Chest Pain

Summary from Rosen's By Liang Liu

Epidemiology

- Chest pain accounts for approximately 6 million patients visits to the ED annually, that is 9% of all patients seen in the ED
- A number of risk factors are associated with increased probability of certain life-threatening pathologies
    - Acute coronary syndrome – family or personal history of CAD, age diabetes mellitus, hypertension, smoking, dyslipidemia, sedentary lifestyle, obesity, cocaine abuse
    - Pulmonary embolism – prolonged immobilization, recent history of surgery, prior VTE, pregnancy, oral contraceptive use with smoking, congestive heart failure, COPD, obesity, and history of hypercoagulability
    - Aortic dissection – HTN, congenital disease of the aorta or aortic valve, inflammatory aortic disease, connective tissue disease, pregnancy, arteriosclerosis, smoking
    - Pericarditis or myocarditis – infection, autoimmune disease, acute rheumatic fever, recent MI or cardiac surgery, malignancy, radiation therapy to mediastinum, uremia, drugs, and prior pericarditis
    - Pneumothorax – prior pneumothorax, Valsalva's maneuver, chronic lung disease, smoking

Pathophysiology

- Afferent visceral fibers from heart, lungs, great vessels, and esophagus enter the same thoracic dorsal ganglia ➔ nonspecific location of pain
- Dorsal segments overlap three segments above and below a level ➔ Disease from the thoracic region can result in pain anywhere from the jaw to the epigastrium
- Somatic afferent fibers synapse in the same dorsal root ganglia as the thoracic viscera ➔ Radiation of pain

Differential Diagnosis

- Wide variety of causes including cardiovascular, pulmonary, GI, musculoskeletal, and neurologic
- Critical diagnosis – Acute myocardial infarction (MI), acute coronary ischemia, aortic dissection, cardiac tamponade, pulmonary embolus, tension pneumothorax, esophageal rupture
- Emergent diagnosis – Unstable angina, coronary spasm, Prinzmetal's angina, cocaine-induced pericarditis or myocarditis, pneumothorax, mediastinitis, esophageal tear (Mallory-Weiss), cholecystitis, pancreatitis
- Nonemergent diagnosis – Valvular heart disease, aortic stenosis, mitral valve prolapse hypertrophic cardiomyopathy, pneumonia, pleuritis, tumor, pneumomediastinum, esophageal spasm, esophageal reflux, peptic ulcer, biliary colic, muscle strain, rib fracture, arthritis, costochondritis, spinal root compression, herpes zoster, postherpetic neuralgia, etc.

Signs and Symptoms *

- Findings on history
    - Severe, crushing, pressure, substernal, exertional, radiation to jaw, neck, shoulder, arm – acute MI, coronary ischemia, unstable angina, coronary spasm
    - Tearing, severe, radiating to or located in back, maximum at onset, migrates to neck – aortic dissection
    - Pleuritic – esophageal rupture, pneumothorax, cholecystitis, pericarditis, myocarditis
    - Indigestion or burning – ACS, esophageal rupture, esophageal tear, cholecystitis
    - Sudden onset, unilateral chest pain, associated with respiratory distress – pneumothorax
    - Associated symptoms
        - Hemoptysis – pulmonary embolism
        - Near-syncope and syncope – aortic dissection, PE, acute MI, pericarditis, myocarditis
        - Dyspnea – ACS, pulmonary embolism, pneumothorax, pericarditis
        - Nausea and vomiting – esophageal rupture, ACS, esophageal tear, cholecystitis
- Physical exam findings
    - Pulmonary embolism – Dyspnea, diaphoresis, tachycardia, fever, hypoxemia, JVD, pleural rub, unilateral leg swelling/warmth/pain/tenderness /erythema
    - Pneumothorax – Dyspnea, unilateral diminished/absent breath sounds, subcutaneous emphysema
        - Tension Pneumothorax – hypotension, tachycardia, hypoxemia, JVD

- Mediastinitis – Tachycardia, Hamman's sign, subcutaneous emphysema
- Aortic dissection – Diaphoresis, hypertension (early), hypotension (late) , tachycardia, significant difference in upper extremity blood pressures, new murmur, focal neurologic findings
- Esophageal rupture – Diaphoresis, hypotension, tachycardia, fever, Hamman's sign, subcutaneous emphysema, epigastric tenderness
- Esophageal tear (Mallory-Weiss) – Tachycardia, epigastric tenderness

Work-up *

- Obtain 12-lead electrocardiography (ECG) – should be performed w/i 10 minutes of arrival
  - Classic MI – ST segment elevation (>1 mm) in contiguous leads, new LBBB, Q waves > 0.04 sec duration
  - Subendocardial infarction – T wave inversion or ST segment depression in concordant leads
  - Pericarditis – Diffuse ST segment elevation, PR segment depression
  - Pulmonary embolism – Right ventricular strain pattern
  - Pericardial effusion/tamponade – Low voltage on ECG
- Chest radiograph (CXR) – indicated in any patient with chest pain
  - Wide mediastinum or ill-defined aortic knob – acute aortic dissection
  - Pleural effusion, subcutaneous air, mediastinal air-fluid level – esophageal rupture
  - Increased cardiac silhouette – pericarditis, cardiomyopathy
  - Pneumomediastinum – esophageal rupture, mediastinitis
- Other imaging: CT, pulmonary angiography, VQ scan, cardiac ultrasound, transesophageal echocardiogram, MRI
- Laboratory testing: Elevation in troponins (I and T) identify patients with ACS with highest risk for adverse outcome
  - CK-MB is more specific for cardiac ischemia than CK but is still considered secondary to troponins

Empiric Management

- ACS – Initial management with oxygen therapy, aspirin, nitroglycerin
  - If STEMI – heparin or LMWH, IV nitroglycerin, beta blocker, revascularization via fibrinolysis or GP IIb/IIIa inhibitor + percutaneous coronary intervention (PCI)
- Aortic dissection – Beta blockade, IV antihypertensive therapy, decrease contractility, immediate surgical consult
- Pulmonary embolism – IV heparin or SQ LMWH, thrombolysis if severe cardiovascular instability
- Tension pneumothorax – Needle decompression or tube thoracostomy
- Esophageal rupture – IV fluid resuscitation, analgesia, IV antibiotics, early surgical consultation
- Pericarditis – US for effusion or tamponade risk, NSAIDs, corticosteroids, cardiology consultation

Disposition

- Will vary greatly based on cause of chest pain
  - Surgical consultation – aortic dissection, esophageal rupture
  - Admission with cardiology consult – myocardial ischemia, pericarditis, myocarditis, etc.
  - Discharge with follow up – musculoskeletal causes , stable angina, low risk chest pain

*See Table 26-6 for further discussion on signs/symptoms and workup on potentially life-threatening causes of chest pain