



Chest Pain

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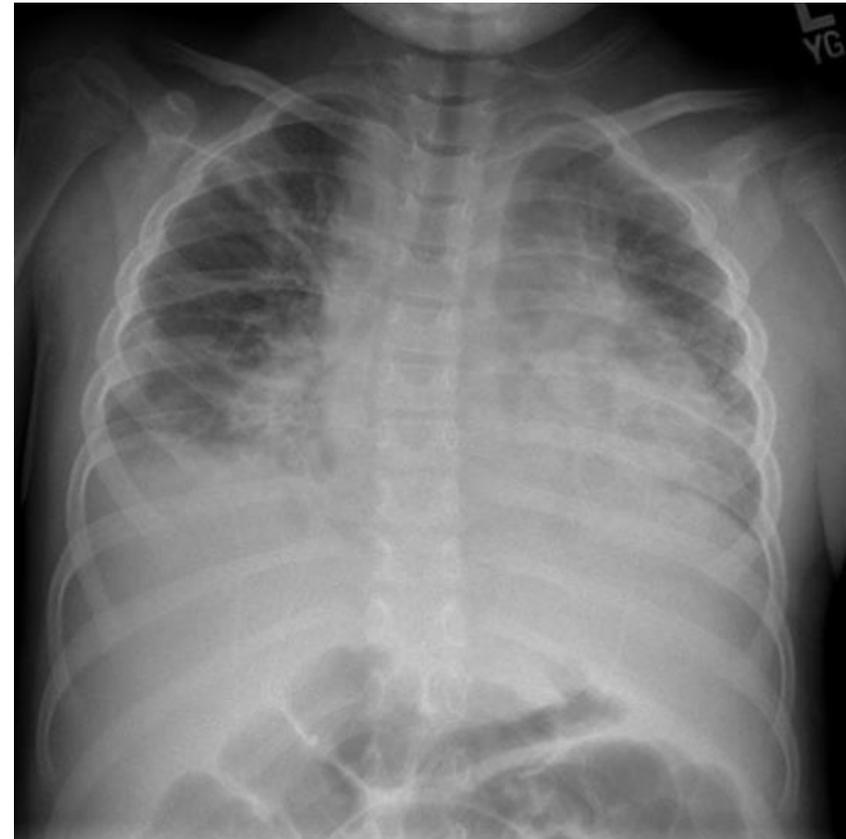
2/28/14

Question 1

- A 12yo girl presents to the ED 2 weeks after the onset of a URI. She recovered from the illness 8 days ago, but she now complains of chest pain, shortness of breath, and fatigue. On physical exam, HR 110 beats/min, RR 28 breaths/min, blood pressure 75/45 mmHg, and oxygen saturation is 95%.
- What additional parts of the physical exam would you expect to be abnormal?

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- The pale girl exhibits tachypnea, muffled heart tones without an obvious murmur, a palpable liver 3cm below the right costal margin, and poor peripheral pulses.
 - She has minimal chest discomfort when sitting, but the pain on palpation increases when she is supine.
 - What do you expect the EKG to show?

- EKG reveals ST-segment abnormalities and diffusely reduced voltages.
- CXR



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 - A. Endocarditis
 - B. Myocardial infarction
 - C. Myocarditis
 - D. Pericarditis
 - E. Tachyarrhythmia

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- The CXR shows pericarditis. It is often associated with a pericardial effusion that can be serous, sanguinous, purulent, or fibrinous, depending on the cause and how long the effusion has been present.
 - In children, MCC is viral (postinfectious pericarditis) due to the inflammatory process adversely affecting the pericardium.
 - 2nd MCC is idiopathic.
 - Malignant pericardial effusions are associated w/ intrathoracic and metastatic cancers, and autoimmune disorders can also result in pericarditis and pericardial effusions.

- The classic sign of pericarditis is a **friction rub**, usually at the lower left sternal border.
- Other physical signs include:
 - **positional chest pain** (pain worsens in the supine position and lessens when upright)
 - Diaphoresis
 - Fatigue
 - Shortness of breath
 - Pericardial tamponade causing **distant and muffled heart sounds**, jugular vein distention, and pulsus paradoxus.

How do we treat pericarditis?

- The treatment for viral or idiopathic pericarditis is **anti-inflammatory agents**.
 - Aspirin
 - NSAIDs
- Severe cases may require:
 - Pericardiocentesis to treat pericardial effusion / tamponade.
 - Antibiotics if a bacterial cause is identified.
 - Corticosteroids.
 - Surgery: rarely, a pericardial window or “stripping” (removal) of the pericardium is required, particularly in chronic cases where pericardiocentesis has proven unsuccessful

Other Answers

- **Viral endocarditis** is rare in children. Instead of the muffled heart tones described in the vignette, you would hear a murmur of valve insufficiency or stenosis.
- **Myocardial infarction** in an otherwise healthy child is also rare, and the chest pain associated with a myocardial infarction is not positional. Although the EKG findings might include ST-segment changes, deep Q waves without reduced overall QRS complex voltages also are seen.
- **Myocarditis** is a relatively common finding in pediatrics, most often due to an underlying viral infection. However, the presence of positional chest pain and muffled heart tones is not typical.
- A **tachyarrhythmia** is unlikely because this patient's heart rate is only minimally elevated and there is no arrhythmia on EKG. An intermittent arrhythmia is possible, but chest pain is not an associated finding.

Question 2

- A 16-year-old lacrosse player presents to the ED at 3am with a 2-month history of chest pain during activity. Episodes of pain last 3 to 5 mins and have been associated w/ dizziness, palpitations, and pre-syncope. Her physical examination is normal w/ the exception of a soft 2/6 systolic murmur at the lower left sternal border. You obtain EKG results that are interpreted as normal.



The MOST appropriate next step in evaluation of this patient is to:

- A. Order an CT chest w/ contrast
- B. Order CRP and CBC w/ differential
- C. Order tilt table testing
- D. Reassure her and family that no further testing is necessary
- E. Restrict her from exercise pending cardiology evaluation.

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- Chest pain accounts for **650,000 physician visits** per year in the US in patients who are 10 to 21 years of age.
 - MCC of chest pain in children and adolescents is **idiopathic**, the 2nd MCC is the **musculoskeletal** structure of the chest.
 - Pain is described as **sharp**
 - Usually located in the center of the chest at a level inferior to the nipples.
 - The pain lasts several seconds to several minutes and is **exacerbated by deep breathing**.
 - Sometimes, **reproducible** by gently pressing on the sternum.

Causes of Pediatric Chest Pain

Cause	Prevalence (%)
Idiopathic	21 to 45
Musculoskeletal	15 to 31
Hyperventilation/psychiatric	0 to 30
Breast related	1 to 5
Respiratory	2 to 11
Gastrointestinal	2 to 8
Cardiac	1 to 6
Miscellaneous	9

- Although they are uncommon, cardiac conditions that are associated w/ chest pain include:
 - Hypertrophic obstructive cardiomyopathy (HOCM)
 - Aortic stenosis
 - Pericarditis
 - Arrhythmias
 - Coronary insufficiency
 - Dissecting aortic aneurysm (esp in patients w/ Marfan syndrome)
 - Mitral valve prolapse
 - The causes of coronary insufficiency in children include Kawasaki disease, Williams syndrome, anomalous origin of the coronary arteries, coronary arteriovenous fistula, and coronary cameral fistula. However, chest pain is a rare symptom.

Evaluation in the ED:

- History:
 - Does the pain, dizziness, or syncope occur during exercise?
 - Is there a family history of early-onset heart or lung disease and premature death?
 - Are there other family members who have chest pain, such as a parent or grandparent who experiences angina?
 - The child's symptoms may relate to concerns about the relative's health.
 - Does the patient have a history of anxiety or is he/she presenting with symptoms of anxiety?
- Physical exam:
 - Complete cardiac exam including palpation of the costochondral junctions, looking for edema, JVD, peripheral pulses.
 - Is the pain reproducible?

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- In most cases, the cause of the pain may be apparent after the history and physical examination.
 - If the history and physical examination are not concerning for cardiac disease, the patient and family may be **reassured** that there is no serious problem.
 - If there is concern for cardiac origin, obtain a **STAT 12 lead EKG**.

This case...

- Red flags: chest pain during exercise associated w/ lightheadedness and pre-syncope
- Her physical examination reveals a systolic murmur at the lower left sternal border.
 - If the murmur increases in intensity when the patient changes posture from lying down to sitting or standing, hypertrophic obstructive cardiomyopathy should be suspected.
- Reassurance without additional evaluation is not appropriate.
- Since there are no signs of infection, a complete blood cell count and C-reactive protein are not indicated.
- Tilt-table testing would be warranted only if the patient's symptoms were postural.

References

- Drossner DM, Hirsh DA, Sturm JJ, et al. Cardiac disease in pediatric patients presenting to a pediatric ED with chest pain. *Am J Emerg Med.* 2011;29:632-638.
- Geggel, Endom. Approach to chest pain in children. *UptoDate.* Accessed 26 February 2014.