Angina

Definition
- discomfort that occurs when oxygen demand exceeds oxygen demand

Classifications
- stable
- unstable
- Prinzmetal’s
Angina Classifications
- Class I: strenuous activity
- Class II: more prolonged or rigorous
- Class III: daily activity
- Class IV: angina @ rest

Angina Etiology
- smoking
- hypertension
- obesity
- hyperlipidemia

Angina Etiology
- diabetes
- sedentary life style
- cocaine use
- low serum folate
• Angina
  □ Diagnostics
    ▪ ECG
      ▪ T wave inversion
      ▪ ST segment depression
    □ Lab
      ▪ ABGs
      ▪ H & H
      ▪ Enzymes (troponin & CK - MB)
      ▪ Echocardiogram
  ▪ Clinical symptoms

• Angina
  □ Clinical Presentation
    ▪ pain (30 seconds to 30 minutes)
    ▪ associated symptoms

• Treatment
  □ modify risk factors
  □ correct aggravating factors
CCRN Review - Cardiovascular

- Treatment
  - oxygen
  - aspirin
  - nitrates
  - β-adrenergic blocking agents
  - calcium channel blockers
  - heparin
  - glycoprotein IIb / IIIa inhibitors

Myocardial Infarction

- necrosis resulting from insufficient supply of oxygenated blood to an area of the heart
- complete necrosis occurs within 4 – 6 hours of total occlusion

CCRN Review - Cardiovascular

- Myocardial Infarction
  - Types
    - Non-Q wave (ST segment elevation, depression or no change and T wave inversion on indicative leads)
    - Q wave (significant Q wave in presence of acute changes)
Myocardial Infarction

Epidemiology

- > 500,000 MI / year
- Males (40 – 65); equality after 65 years of age
- Women experience more lethal and severe 1st MI

Etiology

- Atherosclerosis
- Coronary artery spasm
- Coronary embolism
- Coronary artery dissection
- MI with normal coronary arteries

Clinical Presentation

- Pain (lasts > 30 minutes)
- Associated symptoms
- No pain in about 20% of patient experiencing MI
CCRN Review - Cardiovascular

- Myocardial Infarction
  - Diagnostics
    - 12-lead ECG (18-lead)
    - enzymes
    - echocardiography
    - clinical symptoms

CCRN Review - Cardiovascular

- Myocardial Infarction
  - 12-lead ECG
    - Inferior II, III, aVF
    - Anterior V2-V6
    - Lateral I, aVL, V5-V6
    - Posterior V1 or V7-V9

CCRN Review - Cardiovascular

- Myocardial Infarction
  - 12-lead ECG
    - Anterolateral I, aVL, V2-V6
    - Inferolateral II, II, aVF, I, aVL, V5-V6
    - Right ventricular V3R, V4R
Myocardial Infarction

Treatment
- bed rest (1st 24 hours)
- NPO until stable, low cholesterol, low Na
- patient education

Oxygen
Nitrates
Analgesia (MS)
aspirin

Thrombolytic therapy
- tPA (TNK)
rPA
Myocardial Infarction

Treatment
- β - adrenergic blocking agents
- ACE inhibitors
- glycoprotein IIb/IIIa

Treatment
- interventional cardiology
- coronary artery bypass grafting (CABG)

Nursing Care
Post-procedure
- Lead Monitoring
  - RCA use leads II, III, aVF
  - LAD use $V_1$ - $V_4$
  - Left Circumflex use I, aVL, $V_5$ or $V_6$
Potential Complications

- Groin complications
  - bleeding
  - hematoma
  - pseudoaneurysm
  - retroperitoneal bleeding

Potential Complications

- Reocclusion (early or late)
  - chest pain
  - ECG: ST segment changes
  - shortness of breath, diaphoresis, nausea

Patient Education

- signs of restenosis
- medications
- risk factor modification
- activity progression
Patient Education

- Activity
  - clarify with MD when to remove groin dressing
  - no lifting > 15 - 20 pounds
  - no vigorous exercise, no sitting for prolonged times, no sports, no squatting for 1 week

- Groin Care
  - if lump develops at puncture site; hold pressure for 20 minutes
  - if bleeding does not stop, continue to hold pressure and go to the ED

- Call MD for:
  - fever
  - chills
  - pain in affected leg
  - drainage from puncture site
  - change in color of affected leg
Patient Education

- Stent Specific
  - carry stent card with you
  - no MRI for 3 - 8 weeks
  - warfarin & dipyridamole for 2 - 3 months and aspirin indefinitely
  - prophylactic antibiotics

Cardiac Surgery

- Indications
  - Left main disease
  - Double vessel disease (proximal LAD)
  - Angina unresponsive to meds

Cardiac Surgery

- Indications
  - CAD with EF < 35%
  - Emergent conditions
Cardiac Surgery

Types of Procedures
- traditional (CABG)
- valve surgery
- MIDCAB
- post access procedure

Preoperative Management
- review history
- preop labs
- medications
- postop education
- surgical preparation

Postoperative Management
- Airway management
- Breathing management
- Hemodynamic status
- Monitor drainage
Cardiac Surgery
- Postoperative Management
  - monitor fluid & electrolytes
  - postoperative medications
  - monitor for complications
  - cardiac pacing

CCRN Review - Cardiovascular

Cardiac Surgery
- Complications
  - dysrhythmias
  - cardiac tamponade
  - MI
  - cardiac failure
  - persistent bleeding
  - hypovolemia

CCRN Review - Cardiovascular

Congestive Heart Failure
- Definition
  - congestion in pulmonary or systemic circulation
  - heart's inability to pump adequate amounts of blood
**Etiology**
- myocardial infarction
- cardiomyopathy
- valvular heart disease
- volume overload
- cardiac depressants
- hyperthyroidism

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**Congestive Heart Failure**

- **Clinical Presentation**
  - dyspnea
  - orthopnea
  - paroxysmal nocturnal dyspnea

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**Congestive Heart Failure**

- **Clinical Presentation**
  - nocturnal angina
  - Cheyne-Stokes respirations
  - fatigue & lethargy
Right Ventricular Failure
- Clinical Presentation
  - jugular venous distension
  - peripheral edema
  - cyanosis
  - congestive hepatomegaly
  - ascites
  - hepatojugular reflex

Left Ventricular Failure
- Clinical Presentation
  - pulmonary crackles
  - tachypnea
  - $S_3$
  - cardiac murmurs (AS, AR, MR)
  - paradoxic splitting $S_2$

Diagnostics
- Lab: CBC, BUN:creatinine, liver enzymes; TSH
- Imaging: chest x-ray; 2D echocardiography; cardiac catheterization
**Goals of Treatment**

- **Systolic Dysfunction**
  - diuretics
  - ACE inhibitors
  - β-blockers
  - digitalis

- **Diastolic Dysfunction**
  - HTN
  - calcium channel blockers
  - ACE inhibitors
  - β-blockers
  - diuretics

- **Direct vasodilating drugs**
- **Anticoagulants**
- **Surgical revascularization**
- **Antiarrhythmic agents**
**Goals of Treatment**

- **Diastolic Dysfunction (AS)**
  - diuretics
  - NO ACE inhibitors, nitrates, and digitalis (except in rate control)
  - aortic valve replacement

- **Diastolic Dysfunction (AR & MR)**
  - ACE inhibitors with diuretics
  - hydralazine with nitrates is ACEI not tolerated

- **Diastolic Dysfunction (restrictive cardiomyopathy)**
  - β-blockers &/or calcium channel blockers
  - restore IV volume
  - septal myotomy
CCRN Review - Cardiovascular

goals of Treatment
- diastolic Dysfunction (Mitral Stenosis)
  - diuretics
  - β - blockers, digitalis &/or verapamil to control HR
  - repair or replace mitral valve
  - balloon valvuloplasty

CCRN Review - Cardiovascular

Dilated (Congestive)
- Introduction
  - ↑ preload & afterload
  - stimulation of renin - angiotensin - aldosterone system
  - heart dilates
  - refractory heart failure

CCRN Review - Cardiovascular

Dilated (Congestive)
- Clinical Presentation
  - right & left heart failure
- Diagnosis
  - Chest x - ray
    - Cardiomegaly
    - Pulmonary congestion
Dilated (Congestive)

**Diagnosis**
- Electrocardiography
  - Biventricular hypertrophy
  - Atrial fibrillation
- Echocardiography
  - Diminished wall motion
  - Reduced EF
- Cardiac catheterization
  - Elevated PAOP, PAP
  - Diminished CO & EF
  - Mitral valve abnormality

**Management**
- Manage CHF
  - \( O_2 \) to achieve 90% \( SaO_2 \)
  - ACE inhibitor
  - Vasodilator
  - Diuretics
  - Inotrope (digitalis)

**Management**
- \( \downarrow \) \( O_2 \) demand
  - Activity restriction
  - Sodium restrictions
  - Anxiolytics as needed
Dilated (Congestive)
- Management - complications
  - dysrhythmias
  - systemic emboli

Hypertrophic (IHSS)
- Introduction
  - hypertrophy of heart muscle
  - rigid, noncompliant ventricle
  - ↓ preload & CO
  - ↓ coronary & cerebral blood flow

Clinical Presentation
- Chest pain
- Syncope
- Palpitations
- Exertional dyspnea
- Fatigue
- Murmurs
Hypertrophic (IHSS) Diagnosis
- Chest x-ray
  - cardiomegaly
- Electrocardiography
  - LV hypertrophy, ST segment T wave changes, Q waves in inferior & precordial leads
  - Atrial & ventricular dysrhythmias

CCRN Review - Cardiovascular

Hypertrophic (IHSS) Diagnosis
- Echocardiography
  - Narrow LV outflow tract
  - Thickened septum
  - Decreased LV chamber
- Cardiac catheterization
  - Decreased LV compliance
  - Mitral regurgitation
  - Hyperdynamic systolic function
  - LV outflow obstruction

CCRN Review - Cardiovascular

Hypertrophic (IHSS) Management - general
- Cardioversion for AF
- IABP
- Fluid & sodium restriction
- O2 therapy
- Rest & exercise restrictions
Hypertrophic (IHSS) Management
- β-adrenergic blockers
- antimicrobials

Hypertrophic (IHSS) Management - complications
- mural thrombus
- pulmonary embolus
- severe heart failure
- sudden cardiac death

Restrictive
Introduction
- fibrous infiltration of heart
- heart becomes noncompliant
- ↓ preload & contractility → diminished CO
CCRN Review - Cardiovascular

- Restrictive
  - Clinical Presentation
    - chest pain
    - fatigue
    - weakness
    - dyspnea, orthopnea
    - PND
  - crackles
  - right-sided symptoms

CCRN Review - Cardiovascular

- Restrictive
  - Diagnosis
    - Chest x-ray
    - cardiomegaly
    - Electrocardiography
      - Low QRS voltage
      - AV blocks

CCRN Review - Cardiovascular

- Restrictive
  - Diagnosis
    - Echocardiography
      - Atrial enlargement
      - Enlarged ventricular outside dimension; small ventricular chamber
    - Cardiac catheterization
      - Elevated LVEDP, RVEDP, PAOP, RAP
Restrictive Management - CHF
- O₂
- ACE inhibitor
- vasodilators
- diuretics
- inotrope

Restrictive Management - complications
- dysrhythmias
- AV blocks
- systemic emboli
- consider transplantation

Endocarditis
- Introduction
  - acute
  - subacute
  - IV drug users
  - prosthetic valve
**Endocarditis**

- **Risk Factors**
  - prosthetic cardiac valves
  - previous bacterial endocarditis
  - congenital malformations

- **Clinical Presentation**
  - fever, chills & fatigue (25% to 80%)
  - embolic phenomenon (50%)
  - skin: petechiae, Osler nodes, splinter hemorrhage, Janeway lesions
  - splenomegaly
Endocarditis

Management
- culture & sensitivity
- antimicrobials
  - vancomycin + rifampin + gentamicin
  - rocephin or oxacillin + gentamicin
  - penicillin + gentamicin

Pericarditis

Definition
- inflammation of pericardium
- variety of etiologies

Etiology
- infections
- MI
- traumatic
- mediastinal radiation
Pericarditis

- **Etiology**
  - uremia
  - neoplasm
  - rheumatic fever
  - other: anticoagulants, ITP

**Clinical Presentation**
- severe constant pain
- pain intensifies with inspiration
- pain relieved by sitting up & leaning forward
- pericardial friction rub

**Diagnostics**
- CBC with differential, BUN & creatinine, cardiac enzymes
- ECG
- Chest x-ray
Pericarditis

- Management
  - Limit activity
  - Patient education regarding complications

- Anti-inflammatory agents
  - NSAIDs
  - Corticosteroids
  - Ventricular rate control

- Management - complications
  - pericardial effusion
  - chronic constrictive pericarditis
  - cardiac tamponade
Aortic Disruption

**Introduction**
- Intimal tear allows blood to dissect between medial layer of the aorta
- Peak incidence in 6th & 7th decade
- Classified as Type A & Type B

**Etiology**
- Atherosclerosis
- Connective tissue disease
- Hypertension

**Thoracic**
- Chest pain (radiates)
- Syncope (12%)
- Hypo- or hypertension
- Unequal or absent pulses
Aortic Disruption

Thoracic
- murmur of AI
- neurologic changes
- mass effect
- cardiac tamponade

Abdominal
- asymptomatic
- pulsatile epigastric mass
- vague abdominal pain (may radiate to back)

Aortic Dissection

Diagnostics
- Ultrasound
- CT scan
- aortogram
- Aortic Dissection
  - Treatment
    - Surgical repair
    - Endovascular repair
Aortic Dissection

- Prognosis
  - > 7 cm 75% risk
  - 6 - 7 cm 35% risk
  - 5 - 6 cm 25% risk
  - 0 - 5 cm low risk

Pericardial Tamponade

- Introduction
  - accumulation of blood in the pericardial sac
  - etiology = blunt & penetrating trauma

Signs & Symptoms

- dyspnea
- cyanosis
- Beck’s triad
- pulsus paradoxus
- shock symptoms
Pericardial Tamponade Interventions
- pericardiocentesis
- open thoracotomy
- operative intervention

Cardiac Contusion
Introduction
- bruising of the heart tissue
- myocardial ecchymoses to myocardial infarction
- etiology = blunt trauma

Cardiac Contusion
Signs & Symptoms
- chest pain similar to MI
- chest wall ecchymoses
- S3 or crackles in lung
- dysrhythmias, ECG changes
- elevated CPK, troponin
Cardiac Contusion

Interventions
- same treatment as for MI
- monitor CO & CV status
- monitor for life-threatening dysrhythmias for 24 - 48 hours

Complications
- cardiac tamponade
- cardiogenic shock
- myocardial rupture
- valve injuries
- constrictive pericarditis

Definition - Shock
- cell hypoxia related to decreased perfusion
- potentially fatal if not identified & treated
Categories
- hypovolemic
- cardiogenic
- distributive
- obstructive

Initial Stage
- cellular changes
- no initial signs or symptoms

Initial Stage
- ↑ glucose
- ↑ lactate level
- ↓ base deficit
- ↓ pHi
Compensatory Shock
- Neural (fight or flight)
- Hormonal
- Chemical

Progressive Shock
Failure of compensatory mechanisms
- Brain
- Kidneys
- GI Tract
- Liver
- Pancreas
- Lungs
- Myocardium

Refractory Shock
Progression to multiple organ failure
- Cardiac Failure
- Acidosis
- Blood Clotting
- Cerebral Ischemia
Hypovolemic

- most common type of shock
- compromise in systemic perfusion
- diminished circulating volume

Hypovolemic Causes
- absolute blood loss
- fluid/electrolyte loss
- third spacing
- redistribution of volume
- endocrine

Hypovolemic Goals
- ABCs
- stop source of loss
- restore intravascular volume
**Hypovolemic**
*Type of replacement*
- dehydration = isotonic
- hemorrhagic = isotonic & possibly blood products
- 3rd spacing = isotonic & possibly colloid

**Adverse Effects**
- hypothermia
- hyperkalemia
- acidosis or alkalosis
- clotting problems
- intravascular debris

**Cardiogenic**
- reduction in flow of $O_2$ to myocardium
- demand $>$ supply
- diminished contractility $\rightarrow$ diminished CI
Cardiogenic

- myocardial infarction
- dysrhythmias
- severe electrolyte disturbances
- drug toxicity
- advanced septic shock

Cardiogenic

- CV surgery
- CHD (AS)
- cardiomyopathy
- acid-base imbalances
- cardiac contusion

Cardiogenic

Goals of Therapy

- Increase Cardiac Output
**Cardiogenic**
- Increase contractility
- Decrease afterload
- Optimize preload
- Optimize heart rate

**IABP**
- Concepts
  - Balloon inflation
  - Balloon deflation

**Complications**
- Limb perfusion
- Contraindications
- Pulseless patient