Session 209

CERTIFICATION REVIEW: Cardiovascular Part 1

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Content Description

This session discusses Acute Coronary Syndrome (ACS), including unstable angina, non-ST-elevation MI (NSTEMI) and ST-elevation MI (STEMI). It will review the American Heart Association and American College of Cardiology (AHA/ACC) guidelines for the presentation, diagnosis, treatment and collaborative management of the patient with ACS. It will also discuss interventional and surgical treatment for ACS. Lastly, it will address the unique care of the patient with a right ventricular myocardial infarction. Emphasis will be on possible questions that may be asked on these subjects in the CCRN, PCCN, and CMC examinations. There will be time allotted for sample questions.

Learning Objectives

At the end of this session, the participant will be able to:

1. Describe clinical presentation and collaborative management of unstable angina, non-ST elevation MI and ST-elevation MI
2. Discuss interventional and surgical intervention for ACS and the nursing care of patients receiving these interventions.
3. Identify a patient experiencing a right ventricular MI and the treatment specific for this disease process.

REFERENCES

NOTE: Please refer to outline for references pertaining to this session
Certification Review: Cardiovascular Part 1

Approximately 20% of the CCRN exam, 36% of the PCCN exam and 43% of the CMC exam will focus on cardiovascular disease.

<table>
<thead>
<tr>
<th>CCRN, PCCN and CMC</th>
<th>CCRN, PCCN and CMC</th>
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<tbody>
<tr>
<td>✓ Acute Coronary Syndrome</td>
<td></td>
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<tr>
<td>✓ Interventional cardiology</td>
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<td>✓ Cardiac surgery</td>
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<td>Heart Failure</td>
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<td>Acute pulmonary edema</td>
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<td>Dysrhythmias</td>
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<td>Conduction defects</td>
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<td>Cardiomyopathies</td>
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<td>Structural heart defects</td>
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<td>Cardiogenic shock</td>
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<td>Hypovolemic shock (in multisystem on PCCN; discussed here)</td>
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<td>Acute peripheral vascular insufficiency/ peripheral vascular surgery</td>
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<td>Hypertensive crisis</td>
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<td>Ruptured or dissecting aneurysm</td>
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<td>Cardiac trauma</td>
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<td>Acute inflammatory disease</td>
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<td>Cardiac tamponade</td>
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<tr>
<td>Pulmonary hypertension (in pulmonary on PCCN. Discussed in pulmonary session)</td>
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Note for PCCN candidates: This presentation includes references to pulmonary artery catheter measurements and vasoactive medications. These topics will not be tested in the PCCN exam.

I. Acute Coronary Syndromes
   • A. Definition Ruptured or dissecting aneurysm
   • Valvular disease

     1. A constellation of clinical symptoms that is compatible with acute myocardial ischemia. It encompasses unstable angina (UA), non-ST-segment elevation MI (NSTEMI), and ST-segment MI (STEMI). It is a continuum of cardiac disease from ischemia to infarction.
   B. Unstable angina (UA)
      1. Description of angina
         Deep, poorly localized chest or arm pain relieved with rest or nitroglycerin
      2. Types
         a. Rest angina
            Angina occurring at rest lasting > 20 minutes
         b. New-onset angina
            Angina without previous history, in which there is marked limitation of ordinary physical activity
         c. Increasing angina
            Previous history of angina that has become more frequent, longer in duration, or lower in threshold
C. Non-ST-elevation MI and ST-elevation MI
1. Zones of Infarction
   Zone 1 - Infarction is area of cell death and muscle necrosis
   Zone 2 - Surrounded by injured tissue; blood to area is insufficient
   Zone 3 - Outer ring of ischemic tissue; cells viable, will return to normal. Origin of many dysrhythmias
2. Classification of MI
   Non-ST-Elevation MI (NSTEMI) AKA non-Q-wave or subendocardial MI
      Affects endocardium and myocardium
      ECG: ST depression; T wave inversion
      Also seen on ECG with UA
   ST-Elevation MI (STEMI) AKA Q-wave or transmural MI
      Affects all three layers of heart muscle
      High incidence of LV failure
      ECG: ST elevations, Q waves

D. ACS risk factors
1. Unmodifiable
   Heredity, age, sex, race
2. Modifiable
   Hypertension, diabetes, hyperlipidemia, weight, smoking

E. Clinical presentation
1. Typical symptoms
   Chest, jaw and/or arm pain
2. Atypical symptoms that may be angina
   Sharp, stabbing, pleuritic, reproducible on palpation or movement
3. May not have chest pain; may see S/S heart failure, change in MS
4. Women
   Frequently do not experience chest pain
   SOB, weakness, unusual fatigue, diaphoresis
   Earlier signs nausea, unusual fatigue, anxiety
5. Elderly more likely to have atypical chest pain
   SOB, nausea, diaphoresis, fainting

F. AHA/ACC Guidelines
1. Identify potential precipitating causes of chest pain and assess hemodynamic impact
   Myocardial ischemia: uncontrolled HTN, thyrotoxicosis
   Cardiac disease: aortic stenosis, hypertrophic cardiomyopathy
   Noncoronary causes: hematologic, pulmonary, GI, chest wall, psychiatric
2. History
   New onset chest/left arm pain or chest/left arm pain like previous angina
   Known history CAD
   Age > 70 years
   Male
3. Pain assessment
   - P = Precipitating factors
   - Q = quality
   - R = Radiation/relieving factors
   - S = Severity
   - T = Timing

4. Physical assessment
   - CP reproducible; recent cocaine use; transient MI; hypotension; diaphoresis; pulmonary edema; crackles

5. ECG
   - Normal; fixed Q waves, abnormal ST-segment or T-waves; transient ST-segment changes; T-wave inversion; Symptomatic changes

6. Cardiac markers
   - Normal or elevated

7. Tools for risk stratification
   - ECG changes
     - Normal ECG
     - Abnormal ECG complexes
       - T-wave inversion
       - ST depression
       - ST elevation
       - Q-wave

   **ischemia**
   **injury**

   **Q waves: Negative deflection before R wave; > .04 second in width; > 1/3 height of R wave**

8. 12-lead ECG changes
   - Obtain 12-lead ECG during episode of chest pain. Changes may disappear when patient is asymptomatic. ST-segment changes of >0.05 mV during chest pain are significant.

<table>
<thead>
<tr>
<th>Location</th>
<th>Anterior</th>
<th>Inferior</th>
<th>Lateral</th>
<th>Septal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>II, III, avF</td>
<td>I, avL, V5, V6</td>
<td>V4</td>
<td>V1</td>
</tr>
</tbody>
</table>
ECG Leads | V2-V4 |
--- | --- |
Need to see changes in at least two contiguous leads  
Lateral and septal rarely isolated  
Common: Anterolateral, anteroseptal

Inferior wall MI (IWMI) - occlusion of RCA - 33% of all MIs  
Lower mortality  
Associated dysrhythmias  
1º AV Block, 2º AV Block, Type I, 3º AV block with junctional escape pacemaker, junctional rhythm, idioventricular, V-tach  
Usually temporary  
Often affects right ventricle as well

Anterior wall MI (AWMI) - occlusion of LAD - 42% of all MIs  
Higher mortality  
Associated dysrhythmias  
2º AV Block, Type II, 3º AV Block with ventricular escape pacemaker, AF, ventricular  
Usually permanent  
High risk for development of heart failure, cardiogenic shock

### Diagnostic Laboratory Tests

#### Cardiac Markers for MI

<table>
<thead>
<tr>
<th>Test</th>
<th>Cardiac Troponin T (cTnT)</th>
<th>Cardiac Troponin I (cTnI)</th>
<th>CK</th>
<th>CK-MB</th>
<th>Myoglobin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal value</td>
<td>&lt; 0.1 ng/ml</td>
<td>&lt; 1.5 ng/ml</td>
<td></td>
<td>0% of total CK</td>
<td>&lt; 85 ng/ml</td>
</tr>
<tr>
<td>Time to rise</td>
<td>3-4 hr</td>
<td>4-6 hr</td>
<td>4-6 hr</td>
<td>6-10 hr</td>
<td>1-4 hr</td>
</tr>
<tr>
<td>Peak</td>
<td>24 hr</td>
<td>18 hr</td>
<td>24 hr</td>
<td>12-24 hr</td>
<td>6-12 hr</td>
</tr>
<tr>
<td>Return to normal</td>
<td>2-3 wk</td>
<td>1-2 wk</td>
<td>3-4 days</td>
<td>2-3 days</td>
<td>1-2 days</td>
</tr>
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8. Pharmacological agents used in treatment of MI

<table>
<thead>
<tr>
<th>Drug</th>
<th>Indications and Actions</th>
<th>Collaborative Management</th>
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<tbody>
<tr>
<td>Drug</td>
<td>Indications and Actions</td>
<td>Collaborative Management</td>
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<tr>
<td>----------------------</td>
<td>----------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Aspirin</td>
<td>US, NSTEMI, STEMI</td>
<td>Chew</td>
</tr>
<tr>
<td></td>
<td>Reduces platelet aggregation</td>
<td>Monitor for bleeding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contraindicated if allergic</td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>Chest pain, ST elevation</td>
<td>SL followed by IV if chest</td>
</tr>
<tr>
<td></td>
<td>Venous dilation</td>
<td>pain unrelieved</td>
</tr>
<tr>
<td></td>
<td>Some arterial dilation</td>
<td>Monitor for relief of chest</td>
</tr>
<tr>
<td></td>
<td>Coronary dilation</td>
<td>pain</td>
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<tr>
<td></td>
<td></td>
<td>Monitor blood pressure</td>
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<tr>
<td></td>
<td></td>
<td>Titrate slowly</td>
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<tr>
<td></td>
<td></td>
<td>Acetominophen for headache</td>
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<tr>
<td></td>
<td></td>
<td>Do not use within 24 hr of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>erectile dysfunction</td>
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<td></td>
<td></td>
<td>medication use such as</td>
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<tr>
<td></td>
<td></td>
<td>sildenafil (Viagra),</td>
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<tr>
<td></td>
<td></td>
<td>vardenafil (Levitra),</td>
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<tr>
<td></td>
<td></td>
<td>and tadalafil (Cialis)</td>
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<tr>
<td>Beta Blockers</td>
<td>Limit infarct size, improve survival post MI</td>
<td>Give PO; if hypertensive,</td>
</tr>
<tr>
<td>Noncardioselective</td>
<td>Decreases myocardial oxygen consumption (MVO2), increases diastolic filling time and</td>
<td>give IV; followed by oral</td>
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<tr>
<td>Propranolol (Inderal)</td>
<td>coronary blood flow</td>
<td>Monitor BP, HR, rhythm</td>
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<tr>
<td>Cardioselective</td>
<td></td>
<td>Give only cardioselective</td>
</tr>
<tr>
<td>Metoprolol (Lopressor; Atenolol (Tenormin)</td>
<td></td>
<td>βB in patients with asthma,</td>
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<td></td>
<td></td>
<td>COPD</td>
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<td></td>
<td></td>
<td>Contraindicated in severe</td>
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<tr>
<td></td>
<td></td>
<td>HF, 2nd &amp; 3rd degree AVB,</td>
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<tr>
<td></td>
<td></td>
<td>hypotension, SB &lt; 50 bpm</td>
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<tr>
<td>Ace inhibitors</td>
<td>LV dysfunction, diabetic, high risk chronic CAD with normal LV fx</td>
<td>Monitor blood pressure,</td>
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<tr>
<td>Captopril (Capoten)</td>
<td>Block rennin-angiotensin system</td>
<td>urine output, BUN and</td>
</tr>
<tr>
<td>Enalopril (Vasotec)</td>
<td></td>
<td>creatinine</td>
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<tr>
<td></td>
<td></td>
<td>Need to discontinue if</td>
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<tr>
<td></td>
<td></td>
<td>BUN/creatinine elevated</td>
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<tr>
<td>Morphine</td>
<td>Relief of persistent pain despite NTG and anti-ischemic agents</td>
<td>Monitor BP, respirations</td>
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<td></td>
<td>Decreases anxiety</td>
<td>Hypotension more common</td>
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<tr>
<td></td>
<td>Reduces MVO2 and preload through venodilation and decreased SBP</td>
<td>than hypoventilation</td>
</tr>
<tr>
<td>Heparin</td>
<td>Prevent reoclusion of coronary arteries</td>
<td>Monitor PTT with UFH for</td>
</tr>
<tr>
<td>Unfractionated</td>
<td>UFH or LMWH in likely or definite ACS</td>
<td>therapeutic range</td>
</tr>
<tr>
<td>Heparin (UFH)</td>
<td>UFH if CABG is planned</td>
<td>Assess for bleeding</td>
</tr>
<tr>
<td>Low molecular weight</td>
<td>LMWH or UFH if PCI planned</td>
<td>LMW Heparin, given SC; less</td>
</tr>
<tr>
<td>(LMWH): Enoxaparin</td>
<td></td>
<td>bleeding, no monitoring of</td>
</tr>
<tr>
<td>(Lovenox); Dalteparin</td>
<td></td>
<td>blood levels, longer-acting;</td>
</tr>
<tr>
<td>(Fragmin)</td>
<td></td>
<td>less incidence of HIT</td>
</tr>
<tr>
<td>Antiplatelet - oral</td>
<td>Prevention of thrombus formation</td>
<td>Assess for bleeding</td>
</tr>
<tr>
<td>Clopidogrel (Plavix)</td>
<td>Onset of effectiveness delayed compared to ASA; indicated for</td>
<td>Give UFH or LMWH,</td>
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<td></td>
<td>patients with ASA allergy.</td>
<td>possibly IIb, IIIA</td>
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<td></td>
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<td>simultaneously due to delay in</td>
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### Drug Indications and Actions Collaborative Management

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<tr>
<th>Drug</th>
<th>Indications and Actions</th>
<th>Collaborative Management</th>
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</thead>
<tbody>
<tr>
<td>Antiplatelet – IV&lt;br&gt;Abciximab (ReoPro)&lt;br&gt;Tirofiban (Aggrastat)&lt;br&gt;Epifibatide (Integrilin)</td>
<td>IIB, IIIa inhibitors used as adjunct to PTCA, and to reduce dosage of fibrinolytics in AMI</td>
<td>Strict BR for 6-8 hours after infusion is complete&lt;br&gt;Monitor CBC&lt;br&gt;To reverse, give platelets</td>
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<td>Fibrinolytics&lt;br&gt;Alteplase (t-PA, Activase)&lt;br&gt;Tenecteplase (TNKase)&lt;br&gt;Retplase (Retavase)&lt;br&gt;Streptokinase (Streptase)</td>
<td>Lysis of thrombus in acute STEMI or new BBB&lt;br&gt;Pain less than 12 hours or still having pain&lt;br&gt;See below for absolute and relative contraindications</td>
<td>Assess for relief of pain, ST segment return to baseline, reperfusion dysrhythmias, early CK peak&lt;br&gt;Monitor for bleeding&lt;br&gt;Avoid puncture&lt;br&gt;Monitor for reoccurrence of pain; indicates reocclusion</td>
</tr>
<tr>
<td>Contraindications with fibrinolytics:</td>
<td>Hx intracranial hemorrhage; AVM; intracranial neoplasm; ischemic stroke within 3 months; suspected aortic dissection; active bleeding except menses; closed-head or facial trauma within 3 month</td>
<td></td>
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<tr>
<td>Cautions with fibrinolytics:</td>
<td>Hx poorly controlled htn; htn on presentation with SBP &gt;180 or DBP&gt;110 mmHg; hx ischemic stroke &gt;3 months; traumatic or prolonged CPR &gt;10 min; major surgery &lt;3 weeks; internal bleeding &lt;4 weeks; pregnancy; current use of anticoagulants – higher the INR, greater the risk</td>
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9. **Collaborative Management of ACS**<br>Based on short-term risk of death or nonfatal MI in patients with UA<br>**High risk**<br>**Intermediate risk**<br>**Low risk**

<table>
<thead>
<tr>
<th>Feature</th>
<th>High Risk</th>
<th>Intermediate Risk</th>
<th>Low Risk</th>
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<tbody>
<tr>
<td>History</td>
<td>(At least 1 of the following features must be present)</td>
<td>(No high-risk features, but must have 1 of the following features)</td>
<td>(No high- or intermediate-risk features, but may have any of the following features)</td>
</tr>
<tr>
<td>Accelerating tempo of ischemic symptoms in preceding 48 hrs</td>
<td>Prior MI, peripheral or cerebrovascular disease, or CABG; prior aspirin use</td>
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<tr>
<td>Character of pain</td>
<td>Prolonged ongoing (&gt;20 min) rest pain</td>
<td>Prolonged (&gt;20 min) rest angina, now resolved, with moderate or high likelihood of CAD Rest angina (&lt;20 min or relieved with rest or sublingual NTG)</td>
<td>New-onset or progressive angina for &lt;20 min. that limits or prohibits ordinary physical activity occurring in the past 2 weeks with moderate or high likelihood of CAD</td>
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<tr>
<td>Clinical findings</td>
<td>Pulmonary edema, most likely related to ischemia. New or worsening MR murmur. S3 or new/ worsening crackles. Hypotension, brady- or tachycardia. Age &gt;75 yrs</td>
<td>Age &gt;70 yrs</td>
<td></td>
</tr>
<tr>
<td>ECG findings</td>
<td>Angina at rest with transient ST-segment changes &gt;0.05 mV New or presumed new BBB Sustained VT</td>
<td>T-wave inversions &gt;0.2 mV Pathological Q-waves</td>
<td>Normal or unchanged ECG during an episode of chest discomfort</td>
</tr>
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</table>

All: Targeted H&P, IV access, cardiac markers, ASA, ECG, continuous ECG monitoring

Low risk: Observation, repeat ECG and markers, stress test
Positive stress test: admit, percutaneous coronary intervention (PCI).
Intermediate risk: SL then IV NTG; morphine, β-blocker, heparin; GP IIb/IIIa inhibitor if PCI is planned
Oxygen if O₂ saturation is < 90% or for first 2-3 hr
Repeat ECG and cardiac markers
Cardiologist’s choice of conservative or invasive treatment
Early conservative treatment
- Stabilize, echocardiogram
- Ejection fraction (EF) > 40%: stress test
  - If positive, PCI
- EF < 40%, PCI

Early invasive treatment
- PCI

High risk: Non-ST-segment elevation.
- Same as intermediate risk

High risk: ST-elevation MI or new BBB: Chest pain greater than 12 hours
- Same as intermediate risk

High risk: ST-elevation MI or new BBB: Chest pain less than 12 hours
Oxygen, IV NTG, morphine, β-blocker, heparin

Reperfusion options
Fibrinolysis preferred
- Early presentation ≤3 hours from symptom onset and delay to invasive strategy
- Invasive strategy not an option
- Delay to invasive strategy >90 minutes

PCI preferred
- Skilled PCI available with surgical backup
- High risk for complications R/T STEMI
- Contraindications to fibrinolysis
- Late presentation >3 hours
- Diagnosis of STEMI is in doubt

10. Right ventricular infarction

Pathophysiology
- Occlusion of right coronary artery
- 50% of patients with inferior or posterior MI
- Inadequate stroke volume, decreased output to lungs & LV

Clinical manifestations
- Triad: hypotension, JVD (Kussmaul’s sign), clear lungs
- Bradycardia, hepatojugular reflex, pulsus paradoxus
- Elevated RAP, normal or decreased PAOP, decreased CO/CI

Diagnostic testing
- Right sided EKG
- ST elevations in V4R, V5R, V6R
- V4R 90% specific for RVMI

Collaborative management
- Administer large volumes of crystalloids as tolerated
  - NSS at 200 cc/hr for 1-2 liters
- May require dobutamine
- Monitor for dysrhythmias, esp. symptomatic bradycardia, ventricular escape rhythms and heart block
- May need atropine, pacemaker for AV block
- Contraindicated: anything that lowers preload
  - Nitroglycerin, diuretics, morphine

11. Interventional and surgical treatment of ACS

Percutaneous Coronary Intervention (PCI)
- Cardiac catheterization and angiography
- Catheters place via femoral artery and vein into right and left heart
- Heart pressures are measured
- Dye injected to visualize coronary arteries

Percutaneous Transluminal Coronary Angioplasty (PTCA) and stenting
- Balloon-tipped catheter advanced to lesion
Inflated intermittently to fracture plaque
Often used in conjunction with stents
Provides a framework to keep artery open, and to increase lumen size
Area of lesion is opened, stent is deployed
Drug-eluting stent to improve outcome

Coronary Artery Bypass Grafting (CABG)
Indicated for relief of angina uncontrolled through medical means
More effective than PTCA/stenting in left main disease, triple-vessel disease, and double-vessel disease where one of the vessels is the proximal LAD and multivessel CAD with DM
Vessels, usually saphenous vein or internal mammary artery around obstruction.

12. Nursing interventions
ACS:
Maintain patient on bedrest with bedside commode if hemodynamically stable
Vital signs, neuro checks, cardiac, pulmonary assessments, I&O
Monitor cardiac rhythm for ST elevations and dysrhythmias
Maintain patent IV line for emergency therapies
Assess for normal bowel function; avoid constipation
Avoid valsalva maneuver
Monitor for, prevent and treat complications
Dysrhythmias
Heart failure
Cardiogenic shock
Papillary muscle dysfunction, ventricular septal rupture
Ventricular aneurysm
Pericarditis
Sudden cardiac death
Assess effectiveness of therapies: absence or normalization of chest pain, denies SOB, normal sinus rhythm or asymptomatic sinus bradycardia, hemodynamic stability, decreased anxiety, demonstration of understanding of education.
Provide emotional support to patient and family
Teach patient/family
Smoking cessation
Blood pressure control
Lipid Management
Physical activity
Weight management
Diabetes management
ACE inhibitor, Beta Blockers, and Antiplatelet medications
written information with teaching, lifestyle changes, diagnostic testing and therapies

PCI
Pre-procedure: maintain patient NPO; ensure consent has been signed and patient understands procedure and risks; check for allergies, including medication, dye, and shellfish; check appropriate labs, including CBC, electrolytes, BUN & creatinine; administer preprocedure medications as ordered: ASA, clopidigrel; GP IIb/IIIa inhibitor, unfractionated heparin or bivalirudin or argatroban for patient with HIT

Post procedure:
Femoral site care: check groin for bleeding; check for retroperitoneal bleed; if pressure device is used, monitor pressures; keep patient flat for 6 hr; insert foley catheter if unable to void in supine position.
Circulation: check peripheral pulses, color, temperature, paresthesia of affected limb
Rehydration: encourage po fluids, administer IVF as ordered
Monitor for recurrence of angina, dysrhythmias
Post sheath removal: monitor for bradycardia, hypotension. Treat with Atropine

Surgical patient:
Cardiovascular support
Heart rate: temporary pacing for bradycardia, β-blockade or calcium channel blockade for tachycardia and afib. Maintain serum K⁺ at 4.5-5.0 to protect from ventricular dysrhythmias.
Preload: Monitor PAOP, keep on high side, 18-20 mmHg; administer crystalloids, colloids, or packed red blood cells.
Afterload: Monitor for hypertension due to intra-op hypothermia; administer nitroprusside as indicated. Treat hypotension with volume, phenylephrine (Neosynephrine).
Contractility: Positive inotropes (dobutamine, milrinone), intra-aortic balloon pump.
Hypothermia: Warm blankets, Bair Hugger, warmed fluids
Bleeding: Monitor chest tube drainage; treat if greater than 150cc/hr with FFP, platelets, Amicar, DDAVP, protamine sulfate.
Chest tube: Maintain patency through milking, stripping, if unavoidable. Loss of patency can cause cardiac tamponade.
Cardiac tamponade: Due to accumulation of blood in mediastinal space. Monitor CVP, PAOP, PAS/PAD. Elevated ≥ 20 mmHg and equalized an indication of tamponade. Monitor for decreased CO, hypotension, JVD, pulsus paradoxus, muffled heart sounds.

Pulmonary care
Promote early extubation – 4-8 hr post-op
Begin weaning when hemodynamically stable, bleeding is controlled, and temperature is normal.

Neurologic
May see alterations due to decreased perfusion during bypass. Assess neuro status, administer haloperidol for delirium as needed, reorient and use appropriate lighting, noise reduction, liberal visitation,
Infection

Post-op fever to 101°F not uncommon. Assess for sternal wound infection, leg incision infection, pneumonia, UTI.

Renal

From decreased perfusion during surgery
Follow I&O, BUN, creatinine
Assess color, amount, presence of sediment

Certification Questions

1. For a patient with an anterior wall MI, which of the following findings would the nurse be especially vigilant for?
   A. Sinus bradycardia with a rate of 40 bpm
   B. Hiccoughs and GI upset
   C. Signs and symptoms of heart failure
   D. JVD and peripheral edema

2. A patient has undergone emergency coronary bypass within 2 hours after percutaneous coronary intervention with administration of GpIIb-IIIa inhibitors. Treatment of this patient’s mediastinal oozing and chest tube output of 100 ml/hr should include administration of:
   A. Platelets
   B. Protamine sulfate
   C. Vitamin K
   D. Argatroban

3. A patient who has had chest pain intermittently for 16 hours, unrelieved by aspirin and nitroglycerin, is admitted to the ICU. A 12-lead ECG shows ST segment elevation in leads II, III and aVF. Which of the following interventions would most benefit this patient?
   A. Administration of thrombolytic therapy such as streptokinase or TNK
   B. Transfer to a hospital able to perform open heart surgery
   C. Administration of heparin and GpIIb/IIIa inhibitor
   D. Immediate transfer to the cardiac catheterization suite for percutaneous coronary intervention

4. A 67-year old female patient underwent CABG surgery 1 hour ago, and is now in the ICU. She has lost 350 ml of blood from her chest tube since her admission to the ICU. Her BP is 168/84 mmHg, and her HR is 144 BPM. She has a pulmonary artery catheter in place, and her PAP is 21/8 mmHg, with a PAOP 6 mmHg. Which assessment parameter is most important to monitor over the next hour?
   A. Central venous pressure
   B. Pulse rate
   C. Pulmonary artery pressure
   D. Amount of chest tube drainage
5. An ECG taken on a patient experiencing chest pain reveals ST-elevations in leads II, III, and aVF. The nurse administers 1/150 grains of sublingual nitroglycerin, and the patient’s BP drops from 130/80 to 80/50. The most likely cause of the decrease in blood pressure for this patient is:
   A. Hypersensitivity to nitroglycerin
   B. Right ventricular MI
   C. Papillary muscle rupture
   D. Rupture of the ventricular free wall

6. During sheath removal after percutaneous coronary intervention (PCI), a patient’s heart rate decreases to 40 beats/min, BP decreases to 80/50 mm Hg, and the patient complains of nausea. Appropriate treatment for this patient would include which of the following?
   A. Continue to monitor the patient, anticipating the heart rate and BP will return to baseline within 5 minutes
   B. Administer atropine 0.5 mg intravenously to treat vasovagal reaction
   C. Administer prochlorperazine (Compazine) 10 mg IV to reduce nausea
   D. Notify the MD immediately of potential retroperitoneal bleeding

7. This ECG was obtained from a patient complaining of chest pain. After reviewing the ECG, the most appropriate action for the nurse would be to:
   A. Obtain a right side ECG
   B. Obtain a second ECG in 30 minutes
   C. Institute transcutaneous pacing at a rate of 60
   D. Administer atropine 0.5 mg IV

References


American College of Cardiology and American Heart Association, Inc. ACC/AHA 2002


Pope, B. (2004). What’s at the Heart of your Patient’s Chest Pain? Nursing made Incredibly Easy!. 2(1); 8-19.

