

CHAPTER XIX.

THE DIAGNOSIS OF SWELLINGS IN CONNECTION WITH BONES.

IN this chapter it is intended to discuss the diagnosis of that large and very important group of swellings which are fixed to, and immovable apart from, bone. In the case of deep and infiltrating tumours of the soft parts great care may be required to distinguish them from tumours growing from and adherent to the bone; but the diagnosis is of great importance, as the treatment in the two cases might and probably would seriously differ. It may be quite impossible to distinguish between some swellings connected with bone, and those of similar nature immediately surrounding the bone, as *e.g.* between a periosteal and parosteal abscess, and between a periosteal and parosteal sarcoma; and it is only by an exploratory incision into the swelling that the diagnosis can be made with certainty. The special tumours of particular regions, such as spina bifida, tumours of the jaws or the skull, will be discussed in the chapters on regional diagnosis. Having determined that a given swelling is connected with the adjacent bone, the surgeon should proceed with his examination in the following way.

1. **Ascertain the history** of the swelling. First, whether it is *traumatic* or *spontaneous*, then whether it is *acute* or *chronic*, and finally whether it has continuously *enlarged*, remained *stationary*, or *receded*. *Traumatic swellings* may be dislocations, fractures, hæmatomata, inflammatory, or neoplastic, for an injury may be the true starting point of a tumour-growth, or a tumour may only become apparent when

some trivial injury has broken across the thin shell of surrounding bone, as in cases of central sarcoma of the shaft of a bone; where a history of injury is given, care must be taken to ascertain whether there were any symptoms, such as local pain, previous to the injury, and whether the injury is a sufficient explanation in itself of the subsequent course of events. *Spontaneous swellings* are inflammatory, neoplastic, and diathetic. The acute specific fevers are liable to be followed by inflammatory swellings of the periosteum. *Acute swellings* are either the direct results of injury (dislocation, fracture, effusion of blood), or inflammatory. *Chronic swellings* may be the secondary results of injury, such as the thickening round a badly-set fracture, inflammatory, neoplastic, or diathetic. *Swellings that progressively enlarge* may be inflammatory or neoplastic; very rapid steady growth is a sign of inflammation, while steady enlargement over a long period and to a great size is a frequent and sometimes very characteristic feature of new growths. *Stationary swellings* may be the result of injuries, of chronic inflammation, or some forms of benign tumour. *Receding swellings* are always inflammatory or the result of injuries, as *e.g.* callus round a fracture, and nodes.

2. **Examine the tumour** and ascertain the following facts:

(a) Whether *single* or *multiple*. Multiple swellings indicate the influence of a diathetic cause, as struma, syphilis, rheumatism, gout; or of infection, as in some cases of secondary sarcoma and carcinoma of bone; multiplicity is also a frequent feature of some simple tumours, such as enchondroma and exostosis. Inquiry should be made to ascertain whether the multiple tumours originated simultaneously (pointing to some diathesis) or appeared successively, and at such a period subsequent to the formation of a first tumour as

to support the view of infection. When multiple, too, it should be noted whether the swellings are symmetrical or not; rachitic tumours are symmetrical, those of congenital syphilis generally are not.

(b) Ascertain whether there are many of the usual signs of inflammation, such as local heat, redness, œdema, pain, tenderness on pressure, loss of function apart from gross mechanical causes, and fever with its attendant effects. This will, of course, have great influence upon the diagnosis, as separating at once the large groups of inflammatory affections. The pain of inflammation of bone is usually (not always) a marked feature, and is of a deep boring or aching character, and is very often worse at night or under any influence increasing the local vascular engorgement.

(c) Examine the consistence of the swelling, to determine whether it is solid or fluid, uniform or of varying consistence in different parts. Fluid swellings are either abscesses or cysts; variation in the consistence of a swelling in different parts is a characteristic sign of sarcomatous tumours of bone, but may be caused also by inflammation at one part running on to suppuration.

(d) Pulsation is a striking feature of some sarcomatous tumours of bone, and is never met with in other bony swellings. (See page 304.)

(e) Notice the part of the bone affected, whether the epiphysis, the diaphysis, or the line of junction of the two. Rachitic, congenital syphilitic, rheumatic, gouty, chronic inflammatory processes, abscess and central sarcomata, affect epiphyses; inflammation acute and chronic, sarcomatous, fibrous, and cystic tumours, attack diaphyses; exostoses grow most often opposite the line of junction of the two parts.

(f) Notice the relation of the swelling to the soft parts over it, whether infiltrating or merely displacing (inflammations and sarcoma infiltrate), and also the

shape of the swelling, whether enlarging away from the bone as an exostosis, or spreading along the bone as a subperiosteal sarcoma, or expanding the bone over it as a central sarcoma; this may occasion egg-shell crackling.

(g) Then notice the state of the neighbouring joint, whether there is effusion into it or limitation of its movements; if the latter, whether it is explained by the mere increased size of one of the bones; whether grating or friction from disease of cartilage or exposure of bone, or pain. Inflammatory affections of bone may be associated with inflammatory changes in the adjacent joints. New growths in articular bones only interfere mechanically with the function of the joint.

3. Investigate the general condition of the patient, looking especially for evidence of rickets, of syphilis, of struma, of gout, or of anæmia and hectic. The bearing of such facts upon the diagnosis is evident, and it need only be remarked that they must not be overstrained, for a strumous patient may suffer from a syphilitic or sarcomatous tumour, and a syphilitic child may have a growth of exostoses quite independent of his diathetic state.

Such an examination will afford the means for a diagnosis. The diagnosis of the individual injuries of bone has been discussed in previous chapters.

If the swelling be acute, it is either

Dislocation.	Periostitis.
Fracture.	Deep abscess.
Hæmatoma.	

For the diagnosis of Dislocation and Fracture, see pages 30, 32.

If the swelling be congenital or immediately following upon an injury, and fluctuate, it may be recognised as a hæmatoma. (See page 77.)

But if the swelling have developed independently of injury, or if it have quickly but not immediately followed it, and there be the local signs of inflammation, with high temperature, quick pulse, and all the other signs of fever, it is *acute periostitis*. Of this there are two forms, *circumscribed* and *diffuse*.

Circumscribed acute periostitis is generally due to an injury, sometimes to syphilis, or zymotic disease, and the history and accompanying signs of disease will determine this point. It is most common in the tibia. Examine the part carefully for fluctuation, which will indicate a *periosteal abscess*.

The *diffused acute periostitis* is a much more serious affection; it is met with in children about puberty, most often affecting the lower end of the femur, but it may occur in other bones. When attacking the femur the swelling is deep, the skin over it is shiny, pitting on pressure, pain and tenderness are very severe, and when suppuration has occurred, fluctuation will be obtained with difficulty; there may be effusion into the neighbouring joint, as the knee. The constitutional signs of this disease are most marked, the fever is very high, often attended with rigors (one or more) followed by sweating, the pulse is rapid and feeble, the tongue furred, and in some cases there is delirium. If the disease be allowed to take its course untreated, it frequently ends in *pyæmia*. The occurrence of a rigor and the presence of œdema are signs of suppuration, which may be acted upon in the absence of fluctuation. When the abscess is opened the bone is found bare, more or less extensively, and sometimes the epiphysis is separated from the diaphysis. A *deep abscess* unconnected with bone would be indistinguishable from the above except by finding, when opened, that the bone was nowhere exposed.

If the swelling be chronic it may be due to

Hypertrophy.	Abscess.
Rickets.	Osteitis deformans.
Inherited syphilis.	Necrosis.
Badly united fracture.	Caries.
Periostitis.	Tumour.

Occasionally, without any symptoms of disease, the bones of one limb, or of one side of the body, are found larger than their fellows, and such must be spoken of as *hypertrophied*. This name is also often given to the elongation which sometimes ensues upon inflammation of the epiphysis of a growing bone, or to the thickening resulting from chronic inflammation.

If multiple symmetrical swellings occur in a child, being found at the ends of the ribs, and over the junction of the epiphyses and diaphyses of the long bones, especially at the lower end of the radius and tibia, and if with these there are signs of softening of the bones (bending, delay in ossification, open fontanelles), the diagnosis of *rickets* may be made. In many cases of rickets there are other well-marked signs, such as profuse sweating, especially about the head, with falling off of the hair, late dentition with early decay of the teeth, flabbiness of muscle or emaciation, "pigeon-breast," "pot-belly," enlargement of the liver and spleen, vomiting, diarrhoea and general tenderness of the surface.

If the swelling occur in an infant or young child, especially if it affect the vault of the cranium, humerus, or tibia, be most marked over the epiphyseal line, and gradually subside up the shaft, especially if there be mobility of the epiphysis on the diaphysis, with soft or grating crepitus or suppuration, it is *syphilitic disease of the bone*. Other signs of inherited syphilis should be sought for. The disease may attack many bones, but in the limbs is not generally symmetrical.

If the swelling be at the site of an old fracture, be stationary, hard, and painless, it may be recognised as a deformity due to union of the fracture in a bad position. In fractures where there has been much comminution of the bone, or laceration of the soft parts, the mass of callus effused is but slowly absorbed, and signs of it may be found for many months as a firm, painless swelling round the bone.

If the swelling be slowly formed, attended with pain of a deep, boring, aching character, becoming worse at night, and there be local tenderness and hyperæmia, the tenderness being especially elicited by sharp percussion, it is *chronic periostitis*. Of this, several varieties must be distinguished.

(a) If the whole diaphysis of a bone be enlarged, the swelling firm, slightly uneven in outline, stationary or but slowly advancing, it is *chronic diffuse ossifying periostitis*, and is probably associated with *sclerosis* of the bone from *chronic osteitis*.

(b) If the swelling be limited to one portion of the bone, it is called *circumscribed periostitis*. If this swelling be of stony hardness, and very chronic, it is known as a *hard node* or chronic ossifying periostitis. If, on the other hand, it be softer, and especially if it fluctuate, it is a *soft node*, and in the latter case a *periosteal abscess*.

(c) *Syphilis* is a very frequent cause of nodes, and syphilitic periostitis may be recognised by the accompanying signs of this dyscrasia, either inherited or acquired, or by the tendency of the nodes to recur and to ossify, and to attack especially the diaphyses of the tibia and clavicle. Occasionally syphilitic nodes soften down into abscess, or they may slough like ordinary gummata.

(d) *Struma* is the other constitutional cause of chronic periostitis. It very frequently affects the bones of children, and is accompanied by other signs of

struma, such as glandular enlargements and abscess, scrofulides, ophthalmia, anæmia, etc. Locally, it is distinguished by its affecting especially the ends of long bones, or the bones of the fingers and metacarpus, by its little tendency to ossification, but its great tendency to soften down slowly into abscess.

If there be a slight localised swelling of the articular end of a long bone, which is the seat of constant and long-continued aching pain especially at night, with marked tenderness to pressure or a smart tap just at spot, and if, further, there be slight swelling of the deep soft parts over the bone, an *abscess* in the bone may be suspected. This affection occurs most frequently in either extremity of the tibia.

If the enlargement of the bone occur in a man past middle life, be very chronic in its course, increase the length and the diameter of the bone, affect many bones (skull, spine, clavicles, humerus, femur, tibia, etc.), and be attended with "rheumatic" pains, and a yielding of the long bones to pressure, the disease is that named by Sir James Paget *osteitis deformans*, and often now spoken of as *Paget's disease of the bones*.

If the enlargement of the bone be attended with suppuration, and on opening the abscess, or on probing the sinus left by such abscess, hard, smooth, bare bone be felt, *necrosis* has occurred. In some cases, as the skull, tibia, and the jaws, the necrosed bone can be seen, and if it has been long exposed to the air the sequestrum becomes dark in colour. In other cases a diagnosis of necrosis may be made by the peculiar penetrating offensive odour of the pus escaping from the abscess or sinus; this feature is very marked in necrosis of the jaws.

In some cases of necrosis of the joint ends of bone, the probe cannot be made to strike the sequestrum, but a diagnosis can be made by observing the peculiar firm smooth grating elicited on manipulating

the affected bone, different from the roughened crepitus elicited in cases of caries, and the softer crepitus in some cases of rheumatoid arthritis.

If the swelling affect the cancellous end of a long or short bone, and there be pain, increased by pressure upon or through the enlarged bone, with some swelling and matting together of the soft parts over the bone, and especially if there be redness of the skin and œdema, or fluctuation from the presence of pus, the diagnosis of *chronic osteitis* may be made. If suppuration have taken place, and if the probe passed along the sinus strike softened porous bone, the condition is commonly called *caries*.

If the tumour occur in a child or young person, grow slowly or remain stationary, be attached to a long bone at the line of junction of its epiphysis, and if it be of stony hardness, prominent, painless unless from pressure upon an adjacent nerve or from injury, it is an *exostosis*. These may be single or multiple, rounded or lobulated; they are most frequently met with at the lower end of the humerus and femur, and the upper end of the tibia. They may have a bursa developed over them. They commence as cartilaginous outgrowths, and so long as their growth continues a layer of cartilage will be found over the bone, but when the whole tumour is ossified growth ceases. Bony tumours are met with in other special situations as the skull and the great toe. (See pages 384, 562.)

If the tumour occur in the hand of a young person, be of slow, steady, and painless growth, globular in outline with rounded projections from the surface, be firm but not absolutely unyielding to pressure, with smooth surface, and especially if a sense of "egg-shell" crackling be obtained on gentle pressure, a diagnosis of central *enchondroma* may be arrived at. These tumours are frequently multiple.

If the tumour be of steady growth, of irregular outline, varying in density at different situations from firm to soft and semi-fluctuant, and especially if the tumour have attained a great size, or pulsate, or have dilated blue veins coursing over it, and be attended with œdema of the limb, and if there be "egg-shell" crackling at one or more spots over it, it is a *sarcoma*.

The varieties of sarcoma cannot with any certainty be distinguished from one another without microscopical examination; but attempts should always be made to diagnose the primary seat of the growth.

If the tumour implicate and expand the epiphyseal end of a bone, showing but little tendency to spread up the shaft, and particularly if it pulsate, or give a sensation of "egg-shell" crackling anywhere on the surface, it is a *central sarcoma*, springing from the cancellous tissue of the articular end of the bone and gradually expanding and destroying the bone in its growth. These tumours are chiefly met with at the lower end of the femur, upper end of the tibia and fibula, and in the head of the humerus.

If, without any swelling having been noticed, "spontaneous" fracture of the shaft of a bone occur and be followed by the continuous growth of a tumour with all the general characters of sarcoma, it is a *central sarcoma* of the shaft of the bone, the neoplasm having started in the medullary canal and gradually destroyed the bone over it until the thin shell snapped by some trivial strain, and the tumour, set free from its bony case, grew with increased rapidity and became palpable. In the early stage pain is the only symptom. These tumours have been noticed with special frequency in the femur.

If the tumour avoid the very extremity of the bone, spread along the shaft of the bone, grow rapidly and attain a large size, without "egg-shell" crackling, or pulsation, the tumour is a *subperiosteal*

sarcoma. These tumours often appear to start about the junction of epiphysis and diaphysis, but in their growth to leave intact the former; they tend to form elongated and ovoid, rather than globular, enlargements of the bones, and to be of very varying consistence owing to their frequent chondrification and ossification. The lymphatic glands of the part may be enlarged. The tumour may be seen fungating through an ulcer in the skin. They grow faster and are more malignant than central sarcoma. They are met with specially at the lower end of the femur, upper end of the tibia and fibula, lower end of the radius and ulna, and involving extensively the diaphysis of the humerus.

When an incision is made into such a tumour the periosteum is found raised over the new growth or entirely destroyed, and the bone is bare beneath the tumour. Should, however, the periosteum be found entire, the bone nowhere exposed, and the tumour altogether outside the periosteum, the growth is a *parosteal sarcoma*; this is a very rare form of the disease, and impossible to recognise without an exploratory incision.

If a tumour in connection with the shaft of a bone grow very slowly, assume a globular smooth outline, be very firm and painless, a *fibroma* may be diagnosed. In general features it will most nearly resemble enchondroma, from which it can only be distinguished by its position, ossifying enchondromata starting from the junction of epiphysis with diaphysis, and central enchondroma affecting the long bones of the hand. From sarcoma it will be distinguished by its more chronic course, its very slow growth or even stationary character, and the absence of fracture or pulsation. Fibroma is a very rare tumour of bone except in the form of fibrous epulis. (See page 393.)

Other tumours, rare in occurrence and still more

rarely diagnosed, are *hydatid cysts of bone*. They have been found in connection with the flat bones, or in the shafts and articular ends of long bones. In the shafts of long bones their first symptom is generally "spontaneous" fracture, with subsequent non-union, and then when an operation is undertaken the hydatid cysts escape. They may be suspected when after "spontaneous" fracture union does not occur, and a sarcomatous tumour does not develop. In other situations they cause a smooth globular distension of the bone, and their nature can only be suspected before operation. These tumours are likely to be mistaken for central sarcoma, from which, however, they differ in their greater chronicity.

Carcinoma only occurs as a secondary growth in bone. The so-called "*blood cysts*" and "*fibrocystic*" tumours of bone are but varieties of *sarcoma*. Satisfactory evidence of the existence of true *osteoneurism* is wanting. (For the diagnosis of *Cystic tumours of the jaws*, see page 389.)

CHAPTER XX.

GENERAL DIAGNOSIS OF ULCERS.

The diagnosis of an ulcer includes the recognition of its condition and its cause. In many cases observation of the former decides the latter; for the one, attention is directed solely to the state of the ulcer itself, without any reference to the general condition of the patient, to concomitant affections or to the progress of the sore; all these demand investigation when we have to decide upon the cause of an ulcer. As the natural and also the simplest and most convenient method to adopt, we shall first discuss the diagnosis of