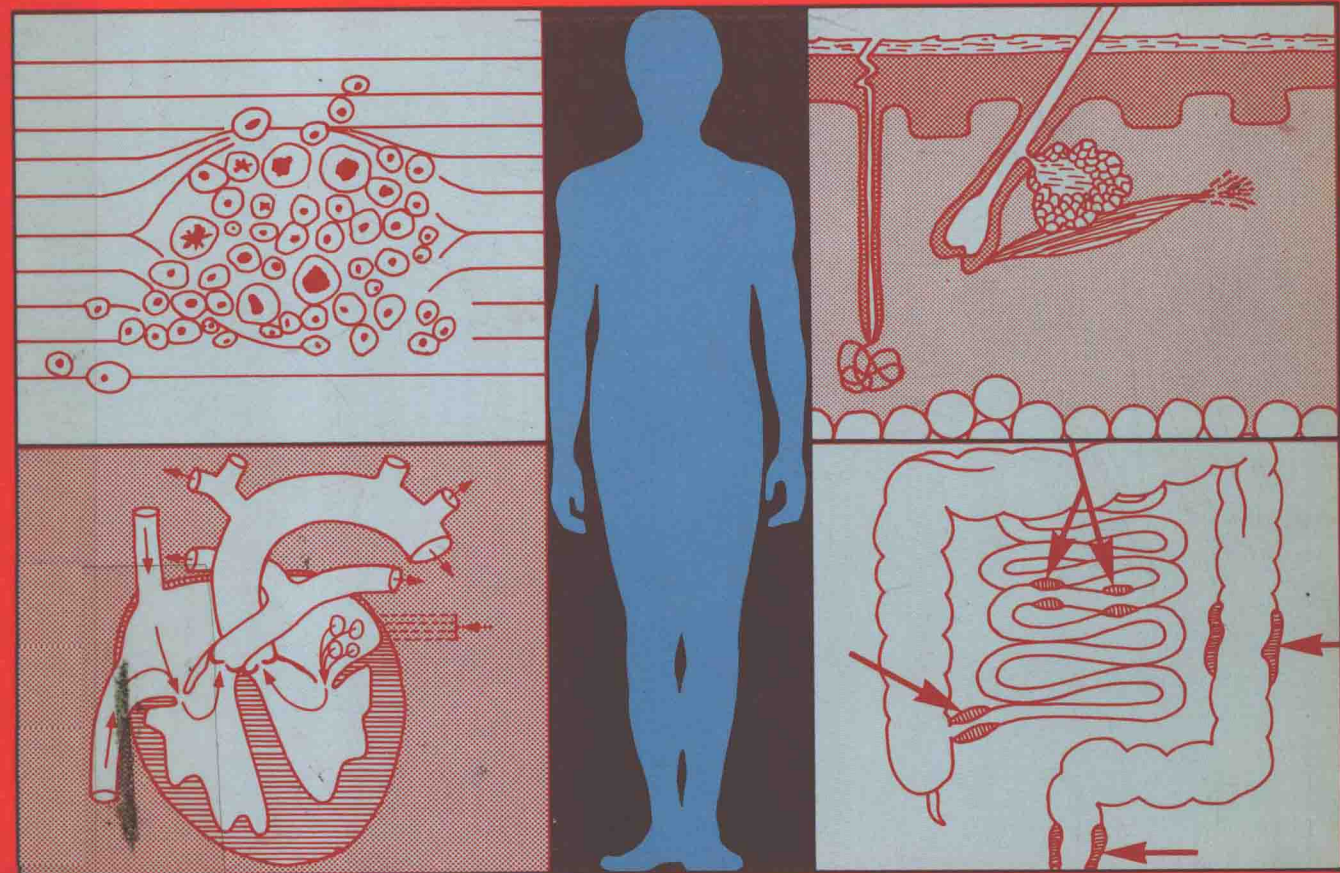


Essential Medicine

J. L. Burton

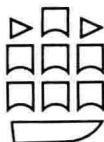


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Essential Medicine

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Essential Medicine

Preface

Nurses and medical students are faced with a daunting task when they first begin their training on a medical ward. The sheer volume of knowledge which has to be assimilated means that often they cannot see 'the wood for the trees'. This little book aims to provide a simple and succinct account of general medicine which can be read easily and quickly and then used as a basis for further study of the larger and more comprehensive textbooks.

I hope that nurses will find it useful throughout their training, and also for rapid revision of essential facts just before examinations. Medical students should find it helpful as an introductory text on their first medical 'firm', and para-medical students such as physiotherapists and radiographers may also find it useful.

Each chapter gives a brief review of the important anatomy and physiology of a particular system, followed by the causes, clinical features, complications and treatment of the common diseases which occur in that system. There are also chapters on medical terminology and on the uses of common drugs.

This book was originally published as *Aids to Medicine for Nurses* but with the change in format the book has been re-titled *Essential Medicine*. It has been completely updated, and enlarged by the addition of several new chapters and more than 50 new diagrams.

Once again I should like to thank my nursing colleagues in the School of Nursing in the Bristol Health District who have been most helpful and have made a number of very valuable suggestions.

1981

J.L.B.

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Disease

Broadly speaking, any alteration of the structure or function of the organs or tissues of the body may be called a disease.

Symptoms

These are what the patient complains of, e.g. pain or tiredness.
They are obtained by taking a history from the patient.

Signs

These are the physical abnormalities found on examining the patient. The physical examination by a physician usually proceeds in the following stages:

1. Inspection i.e. looking
2. Palpation i.e. feeling with the hands or fingers
3. Percussion i.e. one finger is placed firmly on the part to be tested and is then tapped with the finger-tip of the opposite hand to detect whether the tissue has the normal resonance. The resonance may be increased by excessive gas or decreased by excessive fluid
4. Auscultation i.e. listening with a stethoscope

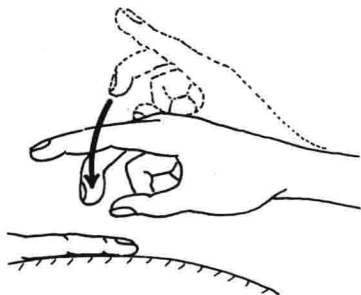


Figure 1.1
Percussion

Syndrome

A set of symptoms and signs which characterize a particular disease.

Diagnosis

The recognition of a particular disease from its symptoms, signs and any special tests.

Differential diagnosis

A list of similar diseases from one of which the patient may be suffering.

Prognosis

The prediction of the duration and outcome of a disease and its likely response to treatment.

Complications

These are developments of the original disease which do not occur in every patient, but which adversely affect the prognosis.

Sequelae

These are the long-term results which follow from a particular disease or its treatment.

Prophylaxis

The prevention of disease.

Aetiology

The various factors involved in the causation of a disease.

Pathogenesis

The mode of production or development of a disease.

Pathognomonic symptom or sign

One which occurs in only one disease, and thus enables the diagnosis to be made.

Types of disease

Diseases may be classified in many ways, but most can be fitted into one or more of the following categories:

1. *Congenital*

This dates from birth.

A congenital disease may be hereditary (i.e. inherited due to a genetic disorder), or it may be due to damage to the fetus caused by drugs or infection which can cross the placenta. Diseases which tend to run in the family are said to be *familial*, but they may not be congenital (e.g. hay fever).

2. *Physical damage* (trauma)

This includes accidental or intentional violence, surgical operations, excessive heat, cold, radiation or corrosive chemicals which cause tissue damage.

3. *Mechanical defects*

These include various factors which obstruct tubes or vessels e.g. blood clot in a vein, adhesions of the bowel.

4. *Infection or infestation*

Various living organisms may cause disease by invading the patient. These include (in ascending order of size):

- (i) *Viruses* e.g. Varicella (chicken-pox) and measles
- (ii) *Bacteria*
 - a. Cocci — round organisms e.g. Staphylococci and Streptococci
 - b. Bacilli — rod-shaped organisms e.g. Mycobacterium tuberculosis
 - c. Treponemes — corkscrew-shaped organisms e.g. Treponema pallidum (Syphilis)
- (iii) *Protozoa* e.g. malaria and amoebic dysentery
- (iv) *Fungi* e.g. dermatophytes and yeasts
- (v) *Animal parasites* e.g. mites, worms, lice
- 5. *Neoplasia* (new growths)

Strictly speaking, a tumour is any kind of abnormal swelling, but most tumours are due to neoplasia. A neoplasm is a new growth of cells which is uncontrolled and unnecessary for the function of the body.

A *benign* neoplasm has the following features:

- (i) Its cells resemble those of the tissue from which they arise
- (ii) It is usually slow-growing
- (iii) It usually has a capsule
- (iv) It does not invade normal surrounding tissue
- (v) It does not spread to distant parts of the body

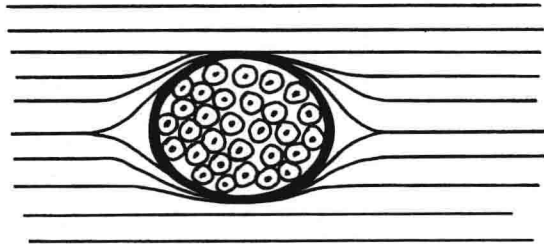


Figure 1.2
Benign tumour. Pressure effects only

Benign tumours usually take their name from their tissue of origin, and they may arise from most tissues:

e.g. *Fibroma* from fibrous tissue

Lipoma from fat

Neuroma from nerve

Angioma from a vessel

Osteoma from bone

A *malignant* neoplasm has the following features:

- (i) Its cells may not resemble the cells of the tissue from which they arise. These tumours are said to be anaplastic and they have a poor prognosis
- (ii) Its cells divide rapidly, often with abnormal nuclei
- (iii) It has no capsule
- (iv) It usually invades the underlying tissues
- (v) It tends to spread (metastasize) to distant parts of the body, either via the blood-stream (haematogenous dissemination) or via the lymphatic vessels (lymphatic dissemination)

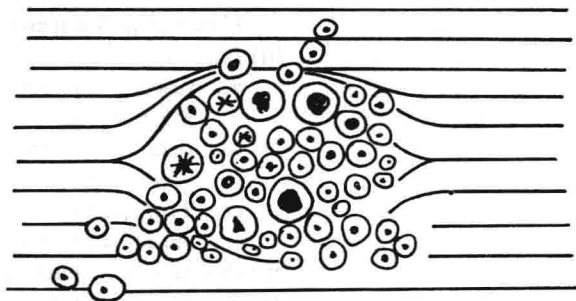


Figure 1.3
Malignant tumour. Pressure effects
and invasion

Malignant tumours are of several types:

1. *Carcinoma* (cancer) originates from a 'lining tissue' (epithelium) such as skin, bronchus or intestinal epithelium. Some cancers are often fatal (e.g. gastric cancer) and others are rarely fatal if treated early (e.g. basal cell cancer of skin)
2. *Sarcoma* originates from a deeper tissue (mesoderm) such as muscle or bone. Sarcoma usually has a poor prognosis
3. *Lymphoma* originates in the reticulo-endothelial cells of the lymphoid tissue, and there are varying degrees of malignancy
4. *Leukaemia* originates in the 'stem cells' which divide to produce white cells (leucocytes)

Most malignant tumours have a poor prognosis but some benign tumours can kill the patient because of their huge size (e.g. ovarian), and some malignant tumours (e.g. basal cell skin cancer) do not metastasize so they can be completely cured.

6. *Degenerative disease*

This occurs when a tissue ages or 'wears out', so that it loses its normal function. Degenerative changes in the heart and blood vessels lead to circulatory failure. An inadequate blood supply to an organ is called *ischaemia*. This usually produces *anoxia* (lack of oxygen) in the tissue, and if the tissue becomes *necrotic* (dies) as a result, this is called *infarction*.

7. *Metabolic disease*

The innumerable biochemical reactions which occur in the body are vital for health, and derangement of this normal metabolism (e.g. by an enzyme deficiency) can cause serious disease.

The endocrine glands secrete hormones which regulate metabolic activity, and over-activity or underactivity of an endocrine gland usually causes disease.

The various components of the diet (fat, carbohydrate, protein, mineral salts, vitamins and water) are also essential for normal metabolism, and excess or deficiency of one or more of these dietary components can cause disease.

8. *Immunological disease*

The body has a number of complex defence mechanisms which help it to prevent infections, but if infection does occur, these immune mechanisms play an important role in producing the changes of inflammation (redness, heat, swelling and tenderness).

There are many ways in which these immunological mechanisms can become deranged and cause disease. Abnormal antibodies may attack the body's own tissue, as in thyroiditis due to anti-thyroid antibodies, or they may cause allergy to an external substance, as in hay-fever, due to pollen allergy. An *allergen* is a substance which is harmless to normal people, but which provokes an abnormal immunological reaction in a person who is sensitized to it. In hay-fever, the allergen is pollen from a particular plant.

More complex immunological abnormalities are involved in the so-called 'collagen-vascular' diseases such as rheumatoid arthritis and systemic lupus erythematosus.

9. *Disease due to drugs or poisons*

As more and more powerful drugs become available to doctors, *side-effects* are becoming increasingly important. Some side-effects are *dose-related* i.e. they would affect everyone in the same way if a big enough dose were given, and others are *idiosyncratic* i.e. they adversely affect only a few individuals, and a large dose is not required for the side-effect to be produced. Sometimes a drug acts as an allergen and provokes an immunological disorder.

The effect of poisons is usually dose-related, and any drug or chemical, even common salt, is poisonous to man if taken in sufficient quantity.

2

Cardiovascular system

The heart is a muscle pump whose function is to perfuse the tissues with blood by contracting rhythmically. In a resting adult the heart expels about 5 litres of blood each minute (*cardiac output*).

The *pericardium* is a two-layered sac which encloses the heart.

The *myocardium* is the heart muscle.

The *endocardium* lines the 4 heart chambers and covers the 4 heart valves.

The 4 chambers are:

1. The R. and L. atria
2. The R. and L. ventricles

The 4 valves are:

1. The aortic and pulmonary valves
2. The mitral and tricuspid valves

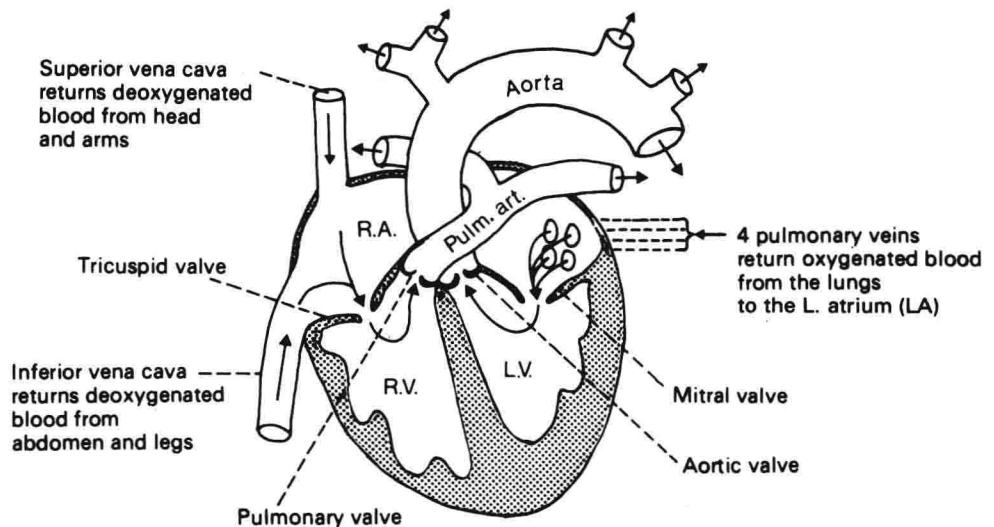


Figure 2.1

Pulmonary and systemic circulation

The heart acts like two separate pumps which act side by side.

The right pump (RA and RV) is responsible for pumping blood to and through the lungs. This is the pulmonary circulation, which drains into the LA.

The left pump (LA and LV) pumps blood throughout the rest of the body. This is the systemic circulation, which drains into the RA.

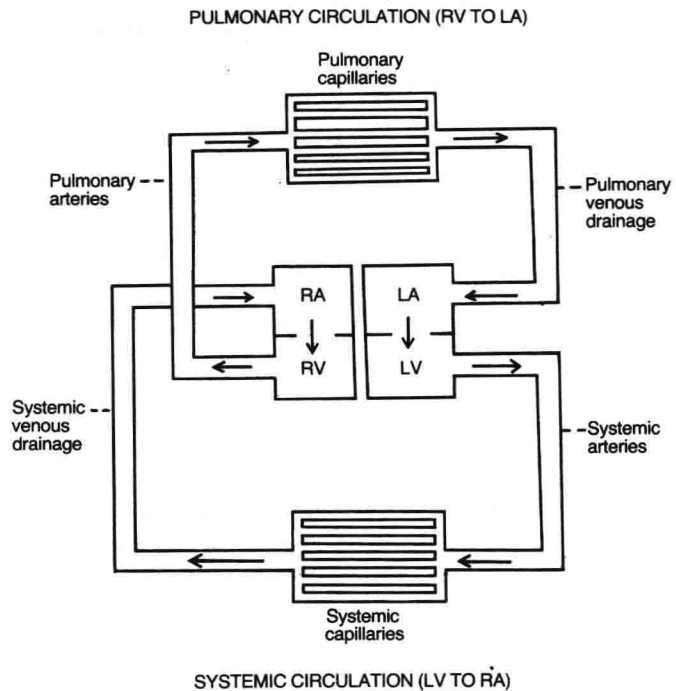


Figure 2.2
The circulation of blood. Note that the heart acts as two separate pumps

The cardiac cycle

Atrial contraction (*atrial systole*) squeezes blood into the ventricles while they are relaxed (*ventricular diastole*). The ventricles then contract (*ventricular systole*) to expel blood into the aorta and R. and L. pulmonary arteries while the atria relax (*atrial diastole*) and refill with blood from the superior and inferior venae cavae and pulmonary veins.

This regular sequence of contraction is maintained by electrical impulses which originate from the *sino-atrial node* (*pacemaker*) in the R. atrium. Each impulse spreads in all directions over both atria, and after a short delay at the *atrioventricular node* it travels rapidly, down the specialized conducting tissue (*atrioventricular bundle*) in the interventricular septum to stimulate both ventricles. After each impulse the conducting tissue requires a short rest period (*refractory period*) before another impulse can pass.

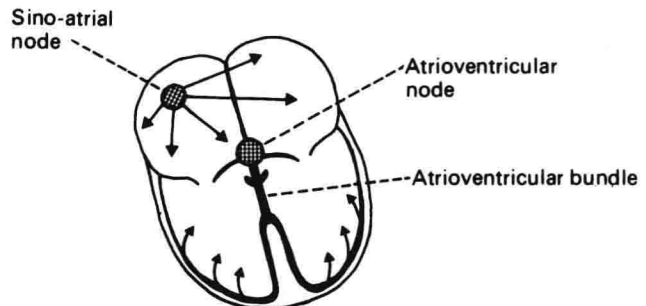


Figure 2.3

General symptoms of heart disease

1. **Dyspnoea** (breathlessness) especially on exertion
Orthopnoea is a later stage in which breathlessness forces the patient to remain sitting up
Paroxysmal nocturnal dyspnoea is characterized by the sudden onset of dyspnoea and wheezing, with a sense of suffocation. It usually occurs at night, and is due to pulmonary congestion with the patient lying flat
2. **Palpitation** (awareness of the heart beat) occurs in normal subjects and in patients with heart disease
3. **Chest pain.** Very variable, but often precipitated by exertion or a heavy meal, and spreads into the neck or arms
4. **Oedema** (swelling due to fluid accumulation) of the most dependent parts (usually ankles or sacrum)
5. **Cerebral symptoms** due to impaired oxygenation of the brain.
 These include insomnia and memory loss
6. **Digestive disturbance** due to gastrointestinal congestion
7. **Cyanosis** is due to the presence of an excess of inadequately oxygenated haemoglobin in the blood
Peripheral cyanosis is limited to the extremities and is due to poor circulation (e.g. cardiac failure, or vasoconstriction due to cold)
Central cyanosis affects also the lips and tongue
Causes of central cyanosis:
 1. Impaired oxygenation of blood in lungs
 2. Congenital heart disease with a R. to L. 'shunt' of blood (e.g. Fallot's tetralogy)

The arterial pulse

- Observe
1. Rate
 2. Rhythm
 3. Character

1. RATE

Normal:	Resting adult	60–85 beats/min
	Resting child	80–100 beats/min
	Newborn infant	100–130 beats/min

Causes of rapid pulse (tachycardia)

1. Exercise or emotion
2. Fever
3. Bleeding
4. Thyrotoxicosis
5. Heart disease e.g. cardiac failure
6. Cardiac arrhythmia

Causes of slow pulse (bradycardia)

1. Physical training
2. Myxoedema

3. Raised intra-cranial pressure
4. Drugs e.g. digitalis
5. Heart block

Pulse deficit. If some ventricular contractions fail to produce a radial pulse beat the *apex rate* (felt or heard at the heart apex) will exceed the rate at the wrist. This is called a 'pulse deficit' and it implies that the heart is not contracting efficiently so that some beats are wasted. A pulse deficit is often an early sign of digoxin overdosage.

Causes of a pulse deficit

1. Extrasystoles
2. Atrial fibrillation

2. RHYTHM

Common causes of an irregular pulse

1. Sinus arrhythmia
2. Extrasystoles
3. Atrial fibrillation

1. Sinus arrhythmia

A physiological increase in pulse rate during inspiration. Common in children and during convalescence.

2. Extrasystole (ectopic beat)

Figure 2.4
Pulse waves showing extrasystole.
Note the compensatory pause after the early beat



An extrasystole is a premature beat due to a cardiac impulse arising at an abnormal (ectopic) site in the heart. The pulse beat felt at the wrist is usually weak. This is followed by a *compensatory pause* and the next beat is unusually forceful. Extrasystoles are common and may not be dangerous.

Causes of extrasystoles

- (i) Fatigue
- (ii) Excessive smoking or ingestion of alcohol or coffee
- (iii) Heart disease e.g. mitral stenosis or myocardial ischaemia
- (iv) Drugs e.g. digitalis
- (v) Thyrotoxicosis

3. Atrial fibrillation

Very rapid uncoordinated contractions of muscle bundles occur all over the atria, and the ventricles are stimulated rapidly and irregularly. The pulse rate is about 100–180 beats/min unless controlled by digitalis.

Causes of atrial fibrillation

- (i) Rheumatic heart disease (e.g. mitral stenosis)
- (ii) Myocardial ischaemia
- (iii) Thyrotoxicosis

3. CHARACTER (Quality)

(i) *Volume*

A full 'bounding' pulse may be due to a hyperdynamic circulation e.g. fever, pregnancy, thyrotoxicosis.

A weak pulse may be due to dehydration, blood loss, myocardial infarction or 'shock'.

Pulsus alternans occurs when the volume of the pulse is alternately large and small in a regular sequence. It is a sign of severe heart failure.

Pulsus alternans may be observed by palpation of the radial pulse, or it may be observed while taking the blood pressure.

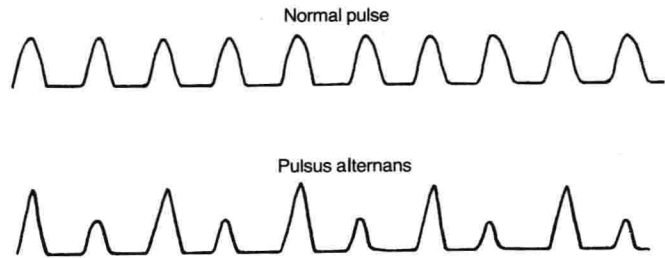


Figure 2.5

(ii) *Pulse wave*

Variations in the pulse wave may be helpful in diagnosis.

In aortic *incompetence* the pulse beat has a 'slapping' quality (*collapsing pulse*).

In aortic *stenosis* the pulse beat is sustained (*plateau pulse*).

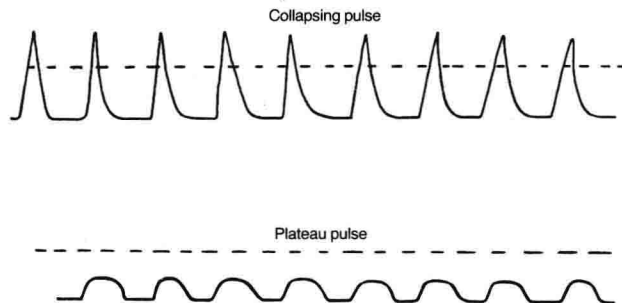


Figure 2.6

(iii) *State of the artery*

Normal arteries are soft and elastic.

Arteriosclerotic arteries are hard and rigid.

Cardiac arrhythmias

1. Extrasystoles (p. 9)
2. Atrial fibrillation (p. 9)
3. Atrial flutter

An uncommon arrhythmia due to heart disease. The pulse rate is rapid and regular but may vary due to changes in the degree of heart block (q.v.).

4. Paroxysmal tachycardia

Rapid heart-beats, often of sudden onset, due to regular discharge of impulses from an ectopic focus in the atria, atrioventricular node or ventricles. The attacks cause palpitations and usually stop suddenly after a few seconds, minutes or days.

Heart block

This refers to impairment of the conduction of the impulses through the AV node and the atrio-ventricular bundle. Mild degrees may be seen only on an electrocardiogram, but in more severe degrees there is bradycardia (about 36 beats/min) with the atria and ventricles contracting independently of each other.

Stokes-Adams attacks are periods of unconsciousness from cerebral anoxia due to transient cardiac arrest as a result of unstable heart block. The patient is very pale during the attack but becomes flushed as consciousness returns.

Jugular venous pulse (J.V.P.)

The pressure in the jugular veins can be estimated by inspecting the neck in the recumbent patient with the head and shoulders raised 30° from the horizontal. The pressure is increased in heart failure and in obstruction of the superior vena cava.

Blood pressure

In taking the blood-pressure (BP) the observer applies the armband of the sphygmomanometer firmly and evenly around the arm about two inches above the elbow. The arm band is then blown up until the brachial artery is occluded and at this point the radial pulse disappears. The stethoscope is then placed over the brachial artery at the elbow and the observer auscultates as the pressure is released.

A soft puffing noise is heard at and below systolic pressure, and as the diastolic pressure is approached the sound gradually becomes much sharper, and then suddenly changes to a much softer sound which fades away. Strictly speaking the point of transition from the loud knocking sound to the soft blowing sound is the diastolic pressure, but often the distinction is not clear.