---** An **agent that** produces coagulation (Coagulation is a complex process by which blood **forms clots**).

Formation Blood Clotting

Phases Blood Clotting

1. Vascular Phase
2. Platelet Phase
3. Coagulation Phase
4. Fibrinolytic Phase

1. Vascular Phase

The initial phase of the process is vascular constriction. This limits the flow of blood to the area of injury.

Ct- Formation Blood Clotting

2. Platelet Phase

- The injured blood vessel activates the platelets so they stick to the vessel wall. A substance produced by the vessel wall known as von Willebrand factor helps the platelets stick to the vessel wall. Two of the soluble proteins, collagen and thrombin, help the platelets stick to each other. The platelets change their shape and form a mesh-like plug that traps more platelets and clotting factors, slowing blood loss. Activated platelets also release components which activate additional platelets.

Ct- Formation Blood Clotting

3. Coagulation Phase

- To insure stability of the initially loose platelet plug, a fibrin mesh (also called the clot) forms and entraps the plug. If the plug contains only platelets it is termed a white thrombus; if red blood cells are present it is called a red thrombus.

Ct- Formation Blood Clotting

4. Fibrinolytic Phase

- Finally, the clot must be dissolved in order for normal blood flow to resume following tissue repair. The dissolution of the clot occurs through the action of plasmin.

- **This** process is carried out by the **fibronolytic system**, the most important aspect of which is the enzyme fibrinolysin.

Other Names for clotted Blood

- **Hemostasis** (literally, the process of stopping bleeding)
- **Embolus** (a type of clot that travels through the vein)
- **Thrombus** (a clot that stays where it is formed)

Types of Anticoagulants

A. Endogenous Inhibitors of Clotting

- Thrombin plays a pivotal role in blood coagulation and Nature has designed several serine protease inhibitors (SERPINS) to regulate the its activity.

- These include antithrombin (major), heparin cofactor II, α_2-macroglobulin, and α_1-proteinase inhibitor.

- **Antithrombin** is present in the plasma in significant concentrations (~2-3 μM). Antithrombin primarily neutralizes factor Xa and thrombin, in addition to inhibiting most active serine proteases of the clotting system.

Ct-Types of Anticoagulants

ctA. Endogenous Inhibitors of Clotting

- **Protein C** is another plasma protein that limits clotting by being activated by thrombin to proteolytically inactivate proaccelerin (V) and antihemophilic factor (VIII).

- **Thrombomodulin**, a cell membrane bound glycoprotein lining the vascular endothelium, specifically binds thrombin so as to convert it to a form with decreased ability to catalyze clot formation but with a >1,000-fold increased capacity to activate protein C.

Ct-Types of Anticoagulants

Exogenous Inhibitors of Clotting

- **The control of clotting is a major medical concern**. Several inhibitors have been developed with different mechanisms of anticoagulant action.

- These include the **heparins**, the **coumarins**, and the **1,3-indanediones**.

Types of Anticoagulants (Exogenous)

- An anticoagulant is a substance that prevents coagulation; that is, it stops blood from clotting.

- **A group of pharmaceuticals called anticoagulants** can be used in vivo as a medication for thrombotic disorders. Some chemical compounds are used in medical equipment, such as test tubes, blood transfusion bags, and renal dialysis equipment.

- **Anticoagulants, blood thinners** – are pharmaceutical drugs that inhibit blood coagulation mainly by disabling one or more of the coagulation factors. Anti-coagulants are divided into three different main groups:

Groups of drugs:---

- They fall into three groups:---
- I . -Inhibitors of clotting factor synthesis. ---These anticoagulants inhibit the production of certain clotting factors in the liver. One example is warfarin (brand name: coumadin).
- II.Inhibitors of thrombin. -----Thrombin inhibitors interfere with blood clotting by blocking the activity of thrombin. They include heparin, lepirudin (Refludan).
- III.Antiplatelet drugs. ----Antiplatelet drugs interact with platelets, which is a type of blood cell, to block platelets from aggregating into harmful clots. They include: aspirin, ticlopidine (Ticlid), clopidogrel (Plavix), tirofiban (Aggrastat), and eptifibatide (Integrilin).

CLASSIFICATION of drugs:

Drugs are classified as:--

1. Anticoagulants.
2. Thrombolytic agents.
3. Antiplatelet agents.

ANTICOAGULANTS AGENTS:

1. Parenteral

Generic name	brand name
Heparin Sulphate.	**HEP-uh-rin**
Danaparoid.	Orgaran®
Lepirudin.	

2. Oral

Warfarin sodium.	Coumadin®
Dicumarol.	
Phenprocoumon.	
Acenocoumarol.	
Anisindione.	

THROMBOLYTIC AGENTS:

- Streptokinase.
- t-PA.
- Urokinase.
- Alteplase.

ANTIPLATELET AGENTS:

- Aspirin
- Dipyridamole
  Persantine®)
- Ticlopidine
  Ticlid®
- Clopidogrel
  Plavix®)

Indications for using ANTICOAGULANTS

- Anticoagulants are generally prescribed for patients who have a disease or condition that places them at risk for the formation of blood clots. Some of the more common indications for anticoagulation drug therapy include:

- Stroke
- Heart Attack
- Heart Valve Disease
- Coronary Artery Disease
- Heart Failure
- Arrhythmia
- Atrial Fibrillation
- Deep Vein Thrombosis
- Pulmonary Embolism
- Active Cancer
- Preventive Therapy after Major Surgery
- Preventive Therapy for Bedridden Patients .