

# Approach to Chest Pain

Mario Ray, M.D.  
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The approach to chest pain in the outpatient setting can be challenging to say the least. The patient who presents to his PCP with chest pain is usually of benign etiology, but occasionally it may portend imminent catastrophe. Although standard textbooks of medicine often emphasize the high-risk nature of chest pain, non-life-threatening etiologies, are much more common in the primary care setting and require a cost-effective approach to diagnosis. The correct diagnosis is most often derived from a detailed history (pain description; associated symptoms; and in some cases disease risk factors) that is supported by specific physical findings, an electrocardiogram, and/or chest x-ray.

## **EMERGENCY RESPONSE TO CHEST PAIN IN THE OFFICE**

Chest pain due to myocardial infarction, pulmonary embolus, aortic dissection, or tension pneumothorax may result in sudden death. Any patient with a recent onset of chest pain, especially when the symptoms are ongoing, who may be potentially unstable based upon history, appearance, or vital signs, should be transported immediately to an emergency department in an ambulance equipped with a defibrillator.

## **EVALUATION \*\*See FIG 1\*\***

The initial goal in the office evaluation of chest pain in stable individuals is to exclude CHD and other potentially life-threatening conditions. \*\*See Table 2 and Table 3\*\*

**Description of chest pain** – A thorough description of the pain is an essential first step in the diagnosis of chest pain.

**Quality of the pain** – The patient with myocardial ischemia often denies feeling chest "pain." More typical descriptions include squeezing, tightness, pressure, constriction, strangling, burning, heart burn, fullness in the chest, a band-like sensation, knot in the center of the chest, lump in the throat, ache, heavy weight on chest (elephant sitting on chest), like a bra too tight, and toothache (when there is radiation to the lower jaw).

**Region or location of pain** – Ischemic pain is a diffuse discomfort that may be difficult to localize. Pain that localizes to a small area on the chest is more likely of chest wall or pleural origin rather than visceral.

**Radiation** – The pain of myocardial ischemia may radiate to the neck, throat, lower jaw, teeth, upper extremity, or either shoulder. \*\*See table 1\*\*

**Temporal elements** – The time course of the onset of chest pain may be a very useful distinguishing feature. The pain associated with a pneumothorax or a vascular event such as aortic dissection or acute pulmonary embolism classically has an abrupt onset with the greatest intensity of pain at the beginning. The onset of ischemic pain is more often gradual with an increasing intensity over time. A crescendo pattern of pain can also be caused by esophageal disease. "Functional" or nontraumatic musculoskeletal chest pain might have a much more vague onset.

Myocardial ischemia may demonstrate a circadian pattern. It is more likely to occur in the morning than in the afternoon, correlating with an increase in sympathetic tone.

**Provocation** – The patient should be asked about factors that provoke or make the pain worse:

- Discomfort that reliably occurs with eating is suggestive of upper gastrointestinal disease. Postprandial chest pain may be due to gastrointestinal or cardiac disease; in the latter case it can be a marker of severe myocardial ischemia (eg, left main or three-vessel CHD)
- Chest discomfort provoked by exertion is a classic symptom of angina, although esophageal pain can present similarly.
- Other factors that may provoke ischemic pain include cold, emotional stress, meals, or sexual intercourse.
- Pain made worse by swallowing is likely of esophageal origin.
- Body position or movement, as well as deep breathing, may exacerbate chest pain of musculoskeletal origin.
- Truly pleuritic chest pain is worsened by respiration and may be exacerbated when lying down.

**Palliation** – Exertional pain relieved by rest indicates angina pectoris. Burning pain radiating from epigastrium to throat exacerbated by lying down and relieved by antacids, suggests GERD.

**Severity** – The severity of pain is not a useful predictor of the presence of CHD. As many as one-third of myocardial infarctions may go unnoticed by the patient.

**Risk factors** – Knowledge about risk factors provides important information regarding disease likelihood, which may ultimately guide the type and extent of evaluation performed. The presence of hyperlipidemia, left ventricular hypertrophy, or a family history of premature CHD increase the risk for myocardial ischemia. Hypertension is a risk factor for both CHD and aortic dissection. Cigarette smoking is a nonspecific risk factor for serious pathology; it is associated with CHD, thromboembolism, aortic dissection, pneumothorax, and pneumonia. A history of cocaine use may increase the suspicion of myocardial infarction; the risk of a myocardial infarction was increased 24 times over baseline in the 60 minutes after cocaine use.

Age is an important risk factor for CHD; among patients older than age 40, chest pain resulting from stable CHD or an acute coronary syndrome (unstable angina or myocardial infarction) becomes increasingly common. On the other hand, elderly patients, especially women, are more likely to have non-classic presentations of coronary disease. Age can also help establish other diagnoses. As examples, men older than age 60 are most likely to suffer aortic dissection, while young men are at highest risk for primary spontaneous pneumothorax.

A recent infection, especially viral, may precede an episode of pericarditis or myocarditis. Other risk factors for pericarditis include a history of chest trauma, autoimmune disease, recent myocardial infarction or cardiac surgery, and the use of certain drugs such as procainamide, hydralazine, or isoniazid.

## Physical examination

The focused physical examination is used to support or disprove hypotheses generated by the history. A brief, "core" examination may suffice to diagnose life-threatening and common etiologies of chest pain, but often a more detailed examination is required. General appearance, full set of vital signs, palpation of the chest wall may evoke pain, complete cardiac examination including auscultation and palpation should be performed in a sitting and supine position to establish the presence of a pericardial rub or signs of acute aortic insufficiency or aortic stenosis. Determine if the breath sounds are symmetric and if wheezes, crackles or evidence of consolidation is present. Careful examination of the abdomen is important, with attention to the right upper quadrant, epigastrium, and the abdominal aorta.

## Ancillary studies

Ancillary studies including an ECG (especially during an episode of chest pain or when there is no obvious noncardiac cause of chest pain) and chest x-ray (when cardiac, pericardial, aortic, or pulmonary disease is a consideration) may support the initial diagnosis and help avoid missing serious etiologies of chest pain such as acute myocardial infarction or pneumothorax.

Table 1

### **Likelihood ratios for myocardial infarction (MI) based on components of the chest pain history**

Description of pain	Positive likelihood ratio (95% CI)
Descriptions increasing the likelihood of MI	
Radiation to right arm or shoulder	4.7 (1.9-12)
Radiation to both arms or shoulders	4.1 (2.5-6.5)
Exertional	2.4 (1.5-3.8)
Radiation to left arm	2.3 (1.7-3.1)
Associated with diaphoresis	2.0 (1.9-2.2)
Associated with nausea or vomiting	1.9 (1.7-2.3)
Worse than previous angina or similar to previous MI	1.8 (1.6-2.0)
Described as pressure	1.3 (1.2-1.5)
Descriptions decreasing the likelihood of MI	
Pleuritic	0.2 (0.1-0.3)
Positional	0.3 (0.2-0.5)
Sharp	0.3 (0.2-0.5)
Reproducible with palpation	0.3 (0.2-0.4)
Inframammary location	0.8 (0.7-0.9)
Nonexertional	0.8 (0.6-0.9)

*CI: confidence interval.*

*Data from: Swap, C, Nagurney, J. Value and limitations of chest pain history in the evaluation of patients with suspected acute coronary syndromes. JAMA 2005; 294:2623.*

Table 2

**Causes of nonemergent chest pain in MIRNET primary care practices**

Cause	Prevalence, percent
Musculoskeletal, including costochondritis	36
Gastrointestinal	19
Cardiac	16*
Stable angina	10.5
Unstable angina or MI	1.5
Other cardiac	3.8
Psychiatric	8
Pulmonary	5
Other/unknown	16

*MIRNET: Michigan Research Network.*

*\* As high as 50 percent in older populations.*

*Adapted from Klinkman, MS, Stevens, D, Gorenflo, DW, J Fam Pract 1994; 38:345.*

Table 3

**Alternative diagnoses to cardiac ischemia for patients with chest pain**

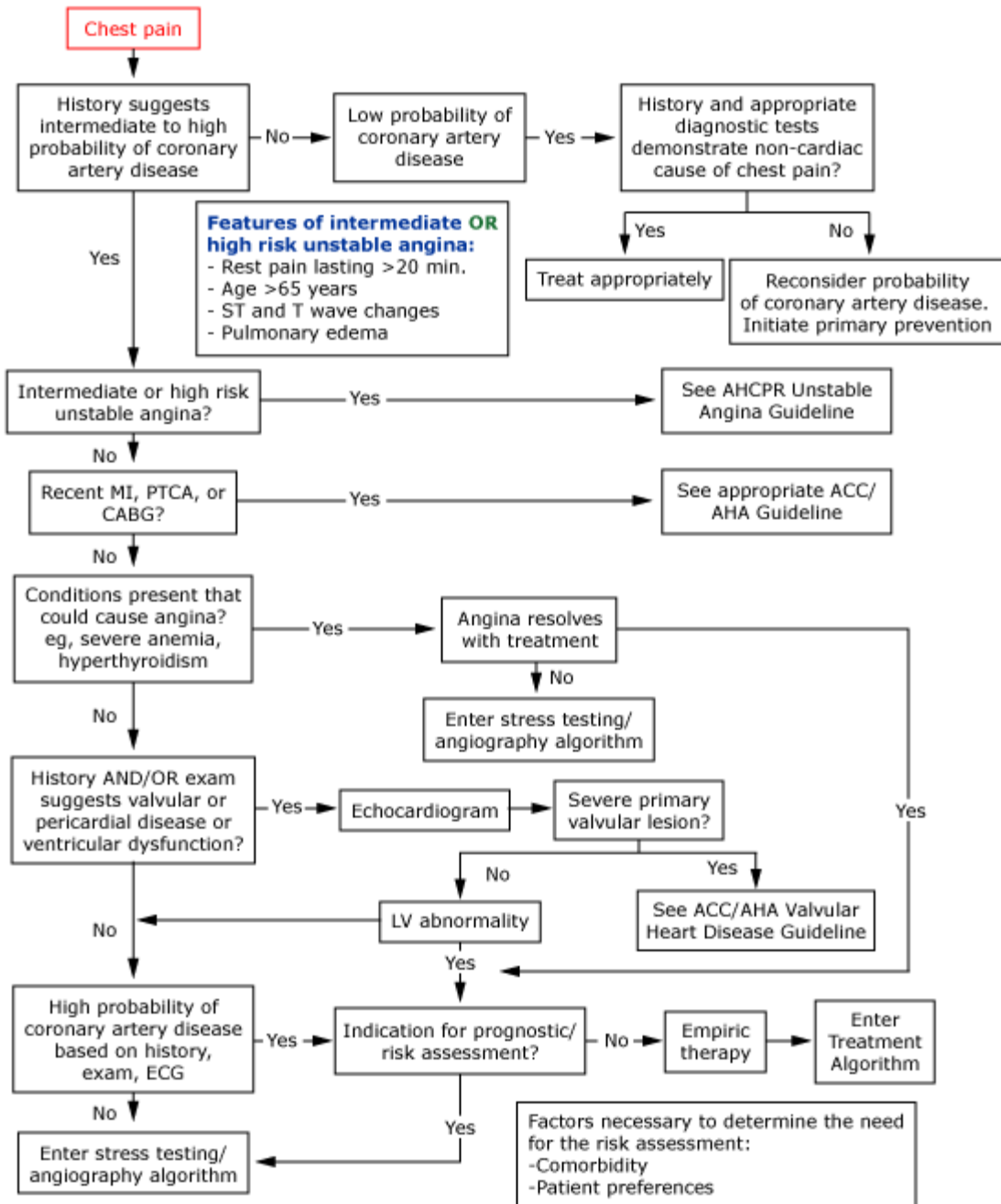
<b>Non-ischemic cardiovascular</b>	<b>Pulmonary</b>	<b>Gastrointestinal</b>
Aortic dissection*	Pleuritis	Biliary
Myocarditis	Pneumonia	Cholangitis
Pericarditis	Pulmonary embolus*	Cholecystitis
<b>Chest wall</b>	Tension pneumothorax*	Choledocholithiasis
Cervical disc disease	<b>Psychiatric</b>	Colic
Costochondritis	Affective disorders (eg, depression)	Esophageal
Fibrositis	Anxiety disorders	Esophagitis
Herpes zoster (before the rash)	Hyperventilation	Spasm
Neuropathic pain	Panic disorder	Reflux
Rib fracture	Primary anxiety	Rupture*
Sternoclavicular arthritis	Somatiform disorders	Pancreatitis
	Thought disorders (eg, fixed delusions)	Peptic ulcer disease
		Nonperforating
		Perforating*

*\* Potentially life-threatening conditions.*

*Adapted with permission from: ACC/AHA/ACP Guidelines for the Management of Patients with Chronic Stable Angina. J Am Coll Cardiol 1999; 33:2092. Copyright ©1999 American College of Cardiology.*

FIG. 1

Clinical assessment of patients with chest pain



AHCPR: Agency for Health Care Policy and Research; MI: myocardial infarction; PTCA: percutaneous transluminal coronary angioplasty; CABG: coronary artery bypass graft; ACC: American College of Cardiology; AHA: American Heart Association; LV: left ventricular; and ECG: electrocardiogram.

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