

# Chest Pain: A Diagnostic Dilemma

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## Citation

S Ruppert. *Chest Pain: A Diagnostic Dilemma*. The Internet Journal of Advanced Nursing Practice. 1996 Volume 1 Number 1.

## Abstract

### ADDITIONAL RESOURCES

Chest pain refers to pain in the anterior thorax.<sup>1</sup> This pain may originate due to cardiovascular, pulmonary, gastrointestinal, musculoskeletal, neurologic, or psychologic causes (see Table 1). Patient history and focused physical assessment should result in the ability to formulate likely differential diagnoses and a management plan related to the presenting patient problem.

### DATABASE

The following history and physical represents a typical patient who might present in an ambulatory/primary care setting:

46 year old obese white female with complaint of left sided chest pain. Describes as a squeezing and tightness. Radiation to left shoulder. Pain began 20 minutes ago while working in garden and has persisted since. Had eaten lunch (cold chicken and potato salad) 1 hour prior to event. Associated nausea and diaphoresis. Took Peptobismol without relief. States has had similar pain intermittently for 1 week. Unable to identify specific events which precipitated attacks. Last episode yesterday after eating dinner. Pain relieved after lying down. Believes episodes are due to indigestion. No recent illnesses. No past or family history of musculoskeletal problems or diabetes. Father died of myocardial infarction at age 56. Mother alive, history of hypertension. History of smoking, but quit 2 years ago. Denies ETOH or drug use. No present medications except oral contraceptive use. No known allergies.

Physical reveals obese (stated weight 225 lbs.) female.

Cardiovascular: B/P 150/96, P 104 regular, skin warm & diaphoretic, face flushed, all pulses 2+, no edema noted, S1S2 heard, no murmurs, heaves, or rubs, no JVD

Pulmonary: Lung sounds clear bilaterally anterior and

posterior. No cough. Respirations 28, rapid and shallow.

Abdominal: Abdomen rotund and soft. BS x 4 quadrants. Dull to percussion. No masses. Tenderness in upper right quadrant with + Murphy's sign. No bruits or hums. No evidence of hepatomegaly or splenomegaly. Kidneys not palpable. No CVAT.

Musculoskeletal: MAE without pain. Full AROM of upper extremities without pain, tenderness, or crepitus. No swelling of joints. No point tenderness with pain reproduction. No lower back pain.

Neurological: Alert and oriented x 3. MAE. Full and equal strength noted in all extremities. No spinal deviation.

### DIFFERENTIAL DIAGNOSES

Differential diagnoses for this patient with associated rationale in order of probability and seriousness would include:

- Myocardial infarction - character of pain; associated nausea, diaphoresis, flushing, and dyspnea; episode related to activity; relief with rest; obesity; family history; tachycardia; and increased blood pressure.
- Angina pectoris - character of pain; episode associated with activity; repeated episodes; relief with rest; family history; obesity; tachycardia; and increased blood pressure.
- Cholecystitis - character of pain; RUQ tenderness with + Murphy's sign; age; gender; obesity; relationship to eating fatty foods.
- Gastroesophageal reflux (hiatal hernia) - character of pain; associated with eating on at least two occasions; may be triggered by exercise. 2

- Musculoskeletal strain or spasms - episode associated with activity and is persistent 2; however, pain does not increase with inspiration or changing position; no point tenderness. 3 .
- Pulmonary embolism - obesity; medication history of oral contraceptive use; dyspnea; sudden onset of pain; however, pain has been occurring intermittently over 1 week and no pleural friction rubs, gallops, or heaves are present.4
- Pericarditis - character of pain; however, no rubs heard and pain does not increase with inspiration 4; no recent viral illness.
- Pleuritic - character of pain with associated upper quadrant abdominal pain; dyspnea; however, no associated fever, pleural rubs, or cough.5
- Psychogenic - unexplained chest pain and hyperventilation; inability to recall past episodes.6
- Aortic dissection - hypertension; family history; however, pain is not “tearing” in nature and does not radiate to the back; pulses are of quality.

### NURSING DIAGNOSES

Nursing diagnoses for this patient include:

- Pain (chest) related to unknown cause;
- Anxiety related to illness experience and fear of the unknown;
- Ineffective breathing pattern related to pain and anxiety;
- Knowledge deficit related to cause of pain and planned treatment; and
- Fear related to unknown cause of pain
- Potential in growth for family coping related to shifts in family roles and responsibilities during illness event.7

### DIAGNOSTIC STUDIES

An immediate diagnostic study related to the present problem would include a 12 lead electrocardiogram (ECG). The clinician would examine the ECG for Q waves and ST segment elevation greater than 1 mm in two contiguous

leads which would indicate injury and/or myocardial infarction. However, ST segment elevation can also be seen with coronary artery spasm. ST segment depression greater than 0.5 mm is suggestive of myocardial ischemia. If available, the present tracing should be compared to any past ECGs. The ECG in this case proved to be negative for such changes. However, the clinician must be aware that an initial ECG is not sensitive for diagnosing myocardial infarction.8

Further evaluation by the primary care practitioner would include cardiac enzymes including CK-MB and a chest x-ray. However, the CK-MB elevation will not begin until four to eight hours after the onset of a myocardial infarction.3 With the negative history and physical data, a probable cause in this case is cholecystitis. However, cardiac cause can not be ruled out without further evaluation.

### MANAGEMENT PLAN

Immediate management while determining cause would include oxygen therapy. In evaluating cardiac causes of pain the patient could be given nitroglycerin 0.3 - 0.4 mg sublingual. If ineffective, the dose can be repeated at 5 minute intervals up to three doses.9 If still not effective, the cause is most probably not cardiac in nature. However, occasionally musculoskeletal and gastrointestinal causes of chest pain can be relieved by nitroglycerin.4 The patient will need analgesia such as meperidine (morphine can cause biliary spasm) if available in the ambulatory setting. If not, the patient should be transported immediately when stable to a tertiary center for referral.

Management includes immediate referral to a primary care physician for further testing including repeat ECG and serial cardiac markers (including enzymes and cardiac troponin if available). A stress test is indicated in cases of myocardial ischemia while coronary angiography is the gold standard in precise diagnosis of coronary artery disease.2 In suspected gastrointestinal causation, an upper gastrointestinal x-rays with barium swallow and oral cholecystogram and/or ultrasound are warranted. This patient also needs evaluation of her hypertension and referral to a health promotion program for counseling on weight management, exercise, and stress management.

### FAMILY INFLUENCES AND EFFECTS

The experience and diagnosis of chest pain can be a frightening event for not only the patient but also the family. Fear of serious illness, even death, can disrupt the family structure and function. In the above case, the patient is a

wife and the mother of two teenage children. She works outside the home as a secretary at a local community college. In light of the present condition and need for referral, the role of the patient within the family must be explored. This includes exploring her role in the management of the household, decision making, child rearing responsibilities, and dependence of other family members on her ability to fulfill these functions. In addition, the impact of her financial contribution to the family and the temporary loss may need to be discussed. Planning for temporary shifts in roles and responsibilities during the illness event is an intervention which can allay anxiety for both the patient and family.

**TABLE 1 DIFFERENTIAL DIAGNOSIS OF CHEST PAIN**

**CARDIOVASCULAR**

- Typical angina pectoris
- Prinzmetal's or variant angina
- Unstable or accelerating angina
- Acute myocardial infarction
- Aortic dissection
- Mitral valve prolapse
- Pericarditis
- Dressler's syndrome
- Postpericardiotomy syndrome

**PULMONARY**

- Pleuritic chest pain
- Pneumonia
- Pulmonary embolism
- Pulmonary hypertension
- Spontaneous pneumothorax

**GASTROINTESTINAL**

- Reflux esophagitis
- Esophageal spasm/angina
- Peptic ulcer
- Pancreatitis
- Cholecystitis

**MUSCULOSKELETAL DISORDERS**

- Costochondritis
- Tietze's syndrome
- Rib fracture or trauma
- Cancer metastasis
- Sternoclavicular arthritis
- Painful xiphoid syndrome
- Fibromyalgia
- Traumatic muscle pain
- Shoulder arthritis/bursitis
- Cervicothoracic nerve root compression
- Thoracic spine arthritis
- Thoracic outlet syndrome

**MISCELLANEOUS**

- Herpes zoster
- Anxiety/depressive disorder
- Panic disorder
- Cocaine use
- Post coronary artery bypass pain

**References**

- r-0.
- r-1.
- r-2.
- r-3.
- r-4.

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