

Updates in Pediatric Cardiology



East Tennessee Pediatric Cardiology P.C.

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Ow, my chest hurts!

Let's face it, chest pain can be a difficult complaint to sort out. We all know that chest pain can also be a pretty common complaint in children and adolescents. The etiology for the pain is not found in up to 45% of patients. Etiologies for the pain are also different by age group where children less than 12 years are more likely to have a cardiorespiratory cause, and children older than 12 years have a higher incidence of psychogenic causes. Finding the cause is no easy feat. More

importantly, ensuring the health of our patients and preventing more significant disease or even sudden events is our primary goal. Not only are we faced with the task of finding the etiology for the pain, we often also have to reassure our patients and families of the benign nature of the pain. We hope this newsletter finds you well and helps take the "pain" out of the daunting task of finding the etiology for our patients' chest pain!

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Causes of chest pain in children

If we break it down by patients who present to their primary physician and those who are referred to a pediatric cardiologist, whereas cardiac causes in patients who present to their primary physician are rare, patients who are referred to a pediatric cardiologist will have a cardiac cause up to 15% of the time. Of these, most common are pericardial disease, mitral valve prolapse, coronary ischemia, aortic stenosis and tachyarrhythmias. Costochondritis, pathologic conditions of the chest wall, and respiratory diseases are the three most common causes, responsible in up to 65% of children.

Chest wall pain

Chest wall pain can account for up to 45% of chest pain. This can be broken down into skin, neural (such as in herpes zoster), musculoskeletal, and breast. Costochondritis, which is more common in adolescents, results in anterior, often unilateral but at times bilateral, chest pain and tenderness without swelling. The pain may be preceded by exercise or respiratory infection and may be aggravated by physical activity or breathing. This pain may last several months. The exam is diagnostic with reproducible pain upon palpation over the chondrosternal

or costochondral junctions. It is a benign condition. Tietze syndrome is a rare form of costochondritis that is associated with swelling, usually in the upper ribs, and can be treated with heat and NSAIDs. Other causes of chest wall pain include muscle strain/injury/spasm (even from overuse such as in coughing or hyperventilation, see "respiratory"), pectus deformities, viral with myalgias or pleurodynia, and mastalgia.

Respiratory

Respiratory causes are responsible for chest pain in up to 20% of patients. Asthma, sometimes only following exertion, may result in chest pain and not be readily apparent until formal exercise stress testing. Also, asthma, in turn, may be associated with gastroesophageal reflux and chest pain (see "gastrointestinal"). Pleuritic chest pain (and effusions) is often worse with inspiration, and history may include a preceding upper respiratory infection, even weeks before presentation. Other causes include pneumothorax, irritation of the diaphragm, infection/pneumonia, and pulmonary embolus. At times, a chest x-ray may be diagnostic, but often additional testing is necessary for diagnosis.

Gastrointestinal

Gastrointestinal disorders account for less than 10% of chest pain in children. The onset and relief of pain in relation to meals may help clarify the diagnosis. This pain may also be referred. "Burning" chest pain may often be associated with esophagitis or reflux and may worsen with certain foods and positions (reclining). Other causes include biliary colic, pancreatitis, splenic flexure syndrome, and less commonly lower, such as colonic or hepatic.

Psychogenic

Psychogenic causes are more common in adolescents and occur equally in males and females. This pain may account for up to 9% of chest pain. Recent stress, death or separation, serious illness or disability, a recent move, failure or abuse often parallels the pain. Other conditions such as anxiety, depression, somatization and conversion can present with chest pain, and often psychologic or psychiatric consultation can be helpful. Psychogenic causes should not be lightly assigned without a thorough history, investigation and follow-up.

Miscellaneous

Precordial catch syndrome (Texidor's twinge) is usually unilateral, sharp, lasts a few seconds up to a few minutes, may be worse with a deep breath or change in position and has no identifiable cause. The condition is benign. It may recur frequently or remain absent for months at a time. It eventually resolves, and patients and families can be reassured.

Idiopathic chest pain or "benign adolescent chest pain" is quite common, accounting for up to 40% of chest pain. It appears to be most common between the ages of 8-16 years. It usually goes on for months, is mostly at rest, may be sharp or "knife-like" or even pressure-like or achy. It is often precordial and brief, lasting less than 2 minutes. It comes on suddenly and may even make the patient aware of his/her "heart beating" (as opposed to a tachyarrhythmia) and result in severe pain that makes the patient cry. The exam and EKG are always normal. It may recur, but it is benign, and the patient can be reassured that they will "outgrow it".



Cardiac

Thankfully, cardiac chest pain only accounts for about 5-15% of chest pain. One should be suspicious and often pursue additional evaluation when there is a history of syncope/presyncope, palpitations, previous cardiac surgery, family history of early/sudden/unexplained death, or the chest pain is exertional. When there are abnormal findings on cardiac exam, CXR or EKG, a cardiology referral is clearly indicated. With a positive family history, a referral may also be indicated. At times, a high level of parental or patient anxiety is also an important reason for a referral to a cardiologist.

Certain syndromes or diseases, such as Marfan's, Turner's, Noonan's, Tuberous Sclerosis, Kawasaki's, or hyperlipoproteinemia, are more likely to be associated with cardiac chest pain.

Pericardial disease can be seen with viral, bacterial, rheumatologic, or autoimmune processes, or even post-traumatic, malignant, or hematologic causes. This pain may be sharp or stabbing, is precordial, and often worse when lying down and relieved after sitting and leaning forward. CXR and EKG can be helpful, and echocardiography is diagnostic.

Coronary ischemia, either congenital (anomalous or stenotic coronaries, fistulae) or acquired (e.g. Kawasaki disease or hyperlipoproteinemia), can also result in chest pain. We should also include drug induced, e.g. cocaine. This pain is typical of anginal pain. Exam may be normal, and EKG is often abnormal. Echocardiography and exercise stress testing can be helpful, but usually coronary angiography is indicated.

Myocardial disease includes myocarditis and cardiomyopathy. Myocarditis may also involve the pericardium. In addition, rheumatic fever most commonly results in a "pancarditis", involving the pericardium, myocardium and valves. The pain in myocarditis and cardiomyopathies may be secondary to the imbalance between coronary blood flow and myocardial oxygen demand. Exam, CXR and EKG usually suggest the diagnosis which is confirmed by echocardiography.

Valvular heart disease that most commonly results in chest pain includes aortic stenosis, pulmonary stenosis and mitral valve prolapse. In fact, chest pain in mitral valve prolapse has been reported in up to 20% of patients. The exact cause of the pain is unknown but it is usually vague, precordial, nonexertional and short in duration. Exam and EKG are suggestive, and echocardiography is diagnostic.

Arrhythmias may also be responsible for chest pain. Even without ischemia, children with arrhythmias will often complain of chest pain. One thought is that the palpitations or more forceful heartbeats are perceived as pain. When chest pain is associated with palpitations or syncope/presyncope, additional evaluation of the conduction system must be performed.



In summary

A systematic approach to chest pain in children is most likely to lead to an accurate diagnosis. One must consider the age of the patient, as certain types of chest pain are more common in different age groups, as well as a careful history and exam. This will usually guide additional diagnostic work-up, and in turn, help establish which patients require a cardiac referral. It is important to remember that a large percentage of patients will have no definable etiology for their chest pain. However, we must ensure for our patients that we have adequately explored the possible causes to prevent more significant disease and that we provide adequate and appropriate treatment. Equally important is establishing a relationship of trust with our patients and providing reassurance when appropriate to help alleviate any anxiety or fear that might accompany the chest pain.

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About East Tennessee Pediatric Cardiology

We are board certified pediatric cardiologists with special expertise in cardiac imaging, fetal cardiology, and care of the patient with complex heart disease. We are pleased to partner with you in managing these patients, as well as evaluating those with chest pain, syncope, murmurs, hyperlipidemias, arrhythmias, athletes needing cardiac clearance, and others with cardiac concerns.

Ours is the only pediatric and fetal echo lab in the region that is certified by the Intersocietal Commission on the Accreditation of Echocardiogram Laboratories (ICAEL), and our doctors

perform the scanning themselves in the office.

We maintain inpatient privileges at East Tennessee Children's Hospital, University of Tennessee Medical Center, St. Mary's Medical Center, and Ft. Sanders Regional Medical Center. If you have an ill patient being admitted to or transferring to one of these facilities, we'd be happy to be involved in their care. Simply call our office to speak with one of our physicians and we'll help coordinate with the accepting hospital. Our after-hours number is 865-771-9070.

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helpful links and printable downloads, especially under "Heart Conditions" and "Condition Specific Organizations."

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