1 History taking and clinical examination

You must be constantly alert from the moment you first see the patient, and employ your eyes, ears, nose and hands in a systematic fashion to collect information from which you can deduce the diagnosis. The ability to appreciate an unusual comment or minor abnormality, which can lead you to the correct diagnosis, only develops from the diligent and frequent practice of the routines outlined in this chapter. **Always give the patient your whole attention and never take short cuts.**

In the outpatient clinic try to see patients walk into the room, rather than finding them lying, undressed, on a couch, in a cubicle. General malaise and debility, breathlessness, cyanosis, and difficulty with particular movements are much more obvious during exercise.

It may also be helpful to see and speak to anyone who is accompanying the patient. A parent, spouse or friend can often provide valuable information about changes in health and behaviour not noticed by the patient. Remember, however, that many patients are inhibited from discussing their problems in front of a third person. It can also be difficult if the relative or friend, with the best of intentions, constantly replies on behalf of the patient. When the time comes to examine the patient, the friend or relative can be asked to leave; further questions can then be asked in private. It is helpful if a nurse is present.

Patients like to know to whom they are talking. They are probably expecting to see a specific consultant. You should **tell patients your name** and explain why you are seeing them. **It is particularly important for medical students to do this.**

Talk with patients or, better still, let them talk to you. At first, guide the conversation but do not dictate it. Treat patients as the rational, intelligent human beings they are. They know more about their complaints than you do, but they are usually unable to interpret their significance. At all stages explain what you are doing, and why you are doing it.

The patient may not be fluent in your own language and require an interpreter. When conducting an interview through an interpreter, keep your questions short and simple, and have them translated and answered one at a time. You will have to use lay terms if you are to be easily understood.

You should not use leading questions to which there is only one answer. All questions should leave the patient with a free choice of answers. You should avoid saying, 'The pain moves to the right-hand side, doesn't it?'. This is a 'leading question' because it implies that it should have moved in that direction, and an obliging patient will answer 'Yes' to please you. The patient should be asked if the pain ever moves? If the answer is 'Yes', you must then ask the supplementary question, 'Where does it go?'. Sometimes, however, patients fail to understand your question and you may have to suggest a number of possible answers, which can be confirmed or rejected.

When a patient is having difficulty communicating with you, remember that a question that you do not think is a leading one may be interpreted incorrectly by the patient if they do not realize that there is more than one answer. For example, 'Has the pain changed?' can be a bad question. There are a variety of ways in which the pain can change – severity, nature, site, etc. – but patients may be so disturbed by the intensity of the pain that they think only of its severity and forget the other features that have changed. In such situations, it often helps to include the possible answers in the question; for example, 'Has the pain moved to the top, bottom, or side of your abdomen or anywhere else?', 'Has the pain got worse, better or stayed the same?', or 'Can you walk as far, less far, or the same distance as you could a year ago?'.

The patient should provide the correct answer providing you ask the question correctly. Do not be over-concerned about the questions – worry about the answers, and accept that it will sometimes take a long time and a great deal of patience and perseverance to get a good history.

HOW TO TAKE THE HISTORY

The history should be taken in the order described below and in Revision panel 1.1. Do not write and talk to the patient at the same time; however, it is important to document dates and times and the full drug history with accuracy, which you may not remember when you have finished the examination and left the room. Brief notes are therefore essential.

Make sure you know, and always record, the patient's name, age, sex, ethnic group, marital status, occupation and address; and always record the date of the examination.

The present complaint

It is customary to ask the patient 'What are you complaining of?' and to record the answer in the patient's own words.

It is currently fashionable to talk about 'problems' rather than 'complaints'. There is no difference, but problem-orientated management sounds more sympathetic.

If you ask 'What is the matter?' the patient will probably tell you their diagnosis. It is better not to know the diagnoses made by the patient, or other doctors, because none may be correct. It is better to try to seek out the patient's complaints. These should be listed in order of severity, with a record of precisely when and how they started. Whenever possible, it should be noted why the patient is more concerned with one complaint than another.

The history of the present complaint

The full history of the main complaint or complaints must be recorded in detail, with precise dates. It is important to get right back to the beginning of the problem. For example, a patient may complain of a recent sudden attack of indigestion. If further questioning reveals that similar symptoms occurred some years previously, their description should be included in this section.

Remaining questions about the affected system

When a patient complains of indigestion it is sensible, after recording the history of the indigestion, to ask other questions about the alimentary system because many of the replies may aid in diagnosing the main complaint.

Systematic direct questions

These are direct questions that every patient should be asked, because the answers may amplify your knowledge about the main complaint and will often reveal the presence of other disorders of which the patient was unaware, or thought irrelevant. Negative answers are just as important as positive answers.

The standard set of direct questions is described in detail below because they are so important. It is essential to know them by heart because it is very easy to forget to ask some of them. **When you have to go back to the patient to ask a forgotten question, you invariably find the answer to be very important.** The only way to memorize this list is by taking as many histories as possible and writing them out in full. All the answers to every question, whether they be positive or negative, must be recorded.

The alimentary system

Appetite Has the appetite increased, decreased, or remained unchanged? If it has decreased, is this caused by a lack of desire to eat, or is it because of apprehension as eating always causes pain?

Diet What type of food does the patient eat? Are they vegetarian? When do they eat their meals?

Weight Has the patient's weight changed? By how much? Over how long a time? Many patients never weigh themselves, but they usually notice if their clothes have got tighter or looser and friends may have told them of a change in physical appearance.

Teeth and taste Can they chew their food? Do they have their own teeth? Do they get odd tastes and sensations in their mouth? Are there any symptoms of water brash or acid brash? (This is sudden filling of

Revision panel 1.1

Synopsis of a history

Names; age and date of birth; sex; marital status; occupation; ethnic group; hospital or practice record number

Present complaints or problems (PC, CO) Preferably in the patient's own words.

History of present complaint (HPC) Include the answers to the direct questions concerning the system of the presenting complaint.

Systematic direct questions

(a) Alimentary system and abdomen (AS)

Appetite. Diet. Weight. Nausea. Dysphagia. Regurgitation. Flatulence. Heartburn. Vomiting. Haematemesis. Indigestion pain. Abdominal pain. Abdominal distension. Bowel habit. Nature of stool. Rectal bleeding. Mucus. Slime. Prolapse. Incontinence. Tenesmus. Jaundice.

(b) Respiratory system (RS)

Cough. Sputum. Haemoptysis. Dyspnoea. Hoarseness. Wheezing. Chest pain. Exercise tolerance.

(c) Cardiovascular system (CVS)

Dyspnoea. Paroxysmal nocturnal dyspnoea. Orthopnoea. Chest pain. Palpitations. Dizziness. Ankle swelling. Limb pain. Walking distance. Colour changes in hands and feet.

(d) Urogenital system (UGS)

Loin pain. Frequency of micturition including nocturnal frequency. Poor stream. Dribbling. Hesitancy. Dysuria. Urgency. Precipitancy. Painful micturition. Polyuria. Thirst. Haematuria. Iincontinence.

In men Problems with sexual intercourse and impotence.

In women Date of menarche or menopause. Frequency. Quantity and duration of menstruation. Vaginal discharge. Dysmenorrhoea. Dyspareunia. Previous pregnancies and their complications. Prolapse. Urinary incontinence. Breast pain. Nipple discharge. Lumps. Skin changes.

(e) Nervous system (NS, CNS)

Changes of behaviour or psyche Depression. Memory loss. Delusions. Anxiety. Tremor. Syncopal attacks. Loss of consciousness. Fits. Muscle weakness. Paralysis. Sensory disturbances. Paraesthesiae. Dizziness. Changes of smell, vision or hearing. Tinnitus. Headaches.

(f) Musculoskeletal system (MSkS)

Aches or pains in muscles, bones or joints. Swelling joints. Limitation of joint movements. Locking. Weakness. Disturbances of gait.

Previous history (PH) Previous illnesses. Operations or accidents. Diabetes. Rheumatic fever. Diphtheria. Bleeding tendencies. Asthma. Hay fever. Allergies. Tuberculosis. Syphilis. Gonorrhoea. Tropical diseases.

Drug history Insulin. Steroids. Anti-depressants and the contraceptive pill. Drug abuse.

Immunizations BCG. Diphtheria. Tetanus. Typhoid. Whooping cough. Measles.

Family history (FH) Causes of death of close relatives. Familial illnesses in siblings and offspring.

Social history (SH) Marital status. Sexual habits. Living accommodation. Occupation. Exposure to industrial hazards. Travel abroad. Leisure activities.

Habits Smoking. Drinking. Number of cigarettes smoked per day. Units of alcohol drunk per week.

the mouth with watery or acid-tasting fluid – saliva and gastric acid respectively.)

Swallowing If they complain of difficulty in swallowing (dysphagia), ask about the type of food that causes difficulty, the level at which the food sticks, and the duration and progression of these symptoms. Is swallowing painful?

Regurgitation This is the effortless return of food into the mouth. It is quite different from vomiting, which is associated with a powerful involuntary contraction of the abdominal wall. Do they regurgitate? What comes up? If food, is it digested or recognizable and undigested? How often does it occur and does anything, such as stooping or straining, precipitate it?

Flatulence Does the patient belch frequently? Does this relate to any other symptoms?

Heartburn Patients may not realize that this symptom comes from the alimentary tract and they may have to be asked about it directly. It is a burning sensation behind the sternum caused by the reflux of acid into the oesophagus. How often does it occur and what makes it happen, e.g. lying flat or bending over?

Vomiting How often do they vomit? Is the vomiting preceded by nausea? What is the nature and volume of the vomitus? Is it recognizable food from previous meals, digested food, clear acidic fluid or bile-stained fluid? Is the vomiting preceded by another symptom such as indigestion pain, headache or giddiness? Does it follow eating?

Haematemesis Always ask if they have ever vomited blood because it is such an important symptom. Old, altered blood looks like 'coffee grounds'. Some patients have difficulty in differentiating between vomited or regurgitated blood and coughed-up blood (haemoptysis). The latter is usually pale pink and frothy. When patients have had a haematemesis, always ask if they have had a recent nose bleed. (They may be vomiting up swallowed blood.)

Indigestion or abdominal pain Some people call all abdominal pains indigestion; the difference between a discomfort after eating and a pain after eating may be very small. Concentrate on the features of the pain, its site, time of onset, severity, nature, progression, duration, radiation, course, precipitating, exacerbating and relieving factors (see pages 7–10).

Abdominal distension Have they noticed any abdominal distension? What brought this to their attention? When did it begin and how has it progressed? Is it constant or variable? What factors are associated with any variations? Is it painful? Does it affect their breathing? Is it relieved by belching, vomiting or defaecation?

Defaecation How often does the patient defaecate? What are the physical characteristics of the stool?

- **Colour**: brown, black, pale, white or silver?
- **Consistence**: hard, soft or watery?
- **Size**: bulky, pellets, string or tape like?
- **Specific gravity**: does it float or sink?
- **Smell**?

Beware of the terms 'diarrhoea' and 'constipation'. They are lay words and mean different things to different people. These words should not be written in the notes without also recording the frequency of bowel action and the consistence of the faeces.

Rectal bleeding Has the patient ever passed any blood in the stool? Was it bright or dark? How much? Was it mixed in with or on the surface of the stool, or did it only appear after the stool had been passed?

Flatus, mucus, slime Is the patient passing more gas than usual? Has the patient ever passed mucus or pus? Is defaecation painful? When does the pain begin – before, during, after, or at times unrelated to defaecation?

Prolapse and incontinence Does anything come out of the anus on straining? Does it return spontaneously or have to be pushed back? Is the patient continent of faeces and flatus? Have they had any injuries or anal operations in the past?

Tenesmus Do they experience any urgent, painful but unproductive desire to pass stool? This is called tenesmus.

Change of skin colour Have the patient's skin or eyes ever turned yellow (jaundiced)? When? How long did it last? Were there any other accompanying symptoms such as abdominal pain or loss of appetite? Did the skin itch?

The respiratory system

Cough How often does the patient cough? Does the coughing come in bouts? Does anything, such as a

change of posture, precipitate or relieve the coughing? Is it a dry or a productive cough?

Sputum What is the quantity (teaspoon, dessertspoon, etc.) and colour (white, clear or yellow) of the sputum? Some patients only produce sputum in the morning or when they are in a particular position.

Haemoptysis Has the patient ever coughed up blood? Was it frothy and pink? Were there red streaks in the mucus, or clots of blood? What quantity was produced? How often does the haemoptysis occur?

Dyspnoea Does the patient wheeze? Does he get breathless? How many stairs can he climb? How far can he walk on a level surface before the dyspnoea interferes with the exercise? Can he walk and talk at the same time? Is the dyspnoea present at rest? Is it present when sitting or made worse by lying down? (Dyspnoea on lying flat is called **orthopnoea**.) How many pillows does the patient need at night? Does the breathlessness wake them up at night – **paroxysmal nocturnal dyspnoea** – or get worse if they slip off their pillows? There are classifications that grade dyspnoea numerically, but it is better to describe the causative conditions rather than write down a number.

Is the dyspnoea induced or exacerbated by external factors such as allergy to animals, pollen or dust? Does the difficulty with breathing occur with both phases of respiration or on expiration?

Pain in the chest Ascertain the site, severity and nature of the pain. Chest pains can be continuous, pleuritic (made worse by inspiration), constricting or stabbing.

The cardiovascular system

Cardiac symptoms

Breathlessness Ask the same questions as those described above under 'Respiratory system'.

Orthopnoea and paroxysmal nocturnal dyspnoea Orthopnoea and paroxysmal nocturnal dyspnoea are the forms of dyspnoea especially associated with heart disease.

Pain Cardiac pain begins in the mid-line and is usually retrosternal but may be epigastric. It is often described as constricting or band-like. It is usually brought on by exercise or excitement. The patient should be asked if the pain radiates to the neck or to the left arm and whether it is relieved by rest.

Palpitations These are episodes of tachycardia which the patient notices as a sudden fluttering or thumping of the heart in the chest.

Ankle swelling Do the ankles or legs swell? When do they swell? What is the effect on the swelling of bed-rest and/or elevation of the leg?

Dizziness, headache and blurred vision These are some of the symptoms associated with hypertension and postural hypotension.

Peripheral vascular symptoms

Does the patient get pain in the leg muscles on exercise (intermittent claudication)? Which muscles are involved? How far can the patient walk before the pain begins? Is the pain so bad that he has to stop walking? How long does the pain take to wear off? Can the same distance be walked again? Is there any pain in the limb at rest? Which part of the limb is painful? Does the pain interfere with sleep? What positions relieve the pain? What analgesic drugs give relief? Are the extremities of the limbs cold? Are there colour changes in the skin, particularly in response to a cold environment? Does the patient experience any paraesthesiae in the limb, such as tingling or numbness?

The urogenital system

Urinary tract symptoms

Pain Has there been any pain in the loin, groin or suprapubic region? What is its nature and severity? Does it radiate to the groin or scrotum?

Oedema Do any parts of the body other than the ankles swell?

Thirst Is the patient thirsty? Do they drink excessive volumes of water?

Micturition How often does the patient pass urine? Express this as a day/night ratio. How much urine is passed? Is the volume and frequency excessive (polyuria)? Is micturition painful? What is the nature and site of the pain? Is there any difficulty with micturition, such as a need to strain or to wait? Is the stream good? Can it be stopped at will? Is there any dribbling at the end of micturition? Does

the bladder feel empty at the end of micturition or do they have to pass urine a second time?

Urine Has the patient ever passed blood in the urine? When and how often? Have they ever passed gas bubbles with the urine (pneumaturia)?

Symptoms of uraemia These include headache, drowsiness, visual disturbance, fits and vomiting.

Genital tract symptoms

MALE

Scrotum, penis and urethra Has the patient any pain in the penis or urethra during micturition or intercourse? Is there any difficulty with retraction of the prepuce or any urethral discharge? Has the patient noticed any swelling of the scrotum? Can he achieve an erection and ejaculation?

FEMALE

Menstruation When did menstruation begin (menarche)? When did it end (menopause)? What is the duration and quantity of the menses? Is menstruation associated with pain (dysmenorrhoea)? What is the nature and severity of the pain? Is there any abdominal pain mid-way between the periods (mittelschmerz)? Has the patient had any vaginal discharge? What is its character and amount? Has she noticed any prolapse of the vaginal wall or cervix or any urinary incontinence, especially when straining or coughing (stress incontinence)?

Pregnancies Record details of the patient's pregnancies – number, dates and complications.

Dyspareunia Is intercourse painful?

Breasts Do the breasts change during the menstrual cycle? Are they ever painful or tender? Has the patient noticed any swellings or lumps in the breasts? Did she breast-feed her children? Has there been any nipple discharge or bleeding? Has she noticed any skin changes over the breasts?

Secondary sex characteristics When did these appear?

The nervous system

Mental state Is the patient placid or nervous? Has the patient noticed any changes in their behaviour or reactions to others? Patients will often not appreciate such changes themselves and these questions may have to be asked of close relatives. Does the patient get depressed and withdrawn, or are they excitable and extroverted?

Brain and cranial nerves Does the patient ever become unconscious or have fits? What happens during a fit? **It is often necessary to ask a relative or a bystander to describe the fit.** Did the patient lie still or jerk about, bite their tongue, pass urine? Was the patient sleepy after the fit? Was there any warning (an aura) that the fit was about to develop? Has there been any subsequent change in the senses of smell, vision and hearing?

Is there a history of headache? Where is it experienced? When does it occur? Are the headaches associated with any visual symptoms?

Has the face ever become weak or paralysed? Have any of the limbs been paralysed or had pins and needles? Has there ever been any buzzing in the ears, dizziness or loss of speech? Can the patient speak clearly and use words properly?

Peripheral nerves Are any limbs or part of a limb weak or paralysed? Is there ever any loss of cutaneous sensation (anaesthesia)? Does the patient experience any paraesthesiae (tingling, 'pins and needles') in the limbs?

Musculoskeletal system

Ask if the patient suffers from pain, swelling or limitation of the movement of any joint. What precipitates or relieves these symptoms? What time of day do they occur? Are any limbs or groups of muscles weak or painful? Can he walk normally? Has he any congenital musculoskeletal deformities?

Previous history of other illnesses, accidents or operations

Record the history of those conditions which are not directly related to the present complaint. Ask specifically about tuberculosis, diabetes, rheumatic fever, allergies, asthma, tropical diseases, bleeding tendencies, diphtheria, gonorrhoea, syphilis, and the likelihood of intimate contact with carriers of the human immunodeficiency virus (HIV).

Drug history

Ask if the patient is taking any drugs. Specifically, enquire about steroids, anti-depressants, insulin,

diuretics, anti-hypertensives, hormone replacement therapy and the contraceptive pill. Patients usually remember about drugs prescribed by a doctor but often forget about self-prescribed drugs they have bought at a pharmacy. Is the patient sensitive to any drugs or any topical applications such as adhesive plaster? If they are, write it in large letters on the front of the notes.

Immunizations

Most children are immunized against diphtheria, tetanus, whooping cough, measles, mumps, rubella and poliomyelitis. Ask about these, and smallpox, typhoid and tuberculosis vaccination.

Family history

Enquire about the health and age, or cause of death, of the patient's parents, grandparents, brothers and sisters, and ask about any children who have died. Draw a family tree if there is obvious familial disorder (e.g. lymphoedema). If the patient is a child, you will need information about the mother's pregnancy. Did she take any drugs during pregnancy? What was the patient's birth weight? Were there any difficulties during delivery? What was the rate of physical and mental development in early life?

Social history

Record the marital status and the type and place of dwelling. Ask about the patient's sexual life, the sex and sexual behaviour of their sexual partners and the nature of their physical relationships. Ask about the patient's occupation, paying special regard to contact with hazards such as dusts and chemicals. What are the patient's leisure activities? Has the patient travelled abroad? List the countries visited and the dates of the visits if these appear to be relevant.

Habits

Does the patient smoke? If so what – cigarettes, cigar or pipe? Record the frequency, quantity and duration of their smoking habit. Does the patient drink alcohol? Record the type and quantity consumed and the duration of the habit. Does the patient have any unusual eating habits?

HISTORY OF PAIN

We have all experienced pain. It is one of nature's ways of warning us that something is going wrong in our body. It is an unpleasant sensation of varying intensity. Pain can come from any of the body's systems but there are certain features common to all pains that should always be recorded.

Be careful in your use of the word **tenderness**. Tenderness is pain which occurs in response to a stimulus, such as pressure from the doctor's hand, or forced movement. It is possible for a patient to be lying still without pain and yet have an area of tenderness. *The patient feels pain – the doctor elicits tenderness.* But although patients usually complain of pain, they may also have observed and complain of tenderness if they happen to have pressed their fingers on a painful area or discovered a tender spot by accident. Thus tenderness can be both a symptom and a physical sign.

The history of a pain frequently betrays the diagnosis, so you must question the patient closely about each of the following features, some of which are depicted graphically in Figure 1.1.

Site

Many factors may indicate the source of the pain but the most valuable indicator is its site.

It is of no value to describe a pain as 'abdominal pain'; you must be more specific. Although patients do not describe the site of their pain in anatomical terms, they can always point to the site of maximum intensity, which you can convert into an exact description. When the pain is indistinct in nature and spread diffusely over a large area, you must describe the area in which the pain is felt and the point (indicated by the patient) of maximum discomfort. It is also worthwhile asking about the depth of the pain. Patients can often tell you whether the pain is near to the skin or deep inside.

Time and mode of onset

It may be possible to pinpoint the onset of the pain to the minute, but if this cannot be done, the part of

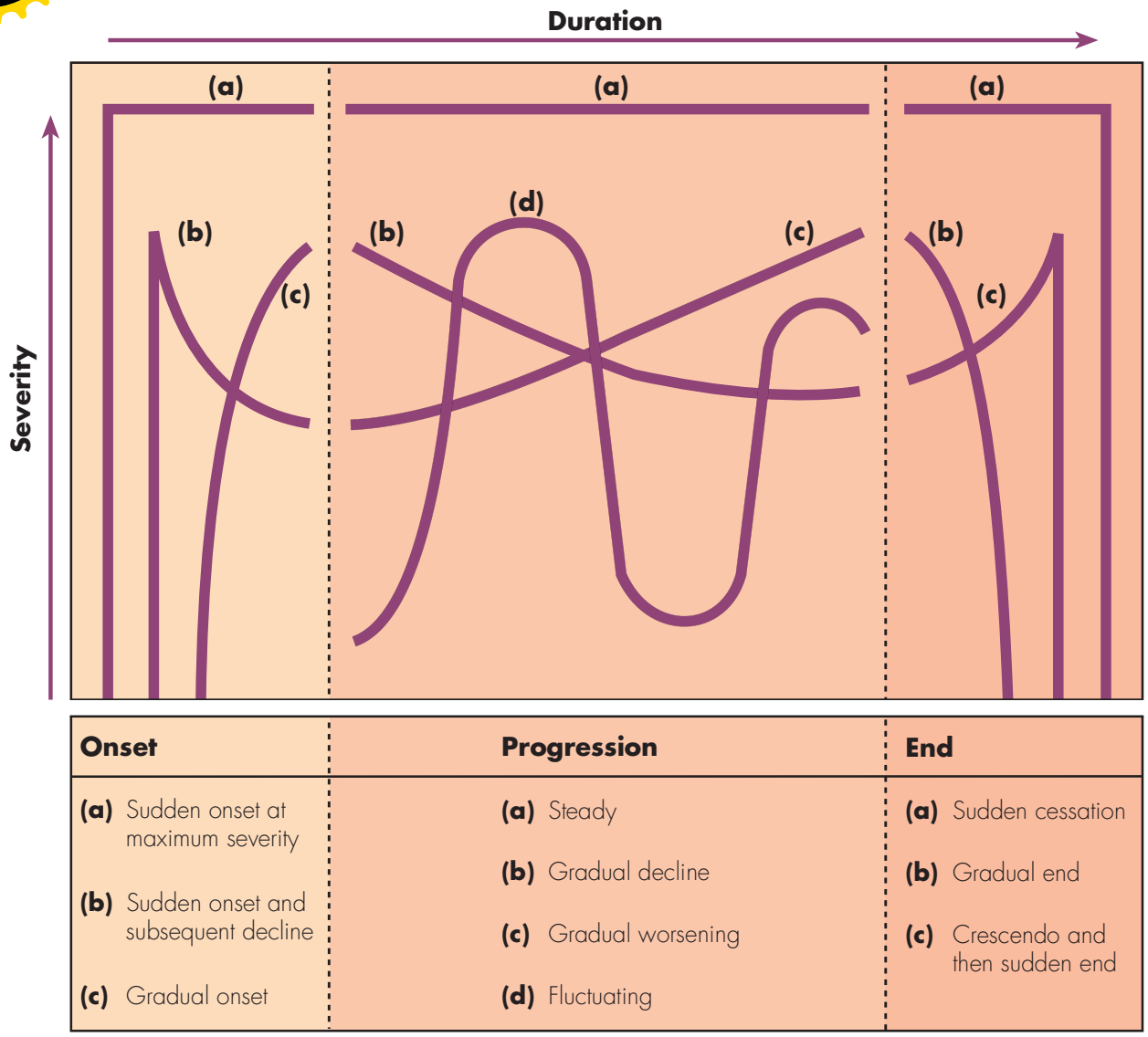


FIG 1.1 The ways in which a pain can change. (Always record dates and calculate time intervals.)

the day or night when the pain began should be recorded. You should record the calendar dates on which events occurred, but it is also very useful to add in brackets the time interval between each event and the current examination, because it is these intervals, not the actual dates, which are more relevant to the problems of diagnosis. For example, 'Sudden onset of severe epigastric pain on 16th September, 1973, at 11.00 a.m. (3 days ago)': but **remember that such comments are useless if you forget to record the date of the examination**. Whenever you write a note about a patient, whether it be a short progress note or a full history, make certain that you **start your notes by writing down the date**.

Ask if the pain began insidiously or suddenly.

Severity

Individuals react differently to pain. What is a severe pain to one person might be described as a dull ache by another. Consequently you must be wary of the adjectives used by a patient to describe the severity of their pain. A far better indication of severity is the effect of the pain on the patient's life. Did it stop the patient going to work? Did it make the patient go to bed? Did they try proprietary analgesics? Did they have to call their doctor? Did it wake the patient up at night, or stop them going to sleep? Was the pain better lying still or did it make the patient roll around? The answers to these questions provide a better indication of the severity of a pain than words such as mild, severe, agonizing or terrible. Your assessment

of the way the patient responds to their pain, formed while you are taking the history, may profoundly affect your treatment.

Nature or character of the pain

Patients find it very difficult to describe the nature of their pain, but some of the adjectives which are commonly used, such as aching, stabbing, burning, throbbing, constricting, distending, gripping or colic, have a similar meaning to the majority of people.

Burning and **throbbing** sensations are within everyone's experience. We have all experienced a burning sensation from our skin following contact with intense heat, so when a patient spontaneously states that their pain is 'burning' in nature, it is likely to be so. We have all experienced a throbbing sensation at some time in our life, so this description is also usually accurate.

A **stabbing** pain is sudden, severe, sharp, and short-lived.

The adjective **constricting** suggests a pain that encircles the relevant part (chest, abdomen, head or limb) and compresses it from all directions. A pain that feels like an iron band tightening around the chest is typical of angina pectoris and almost diagnostic, but when patients speak of a **tightness** in their chest or limb do not immediately assume that they have a constricting pain. They may be describing a **tightness** caused by distension, which may occur in any structure that has an encircling and restricting wall, such as the bowel, bladder, an encapsulated tumour or a fascial compartment. Tension in the containing wall may cause a pain which the patient may describe as distension, tightness or a **bursting feeling**.

A **colicky pain** has two features. First, it comes and goes in a sinusoidal way. Second, it feels like a migrating constriction in the wall of a hollow tube which is attempting to force the contents of the tube forwards. It is not a word which many patients use and it is dangerous to ask them if their pain is colicky without giving an example. This is not difficult, because most of us have experienced colic during an episode of diarrhoea, and many women have suffered the colicky pains of labour. A recurring, intermittent pain is not necessarily a colic; it must also have a gripping nature.

'Just a pain, doctor'. Most pains have none of the features mentioned above and are described by many patients as 'a pain'. This may vary in severity from a mild discomfort or ache, to an agonizing pain that makes them think they are about to die. When a patient cannot describe the nature of their pain, do not press the point. You will only make them try to fit their pain to your suggestions and ultimately this may be misleading.

Revision panel 1.2

The features of a pain that must be elicited and recorded

Site

Time and mode of onset
Record the time and date of onset and the way the pain began – suddenly or gradually.

Duration
Record the duration of the pain.

Severity
Assess severity by its effect on the patient.

Nature/character
Aching, burning, stabbing, constricting, throbbing, distending, colic.

Radiation
Record the time and direction of any radiation of the pain; remember to ask if the nature of the pain changed at the time it moved.

Referral
Was the pain experienced anywhere else?

Progression
Describe the progression of the pain. Did it change or alter?

The end of the pain
Describe how the pain ended. Was the end spontaneous or brought about by some action by the patient or doctor?

Relieving and exacerbating factors

Cause
Note the patient's opinion of the cause of the pain.

Progression of the pain

Once it has started, a pain may progress in a variety of ways.

- It may begin at its maximum intensity and remain at this level until it disappears.
- It may increase steadily until it reaches a peak or a plateau, or conversely begin at its peak and decline slowly.
- The severity may fluctuate (see Fig. 1.1). The intensity of the pain at the peaks and troughs of the fluctuations, and the rate of development and regression of each peak, may vary. The pain may go completely between each exacerbation. The time between the peaks of an abdominal colic may indicate the likely site of a bowel obstruction (e.g. in upper small bowel obstruction, the frequency of the colic is every 1–2 minutes, in the ileum every 20 minutes). It is essential to find out how the pain has progressed and ascertain the timing of any fluctuations before its nature can be determined; for example, colic has two features – its gripping nature and its intermittent progression.

The end of the pain

A pain may end spontaneously, or as a result of some action by the patient or doctor. The end of a pain is either sudden or gradual. The way a pain ends may give a clue to the diagnosis, or indicate the development of a new problem.

Patients always think that the disappearance of their pain means that they are getting better. They are usually right, but sometimes their condition may have got worse.

Duration of the pain

The duration of a pain will be apparent from the time of its onset and end, but nevertheless it is worthwhile stating the duration of the pain in your notes. The length of any periods of exacerbation or remission should also be recorded.

Factors which relieve the pain

Patients will know if there is anything, such as position, movement, a hot-water bottle, aspirins, food, antacids, etc., which relieves the pain. The natural response to a pain is to search for a way to relieve it. Sometimes patients try the most bizarre remedies and many convince themselves that some minor change in habit or a personal remedy has been helpful, so accept their replies to this question with caution.

Factors which exacerbate the pain

Anything that makes the pain worse is also likely to be known to the patient.

The type of stimulus that exacerbates a pain will depend on the organ from which it emanates and its cause. For example, alimentary tract pains may be made worse by eating particular types of food; musculoskeletal pains are affected by joint movements, muscle exercise and posture. It is perfectly reasonable to ask direct questions about those stimuli which you think might affect a pain if the initial description has indicated its source.

Radiation and referral

Radiation Radiation is the extension of the pain to another site whilst the initial pain persists. For example, patients with a posterior penetrating duodenal ulcer usually have a persistent pain in the epigastrium, but sometimes the pain spreads through the abdomen to the back. The extended pain usually has the same character as the initial pain.

A pain may occur in one site, disappear, and then reappear in another. This is not radiation: it is a new pain in another place.

Referred pain This is a pain which is felt at a distance from its source. For example, inflammation of the diaphragm will cause a pain which is felt at the tip of the shoulder. A referred pain is caused by the inability of the central nervous system to distinguish between visceral and somatic sensory impulses. From the patient's viewpoint, the pain is where they feel it – the fact that the source is some distant organ does not concern them.

Cause

It is worthwhile asking patients what they think is the cause of their pain. Even if they are hopelessly wrong, you will get some insight into their worries.

Sometimes a patient will be obsessed with the cause of his condition and careful questioning may reveal that he will gain or lose compensation or insurance money as the result of your opinion. Nevertheless, **always listen to the patient's views with care and tolerance**.

THE CLINICAL EXAMINATION

Each chapter of this book deals with a specific region of the body and its surgical diseases. Those methods of examination peculiar to each region are described in detail in the relevant chapter. The emphasis in this introductory chapter is on the importance of taking an exact and full history, but it would not be complete without a description of the basic plan of a physical examination, with particular reference to those regions not discussed in later chapters, such as the heart, the lungs and the nervous system. As this is a thumb-nail sketch of clinical examination, your knowledge will need to be enlarged by additional reading, but your understanding and ability to solve the practical problems of clinical examination can only be clarified by frequent bedside practice. Examine as many patients as you can. Nothing can be learnt without frequent practice. Repetition is the secret of learning. This axiom applies as much to the doctor as it does to the sportsman or the concert pianist. You will become confident of your interpretation of your visual, tactile and aural appreciation of the patient's body only by repeatedly exercising these senses.

Experienced clinicians rarely begin the routine physical examination without some suspicions about the diagnosis suggested by the history. Consequently, they often modify the impartial systematized examination described in textbooks such as this by specifically looking for signs which confirm or refute their tentative diagnoses, but when a sign is elicited that denies their suspicions they return to the textbook routine. Students must not do this. Although it is a practical and time-saving method in a busy clinic, and acceptable from someone with years of clinical experience who can pick out those patients to whom it can be applied, it is fundamentally wrong. Bad habits grow fast enough without encouragement. Unless students discipline themselves to use the standard textbook routine for every physical examination, many mistakes will inevitably be made and, as time passes, some parts of the examination will be completely forgotten, with serious consequences.

The easiest way to ensure that you perform a complete examination is to learn the routine by heart and repeat it to yourself during the examination. Whilst looking at a lump, say to yourself, 'position, shape, size', etc. If you do not do this, you will find when you sit down to write your notes that you have forgotten to elicit some of the lump's physical features and will have to go back to re-examine the patient. Always keep to the basic pattern of looking, feeling, tapping and listening (inspection, palpation, percussion, auscultation), whatever you are examining. Whilst keeping to the routine it is, however, often best to examine first the part of body that is the source of the patient's complaint.

General assessment

The first part of the physical examination is performed when taking the history. While you are talking to the patient you can observe and later record their general demeanour, their intellectual ability and intelligence, and their attitudes to their disease, to you, to their treatment, and to society in general. These observations affect the manner in which you conduct the examination. Your instructions will need to be extremely simple if the patient is unintelligent, or coaxing and gentle if the patient is shy or embarrassed.

The patient's general mental state, his memory and use of words should be noted. There is a whole vocabulary used by the neurologists to describe various speech and communication disorders. Some of the common ones are:

- **dysarthria**: impaired speech caused by muscle weakness;
- **dysphasia or aphasia**: impaired or absent ability to speak caused by a neurological abnormality;
- **dysgraphia or agraphia**: impaired or absent ability to write;
- **dyspraxia or apraxia**: impaired or absent ability to perform purposeful movements in the absence of paralysis.

When a patient has been admitted as an emergency, especially if they have been injured, it is important

to record their level of consciousness using the Glasgow Coma Scale.

You can also observe a number of physical characteristics when taking the history, such as posture, mobility, weight, colour of skin, facial appearance and general body build.

Revision panel 1.3
The Glasgow Coma Scale

		Score
Eyes	Open spontaneously	4
	Open to command	3
	Open to pain	2
	Do not open	1
Speech	Sensible/orientated	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	None	1
Motor responses	Obeys commands	6
	Localizes stimuli	5
	Withdraws from stimuli	4
	Flexion responses	3
	Extension responses	2
	None	1
	Total	

Revision panel 1.4
Some common causes of weight loss

In the young	Malnutrition
	Diabetes
	Malabsorption
	Anorexia nervosa
	Tuberculosis
From middle age onwards	Diabetes
	Thyrotoxicosis
	Chronic hypoxia
	Chronic heart failure
	Malignant disease
	Senile cachexia
	Neglect

Hold the patient's hand and examine it

Make physical contact with the patient early in the examination by holding their hand and counting the pulse. It is very important for the patient to feel that you are willing to get physically as well as mentally close to them. The physical contact that is essential for the examination forges an intimate bond between you and the patient. It is an extraordinary privilege granted to you by the patient and must never be abused.

The features that can be observed by examining the hands are as follows.

Pulse See details on page 22.

Nails Look at the colour and shape of the nails. Spoon-shaped nails (koilonychia) are associated with anaemia; clubbing of the nails occurs in pulmonary and cardiopulmonary disease (see Fig. 5.24, page 160); and splinter haemorrhages under the nails are caused by small arterial emboli. Pits and furrows are associated with skin diseases such as psoriasis. Bitten nails may indicate nervousness and anxiety.

Temperature Observe the temperature of the hands – but remember that it will be affected by room temperature and the duration of exposure.

Moisture Are the patient's palms sweating excessively?

Colour Pallor of the skin of the hands, especially in the skin creases of the palm and in the nail beds, suggests anaemia. Reddish-blue hands occur in polycythaemia and cor pulmonale. The fingers may be stained with nicotine.

Callosities The position of any callosities may reflect the patient's occupation.

Examine the head and neck

Eyes

Look for any asymmetry of the position, size or colour of the eyes and especially any abnormality in the width of the palpebral fissures. This can be caused by **ptosis** (droopy eyelids) or **proptosis** (**exophthalmos**) when the eyeball is pushed forwards, pushing the lids apart (see Chapter 11, pages 292–4). The size and equality of the two pupils should be recorded (dilated, constricted or unequal).

The reaction of the pupil to light is checked by shining a bright light off and on the pupil. The pupil's reaction to accommodation is assessed by asking the patient to look into the distance and then to refocus on a finger held close to their eye.

The **eye movements** are examined by fixing the patient's head with one hand while asking them to watch your finger as it travels upwards and downwards and inwards and outwards to the full extremes of movement. Patients should be asked if they experience any double vision (**diplopia**) in any particular position. While the eye movements are being tested, the presence of any **strabismus** (**squint**) can usually be easily seen, which may be concomitant (divergent or convergent) or paralytic.

Look for the presence of **nystagmus** (oscillations of the eye characterized by a slow drift and a rapid jerk back) at the inward and outward extremes of movement.

Inspect the **lids**, **conjunctiva**, **cornea** and **lens**. Styes, Meibomian cysts, and blepharitis may inflame the lids or cause a swelling. The edges of the eyelids may be everted or inverted (**ectropion** or **entropion**) and the eye may water if the **tearduct** or **lacrimal sac** is blocked.

A painful red eye may be caused by acute conjunctivitis (when there is usually an associated discharge), acute iritis (when the anterior chamber of the eye is inflamed), acute glaucoma (which is associated with severe pain and a misty cornea), acute keratitis (from a corneal ulcer, seen as a cloudy opacity) or episcleritis.

When an elderly patient has a gradual loss of eyesight they are likely to have a cataract (which can be confirmed by finding a loss of part or the whole of the 'red-reflex' when a powerful light is shone on the pupil). Other possible causes of gradual loss of vision, such as optic nerve or retinal damage, can only be detected by inspecting the retina through an **ophthalmoscope**. This requires practice, and you should take every opportunity to use the ophthalmoscope by inspecting the retinae of all the patients you examine.

Ophthalmoscopy is best carried out in a darkened room to ensure that the pupils are dilated. The ophthalmoscope is an illuminated lens system which can be focused on the retina. Patients are asked to stare fixedly at a point on the wall behind the examiner. The instrument is switched on and held by its handle in the right hand. The examiner then places his right eye against the lens opening and his left hand on the patient's forehead above their right eye. He then looks through the aperture of the ophthalmoscope, brings the instrument very close to the patient's right pupil by placing his forehead against his left hand on the patient's forehead. The light can be watched illuminating the fundus, through the pupil, as the instrument and the patient's eye are brought close together. The approach should be slightly from the temporal side, at an angle of 10–15° to the direct line, to avoid noses colliding! When the pupils are level, this approach usually ensures that the optic nerve disc is the first part of the fundus to come into view. If the disc is not seen, a retinal artery should be followed back until the edge of the pale yellow disc is seen.

The optic disc is *cupped* by chronic glaucoma and swollen by *papilloedema* (see Fig. 2.3, page 46). Other abnormalities that can be detected by careful fundoscopy of the rest of the retina include haemorrhages and exudates (in diabetes and hypertension), retinal emboli and infarcts, and occasionally retinal detachment. At the end of the examination, the patient should be asked to look directly at the light of the ophthalmoscope in order to inspect the macula.

Ears and nose

Do not forget to look into the ears to inspect the external auditory canal and the ear-drum. Look up the nose. The ears and nose are often forgotten during routine examination but they are important, particularly if there is any possibility of disease in the head and neck.

Clinical examination of the ear requires an auroscope. This instrument directs a beam of light down a conical metal speculum which is viewed through a lens. The speculum is gently inserted into the external auditory meatus, while the ear is pulled gently upwards and backwards to straighten the external auditory canal. Wax may be present and must be removed before the tympanic membrane can be seen.

The whole of the tympanic membrane can only be seen if the angle of the speculum is altered. Normal tympanic membranes vary in colour, translucence and shape – so you should look at as many normal tympanic membranes as possible. The external auditory canal may contain wax or foreign bodies. You may see otitis externa (dermatitis), blood or pus. The tympanic membrane may be normal, torn (injury),

bulging and inflamed (acute otitis media), or perforated (chronic otitis media).

Mouth

Note the colour and state of the lips. Ask to see the patient's tongue; observe its movement, symmetry and surface.

Look at the teeth and gums. Use a spatula to inspect the soft palate, tonsils and posterior wall of the oropharynx.

Neck

The important features to examine in the neck are the jugular veins, the trachea, the thyroid gland and the lymph glands.

Examine the cranial nerves

*'**O**n **O**ld **O**lympus **T**owering **T**ops **A** **F**inn **A**nd **G**erman **P**icked **S**ome **H**ops' is the most-used mnemonic for the names of the cranial nerves.*

I Olfactory nerve

Ask the patient about their sense of smell. If thought to be abnormal, it can be specifically tested with bottles containing cloves, peppermint etc.

II Optic nerve

Visual acuity Visual acuity is tested with a *Snellen's chart* at a distance of 6 metres. Vision is expressed as a fraction of the normal: the smallest letter visible with comfort is 6/6; if letters twice that size are all that can be read, the vision is 6/12. The larger letter is visible to the normally sighted at 60 metre. Below this level of vision, 'counting fingers', 'hand-movements' and 'perception of light' are used to grade degrees of blindness. Near-vision is tested by a card covered with varying sizes of print.

Test the visual fields Sit directly in front of the patient, ask them to close one eye and look straight at you with the other eye. Keeping your hand midway between you and the patient, extend your arm so that your hand is beyond your own peripheral vision. Then gradually move it towards the mid-line until it appears in your visual field. If you and the patient have normal visual fields, you will both see your finger at the same time.

III Oculomotor nerve

This nerve supplies all but two of the extrinsic eye muscles, as well as the levator palpebrae superioris and the muscle of accommodation. When it fails to function, the eye turns downwards and outwards, the upper lid droops (ptosis) and the pupil becomes fixed (not responding to accommodation). Sometimes individual muscles supplied by the third nerve can be paralysed. To test the superior rectus muscle, ask the patient to 'look up'; the inferior rectus – 'look down'; the medial rectus – 'converge'; and the inferior oblique – 'look up and out'.

IV Trochlear nerve

This nerve supplies the superior oblique muscle, which turns the eye downwards and outwards. The patient cannot perform this movement if the nerve is damaged. The eye will look inwards and the patient will experience diplopia below the horizontal plane.

V Trigeminal nerve

This nerve has sensory and motor functions. It is sensory to the whole of the side of the face. The cutaneous distribution of its three sensory divisions – ophthalmic, maxillary and mandibular – is shown in Figure 1.2.

The trigeminal nerve is also the sensory nerve of the conjunctiva and the inside of the mouth. The conjunctival reflex (ophthalmic division) is lost if

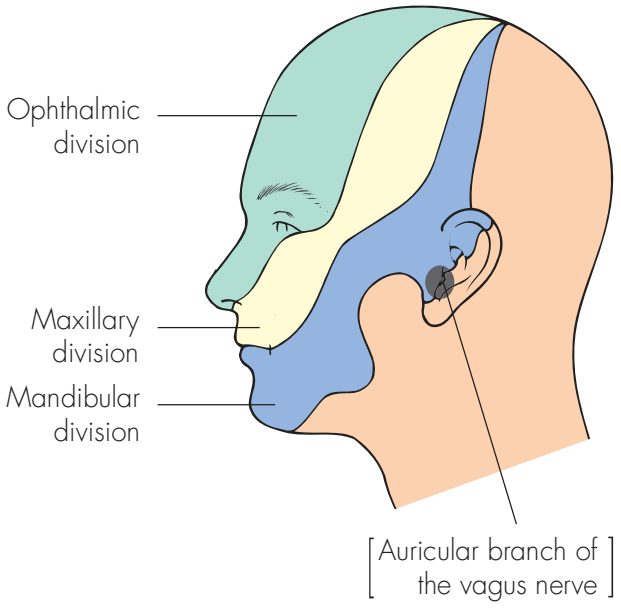


FIG 1.2 The distribution of the three sensory divisions of the trigeminal nerve.

the nerve is damaged. This is tested by touching the conjunctiva with a 'wick' of cotton or tissue paper to elicit a 'blink'. Sensation in the nose, pharynx, roof of mouth, soft palate and tonsil should also be tested. The palatal reflex (maxillary division) is elicited by placing a speculum against the palate to induce a gag reflex. The sensitivity of the tongue, lower teeth and mucous membrane over the mandible (mandibular division) is tested by touching each area with a spatula.

The taste fibres of the anterior two-thirds of the tongue travel with the lingual nerve (one of the branches of the mandibular division of the trigeminal nerve) after leaving the geniculate ganglion as the chorda tympani. Taste can be specifically tested with sweet, sour, salt and bitter substances – such as sugar, acid, salt and quinine – if this is felt to be important.

The motor fibres of the trigeminal nerve run in its mandibular division to the muscles of mastication – masseter, temporalis and the pterygoid muscles. Ask the patient to clench their teeth and feel if the masseter contracts.

VI Abducens nerve

This nerve supplies the lateral rectus muscle, which turns the eye outwards. The eye will not move when the patient attempts to look sideways and they will experience diplopia.

VII Facial nerve

This is the motor nerve to the muscles of facial expression. When a facial nerve fails to function, the affected side of the face is flabby, the eyelids cannot be closed properly, and the mouth becomes asymmetrical when the patient tries to bare their teeth. Whistling is impossible. The nucleus of the seventh nerve is in the pons varolii. Any damage to the tract or the nerve distal to the nucleus causes paralysis of the whole of one side of the face; but a lesion above the nucleus misses those fibres coming from the opposite hemisphere to the upper part of the face, so that the function of the forehead and eyelid muscles is preserved. To test the facial nerve, ask the patient to look up (the forehead should wrinkle), to close their eyes tightly (test the strength of the orbicularis oculi by trying to part the eyelids) and to show you their teeth (lips should part symmetrically).

VIII Auditory nerve

This nerve innervates the hearing mechanism in the cochlea and the position sense organs in the semicircular canals. Hearing can be tested very easily by speaking softly and asking the patient to repeat your words, or by asking them if they can hear your thumb and finger rubbing lightly together close to their ear. The deafness is called **conductive** when it is the result of an obstruction in the external meatus, tympanic membrane, middle ear cavity or ossicles of the middle ear interfering with the normal passage of airborne sounds. This is tested by striking a tuning fork and holding it next to the external auditory meatus until the patient signals that sound can no longer be heard. The base of the tuning fork is then immediately placed firmly on the mastoid process. If sound is still heard by bone conduction (a negative *Rinne's test*), the patient has a conductive deafness. If the tuning fork is placed on the centre of the forehead, an ear with a conduction deafness will appreciate a louder sound. This is *Weber's test.*

When there is **nerve perception deafness**, any sound that can be heard will be loudest in the better ear, and louder when the tuning fork is placed by the ear than when it is placed on the bone, i.e. good bone conduction = a normal cochlea and auditory nerve, whereas poor bone conduction = a defective cochlea and auditory nerve.

The sensitivity of the vestibular apparatus is tested by assessing the response to syringing the external meatus with warm and cold water. This is called the *caloric test*. These tests should only be done under careful supervision in the ENT department.

IX Glossopharyngeal nerve

This nerve is the sensory nerve of the posterior third of the tongue. It supplies the taste receptors and the sensory endings of the mucous membrane of the pharynx.

It is also motor to the middle constrictor muscle of the pharynx.

The sensory integrity of this nerve can be tested by stroking the back of the oropharynx to evoke a pharyngeal gag reflex.

X Vagus nerve

This is the motor nerve of the soft palate, pharynx and larynx, and the sensory nerve of the heart, lungs

and gastrointestinal tract. When patients are asked to open their mouths wide and say 'Aarrh', the soft palate should arch upwards symmetrically. If one side of the palate is paralysed, it will not move and the uvula will be pulled over towards the functioning side. Loss of function of the recurrent laryngeal nerves (branches of the vagus) should be suspected if there is a change in the patient's voice or an inability to cough. The vocal cords must be examined with a laryngeal mirror to confirm the diagnosis.

XI Spinal accessory nerve

This nerve supplies the trapezius and sterno-mastoid muscles. The function of these muscles is tested by asking the patient to shrug their shoulders and to press the point of their chin downwards against your hand.

XII Hypoglossal nerve

This is the motor nerve of the tongue. When one hypoglossal nerve is paralysed, the tongue will deviate to that side when the patient tries to push it forwards. The weak side will also be wasted (see Fig. 10.14, page 261).

Revision panel 1.5
Common causes of pleuritic pain

Pleurisy
Pneumonia
Pulmonary infarction (thromboembolic)
Neoplasia (primary and secondary)
Fractured ribs
Muscle strains/prolapsed intervertebral disc
Herpes zoster
Bornholm disease (Coxsackie virus)
Don't forget pathology below the diaphragm, *e.g. ruptured spleen, Curtis–Fitz–Hugh syndrome (see Chapter 15)*

Revision panel 1.6
Common causes of haemoptysis

Pneumonia
Carcinoma of the bronchus
Chronic bronchitis
Pulmonary tuberculosis
Pulmonary infarction (thromboembolic)
Bronchiectasis

Examine the chest wall and lungs

Inspection

The colour and respiratory rate of the patient indicate the adequacy of ventilation. Cyanosis caused by cardiopulmonary disease is most easily appreciated by inspecting the inner aspect of the lips. Cyanosis of the nail beds and the tip of the nose and ears may be caused by a peripheral or central abnormality. Patients may be polycythaemic rather than cyanotic if the peripheral tissues are a deep reddish-purple colour and their face is red and plethoric. Cyanosis is difficult to detect in anaemic patients.

Count the rate of respiration and notice the rhythm. A fluctuating respiratory rate and volume, with periods of apnoea interspersed between episodes of tachypnoea, is called *Cheyne–Stokes* or periodic respiration. It is caused by variations in the sensitivity of the respiratory centre to normal stimuli, and occurs commonly in patients with heart failure and following severe cerebrovascular accidents.

Notice if respiration seems to require voluntary effort and compare the durations of inspiration and expiration. Watch the chest during inspiration to see if there is any inward movement of the intercostal spaces (**paradoxical movement**). This is usually caused by obstruction to the inflow of air into the lungs, but in an injured patient may indicate instability of a segment of the chest wall (e.g. two sets of fractures).

Record any abnormality in the shape of the chest. The two common deformities are funnel chest (pectus excavatum) and pigeon chest (pectus carinatum) (see Fig. 8.29, page 235).

Palpation

Trachea Check the position of the trachea at the suprasternal notch.

Chest expansion Spread your hands around the chest so that your thumbs just meet in the mid-line. Ask the patient to take a deep breath. Your thumbs should be dragged apart to a distance roughly equivalent to half the chest expansion. When the expansion is asymmetrical it will be felt and seen.

Chest expansion is the difference between the circumference of the chest at full inspiration and full expiration, measured at the level of the nipples.

Apex beat The apex beat is the lowest and most lateral point at which you can feel the cardiac impulse. It will move laterally if the heart enlarges but may also move medially or laterally if the mediastinum shifts. The mediastinum (and the trachea) will move to one side if it is pulled over by a collapsed, contracting lung or pushed over by air or fluid in the opposite pleural cavity.

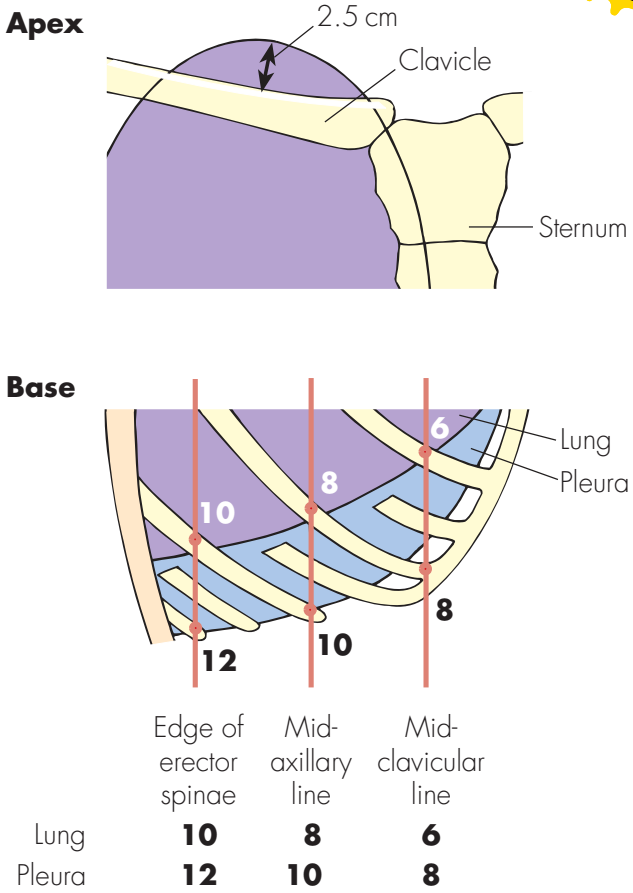
Tactile vocal fremitus (Fig. 1.4, page 18) Place your whole hand firmly on the chest and ask the patient to say '99'. The vibrations that you can feel with your hand are called the vocal fremitus. Compare the strength of these vibrations on either side of the chest, front and back, and over the apical, middle and basal zones of the lung. To feel vocal fremitus the sound waves must be conducted through the air in the bronchi, bronchioles and alveoli to the chest wall. A blocked bronchus or a layer of fluid or air between the visceral and parietal layers of the pleura (a pleural effusion) will suppress the conduction of the sound waves and reduces the intensity of the palpable fremitus. A stiffening of the lung tissue with patent air passages, which occurs in very early pneumonia, increases conduction through the lung, and tactile vocal fremitus is increased.

Palpate both axillae.

Percussion

The whole of the surface of both lungs must be percussed. The surface markings of the lungs are shown in Figure 1.3. Place one hand flat on the chest wall, keeping the finger you intend to strike straight and firmly applied to the underlying skin. Tap the centre of the middle phalanx of this finger with the tip of the middle finger of the other hand. Listen carefully to the sound and compare it with the sound produced by percussing the same area on the other side of the chest.

The two areas most often forgotten when percussing the chest are the lateral zones high in the axillae and the anterior aspect of the apices behind the clavicles. Percuss the latter area by striking the clavicle directly with the percussing finger.



	Edge of erector spinae	Mid-axillary line	Mid-clavicular line
Lung	**10**	**8**	**6**
Pleura	**12**	**10**	**8**

FIG 1.3 The surface markings of the lung and pleura.

The normal chest gives a resonant sound when percussed; a sound which is, to some extent, felt by the percussing finger as well as being heard. Anything solid in the pleural space or in the substance of the lungs decreases the resonance and makes the sound dull. Any extra air, whether in the pleural space (a pneumothorax) or in the lung substance (an emphysematous bulla or multiple bullae), makes the sound more resonant (hyper-resonance) (page 19).

In the presence of a large pneumothorax, a ringing resonance can be heard with a stethoscope when the percussion is performed by tapping a coin held against the chest wall with a second coin.

Auscultation

The normal sounds of breathing can be heard all over the chest except over the heart and spine (page 20). They consist of an inspiratory sound followed immediately by a shorter, softer, expiratory sound. There is **no gap** between the two phases. This pattern

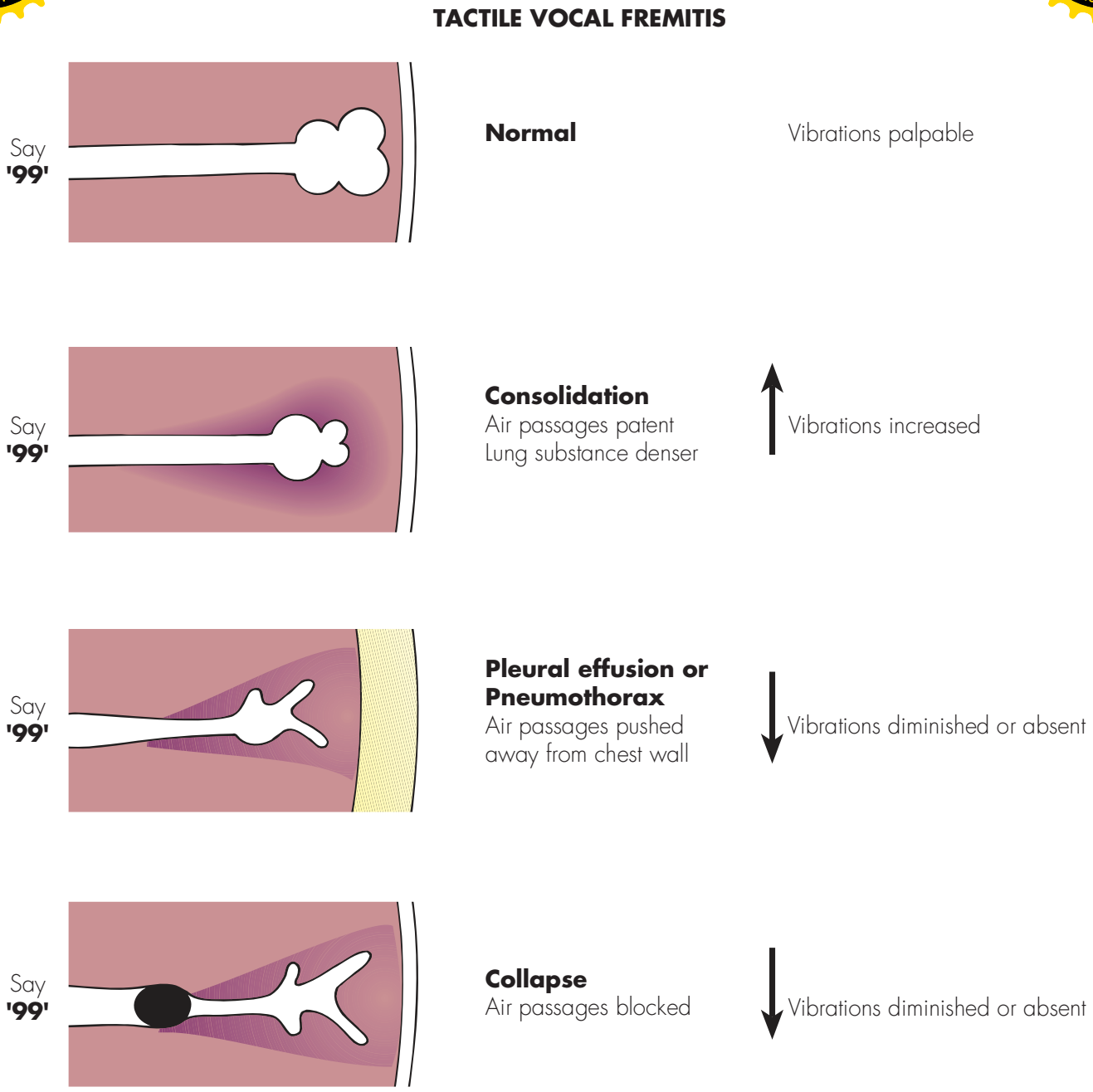


FIG 1.4 Tactile vocal fremitus can only be felt if there are patent air passages right out to the chest wall.

is known as **vesicular breathing** and is caused by the movement of air in and out of the smaller bronchioles and alveoli – a rustling noise similar to that of gas being blown down plastic tubing.

The sound of air moving in the larger bronchioles and main bronchi is heard when the periphery of the lung has been solidified by pneumonia or collapse (atelectasis). This sound is harsher and louder than the low rustle of vesicular breathing. The inspiratory and expiratory phases are of equal length and separated by a short, silent gap. This is called **bronchial breathing**. The quality of the sound and the presence of the gap are the two distinguishing features.

The pitch of bronchial breathing may be high or low. The high-pitched variety is sometimes called **tubular** bronchial breathing. The low-pitched variety, which sounds like the noise produced by blowing across the mouth of a jar, is called **amphoric** bronchial breathing. Amphoric sounds are heard when air is passing in and out of a cavity in the lung such as a tuberculous cavity.

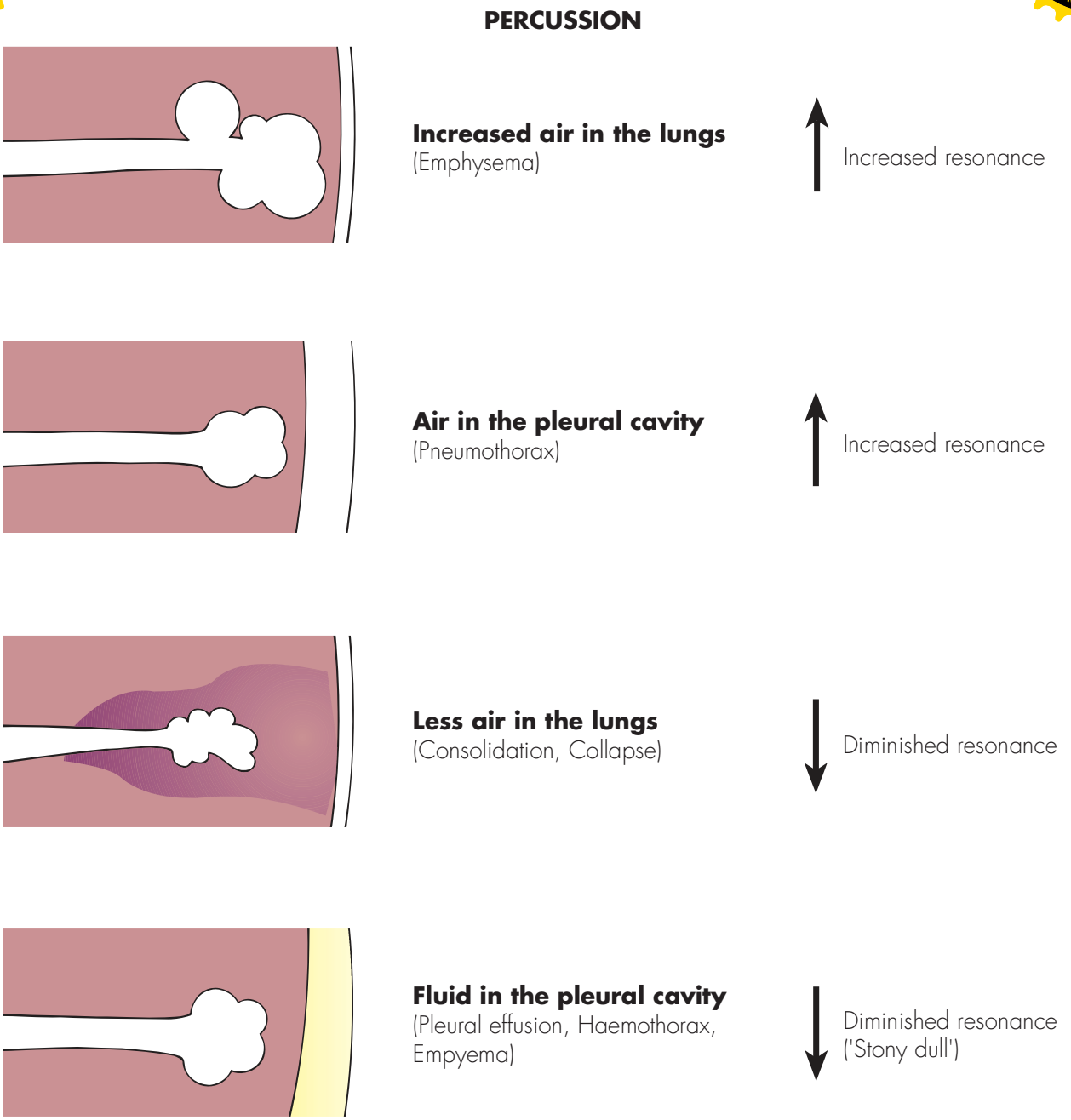


FIG 1.5 The causes of changes in lung resonance.

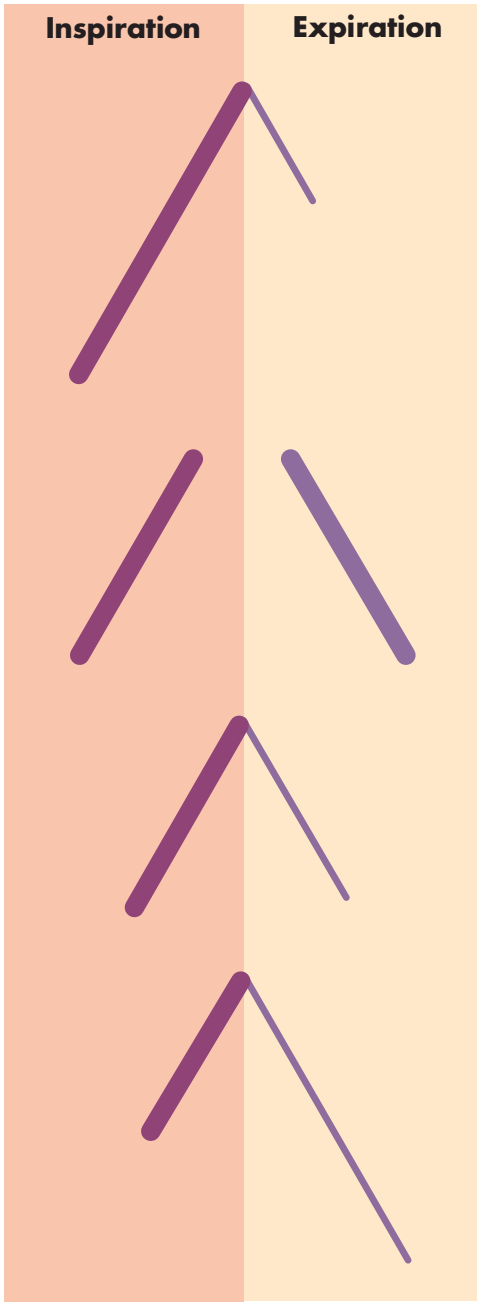
There is a type of breath sound mid-way between vesicular and bronchial breathing, known as **bronchovesicular** breathing. In this variety the inspiratory and expiratory sounds are of equal length and slightly harsher than those of vesicular breathing, but there is **no gap between the two phases**. Bronchovesicular breathing is often heard in normal people over the anterior aspect of the upper lobes, where there are large bronchi near the surface of the lung, and must not be mistaken for bronchial breathing.

Absent sounds

Breath sounds are abolished or diminished by any process which reduces the normal conduction of sound through the lung substance and chest wall. The two common causes are bronchial obstruction (producing collapse of the distal part of the lung) and pleural effusion or pneumothorax.

When the lung alveoli are full of fluid, exudate or pus (consolidation) but the air passages remain patent, the thickened lung transmits the sound

BREATH SOUNDS



Vesicular	Expiration much shorter and softer than inspiration No gap between each phase
Bronchial	Inspiration and expiration of equal length and quality (harsh and loud) Gap between the two phases
Bronchovesicular	Inspiration and expiration of equal length but expiration is softer and smoother No gap between each phase
Asthmatic	Prolonged expiration, usually associated with inspiratory and expiratory rhonchi

FIG 1.6 The four types of breath sound.

from the larger bronchi. Thus bronchial breathing is heard over an area of consolidated lung. There are, however, no breath sounds over an area of collapsed lung.

Added sounds

There are three varieties of added sounds: rhonchi, râles and crepitations. These are often referred to as wheezes, coarse crackles and fine crackles by the younger generation of pulmonary physicians.

Rhonchi/wheezes These are the whistling noises made by air passing through narrowed air passages. They are commonly heard in patients with asthma or chronic bronchitis. Their pitch depends upon the velocity of airflow and the diameter of the bronchioles from which they originate. They are unmistakable.

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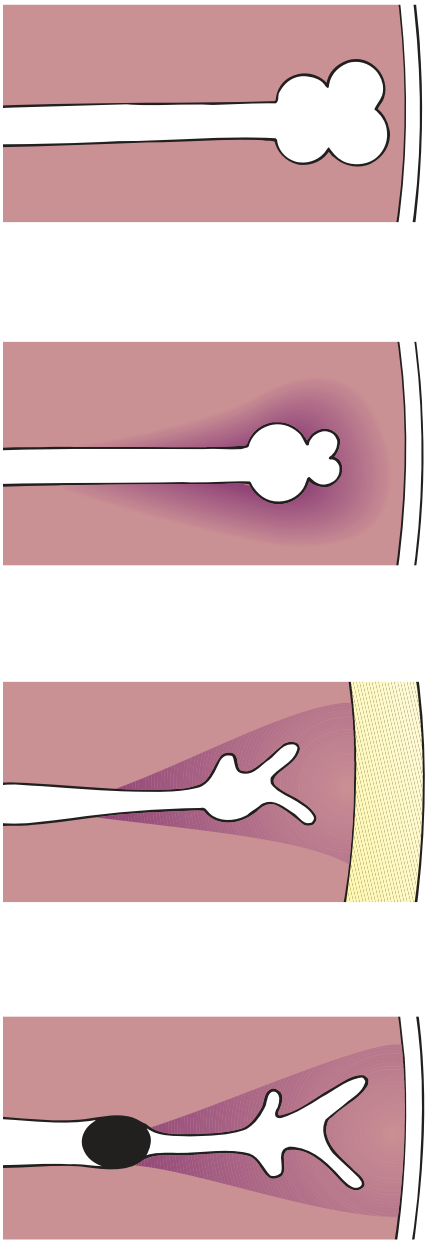
EFFECT OF LUNG DISEASE ON THE BREATH SOUNDS



Normal	Vesicular sounds audible
Consolidation	Bronchial sounds audible, caused by increased sound conduction from large bronchi
Pleural effusion or Pneumothorax	No sounds audible as layer of fluid or air prevents conduction of sound to the surface
Collapse	No sounds audible as obstruction of bronchus stops sound conduction

FIG 1.7 The causes of abnormal breath sounds.

Râles/coarse crackles These are the coarse bubbling noises caused by air passing through bronchioles containing water, mucus or pus. The sound is identical to that made by air bubbling through water. Moving the fluid may abolish the noise, so ask the patient to take a deep breath and cough, and then listen again. If the bubbling sounds disappear, they must have been râles because crepitations cannot be abolished in this way.

Crepitations/fine crackles These are fine crackling sounds similar to the noise heard when you hold a few hairs close to your ear and roll them between your thumb and index finger. They are thought to be produced as the alveoli and their ducts pop open to allow air to enter when there is interstitial oedema. Crepitations are heard over areas of consolidation, such as pneumonia, and often provide important evidence of left ventricular failure. They are not abolished by coughing.

Some authorities do not distinguish râles from crepitations and use the all-embracing term **moist sounds** for either variety.

Pleural rub The visceral and parietal layers of the pleura normally slide easily over one another but, if the pleura is inflamed, the roughened pleural surfaces rubbing together produce a noise which is similar to the sound heard when a finger is pressed hard onto a pane of glass and then slid across it. It is a mixture of grating and squeaking sounds. A pleural rub can only be heard when the chest is moving, i.e. during inspiration or expiration. The patient usually complains of pleuritic pain over an area where there is an audible rub.

Examine the heart and circulation

Much will have been learnt about the circulation from your initial observations of the patient's colour and breathing. It is common practice to feel the pulse when you take the patient's hand at the beginning of the examination. Any abnormalities detected at this stage require reassessment by further careful palpation.

The pulse

The following features should be observed and recorded.

The rate Express the rate in beats/minute. Do not count the pulse for 5 seconds and multiply by 12; always count for 15 seconds or longer if the beat feels irregular.

The rhythm The pulse beat may be regular or irregular. When the pulse is irregular it may have a regular recurring pattern or be totally irregular. The latter is sometimes called an **irregularly irregular** pulse and indicates **atrial fibrillation**. Some common varieties of irregular pulse are shown in Figure 1.8.

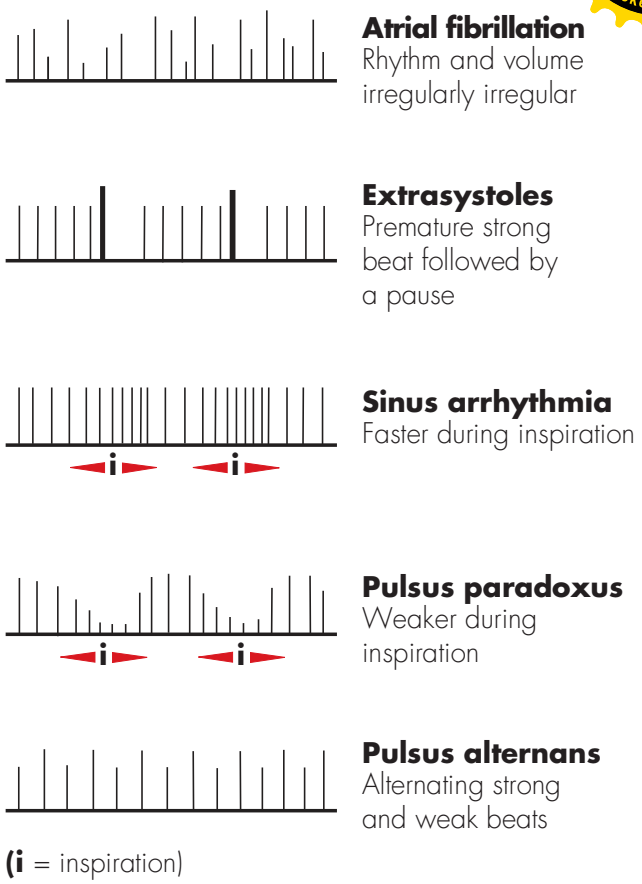


FIG 1.8 Common variations of the rhythm and volume of the pulse.

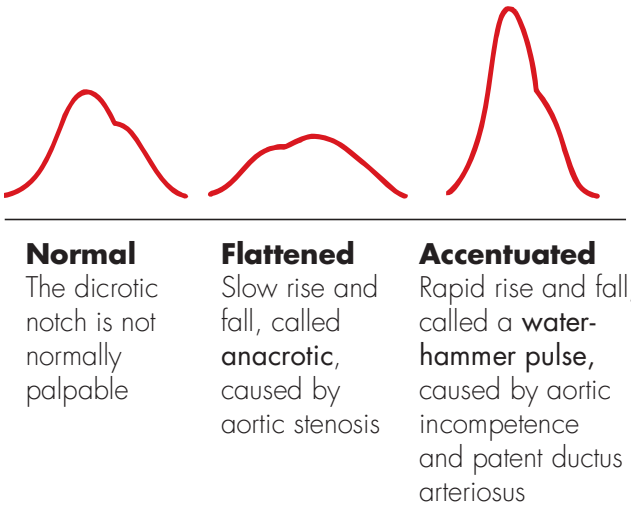


FIG 1.9 Variations of the pulse wave.

The volume The examining fingers can appreciate the expansion of the artery with each beat and consequently get an impression of the amount of blood passing through the artery. Patients with a high cardiac output have a strong pulse. Patients in haemorrhagic (hypovolaemic) shock have a weak, thin, 'thready' pulse.

The nature of the pressure wave Every pressure wave has definable characteristics such as the rate of increase and decrease of pressure and the height of the pressure (see Fig. 1.9).

A steep rise followed by a rapid fall, with a large pulse pressure (high peak), is called a **collapsing** or **water-hammer pulse** and is typical of **aortic regurgitation**. Conversely, a tight **aortic stenosis** causes a slow rise and fall.

The shape of the pulse wave can be appreciated more easily over the carotid than the radial artery.

The nature of the artery It is relatively easy to estimate the diameter of the radial artery and guess the thickness of its wall, but the presence or absence of thickening of the radial artery gives no indication of the thickness of other vessels in the body.

Measure the blood pressure

The blood pressure is usually measured in the brachial artery with a sphygmomanometer. The cuff, which must fit snugly and be at least 10 cm wide (a narrow cuff gives false readings), should be firmly wrapped around the middle of the upper arm and inflated above the systolic pressure (250 mmHg). It should then be slowly deflated until the commencement of blood flow below the cuff is detected by listening over the brachial artery at the elbow with a stethoscope or palpating the pulse at the wrist. The pressure at this point is the systolic blood pressure.

(The sounds which indicate the commencement of flow in the brachial artery below the cuff are caused by turbulent blood flow. They were first described by Korotkoff and are known as *Korotkoff sounds*.)

The cuff pressure is further reduced until the Korotkoff sounds suddenly diminish or, more often, disappear. This is the diastolic pressure.

It is worth repeating both measurements on several occasions with the patient sitting and lying down and again at the end of the examination when the patient is less worried.

Whenever there is the possibility of disease of the aorta and its branches, the blood pressure should be measured in both arms.

Remember that the readings from a very fat arm will be falsely high by as much as 10 mmHg.

Inspect the head and neck again

You will already have looked at the patient's skin, face and general demeanour. Look again for the signs particularly indicative of cardiovascular disease – **cyanosis**, **plethora** and **dyspnoea**.

Xanthomata These are grey-yellow plaques of lipid in the skin. They often occur in the skin of the upper eyelid (see Fig 3.47, page 103). Their presence may indicate an abnormal lipid metabolism such as hyperlipidaemia, but they may occur in patients with normal blood lipids.

Arcus senilis This is a white ring at the junction of the iris and sclera (see Fig. 8.14, page 227). It is said to be more common in people with advanced arteriosclerosis, but in practice is not a reliable indicator of the presence of vascular disease (see Chapter 8, page 226). It may indicate the presence of a hyperlipoproteinaemia if present in a patient under the age of 40 years.

The jugular venous pressure The pressure in the great veins is slightly greater than the pressure in the right atrium. The pressure in the right atrium is one of the most important influences of cardiac activity. An increase in the right atrial pressure increases cardiac output by stimulating an increase of cardiac contractility and rate. The right atrial pressure therefore 'drives' the heart. The pressure in the right atrium can be estimated clinically from the pressure in the internal jugular veins. In a normal person, reclining at 45°, the great veins in the neck are collapsed. There should be no visible venous pulsations above the level of the manubrio-sternal joint, which, when the patient is reclining at 45°, is at the same level as the mid-point of the clavicles (see Fig. 1.10).

The right atrial pressure is raised if there are visible pulsations in the internal jugular veins when the patient is reclining at 45°. The vertical distance between the upper limit of the venous distension and the level of the clavicle should be estimated by eye and expressed and recorded in centimetres.

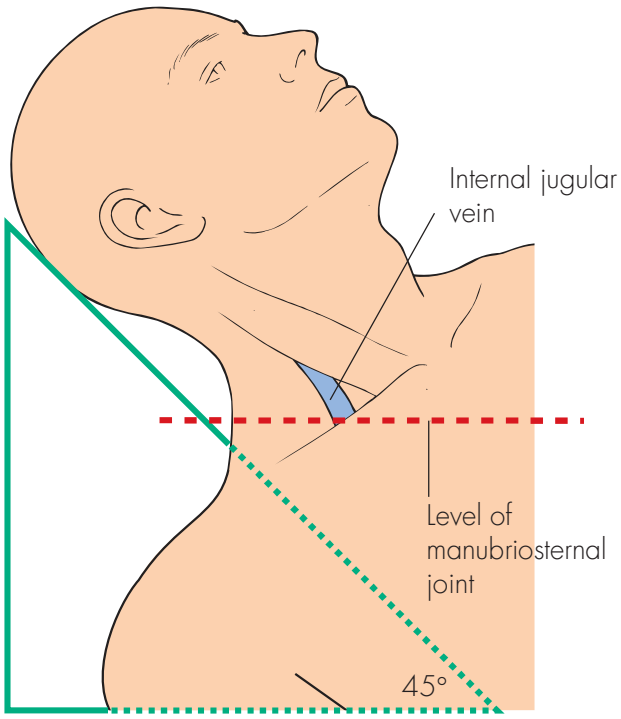


FIG 1.10 Measurement of the jugular venous pressure.

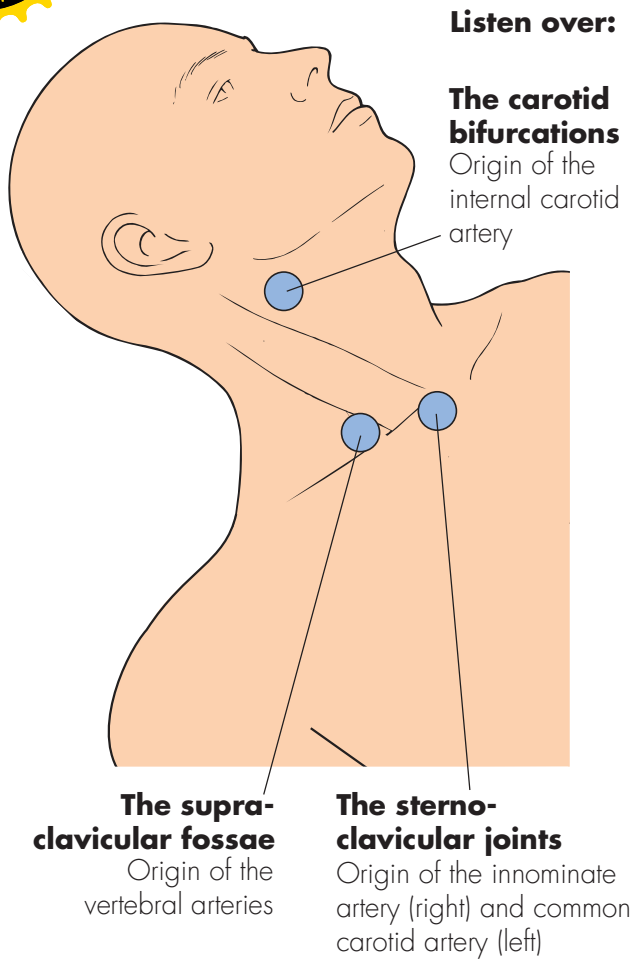


FIG 1.11 The sites of auscultation for vascular bruits on the neck.

Obstruction of the great veins in the superior mediastinum will also cause distension of the neck veins, but there will not be a visible venous pulse wave.

Neck arteries Feel the pulses in the neck and listen along their whole length, especially over the sterno-clavicular joints, in the supraclavicular fossae, and at the level of the hyoid bone just below the angle of the jaw. These sites correspond to the origins of the subclavian, vertebral and internal carotid arteries, respectively (see Fig. 1.11).

Examine the heart

Inspection The heart may be seen to be beating rapidly or to be heaving up the chest wall with each beat.

Palpation Place your whole hand firmly on the chest wall, just below the left nipple, and ascertain the strength of the cardiac impulse. It may be weak, normal or heaving in nature. The apex beat is the lowest and most lateral point at which the cardiac impulse can be felt. It should be in the fifth intercostal space, near the mid-clavicular line (an imaginary vertical line which passes through the middle of the clavicle). The apex beat moves laterally and may be felt as far out as the mid-axillary line if the heart is enlarged. It may also be possible to feel vibrations, called **thrills**, which correspond to audible heart murmurs. Thrills may be felt during systole, diastole or throughout the whole cardiac cycle.

Remember to palpate the back of the chest. Thrills from abnormalities of the aorta, such as a patent ductus arteriosus or a coarctation of the aorta, are conducted posteriorly as well as anteriorly.

It is advisable to feel the femoral pulses at this stage.

Percussion The area of cardiac dullness should be delineated by percussion.

Auscultation The whole of the anterior aspect of the heart must be examined with the stethoscope, but the areas where the sounds from the four valves are best heard are shown in Figure 1.12.

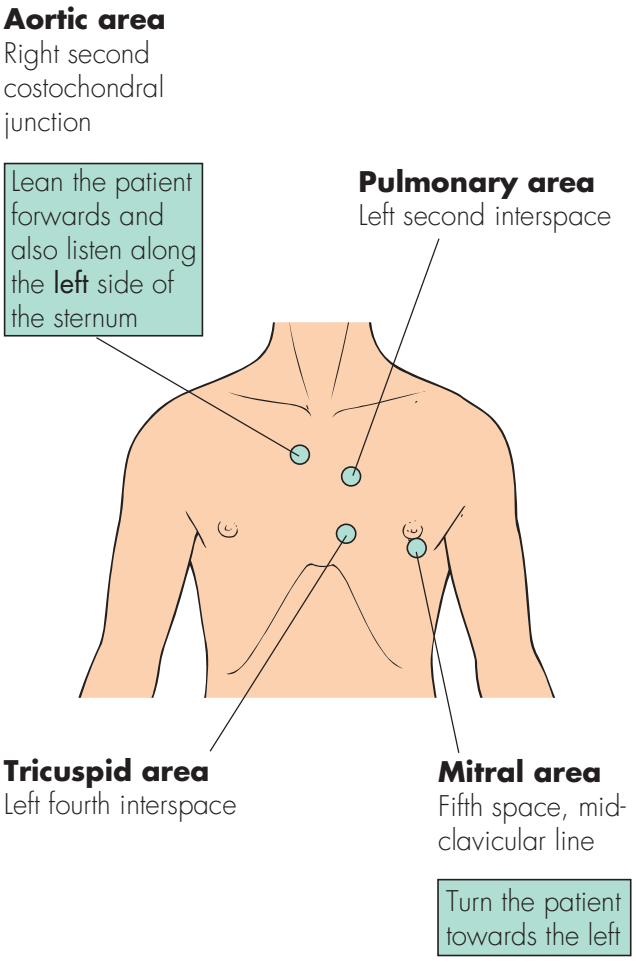


FIG 1.12 Areas of cardiac auscultation.

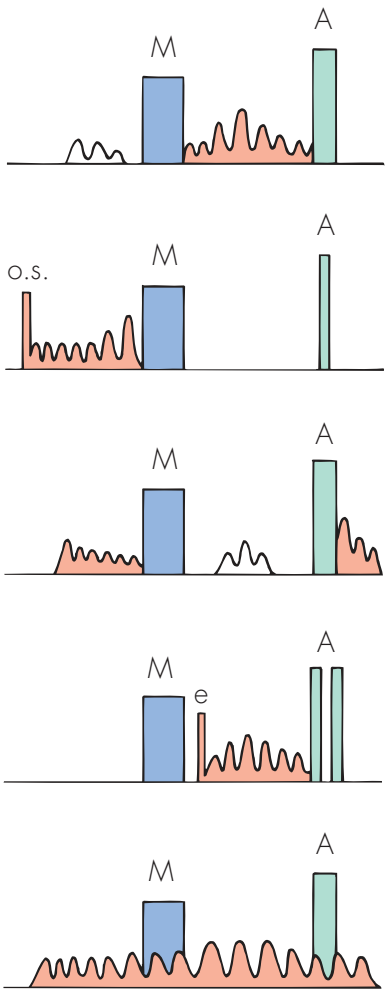
Begin by listening at the apex of the heart – the mitral area. Identify the first and second heart sounds. The heart sounds are traditionally described as sounding like the words lub-dub; that is to say, the first sound is slightly longer and softer than the second sound. As this is not always the case, it is wise to confirm that the sound you believe to be the first sound corresponds to the beginning of the cardiac impulse or coincides with the subclavian or carotid pulse. Having decided which sound is which, listen carefully to the second sound. It may be sharper and shorter than usual – almost a click – or it may be split. A double, or split, second sound occurs when the aortic and pulmonary valves close asynchronously. A double sound can be heard when the sounds are 0.2 or more seconds apart and indicates pulmonary hypertension.

Next, listen carefully to the intervals between the two main sounds, and between diastole and systole, for any additional heart sounds or murmurs.

Murmurs are caused by turbulent flow and the vibration of parts of the heart. They may vary in nature from a low-pitched rumble to a high-toned swish. Try to decide whether the murmur occupies the whole or part of diastole or systole and whether its intensity changes.

Think of the way you are going to record your findings (see Fig. 1.13), two blocks for the main heart sounds (M1 and A2) and a zig-zag line for the murmur. Imagine your drawing as you listen to the sound and you will find it easier to define the timing of the murmur. A detailed description of the many heart sounds and their interpretation is beyond the scope of this book. The student must read a textbook of cardiology, but Figure 1.13 illustrates the common types of murmur and their likely causes.

The exercise just described must be repeated over the other three areas where the aortic, pulmonary and tricuspid valve sounds are best heard.



Mitral incompetence	Pansystolic murmur Soft first sound May be a short mid-diastolic murmur preceded by a third sound
Mitral stenosis	Diastolic murmur with a presystolic crescendo preceded by an opening snap (o.s.) Loud first sound
Aortic incompetence	Early diastolic murmur May be a soft mid-diastolic murmur
Aortic stenosis	Systolic murmur preceded by an ejection click (e) Split second sound
Patent ductus arteriosus	'Machinery' murmur Continuous throughout systole and diastole

FIG 1.13 The sounds of some common cardiac abnormalities (M = 1st heart sound, A = 2nd heart sound).

Some murmurs will be audible in more than one area. The site of maximum intensity of a murmur usually indicates its site of origin. Find this by 'inching' the stethoscope over the chest wall between the areas. The same technique should be used to assess whether murmurs in the aortic area are conducted into or coming from the neck.

The sounds at the apex, from the mitral valve, can be made louder by asking the patient to turn over onto their left side; the aortic valve sounds can be amplified by asking the patient to lean forwards.

Always listen to the heart sounds at the back of the chest. The murmur of a patent ductus or coarctation can often be heard over the aorta, posteriorly, just to the left of the mid-line.

Test for oedema

Oedema commonly appears first in the feet and ankles, but may be more apparent in the sacral and buttock regions if the patient has been bedridden for some time. Cardiac oedema is very soft, 'pits' easily and often gives the skin a pale, waxy, transparent appearance.

Revision panel 1.7
Common causes of ankle swelling

Dependency/immobility
Pregnancy
Heart failure
Low plasma proteins
Chronic venous insufficiency
Deep vein thrombosis
Lymphatic insufficiency
Chronic renal failure (nephrotic syndrome)

Revision panel 1.8
Classification of muscle strength

5	Normal
4	Weak but can overcome gentle resistance
3	Cannot overcome gentle resistance but can overcome gravity
2	Cannot overcome gravity but muscle contracts
1	Barely perceptible muscle contractions
0	No contractions

Examine the abdomen

Examination of the abdomen is described in detail in Chapter 16. It has been put there in the hope that you will read it whenever you refer to other parts of the chapter. A large amount of the surgical disease presenting to a surgical clinic is intra-abdominal and so a good technique for abdominal examination is essential.

Examination of the abdomen follows the standard pattern.

- **Inspection** for asymmetry, distension, masses, visible peristalsis and skin discolouration.
- **Palpation** for superficial and deep tenderness, the normal viscera (liver, spleen and kidneys) and any abnormal masses.
- **Percussion** of the liver and splenic areas and any other masses.
- **Auscultation** for bowel sounds and vascular bruits.
- **Rectal examination and vaginal examination.**

There are four things that are easy to forget, so do them before you start general palpation.

1. Palpate the supraclavicular lymph glands.
2. Palpate the hernial orifices.
3. Feel the femoral pulses.
4. Examine the genitalia.

Two further things which often get forgotten are auscultation and the rectal examination, but you must leave these to the end.

Examine the limbs

There are four main tissues to be examined in a limb: the bones and joints, the muscles and soft tissues, the arteries and veins, and the nerves. The first three are often involved in surgical disease and their examination is described in Chapters 4 and 7. Only the examination of the peripheral nerves is described here.

Examine the peripheral nerves

The nerves in the limbs serve three functions: motor, sensory and reflex. Examine each of these functions in turn.

Motor nerve function

Voluntary movement Ask the patient to move each joint in all directions, as far as possible. This will demonstrate any loss of voluntary muscle function and the presence of any musculoskeletal abnormalities, such as arthritis or muscle contractures, which limit movement.

Strength of the muscles Check in a systematic way the strength of the muscles which move each joint. Strength is assessed by asking the patient to move the joint against a resistance, or by asking them to keep the joint fixed while you try to move it. The latter is the simplest method because the patient only needs to be instructed to keep the limb still.

It is customary to grade muscle strength as follows:

5: normal
4: moderate, but not full strength
3: can work against gravity but not against a greater resistance
2: cannot work against gravity but the muscles contract
1: barely perceptible contractions
0: complete paralysis.

It is, however, better to describe the strength of the muscles than use a numerical code.

The segments of the spinal cord and the nerves which control each joint are listed in Revision panel 1.9.

Sensory nerve function

The peripheral nerves transmit the sensations of light touch, deep touch and pressure, pain, temperature, vibration sense, position sense, and muscular coordination.

The appreciation of light touch This is tested with a wisp of cotton wool.

Revision panel 1.9
The nerves and spinal segments which innervate the major muscle groups

Muscle groups		Spinal segments	Nerves
Shoulder	Flexion	C5, 6	Nerve to pectoralis major, circumflex nerve
	Extension	C5, 6	
	Abduction	C5, 6	Subscapular nerve Circumflex nerve
Elbow	Flexion	C5, 6	Musculocutaneous nerve
	Extension	C6, 7, 8	Radial nerve
Wrist	Flexion	C6, 7, 8	Median nerve and ulnar nerve
	Extension	C6, 7, 8	Radial nerve
Intrinsic hand muscles		C8, T1	Median nerve and ulnar nerve
Hip	Flexion	L2, 3, 4	Lumbar and femoral nerves
	Extension	L5, S1, 2	Inferior gluteal nerve
	Abduction	L4, 5, S1	Superior gluteal nerve
	Adduction	L2, 3, 4	Obturator nerve
	Rotation	L5, S1, 2	
Knee	Flexion	L4, 5, S1, 2	Sciatic nerve
	Extension	L2, 3, 4	Femoral nerve
Ankle	Flexion	L5, S1, 2	Medial popliteal + posterior tibial nerves
	Extension	L4, 5, S1	Anterior tibial nerve
Foot	Inversion	L4, 5	Anterior + posterior tibial nerves
	Eversion	L5, S1	Musculocutaneous nerve

Make sure that the patient cannot see you when you touch them, and touch the limb in a random manner. Move from the normal to the abnormal when mapping out an area of hypo-aesthesia. The important dermatomes are shown in Figure 1.14.

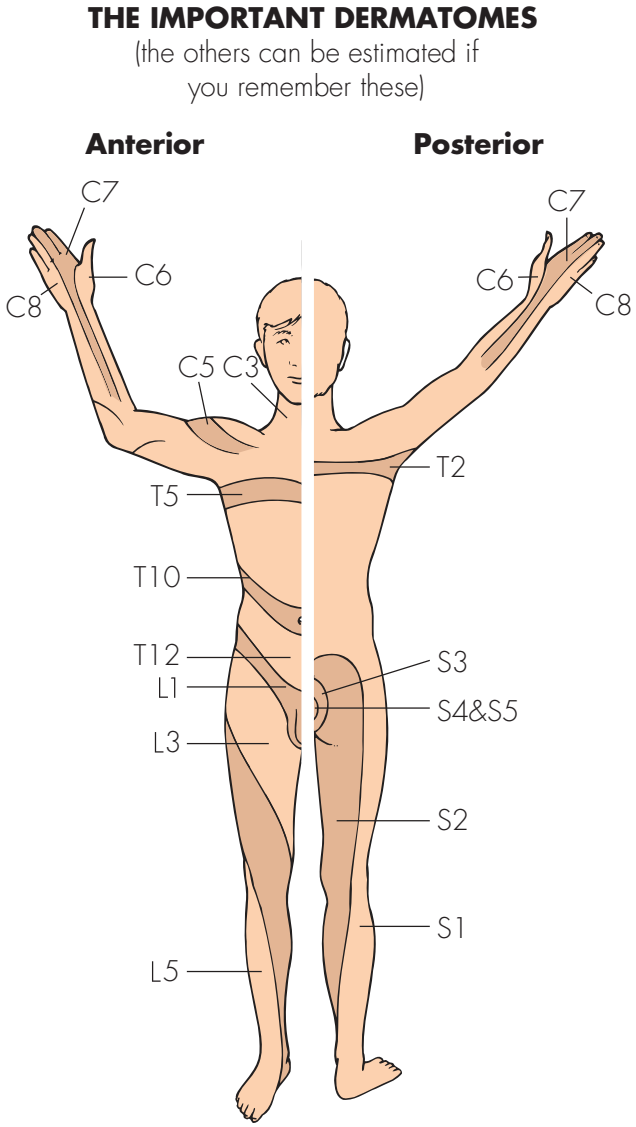


FIG 1.14 The important dermatomes.

Revision panel 1.10
The segments involved in the common stretch reflexes

Biceps jerk	C5, 6
Triceps jerk	C6, 7
Finger jerk	C8
Knee jerk	L2, 3, 4
Ankle jerk	S1, 2

Deep touch and pressure sensation This is tested by pressing firmly on the skin with a blunt object. It is unlikely to be abnormal if the response to light touch is normal.

Pain The best test of pain sensibility is the response to a pinprick. A new sterile needle must be used for each patient to avoid transmitting infection such as hepatitis. The patient must be asked whether the needle feels 'sharp' or 'blunt'.

Temperature Ask the patient to differentiate between a hot and a cold object. The simplest method is to use two test tubes, one filled with hot and the other with cold water.

Vibration sense Strike a tuning fork firmly. Place its base on a bony protuberance, such as the malleolus at the ankle, and ask the patient to describe the sensation they can feel. A description of a 'buzzing' or 'vibrating' sensation indicates normal vibration sense. Do not put these words into the patient's mind by using them in a leading question.

Position sense The proprioceptive nerve endings in a joint tell the brain about the joint's spatial orientation. Test this ability by moving the great toe or thumb into different positions of flexion or extension and ask the patient to identify them. It is easier to ask patients to state the direction in which the digit is pointing (e.g. up or down) than to use unfamiliar anatomical terms. The patient must keep their eyes shut.

Muscle coordination Test the coordination of the upper limbs by asking the patient to touch your upheld finger with their index finger and then to touch the tip of their nose. You will also be testing joint position sense if you ask them to do this a second time with their eyes shut. Coordination in the lower limbs is tested by asking the patient to slide the heel of one foot up and down the shin of the other leg. This should also be done with the eyes open and then shut.

Reflex function

The limb reflexes are all stretch reflexes and test the integrity of the spinal segments, and the motor and sensory nerves which innervate the muscles being stretched.

To stimulate a good stretch reflex you must stretch the muscle's tendon suddenly by striking it with a rubber hammer. A weak reflex can be reinforced by asking patients to clench their teeth or to interlock their fingers and try to pull them apart.

Clonus The increase in muscle tone that occurs with an upper motor neurone lesion increases the susceptibility of the tendons to the stretch reflex. Sudden and persistent stretching can cause repeated contractions known as **clonus**.

The plantar reflex Scraping the lateral aspect of the sole of the foot causes a withdrawal reflex and flexion of the great toe. If the toe extends, there is an upper motor neurone lesion. This reflex involves the L5, S1 and S2 spinal segments.

Abdominal reflexes Stroking the upper and lower abdomen causes the rectus abdominis muscle to contract. This tests the T8, 9 and 10, and T11 and 12 segments, respectively.

Cremasteric reflex Stroking the inner side of the thigh makes the cremaster contract, testing the L1 segment.

Test the urine, faeces and sputum

It is important to note the colour and smell of the urine before using the modern simple dipstick methods for testing it for sugar, blood, acetone and protein. Do not forget to measure the specific gravity of the urine and to inspect any precipitate under the microscope.

Look at the faeces if the patient complains that they are abnormal.

Look at the sputum.

HISTORY AND EXAMINATION OF A LUMP

History

Most patients with a lump feel it frequently and should be able to tell you about the history of its clinical features. Therefore you should seek answers to the following questions.

1. **When was the lump first noticed?**
   It is important to be precise with dates and terminology. Do not write 'the lump first appeared 6 months ago', when you mean 'the lump was first noticed 6 months ago'. Many lumps may exist for months, even years, before the patient notices them.
2. **What made the patient notice the lump?**
   There are three common answers to this question:
   'I felt or saw it when washing'.
   'I had a pain and found the lump when I felt the painful area'.
   'Someone else noticed it and told me about it'.
   The presence or absence of pain is important, particularly if it is the presenting feature. In very general terms, pain is usually associated with inflammation, not neoplastic change. Most

Revision panel 1.11
The examination of a lump or ulcer

Local examination

- Site
- Size
- Shape
- Surface
- Depth
- Colour
- Temperature
- Tenderness
- Edge
- Composition:
  - consistence
  - fluctuation
  - fluid thrill
  - translucence

  (Solid, fluid or gas)
  - resonance
  - pulsatility
  - compressibility
  - bruit

  (Vascular)
- Reducibility
- Relations to surrounding structures – mobility/fixity
- Regional lymph glands
- State of local tissues:
  - arteries
  - nerves
  - bones and joints

General examination

patients expect cancer to be painful – and do themselves irreparable harm by ignoring a lump just because it does not hurt them.

3. **What are the symptoms of the lump?**
   The lump may be painful and if it is, you must take a careful history of the pain, as described earlier in this chapter. The characteristic feature of pain associated with acute infection is its throbbing nature.
   A lump may be disfiguring or interfere with movement, respiration or swallowing. Describe the history of each symptom carefully.
4. **Has the lump changed since it was first noticed?**
   This is where you use the patient's own knowledge of their physical signs. The feature that they notice is the size of the lump. They should be able to tell you if it has got bigger, smaller, or has fluctuated in size and when they noticed a change in size. They may also have appreciated other changes in the nature of the lump that they can tell you about. They may also have noticed tenderness, which may have altered in any of the ways that a pain may change.
5. **Does the lump ever disappear?**
   A lump may disappear on lying down, or during exercise, and yet be irreducible at the time of your examination. The patient should always be asked if the lump ever goes away, because this physical characteristic is peculiar to only a few types of lump.
6. **Has the patient ever had any other lumps?**
   You must ask this question because it might not have occurred to the patient that there could be any connection between their present lump and a previous lump, or even a coexisting one.
7. **What does the patient think caused the lump?**
   Lumps occasionally follow injuries or systemic illnesses known only to the patient.

Revision panel 1.12
The history of a lump or an ulcer

Duration
When was it first noticed?

First symptom
What brought it to the patient's notice?

Other symptoms
What symptoms does it cause?

Progression
How has it changed since it was first noticed?

Persistence
Has it ever disappeared or healed?

Multiplicity
Has (or had) the patient any other lumps or ulcers?

Cause
What does the patient think caused it?

Examination

Site/position The location of a lump must be described in exact anatomical terms, using distances measured from bony points. Do not guess distances; use a tape measure.

Colour and texture of overlying skin The skin over a lump may be discoloured and become smooth and shiny or thick and rough.

Shape Remember that lumps have three dimensions. You cannot have a circular lump because a circle is a plane figure. Many lumps are not regular spheres, or hemispheres, but have an asymmetrical outline. In these circumstances, it is permissible to use descriptive terms such as pear shaped or kidney shaped.

Size Once the shape is established, it is possible to measure its various dimensions. Again, remember that all solid objects have at least three dimensions: width, length and height or depth. Asymmetrical lumps will need more measurements to describe them accurately; sometimes a diagram will clarify your written description.

Surface The first feature of the lump that you will notice when you feel it will be its surface. It may be smooth or irregular. An irregular surface may be covered with smooth bumps, rather like cobblestones, which can be called bosselated; or be irregular or rough.

There may be a mixture of surfaces if the lump is large.

Temperature Is the lump hot or of normal temperature? Assess the skin temperature with the dorsal surfaces of your fingers, because they are usually dry (free of sweat) and cool.

Tenderness Is the lump tender? Which parts are tender? Always try to feel the non-tender part before feeling the tender area, and watch the patient's face for signs of discomfort as you palpate.

Edge The edge of a lump may be clearly defined or indistinct. It may have a definite pattern.

Composition Any lump must be composed of one or more of the following:

- calcified tissues such as bone, which make it hard;
- tightly packed cells, which make it solid;
- extravascular fluid, such as urine, serum, cerebrospinal fluid (CSF), synovial fluid or extravascular blood, which make the lump cystic;
- gas;
- intravascular blood.

The physical signs which help you decide the composition of a lump are: consistence, fluctuation, fluid thrill, translucence, resonance, pulsatility, compressibility and bruits.

Consistence The consistence of a lump may vary from very soft to very hard. As it is difficult to describe hardness, it is common practice to compare the consistence of a lump to well-known objects. A simple scale for consistence is as follows:

- **Stony hard**: not indentable – usually bone or calcification.
- **Firm**: hard but not as hard as bone.
- **Rubbery**: but slightly squashable, similar to a rubber ball.
- **Spongy**: soft and very squashable, but still with some resilience.
- **Soft**: squashable and no resilience.

The consistence of a lump depends not only upon its structure but also on the tension within it. Some fluid-filled lumps are hard, some solid lumps are soft; therefore, the final decision about composition of a lump (i.e. whether it is fluid or solid) rarely depends solely upon an assessment of the consistence. Other features such as those peculiar to fluid may be more important.

Fluctuation Pressure on one side of a fluid-filled cavity makes all the other surfaces protrude. This is because an increase of pressure within a cavity is transmitted equally and at right-angles to all parts of its wall. When you press on one aspect of a solid lump, it may or may not bulge out in another direction, but it will not bulge outwards in every other direction.

Fluctuation can only be elicited by feeling at least two other areas of the lump whilst pressing on a third. The lump fluctuates and contains fluid if two areas on opposite aspects of the lump bulge out when a third area is pressed in. This examination is best carried out in two places, the second at right-angles to the first.

Fluid thrill A percussion wave is easily conducted across a large fluid collection (cyst) but not across a solid mass. The presence of a fluid thrill is detected by tapping one side of the lump and feeling the transmitted vibration when it reaches the other side. A percussion wave can be transmitted along its wall if a swelling is large. This is prevented by placing the edge of the patient's or an assistant's hand on the lump mid-way between the percussing and palpating hands.

Percussion waves cannot be felt across small lumps because the wave moves so quickly that the time gap cannot be appreciated or distinguished from the mechanical shaking of the tissue caused by the percussion. The presence of a fluid thrill is a diagnostic and extremely valuable physical sign.

Translucence (transillumination) Light will pass easily through clear fluid but not through solid tissues. A lump that transilluminates must contain water, serum, lymph or plasma, or highly refractile fat. Blood and other opaque fluids do not transmit light. Transillumination requires a bright pinpoint light source and a darkened room. The light should be placed on one side of the lump, not directly on top of it. Transillumination is present when the light can be seen in an area distant from the site in contact with the light source.

Attempts at transillumination with a poor-quality flashlight in a bright room are bound to fail and mislead.

Resonance Solid and fluid-filled lumps sound dull when percussed. A gas-filled lump sounds hollow and resonant.

Pulsatility Lumps may pulsate because they are near to an artery and are moved by its pulsations. Always let your hand rest still for a few seconds on every lump

to discover if it is pulsating. When a lump pulsates you must find out whether the pulsations are being **transmitted** to the lump from elsewhere or are caused by the **expansion** of the lump. Place a finger (or fingers if large) of each hand on opposite sides of the lump and feel if they are pushed outwards and upwards. When they are, the lump has an *expansile* pulsation. When they are pushed in the same direction (usually upwards), the lump has a *transmitted* pulsation.

The two common causes of expansile pulsation are aneurysms and very vascular tumours.

Compressibility Some fluid-filled lumps can be compressed until they disappear. When the compressing hand is removed the lump re-forms. This finding is a common feature of vascular malformations and fluid collections which can be pushed back into a cavity or cistern. Compressibility should not be confused with reducibility (see below). A lump which is reducible – such as a hernia – can be pushed away into another place but will often not reappear spontaneously without the stimulus of coughing or gravity.

Bruits Always listen to a lump. Vascular lumps that contain an arteriovenous fistula may have a systolic bruit. Hernaie containing bowel may have audible bowel sounds.

Reducibility You should always see if a lump is reducible (disappears) by gently compressing it. A reducible lump will be felt to get smaller and then to move into another place as it is compressed. It may disappear quite suddenly after appropriate pressure has been applied. If you ask the patient to cough, the lump may return, expanding as it does so. This is called a cough impulse and is a feature of herniae and some vascular lumps. The reduction can be maintained by pressing over the point at which the lump finally disappeared. In many ways the differences between compressibility (see above) and reducibility are semantic.

Relations to surrounding structures By careful palpation, it is usually possible to decide which structure contains the lump, and what its relation is to overlying and deeper structures. The attachment of skin and other superficial structures to a lump can easily be determined because both are accessible to the examiner and any limitation of their movement easily felt. The lump should be gently moved while the skin is inspected for movement or puckering.

Attachment to deeper structures is more difficult to determine. Underlying muscles must be tensed to see if this reduces the mobility of an overlying lump or makes it easier or less easy to feel. The former indicates that the lump is attached to the fascia covering the superficial surface of the muscle or to the muscle itself; the latter that the lump is within or deep to the muscles. Lumps that are attached to bone move very little. Lumps that are attached to or arising from vessels or nerves may be moved from side to side across the length of the vessel or nerve, but not up and down along their length. Lumps in the abdomen that are freely mobile usually arise from the intestine, its mesentery or the omentum.

State of the regional lymph glands Never forget to palpate the lymph glands that would normally receive lymph from the region occupied by the lump. The skin, muscles and bones of the limbs and trunk drain to the axillary and inguinal glands; the head and neck to the cervical glands; and the intra-abdominal structures to the pre-aortic and para-aortic glands.

State of the local tissues It is important to examine the overlying and nearby skin, subcutaneous tissues, muscles and bones, and the local circulation and nerve supply of adjacent tissues. This is more relevant when examining an ulcer; but some lumps are associated with a local vascular or neurological abnormality, or cause an abnormality of these systems, so this part of the examination must not be forgotten.

General examination It is often tempting to examine only the lump about which the patient is complaining. This will cause you to make innumerable misdiagnoses. **You must always examine the whole patient.**

HISTORY AND EXAMINATION OF AN ULCER

An ulcer is a solution (break) of the continuity of an epithelium (i.e. an epithelial deficit, not a wound). Unless it is painless and in an inaccessible part of the body, patients notice ulcers from the moment they begin, and will know a great deal about their clinical features.

History

The questions to be asked concerning an ulcer follow a pattern similar to those for a lump.

1. **When was the ulcer first noticed?**
   Ask the patient when the ulcer began and whether it could have been present for some time before it was noticed. The latter often occurs with neurotrophic ulcers on the sole of the foot.
2. **What drew the patient's attention to the ulcer?**
   The commonest reason is pain. Occasionally, the presenting feature is bleeding, or a purulent discharge, which may be foul smelling.
3. **What are the symptoms of the ulcer?**
   The ulcer may be painful. It may interfere with daily activities such as walking, eating or defaecation. Record the history of each symptom.
4. **How has the ulcer changed since it first appeared?**
   The patient's observations about changes in size, shape, discharge and pain are likely to be detailed and accurate. If the ulcer has healed and broken down, record the features of each episode.
5. **Has the patient ever had a similar ulcer on the same site, or elsewhere?**
   Obtain a complete history of any previous ulcer.
6. **What does the patient think caused the ulcer?**
   Most patients believe they know the cause of their ulcer, and are often right. In many cases it is trauma. When possible, the severity and type of injury should be assessed. A large ulcer following a minor injury suggests that the skin was abnormal before the injury.

Examination

The examination of an ulcer follows the same pattern as the examination of a lump. When an ulcer has an irregular shape that is difficult to describe, draw it on your notes and add the dimensions. When an exact record of size and shape is needed, place a thin sheet of sterile transparent plastic sheet over the ulcer and trace around its edge with a felt-tipped pen.

After recording the site, size and shape of the ulcer, you must examine the base (surface), edge, depth, discharge and surrounding tissues, the state of the local lymph glands and local tissues, and complete the general examination.

Base

The base, or floor, of an ulcer usually consists of slough or granulation tissue (capillaries, collagen, fibroblasts, bacteria and inflammatory cells), but recognizable structures such as tendon or bone may be visible. The nature of the floor occasionally gives some indication of the cause of the ulcer.

- Solid brown or grey dead tissue indicates full-thickness skin death.
- Syphilitic ulcers have a slough that looks like a yellow-grey wash-leather.
- Tuberculous ulcers have a base of bluish unhealthy granulation tissue.
- Ischaemic ulcers often contain poor granulation tissue, and tendons and other structures may lie bare in their base.

The redness of the granulation tissue reflects the underlying vascularity and indicates the ability of the ulcer to heal. Healing epidermis is seen as a pale layer extending in over the granulation tissue from the edge of the ulcer.

Edge

There are five types of edge (see Fig. 1.15).

A flat, gently sloping edge This indicates that the ulcer is shallow and this type of ulcer is usually

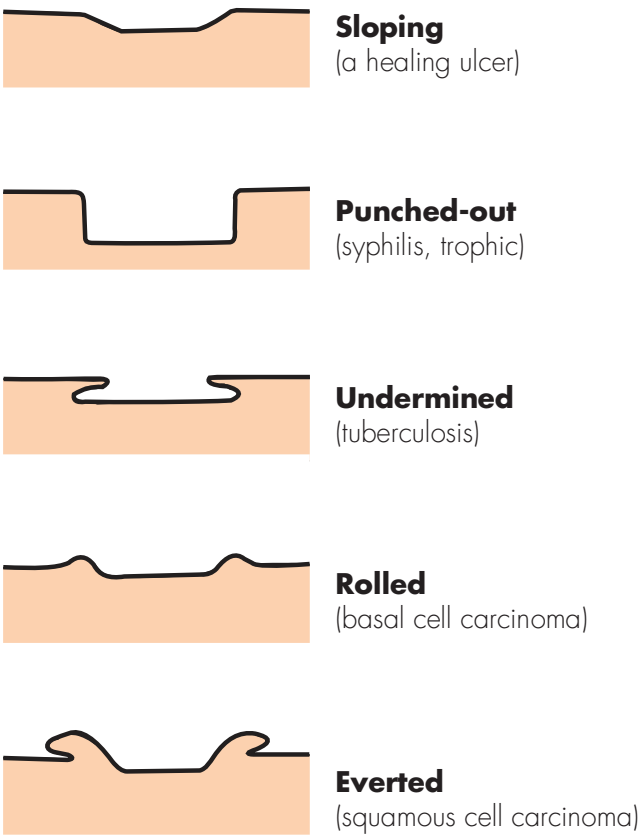


FIG 1.15 The varieties of ulcer edge.

Revision panel 1.13
Remember the four basic techniques

Inspection
Palpation
Percussion
Auscultation

Revision panel 1.14
A classification of the aetiology of disease

Congenital
- Genetic
- Sporadic

Acquired
- Traumatic
- Inflammatory:
  - Physical
  - Chemical
  - Infection
    - Viral
    - Bacterial
    - Rickettsial
    - Spirochaetal
    - Protozoal
    - Fungal
    - Helminthic
    - Mycoplasma
    - Prions
- Neoplastic
  - Benign
  - Malignant
  - Primary
    - Carcinoma
    - Sarcoma
    - Others
  - Secondary
- Degenerative
- Autoimmune
- Proliferative
- Metabolic
- Hormonal
- Mechanical
- Vascular
- Self-induced
- Psychosomatic
- Iatrogenic

superficial, often only half-way through the skin. Venous ulcers usually have this type of edge, but so do many other types of ulcer. The new skin growing in around the edge of a healing ulcer is pale pink and almost transparent.

A square-cut or punched-out edge This follows the rapid death and loss of the whole thickness of the skin without much attempt at repair of the defect. This form of ulcer is most often seen in the foot where pressure has occurred on an insensitive piece of skin, i.e. a trophic ulcer secondary to a neurological defect. The classic textbook example of a punched-out ulcer is the ulcer of tertiary syphilis, but these lesions are rare today in Europe. Most of the punched-out ulcers that are now seen are caused by the neuropathy of diabetes and peripheral arterial ischaemia or, outside Europe and North America, leprosy.

An undermined edge When an infection in an ulcer affects the subcutaneous tissues more than the skin, the edge becomes undermined. This type of ulcer is commonly seen in the buttock as a result of pressure necrosis, because the subcutaneous fat is more susceptible to pressure than the skin; but the classic textbook example is the tuberculous ulcer – which is now uncommon in Europe and North America.

A rolled edge This develops when there is slow growth of tissue in the edge of the ulcer. The edge looks like the heaped-up mound around an ancient Roman earthwork. A rolled edge is typical, and almost diagnostic, of a basal cell carcinoma (rodent ulcer). The edge is usually pale pink or white, with clumps and clusters of cells visible through the paper-thin superficial covering of squamous cells. Telangiectases are commonly seen in the pearly edge.

An everted edge This develops when the tissue in the edge of the ulcer is growing so rapidly that it spills out of the ulcer to overlap the normal skin. An everted edge is typical of a carcinoma and is seen in all those organs where carcinomata occur – the skin, in the bowel, in the bladder and in the respiratory tract.

Depth

Record the depth of the ulcer in millimetres, and anatomically by describing the structures it has penetrated or reached.

Discharge

The discharge from an ulcer may be serous, sanguinous, serosanguinous or purulent. There may be a considerable quantity of discharge which is easily visible, or it may only be apparent from inspection of the patient's dressings, and you may not be able to see the features of the ulcer at all if it is covered with coagulated discharge (a scab). This may have to be removed to examine the ulcer properly. **Students should not do this without the permission of the doctor in charge of the patient.**

Relations

Describe the relations of the ulcer to its surrounding tissues, particularly those deep to it. It is important to know if the ulcer is adherent or invading deep structures such as tendons, periosteum and bone – which may indicate the presence of osteomyelitis.

The local lymph glands must be carefully examined. They may be enlarged because of secondary infection or secondary tumour deposits and they may be tender.

State of the local tissues

Pay particular attention to the local blood supply and innervation of the adjacent skin. Many ulcers in the lower limbs are secondary to vascular and neurological disease. There may also be evidence of previous ulcers that have healed.

General examination

This is very important because many systemic diseases as well as many skin diseases present with skin lesions and ulcers. Examine the whole patient with care, looking especially at their hands and facies, which can supply important clues to the diagnosis.