

straight, so that a line between the two anterior superior iliac spines crosses at right angles a line drawn from the xiphoid cartilage to the symphysis pubis. The surgeon should then notice whether, when the spine is resting its whole length upon the mattress, the suspected limb can also be placed straight down; if not, it indicates that the joint is flexed, and this is a most important sign of disease. When the joint is flexed to even a marked extent the thigh can still be placed straight down by tilting the spine into a position of lordosis; when this is marked the hollow under the back is readily recognised; but in order to detect any slight degree of flexion, and also to measure its amount, the surgeon should grasp the knee of the sound limb and raise the thigh until it lies with its whole length along the front of the trunk (until the hip joint is fully flexed), the spine will then be extended along the mattress; if now the suspected limb still lies flat along the couch there is no permanent flexion of the joint; if on the other hand, as the spine is by this manœuvre extended, the diseased limb rises, the vertical height of the knee above the mattress is a measure of the amount of flexion of the hip joint. Flexion is the most constant and the most important deformity observed in inflammation of the hip, but it is also observed in cases of ilio-psoas abscess and effusion into the bursa beneath the psoas; it is not a feature of sacro-iliac disease, unless it be complicated with ilio-psoas abscess. The parallelism or the reverse of the limb to its fellow should then be noted; normally the thighs are inclined slightly inwards, and rather more so in women than in men; abduction of the thigh is seen in the early stages of morbus coxæ, and only occasionally later, and in cases of synovitis; adduction is found in the later stages of morbus coxæ, and becomes exaggerated when the head of the femur is dislocated on to

the dorsum ilii. At the same time the surgeon will notice whether the limb is rotated in or out; eversion is seen when the synovial cavity is distended as in simple synovitis or the early stage of morbus coxæ commencing in the synovial membrane, and in any condition leading to tension of the ilio-psoas muscle, such as abscess in its sheath or in the bursa beneath it; inversion is found in the later stages of morbus coxæ, and is most marked when the femur is dislocated. The mutual relations of the bony prominences of the hip should then be ascertained by comparative measurement on the two sides. (See page 203.) The great trochanter may be raised to a slight extent by absorption of its neck or flattening of its head, by separation of the upper epiphysis of the femur, or to a more marked extent by dislocation of the femur on to the dorsum ilii. Approximation of the trochanter to the median line may be caused by absorption of the neck or head of the bone, and by displacement of the femur through the acetabulum into the pelvis; on the other hand, undue prominence of the trochanter is caused by dorsal dislocation of the bone. While recording these absolute measurements of the parts the surgeon should not fail to notice the apparent relative length of the two limbs as observed when they are both stretched out straight upon the mattress; apparent shortening, far in excess of, or indeed in the absence of real shortening, is frequently seen in morbus coxæ; while apparent lengthening of the limb is a characteristic sign of sacro-iliac disease; in each case alike it is due to tilting of the pelvis. The mobility or rigidity of the joint should then be tested. For this the left hand should be placed firmly upon the outer surface of the pelvis, and the right hand grasping the knee should first make gentle and then more forcible attempts to flex and extend, abduct and adduct, or rotate the thigh. Care

should be taken to divert the patient's attention as much as possible while carrying out this manipulation. The surgeon should notice first whether the pelvis follows the movements of the thigh closely, or whether there is only partial rigidity of the joint; secondly, whether the movement is painful, and if so whether, when the joint is fully flexed, rotatory and lateral movements are still painful and limited, or painless, free, and smooth; thirdly, whether movement is attended with any soft or hard, smooth or rough grating or crepitus. Rigidity of the joint may be due to true ankylosis, or to muscular spasm, and in the latter case it points to arthritic inflammation. When extension of the joint is painful and limited, but on full flexion the rigidity and pain in moving the thigh pass off, it indicates that there is spasm of the ilio-psoas muscle, and careful examination should be made for abscess in its sheath, or between it and the capsule of the joint. If all rigidity pass off under chloroform it is proved to be entirely muscular. In connection with this symptom notice the tension of the adductor tendons and of the sartorius, and also turn the patient on to his face, and compare the fullness of the two buttocks and the level of the gluteal fold on each side; a lowering of the gluteal fold is a sign of wasting of the gluteal muscles.

The surgeon should then examine into the condition of the bones. The outline of the trochanter should first be compared on the two sides, and then the palm of the hand being placed flat on the trochanter, firm and gradually increasing pressure should be made in the line of the neck of the bone; if this elicit signs of pain it indicates tenderness to pressure and inflammation of the neck or head of the femur; this sign should not be elicited by sudden blows upon the trochanter or upon the heel; in children the mere blow may cause them to cry, and in all patients alike

unnecessary pain may be caused, and when the heel is struck the position of the tender part cannot be precisely localised. The head of the bone may be felt in the buttock or the extreme shortening, adduction and rotation of the thigh together with a marked hollow in the groin indicate dislocation of the femur. Then the surgeon should place one hand on the front of each iliac crest and attempt to press these two bones asunder or together, and to compress the pelvis laterally; by this means some slight movement is occasioned between the ilium and sacrum, and by the occurrence or non-occurrence of pain referred to that joint, it may be inferred that the joint is or is not diseased. Any swelling of the part should be carefully investigated; there may be simply indistinct fullness in the groin, or swelling of the inguinal glands, or a fluctuating collection of fluid. If the latter, care should be taken to notice whether it corresponds in position with the bursa under the psoas muscle beneath and below Poupart's ligament, or with the sheath of the iliacus or psoas, or the bursa over the great trochanter of the femur, or is occupying the planes of cellular tissue of the part. A fluctuating swelling bulging above Poupart's ligament, just internal to the iliac crest, not reaching into the thigh at all, or quite to the outer side of the femoral vessels, is an *iliac abscess*. A fluctuating swelling pointing above the middle of Poupart's ligament, and extending into the thigh behind the femoral vessels to their inner side, is a *psoas abscess*. An abscess pointing above the brim of the pelvis is probably connected with disease of the acetabulum. Pain in the knee, especially at the inner side of the joint, may be the chief or the only spontaneous pain complained of in hip-joint disease. In sacro-iliac disease pain may be referred to the branches of the great sciatic or of the anterior crural nerve.

In cases where the limb is apparently lengthened,

while the hip joint can be fully extended, and there is no rigidity or pain in moving this joint, whereas there is tenderness over the sacro-iliac joint, with pain on pressing the two innominate bones together or asunder, the surgeon may diagnose *sacro-iliac disease*. This is a disease of adult life, it comes on insidiously, the patients complaining of lameness, weakness and pain in the back and along either the sciatic or anterior crural nerve. Look for iliac abscess, which may cause flexion of the hip, but neither rigidity nor pain in moving it, and for abscess in the buttock or in the pelvis bursting into the rectum.

If the hip joint can be moved without pain in all directions, and to the full extent, and no pain be caused by firm pressure along the neck of the bone, the hip joint and the articular bones may be regarded as free from active disease. When there is pain in pressing along the neck of the bone, and a limp in walking, and the joint is flexed and rigid, *epiphysitis of the femur* may be diagnosed. When there is marked rigidity of the joint in the flexed, abducted, and everted position, and great pain on any movement of the part, but pressing the great trochanter does not excite pain, *synovitis of the hip joint* is to be diagnosed. With increased flexion, adduction, and rotation in, the advance of the disease to the ligaments and bones may be recognised, or dislocation of the bone may be verified. Disease of the pelvic part of the articulation may be suspected when abscess is found coming up from the inner surface of the pelvis to the brim, and pointing at the groin; or where a probe passed along a sinus strikes necrosed bone which does not move when the thigh is rotated; this sign may, however, be caused by separation of the head of the femur, but in that case the surgeon will notice that the trochanter turns upon its own axis, or round a much smaller circle than on the sound side.

Inability to extend the thigh, and pain in attempting to do so, together with a fluctuating swelling deep in the groin, but freedom of flexion of the joint, and when the joint is flexed, absence of all rigidity, and smoothness of motion of the femur in the acetabulum, are the signs whereby we can recognise *effusion into the bursa under the psoas*. This may be met with as a complication of *morbus coxæ*. Where a *psoas abscess* is present the spine must be carefully examined for evidence of caries, especially the lower dorsal region, failing that, the pleural cavity and the kidney of the same side should be examined. Where an *iliac abscess* is found, its cause should be sought for in disease of the lumbar spine, of the sacro-iliac joint, or of the ilium, or in inflammation around the cæcum or sigmoid flexure.

**Knee joint.**—This joint should always be examined with the limb extended. The synovial membrane extends on each side of the patella and above it; when distended it gives a smooth elastic fluctuating swelling in this position, and it floats the patella forwards away from the femur upon which it normally rests; when this bone is pressed upon at right angles to its surface, it is felt to yield and presently to tap against the femur; this is what is known as the "floating of the patella." This is an extremely important sign of effusion into the joint, as it is obtained when the amount of fluid is too small to yield either fluctuation or decided swelling. To obtain it, it is important that the knee be extended, the hip flexed, and the triceps muscle relaxed. The limb should be examined resting upon a couch; the surgeon should then grasp the thigh just above the knee with his left hand, and gently but firmly draw the soft parts down to relax the rectus, and to make sure of this he should note whether the patella is freely movable from side to side; he should then with the tips of two

or three fingers of the right hand press the bone directly back, and if he feel it yield under the pressure, and then strike against the femur, the patella "floats;" unless there is something in the joint raising the patella, it always lies on the femur in every position. Unless these precautions are taken, the surgeon may be deceived in trying to elicit this sign; thus if the bone be pressed obliquely or laterally it may be so moved on the femur as to simulate the tap of the "floating" patella; while if the amount of fluid be small or moderate, and the rectus be contracted, the bone may be pressed back on the femur by that muscle, or held so firmly that this symptom is not elicited. This is a constant sign of fluid in the knee joint, and the only other condition causing it is the presence of a very soft neoplasm in the joint; the writer recently had an opportunity of observing this, and was for a time misled by it as to the nature of the case.

In all acute and subacute inflammations of the joint it assumes a position of moderate flexion, with rotation out of the tibia, and if the head of the tibia become displaced backwards on the femur it shows that the hamstring muscles are spasmodically contracted, and that the crucial and lateral ligaments have yielded to their traction; this displacement, therefore, is an important sign of the implication of the ligaments in disease.

Excessive lateral motion in the joint is sometimes seen as the result of stretching of the ligaments in hydrarthrosis. Tenderness over the attachments of the internal lateral ligament is not uncommon after acute synovitis.

The bones are so subcutaneous that their condition can be well investigated; it may be useful to point out that the patella may be alone involved in acute or chronic inflammation ending in either necrosis or caries.

Loose bodies are more frequent, and more

usually occasion acute and characteristic symptoms in the knee than in any other joint. The joint is also liable to *displacement of a semilunar cartilage*, giving rise to fixity of the joint and severe pain, coming on during some quick movement of the joint, and often followed by an attack of subacute synovitis; these symptoms are the same as those met with in "loose bodies" in the joint, and the diagnosis of the case depends upon noticing that the seat of pain is always over one or other semilunar cartilage, that at the time some projection of the cartilage may be felt, or possibly a depression if it be displaced inwards, and that no "loose body" can be felt in the joint; the pain is not so great in displacement of a meniscus as in impaction of a "loose body."

There are a number of bursae around the knee joint, the position of which must be remembered.

A swelling over the patella, obscuring that bone, may be diagnosed as involving the *prepatellar bursa*, and is either acute or chronic, serous, suppurative, or plastic; it may assume the form of a globular, firm, unyielding tumour, smooth and rounded externally, not adherent to the skin, and freely movable over the patella; this is *chronic plastic bursitis*.

If there be a rounded tense fluctuating swelling above the patella, but that bone do not "float," and there is no swelling on either side of the patella, or fluctuation across the joint from side to side, it is to be diagnosed as effusion into the *suprapatellar bursa*.

If there be no fluid in the knee joint, but active extension of the joint is painful, and the ligamentum patellæ is prominent with a little swelling on either side of it, with fluctuation across from one side to the other, and especially if pressure upon the ligament causes some pain and a lateral bulging on each side of it, effusion into the *infrapatellar bursa* (or the bursa between the patellar ligament and the upper part

of the tubercle of the tibia) may be diagnosed. The fat normally present around this bursa may give a sensation very closely simulating fluctuation and therefore a comparison with the sound knee should be made with every care, and this diagnosis arrived at only when the condition is different on the two sides, and fluctuation is unequivocal.

If a fluid tumour be found on the inner side of the knee beneath the semimembranosus tendon, which becomes full and tense and projects back into the ham when the knee is extended, but much less tense when the joint is bent, it is an effusion into the *bursa between the semimembranosus and the gastrocnemius*, sometimes called the *popliteal bursa*; when the joint is bent the swelling will be plainly felt between these muscles; if the bursa communicate with the joint, it will be reducible on pressure.

A similar swelling over the inner condyle of the tibia, superficial to the semimembranosus tendon, becoming as it enlarges ovoid in shape with its long axis vertical, is an effusion into the *bursa under the sartorius*.

A small tense fluctuating swelling immediately above the head of the fibula bulging backwards towards the ham is an effusion into the *bursa under the biceps*.

In every case of pain in the knee the surgeon should satisfy himself that there is no disease in the hip joint.

**Ankle joint.**—The bones entering into this joint are so immediately subcutaneous that they can be readily and satisfactorily examined. It is necessary to point out the peculiarities of the swellings produced by effusion into the joint and into the tendinous sheaths and the bursa around the joint, and also the peculiarities of the pain met with in these different affections. *Effusion into the ankle joint* causes some fulness

in the front of the joint beneath the extensor tendons, but particularly a rounded fluctuating swelling below and partly around each malleolus which gives an appearance of increased width to the joint which is very characteristic when seen from the back; there may be distinct fluctuation from one of these lateral swellings to the other.

*Effusion into the sheath of the tibialis posticus tendon* causes an elongated fluctuating swelling behind and below the inner malleolus reaching two inches or so above its tip, and extending downwards into the sole at the instep. The swelling is longer and reaches higher up than that caused by effusion into the ankle joint, and is usually not accompanied by swelling around the outer malleolus. *Effusion into the peroneal sheath* causes a similar swelling behind the outer malleolus, and reaching down below it over the os calcis; this is not so common as the former. *Effusion into the bursa beneath the tendo Achillis* causes a swelling above the point of the heel under the tendon, with fluctuation from side to side. Care must be taken in this observation, as the soft fat beneath the tendon may give a sensation which may be readily mistaken for fluctuation. Characteristic creaking and soft grating may be detected in these synovial sheaths and bursa on moving the parts. The pain of disease of the ankle joint must be distinguished in the first place from that of disease of the tarsal joints, and then from that of disease of these synovial sheaths and bursa. For this purpose the heel and instep should be grasped close to the ankle joint and moved on the leg; if this elicit pain it excludes tarsal disease. If now, while the ankle is fixed, the foot be everted and inverted, the tibial and peroneal tendons will be alternately put on the stretch, and if pain be produced in either movement it will indicate the sheaths of these tendons

as the seat of the mischief. In inflammation of the bursa behind the os calcis, there is pain when the patient points his toes and contracts his calf muscles, and when the surgeon raises the toes and stretches the tendon of these muscles, not when the toes are passively pointed. The pain of inflammation of the synovial membrane is elicited by every movement of the joint. The position of tenderness is also of use as indicating the seat of disease.

For *disease of the tarsal joints*, see chapter xlv.

#### ANCHYLOSIS.

When a patient presents a stiff joint the surgeon has to determine whether the ankylosis is *true* or *false*, and if the latter whether it is *intra-articular* or *extra-articular*, and the nature of the *disease leading to it*. Premising that *true ankylosis* is of much rarer occurrence than *false*, and that therefore every case is to be considered *false* until demonstrated to be *true*, we will endeavour to point out how these problems are to be solved in any given case.

**Nature of the ankylosis.**—In some cases motion at the affected joint is at once obvious, and the following remarks apply only to those in which there is apparent immobility at a joint. (a) Notice whether there is pain during either active or passive attempts to move the joint; if there is, it indicates the absence of *true ankylosis*. (b) Next notice the condition of the muscles which act upon the joint in question; if they are found spasmodically contracted, or if on attempting to move the joint they become tense, it shows that the ankylosis is *false*; great wasting and entire relaxation of the muscles is a useful sign of *true ankylosis*. (c) Notice whether there is any yielding of the joint to passive movements, or whether, on the contrary, the limb feels solid; to render the diagnosis certain, either or

chloroform should be given to full narcosis, and careful attempts then made to obtain movement. If the limb feel quite solid when manipulated, and if attempts at movement do not cause pain or spasm of muscles around the joint, and if during complete unconsciousness there be no movement obtained in the joint, it may be pronounced to be a case of *true ankylosis*. Where, on the other hand, some movement or yielding of the joint is obtained, or the attempt causes pain or muscular spasm, the *ankylosis is false*.

To determine the *variety of the false ankylosis* is in many cases a more difficult matter. The history of the case should, of course, be carefully investigated, and the joint examined with a view of finding evidence of affection of the bones (enlargement or adherent cicatrices) or of the synovial membranes, or matting together of the tendons around the joint. The signs of old sinuses are important, as they usually, but not invariably, indicate *intra-articular* disease. If, then, the stiffening have followed upon a severe burn or destructive inflammation of the soft parts, or upon a fracture not extending to the joints; or if there be evident thickening of the soft parts, matting together or immobility of one or more tendons around the joint, and there be no deformity in the joint, no enlargement of the bones, and if any movement that is possible be smooth and even, the *adhesions* are *extra-articular*. Where, on the other hand, there is a history of inflammation of the joint itself, or of wound or fracture extending into it; or the joint is deformed, the bones enlarged, and the soft parts marked with scars of old sinuses, the *adhesions* are *intra-articular*. In some cases these two varieties are combined, or the diagnosis between them may be impossible.

The diagnosis of the *nature of the disease* inducing the ankylosis presents no special points that require to be discussed here; the history of the case and the

nature of the changes in the part will lead to a correct judgment on the point. There are, however, some practical points in relation to some of the individual joints which require notice.

**Anchylosis of the lower jaw** is very rarely true; its diagnosis is difficult, and absolutely necessitates the administration of an anæsthetic; it often depends upon cicatrices in the mouth. (See page 391.)

**Anchylosis of the shoulder** is very common, but is almost invariably *false*, and is very often *extra-articular*. Owing to the extreme mobility of the scapula, and the large share it takes in the angular movements of the arm, the patient, and even an incautious surgeon, may be misled as to the degree of stiffness present. To test the point, the surgeon should rotate the arm with one hand, while the other rests firmly on, and fixes the scapula. As the scapula takes no share in this movement, any rotation that is possible must be at the humero-scapular joint; the rotation must not be violent, especially when a joint has long been stiff, or it may cause fracture of the neck of the humerus.

**Anchylosis of the elbow** is more often true. It only needs to point out that flexion and extension may be seriously limited by plastic material or bone filling up the coronoid or olecranon fossæ, or by out-growths from the coronoid or olecranon processes; the radio-ulnar joint participates in intra-articular ankylosis of the elbow. In cases of sudden limitation of flexion of the joint at a right-angle be careful to ascertain that the head of the radius is not displaced forwards.

**Anchylosis of the wrist** is most frequently *extra-articular*, caused by adhesion of the tendons in their sheaths; this is known by the accompanying limitation of the movements of the fingers and thumb, parts quite at a distance from the original injury or disease.

**Anchylosis of the digits** is most often due to *whitlow* and tendinous adhesions, or to *arthritis deformans*.

**Anchylosis of the hip** may be due to *arthritis deformans*, but is more often the result of *strumous arthritis*. Care must be taken to fix the hip bone by firm pressure while attempting passive or active movements, for where the joint is rigid the normal movement at the lumbar spine becomes increased; as in the shoulder, rotation movements are the most reliable.

**Anchylosis of the knee.**—The patella is the most convenient bone to examine for mobility; if it can be moved laterally to any degree it shows that it is not ossified to the femur, and this is very strong evidence that the ankylosis between the tibia and femur is also *false*. Subluxation of the tibia backwards, or rotation of the bone outwards, or marked flexion of the joint, are strong evidence of intra-articular disease.

**Anchylosis of the ankle** is very often *extra-articular*, being frequently seen after fractures near the joint, or in bad sprains. When it is of long standing and complete, the tarsal joints become unusually mobile.

**Anchylosis of the tarsus** is most often *intra-articular* and *true*. It may exist on the outer side of the foot in connection with old standing talipes varus. In the joint of the great toe it is usually due to gout.

**Anchylosis of the spine and ribs** is mentioned on page 395.

## CHAPTER XXIV.

### DIAGNOSIS OF DISEASES OF THE HEAD.

IN chapter v. the diagnosis of the injuries of the head and their sequelæ is discussed, and we must refer the reader to that chapter for information on the