Acute Chest Pain in Pediatric patients

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Objective

- Describe importance of chest pain in pediatrics
- List non-cardiac vs cardiac causes
- Pathophysiology
- Recognize importance of history and possible clues to diagnosis
- Labs

Pediatric Chest Pain

- Chest pain is one of the most common reasons for unscheduled visit.
- It accounts for 650,000 visits per year in patients 10 - 21 year of age.
- It is the 2nd most common reason for referral to pediatric cardiologist.
  - (murmur is the most common)
- Non-cardiac chest pain is by far the most common cause of chest pain in children.

Non-cardiac Chest Pain

- Musculoskeletal chest wall trauma is the most common.
- Pulmonary diseases -pneumonia, asthma pneumothorax and cough accounts for ⅕ of the cases.
- Other causes - hyperventilation, Psychiatric, GI.
- 15% of cases remain idiopathic.

History of Present Illness

- Obtain a detailed History
  - location
  - Duration
  - Radiation,
  - Quality
  - Associated signs and symptoms
  - Aggravating and alleviating factors

*Pathognomonic findings are rare on exam, therefore history will help narrow the DDx.

PMH

- Is there a history of other chronic illness?
  - Asthma, Marfan or Turner syndromes, Diabetes, Anemia
- Hx of Kawasaki Disease
  - Consider possible undiagnosed cases
- Medications that can cause mucosal injury
  - Nsaid, Tetracycline
- Substance Abuse
  - Cocaine, Methamphetamine
- Family Hx
  - Recurrent syncope or unexplained sudden death
  - Marfan, Cardiomyopathy, prolonged QT syndrome
  - Heart Disease in an adult family member may provoke anxiety-related chest pain in child

History Clues

- If pain occurs with exercise consider cardiac or respiratory causes.
- If pain awakens the child from sleep, likely not psychological causes consider cardiac, respiratory, GI, MSK causes.
- If deep, poorly localized and radiates to the neck or shoulders consider visceral pain.
- Superficial, sharp pain that is exacerbated by lifting or movements of the torso consider musculoskeletal pain.
- Consider psychogenic sources if
    - poorly localized, associated with recurrent somatic complaints, family or school stress and a family history of chest pain is present.

History Clues

- Peripheral pain increases with inspiration consider pleural inflammation.
- Trauma to the chest that occurred 1-3 months before consider post traumatic pericardial effusion.
- Sharp pain that decreases with leaning forward, consider pericardial inflammation.

Physical Exam

A thorough physical examination in combination with a detail history will most likely uncover the cause of chest pain.

- Clicks, rubs, Systolic murmurs (specially if increase in intensity with Valsalva maneuver) points to cardiac source
- A third heart sound or Gallop is heard in myocarditis and congestive heart failure.
- Pleural friction rubs, wheezes, tachypnea, and crackles suggest pulmonary cause
- Hyperventilation associated with lightheadedness, paresthesia, dizziness and high level of stress or anxiety suggest Hyperventilation Syndrome

Labs

Laboratory test are usually not helpful in establishing a specific diagnosis.

In most cases, Chest XR and ECG will confirm clinical suspicious.

Differential Diagnosis

- Musculoskeletal Chest Pain & Chest Wall Conditions
- Breast Causes
- Skin Causes
- Pulmonary Conditions
- Gastrointestinal Causes
- Infectious
- Idiopathic Causes
- Psychological disorders

Musculoskeletal and Chest Wall Conditions

- Look for bruising, swelling over joints, splinting, signs of trauma, or abnormal breathing pattern.
- Reproduction of pain with point tenderness palpation, movement of torso or flexion of arms is the strongest evidence favoring the diagnosis of chest wall disease.

*Consider stress fracture in athletes performing repetitive movement
*Inquire about severe cough and lifting heavy weights including heavy backpacks

Breast Disorders

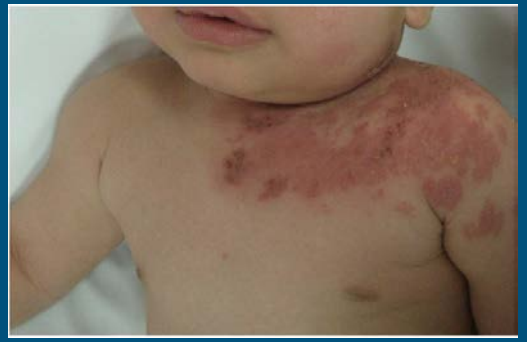
- Early Puberty
  - Pain related to breast nodules development in males and females
- Pregnancy/Menstrual Swelling
  - Can cause CP in pubertal female teens
- Gynecomastia
  - Adolescents with gynecomastia or breast pain may experience chest pain that is easily discernible on inspection and palpation of the developing breast tissue.

Skin

Shingles (Herpes Zoster)

Chest pain that is sharp, band-like pain that appears several days prior to rash.

Pain with light touch to the chest wall or even with wearing clothes



Pulmonary Conditions

- Asthma
  - chest pain from excessive cough, overuse of intercostal muscles.
  - Isolated pain as a manifestation of asthma is unusual
  - Exercise-induced chest pain or tightness that resolves with rest or use of bronchodilators
- Spontaneous pneumothorax
  - Associated with Cystic Fibrosis, Asthma, Marfan syndrome in adolescents
    - Assume pneumothorax in children with CF and chest pain
  - Can also occur in healthy teenagers who are usually tall and thin and
  - Presents with dyspnea, shoulder pain, tachypnea and chest pain

Gastrointestinal Conditions

- Acid Reflux
  - Can mimic pain of angina
  - Causes acute and chronic CP
  - Gnawing substernal burning sensation
  - Can last for hours
  - Worse after meals and on reclining
- Esophagitis
  - Most common cause of GI chest pain, can have nonspecific presentation
    - Abnormalities of peristalsis, foreign body, trauma
  - Nonspecific presentation

*If child has idiopathic chest pain, consider a trial of H2-receptor antagonist before extensive testing.

Infectious

- Myocarditis - Coxsackievirus B
  - Usually can develop chest pain with concomitant pericarditis is present.
  - Other signs include tachycardia out of proportion to fever, or when patient is quiet/sleeping, signs of heart failure, poor perfusion, arrhythmia.
- Pericarditis - infectious agents or autoimmune process
  - Sharp pain, exacerbated with lying down or inspiration. Also fever and dyspnea
  - Findings include, Friction rub, distant heart sounds, pulsus paradoxus and ECG with new widespread ST elevation or PR depression.
- Pleuritis - mostly caused by bacterial pneumonia
  - Pain is aggravated by deep breathing and movement.

Cardiac Conditions

- Cardiac disease in children rarely produces isolated CP and it is always associated with other findings.
- Sudden death in children is caused by a small subgroup of disorders
  - Abnormalities of myocardium or coronary vessel
  - Specific congenital heart lesions
  - Arrhythmias
  - Conduction disorders
- Concern signs and symptoms
  - Exertional nonrespiratory dyspnea, syncope, palpitations
  - Family history of sudden death and chest pain

Psychogenic Causes

More common in adolescents than in children younger than 12 years.

If psychogenic cause is entertained, then the diagnosis should not be made by exclusion of organic disease; rather the diagnosis should be based on positive psychiatric evidence.

- Hyperventilation can be associated with chest wall syndrome in teenagers with underlying anxiety.
- Presents with dyspnea, rapid breathing, anxiety and sometimes with palpitation, chest pain, lightheadedness, paresthesia, confusion.

Idiopathic Causes

Approximately 20-45% of children and adolescent with Chest Pain have no obvious cause.

The diagnosis of Idiopathic chest pain is reached after a thorough evaluation.

Symptoms typically resolve over time.

Cardiac Causes

Aortic Stenosis and Hypertrophic cardiomyopathy

- Most important lesions that cause left ventricular outflow obstruction
- Chest pain results from the inability of the heart to increase cardiac output with exercise.
- Also presents with exertional syncope.
- Mild aortic stenosis does NOT cause chest pain.

Arrhythmia

- Chest pain is not usually primary complaint, unless palpitations are perceived as painful.
- Older children complain of lightheadedness or dizziness along with palpitations

Mitral Valve Prolapse

- Most adolescents with MVP are asymptomatic and have the same rate of chest pain as those without the condition

When to Refer

Signs and Symptoms that Accompany Chest Pain and Warrant Referral or Hospitalization

Signs

- Syncope
- Fevers, chills, weight loss, malaise, anorexia
- History of Kawasaki disease, Turner syndrome, Marfan syndrome, sickle cell disease, or cystic fibrosis
- Recent elective abortion, calf pain, oral contraceptive use
- Family history of hypertrophic obstructive cardiomyopathy or unexplained syncope

When to Refer

Symptoms

- Cyanosis, toxic appearance, or respiratory distress
- Murmur that increases with Valsalva maneuver
- Pleural or pericardial friction rub
- Pulsus paradoxus
- Cardiac clicks, thrills, gallop, or third heart sound
- Chest pain with exercise
- Palpitation or tachycardia

Resources

Schroeder, Scott A. Textbook of Pediatric care, Chapter 133: Chest pain. https://pediatriccare.solutions.aap.org/chapter.aspx?sectionid=107998340&bookid=1626

Geggel, Robert L. “Causes of nontraumatic chest pain in children and adolescents”. Uptodate. https://www.uptodate.com/contents/causes-of-nontraumatic-chest-pain-in-children-and-adolescents

Thank you for staying awake!