Heart failure is normally a disorder of older patients. Generally patients are over age sixty and one in five of eighty year olds has this chronic disorder.

The main symptoms which characterise heart failure are:
- Ankle swelling
- Breathlessness
- Tiredness

Other symptoms depend on which part of the heart is affected.

Consider the circulation of blood through the heart. It returns from the body in the *vena cava* and enters the *right atrium* (on the left as you look at the picture).

It passes into the *right ventricle* and then travels to the lungs in the *pulmonary artery* where it collects oxygen. It then returns to the heart into the *left atrium*, thence into the *left ventricle* and from there into the *systemic circulation* which supplies blood to the brain, heart, gut and all the other components of the body.

If a part of the heart becomes damaged, then there is restriction of blood flow in that area which causes the blood to slow down in the vessels leading to that area. Fluid accumulates in the affected area and produces related symptoms as a consequence.
Thus, if the right side of the heart is damaged, blood slows on the way back to the heart resulting in what is commonly called congestive heart (cardiac) failure. This is accompanied by the collection or pooling of fluid in the body leading to swollen ankles (oedema), and an enlarged liver. If the left side of the heart is damaged, then the pooling of blood and increased back pressure affects the lungs resulting in fluid accumulation, breathlessness, cough, and acute attacks of sudden breathlessness at night (paroxysmal nocturnal dyspnoea - which means intermittent breathlessness at night).

The reality is that the division into left and right is usually artificial because the heart as a whole is affected and the symptoms are a mixture of failure affecting both sides.

The speed of onset may vary considerably and the symptoms may develop quickly (acute heart failure) or over months or years (chronic heart failure).

It may be associated with any event which results in damage to the heart such that its muscles lack the power to push the blood round the system as effectively as they did formerly. It may therefore develop following a heart attack, because of high blood pressure, because of damage to the heart valves or abnormalities in the rhythm of the heart. Less commonly it may be due to:

- Cardiomyopathy (a term for diseases of the heart where the muscle becomes stretched, stiffened or thickened preventing normal function)
- Excessive alcohol consumption
- Anaemia
- Hyperthyroidism (overactive thyroid).

It may be complicated by reduced ability to exercise and by the formation of blood clots, often in the legs, which may result in a pulmonary embolus (clot in the lung) or a stroke.

**Diagnosis**

Suspicion may be aroused following one of the predisposing or precipitating factors with increasing swelling or breathlessness, necessitating a visit to the GP.

Physical examination may identify an enlarged heart, fluid on the lungs, enlarged liver or swollen legs and feet. In such circumstances, GPs may undertake investigations to confirm the diagnosis.

- BNP (B-type natriuretic peptide) test which identifies a chemical produced largely by the left ventricle in response to strain.
- Chest X-ray will demonstrate fluid in the lungs and an enlarged heart
- Electrocardiogram. This will assist the doctor in identifying abnormalities of rhythm and other pathologies.
- Echocardiogram. This investigation
produces ultrasound images of the heart and can identify any evidence of reduced function of the heart muscle together with any damage to or abnormal function of the heart valves.

Once a diagnosis is made, much of the management depends on the modification of lifestyle to reduce the progression of the condition. Such actions will include:

- Reduction or elimination of obesity
- Cessation of smoking
- Reduction of cholesterol
- Having a good diet
- Regular exercise
- Alcohol only in moderation.

In addition, patients with heart failure may require medical treatment to reduce blood pressure or relieve the symptoms of heart failure by making the heart more effective as a pump to lower the fluid load that it is required to circulate.

- Angiotensin-converting enzyme (ACE) inhibitors have a dual action. They reduce blood pressure and they improve the function of the heart. They have made an important contribution to prolonging survival and reducing acute medical episodes. As the name suggests the drugs work by inhibiting the action of angiotensin-converting enzyme. Angiotensin is a hormone which causes blood vessels to constrict (become narrower) and therefore for blood pressure to rise. Sometimes ACE inhibitors cause side effects but in a proportion of patients may lead to a persistent, dry and troublesome cough. In such patients the ACE inhibitor may be replaced by:

  - Angiotensin Receptor Blocker (ARB). These drugs act in a similar way to ACE inhibitors but work at a different point on the enzyme pathway. They are more expensive than ACE inhibitors and are used as a second line.
  - Beta-blocking drugs lower blood pressure and are valuable in heart failure. They make the heart beat more slowly and with less force. They work by blocking the effects of adrenaline and nor-adrenaline. It means that the heart does not have to work so hard. Bisoprolol is a drug which may commonly be used. Side effects may include cold extremities, tiredness and impotence in men.

- Diuretics like bendroflumethiazide may be included in the treatment. They reduce the circulating blood volume and increase urine output. The result is to reduce
the overall fluid load on the body (for example reduced oedema [ankle and leg swelling] or lung congestion). The diuretic spironolactone may be used if others are ineffective.

• **Digoxin** is a very longstanding drug, originally formulated from Digitalis lanata (the foxglove plant). It is used to treat heart failure and abnormal rhythms of the heart such as atrial fibrillation and atrial flutter. It acts to make the heart beat more slowly and with increased force to make it more effective and efficient.

• **Pacemaker**, In some patients a pacemaker is required to make the heart beat regularly. The device is implanted under the skin of the chest and it sends a small electrical charge at a regular rate to the heart to stimulate it to beat.

• **Heart transplant** is a last resort for a small number of patients with severe heart failure.

Prevention is crucial to good health. A healthy lifestyle reduces the risk of heart diseases, in particular maintaining a normal blood pressure and not smoking, supported by exercise, a balanced diet and moderation in the use of alcohol.

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The British Heart Foundation is a brilliant organisation which contributes a huge amount to the advances in the management of heart disease promoting education and research. They can be contacted by:

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