

Inflammatory Cardiovascular Disorders

Presented by:
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Rheumatic Fever

Pathophysiology

- Autoimmune reaction
 - To antigens of group A beta-hemolytic streptococci
- Usually in children (commonly - 5 to 15yrs)
- Complication of strep infection; strep throat
- Onset 2-3 weeks after infection
- Inflammatory response targeting joints and heart

Rheumatic Fever

Signs and Symptoms

- Polyarthrititis
- Subcutaneous nodules
- Chorea
- Carditis
- Fever
- Arthralgia
- Pneumonitis

Rheumatic Fever

Diagnostic Tests

- Throat culture
- No specific test for RF
- Antistreptolysin O titer > 250
- ESR
- WBC

Rheumatic Fever

Medical Treatment

- Aim is controlling the symptoms, no cure
- Anti-inflammatory medications
 - Aspirin or corticosteroids
 - Control fever, joint inflammation and pain
- Limit activity

Rheumatic Fever

Complications

- Rheumatic Carditis
 - Pancarditis
 - All layers of heart affected
 - Pericarditis
 - Layers are covered with exudate and become thickened
 - Myocarditis
 - Nodules in myocardial tissue
 - Scarring occurs
 - Tiny pin head sized vegetations from blood and fibrin form on valve leaflets

Rheumatic Carditis

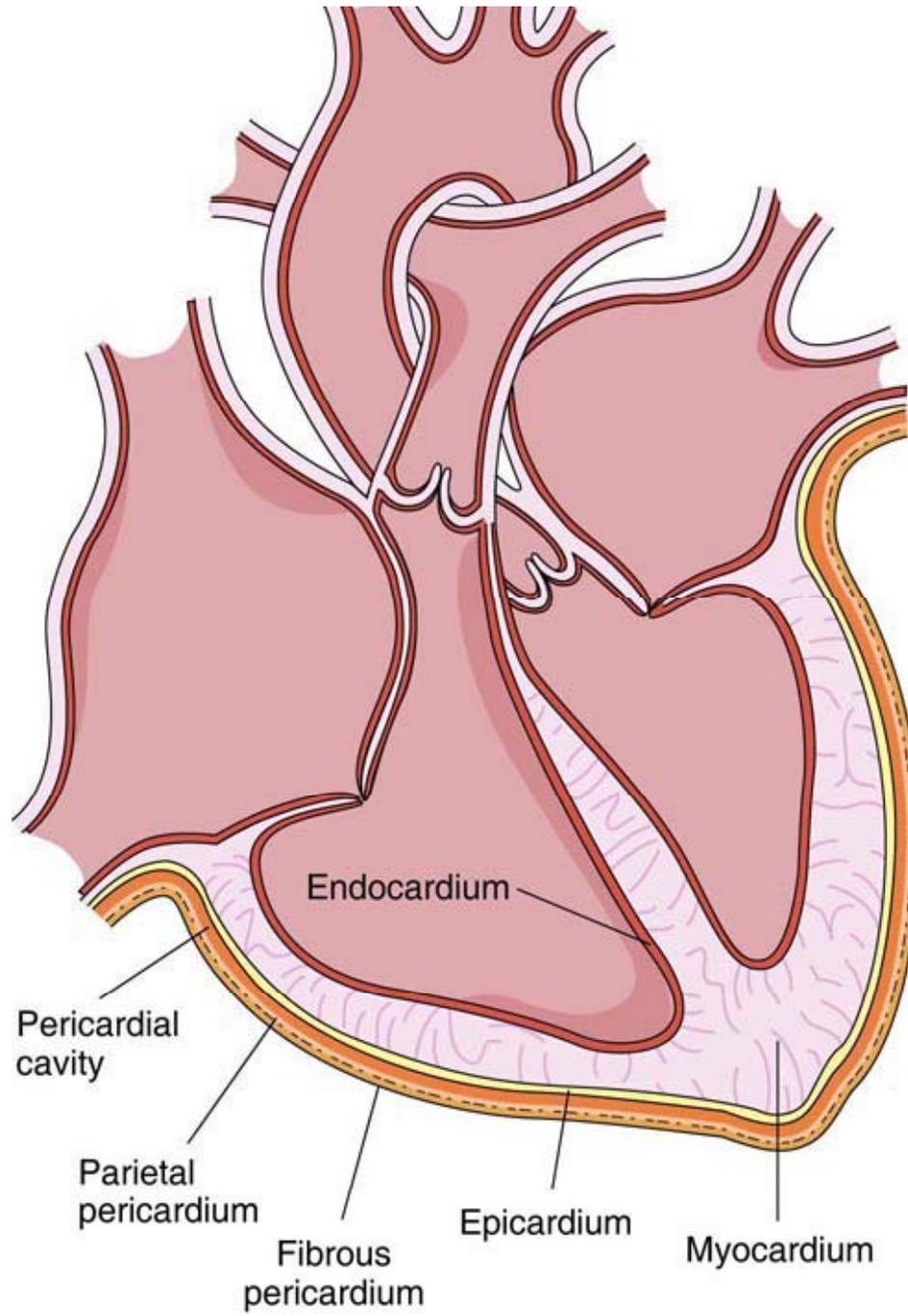
Pathophysiology

- Endocardium
 - Most serious part of the heart affected
 - Vegetation on valve leaflets from blood and fibrin
 - Leads to thickening, fibrosis, and calcification of valve leaflets
 - Valves don't close completely
 - Regurgitation
 - Valves do not fully open
 - Valvular stenosis, resulting in severe heart failure

Rheumatic Carditis

Signs and Symptoms

- Depends on area of heart involved
- New murmur
- Pericarditis signs & symptoms
 - Tachycardia
 - Heart murmur
 - Pericardial friction rub
 - Chest pain
 - Cardiomegaly
 - EKG changes
 - Heart failure



Rheumatic Carditis

Treatment

- PREVENTION IS KEY
 - Treat strep infections with PCN, or EES with allergy
- Activity limitations
 - Depend on severity of cardiac involvement
- Treat symptoms

Rheumatic Carditis

Nursing Management

- History
 - Recent illness
 - Sore throat, strep throat, scarlet fever
- Physical exam
 - Murmurs, pericardial friction rub
 - s/s heart failure
 - Vital signs

Rheumatic Carditis

Nursing Management

- Nursing care
 - Pain relief
 - Minimizing anxiety
 - Maintaining normal cardiac function
 - Patient teaching

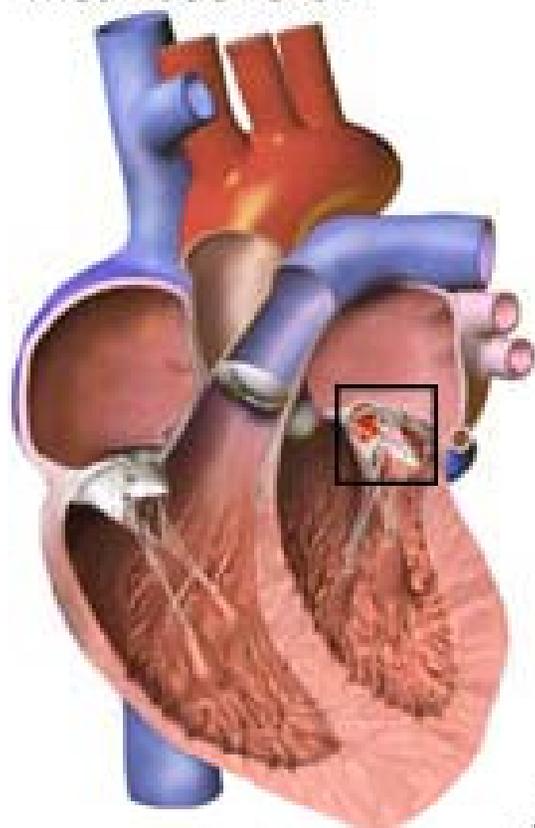
Ineffective Endocarditis

Pathophysiology

- Microorganisms infecting the endocardium
 - Attach to eroded endocardium where platelets and fibrin have formed a vegetative lesion
- Vegetation
 - Growths of the infecting organism
 - May break off and become emboli
- Portals of entry
 - Invasive catheters, IV drug use, dental and invasive procedures, infections of skin and GI tract
- Risk factors
 - IV drug use, compromised immune system, congenital/valvular heart disease, Gingival gum disease

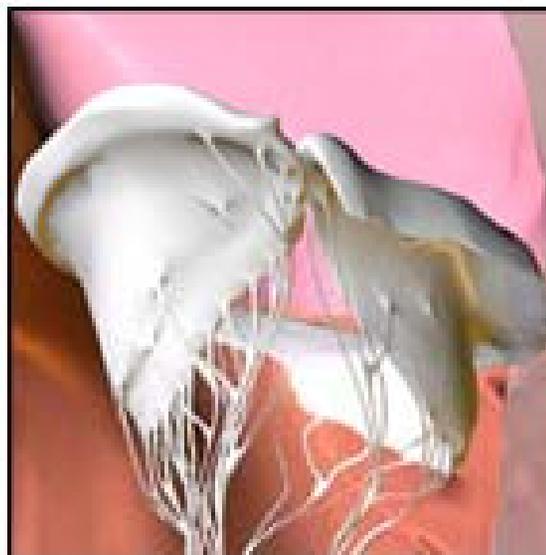
Endocarditis

An infection of the innermost layers of the heart. It may occur in people with congenital and valvular diseases, and those who have had rheumatic fever.



Vegetations

Healthy valve



Infected valve

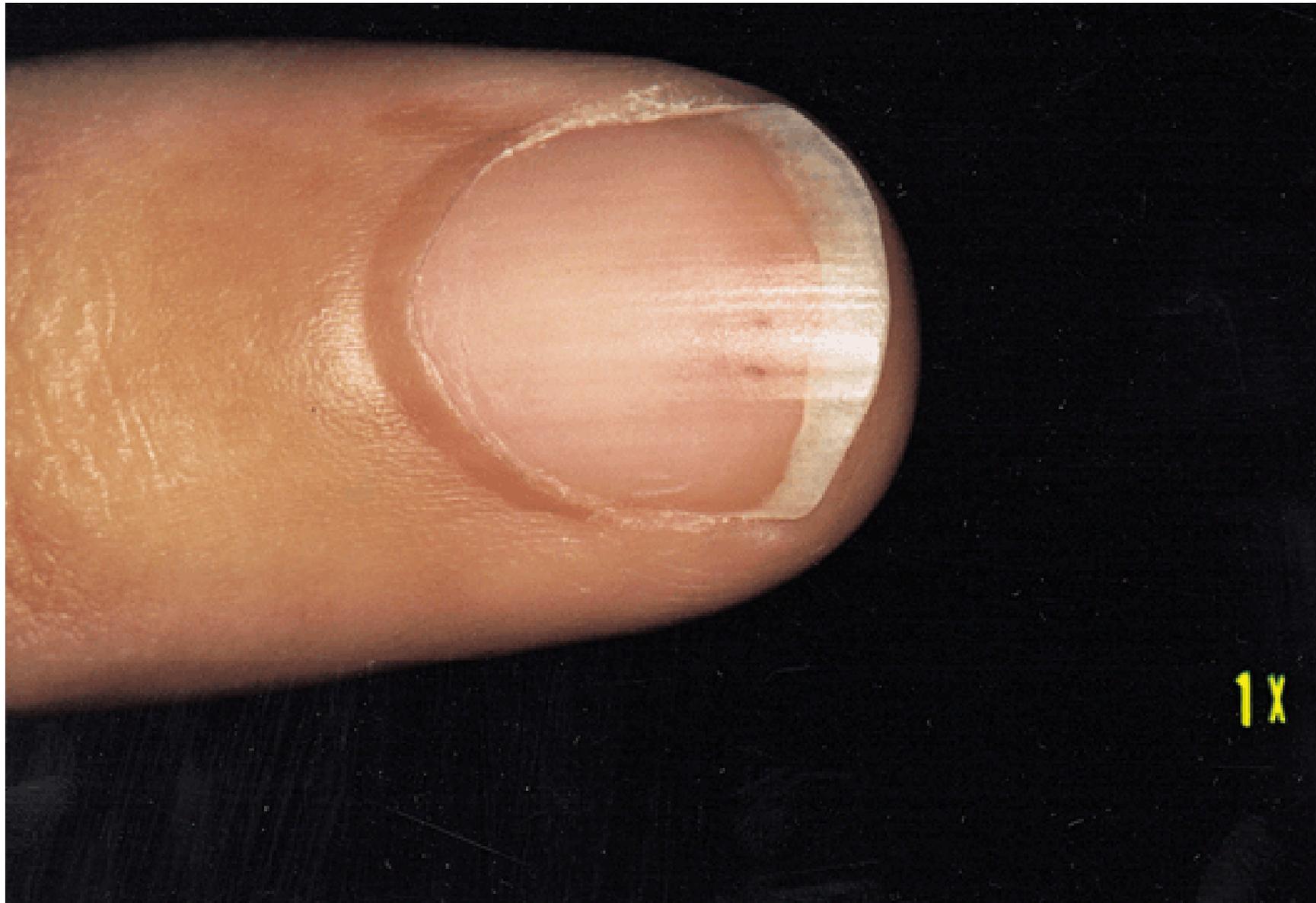


Infective Endocarditis

Signs & Symptoms

- High Fever, chills, night sweats
- Murmur heard with valvular damage
- Fatigue, malaise, weakness
- Weight loss
- Abdominal pain, anorexia
- Joint and back pain
- Vascular sign
 - Splinter hemorrhages in nails
 - Petechiae (microembolization of vegetations)





1x



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SPLEEN ENLARGEMENT (SPLENOMEGALY)

Infective Endocarditis

Complications

- Emboli
- Regurgitation(valve leakage)
- Stenosis(valve narrowing)
- Heart failure

Infective Endocarditis

Diagnostic Tests

- Blood cultures
 - Identify causative organism
- CBC → WBC
- ESR
- EKG
- Echo
 - Transesophageal echo
 - Identifies vegetations on valves
- Cardiac catheterization

Infective Endocarditis

Treatment

- Acute
 - Hospitalization
 - IV antimicrobial meds
 - PCN, vancomycin, amphotericin B
 - Antipyretics
 - Rest
 - Decreases cardiac workload
 - Surgical valve replacement
 - Commissurotomy
 - Incising the adhesions of mitral valve

Infective Endocarditis

Nursing Management

- Subjective & objective data
 - Refer to Table 22-3
- Notify MD w/changes in circulation
 - Cold skin
 - ↓ capillary refill
 - Cyanosis
 - Absent peripheral pulses

Infective Endocarditis

Nursing Management

- Goal of nursing care
 - Patient/family education
 - Home antibiotic therapy (prophylactic antibiotics)
 - Good hygiene esp. dental care
 - Soft toothbrush, regular dental visits

Pericarditis

Pathophysiology

- Inflammation of the pericardium
- Increased pericardial fluid (**pericardial effusion**)
- Inflammation of nearby tissues
- Acute or chronic

Pericarditis

Etiology

- Infections
- Drug reactions
- Connective tissue disorders
- Post MI
- Trauma from chest injuries
- Dissecting aneurysm
- Pulmonary disease
- Neoplastic disease
- Renal dx or uremia
- Postpericardiotomy
 - i.e, After cardiac surgery

Pericarditis

Signs and Symptoms

- Pericardial chest pain
- Dyspnea
- Lo grade fever
- Chills
- Cough
- **Pericardial friction rub (CLASSIC SIGN)**
 - Grating, scratchy, high pitch sound
 - Inflamed pericardial and epicardial layers rubbing together

Pericarditis

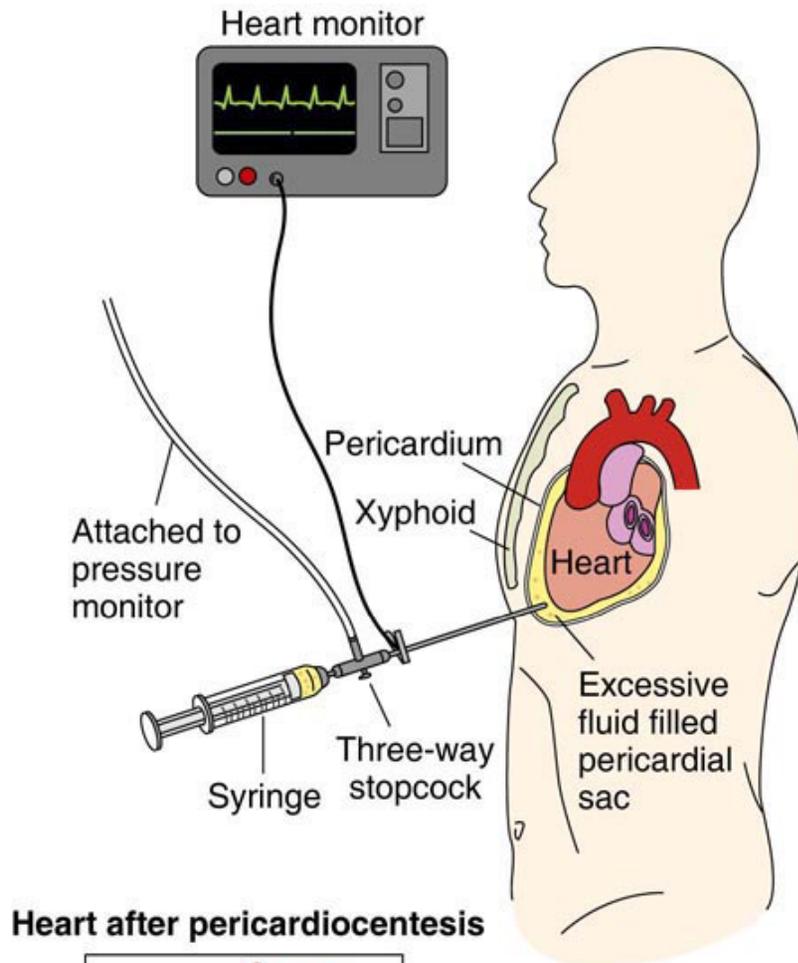
Diagnosis

- CBC → WBC
- BUN & Creatinine
 - Elevation may indicate uremia
- EKG
 - ST – T wave elevation in all leads
- Echocardiogram
 - Reveals pericardial effusions
- MRI or CT
 - May show thickened pericardium in chronic disease

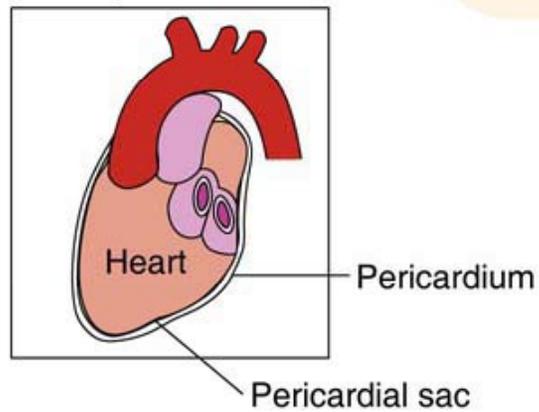
Pericarditis

Medical Treatment

- Antibiotics
- Anti-inflammatory meds
 - NSAIDS – esp. indomethacin (Indocin®)
 - Corticosteroids
- Bedrest
- Hemodialysis
 - To treat uremic pericarditis
- Pericardial window
- Pericardectomy



Heart after pericardiocentesis



Pericarditis

Complications

- Pericardial effusion
 - Dyspnea, cough, tachypnea
 - Distant heart sounds
- Cardiac tamponade
 - Life-threatening compression of heart by fluid
 - ↓ BP, decreased cardiac output
 - Restlessness, confusion, tachycardia, tachypnea
 - Jugular vein distention
 - Requires immediate treatment

Pericarditis

Nursing Management

- History
 - Cardiac dx, recent infections, current meds
- Physical assessment
 - Evidence of chest pain or pericardial friction rub
 - Note heart sounds
 - Signs of heart failure
 - Vital signs

Pericarditis

Nursing Management

- Nursing care
 - Relieve pt's pain & anxiety
 - Maintain normal cardiac function
 - Monitor signs & symptoms
 - Report to MD
 - Patient teaching

Myocarditis

Pathophysiology

- Inflammation of myocardium
- Muscle destruction and necrosis
- Heart may enlarge
- Most cases are benign
 - Produce minimal signs & symptoms

Myocarditis

Etiology

- Microorganisms
 - Viral, bacterial, parasitic(lyme disease), fungi, spirochetes
- Medications
- Lead toxicity
- Autoimmune factors
 - Lupus, RHD, HIV
- Pericarditis, infective endocarditis
- Cardiac transplant rejection

Myocarditis

Signs & Symptoms

- None to severe
- Fatigue, fever, pharyngitis
- Malaise, dyspnea
- Palpitations, muscle aches
- GI discomfort
- Enlarged lymph nodes
- Cardiac manifestations
 - Chest pain, tachycardia or pericardial friction rub
 - Sudden death may occur

Myocarditis

Diagnostic Tests

- Percutaneous endomyocardial biopsy
 - During 1st 6 weeks of inflammation
 - Preferred test for diagnosis
 - Positive only 30% of times
- MRI
- Gallium-67 scanning
- EKG
 - Reveal arrhythmias

Myocarditis

Treatment

- Aimed at cause
- Antibiotics
- Reduce cardiac workload
 - Bed rest, limit activity
 - Supplemental oxygen
- Cardiac monitoring
- Digoxin
 - Treat heart failure
 - Monitor for toxicity
- Immunosuppressants(just being investigated)

CARDIAC TRAUMA

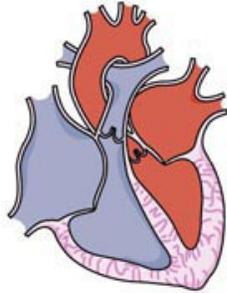
- Nonpenetrating
 - Contusions from blunt trauma-MVA,
 - contact sports with direct compression or force is applied to upper body
 - Contusions range from bruising to hemorrhage
- Penetrating
 - Stab/gun shot wound , invasive lines that penetrate
- Signs/symptoms
 - Asymptomatic to MI like symptoms
 - Cardiac tamponade may occur with bleeding

Cardiomyopathy

Pathophysiology

- Enlargement of heart muscle
- 3 Types
 - Dilated or congestive
 - Hypertrophic
 - Restrictive
- NO CURE
- Genetic Research has identified potential causes

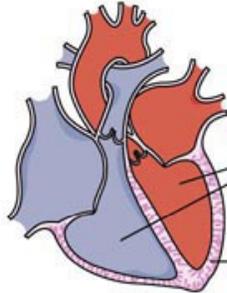
Normal



Comparison to normal

Note normal size of chambers and thickness of ventricle walls for comparison with cardiomyopic heart changes.

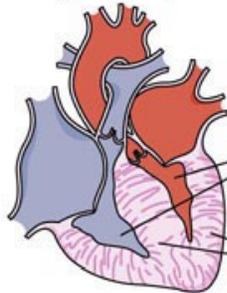
Dilated or (congestive)



Chambers greatly enlarged

Ventricle walls are thinner

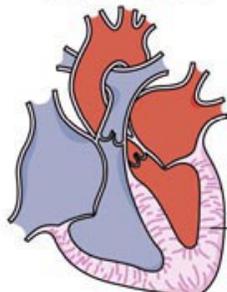
Hypertrophic



Smaller filling areas

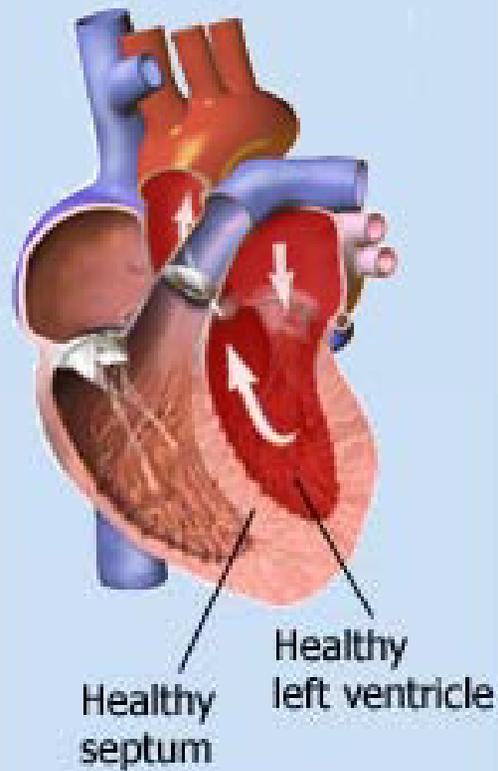
Ventricle walls greatly thickened

Restrictive



Muscle layers are stiff and resist stretching for filling.

Normal



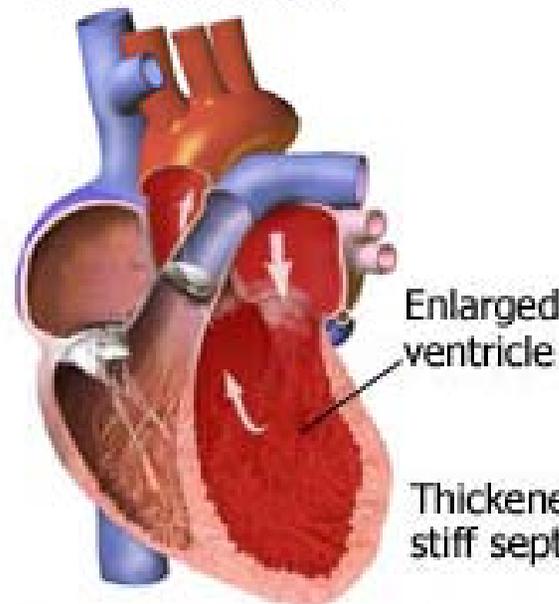
A healthy left ventricle pumps enough oxygenated blood to meet the body's needs.

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Cardiomyopathy

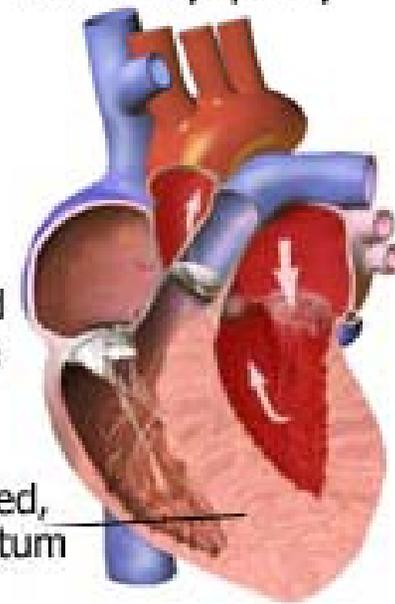
A condition in which a ventricle has become enlarged, thickened and/or stiffened. As a result, the heart's ability to pump is reduced. Two types of cardiomyopathy include:

Dilated cardiomyopathy



An enlarged, weakened left ventricle struggles to pump enough blood to meet the body's needs.

Hypertrophic cardiomyopathy



Left ventricle cannot fully relax between heartbeats, resulting in less blood flow.

Cardiomyopathy

Signs & Symptoms

- Depends on type
- Signs of heart failure in varying degrees
 - Dyspnea on exertion
 - Angina
 - Syncope
 - Fatigue
 - Arrhythmias

Cardiomyopathy

Diagnostic Tests

- CXR
 - Reveals *cardiomegaly*
- Echocardiography
 - Reveals muscle thickness/chamber size
 - Differentiates type
- EKG
 - Dysrhythmias
- Cardiac catheterization

Cardiomyopathy

Treatment

- No cure
- Palliative
- Manage heart failure
 - Vasodilators
 - Digoxin
 - Beta blockers, calcium channel blockers
 - Anticoagulants
 - Antidysrhythmics
- Heart transplant – when medical tx fails

Cardiomyopathy

Nursing Management

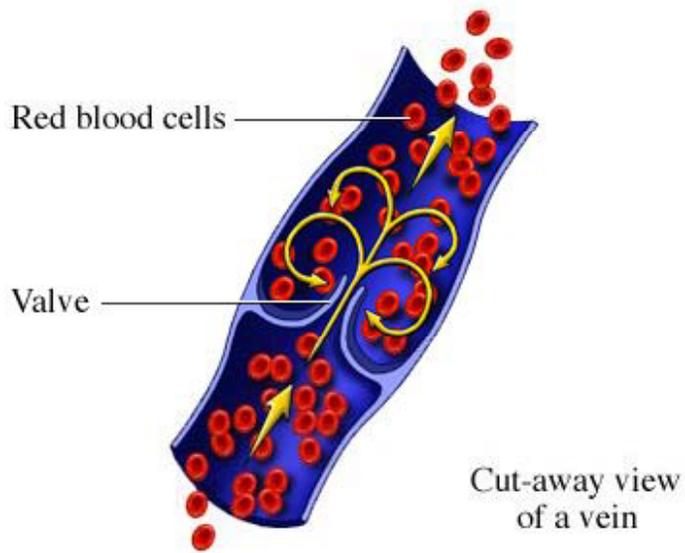
- History & physical examination
- Aim is to maintain normal cardiac function
 - Careful monitoring of s/s
 - Frequent rest periods, small meals
 - Avoid ETOH
 - Reduce anxiety
 - Pt teaching
 - Emotional support

Venous Disorders

Thrombophlebitis

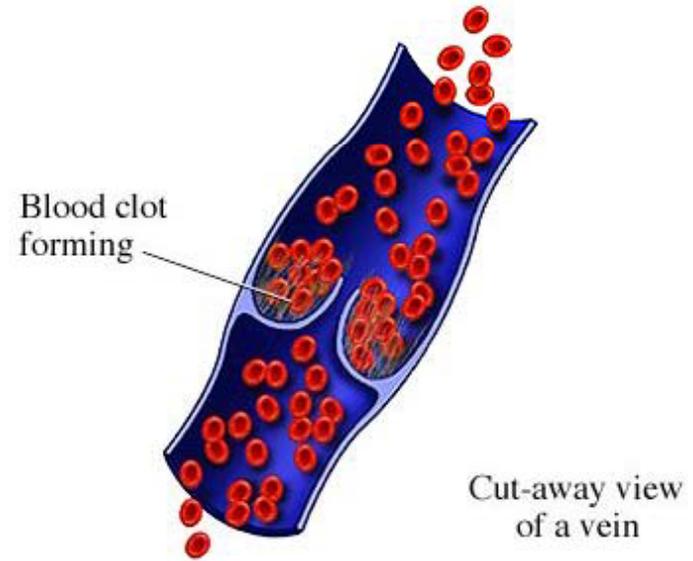
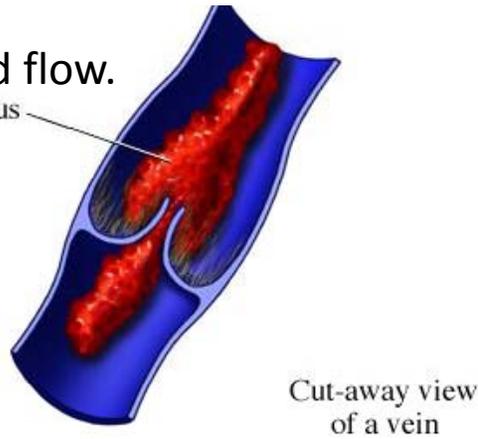
Pathophysiology

- Formation of a clot and inflammation within a vein
 - Clot forms first then inflammation follows
- Most common disorder of veins
- Affects superficial or deep veins
- DVT most serious
 - PE if detaches



Normal venous blood flow.

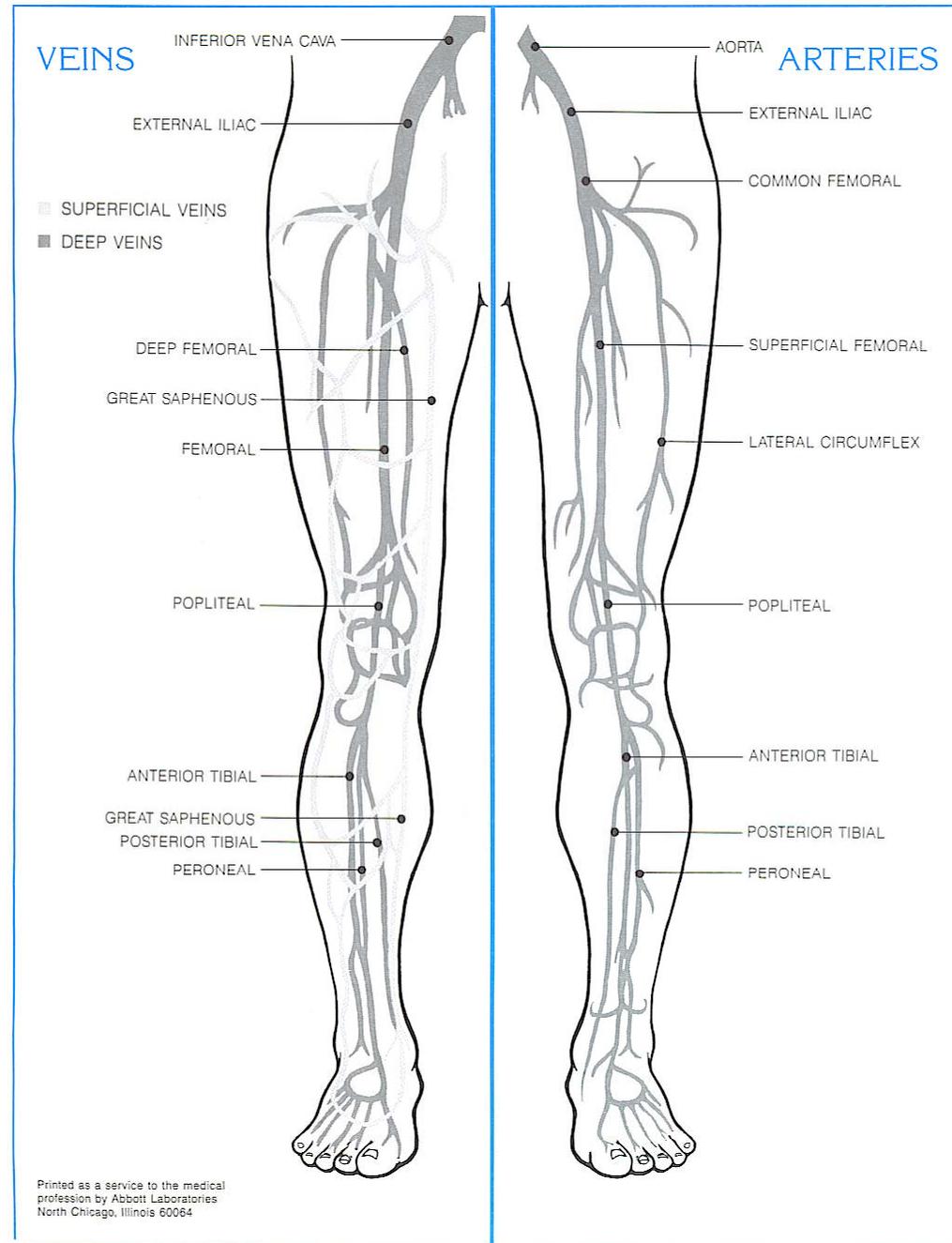
Thrombus

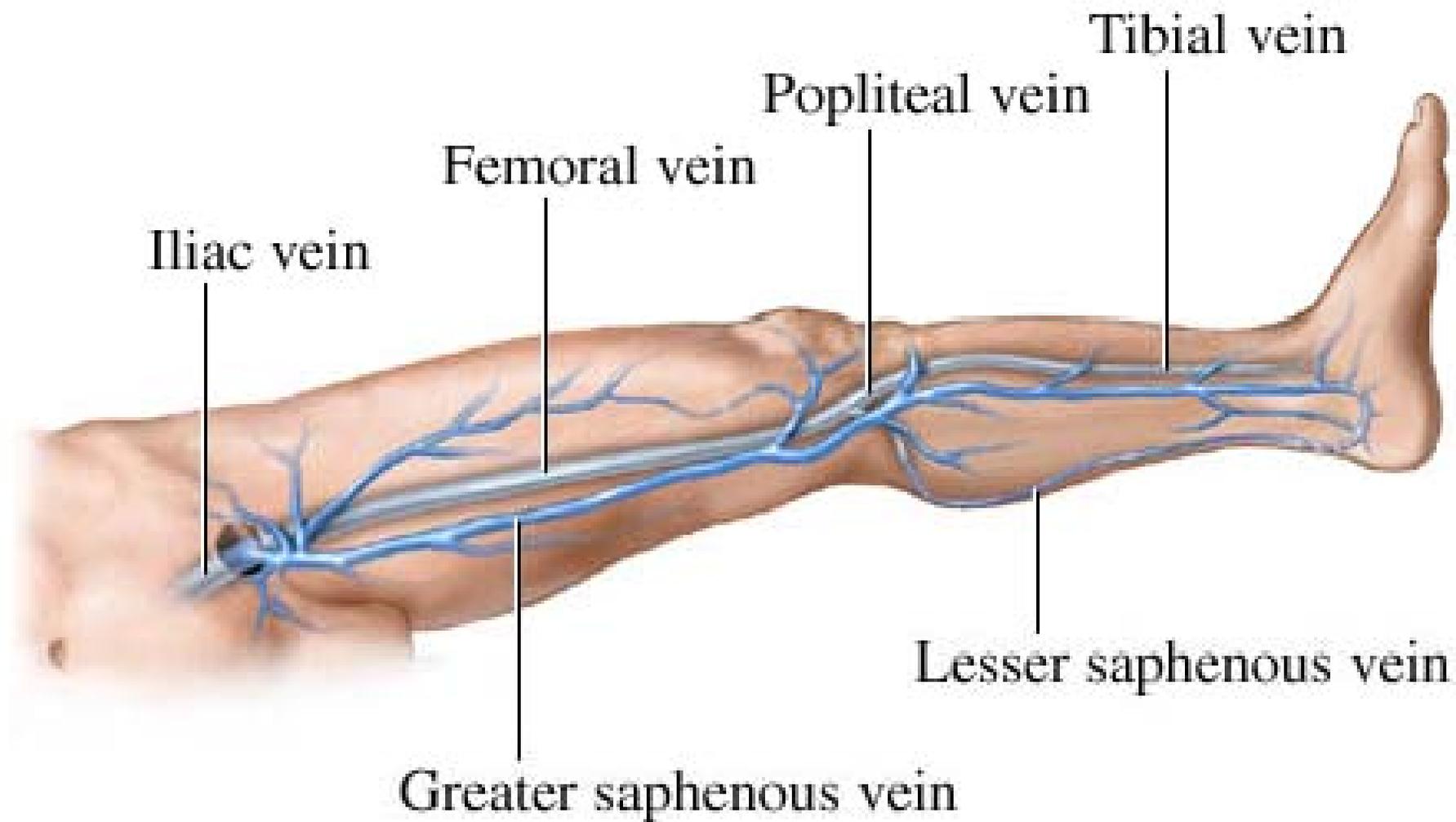


Formation of a blood clot.

Formation of a thrombus.

VASCULATURE OF THE LEG



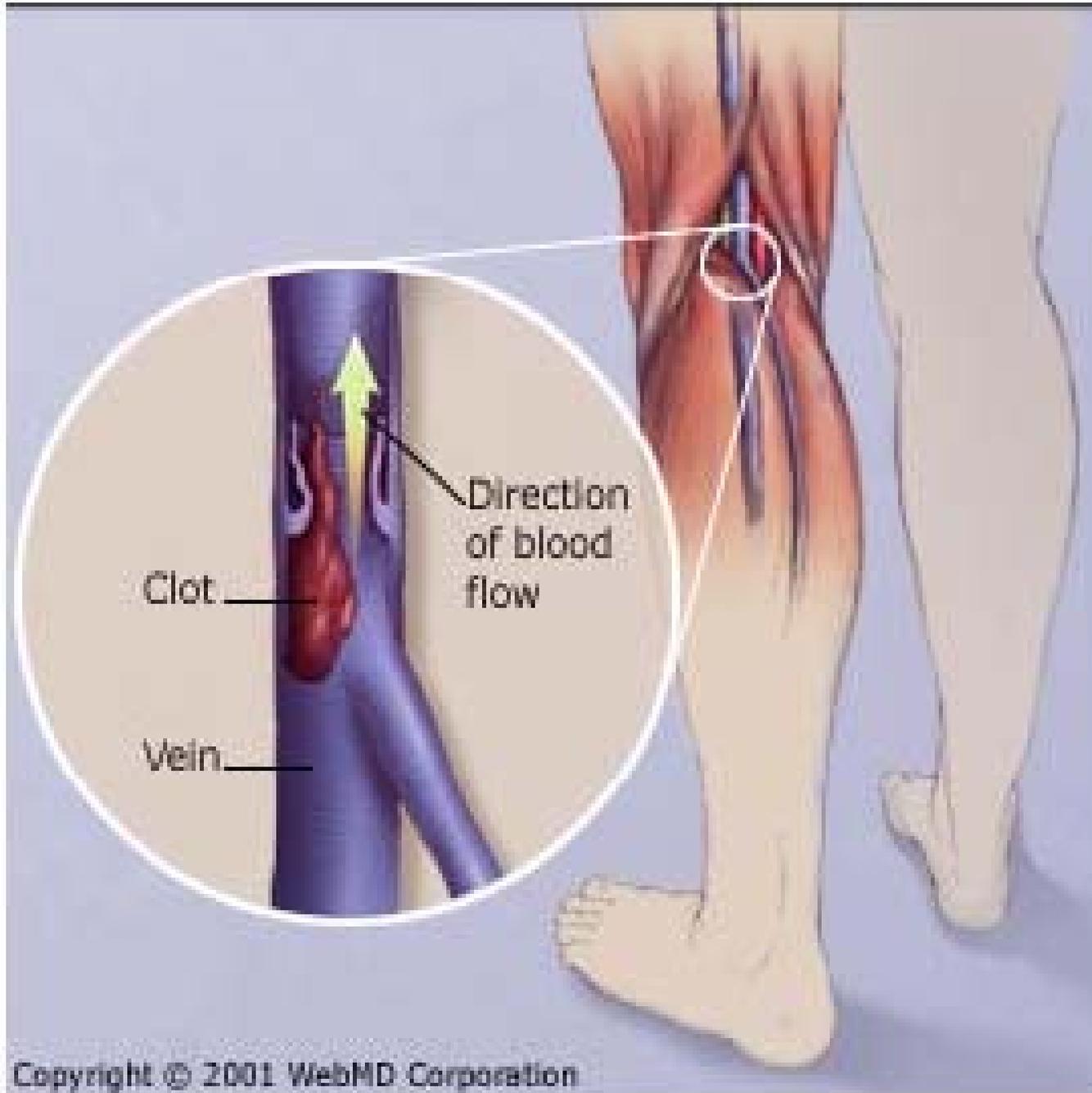


Thrombophlebitis

Etiology

- 3 Factors (Virchow's Triangle)
 - Stasis of blood flow
 - Damage to lining of the vein wall
 - Increased blood coagulation

Thrombophlebitis



Prevention

- See Table 22.6 for Risk Factors
 - Elderly at great risk
- Immobility
 - Sedentary jobs- walk, ankle leg exercises, change positions,
 - Bedrest- legs above heart, repo q 2 hours
 - Post-op- AROM or PROM, early ambulation, deep breathing
- Prophylactic antiembolism devices
 - PVD , bedrest, surgery/trauma patients
- Prophylactic medication (Table 22.7)
 - Post-op LMWH or heparin; Coumadin for high risk pts.
- Intravenous therapy
 - Monitor IV sites 48-72 hours



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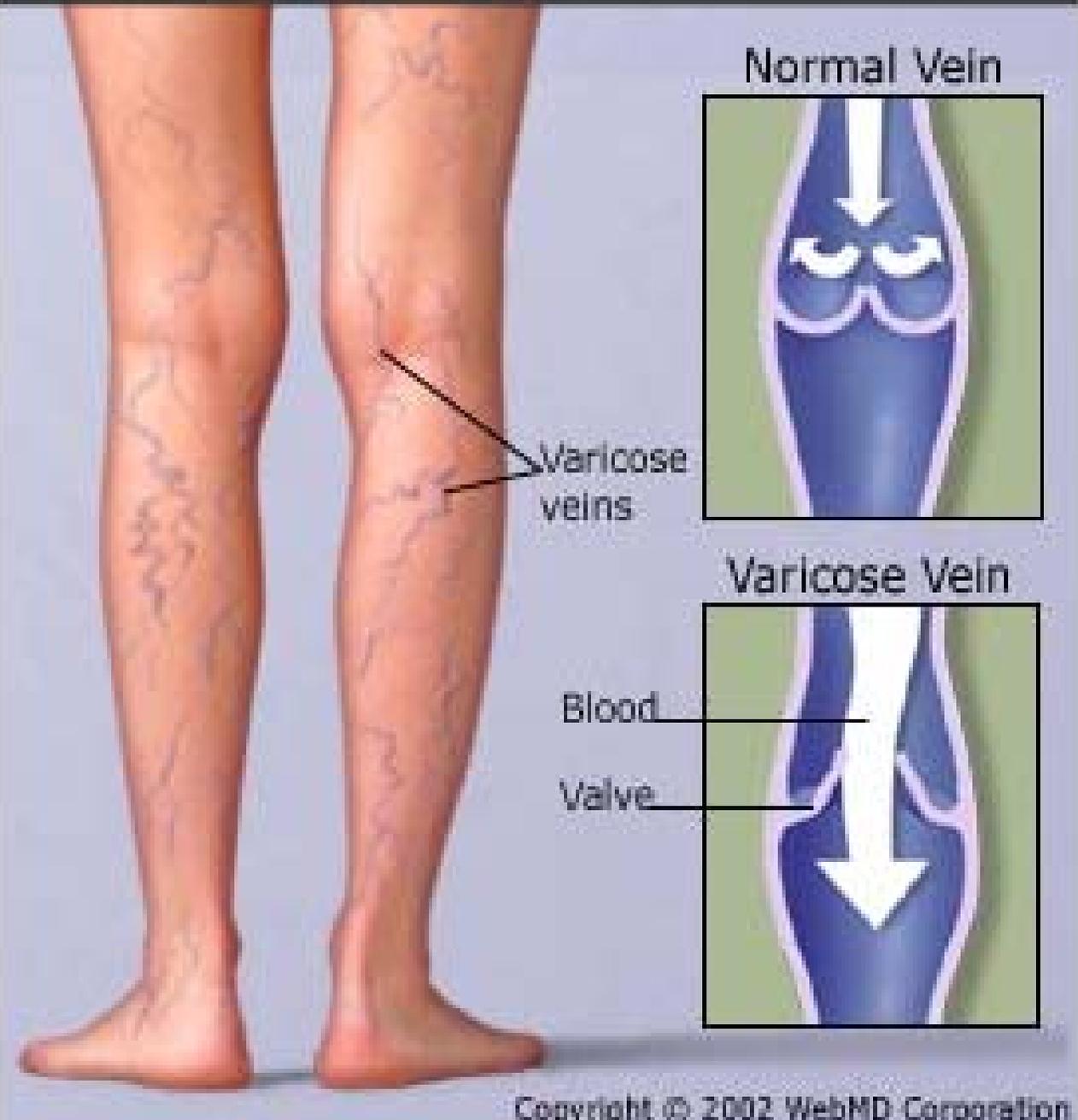
Thrombophlebitis

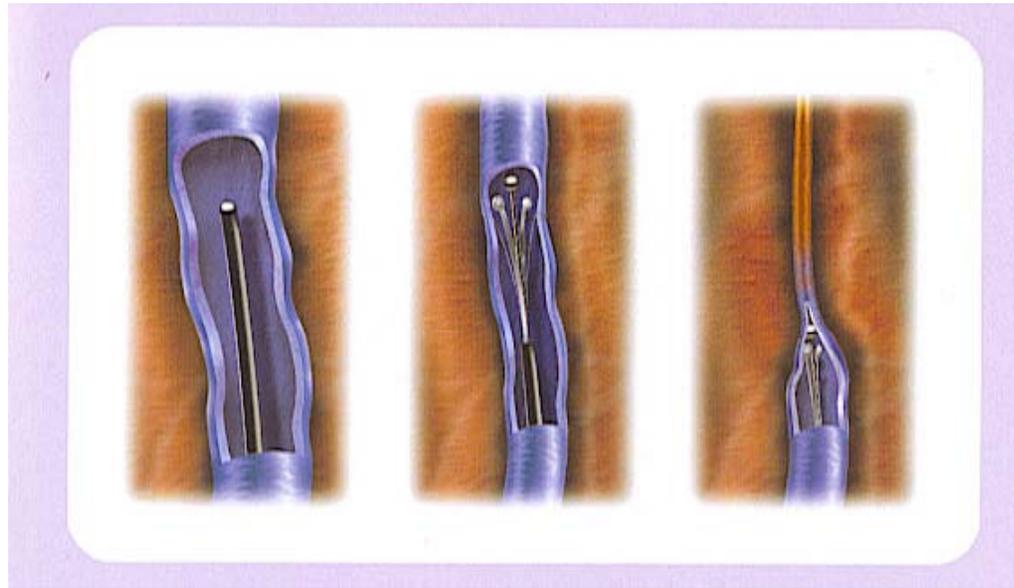
Signs and Symptoms

- Superficial Veins:
 - Redness
 - Warmth
 - Swelling
 - Tenderness
 - Induration (firm cord)
- Deep Veins:
 - Swelling
 - Edema
 - Pain
 - Tender w/palpation
 - Warmth
 - Venous distention
 - Fever
 - + Homan's Sign



Varicose Veins





Pre-treatment



One week
post-treatment*

*Individual results may vary.

Thrombophlebitis

Complications

- Pulmonary embolism
- CVA, MI
- Chronic venous insufficiency
 - Edema
 - Pain
 - Brownish discoloration
 - Ulceration of medial ankle
 - Venous distention
 - Dependent cyanosis



Thrombophlebitis

Diagnostic Tests

- Coagulation tests: PT, INR, PTT, platelet count
- D-dimer
- Venous duplex ultrasound
- MRI (Magnetic resonance venography)
- Lung scan(Ventilation-Perfusion Scan); when PE is suspected

Thrombophlebitis

Medical Treatment

- Goals is to prevent
 - Thrombus enlargement
 - Pulmonary emboli
 - Further thrombus formation
 - Relieve pain

Thrombophlebitis

Medical Treatment (cont.)

- Superficial
 - Bedrest
 - Extremity elevation
 - Warm, moist heat
 - Analgesics
 - NSAIDs
 - Compression stockings
- Deep Vein
 - Bedrest
 - Extremity elevation above level of heart 5-7 days
 - Warm, moist heat
 - Elastic stockings
 - Anticoagulants
 - Thrombolytic therapy
 - Surgery

Thrombophlebitis

Anticoagulants

- Heparin
 - Continuous IV infusion for up to 10 days
 - Oral anticoagulant 4-7 days before heparin stopped
 - Oral anticoagulant continued for several months

Thrombophlebitis

Heparin

- Anticoagulant
- Natural substance
- Uses
 - DVT
 - Pulmonary embolism
 - Prophylaxis of DVT & PE
 - Acute peripheral arterial embolism
 - Unstable angina
 - DIC
- Given subq or IV
- Normal therapeutic range
 - APTT 1.5-2.5 Xs control
- Subq
 - Abdomen
 - 2 inches away from umbilicus
- Do not massage
- Rotate sites
- Do not aspirate

Thrombophlebitis

Heparin - Side Effects

- Hematoma formation
- Bleeding – hemorrhage
- Thrombocytopenia
- Hypersensitivity reaction

- Antidote: **Protamine sulfate**

Thrombophlebitis

Coumadin (Warfarin)

- Inhibits activity of Vitamin K
- Uses
 - PE, DVT, MI
 - RHD w/heart valve damage
 - Atrial arrhythmias
- Dosage based on INR most commonly now
- Given PO
- No effect on existing clots

Thrombophlebitis

Prothrombin Times

- Therapeutic range is 1.5 to 2 times the normal prothrombin time range
 - Example:
 - Client's value on Coumadin: 16 seconds
 - Normal PT range: 9-12 seconds
- | | |
|--------------------|---------------------|
| 1.5 | 2 |
| <u>X 9 seconds</u> | <u>x 12 seconds</u> |
| 13.5 seconds | to 24 seconds |

Thrombophlebitis

Coumadin (Warfarin)

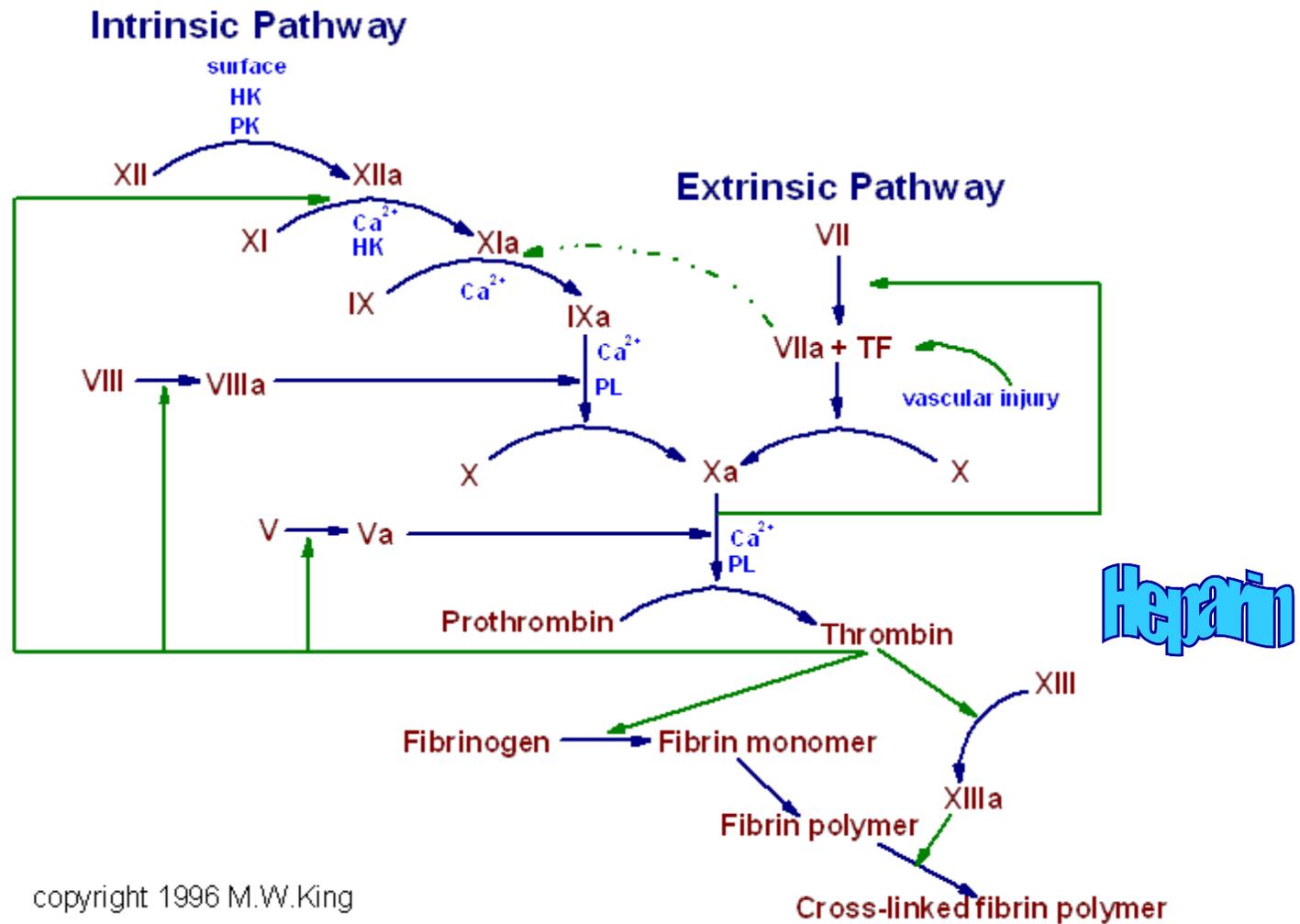
- Complications
 - Hemorrhage
 - Drug interactions
 - No Aspirin
- Antidote: **Vitamin K**

Thrombophlebitis

Lovenox (Enoxaparin sodium)

- Specific action at certain steps of coagulation pathway- less potential hemorrhage
 - Uses
 - Prevention of DVT
 - Unstable angina or non-Q MI
 - Subcutaneously in abdomen
 - Do not massage, rotate sites, avoid umbilicus
- DO NOT INJECT INTRAMUSCULARLY**
- Side Effects
 - Same as heparin
 - Monitoring of clotting times not necessary

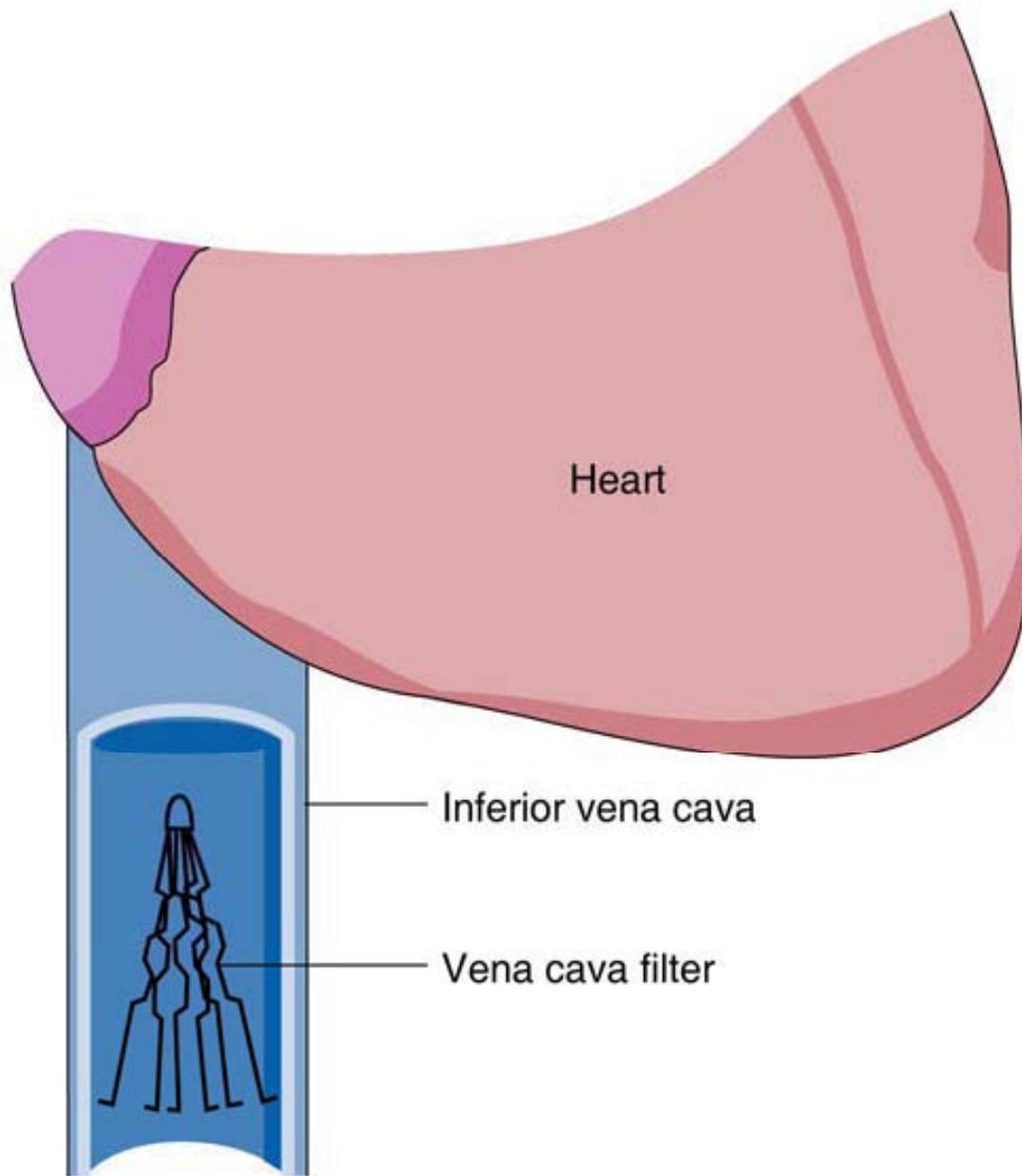
Coagulation Cascade



Thrombophlebitis

Surgical Treatment

- Used to prevent
 - Pulmonary emboli
 - Chronic venous insufficiency
 - When anticoagulants contraindicated
 - High risk of PE
- Venous thrombectomy
 - Removes clot
- Vena cava filter
 - Placed in inferior vena cava through femoral or right internal jugular
 - Opens and attaches to vein wall
 - Traps clots traveling toward lungs without hindering blood flow



Thrombophlebitis

Nursing Management

- History
 - Recent IV therapy, surgery, trauma, childbirth, bedrest, long trip, cardiac dx, recent infection, medication list
- Physical assessment
 - Note pain, fever, tenderness, + Homan's sign, redness, warmth, swelling, edema
 - Note firm, cordlike vein
 - Daily thigh/calf measurements
- Monitor coagulation tests
- Monitor for s/s of PE
 - Dyspnea, tachypnea, tachycardia, blood-tinged sputum, chest pain, change in LOC—report to MD immediately