CHEST PAIN

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Chest Pain

Any part of the thorax can cause “chest pain”, including the heart, lungs, esophagus, muscle, bone, and skin.
Chest Pain: Causes

- Myocardial infarction
- Angina pectoris
- Pericarditis
- Pleuritic/Pulmonary chest pain
- Gastrointestinal
  - GERD, Hiatal hernia, PUD
- Neuropathic pain
  - VZV
- Musculoskeletal pain
  - Costochondritis
- Esophageal spasm
- Drug induced
- Aortic aneurysm
Chest Pain: Differential Diagnosis

- What are the events surrounding the pain?
- Is it...
  - Non-cardiac
    - Is the pain REPRODUCIBLE?
    - Episodic?
    - Positional?
  - Cardiac
    - Radiating?
    - Shortness of breath?
    - Sudden?
    - Crushing?
    - Other signs?
Differential Diagnosis: Non-cardiac

- Musculoskeletal
- Esophageal
- Aortic aneurysm
- Pulmonary
- Gastrointestinal
- Neuropathic
Differential Diagnosis: Musculoskeletal

- Likely the most common cause
- Results from physical exertion/strain
  - History
- Localized and reproducible
- Does not radiate
- Made worse by movement/breathing
Differential Diagnosis: Musculoskeletal

- Costochondritis
  - Inflammation of the cartilage between the ribs
  - Pain is typically located in the mid chest, with intermittently dull and sharp pain that may be increased with deep breaths, movement, and deep touch
Differential Diagnosis: Non-cardiac

- Musculoskeletal
- Esophageal
- Aortic aneurysm
- Pulmonary
- Gastrointestinal
- Neuropathic
Differential Diagnosis: Non-cardiac

- Musculoskeletal
- Esophageal
- Aortic aneurysm
- Pulmonary
- Gastrointestinal
- Neuropathic
Differential Diagnosis: Esophageal

- Disorders of the esophagus - mimics chest pain from a heart attack.
  - Substernal or epigastric
  - Positional – lying down
  - May follow a meal

- Gastroesophageal reflux disease, or GERD occurs when acidic digestive juices flow backward from the stomach into the esophagus. The resulting heartburn is sometimes experienced as chest pain.

- Esophagitis - inflammation of the esophagus.
  - Infectious
  - GERD – relieved by antacids

- Esophageal spasm is defined as excessive, intensified, or uncoordinated contractions of the smooth muscle of the esophagus.
  - Spontaneous or meal induced
Differential Diagnosis: Non-cardiac

- Musculoskeletal
- Esophageal
- Aortic aneurysm
- Pulmonary
- Gastrointestinal
- Neuropathic
Differential Diagnosis: Aortic aneurysm

- Sudden acute severe chest pain
  - Greatest at the time of onset
  - Can effect thoracic or abdominal aorta
- Radiates to back
- Upper and lower extremity blood pressure/pulse quality will differ
- May lead rapidly to death due to rupture or thrombosis
- Treatment is surgical
  - Graft
  - Stent
Normal aorta

Aorta with large abdominal aneurysm
Differential Diagnosis: Non-cardiac

- Musculoskeletal
- Esophageal
- Aortic aneurysm
- Pulmonary
- Gastrointestinal
- Neuropathic
Differential Diagnosis: Pulmonary embolism

- Sudden occlusion of a vessel in the pulmonary arterial tree by an embolism
  - Thrombotic
  - Fracture related – fat/marrow embolism
  - Amniotic fluid
  - Air
- Sudden chest pain, tachycardia, shortness of breath, hypotension
  - Massive embolism = death
  - Blood tinged sputum
  - Leg pain
Embolius lodged in left pulmonary artery
Differential Diagnosis: Pneumonia

- Infectious inflammation of the lungs
- Caused by bacteria, viruses, and fungi
- Pneumonia is a common illness that affects millions of people each year in the U.S.
Differential Diagnosis: Pneumonia

Symptoms

- **Cough** with greenish or yellow mucus; **bloody sputum** happens on occasion
- **Fever** with shaking chills
- Sharp or stabbing **chest pain** worsened by deep breathing or coughing
- **Rapid, shallow breathing**
- **Shortness of breath**
Differential Diagnosis: Non-cardiac

- Musculoskeletal
- Esophageal
- Aortic aneurysm
- Pulmonary
- Gastrointestinal
- Neuropathic
Differential Diagnosis: Hiatal hernia

- The stomach protrudes upward into the chest through an opening in the diaphragm
- Increasing age, obesity, and smoking are known risk factors in adults
Differential Diagnosis: Hiatal hernia

- **Heartburn**, worse when bending over or lying down
- **Swallowing difficulty**
- **Chest pain**
- **Belching**

A hiatal hernia by itself rarely causes symptoms -- pain and discomfort are usually due to the reflux of gastric acid, air, or bile.
Differential Diagnosis: Peptic ulcer disease (PUD)

- Ulcers are erosions in the lining of the stomach or duodenum
  - NSAIDs
  - Excessive alcohol
  - Smoking
- The most common cause of PUD is *Helicobacter pylori*
Differential Diagnosis: Peptic ulcer disease (PUD)

**Symptoms**

- Abdominal pain
- Nausea, vomiting
- Weight loss
- Fatigue
- Heartburn, indigestion, belching
- Chest pain
- Vomiting blood
- Bloody or dark tarry stools
Differential Diagnosis: Non-cardiac

- Musculoskeletal
- Esophageal
- Aortic aneurysm
- Pulmonary
- Gastrointestinal
- Neuropathic
Differential Diagnosis: Zoster

- Herpes zoster, or shingles, occurs as a result of the varicella virus re-emerging after many years.
- The cause of the re-activation is usually unknown, but may be linked to aging, stress or an impaired immune system.
- Lesions typically appear along a single dermatome and are unilateral.
- The trunk is most often affected, showing a rectangular belt of rash from the spine around one side of the chest to the sternum.
Differential Diagnosis: Zoster

- Warning symptoms of unilateral pain, tingling, or burning sensation limited to a specific part of the body
Differential Diagnosis: Pericarditis

- Acute pericarditis: Inflammation of the pericardium, which is the outer membrane that covers the heart
  - Viral
  - Mycobacterial
  - Autoimmune – SLE, Rheumatoid arthritis
  - Renal failure
- Midsternal chest pain
- Increased upon breathing and swallowing
- +/- Fever
- Relieved by bending forward
- Sternal rub on exam – sandpaper, crepitus
General Considerations

- CAD is the major cause of death in the U.S. (41% of all deaths)
  - > 1,000,000 AMI/year
- Medically compromised patients are management risks
- Recognition and understanding the disease are key
General Considerations

- Chest pain is a major clue to underlying heart disease
  - Usually a late finding
  - Ominous sign
- Most common causes in a dental setting are angina pectoris, hyperventilation, and AMI
General Considerations: Etiology

- **Atherosclerosis**
  - CAD, aortic aneurysms, peripheral vascular disease, cerebrovascular disease

- **Risk factors - modifiable**
  - Tobacco
  - Cholesterol
  - Hypertension
  - Diabetes
General Considerations: Etiology

- **Risk factors – unmodifiable**
  - Genetics
  - Sex
  - Age
  - Race

- **Risk factors – minor**
  - Physical activity
  - Gout
  - Obesity
  - Contraceptive use
  - Personality type
General Considerations: Risk factors

- **Tobacco**
  - Risk for CV morbidity and mortality 1.6 times higher
    - Decreases after quitting, but always higher than nonsmokers

- **Nicotine**
  - Increased O$_2$ demand
  - Decrease threshold for ventricular fibrillation
  - Increase platelet adhesiveness

- **CO** – decrease O$_2$ availability
General Considerations: Risk factors

- Hyperlipidemia
  - High cholesterol = high risk for CAD
    - Serum Chol > 300 = 4 x risk of Serum Chol < 200
  - LDL’s atherogenic
  - HDL’s protective
    - Generally higher in women
General Considerations: Risk factors

- Hypertension (HTN)
  - Elevation in BP correlates to risk of CAD
  - Damage to vessels from HTN irreversible
    - Goal of Rx is to stop progress
  - Rapid decreases in BP via Rx can be dangerous
General Considerations: Risk factors

- Diabetes Mellitus
  - Precursor to generalized vascular disease
  - 2 x greater risk of developing CAD in males
  - CAD is the major cause of mortality in patients with NIDDM
    - Mortality in IDDM primarily associated with renal disease
General Considerations: Risk factors

- **Heredity**
  - Parents or sibs affected < 50 years old (5:1)

- **Sex**
  - Predominantly males
  - Postmenopausal females

- **Race**
  - Higher in nonwhite men

- **Age**
  - Ages 55 to 64 – up to 40% of all deaths
General Considerations: Prevention

- **Primary prevention**
  - Elimination of known risk factors

- **Secondary prevention most common**
  - Medications, interventions, lifestyle modifications
  - Ex: controlling hypertension leads to decrease in fatal and nonfatal cardiac events
    - Check your patient's BP prior to the procedure!
General Considerations: Chest pain

- Decreased blood flow to myocardium
  - Hypoxia
  - Anoxia
  - Ischemia
  - Infarction
- Increased $O_2$ demand
General Considerations: Chest pain

- **Management**
  - Decrease cardiac workload
  - Increase O₂/Blood flow
  - Manage pain

- **BLS/ACLS when needed**
General Considerations: Chest pain

- **Work up**
  - EKG, vitals, blood work
  - Echocardiogram
  - Stress test
    - exercise vs. pharmacologic
  - Cardiac catheterization

- **All may be required prior to routine dentistry**
  - Guided by patient history
Angina Pectoris

- Chest pain
- Substernal, “heavy,” “suffocating”
- Precipitated by
  - Exercise
  - Heavy meals
  - Stress - that means you Dr.!
  - Spontaneous
  - Drugs - epinephrine
Angina Pectoris

- Clinical sign of CAD
- $O_2$ demand has exceeded supply
- May progress to ischemia or infarction

Three types
- Stable
- Variant
- Unstable
Angina Pectoris: Stable

- CAD
- aka – exertional
- Precipitated by stress, exertion, heavy meal, ...
- Relieved by
  - Rest
  - Nitroglycerin (vasodilator)
Angina Pectoris: Variant

- aka – Prinzmetal’s, vasospastic
- Can occur at rest at any time
- With or without CAD
  - Associated with dysrhythmia
  - Absence of CAD risk factors
- Result of coronary spasm
  - Sudden brief occlusion resulting in chest pain
- Nitrates, Ca++ channel blockers
Angina Pectoris: Unstable

- aka Crescendo
- Progression of atherosclerosis
  - High % go on to AMI
- Longer lasting, ? Nitro
- Classified according to onset, associated activity (or lack of...), course, alleviating factors
Angina Pectoris: Goal

- PREVENTION!
  - Thorough health history
  - Review of systems
    - Particular attention to affirmative answers on health questionnaire
    - Ask questions, tease out the details
Angina Pectoris: History

- Specific questions regarding
  - CAD?
  - Surgery?
  - Chest pain?

- FUNCTIONAL STATUS!
  - City blocks, stairs, carrying groceries, chores...
    - Context
  - Do you ever have to stop? Why? How long?
Angina Pectoris: History

- Medications? β blockers, nitrates, etc…
  - Did they take them this am?
  - Do they have them with them (nitro)?
- Describe anginal episode in detail
  - Quality of pain - squeezing, burning, crushing...
  - How long? - seconds vs. minutes
  - Location - chest, neck, jaw, back, arm
  - Precipitating factors - rest vs. exertion, meals, stress
  - Frequency - daily, weekly, monthly
  - Alleviating factors - meds, rest
  - Other concomitant symptoms - nausea, vomiting
  - Changes?
Angina Pectoris: Exam

- NORMAL when asymptomatic
- May have other signs of CAD
  - Dysrhythmias – afib, heart block
  - Defibrillator/Pacer
  - S3/S4/gallop – failure
  - Pulmonary signs
  - Shortness of breath
  - Vomiting
  - Diaphoresis
  - Median sternotomy scar
Angina Pectoris: what to do?

- Communicate
- Work-up
- Asking for a medical consult does not absolve one from responsibility!
  - You are a doctor, this is your patient!
  - Knowledge is power
  - Judgement
Angina Pectoris: what to do?

- Stress reduction – patient driven
  - Length of the appointment
  - Pain control
  - Sedation
  - Time of the appointment
- Signs and symptoms – STOP!
- Unstable angina
  - Not fit for the chair
  - Hospital
Angina Pectoris: what to do?

- Pain
  - Block more efficient with local
  - Accuracy
  - Combine agents
Angina Pectoris: what to do?

- Sedation
  - Consider N₂O
  - Avoid agents which acutely diminish preload/drop blood pressure

- Check vitals at each appointment
Angina Pectoris: how to treat

- STOP the procedure
- Comfortable patient positioning
- BLS as needed
- $O_2$ nasal hood or canula
- Nitroglycerin
  - 1 tab q 5 min, no more than 3 in 15 min
  - Usually effective in 2 to 4 min
  - HA, tachycardia, hypotension
Angina Pectoris: how to treat

- Nitroglycerin
  - Most effective antianginal
  - Decreases systemic vascular resistance
    - Decreased preload and afterload = decreased workload
    - Decreased cardiac O₂ requirement
Angina Pectoris: how to treat

- If nitro doesn’t work, call 911
  - EMS transport to hospital, ? AMI

- AMI...
Acute Myocardial Infarction

- Rapid development of myocardial necrosis caused by a critical imbalance between the oxygen supply and demand of the myocardium.
- Usually results from plaque rupture with thrombus formation in a coronary vessel.
- Total occlusion of the vessel for more than 4-6 hours results in irreversible myocardial necrosis.
Post Myocardial Infarction

Hyperacute phase

Fully evolved phase

Resolution phase

Stabilized chronic phase
Plaque build up in the coronary artery blocking blood flow and oxygen to the heart.

Damage and death to heart tissue shown in purple.
Acute Myocardial Infarction

- Can lead to immediate
  - Cardiac arrest
  - Shock
  - Heart failure
- BLS/ACLS
Acute Myocardial Infarction

- AMI occurs most frequently in persons older than 45 years
  - Male predilection exists in persons aged 40-70 years

- Approximately 1.3 million cases of nonfatal AMI are reported each year
  - Approximately 500,000-700,000 deaths caused by ischemic heart disease
Post Myocardial Infarction: Prevention

- Good History
- Last MI?, # of MI’s, functional status?, CABG?, PTCA?, recent stress test?
- Medications?, changes in medication regimen?
  - β blockers
  - Ca++ channel blockers
  - Nitrates
  - ACE inhibitors
  - ARB’s
  - Anti-platelet therapy
Post Myocardial Infarction: Dental considerations

- **Treatment**
  - $O_2$
  - Sedation/N$_2$O
  - Analgesia/Anesthesia
  - Short appointments
  - Elective Rx deferred for 6 months post MI
  - Consultation
  - ? Alteration of anticoagulation regimen
Post Myocardial Infarction: What if that doesn’t work?

- **Pain**
  - Present 80% of the time
  - Most often occurs at rest (50%)
    - Often in the early AM
    - During surgery – 6%
- **Diaphoresis**
- **Sense of impending doom, restless**
- **Heaviness**
- **No relief from nitroglycerin**
Post Myocardial Infarction: What if that doesn’t work?

- Vital signs
- 911
- IV access
- “MONA” if available – do your best
  - Morphine
  - Oxygen
  - Nitro
  - Aspirin
- BLS/ACLS ready
Acute Myocardial Infarction: Complications

- Acute complications >> during the 4-6 hours post MI
  - Dysrhythmia (ventricular fibrillation)
  - Arrest
  - 60% within 1st hour
- What does this mean to you?
  - Rapid activation of EMS and transport
  - AED in office
Acute Myocardial Infarction: Hospital

- PTCA (percutaneous transluminal coronary angioplasty)
- CABG (coronary artery bypass grafting)
- Medical management
Dye is injected into the coronary arteries

Coronary artery blockage site

X-ray image

A balloon-tipped tube is inserted in coronary artery

Balloon is expanded several times

Stent insertion

Stent expansion

Stent remains in coronary artery
Questions?

Thank you