Pediatric Chest Pain and Syncope:
Which Kids Should Worry You

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Objectives

• At the conclusion of this program, participants will be able to:
  • appropriately evaluate pediatric chest pain or syncope patients presenting to the emergency department.
  • recognize and manage serious and dangerous causes of pediatric chest pain or syncope.
  • establish proper disposition of pediatric chest pain or syncope patients presenting to the emergency department.
How big is the concern?

- Not common CC
- Rarely serious pathology
- But the serious causes are serious
- Good hx and physical are critical
Sebst et al 1988

- 407 ED presentations
- 60% had normal exam
- most common abnormality: chest wall TTP
- 4% had cardiac etiologies: arrhythmia, pericarditis, MVP, pericardial effusion, mitral regurgitation
- 1 pneumothorax with hx Marfans
- Final Dx: 21% idiopathic, 15% musculoskeletal
Sebst et al 1990

- followed 149 for 6 months, 51 for 2+ years
- 34% had dx changed: MC idiopathic
- only 1 new cardiac dx: MVP
- 43% still had chest pain
Rowe et al 1990

- 336 ED presentations
- nearly half had chest wall TTP
- 5 had cardiac dx: myocarditis, ASD, HCM, WPW, congenital heart block
- 28% dx with chest wall pain
Cohn et al 2012

• retrospective record review of 203 pts sent to pediatric cardiologist for chest pain
• exertional CP not assoc with higher risk of CV dx
• most helpful studies: EKG and echo
• 93% did not have a CV dx
Anderson et al 2012

• retrospective review 627,489 ED visits for pediatric syncope
• MCC neurocardiogenic syncope (vagal)
• serious causes: LQTS, Brugada, HCM, congenital structural heart disease
• Overall low yield on testing except EKG
• neuroimaging appropriate if head injury, HA, or associated seizure-like activity
What makes these patients challenging?
What to do every time...

• get a very thorough:
  • HPI
  • medical history
  • family history
• physical exam
• EKG and CXR
• risk stratification to determine if any further testing or specialist follow up is needed
Chest pain equivalents in children

- syncope or presyncope
- dizziness
- palpitations
- dyspnea
- seizure-like activity
How to rapidly mentally categorize and recall the serious causes...

- Structural
- Electrical
- Inflammatory/infectious
Structural

- Hypertrophic Cardiomyopathy
- Pneumothorax/Pneumomediastinum
- Aortic Dissection
- Pulmonary Embolism
- Coronary Artery Anomalies
- Mitral Valve Prolapse
Hypertrophic Cardiomyopathy

• 14 year old male

• syncopal episode during football practice

• no significant history

• normal exam

• describes sudden onset
• mutation in cardiac sarcomere protein genes
• leading cause of sudden death in young athletes
• common symptoms: chest pain, syncope, palpitations, exercise intolerance
• can progress to heart failure at any age
• 1-2% per year rate of sudden death
• urgent pediatric cardiology referral, beta blockers
Pneumothorax/Pneumomediastinum

- 17 year old girl presents with right sided chest pain after playing basketball at church.
- reproducible on exam
- no medical or family history
- normal EKG
Aortic dissection

• uncommon
• associated with Marfans, other connective tissue diseases, aortic stenosis, coarctation, cocaine use, HTN, blunt chest trauma
• CT angiography
• emergent surgical intervention
Pulmonary Embolism

• almost always due to underlying disorder, OCPs, or line-related

• unexplained persistent tachycardia, hypoxemia, fever, leg/arm swelling

• clinical decision rules not useful

• D-dimer less useful in children

• V/Q vs CT
Coronary Artery Abnormalities

- 7 year girl presents after syncopal episode during gymnastics
- History reveals previous episodes of palpitations
- Normal exam
- EKG shows ischemic changes
Mitral Valve Prolapse

• chest pain is uncommon with MVP
• may be due to papillary muscle dysfunction or subendocardial ischemia
• midsystolic click +/- late systolic murmur
Electrical

• Supraventricular Tachycardia
• Wolff-Parkinson-White
• Brugada
• Long QT Syndrome
13 year old girl with 1.5 hrs of heart racing. Started during volleyball practice. No other symptoms. No medical history, grandfather had cardiac ablation.
• adenosine
• cardioversion
• cardiology follow up
• may require cardiac ablation
Wolff-Parkinson White

7 year old female presents with cough
she reports history of "sometimes it feels like my heart is beating really fast"
no medical or family history
normal exam, normal vitals
• treatment of tachycardic episodes

• vagal maneuvers, adenosine, verapamil, cardioversion

• urgent cardiology referral

• some need emergent evaluation

• longer-term treatment

• Calcium channel blockers or beta blockers

• ablation
A 5 year old girl presents after syncopal episode occurred at rest. She has had a fever for 2 days. Her uncle had a sudden unexpected death at age 18.
• arrhythmogenic disorder

• can be asymptomatic until sudden cardiac death

• fever can precipitate symptoms

• managed in kids with defibrillator or quinidine

• emergent cardiology evaluation
LQTS

- 14 year old male presents after a syncopal episode
- He describes palpitations at onset, otherwise sudden
- No medical history
- Family history of multiple family members with early sudden unexplained death
Other channelopathies that can cause syncope or sudden cardiac death

- Catecholeminergic Polymorphic Ventricular Tachycardia
- Short QT Syndrome
- Congenital Sick Sinus Sinus Syndrome
Inflammatory/Infectious

• Pericarditis
• Myocarditis
• Kawasaki Disease
Pericarditis

- 12 year old male presents with chest pain
- recent URI symptoms
- pain is worse if laying flat, improves if leaning forward
- no medical history or family history
• don’t routinely require labs

• CXR and/or US to evaluate for possible pericardial effusion

• if no effusion or suspected bacterial cause, can treat with NSAIDs

• can have concurrent myocarditis
Myocarditis

- 4 year old female with fever, shortness of breath, tachycardia
- prolonged capillary refill
- EKG sinus tachycardia, nonspecific ST/T changes
- CXR mild pulmonary edema
• Wide variation of severity from mild presentation to acute fulminant illness
• no universally accepted definition
• if no preexisting heart disease, normal troponin can be used to exclude myocarditis
• in one study, 83% of those with myocarditis had abnormal EKG, mostly nonspecific changes
Kawasaki Disease

- 3 year old male presents with chest pain, difficulty breathing, and tachycardia
- hx of 1 week long febrile illness sometime last month
- exam significant for peeling fingers and toes
- CXR shows cardiomegaly
- BSUS shows pericardial effusion
- EKG sinus tachycardia
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<th>Clinical Manifestations of Kawasaki Disease</th>
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<td><strong>Fever</strong></td>
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<td><strong>Cardiovascular</strong></td>
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<td><strong>Thrombocytosis</strong></td>
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<td><strong>Weeks</strong></td>
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<th>Acute</th>
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• IVIG and ASA
• variations in incidence
  • racial/ethnic
• seasonal
Summary

• Serious causes of pediatric chest pain are rare
• Always get a good hx and physical exam along with an EKG and CXR
• Mentally categorize
  • Structural
  • Electrical
  • Inflammatory/infectious
References


