Outreach Education

Chest Pain: Is It Cardiac?
New Developments in Pediatric Cardiology

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Program Handouts

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Chest Pain: Is It Cardiac?

New Developments in Pediatric Cardiology

Objectives

• Identify chest pain signs and symptoms which indicate cardiac referral.
• Explain diagnostic testing for the work up for chest pain.
• Assess the child with a pacemaker or defibrillator device in the school context.
• Identify signs and symptoms which require urgent cardiac attention in children with pacing devices.
• Discuss new cardiac interventions and procedures in cardiology.

Topic Outline

• Chest pain: Differentiating Cardiac pain from other types of chest pain such as panic attack or heartburn
• Diagnostic testing for cardiac chest pain
• Pacemaker/defibrillators in children: Signs and symptoms
• New Cardiac interventions and procedures in pediatrics

Chest Pain

• Chest pain can be acute (<48hrs) or chronic (> 6 months)
• May result in restriction of activities and school absences
• Causes anxiety in patients and their families b/c of its association with fatal heart disease in adults
• In fact, cardiac causes of chest pain are rare

Chest Pain: Prevalence

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiopathic</td>
<td>21 to 45</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>15 to 31</td>
</tr>
<tr>
<td>Hyperventilation/psychiatric</td>
<td>0 to 30</td>
</tr>
<tr>
<td>Breast related</td>
<td>1 to 5</td>
</tr>
<tr>
<td>Respiratory</td>
<td>2 to 11</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>2 to 8</td>
</tr>
<tr>
<td>Cardiac</td>
<td>1 to 6</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>9</td>
</tr>
</tbody>
</table>
Chest Pain: Idiopathic

– a diagnosis is often never established and those with idiopathic pain typically have no serious underlying medical condition.

Chest Pain: Musculoskeletal

Traumatic – rib fracture, bruise or rarely hemopericardium (blood collection around heart)

Non traumatic –

- Costochondritis - tenderness of the costal cartilages, unilateral, occurring more frequently on the left side (left fourth sternocostal cartilage), hx of lifting heavy book bag for school
- Slipping rib syndrome - involves the eighth, ninth, and tenth ribs (not attached by costal cartilage to the sternum but are attached to each other by fibrous tissue), can slip and impinge on the intercostal nerve, producing pain.

Chest Pain: Musculoskeletal con’t

- Precordial catch known as Texidor’s twinge –
  – brief episodes (seconds to a few minutes) of sharp pain that can be localized with the fingertip to one interspace at the left sternal border or cardiac apex
  – sudden onset, typically at rest or during mild activity, and increases with inspiration. The cause is unknown, although it has been associated with poor posture.

Chest Pain: Psychogenic

- Caused by anxiety due to stressful event including recent death, illness or accident in the family, family separations, or school changes
- They may have other complaints including abdominal, extremity or headache pain, sleep disturbance

Chest Pain: Breast pain

- Males with gynecomastia, anxiety about the size of their breasts
- Females with mastitis, fibrocystic disease, thelarche, or tenderness associated with pregnancy
- Both can often be worried about cancer

Chest Pain: Respiratory disorders

- Pneumonia, bronchitis, and reactive airway disease, are common causes of acute chest pain.
- Exercise-induced bronchoconstriction appears to be a frequent cause of chest discomfort even in patients without audible wheezing.
- Less common causes are pleuritis, pleural effusion, pneumothorax, and pneumomediastinum
Chest Pain: Gastrointestinal type
- Esophagitis (typically caused by gastroesophageal reflux), gastritis, and more rarely diffuse esophageal spasm
- Esophageal disorders causing chest pain include strictures, foreign body, and caustic ingestions
- More rare - Biliary (eg, gallstones) and pancreatic disorders

Chest Pain: Pulmonary Vascular Disease
- Pulmonary embolism is unusual in children but can present with chest pain that would usually be acute
- Pulmonary hypertension can be secondary to lung disease, congenital heart disease, or other systemic disorders, or have no identified cause (idiopathic pulmonary arterial hypertension)
- May have symptoms of fatigue, lethargy, and dyspnea or syncope with exertion.

Chest Pain: Acute chest syndrome
- Occurs in 50% of patients with sickle cell disease and can be serious and potentially fatal
- Characterized by the presence of a new pulmonary infiltrate involving at least one complete lung segment (not atelectasis), temperature >38.5°C, and tachypnea, wheezing, or cough

Chest Pain: Cardiac Conditions
- Cardiac disease is more likely if chest pain occurs during exertion and is recurrent.
- Most conditions will be associated with an abnormal cardiac examination or coexisting symptoms.
- In patients with known heart disease, chest pain may indicate progression of the underlying condition.

Chest Pain: Other Causes
- Toxic exposure – cocaine ingestion, use of marijuana, methamphetamines, and sympathomimetic decongestants. Chest pain can be the result of ischemia.
- Neurologic disorder – herpetic neuralgia (dermatomal distribution to the chest) or spinal chord compression causing radicular pain

Chest pain symptoms: How to differentiate
Non cardiac chest pain
- Changes with breathing
- Able to touch it on the chest and make it hurt by pressing in that spot
- Occurs with eating or swallowing
- There’s a popping or clicking sound or it feels like something is slipping
- It’s sharp and lasts only seconds to minutes
- It is localized to one small area
Cardiac Chest Pain

- Radiates to the neck, throat, lower jaw, teeth, upper extremity, or shoulder.
- Chest discomfort provoked by exertion
- Palpitations and syncope
- For pericarditis - sharp in quality, usually retrosternal in location, often with radiation to the left shoulder. It is more severe in the supine position or with deep inspiration (because of pericardial distention).
- Squeezing, tightness, pressure, constriction, burning, or fullness in the chest.

Cardiac symptoms

- In young children, irritability that doesn’t resolve even though the usual comfort measures have been tried
- Poor appetite, poor growth
- Increased work of breathing
- Activity intolerance compared to peers
- Paleness or cyanosis
- Fatigue

Increased Work of Breathing

- Subcostal and intercostal retractions
- Nasal flaring
- Head bobbing
- Grunting – red flag!
- Lethargy, listlessness – red flag!

Diagnostic studies

- Vital signs including O2 saturation, temp
- Chest X-ray
- Electrocardiogram
- Echocardiograph
- ExerciseTreadmill

General Guidelines

- Study of 407 patients seen the ER of which 149 were seen for at least 6 months and 51 were seen for 2 years (Selbst et al, 1990)
- Chest pain persisted in 37%, 12 patients eventually were diagnosed with a problem and only one of those had a cardiac problem and 3 had asthma. (Selbst et al, 1990)
- Chest pain may persist or recur over a period of years
- Follow up should occur until the chest pain resolves
Pacemaker/ICD in Children

Transvenous pacemaker

8 weeks; 2.95 kg
5 years; 17.2 kg

Pacemaker/ICD in Kids

- Bradycardic or tachycardic arrhythmia
- Some have strictly a rhythm issue and others have concomitant structural heart disease or congenital heart disease
- When to call 911:
  - If the child develops syncope or becomes pale and lethargic or receives an ICD shock
  - If the child is immediately awake and response after the shock with no further problems, then the child should be seen within 24 hours by their cardiologist

Pacemakers/ICD in kids

- Our goal is to allow these children to lead a life as normal as possible
- Remember that they have a rhythm device to keep them safe and to allow them to live normally
- Parents are very helpful in sorting out what to be concerned about and should be involved early on when symptoms occur

New Developments in Cardiology

- Pediatric cardiologists are becoming more specialized such as electrophysiologists and interventionalists.
- Other cardiology subspecialties include fetal echocardiography, adult congenital heart disease, cardiac transplant, cardiac intensive care, cardiac genetics and others

Interventional Cardiology

- Cardiac catheterization procedures which are purely diagnostic are fewer and further between
- Often an intervention is planned in addition to performing diagnostics such as
  - device closure of an ASD or VSD
  - coil embolization of PDA
  - balloon dilation of heart valve or artery
  - stent placement in the pulmonary artery or aorta

Research studies

- Catheter based percutaneous pulmonary valve placement in select patients