Special Article

Variations on a theme from Heberden: symptoms in angina pectoris[1]

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Typical angina pectoris is a distress, other than dyspnea, located in the upper half of the body precipitated by walking and relieved promptly by rest. Arteriographic evidence of severe coronary disease is almost always found in patients with typical symptoms. Although the diagnosis of angina pectoris may be simple, variations in the character and location of the distress, precipitating factors, accompanying symptoms, and means of obtaining relief may cause confusion. Awareness of these variations increases diagnostic precision. Certain symptoms are warnings that the discomfort may not be of cardiac origin. Some noncardiac diseases are more frequent in patients who have angina pectoris, especially angina due to coronary spasm.

Index term: Angina pectoris

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Myocardial ischemia is manifested by three types of pain: angina pectoris; a type variously called coronary failure, coronary insufficiency, or intermediate syndrome; and myocardial infarction. The latter two types of pain often may be difficult to interpret on the basis of symptoms alone, but the diagnosis of typical angina pectoris can be so simple that an undergraduate may feel as secure in interpretation as an experienced cardiologist. If this is true, why inflict this common knowledge on the reader? The reasons are that confusion may arise from unusual manifestations, and certain symptoms militate against the diagnosis.

Typical angina pectoris is a discomfort, other than dyspnea, in the upper half of the body precipitated by walking

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and relieved promptly by rest (within 15 minutes). Rest pain is a type of angina that occurs without exertion either during the day or night and may be the sole manifestation of coronary artery disease. The absence of exertional precipitation makes one less confident of ischemic origin, and correlation with abnormalities demonstrated by coronary arteriography is much lower than in cases of typical angina pectoris, in which the correlation may approach 95%.[1]

Strictly speaking, if the history is typical, the diagnosis of angina pectoris is secure; however, this diagnosis does not assure the presence of coronary atherosclerosis or, indeed, any demonstrable heart disease. In the absence of evidence of valvular or myocardial disease, angina pectoris is as indicative of obstructive coronary disease as any other pain syndrome is indicative of any demonstrable organic disease. Still, a small percentage of patients describe angina pectoris who do not have evidence of heart disease. These patients survive for long periods without other evidence developing which would suggest cardiac abnormality. For unknown reasons, this association is common in the young, in women, and particularly, in young women. Some patients who have what seems to be severe angina pectoris but whose coronary arteriograms are normal are "dedicated sufferers" and undoubtedly have emotional problems.

The combination of chest pain and arteriographically demonstrable severe coronary disease does not necessarily mean that the pain is angina pectoris. The chest pain may be of noncardiac origin, and often patients who have angina pectoris or who have had previous myocardial infarctions also have noncardiac pain. Such pain may confuse the unwary. In addition, the discomfort may be inconsistently related to walking; other types of exercise may more frequently precipitate pain. Atypical angina pectoris may be diagnosed under these circumstances, but this diagnosis is less closely associated with cardiac disease than is typical angina.[1]

The symptoms of angina pectoris were well described by Heberden and Parry[2,3] and, more recently, by Osler and Albutt.[4,5] The development of selective coronary arteriography approximately 25 years ago has permitted correlative studies. The features of angina described here are those seen personally. Variations of discomfort, its precipitation or potentiation, accompanying symptoms, and means of relief are reviewed.

Descriptions of the character of the distress are numerous. Tightness, pressure, crushing fullness, squeezing, heaviness, and burning are commonly used terms, but aching and numbness are descriptions occasionally mentioned. The adjective "sharp" is rarely used, and sometimes even then is used to mean severe. Sometimes the discomfort is so ill-defined that it may be called a disagreeable sensation, uneasiness, or vaguely, "a need to stop." Another unusual variation is dyspnea alone, that is, dyspnea relieved promptly by enforced rest or nitroglycerin, in contrast to the more prolonged dyspnea of respiratory disease. Certain adjectives to describe angina have not been encountered: shooting, sticking, and colicky. Levine described what has been called the "fist sign." The patient demonstrates pain with a clenched hand held over the substernal or precordial area. This sign has been well publicized and many well-intentioned physicians have displayed it to patients. It is of no diagnostic value in this country since most patients demonstrating it do not have angina pectoris. In subsequent discussion, the word "pain" also includes pain variants. The location of the pain varies both in site of origin and radiation.[6] The pain may involve any part of the trunk, front or back, as well as the neck, throat, mandible, maxilla, face, temporal areas, vertex, occipital region, shoulders, arms, antecubital spaces, forearms, wrists, hands, and fingers. Substernal pain is absent or this area is involved only secondarily in about 25% of patients. The distress may be strictly precordial and rarely may be confined to the region of the cardiac apical impulse. Actually, the precordium is the most common atypical site of origin, although pain arising in the upper extremities or epigastrium is common. Pain restricted to the back of the thorax or neck may be misinterpreted as being other than anginal. Pain may occur in the right side of the chest only and may radiate to the right arm and forearm. Pain in the arms most often affects the medial aspect of the arms and forearms, but the whole extremity or lateral aspect may be the site. The pain may be in the fifth or fourth and fifth fingers. In general, pain may arise or even be confined to any of the areas mentioned, or these areas may be the sites of pain radiating from other locations. Although pain starting peripherally and radiating to the chest is less common than the reverse, it is much more specific for angina. A peculiar radiating pain to the left leg is difficult to differentiate from complicating intermittent claudication.

However, peripheral vascular disease may not be clinically evident, and if the patient has rest pain as well as exertional distress, the discomfort is felt in the leg. Angina should not be diagnosed as atypical simply on the basis of location of the distress if exertional precipitation occurs consistently. The site of origin and radiation of angina pectoris are not related to the location of the coronary lesions.[7]

By definition, anginal pain is of brief duration. If the patient is observed during stress testing and if the time of the pain is determined by inquiry, the pain often is of shorter duration than that estimated by the patient when the history was taken, even though the patient may say that it was a typical attack. Most anginal attacks last about two to five minutes with rest. Momentary pains are not anginal; some of these are associated with premature contractions of the heart, which the examiner may be fortunate enough to observe at the time the patient experiences pain. Prolonged pains are not angina pectoris and most often are not of coronary origin.

Angina pectoris has a characteristic tapered shape, if a symptom may be described as having form. It begins as a low-level discomfort, but gradually increases in intensity, although it rarely is really severe; reaching a maximum, it maintains a plateau of variable duration and then subsides gradually. Patients may learn that the Valsalva maneuver may relieve or minimize the distress, but with the resumption of normal breathing, the discomfort sometimes may return.

Exertional precipitation with prompt relief by rest are unique to ischemic pain, either angina pectoris or intermittent claudication. In the absence of exertional precipitation, the diagnosis of angina must always be questioned. Walking is overwhelmingly the most common form of exercise-inducing angina, and rapid walking causes pain earlier than moving at a more moderate pace. Survival is related somewhat to ease of precipitation with walking.[8] The patient should be queried about how far he can walk at a normal pace before pain occurs. Often he can walk indefinitely at a slow pace, which he had been advised to adopt, but at a normal pace he may have to stop within 100 yards. Inclines and hills are tolerated poorly. Stairs in the home are ascended well usually because these total only 12 to 14 in many homes, but climbing several flights of stairs or a single long stairway frequently causes distress. The relationship to walking is not always constant. Enjoyable exercise may be tolerated better than endured exertion. Exercise tolerance may vary from day to day or even at different times on the same day. Many patients find that early morning exercise is tolerated poorly, sometimes even if breakfast is omitted. A few say that fatigue in the evening predisposes to exertional attacks. First-effort pain is not rare; pain is often caused by walking but immediately relieved with rest and the patient is then able to walk much greater distances without discomfort. The first hole on the golf course may be tolerated poorly, but then the patient can play 17 more without discomfort.

Use of the arms frequently causes anginal attacks. Examples are raking, shoveling, sweeping, vacuuming, scrubbing, chopping wood, sawing, using a screw driver, hammering, painting, bathing, drying with towels, and making beds. Working with the arms in an elevated position seems to be tolerated poorly, as well as some less obvious activities involving the use of the arms as dressing and undressing, tooth brushing, and even shaving. Using the arms when the body is bent over, such as shoe tying, may be tolerated poorly. A peculiar precipitating factor is driving a vehicle in reverse, as in backing out of a driveway or parallel parking. This symptom is less prevalent now because of the increased use of power steering and smaller automobiles. Carrying heavy weights short distances may cause anginal attacks and even light carrying may decrease exercise tolerance. Simple lifting rarely causes pain.

If exertional precipitation is lacking, angina pectoris is doubtful, but other factors may precipitate or potentiate pain. Emotion, especially anger, is responsible for attacks. Excitement, sudden fear, and anxiety may cause symptoms, and rarely, vigorous laughing may be responsible. Coitus is a combination of exercise and emotion, to speak prosaically, and often causes anginal pain in the male who has moderately severe limitation of exercise tolerance. Eating large meals may result in anginal pain, but eating meals, large or otherwise, more commonly potentiates exertional attacks. Exposure to cold, even if limited to the hands, may decrease the threshold to exercise, and walking against the wind may potentiate pain. More rarely, hot, humid air may be a factor. The supine position may cause pain or increase distress if pain is present. Patients usually learn quickly that the horizontal position is unfavorable. Lying down after meals often results in anginal attacks. Nocturnal pain may occur

when the patient is first supine or may waken the patient. The sitting or standing positions are required for relief. Anginal pain may occur at any hour of the night, but if pain recurs persistently towards morning (several hours before normal time of arising), the variant form of angina should be considered. Some emotionally stable patients say that lying on the left side is most likely to cause pain. Dreams may cause attacks and unremembered dreams have been thought by some to account for most nocturnal episodes.[9]

Many factors are rare in precipitation or potentiation of anginal attacks. Urination is an extremely rare cause. Conditions causing acute hypertension or hypotension may be responsible, as may severe anemia. High altitudes (more than 7,500 feet above sea level) potentiate angina. Tobacco smoking is a rare cause and difficult to prove. Hyperthyroidism induced by thyroid therapy may accentuate angina, and effective treatment of myxedema may unmask angina due to coronary disease. Hypoglycemic reactions to insulin and the use of epinephrine, angiotensin, and pitressin may precipitate angina. Ergot preparations by injection or suppository may cause pain in the variant form of angina. Chemotherapy for tumors can cause or accentuate angina for a few days after intravenous use. Anginal pain may be more frequent during menstruation.

Several factors, in addition to continued exertion, may accentuate anginal distress. Pain is increased by the supine position. Nitroglycerin may have an initial effect of increasing the intensity of the distress, sometimes to the extent that the patient may refuse to take the drug.

Certain precipitating or potentiating features should signal caution in the differential diagnosis of angina pectoris. Ascending the stairway of an average home rarely causes anginal pain. Pain following, rather than during, exertion is not angina, unless it is the variant Prinzmetal form. Talking, itself, without a significant emotional component as in public speaking, does not cause angina, but may be a factor in noncardiac pain in neurotic persons. Rarely, a patient with genuine angina may say that lying on the left side is a precipitating factor; however, this is a common complaint of those with noncardiac pain. Coitus often causes anginal pain in the male, but in the female, chest pain induced by intercourse is almost always neurotic, as is pain following intercourse in either sex. Exposure to tobacco smoke may result in nonanginal pain in nervous patients. Discomfort increased by inspiration is not anginal.

Certain symptoms may accompany attacks of anginal pain, and occasionally these are so conspicuous that the patient or physician may be misled to focus on these rather than the angina. Dyspnea is a frequent symptom during angina, but it is not severe. Sweating, especially of the forehead, is common. Eructation may occur during attacks, and frequently patients believe that this tends to relieve distress. Nausea and, more rarely, vomiting may occur, and many patients who have nausea have ptyalism also. Sometimes the excessive salivation is a striking symptom, and in milder form is recognized frequently if the patient is questioned specifically. Conversely, drying of the mouth may occur, perhaps due to mouth breathing during episodes. A feeling of faintness is not characteristic of angina, but syncope may occur and is especially frequent in patients who have the variant form of angina. The duration of unconsciousness is brief, usually less than three minutes, and the patient is commonly free from pain when consciousness is recovered. Palpitation and an awareness of tachycardia are absent in angina with two exceptions. Anginal pain may accompany attacks of paroxysmal arrhythmia; the pain follows the onset of the rapid heart action rather than the two conditions occurring simultaneously, and it ends quickly when a normal heart rate is restored. The other condition in which palpitation and tachycardia are associated with anginal pain is that in which angina is secondary to severe aortic insufficiency. Pain often is nocturnal in this condition, and palpitation, tachycardia, and flushing of the skin accompany the attacks.[10] Walking may bring relief.

Formerly, great emphasis was put on angor animi as a symptom of angina. Actually this is an unusual and nonspecific symptom, and inadvertent education by the physician relative to its occurrence may be a contributing factor. Some patients prefer to be speechless during angina, but this is also true of some who have noncoronary pain. If pain radiates to the arm, there is rarely difficulty in using the extremity during attacks. Urinary urgency is encountered occasionally. Although a sign rather than a symptom, pallor is often mentioned. Facial skin may be ashen, and the spouse can often recognize from this sign that the patient is having an attack.

Certain symptoms suggest that pain is not anginal. Palpitation and tachycardia do not accom-

pany the ordinary form of angina. Patients with noncoronary pain may note tenderness and hyperesthesia during or after pain, but these symptoms are not characteristic of angina. Weakness and exhaustion during anginal pain are not reported complaints. Numbness circumorally and lightheadedness suggest the hyperventilation syndrome. Dysphagia is common with noncoronary pain.

Relief of anginal distress usually occurs following cessation of the activity that induced the attack. Patients stand or sit to relieve pain with rare exception. Forcefully pressing the back of the thorax against the back of a chair, wall, or outside corner, or bracing the shoulders may give relief. The Valsalva maneuver may be beneficial, as Parry[3] indicated, and could at least partially explain the relief from pressure on the back of the chest or shoulder bracing. Rarely, nocturnal pain is relieved by pacing about, as is the angina accompanying aortic insufficiency. Some patients can "walk off" angina; although pain occurs with walking, if walking is continued, the discomfort may disappear in a few minutes and the patient can then walk indefinitely. Rarely, angina can be relieved by elevating both arms and forearms. Patients may be taught by physicians to apply carotid sinus pressure during pain, which may give relief. Eructation, spontaneous or induced by drinking carbonated beverages, seems to be beneficial in some. The effect of drinking warm liquids or whiskey is difficult to evaluate, although relief may be claimed. Urination may be helpful rarely. Sublingual nitroglycerin is the most commonly used medication for anginal attacks. It dissolves quickly and usually has a beneficial effect in about one minute.

Nonanginal pain can often be differentiated and identified by reaction to certain measures that afford relief. The application of heat to the precordium, pressure of the hand over the precordium, oxygen inhalation in ambulatory patients, and preference for the decubitus position are among these measures. If relief ascribed to nitroglycerin is almost instantaneous or is delayed by more than three or four minutes, the drug is not responsible.

The concomitant presence of certain other diseases may lend weight to the diagnosis of angina pectoris. Arteriosclerosis obliterans of the legs or carotid arteries, previous stroke, or abdominal aortic aneurysm are among these conditions. Migraine and Raynaud's phenomenon suggest the possibility of the variant form of angina pectoris.

Undoubtedly, other variations of angina pectoris have not been mentioned. Precipitation by walking is the *sine qua non* of typical angina pectoris and rest gives relief. Many other features may color the history. Angina may be suspected in the absence of exertional precipitation, but correlation with abnormalities demonstrated by cardiac catheterization is much lower when walking is not a factor.

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