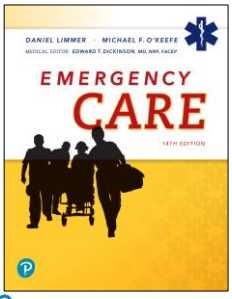
Emergency Care

Fourteenth Edition



Chapter 20

Cardiac Emergencies

Topics

- Cardiac Anatomy and Physiology
- Acute Coronary Syndrome
- Cardiovascular Disorders

Cardiac Anatomy and Physiology

Back to Topics

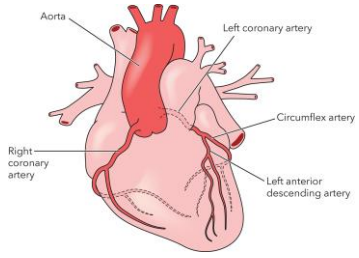
Cardiac Anatomy and Physiology (1 of 2)

- Review of the cardiovascular system:
  - Composition of the blood
  - Flow of blood through the chambers of the heart
  - Flow of blood through arteries, veins, arterioles, venules, and capillaries
  - Circulation of blood between heart and lungs, and between heart and the rest of body

Cardiac Anatomy and Physiology (2 of 2)

- Only job of the heart is to pump blood.
  - Generation and distribution of electrical charge
  - Mechanical response to create rhythmic and unceasing pumping action
  - Requires constant supply of oxygen and nutrients

Coronary Arteries



The coronary arteries.

Think About It

- How does the normal function of the heart and blood vessels relate to blood pressure and distal pulses?
- How is shock related to the function of the heart and blood vessels?

Acute Coronary Syndrome

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Acute Coronary Syndrome (1 of 4)

- Sometimes called cardiac compromise
- Refers to any time the blood supply to the cells of the heart is blocked or disrupted
- Heart muscle cells go without oxygen, causing cell death.

Acute Coronary Syndrome (2 of 4)

- Hypoxic condition of the heart is called ischemia
- Cells die quickly without adequate blood supply

Acute Coronary Syndrome (3 of 4)

- Chest discomfort is best-known symptom.
  - Can be described as pressure, squeezing, or aching
- Radiates to the jaw, neck, either arm, or upper abdomen
- Dyspnea is another common finding in older patients and women

Acute Coronary Syndrome (4 of 4)

- Other symptoms
  - Nausea and/or vomiting
  - Syncope
  - Sudden onset of sweating
  - Abnormal pulse (tachycardia/bradycardia)
  - Abnormal blood pressure
  - Anxiety, feeling of impending doom

Patient Assessment (1 of 8)

- Acute coronary syndrome
  - Perform primary assessment.
  - Explore chief complaint.
  - Use OPQRST to get history of present illness.
  - Obtain past medical history.
  - Take baseline vital signs.

Patient Assessment (2 of 8)

- Signs and symptoms of ACS
  - Pain, pressure, or discomfort in the chest, jaw, neck, arms, or upper abdomen
  - Difficulty breathing
  - Palpitations
  - Sudden onset of sweating and nausea or vomiting

Patient Assessment (3 of 8)

- Signs and symptoms of ACS
  - Syncope
  - Anxiety
  - Unusual generalized weakness
  - Abnormal pulse
  - Abnormal blood pressure

Patient Assessment (4 of 8)

- Physical examination
  - Grabbing or clutching the center of the chest
  - Sweating
  - Pale or gray skin
  - Anxiousness or restlessness

Patient Assessment (5 of 8)

- Physical examination
  - Acute pulmonary edema
  - Swollen ankles and feet
  - Medic alert jewelry indicating cardiac problems

Patient Assessment (6 of 8)

- 12-lead ECG
  - Speed up process of recognizing electrocardial findings
  - Interpretation is outside scope of EMT
  - EMT can place leads and acquire print tracing
  - EMT can transmit ECG to destination hospital

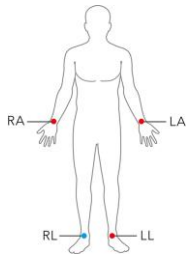
Patient Assessment (7 of 8)

- Preparing a patient for an ECG
  - Place electrodes on chest
  - Electrodes need secure contact with the skin
  - Remove clothing and jewelry
  - Remove sweat and dead skin cells
  - Remove hair

Patient Assessment (8 of 8)

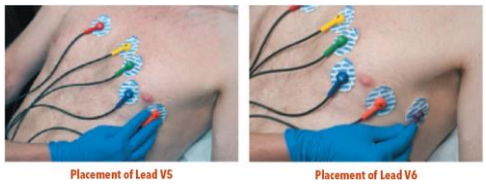
- 12-lead ECG placement
  - Step 1—Place limb leads
  - Step 2—Place V1 and V2 leads
  - Step 3—Place V4 and V3 leads
  - Step 4—Place V5 and V6 leads

12-Lead ECG (1 of 2)



Placement of arm and leg leads.

12-Lead ECG (2 of 2)



Placement of V5 and V6

Care of the Patient with Acute Coronary Syndrome (1 of 8)

- Fundamental Principles of Care
  - Place patient in position of comfort.
  - Determine if oxygen should be administered.
    - Respiratory failure, agonal breaths, or apneic should receive high-concentration oxygen via ventilations

Care of the Patient with Acute Coronary Syndrome (2 of 8)

- Fundamental Principles of Care
  - Determine if oxygen should be administered.
    - Low oxygen saturations receive high-concentration oxygen via mask or nasal cannula
    - No significant distress and oxygen saturation of at least 94 percent should not receive oxygen

Care of the Patient with Acute Coronary Syndrome (3 of 8)

- Fundamental Principles of Care
  - If trained, equipped, and authorized to do so, obtain a 12-lead electrocardiogram (ECG).
  - Follow local protocol as to whether to transmit it to hospital for interpretation.

Care of the Patient with Acute Coronary Syndrome (4 of 8)

- Fundamental Principles of Care
  - Administer 325 mg of aspirin by mouth if allowed
  - Indications for NOT administering aspirin
    - Risk for aspiration
    - Already taken a full dose
    - Aspirin allergy
    - Recent GI bleeding
    - Taking blood thinner

Treatment (1 of 2)

Aspirin

Care of the Patient with Acute Coronary Syndrome (5 of 8)

- Fundamental Principles of Care
  - Indications for administering nitroglycerin
    - Chest pain
    - History of cardiac problems
    - Physician has prescribed nitroglycerin to patient
    - Patient has nitroglycerin at hand

Treatment (2 of 2)

Nitroglycerin

Care of the Patient with Acute Coronary Syndrome (6 of 8)

- Fundamental Principles of Care
  - Indications for administering nitroglycerin
    - Systolic blood pressure meets protocol criteria
    - Patient has not had Viagra or similar drug for erectile dysfunction within 48 to 72 hours
    - Medical direction authorizes administration of the medication

Care of the Patient with Acute Coronary Syndrome (7 of 8)

- Fundamental Principles of Care
  - After giving one dose of nitroglycerin, repeat dose in 5 minutes if:
    - Patient experiences no relief or only partial relief.
    - Systolic blood pressure remains greater than 90 to 100 systolic.
    - Medical direction authorizes another dose of medication.

Care of the Patient with Acute Coronary Syndrome (8 of 8)

- Fundamental Principles of Care
  - Administer maximum of three doses of nitroglycerin
    - Reassess vital signs and chest pain after each dose
    - Treat for shock if blood pressure falls below 90 to 100 systolic
    - Transport promptly

Cardiovascular Disorders

Back to Topics

Cardiovascular Disorders

- Heart problems caused by a number of disorders affecting condition and function of blood vessels and heart

Coronary Artery Disease (1 of 2)

- Conditions that narrow or block arteries of heart
- Often result from fatty deposit buildup on inner walls of arteries
- Buildup narrows inner vessel diameter, restricting flow of blood.

Coronary Artery Disease (2 of 2)

- Risk factors
  - Heredity
  - Age
  - Hypertension
  - Obesity
  - Lack of exercise
  - Elevated blood cholesterol and triglycerides
  - Cigarette smoking

Angina Pectoris (1 of 2)

- Chest pain caused by insufficient blood flow to the myocardium
- Typically due to narrowed arteries secondary to coronary artery disease
- Pain usually during times of increased myocardial oxygen demand, such as exertion or stress

Angina Pectoris (2 of 2)

- Possession of nitroglycerin is good indication that patient has history of angina
- Nitroglycerin dilates blood vessels so heart has less blood to pump

Assessing and Treating Angina Pectoris

- If symptoms subside with rest, it is angina pectoris.
- Assume patient is having myocardial infarction until proven otherwise.
- Consider oxygen, administer nitroglycerin and aspirin, obtain 12-lead ECG, transport.

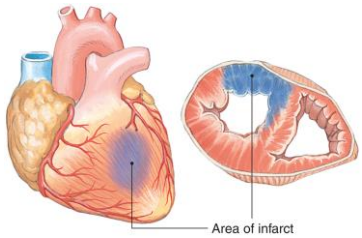
Acute Myocardial Infarction (1 of 6)

- Hardened plaque can cause rupture (aneurysm) of a blood vessel.
- Narrowing of a vessel causes blood flow to be blocked by an occlusion.

Acute Myocardial Infarction (2 of 6)

- Thrombus
  - Occlusion of blood flow caused by formation of a clot on rough inner surface of diseased artery
  - Can break loose and form an embolism
- Emboli can move to occlude flow of blood downstream in a smaller artery.
- Blocking of coronary artery by thrombus or embolism is an acute myocardial infarction (AMI).

Acute Myocardial Infarction (3 of 6)



Cross-section of a myocardial infarction.

Acute Myocardial Infarction (4 of 6)

- Acute myocardial infarction can cause:
  - Ischemia
    - Leads to injury of cells and cell death
    - Disturbs electrical function of the heart
  - Dysrhythmias
    - Harmful changes to rate, rhythm, and pumping ability

Acute Myocardial Infarction (5 of 6)

- Acute myocardial infarction can cause:
  - Mechanical problems within the heart
    - Cardiogenic shock
  - Sudden death
    - Cardiac arrest within 2 hours of the onset of symptoms

Acute Myocardial Infarction (6 of 6)

- Treatment of AMI at the hospital
  - Fibrinolytics
  - Balloon angioplasty
- Treatment upon discharge
  - Aspirin every day
  - Beta blocker

Assessment and Treatment of a Myocardial Infarction (1 of 2)

- Primary and secondary assessment
- Pattern of symptoms similar to ACS
  - Chest discomfort
  - Dyspnea
  - Nausea/vomiting
  - Syncope
  - Sweating

Assessment and Treatment of a Myocardial Infarction (2 of 2)

- Most important treatment is transport
- 12-lead ECG
- Contact ALS
- Be prepared for cardiac arrest
- Aspirin and nitroglycerin

Heart Failure and Acute Pulmonary Edema (1 of 3)

- Heart failure
  - Congestive heart failure (CHF)
  - Heart is unable to pump blood efficiently
  - Ability to perfuse body tissues is impaired
  - Exercise-related tasks are difficult
  - Limited ability to compensate for challenge
  - Causes fluid buildup

Heart Failure and Acute Pulmonary Edema (2 of 3)

- Right-sided failure
  - Pressure builds up in right atrium and superior and inferior vena cava
  - Jugular venous distention
  - Swelling and fluid buildup in abdomen
  - Pedal edema

Heart Failure and Acute Pulmonary Edema (3 of 3)

- Left-sided failure
  - Pressure builds up in left atrium and pulmonary vein
  - Fluid leaks into alveoli
  - Gas exchange is impaired
  - Pulmonary edema
  - Can be life-threatening

Assessment and Treatment of Heart Failure (1 of 4)

- Assessment:
  - History of heart failure
  - Medications designed to control fluid levels
  - Pedal edema
  - Swelling in the abdomen or buttocks
  - JVD

Assessment and Treatment of Heart Failure (2 of 4)

- Assessment:
  - Pulmonary edema
  - Difficulty breathing
  - Crackles
  - Coughing up pink, frothy sputum

Assessment and Treatment of Heart Failure (3 of 4)

- Examination:
  - Primary assessment
    - May require positive pressure ventilation
  - Use OPQRST and SAMPLE
  - Detailed assessment of cardiovascular system
  - Vital signs

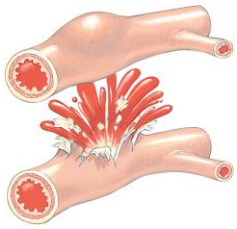
Assessment and Treatment of Heart Failure (4 of 4)

- Treatment:
  - Treat signs and symptoms
  - Contact ALS for pulmonary edema
  - Consider application of CPAP
  - Administer nitroglycerin

Aneurysm (1 of 2)

- Weakened sections of arterial walls begin to dilate (balloon).
- Bursting can cause rapid, life-threatening internal bleeding.

Aneurysm (2 of 2)



A weakened area in the wall of an artery will tend to balloon out, forming a saclike aneurysm, which may eventually burst.

Chapter Review

Chapter Review (1 of 6)

- Patients with acute coronary syndrome (ACS) can have many different presentations. Some complain of pressure or pain in the chest with difficulty breathing and a history of heart problems. Others may have just mild discomfort that they ignore for several hours or that goes away and returns. Some patients having heart attacks have no chest discomfort at all.

Chapter Review (2 of 6)

- Use a thorough secondary assessment to identify the signs and symptoms associated with the pattern of acute coronary syndrome.

Chapter Review (3 of 6)

- Because of the many possible presentations and the potentially severe complications of acute coronary syndrome, it is important to have a high index of suspicion and to treat patients with these symptoms aggressively. The treatment will not hurt them and may help them.

Chapter Review (4 of 6)

- Patients with suspected ACS who are hypoxic or short of breath need oxygen and prompt, safe transportation to definitive care. You may be able to assist patients who have their own nitroglycerin in taking it, thereby relieving pain and anxiety.

Chapter Review (5 of 6)

- Definitive treatment for an acute myocardial infarction occurs at the hospital. Treat suspected AMI as a time-sensitive disorder. Consider appropriate transportation destinations, activate systems of care, and obtain early 12-lead ECG, if possible.

Chapter Review (6 of 6)

- Aspirin and nitroglycerin are first-line medications associated with the treatment of acute coronary syndrome.
- Heart failure is a chronic condition that can have life-threatening acute presentations. Recognize the signs and symptoms of acute pulmonary edema and treat aggressively.

Remember (1 of 4)

- The heart is a simple pump that moves deoxygenated blood to the lungs and oxygenated blood to the body. Pressure within the cardiovascular system is critical to the moving of blood.

Remember (2 of 4)

- Acute coronary syndrome (ACS) is a blanket term that refers to a number of situations in which perfusion of the heart is inadequate.
- Although there are common symptoms of ACS, EMTs must recognize atypical findings and err on the side of caution.

Remember (3 of 4)

- Oxygen, nitroglycerine, and aspirin are key medications indicated to treat ACS. However, the definitive treatment is transportation of the patient to a facility that can open the blocked artery.

Remember (4 of 4)

- Most cardiac conditions are caused by arterial problems. Angina pectoris and acute myocardial infarction are caused by inadequate perfusion of the heart.

Questions to Consider

- What position is best for a patient with:
  - Difficulty breathing and a blood pressure of 100/70?
  - Chest pain and a blood pressure of 180/90?

Critical Thinking

- A 62-year-old female has been complaining of severe shortness of breath and chest pain for 15 minutes prior to your arrival. When you arrive, you find the patient conscious but with difficulty breathing and oxygen saturation of 88 percent. What steps should you take in caring for this patient?

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