History and examination of the cardiovascular system

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Abstract

A full history and physical examination remain an integral part of assessment of the cardiac patient in the twenty-first century. They allow easier rapport with the patient and facilitate assessment of the best management. It is profoundly unwise to rely solely on the results of imaging and other investigations. Total reappraisal is necessary when the history, examination and investigations are discordant — no investigation is infallible and the clinical assessment should never be ignored. Here we summarize the four main symptoms of cardiological problems (chest pain/discomfort, breathlessness, palpitations and light-headedness/syncope) and discuss how they will present in the history. Also, appropriate sections of the examination are detailed.

Keywords breathlessness; cardiology; chest pain; clinical assessment; examination; heart murmurs; history; palpitations; syncope

'It is a truth universally acknowledged that anyone in possession of a cardiac problem is in need of a first class history and examination.'

With the enormous advances in medical imaging and technology, do we really need to continue to depend on the history, which is inevitably subjective, and physical examination, which may be imperfect and unskilled? Despite the advance and possible dominance of the technocrats in cardiology, this is certainly still the case. The patient who has important coronary artery disease on angiography may have chest pain which is non-cardiac and this will inevitably change the way they are managed. Similarly, the patient with important valvular disease may have breathlessness for another reason. Furthermore, interpretation of any investigation can be erroneous. If the patient is to be treated as an individual, a first-class history and examination are absolutely essential. Furthermore, it is only by taking a careful history that the good rapport essential for satisfactory management of any patient with any medical problem will be achieved.[1] Full accounts of basic history taking and examination of the cardiovascular system are available in all text books of clinical methods.[2,3] This article will not attempt to cover the entire field but will merely point out areas where emphasis is particularly appropriate.

The history

A patient with a cardiological problem is likely to have one or more of four main symptoms:

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- chest pain/discomfort
- breathlessness
- 'palpitations'
- light-headedness and/or blackouts.

Chest pain/discomfort

The original description of angina by Heberden is difficult to improve upon for the classical presentation.[4] However, ischaemic pain does not always present in typical form. Furthermore, the patient is often clear that he or she is not experiencing 'pain'. Whereas he/she may perceive a problem in the chest, discomfort may be in the adjoining areas, so angina may present as discomfort in the arms, teeth, hand, wrist, back, throat or epigastrium.

Angina can be defined as 'an abnormal feeling in the upper body due to relative ischaemia of the myocardium'. The character of the pain is usually described as heavy, tight, gripping or crushing, or even 'like an elephant stood on my chest'. The terms, 'pricking', 'burning' and 'pinching' are not usually used by patients whose first language is English, although these terms have been encountered in true angina among those for whom English is their second language. Left submammary pain is extremely unlikely to be anginal. The relationship to exercise is of paramount importance although, of course, unstable angina will occur at rest. In general, the main differential diagnosis is of oesophageal pain which can be totally indistinguishable.

Breathlessness

Cardiac breathlessness usually occurs initially on exercise, although acute pulmonary oedema clearly causes very severe breathlessness at rest. Breathlessness that is totally episodic with no precipitating factors, which comes and goes without any clear reason, is not usually cardiac. It is of value to ask the patient to mimic the pattern of their breathlessness; sometimes 'breathlessness' can be the description given by patients to deep sighing. The patient who complains that he or she has 'difficulty taking a big breath', or who complains of 'not being satisfied' by their breathing or of 'not getting enough oxygen', or who demonstrates that they take large deep breaths without any tachypnoea rarely has a cardiac or respiratory problem. Paroxysmal nocturnal dyspnoea is usually recognized as cardiac in origin but nocturnal coughing may not be.

'Palpitations'

Most patients who complain of 'palpitations' describe an increased awareness of the heartbeat. A clear description of the nature of the palpitations will often give the diagnosis. A 'missed beat', 'heavy beat' or 'big beat', followed by a minute or two of rapid heart beating, is often the description of an extra systole followed by sinus tachycardia. The rate and the rhythm of the palpitations should be estimated from the history and it is useful if the patient can tap out the rhythm. At rapid speeds, patients cannot discern the irregularity of atrial fibrillation and may describe it as regular. Accompanying symptoms, such as breathlessness or light-headedness, must also be solicited. It is important to note that patients can feel perfectly well with ventricular tachycardia and conversely can feel extremely ill with a supraventricular tachycardia. Severity of symptoms is a poor indicator of the exact diagnosis.

Light-headedness and blackouts

Light-headedness and/or blackouts are usually either cardiac or neurological in origin.[5] The patient with light-headedness resulting from cardiac problems frequently has other cardiac symptoms. 'Cardiac light-headedness' may be accompanied by nausea, sweating, breathlessness or chest pain. The patient does not usually complain of vertiginous symptoms but may find that sitting down will stop the attack or substantially relieve it. They may recall having been able to abort some episodes whereas others (when they have not had the opportunity to sit down) have progressed and led to a blackout.

Patients will sometimes present with 'blackouts' and a carefully taken history will reveal that they have not completely lost consciousness. Conversely, if a patient does lose consciousness, the clearest possible account of heralding symptom is of value. A sudden and immediate blackout will cause the patient to say that the first thing that they remember is waking up on the floor. Clearly, the statement and observations of a witness are of enormous value. A classical epileptic fit will usually present no diagnostic difficulty, although it is important to recognize that reduced blood supply to the brain because of cardiac malfunction can cause a generalized seizure. Equally, it is important to know that a patient with a cardiac problem who loses consciousness very transiently can be incontinent of urine if they have an unstable sphincter.

In patients with severe left ventricular outflow tract obstruction, e.g. in aortic stenosis, syncope can occur with exertion. Unprovoked loss of consciousness is very rare in severe aortic stenosis but can occur occasionally as a result of ventricular arrhythmias, or bradycardia due to aortic calcification extending into the conducting system.[6]

Cardiovascular examination

Major genetic abnormalities associated with characteristic facial appearance or body habitus are usually detected well before adulthood in the majority of patients. Conditions such as Down's syndrome, Williams' syndrome and Turner's syndrome are usually detected in early childhood — Marfan's syndrome[7] may be an exception.

Traditionally, examination of the cardiovascular system begins with the hands, where evidence of finger-clubbing, splinter haemorrhages, the rare Janeway's lesions and the vanishingly rare Osler's nodes may be sought. Cyanosis in the hands may be central or peripheral and associated cyanosis of the mouth, lips or tongue will confirm a central origin.

Examination of the pulse

Both radial pulses should be examined to confirm that they are both present. Looking for radio-femoral delay as evidence of coarctation of the aorta is also important. At the wrist, the radial pulse gives information about cardiac rate and rhythm. Assessing the character and volume of the pulse require examination of the carotid or brachial artery; the one exception is the water-hammer pulse, which is detected with the palm of the hand around the wrist of the raised arm. A water-hammer, collapsing, or decrescendo pulse, has a number of causes (Table 1), the most prominent of which is significant aortic regurgitation.

The bisferiens pulse, with a double peak, is most usually attributed to a combination of aortic stenosis and aortic

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Main causes of collapsing (water-hammer) pulse

Aortic regurgitation
Patent ductus arteriosus
Ruptured sinus of Valsalva aneurysm
Large arterio-venous malformation

Table 1

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regurgitation. However, it can also occur in hypertrophic cardiomyopathy and also occasionally in pure aortic regurgitation.[8] Characteristic of hypertrophic obstructive cardiomyopathy is the sharp upstroke pulse of low amplitude of the 'jerky' pulse.[9]

Pulsus paradoxus (diminution in volume on inspiration) is found in constrictive pericarditis and at times in cardiac tamponade — pulsus alternans (relatively high amplitude or normal amplitude pulse followed by a pulse of lower amplitude) occurs in severe left ventricular disease and is rarely discerned at the wrist or brachial artery by palpation. Both pulsus paradoxus and pulsus alternans may need a sphygmomanometer for their recognition.

Pulsus bigeminus is the presence of a large pulse followed by a coupled ectopic, giving a smaller pulse. The findings differ from pulsus alternans, where each pulse is evenly spaced. Pulsus bigeminus occurs classically in digitalis intoxication, caused by coupled ectopics. However, it can also occur in any patient with coupled ventricular ectopics, including those with hypokalemia.

Severe fixed left ventricular outflow tract obstruction, most commonly results from severe aortic stenosis and gives rise to a slow-rising or 'anacrotic' pulse, characterized by a 'notch' on the upstroke of the pulse wave. This is one of the most important physical signs in cardiology, one of the most difficult to discern and one of the easiest to get wrong. Even experienced clinicians can be fallible.

Examination of the jugular venous pulse

The jugular venous pressure is usually examined with the patient at an angle of 45° to ensure that the top of the distended vein is above the clavicle and below the angle of the jaw, and measured as the height of the venous pulsation above the angle of Louis. The jugular venous pressure has two waves in sinus rhythm, the 'a-wave' and the 'v-wave'. The 'a-wave' is absent in atrial fibrillation because of loss of atrial activity, although small oscillations may still be seen before the 'v-wave' or systolic wave. The 'a-wave' is prominent in three groups of patients:

a. Patients with tricuspid stenosis, where there is forcible contraction of the atrium against a stenosed tricuspid valve.
b. Patients with severe right ventricular hypertrophy of any cause (including pulmonary stenosis and pulmonary hypertension), where there is forceful atrial contraction into a non-compliant right ventricle.
c. Patients with severe left ventricular hypertrophy (e.g. in severe aortic stenosis) who may also have a large 'a-wave' due to hypertrophy of the inter-ventricular septum and resulting poor compliance of the right ventricle — the so-called Bernheim effect.[10]

A large 'cv' (or systolic) wave is seen in tricuspid regurgitation where the right ventricle effectively ejects directly into the right atrium and jugular veins.

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