Chest Pain in Athletes
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Bayes Theorem

• In summary (and simplified), Bayes Theorem states that the accuracy of a test depends on the likelihood of the disease process in the population/patient tested.
• Example: Exercise Stress Testing in Young women. CAD is rare in young women and therefore leads to a high false positive rate.
• You need to consider common diagnoses in the patient you are evaluating!
Causes of Death in Young People

Figure 3: Causes of Death in Young People Annually in the United States, including in NCAA Athletes
NCAA Athletes

Figure 2 Causes of Sudden Death in NCAA Athletes

- Confirmed CV (n = 47)
  - HCM (21)
  - Coronary artery anomaly (8)
  - CAD (5)
  - Aortic rupture (3)
  - ARVC (3)
  - Dilated CM (2)
  - Myocarditis (2)
  - LOTS (1)
  - MVP (1)
  - AMI [Kawasaki Syndrome] (1)

- Presumed CV* (n = 17)
  - Brain Aneurysm (n=3)
  - Pulmonary (n=3)
  - Spinal (n=2)

- Drugs (n = 21)
- Suicide (n = 31)
- Trauma (n = 15)
- SCT (n = 11)
- Drowning (n = 11)
Differential Diagnosis
Angina

• Symptom (classically chest discomfort) caused by a lack of adequate oxygen delivery to myocardium
• Mostly due to atherosclerotic coronary artery disease
• Other causes include anemia, increased oxygen demand (i.e sepsis), etc.
The Evaluation of Chest Pain

- Dangerous Causes: coronary artery disease (i.e. acute coronary syndrome), aortic dissection, pneumothorax, pulmonary embolus
- Benign causes: GERD, musculoskeletal
Basic Evaluation of Chest Pain

• History: focused on both the issues that place the patient in a risk group as well as the specific qualities of the chest pain.

• “Typical Chest Pain”: left precordial pressure that occurs with activity and is relieved with rest. May radiate to the jaw/left arm and be associated with dyspnea and nausea.
**Athlete Specific History**

**TABLE. The 12-Element AHA Recommendations for Preparticipation Cardiovascular Screening of Competitive Athletes**

<table>
<thead>
<tr>
<th>Medical history*</th>
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<tbody>
<tr>
<td>Personal history</td>
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<tr>
<td>1. Exertional chest pain/discomfort</td>
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<tr>
<td>2. Unexplained syncope/near-syncope†</td>
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<tr>
<td>3. Excessive exertional and unexplained dyspnea/tachycardia, associated with exercise</td>
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<td>4. Prior recognition of a heart murmur</td>
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<tr>
<td>5. Elevated systemic blood pressure</td>
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<tr>
<td>Family history</td>
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<tr>
<td>6. Premature death (sudden and unexpected, or otherwise) before age 50 years due to heart disease, in ≥1 relative</td>
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<td>7. Disability from heart disease in a close relative &lt;50 years of age</td>
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<td>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</td>
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<tr>
<td>Physical examination</td>
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<tr>
<td>9. Heart murmur</td>
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<td>10. Femoral pulses to exclude aortic coarctation</td>
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<tr>
<td>11. Physical stigmata of Marfan syndrome</td>
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<tr>
<td>12. Brachial artery blood pressure (sitting position)§</td>
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</tbody>
</table>

*Parental verification is recommended for high school and middle school athletes.
†Judged not to be neurcardiogenic (vasovagal) of particular concern when related to exertion.
‡Assessment 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.
Athlete Specific Evaluation (cont.)

- Age, gender, family history of CAD, HCM, LQTS (etc.) or sudden death from a cardiac cause
- Personal History of: exertional chest pain/excessive dyspnea/fatigue, syncope/near-syncope, known murmur, HTN
- Physical Exam: Heart murmur, blood pressure, femoral pulses, findings of Marfan’s (or other connective tissue disorders
Testing in Athletes

• What diagnosis are common? Master athlete (age > 35 y.o.)?
• In younger athletes HCM is the biggest concern: consider resting EKG and echocardiogram
• In master athletes CAD becomes more common, consider exercise stress testing
Treatment of Athletes with Chest Pain

• Consider that almost all athletes that you will evaluate for chest pain will have a benign cause!
• If you order a cardiac test that is abnormal cardiology consultation is appropriate.
• So……what do you do with the rest (and majority) of the cases?
• Develop a list of benign causes of chest pain!
Benign Causes of Chest Pain

- GERD
- Musculoskeletal
- Atypical gall balddder
- Poor training!
Taking a Training History!

• Personal history of training/sports participation
• Current level of training: how many miles, how often, how fast?
• Does the training regimen appropriately prepare the athlete for competition?
• Are the athlete’s expectations realistic?
• PEDs? Street drugs?
Treatment of Chest Pain

• The most under appreciated part of the evaluation.
• The goal is to improve the symptoms, not “rule out” a malignant cause.
• Consider a trial of proton pump inhibitors, NSAIDS.
• Recommend an appropriate exercise prescription (you may need to start simply)!
Summary

• Use a Bayesian approach: what is likely in the patient that I am seeing?
• Assess for high risk factors: family h/o HCM, sudden death, personal h/o chest pain, syncope, dyspnea, murmur
• Echo and EKG in young athletes, lean toward stress test in master athletes
• Find the cause and treat appropriately!