

## CHAPTER XXXII

### INJURIES OF THE KNEE-JOINT

THE knee-joint is very superficially situated. This, combined with its massive structure and the characteristic shape of the bones which enter into the formation of the joint, make it more accessible to palpation than any other joint in the body. The physiological movements which here take place are so complicated and yet follow well-understood laws so closely, that disturbances of motion can be interpreted without difficulty. All these points taken together make the diagnosis of diseases of the knee-joint uncommonly easy, and therefore favourable to the beginner, because he can readily acquire insight into the method of diagnosis and gain confidence in his own efforts. Open injuries demand examination by means of direct inspection and palpation; they are therefore only of casuistic interest. Very little can be said of them in general. Subcutaneous injuries, dislocations, and fractures are of interest because they follow fixed rules. The diagnosis is never difficult, even if considerable swelling obscures the whole region. Palpate thoroughly, for only in exceptional cases with excessive swelling can any difficulty arise. If the injury is recent, and no swelling has formed, the changes are unmistakable. We are able to see and feel them, and the picture allows of but one interpretation.

FRACTURES OF THE PATELLA can not be overlooked, for the line of fracture can be both seen and felt, no matter whether it is transverse or longitudinal, whether broad or narrow. Dislocations of the patella can not fail to attract attention. In the lateral variety the intercondyloid fossa (the trochlea) is found empty; the patella lies upon the external condyle of the femur; the leg is flexed and rotated outward. In vertical dislocation of the patella, the edge of the bone stands out like a ridge on the anterior surface of the joint. The patella has made a twist of ninety degrees, and no longer lies with its surface, but only with its edge, applied to the joint surface of the femur.

DISLOCATIONS OF THE TIBIA in the recent state present a striking picture. It is, as a rule, the femur and not the tibia which passes through the capsular rent, and is displaced; but, as the tibia is the peripheral bone, it is said to be dislocated. We rarely see such a dislocation. I myself have seen but few; but it is easy to imagine the condition or to produce it on the cadaver. Lateral dislocations are described with much enthusiasm by observers fortunate enough to see them. The axis of the leg is parallel to the axis of the thigh, but at the knee a broken line  $\perp$  is produced. The joint surface of the tibia is recognised through the tense and thinned-out skin which at each moment threatens to give way. The surface is exposed so that the finger may be placed upon it, or, as Pitha used to say, so that a glass of water could safely stand upon it. On the opposite side the end of the femur is readily palpated. The patella lies transversely. Who can mistake this picture?

Anterior dislocations, by far the most frequent, are

not as striking, but still sufficiently so to be always readily recognised. The anterior surface of the joint is altered by the position assumed by the patella. This bone lies almost upon the upper surface of the tibia, while above the patella is found a deep semilunar fold of skin with its convexity directed upward. Behind, the posterior surfaces of the condyles of the femur are prominent, and can be readily grasped.

The rare posterior dislocation causes the posterior edge of the tibia, and also the posterior portion of its joint surface, to become prominent. The patella is firmly pressed against the femur, and the long axis of the leg is behind the long axis of the thigh.

In order to make the deviation in the longitudinal axes more prominent, it is evident that in lateral dislocations the limb must be looked at from in front, in anterior or posterior luxations from the side. The extremely infrequent rotatory dislocations of the tibia are recognised by the rotation of the foot. The limb is not broken, yet the leg is twisted on its axis, so that the fibula lies posteriorly, the inner edge of the tibia anteriorly. The patella is vertically rotated, its tendon is tightly stretched, the joint fixed.

The infrequent *dislocation of the fibula* at the upper tibio-fibular joint is readily recognised. If the dislocation is in an anterior direction, the head of the bone lies upon the ligament of the patella. It is seen to be continuous with the shaft of the fibula, and to have the biceps tendon, which now runs in an arched direction, inserted into it. If a posterior dislocation occurs, the deformity is no less typical. A considerable bony projection is felt posteriorly, which is continuous with the fibula. The biceps tendon can be traced to this

projection. In both varieties a deep hollow is found at the normal site of the tibio-fibular joint.

*Rupture of the quadriceps tendon* also gives a clear picture. If the tendon is torn above the patella, a furrow can be felt between the two ends. If the patellar ligament is ruptured, a furrow is found below the patella, and that bone is drawn upward.

FRACTURE OF THE LOWER END OF THE FEMUR causes even more marked displacement and greater shortening than that due to dislocation. The serrated edge of the upper fragment can be felt above the patella, and may perforate the quadriceps tendon or the skin. The uneven surface of the lower fragment may be palpated in the popliteal space. Fracture of one condyle of the femur can not be recognised by inspection, but by palpation, and by noticing the abnormal mobility, the diagnosis can be readily made. In the so-called T-shaped fractures of the lower end of the femur, in which the line of fracture runs transversely across the long diameter, and in which the lower fragment is divided by a vertical fracture separating the external and internal condyles, the separation from the rest of the bone can not be overlooked. The vertical fracture may more easily escape notice. Never forget to test the mobility of one condyle upon the other.

Only one variety of subcutaneous injuries of the knee-joint can not be recognised by direct examination, and must be diagnosed by the combination of symptoms. This is RUPTURE OF THE LIGAMENTS OF THE JOINT.

I observed the following case at v. Dumreicher's clinic: A man, of about thirty years of age, strong, and tall of stature, was engaged in pulling a hand-cart. He was caught between two street-cars and

struck by one of them. His leg was firmly fixed, the shock bending his body in a forward and outward direction with such force that he fell down. He was at once brought to the clinic. The left leg was somewhat rotated inward, and also slightly dislocated backward. This displacement could be reduced without exerting any force. The joint could be overextended, therefore the crucial ligaments were torn; strong abduction of the leg was possible, therefore the internal lateral ligament was no longer intact. The leg could be rotated about its own axis, the external condyle acting as the fixed point, and as adduction was resisted, the external lateral ligament evidently was not torn through. Later, I saw a similar case in private practice. A twenty-year-old girl, carrying a burden on her shoulders, sat down on a mound by the roadside to rest herself. As she rose to pursue her way she inclined her body far forward. Her body, weighed down by the load, bent strongly forward and to the side. When the physician who treated the case arrived, he found the whole knee-joint much swollen, the leg strongly abducted. Overextension was readily produced and motion caused crepitus. He diagnosed the case as supracondyloid fracture, straightened the leg, and applied a plaster bandage. On removing the plaster, after several weeks, he was surprised by the unexpected state of affairs encountered, and called me in consultation. I found no sign of fracture, either on the femur or tibia, no shortening, but the leg was rotated upon the thigh and the joint almost completely stiff. There was a slight degree of equinus. The rotation was outward, so that a portion of the upper joint surface of the internal condyle of the tibia could be palpated in front of the internal condyle of the femur. Because overextension and abduction were possible immediately after the injury the diagnosis of the condition could still be made. In the preceding case the function of the knee-joint was completely restored; in this case partial ankylosis in slight rotation resulted. Therefore, it is important to recognise this injury.

At the time that Stark published two cases of rupture of the crucial ligaments the report attracted considerable attention. In both cases the following group of symptoms was found: After a fall producing hyperextension of the knee-joint, accompanied by audible cracking, the limb became helpless. The joint could

not be steadied so as to permit of standing. In the sitting posture the knee could be actively and passively flexed and extended; at the same time the tibia could be displaced forward and backward on the femur. The noticeable fact in these cases was, that after the crucial ligaments had been ruptured no anterior dislocation of the tibia occurred. In parenthesis, we may mention that Stark's diagnosis was not entirely correct. If hyperextension and lateral mobility were present, the internal lateral ligament must also have been torn. The rupture of this ligament can be demonstrated by palpating the region occupied by the structure, with the leg flexed at right angles and rotated outward. If the ligament is torn a gap is noticed at the site at which its fibres are usually felt. In addition, we find that the leg can be slightly abducted, and that, with the knee flexed, a greater freedom of rotation can be demonstrated than on the healthy side. The external condyle, as has been previously mentioned, acts as the fulcrum. Rupture of the external lateral ligament I have never seen, but one case has been mentioned to me.

If any injury of the knee-joint is followed by excessive swelling, some difficulty may arise in the diagnosis. It has already been stated that rupture of a ligament can be readily overlooked. It is to be emphasized that sometimes even dislocations and fractures are hard to distinguish from one another without painstaking examination. This examination must necessarily demonstrate whether the constituents of the joint are in their normal relationship or not. If the tuberosity of the tibia occupies its normal relations to the head of the fibula and to the condyles of the femur, a dislocation may be excluded, no matter how equivocal the

distortion of the axis of the limb may seem. The worst possible mistake would be to entirely overlook a dislocation or fracture hidden by excessive swelling, and to call the injury traumatic gonitis. If you are called upon to see such a case, examine thoroughly.

## CHAPTER XXXIII

### INFLAMMATORY SWELLINGS OF THE KNEE-JOINT

IN dealing with *inflammatory processes* of the knee-joint, we will take a case of acute EFFUSION INTO THE JOINT as an example, and with this as a basis discuss the symptoms which arise and the method of proving the effusion to be intra-articular. If a hole is bored into the patella of a cadaver and fluid introduced into the joint through a cannula, a peculiar phenomenon is noticed. The patella is floated upward, the whole region about the knee-joint appears swollen, and the leg assumes a certain well-defined posture. The patella is merely raised by the fluid, which accumulates between it and the lower end of the femur. The position of the leg is due to the tension of a particular portion of the capsule. The outline of the distended joint indicates the extent of the synovial sac filled with fluid, and its shape is characteristic. In the normal state, the well-known grooves situated to either side of the patella can readily be seen; they disappear in the distended joint, and the outline of the patella simultaneously grows indistinct. Above the patella a swelling also appears, and extends upward upon the femur for two to three inches. The boundary of the swelling has its convexity directed upward. This increase in size above the patella owes its origin to a recess of the