Chest Pain in Young Athletes

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Disclosures

• None
Chest Pain: the good news and the bad news:

• GOOD: Of all children and adolescents with a chief complaint of chest pain, very few have life threatening disease.

• BAD: Chest pain is common in children: you will encounter it.

• GOOD: A history and physical exam are usually all that is needed to approach a diagnosis.
Chest Pain

• In adults, chest pain is a heart attack until proven otherwise
• In children, chest pain is virtually never caused by a heart attack (i.e. a true myocardial infarction)
  – Multitude of causes, most of which are benign
Chest Pain Clues

• Factors associated with “real” disease:
  – Acute onset of pain that is now unrelenting
  – Presence of fever and systemic illness
  – Pain waking the patient at night
  – ONLY during exertion/exercise
Differential Diagnosis

• Major Categories:
  – Idiopathic (~30% of cases) → like headaches
  – Musculoskeletal (~25%)
  – Pulmonary (~15%)
  – Psychogenic (~10%)
  – Gastrointestinal (~5 – 10%)
  – Cardiac (~5%)
Specific Diagnoses

- **Musculoskeletal Chest Pain:**
  - **Costochondritis:** *sharp* pain involving 2-4 costochondral junctions, several seconds to minutes, exacerbated by *deep breathing*, and reproducible on exam
  - **Tietze Syndrome:** Inflammation of a costochondral junction with a *warm, tender, and swollen* area on the chest (rare in children).
Musculoskeletal Causes

• **Precordial Catch Syndrome**: brief, sharp, stabbing pain in the left chest, often pleuritic (worse with deep breaths).
• Muscle Strain/Trauma
• Acute Chest Syndrome in Sickle Cell Disease
Other Causes

- Asthma, especially exercise-induced (more “tightness” than pain)
- Infection: pneumonia, bronchitis, Shingles
- GE Reflux
- Pneumothorax
- Psychogenic (more common in teenagers, especially with a + FH of chest pain)
Cardiac Causes

- Hypertrophic Cardiomyopathy
- Aortic Stenosis
- Pericarditis/Myocarditis
- Arrhythmias
- Coronary Disease (usually congenital)
- Dissecting Aortic Aneurysm (previous surgery or Marfan Syndrome)
Causes of Sudden Death in 387 Young Athletes

- Coronary artery anomalies (14%)
- LVH – Indeterminant (7%)
- Myocarditis (5%)
- Ruptured Ao Aneurysm (Marfan) (3%)
- ARVC (3%)
- Tunnelled coronary (3%)
- AS (2.5%)
- CAD (2.5%)
- DCM (2%, 9pts)
- Myxomatous MV (2%)
- Asthma (2%)
- Heat Stroke (1.5%)
- Drug Abuse (1%)
- LQTS (1%)
- Sarcoidosis (1%)
- Trauma (1%)
- Other (1.5%)
- Ruptured cerebral art. (1%)

HCM (26%)
Distribution of cardiovascular causes of sudden death in 1435 young competitive athletes

Hypertrophic Cardiomyopathy

- Chest pain and or syncope with exercise
- Characteristic murmur
- Family history of sudden death in young people
- Often no signs or symptoms until sudden death
Coronary Abnormalities

- Abnormal origin of either artery
- History of Kawasaki Disease
- Can present with typical angina or with sudden death
- Often no specific PE findings
Myocarditis/Pericarditis

- Infection and/or inflammation of:
  - Heart muscle (myocarditis)
  - Pericardium (pericarditis)
Cardiac causes of chest pain

• These are the diseases that can cause sudden cardiac arrest and sudden death in the young athlete
  – They cause fatal arrhythmias: ventricular tachycardia, ventricular fibrillation, asystole

• Exertional chest pain, and/or fainting or nearly fainting during or after exercise, is a red flag warning
History

• Family History
  – Cardiac disease in children / young adults
  – Sudden Death

• Past Medical History
  – Kawasaki Disease
  – Previous chest pain
  – Previous heart surgery

• Social History
  – Stressors, substance abuse
Physical Exam

• Vital Signs and general appearance
• Inspection and palpation of entire chest wall, muscles, bones, and abdomen
• Auscultation (murmur, click, gallop, rub) and for breath sound abnormalities
Anatomic Approach to the Exam
“Red Flags”

- Exertional pain
- Exertional pre-syncope or syncope
- + Family History of genetic heart disease
- Abnormal cardiac exam
- True angina
- Fever
- Young age (less often psychogenic)
Laboratory Studies

• Generally not needed after thorough H&P
• ECG and CXR if cardiac disease is suspected
  – CXR: heart size, lung opacities, pneumothorax
  – ECG: arrhythmia, ST changes (pericarditis, ischemia, old infarct), WPW (delta wave), abnormal voltages (HCM)
• Cardiac enzymes (CKMB, troponin) tend to be over-utilized to “rule-out” heart disease
The 12-Element AHA Recommendations for Pre-participation Cardiovascular Screening of Competitive Athletes

Medical History

Personal History
1. Exertional chest pain/discomfort
2. Unexplained syncope/near-syncope
3. Excessive exertional and unexplained dyspnea/fatigue, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure

Family History
6. Premature death (sudden and unexpected, or otherwise) before age 50 years due to heart disease, in 1 relative
7. Disability from heart disease in a close relative <50 years of age
8. Specific knowledge of certain cardiac conditions in family members: hypertrophic or dilated cardiomyopathy, long-QT syndrome or other ion channelopathies, Marfan syndrome, or clinically important arrhythmias
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Physical Examination

9. Heat murmur
10. Femoral pulses to exclude aortic coarctation
11. Physical stigmata of Marfan syndrome
12. Brachial artery blood pressure (sitting position)
5. Elevated systemic blood pressure

• Parental verification is recommended for high school and middle school athletes.
• Judged not to be neurocardiogenic (vasovagal); of particular concern when related to exertion.
• Auscultation should be performed in both supine and standing positions (or with Valsalva maneuver), specifically to identify murmurs of dynamic left ventricular outflow tract obstruction.
• Preferably taken in both arms.³⁷
PAIN RELIEVERS

"It only hurts during Social Studies."
References

• www.suddendeathathletes.org (Minneapolis Heart Institute Foundation)