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Joan Kirschenbaum Cohn and Peter F. Cohn

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# CARDIOLOGY PATIENT PAGE

## Chest Pain

Joan Kirschenbaum Cohn, DSW; Peter F. Cohn, MD

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“All that glitters is not gold” is a familiar saying. Similarly, all that is called chest pain is not necessarily a result of heart disease. The association between chest pain (angina pectoris\*) and heart disease goes back to its initial description by Heberden in 1772. His description was of a “strangling sensation in the chest.” Although angina pectoris is not the only symptom of heart disease, it is the most common one and is a good place to begin a brief discussion of cardiac pain.

### Chest Pain and Heart Disease

An intriguing question that has puzzled both physicians and the lay public concerns the relationship between injury to an internal organ and the sensation of that injury perceived by patients as arm, chest, back, or jaw pain. The transmission of the pain impulse from the heart to the brain via the spinal cord is still not completely understood. Because the location in the spinal cord area in which pain signals from the heart are received is located near areas in which similar pain signals for the chest wall and arms are received, it is believed that “spillover” in these spinal cord areas is responsible for the perception of the cardiac discomfort in the arms, chest, and occasionally the back.

Patients usually are not aware of injuries to internal organs unless the affected organ swells, causing pressure on nerve endings, and these nerve fibers then transmit pain impulses to the brain. This neurological pathway is true of the liver, lung, intestines, and heart. In the case of the heart, inflammation of its outer lining surface, the pericardium, causes sharp pain while breathing in and with certain

body movements, similar in many ways to pleurisy, an inflammation of the outer lining of the lungs. Chest pain caused by inadequate blood supply to the heart muscle (a condition called ischemia) is usually different: Common phrases used by patients to describe the pressure sensation they feel are “vise-like” and “an elephant standing on my chest.” Sharp stabbing pains are not typical of angina or of the most severe form of ischemia (a heart attack, also known as myocardial infarction), though, as previously noted, this type of pain sometimes indicates inflammation of the lining of the heart (pericarditis). Interestingly, women with heart disease are more likely to experience atypical symptoms such as shortness of breath and fatigue for reasons that are not well understood.

Each patient must know his or her symptoms and recognize them when they occur. This sounds simple, but we know a physician who experienced anginal discomfort in the form of back pain (this was his anginal equivalent) and eventually underwent bypass surgery. Yet when the back pain returned several years later, he again ascribed it to a muscular sprain and denied it was cardiac in origin until a stress test confirmed that this was the case.

### Diagnosis of Chest Pain

If all chest pains are not caused by heart disease, what are their origins and how can we tell the difference? This question is the basis for the physician’s system of diagnosing the cause of chest pain. If the chest wall is tender to the touch, or if the pain occurs with movement of the shoulder, arm, etc, then a musculoskeletal cause is suspected. If the chest discomfort is related to eating, then gall bladder disease is suggested. If an empty stomach causes symptoms, then reflux of stomach acid or ulcer disease can be the culprit. It may seem strange that these examples of gastrointestinal disease can be experienced as chest discomfort, but it is not at all unusual. Other causes of chest pain are referred nerve pain from conditions such as arthritis of the cervical spine.

The key distinctive point in diagnosing chest pain caused by atherosclerotic blockages in the blood vessels of the heart (coronary artery disease) is in its relation to

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\*Patients often ask about the correct pronunciation of this word. The word “angina” is like “Caribbean”: It can be pronounced correctly with emphasis on either the first or second syllables.

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physical exertion. If the chest discomfort is not precipitated by physical exertion, it is highly unlikely that coronary artery disease of any significant degree is present. Thus, the doctor will recommend a key diagnostic test (the stress test or exercise test) in which an attempt is made to reproduce the chest pain while electrocardiographic (ECG) leads are attached to the patient, thereby recording alterations in the heart's electrical activity. Some of these alterations can suggest that there are supply and demand imbalances in blood flow and oxygen delivery to the heart muscle (ischemia, as noted earlier). The treadmill exercise test is less reliable in women and there may therefore be a need for alternative stress tests in women, as described in the next section.

### Major Causes of Chest Pain

- Cardiac diseases
  - (1) Resulting from blockages in coronary arteries
  - (2) Resulting from other cardiac problems (such as pericarditis)
- Musculoskeletal diseases of the chest wall, shoulders, etc.
- Gastrointestinal diseases (especially gall bladder, acid reflux, ulcer)
- Cervical arthritis or other neurological conditions

### Types of Stress Tests

Various types of stress tests are used depending on whether the patient is capable of walking on a treadmill, if there is an abnormal ECG at rest, or other factors. These tests are not only helpful in diagnosing coronary artery disease, but they yield important data to predict the possible development of additional complications. For example, the presence or absence of electrocardiographic and other stress test abnormalities provides important clues about the possibility that future cardiovascular incidents such as severe chest pain (unstable angina) will occur. In addition to electrocardiographic changes, stress tests that involve nuclear scans may also show areas of heart muscle that are underperfused with blood, suggesting the presence of a blockage in the blood supply. Similarly, the echocardiographic (ultrasound) stress test may reveal an area of heart muscle that is not contracting properly because of a blood supply problem.

When the stress test is abnormal, the next step in diagnosing coronary artery disease is the cardiac catheterization procedure, also known as the coronary angiogram. This is a procedure that carries a small but definite risk of serious

complications. Nevertheless, the coronary angiogram represents the best means available for diagnosis and is also used in contemporary medical practice to treat symptoms. For example, angioplasty and/or stent procedures can eliminate blockages shown on the angiogram and can be performed at

### Types of Stress Tests That Can Be Used for Diagnostic Purposes

- Routine treadmill exercise test
- Treadmill test with nuclear scan\*
- Nontreadmill chemical test with nuclear scan\*
- Echocardiographic stress test with exercise or chemicals\*

\*Preferred for women.

the same time as the diagnostic procedure.

### Summary

Chest pain can be a clue to underlying coronary artery disease, but it can also be caused by noncardiac conditions, most of which are less serious. Proper attention to the quality of the pain and the factors that preceded it can be used as a tool to determine whether the origin is cardiac or not. A stress test is indicated when there is doubt.

No discussion of chest pain is complete without mentioning the well-known observation that serious heart disease can exist without the usual symptoms (silent ischemia, a form of silent heart disease). If readers seek a more detailed explanation of cardiac pain mechanisms, silent ischemia, or drug therapy for coronary artery disease, they are referred to 2 books written expressly by the authors for the lay public. These are entitled *Heart Talk*<sup>1</sup> and an updated version *Fighting the Silent Killer*<sup>2</sup>.

For additional information, see the following web sites:

1. Ornato JP, Hand MM. Warning signs of a heart attack. *Circulation*. 2001;104:1212–1213. Available at: <http://circ.ahajournals.org/cgi/content/full/104/11/1212>. Accessed July 1, 2002.
2. American Heart Association. Angina Pectoris. Available at: <http://www.americanheart.org/presenter.jhtml?identifier=4472>. Accessed July 1, 2002.

### References

1. Cohn PF, Cohn JK. *Heart Talk: Preventing and Coping with Silent and Painful Heart Disease*. Boston, Mass: Harcourt Brace Jovanovich; 1986.
2. Cohn PF, Cohn JK. *Fighting the Silent Killer: How Men and Women can Prevent and Cope With Heart Disease Today*. Boston, Mass: A.K. Peters; 1993.