Acute Chest Pain in Childhood

Pediatric Emergency Medicine Update

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Disclaimer

I have no personal financial relationship with the manufacturer of products or services which will be discussed in this activity.

I do not plan to discuss any product which is still investigational or not labeled for the use under discussion.

Any clinical example is purely for illustrative purposes only, and no names, ages, other demographic information, or specific diagnoses are based on actual patients.
Acute Chest Pain in Childhood

Objectives

1. Recognize chest pain as a common complaint in childhood.
2. Use a diagnostic algorithm to suggest presence or absence of a cardiac etiology for chest pain.
Acute Chest Pain in Childhood

- Background
- Approach to Evaluation and Management of Pediatric Chest Pain
- Cases
- Summary
- Questions
Background

- Frequency
- Underlying Cardiac Pathology
- Resource Utilization
Differential Diagnosis

Coronary artery disease-ischemia/infarction
Anomalous coronary arteries
Kawasaki disease (coronary arteritis)
Diabetes mellitus (long standing)
Arrhythmia
Supraventricular tachycardia
Ventricular tachycardia
Structural abnormalities of the heart
Hypertrophic cardiomyopathy
Severe pulmonic stenosis
Aortic valve stenosis
Infection
Pericarditis
Myocarditis
Chest wall strain
Direct trauma/contusion
Rib fracture
Costochondritis
Severe cough
Asthma

Pneumonia
Pneumothorax
Pneumomediastinum
Pulmonary embolism
Psychological disorders
Stress-related pain
Gastrointestinal disorders
Reflux esophagitis
Pill-induced esophagitis
Esophageal foreign body
Sickle cell crisis
Aortic dissection
Aortic aneurysm
Pleural effusion (collagen vascular disease)
Pleurodynia (coxsackievirus)
Breast tenderness (pregnancy, physiologic)
Tietze syndrome
Texidor’s twinge/precordial catch syndrome
Chest mass
Idiopathic

Differential Diagnosis

Options for Diagnostic Testing

Electrocardiogram
Chest radiographs
Echocardiogram
Exercise Stress Testing
Holter monitoring
Cardiac magnetic resonance imaging
Troponin measurement
Creatinine kinase (with MB frac) measurement
Esophageal pH probe
Upper endoscopy
Computerized tomography angiogram
Ventilation-perfusion scan
Acute Chest Pain in Childhood

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Heed the Red Flags!!!
Clues from the History and Physical

Clues from the History and Physical

Past Medical History:

- Cardiac disease
- Systemic inflammatory disease
- Malignancy
- Clotting disorder/blood clot
- Connective tissue disorder
- Chronic medical problems
- Psychiatric/behavioral health
- Young age*
Clues from the History and Physical

Past Medical History:
Family History*:

- Sudden/unexplained death < 50 years
- MI < 50 years
- Congenital heart disease
- Arrhythmia
- Cardiomyopathy
- Severe familial hyperlipidemia
- Pulmonary hypertension
- Connective tissue disorder
- Clotting disorder
- Congenital deafness
Clues from the History and Physical

Past Medical History
Family History
Social History:
  Drug use
Approach to the Child with Chest Pain

“Tell me about your pain…”

Exertional
Syncope (or presyncope)
Palpitations
Skipped beats
Dyspnea
Acute, awakens from sleep
“Substernal crushing”
Radiation
Orthopnea
Pulmonary embolism risk factors
Outpatients without Known Cardiac Disease

Chief Complaint of Chest Pain

History and Physical Examination

Risk Factors for Cardiovascular Etiology

(+) History or Physical Examination
- Monitor, ECG, Cardiology Consult
  - Abnormal: Discuss need for chest X-ray, labs with Cardiology
  - Normal: Outpatient Treatment

(+) Past Medical History or Family History
- ECG
  - Abnormal: Cardiology phone consult then Outpatient Treatment
  - Normal: Outpatient Treatment

(-) History or Physical Examination
- Outpatient Treatment

http://www.chop.edu/clinical-pathway/chest-pain-clinical-pathway
Acute Chest Pain in Childhood

• Background
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Case #1

Deonte*: 15 y.o. male
Chief Complaint: Chest pain
Past Medical/Surgical History: None relevant
Social History: No stressors. +Athletics.
Family history: Sudden death in uncle.
History (Present Illness):
  Mild (currently pain-free)
  Substernal/leftward
  +Exertional
  +Presyncope (no syncope)
Case #1

Deonte: 15 y.o. male
Chief Complaint: Chest pain

Examination:
Vital signs are normal for age
Systolic murmur
Parasternal lift
Normal pulses and capillary refill
No hepatomegaly
No edema
Outpatients without Known Cardiac Disease

Chief Complaint of Chest Pain

History and Physical Examination

Risk Factors for Cardiovascular Etiology

(+) History or Physical Examination
- Monitor, ECG, Cardiology Consult
  - Abnormal: Discuss need for chest X-ray, labs with Cardiology
  - Normal: Outpatient Treatment

(+ ) Past Medical History or Family History
- ECG
  - Abnormal: Cardiology phone consult
  - Normal: Outpatient Treatment

(- ) History or Physical Examination
- Outpatient Treatment

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Case #1: HOCM

Hypertrophic Obstructive Cardiomyopathy

• Increased risk of sudden death
• Increased risk of arrhythmia
• Most common cause of sudden death in “competitive athletes”
• Approximately up to 1:100,000
• Medical treatment does not alter disease progression
• Automated internal defibrillators
Case #2

Eleanor*: 8 y.o. female
Chief Complaint: N/A (chest pain elicited during a routine well visit)
Past Medical/Surgical History: None relevant
Social History: Starting new school.
Family history: Father died of colon cancer the previous year.
History (Present Illness):
  Nonspecific anterior chest pain
  Not exertional
  No associated syncope
Case #2

Eleanor: 8 y.o. female
Chief Complaint: N/A (chest pain elicited during routine well visit).

Examination:
- No fever*
- Heart rate is 145
- Respiratory rate is 31
- Tired-appearing but non-toxic
- CV and lung exams OTW normal
- No organomegaly or edema
Outpatients without Known Cardiac Disease

1. **Chief Complaint of Chest Pain**
   - **History and Physical Examination**
     - **Risk Factors for Cardiovascular Etiology**
       - **(+)** History or Physical Examination
         - Monitor, ECG, Cardiology Consult
           - Abnormal: Discuss need for chest X-ray, labs with Cardiology
           - Normal: Outpatient Treatment
       - **(+)** Past Medical History or Family History
         - ECG
           - Abnormal: Cardiology phone consult
             - Outpatient Treatment
           - Normal: Outpatient Treatment
       - **(-)** History or Physical Examination
         - Outpatient Treatment

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Case #2: Myocarditis

- Primarily viral*
  - Enterovirus and adenovirus
  - Parvovirus and human herpesvirus-6

- 1-5:100,000 healthcare visits

- Bimodal distribution
Age distribution in acute myocarditis.

Case #2: Myocarditis

• Primarily viral*
  Enterovirus and adenovirus
  Parvovirus and human herpesvirus-6

• 1-5:100,000 healthcare visits

• Bimodal distribution

• Treatment remains controversial
Case #3

Gabriel: 18 y.o. male
Chief Complaint: Chest pain
Past Medical/Surgical History: None relevant
Social History: None
Family history: None relevant
History (Present Illness):
    Tender
    Unilateral
    Non-exertional, non-radiating
    No syncope, palpitations, or dyspnea
Case #3

Gabriel*: 18 y.o. male
Chief Complaint: Chest pain

Examination:

Vitals are normal
Normal heart sounds, pulses
No precordial heave or JVD
Lungs are clear to auscultation
+Tender area over the costo-chondral junction of the 3\textsuperscript{rd} rib on the left.
Case #3: Tietze Syndrome

- Teens/young adults
- Unilateral
- Single site
- Exacerbating factors
- Chronic
Case #4

Mathias*: 17 y.o. male
Chief Complaint: Chest pain
Past Medical/Surgical History: Asthma/None
Social History: None relevant
Family history: None relevant
History (Present Illness):
  + Exertional
  + Dyspnea
  + Palpitations
  + Syncope
Case #4

Mathias*: 17 y.o. male
Chief Complaint: Chest pain

Examination:

Vitals are normal.
No abnormalities on exam
(including neurologic)
Outpatients without Known Cardiac Disease

1. **Chief Complaint of Chest Pain**
   - **History and Physical Examination**
     - **Risk Factors for Cardiovascular Etiology**
       - (+) History or Physical Examination
         - Monitor, ECG, Cardiology Consult
           - Abnormal: Discuss need for chest X-ray, labs with Cardiology
           - Normal: Outpatient Treatment
       - (+) Past Medical History or Family History
         - ECG
           - Abnormal: Cardiology phone consult
           - Normal: Outpatient Treatment
       - (-) History or Physical Examination
         - Outpatient Treatment

http://www.chop.edu/clinical-pathway/chest-pain-clinical-pathway
Case #4: Anomalous Aortic origin of a Coronary Artery (AAOCA)
Case #4: Anomalous Aortic origin of a Coronary Artery (AAOCA)

• May affect right or left coronary arteries
• Second most common cause of sudden cardiac death in athletes
• Incidence of 0.7%
• Sudden death may be the initial manifestation
• Diagnostic testing
Acute Chest Pain in Childhood

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Summary

• Chest pain is common

• Heed the red flags!

• History (HPI/Fam/Social) and exam are key.

• ECGs can be important but are not always essential.

• Cardiac pathology is rare, but it still occurs.
Questions?
Thank you!!!
References


References


References

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