

Differentiating Non-Cardiac Chest Pain from Cardiac-Related Chest Pain: Causes, Risk Factors, and Effective Healthcare Strategies

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Abstract

Chest pain is a very common symptom in emergency departments worldwide, and having an accurate differentiation between cardiac and non-cardiac chest pain causes, helps to ensure timely patient care.

The strategies for differentiating cardiac chest pain usually starts with the patient's clinical history and physical examinations that they've already done. Important parts of the history include the duration, location, and radiation of the pain, as well as checking for associated symptoms like dyspnea, diaphoresis, and nausea. The patient's medical history, including any previous cardiac conditions, are also important to consider as well.

Electrocardiography (ECG) plays a role in the evaluation. It can quickly identify signs of infarction, arrhythmias, and other cardiac abnormalities. It also helps to detect changes such as ST-segment elevation or depression, T-wave inversions, or the presence of pathological Q-waves that may indicate the cause of cardiac pain.

Measurements of cardiac biomarkers can also help to spot a cardiac injury, because the elevated troponin levels are highly specific for cardiac muscle damage and can help confirm if there's any problems with that.

Imaging procedures, including chest radiography, echocardiography, and tomography angiography (CTA), can offer insight into the source of chest pain. Chest radiography can rule out any pulmonary causes of chest pain and look for complications like pneumothorax or pleural effusions. Echocardiography helps healthcare workers to see the cardiac structure and function, which can help in the diagnosis of conditions like pericardial effusion or valvular dysfunction. CTA is also useful in looking for coronary artery disease, aortic dissection, or pulmonary embolism in a patient.

Introduction

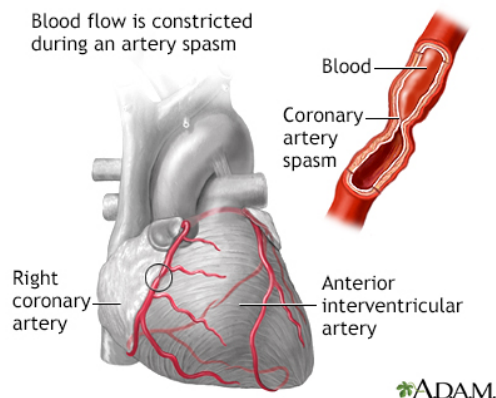
In general, chest pain is a symptom that should never be taken lightly. It can be a warning sign to underlying medical conditions, ranging from small to life-threatening. Two categories that healthcare professionals consider when looking at chest pain are cardiac and non-cardiac chest pain. Cardiac chest pain, often associated with heart-related issues, can be a sign of problems

with the cardiovascular system. Non-cardiac chest pain can come from a wide range of sources, some less life-threatening but still requiring attention. Differentiating between these two types of chest pain is not only important for an accurate diagnosis but also for helping to find the appropriate treatment options. This review paper will talk about the characteristics, causes, and diagnostic approaches for cardiac and non-cardiac chest pain, and highlight the importance of careful evaluation by healthcare workers when they encounter certain symptoms.

Coronary Artery Spasms (Cardiac Chest Pain)

Coronary artery spasms are sudden episodes that temporarily narrow the coronary arteries (1). These spasms that happen are dangerous because they can restrict the blood flow to the heart muscle, which leads to cardiac chest pain or angina (Figure 1) (1). Unlike most cases of angina, which are usually caused by physical exertion or emotional stress, coronary artery spasms can happen to anyone even while resting, usually while sleeping (in the night and early morning) (2). The exact cause of these spasms is not always clear, but in some cases it can be due to smoking and drug use. Exposure to cold temperatures can also increase the risk of coronary artery spasms (2). While the chest pain that these spasms cause is usually temporary, it can be severe and mimic the pain experienced during a heart attack, or heartburn (1). Getting the proper medical attention is important to identify these symptoms and help manage coronary artery spasms effectively and prevent potential complications, ECGs and many general screenings can help see where the spasm is coming from in the chest area.

Figure 1



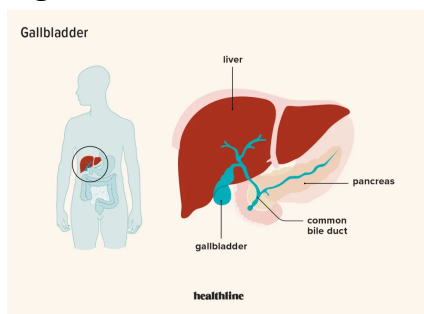
(This figure describes what a coronary artery spasm looks like in the blood vessel)

Gallbladder and Pancreas Disorders (Non-Cardiac Chest Pain)

Gallbladder and pancreas disorders can be significant contributors to non-cardiac chest pain (3). The gallbladder is responsible for storing bile, which helps to digest fats in your stomach, so when gallstones form in the gallbladder or the bile ducts, it can cause blockages and inflammation (5). A big symptom of this is intense upper abdominal pain (Figure 3) that can also radiate to the chest through your nervous system, because the nerves that supply the gallbladder and the chest wall share common pathways, leading to a pain in the chest (4).

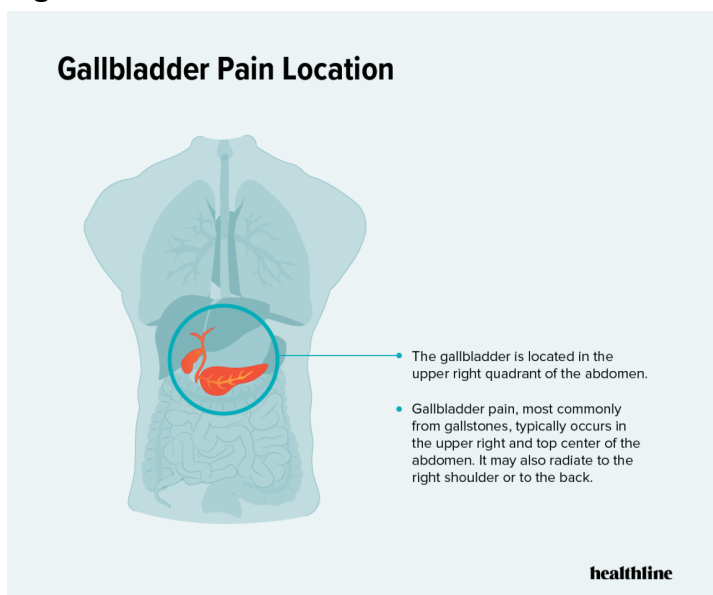
Similarly, disorders of the pancreas, such as pancreatitis (inflammation of the pancreas) can also cause non-cardiac chest pain (4). The pancreas is located deep in the abdomen (Figure 2), and inflammation or tumors in this organ can make for discomfort that is felt in the chest area due to the neural connections (3). Diagnosing gallbladder and pancreas disorders is a very important part of differentiating non-cardiac chest pain from cardiac-related chest pain, to ensure the appropriate management and treatment for the patients experiencing these symptoms.

Figure 2



(Description of the gallbladder and all of its parts)

Figure 3



(Location of the gallbladder along with the places where the pain is most commonly found)

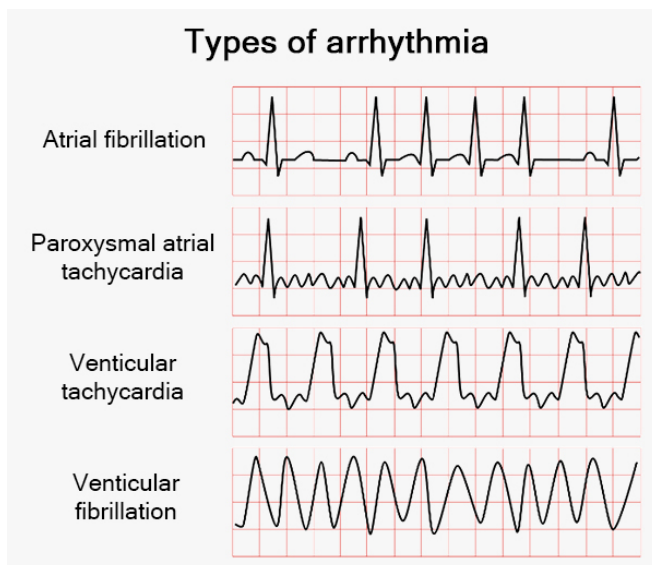
Peptic Ulcer Disease (Non-cardiac chest pain)

Peptic ulcer disease is another significant factor associated with non-cardiac chest pain. Peptic ulcers, which are open sores that develop on the lining of the stomach, small intestine, or esophagus, can develop as a result from the imbalance between stomach acid and the other protective factors of the digestive system (7). The pain caused by peptic ulcers can imitate cardiac-related chest pain (6). The discomfort from this pain is often described by patients as a burning or gnawing sensation in their chest area (6). This arises from the shared nerve pathways between the gastrointestinal tract and the chest. Differentiating between peptic ulcer-related chest pain and cardiac chest pain is important for an accurate diagnosis and for proper management.

Arrhythmias (Cardiac chest pain)

Arrhythmias are irregular heart rhythms that can lead to many symptoms, including cardiac chest pain (8). When the heart's electrical system malfunctions, it can disrupt the normal rhythm of heartbeats, causing the heart to beat too fast (tachycardia), too slow (bradycardia), or in an irregular pattern (9). These abnormal rhythms (Figure 4) can affect the heart's ability to pump blood effectively, which can lead to reduced blood flow and oxygen delivery to the heart muscle, which can result in chest pain and discomfort. It is important to note that not all arrhythmias cause chest pain, (9) but those that do can imitate the sensation of angina or a heart attack.

Figure 4



(describes the different types of arrhythmias people can experience)

Rib Cartilage Inflammation (Non-Cardiac chest pain)

Rib cartilage inflammation (costochondritis) is a common cause of non-cardiac chest pain (10). Costochondritis is the inflammation of the cartilage that connects the ribs to the breastbone (sternum). This condition can lead to localized chest pain that can be sharp, aching, or tender to the touch (12). The pain is usually worsened by movement, exercise, deep breathing, or pressing on the affected area. Due to its proximity to the chest wall, the discomfort caused by costochondritis can imitate cardiac-related chest pain (11). However, costochondritis pain is typically felt more on the outside of the body, meaning it doesn't respond well to medications like nitroglycerin, which are typically used to relieve cardiac chest pain (12). It's important for healthcare professionals to consider costochondritis as a potential cause of non-cardiac chest pain, especially in patients with no underlying heart conditions.

Cardiac Amyloidosis (Cardiac chest pain)

Cardiac amyloidosis is a condition where there's a buildup of abnormal proteins called amyloids in the heart tissue (14). These amyloids can affect the structure and function of the heart, leading to symptoms like cardiac chest pain (14). The presence of amyloids can cause the heart muscle to become stiff and less flexible, which makes it harder for the heart to pump blood effectively (13). This reduced blood flow and oxygen supply to the heart can result in chest pain and discomfort. Cardiac amyloidosis can also cause other symptoms such as shortness of breath, fatigue, and swelling in the legs (14) (because the heart has a harder time pumping out blood to the further out parts of your body). Diagnosis and treatment of cardiac amyloidosis usually involves imaging tests, biopsies, and targeted therapies to help alleviate symptoms.

Pleurisy (Non-Cardiac chest pain)

Pleurisy, also known as pleuritis, is a condition where the pleura (the double-layered membrane that surrounds the lungs and lines the chest cavity) is inflamed (15). This inflammation can lead to sharp, stabbing chest pain that worsens while you breath or cough (15). While pleurisy itself is not directly related to non-cardiac chest pain, it is often mistaken for it due to the symptoms being very similar (16). Non-cardiac chest pain refers to chest discomfort that is not caused by heart-related issues, such as angina (16). The confusion occurs because both conditions can cause chest pain (16). Pleurisy can occur from various factors, including respiratory infections, autoimmune diseases, or trauma to the chest. To address non-cardiac chest pain accurately, a good healthcare evaluation that considers potential causes like pleurisy is crucial.

Hypertrophic Cardiomyopathy (Cardiac chest pain)

Hypertrophic cardiomyopathy (HCM) is a condition where the heart muscle thickens, which can lead to cardiac chest pain (17). In HCM, the walls of the heart become very thickened, making it harder for the heart to pump blood effectively (17). This can cause reduced blood flow to the coronary arteries, causing chest pain known as angina (18). The chest pain in HCM is usually triggered by physical activity or exercise, because the heart requires more oxygen and blood flow during these times (18). Not everyone with HCM experiences chest pain, but it can be a significant symptom for some people. The management of HCM often involves medications to improve blood flow, lifestyle modifications (like lighter exercise), and, in some extreme cases, surgical interventions (18).

Conclusion

In conclusion, healthcare professionals play an important role in differentiating between non-cardiac and cardiac-related chest pain, and in order to help give an accurate diagnosis and proper treatment, they have to consider clinical assessments and diagnostic tests. Cardiac-related chest pain, which is often associated with angina or heart attacks, may show radiation of pain to the left arm, neck, or jaw, along with other symptoms like shortness of breath and sweating. Electrocardiograms (ECGs) and cardiac enzyme tests help to identify heart-related abnormalities. Non-cardiac chest pain may have triggers related to movement, meals, or specific activities. Additionally, imaging techniques such as X-rays, CT scans, and echocardiograms can provide valuable insights into both cardiac and non-cardiac causes. By considering patient history, clinical presentation, and diagnostic results, healthcare professionals can make informed decisions and provide relief to patients and improve their overall well-being.

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Figure 1

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Figure 2

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