

## Management of Paediatric Chest Pain

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### Abstract

**Introduction:** Chest pain can be an alarming complaint in children, which may frighten and concerned family to a pediatrician or emergency room and a further referral to a pediatric cardiologist. Since chest pain in common associated with significant cardiovascular diseases and sudden death in adult patients, medical personnel commonly have heightened concerns over pediatric patients presenting with chest pain. Several causes of chest pain in children are self-limited but serious and life-threatening etiologies also exist. Moreover, chest pain is a maybe worrisome symptom for families who fear a cardiac cause, and this may lead to school absence and limitation of activities. Therefore, the physicians must be familiar with all possible causes for chest pain and attempt to identify the etiology properly. Thorough case history and physical examination are sufficient to identify the source of the pain, and diagnostic tests can be run on a selective basis to address concerns identified. Only after a serious cause has been excluded should reassurance and symptomatic care be offered.

**Aim of the Study:** The aim of the review is to understand the causes of the chest and management of the same accordingly.

**Methodology:** The review is comprehensive research of PUBMED since the year 1976 to 2011.

**Conclusion:** Chest pain is a relatively infrequent and mostly benign in occurrence in pediatrics. Detailed case history and physical examination are usually all that is necessary for excluding the rare, life-threatening causes of chest pain. These rare, life-threatening events require immediate evaluation, treatment, and subspecialty consultation. Idiopathic chest pain is known to be the most frequent diagnosis in pediatric chest pain, and the symptoms are typically chronic. Laboratory testing is usually nondiagnostic, costly, and burdensome to patients and, therefore unnecessary. A long-term, trusting relationship with the patients and their families is needed to reassure them and allow symptoms to resolve.

**Keywords:** Pediatric Chest Pain; Causes; Management

### Introduction

Approximately 0.3% to 0.6% of chest pain cases are estimated for pediatric emergency department visits. The frequency of visits is constant throughout the year, with a slight excess visit reported in summer months according to one study. The emergency department is treating children up to 18 years of age with the median age for presentation with chest pain was found to be 12 to 13 years. The reported male to female ratio is even, ranging from 1:1 to 1.6:1. However, in adolescents, relatively more girls present with chest pain. Many emergency department studies conducted on pediatric chest pain report that most cases present with acute pain are of less than 1 day in duration [1-3].

Chronic chest pain with persistent symptoms in the pediatric population accounts for 45% to 69%, and 19% of them have symptoms that last for more than 3 years. But 81% of patients with persistent symptoms, the chest pain resolves with time and not many patients over 3 years developed any severe disease process. Because of the chronic nature of pain and often unconfirmed cause, paediatricians must develop a good trusting and working relationship with these children and their families and should be prepared to work together over time for diagnosing and treating patients appropriately with this very common and predominantly benign complaint [4,5].

### Methodology

We did a systematic search for management of pediatric chest pain using PubMed search engine (<http://www.ncbi.nlm.nih.gov/>) and Google Scholar search engine (<https://scholar.google.com>). All relevant studies were retrieved and discussed. We only included full articles.

The terms used in the search were: Pediatric chest pain, causes of chest pain, management.

### Causes of paediatric chest pain

#### Following are the most frequent causes of chest pain in a child

##### Trauma and deformities of the chest wall

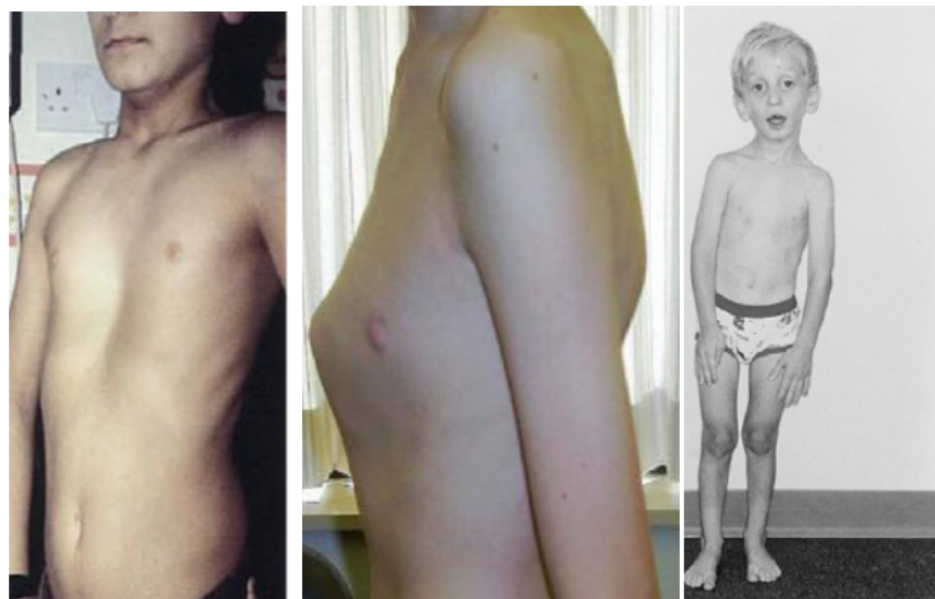
Approximately 5% of chest pain cases have been reported to be caused by direct trauma. Frequent or severe cough leads to muscle strain, which may cause chest pain. Delayed onset muscle soreness of the pectoralis or shoulder muscles is seen in children participating in physical activities, which typically occur within 2 days of activity. Because of the lag in the development of soreness, parents may not recognize the association of the pain due to physical activity and medical attention [3,6].

Pectus excavatum or pectus carinatum is some chest wall deformities associated with musculoskeletal chest pain. Patients with evident chest wall deformities should be examined properly for Marfan syndrome findings, which are associated with a high risk of aortic root dilation, dissection, and spontaneous pneumothorax. Pectus excavatum may also be associated with aortic root dilation, even with the absence of signs of Marfan syndrome [7].

Costochondritis is a localized pain to costal cartilage that is reproducible on palpation. Many patients often complain of chest pain are found to have areas of tenderness at the costochondral or costosternal junctions. A diagnosis of costochondritis is made when pain reproducible by palpation is not attributed to another diagnosis. The etiologies are not well known but may include minor trauma, cough, and postviral reaction [1].

### Pulmonary

The pulmonary origin of chest pain was seen in approximately 13 to 24% of children in the emergency department, out of which the most common cause is asthma. According to Selbst and colleagues, 7% of patients presenting to the emergency department with chest pain is due to asthma. Exercise-induced asthma may be an underrecognized cause of pediatric chest pain. While 2 - 5% of pneumonia case has been reported to cause chest pain in the emergency department. In sickle cell disease, chest pain occurs along with lower respiratory



**Figure 1:** Pectus excavatum (left), pectus carinatum (middle) and patient with typical Marfan syndrome appearance (right) [8].

tract symptoms. Infiltrate on radiographs should be managed as an acute chest crisis. Pleurodynia (historically known as “devil’s grip”) shows symptoms such as fever and pleuritic chest pain. It may occur in epidemics (localized) and is often associated with coxsackievirus B1. Pleural effusions and pleuritis are uncommon causes of pleuritic chest pain but can be seen in children with infections and such conditions as collagen vascular disease, malignancy and familial Mediterranean fever [2,3,4,6,9].

### Gastro-intestinal

Chest pain due to the gastrointestinal cause is seen in 8% of patients presenting to the emergency department. Gastroesophageal reflux disease is the most commonly diagnosed gastrointestinal cause for chest pain in children. Since it is usually a clinical diagnosis, it is difficult to estimate the true contribution of gastroesophageal reflux disease in chest pain [10,11].

### Cardiac

This accounts for only 2 - 5% of chest pain in the emergency department. Fever, dyspnea, palpitation, pallor, and abnormal cardiac auscultation are known to be associated with cardiac etiology. The other causes are acute myocardial infarction, coronary artery anomalies, congenital heart disease, Kawasaki disease, familial hypercholesterolemia, previous heart transplant, sickle cell disease. Myocarditis is a serious cause of chest pain in children though it is rare. Symptoms may vary from chest pain, palpitation, lightheadedness to syncope and seizure [4,12].

### Psychiatric

Psychiatric causes contribute 5 - 9% of chest pain cases in children. History of a stressful event such as a death in the family, hospitalization, school changes, family separation may trigger it. Other reasons are anxiety disorder, panic disorder, social phobia, general anxiety may be linked to chest pain in the child [1,2,13].

**Evaluation of child patient with chest pain**

The first step in evaluation is to rule out the cardiac and other causes leading to chest pain. A detailed history and physical examination may help to differentiate and rule out the cause.

**History**

A detailed history is important in assessing a child with chest pain as it gives a thorough knowledge into the nature of the pain, and associated features that may be needed to make a definitive diagnosis. Age is an important consideration when assessing these patients since adolescents are more likely to have psychogenic or musculoskeletal causes of chest pain, while the young child may have a wide range of symptoms.

Condition	Symptoms
Musculoskeletal	<ul style="list-style-type: none"> <li>Localized and can be reproduced with palpation or gentle sternal pressure. Worse with movement, coughing, and inspiration.</li> </ul>
Respiratory	<ul style="list-style-type: none"> <li>It is described as tightness, shortness of breath, wheeze, and dry cough.</li> <li>Sharp and localized are pleuritic which is exacerbated by coughing and inspiring.</li> <li>Ipsilateral pain is seen in pneumothorax and is often felt in the upper anterior part of the chest.</li> </ul>
Psychogenic	<ul style="list-style-type: none"> <li>Often recurrent with particular stressors.</li> <li>History of anxiety (particularly panic disorder) or any stressful events.</li> </ul>
Gastrointestinal	<ul style="list-style-type: none"> <li>Pain is retrosternal or epigastric but can be central. It is sharp and typically burning in nature.</li> <li>Triggered by posture or eating.</li> </ul>
Cardiac	<ul style="list-style-type: none"> <li>The pain is centrally located and may radiate to the left arm or left shoulder. It is described as crushing or heaviness.</li> <li>Other symptoms are sweatiness, nausea, and pallor and associated with presyncope or syncope along with palpitation.</li> </ul>

*Table 1: The characteristic of chest pain in different conditions [14-16].*

**Following should be enquired in history [14-16]:**

- History of trauma or intense physical activity.
- Duration of pain.
- Association of pain with eating, exercise, any posture, or coughing.
- Alleviating factors like change in position, rest, analgesics, and antacids.
- The length of the episode.
- History of dyspnoea, wheeze and cough, fever, anorexia, weight loss.

**Physical examination [15]:**

- Vital signs, such as blood pressure and oxygen saturation.
- A general assessment of appearances such as color, level of alertness, breathlessness, and any evidence of anxiety or distress.
- Evaluation of pulse: rate, volume, and character.
- Chest inspection for any sign of trauma, bruising, swelling, and asymmetry.
- Tenderness on palpation of the chest.

- Auscultation of lung fields for air entry, wheeze, crackles, and pleural rub.
- Auscultation of precordium for heart sounds, murmurs, and pericardial rub.
- Examination of the abdomen for signs of tenderness (particularly epigastric), trauma and organomegaly.

**Investigation and treatment**

After the complete history and physical examination are elicited, and if a serious etiology is suspected or if the pain is disruptive to usual activities, further investigations may be required. It may be difficult to identify the exact cause, but it is essential to exclude severe pathology. A chest radiograph is advised in any unexplained pain of acute onset, respiratory distress, abnormal cardiac or pulmonary auscultation, fever, cough, etc.

Diagnostics	History/Symptom	Sign
Chest Radiograph	<ul style="list-style-type: none"> <li>• Fever, cough, shortness of breath</li> <li>• History of trauma, foreign body ingestion</li> <li>• Acute onset of severe pain</li> </ul>	<ul style="list-style-type: none"> <li>• Fever, tachypnea, significant trauma</li> <li>• Unexplained tachycardia, pathological heart auscultation, subacute air crepitus</li> </ul>
Electrocardiogram	<ul style="list-style-type: none"> <li>• Shortness of breath</li> <li>• Association with exercise or syncope</li> <li>• Palpitation</li> <li>• Pericardial trauma</li> <li>• Personal or family history of the disease.</li> </ul>	<ul style="list-style-type: none"> <li>• Pathological heart auscultation</li> <li>• Unexplained tachycardia</li> <li>• Diminished perfusion</li> <li>• Decreased pulse</li> <li>• Evidence of trauma.</li> </ul>

*Table 2: Advised investigation and possible result [3].*

**Referral and treatment [8]**

Musculoskeletal pain	Can be relieved from analgesics such as ibuprofen or acetaminophen.
Patients with an infectious, respiratory, or cardiac causes	The cause of the underlying condition is needed to be treated directly. Referral and consultation to a cardiologist is required if there is exertional pain, the history of palpitations, syncope, or presyncope; abnormal cardiac auscultation, chest radiograph, or ecg.
Gastric cause such as esophagitis or gastritis	A therapeutic dose of an h2 blocker or proton pump inhibitor is initiated to relieve pain.
Idiopathic or undiagnosed pain	Analgesics and close follow-up are appropriate.
Trauma	Referred to an Emergency Department
Psychological pain	If concerning family history; or significant recurrent pain of unknown aetiology if emotional stress, anxiety, depression, or is present, the patient is referred to a psychologist or a psychiatrist or primary care provider with experience in mental health issues.

**Conclusion**

Chest pain is infrequent symptoms in children seen in the emergency department, ambulatory clinics, and cardiology clinics. Although the cause of chest pain is usually benign, some have serious and life-threatening conditions. The symptom must be carefully evaluated before reassurance, and then supportive care is offered. Since the serious causes of chest pain are uncommon, so not many prospective studies are made available, which in turn makes it difficult to develop evidence-based guidelines for evaluation and appropriate protocol

for treatment. The clinician should know a broad differential diagnosis in evaluating a child with chest pain and pursue further investigation when the history and physical examination suggest the possibility of serious causes.

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