

INJURIES OF THE KNEE-JOINT.

By SIR JAMES R. ROBERTS, C.I.E., M.B.,
M.S., F.R.C.S. (Eng.),

LIEUTENANT-COLONEL, I.M.S. (Retired).

Important Anatomical Points.—The bones concerned are the lower end of the femur with its deep intercondylar notch; the upper end of the tibia with its spine, to which are attached the crucial ligaments; the upper end of the fibula, its articulation with the tibia and the insertion of the biceps tendon; the patella with its relation to the quadriceps tendon and its smooth posterior surface.

Ligaments.—These are the capsular, external and internal lateral, ligamentum patellæ, crucial ligaments preventing anterior and posterior movements of one bone on the other, but permitting of flexion and extension, and when the knee is flexed at a right angle allowing of a certain amount of rotation. This rotation is important to remember as will be shown later; it should be produced in the normal subject in order to familiarise oneself with the amount.

The *semi-lunar cartilages* are attached by their outer margins, free internally, with narrow anterior corners and broad bulbous-like posterior corners.

Tendons.—Those of the biceps and semi-membranosus muscles—with bursæ, often communicating with the joint; the tendon of the quadriceps and ligamentum patellæ—with bursa—lie under the latter.

The synovial membrane on a basis of fibrous tissue affords a lining to the joint, and is reinforced in front by pads of fat on either side of the patella; these pads project so as to fill up the spaces left by the rounded ends of the two articulating bones.

It is not proposed to deal with fractures into the knee-joint.

Injuries and methods of production.—It is important to ascertain the manner in which the injury has been produced, and the patient must be most carefully questioned, as an obscure point in the exact diagnosis may often be cleared up by this means. Thus:—Was the joint in a position of extreme extension and then twisted, or was it semiflexed and twisted? The twisting is more often produced by the weight of the body thrown to one side or the other, as when a football player is borne to the ground with the knee in extreme flexion and the body twisted round.

Wrenches in which strain is put on the external or internal lateral ligaments cause tearing of these. In twisting movements strain is especially put on the crucial ligaments and on the external attachments of the semi-lunar cartilages.

Method of examination.—Note the gait of the patient; does he walk on the toes of the

injured limb because the joint is painful in extension, or cannot be extended; or is the joint locked and the patient unable to put the foot to the ground? Examine the patient by placing him prone on a full-length couch, with both legs exposed for the purposes of comparison. Note the amount of swelling and "traumatic effusion" into the joint; fluid in the joint can be delicately ascertained by the floating patella test, i.e., fixing the quadriceps tendon with the left hand, and placing the tips of the fingers of the right hand on the patella; then by a series of sharp pressures feel whether the patella lies directly on the bone, or is separated from it by a layer of fluid. This must be practised by a beginner on normal joints in order to gain familiarity.

It is most important to test the extension of the joint, and whether it can be forced back to extreme extension as in the opposite limb, and whether if this can be done, it is painful or not. Knees with unrelieved derangements cannot be completely extended. In order to do the test, put a pillow under the patient's heels so as to raise the knees, leaving a space between them and the couch. With one hand on each knee force both backwards, and compare the two, watching the patient for signs of pain. *Another method* of testing the extension is to place two chairs side by side at a distance of 18 inches apart. The surgeon sits on one and the patient on the other; the latter then turns half left and places both limbs on the surgeon's lap, leaving the knees unsupported between the chairs, when the test for complete extension can be carried out. There are important decisions to be made by the surgeon on this test, e.g., whether the joint is cured, and what amount of exercise or games the patient is to be allowed.

This is the place to make a remark on the subject of "synovitis"; this term should be relegated to cases of arthritis, and not to injury. In these latter it is proper to describe the swelling as due to "traumatic effusion," not synovitis.

The test for antero-posterior mobility in cases of complete rupture of the crucial ligaments can be made as follows:—The patient being seated on a chair, the surgeon grasps the thigh with one hand, and curls his other hand and arm round the leg, so as to bring his wrist upon the upper calf, he then pulls the leg backwards and forwards, and notices whether the tibia is movable on the femur or not. If not, the crucial ligaments are intact.

Injury to the External Lateral Ligaments.—This is the less common, but is often associated with fracture of the head of the fibula, below the attachment of the tendon of the biceps; ascertain this point. Injury to the external lateral ligament gives rise to

local tenderness and may be followed by a cystic condition of the bursa connected with the biceps tendon. This bursa may connect directly with the joint. An ununited fracture, which is likely to occur, if overlooked, can be treated by open operation; freshening the two fractured surfaces, turning down a strip of the vastus externus tendon, but leaving it attached at its lower end; vertically drilling the head of the fibula, threading the tendon strip through this; then drilling the shaft for three-fourths of an inch or so, and making a side connecting hole through the wall of the shaft. Along this curved passage the strip is made to pass and tied above the head of the fibula to the tendon there.

Injury to the Internal Lateral Ligament.—Injuries to this ligament are not uncommon, especially since ski-ing became popular, and can be diagnosed by the swelling and seat of pain, the mobility produced and the traumatic effusion. Complete extension of the knee-joint is painful and even impossible. It is important to remember in connection with this injury that trauma is inflicted on muscle attachments and that effusion occurs above the internal condyle of the femur. In common with injuries to muscle attachments near joints—such as the brachialis anticus—ossification is likely to take place, and a protracted convalescence ensues, only to be hastened by removal of the osseous deposit. Thus injury to muscles near a joint produces the so-called “myositis ossificans.” It stands to reason that early massage of the swelling after injury to the internal lateral ligament can only make matters worse, and it is only after prolonged rest, when recovery has set in that a little final massage can be tried. Here it is that *x*-rays prove their value in demonstrating this bony condition, deposits of which can take place both in the injured lateral ligament and above the internal condyle of the femur.

Fracture of the spine of the tibia.—The fractured spine takes with it the attachments of the crucial ligaments, and is an example of how bone often gives before ligaments. The diagnosis is easy owing to the mobility; but the differential diagnosis between this and ligament rupture is dependent on an *x*-ray photo. The treatment is prolonged rest in easy flexion, for if the knee is kept extended the spine is drawn from its head by the crucial ligaments.

Rupture of the crucial ligaments is usually associated with so severe an injury that the whole complex will require careful and well thought out treatment by position, rest and apparatus.

Injuries of the semi-lunar cartilages.—It is to be remembered that these structures are narrow at their anterior ends and broader and bulb-like at their posterior ends, and are attached to the capsule and bone along their

outer margins. Dislocation of these cartilages means a splitting along the outer margin leaving the anterior and posterior ends intact and fixed; or it may be that either the anterior or posterior end becomes detached. In the first case a strap, as it were, is free—though attached in front and behind—to move between the articular surfaces, or to be pushed into the intercondylar notch of the femur. Once in this position it may remain there and cause no more trouble, but usually it is displaced again into the joint cavity and locks the joint. Many cases of dislocated cartilage are cured by bone-setters' manipulations; this is due to their having succeeded in forcing the cartilage up into the notch.

The signs of dislocated cartilage are locking of the joint, interference with expansion, and sometimes a history of previous replacement by efforts on the part of the patient. With the original dislocation effusion is marked, more so than in the subsequent ones. The patient complains of intense pain at the time of the displacement, and tenderness over the attachment of the cartilage. It is not always the case that external cartilage dislocation can be differentiated from internal, as injury to the former may also give rise to pain internal to the patella, though as a rule the discovery of tender spots on either side of the patella gives the clue.

The treatment of displaced cartilage is either by manipulation or operation. Here one may refer to immediate treatment or first aid. Thus were one present at a football match, where a player injures his knee, proceed as follows:—lay the patient on his back; seize the limb by the ankle or foot; bend the limb to a right angle and rotate the tibia on the femur from side to side, not once but many times in succession. This is almost certain to replace the cartilage from between the bones, and is to be followed by extension. If this can be done the rotation has been successful; if not, try again; but if unsuccessful it is a case for *x*-rays and probably operation. After reduction the treatment is one of fixation, rest, etc., remembering that the cartilage will take some time to regain its firm attachment. Should this not be accomplished the case is then one for operation.

Cartilage injury.—For some unaccountable reason, a piece of articular cartilage covering the femur, tibia or patella may become separated and form a loose body. An erosion is left behind at the site of detachment. This injury is difficult of diagnosis, as the symptoms are milder, the disability only feebly crippling to the patient, unless a large loose body catches between the femur and tibia. Such cases are only cured by operation. Removal of the body can be done, but it is important to examine the articular surfaces in order to discover the pit, and if its edges

are undermined to cut away these—beveling them as it were.

Synovial membrane fringes.—These fringes hypertrophy, and the edges get nipped between the bones, or cartilaginous and osseous nodules form in the fringes, subsequently to be detached and form “loose bodies” in the joint. These cases are generally over 30 years of age. Some persons have permanently creaking knee-joints and crepitus can be felt by a hand placed on the joint while it is being flexed and extended. Nipping of a fringe is followed by traumatic effusion if not relieved and prolonged treatment is required. The accident is sudden and painful, and the patient comes into the surgeon's room limping on the toes of the injured side. The movements made in walking, jumping, playing tennis, etc., are the direct causes. The fringe when nipped requires to be freed—the sooner the better. This is done by rotation from side to side when the knee is bent at a right angle, as previously described. The relief is immediate and a bandage should be worn for a few days to support the joint. The patient can be instructed in the manipulation of replacement to meet a future occasion.

Enlargements of the bursæ of the biceps and semi-membranosus tendons are likely to communicate with the joint. For the first treatment simply evacuate; if it refills dissect it out; if again unsuccessful the joint requires to be opened and the synovial membrane in the vicinity examined, and if diseased scraped away.

Supervention of malignant disease after injury.—In young persons it is important to remember that an injury to the knee-joint may be the starting cause—though this is rare—of a sarcoma of the lower end of the femur or tibia. A patient after prolonged treatment without improvement, is dissatisfied, sees another surgeon who x-rays the limb and makes the diagnosis. Non-diagnosis of malignant disease in its early stage is a serious matter and emphasises the necessity of an x-ray photo in all cases that are obscure, or who do not begin to improve from the first.

Supervention of tuberculous disease after injury.—This is another important contingency to be remembered, and the importance of an x-ray examination is here again emphasized.

This paper is not one dealing with arthritis; but it is to be remembered that pain down the inner side of the head of the tibia points to arthritis, and to bear in mind the association of pain in the knee with hip disease.

Operation on the knee-joint.—A vertical incision through the skin and capsule is better than an L-shaped one, lest the capsular ligament be injured in the horizontal incision of the L. The capsular incision should not be

placed immediately under the skin incision, for fear lest the buried sutures of the capsule make contact with those of the skin and a channel for infection be created. As many as three incisions can be made if found necessary. The first in front, to explore the anterior portion of the semi-lunar cartilage; if this is intact then a posterior incision is made to deal with that portion of the cartilage. Put up the limb in a slightly flexed position, and on removal of the stitches allow the patient to get up. Within a fortnight allow him to discard a splint and move about the house, giving massage to the muscles in order that they may retain their tone, and so be prepared to protect the joint. These cases do not require a long convalescence. To split the patella vertically in order to expose the joint is barbarous surgery, as chronic disability is so apt to be left behind. Hæmorrhage into the knee-joint owing to injury or operation can be recognised by a rise of temperature. In knee surgery there is no margin except for the strictest aseptic surgery, as there is no more vascular part of the human anatomy.

BERIBERI: ITS SYMPTOMS AND TREATMENT.

By A. E. COYNE, M.D., L.R.C.P., L.R.C.S. (Edin.),
Superintendent, Gifford Mission Hospital, Nuzvid,
Kistna District.

SYMPTOMS.

Dry Beriberi.—This form usually begins with some burning in the stomach, and tingling in the legs and feet and sometimes in the hands. After one or two days pains occur in the legs, at first being only slight, but becoming quite annoying within three or four days. The calf muscles are especially painful. The tingling gradually increases in intensity and also spreads over a greater area, affecting the hands and arms. The tingling is most intense in the soles of the feet and in the palms of the hands. Sometimes it is also intense in the lower abdomen, and some patients complain of a tingling sensation in the tongue. The pains in the abdomen increase and there is a sensation of tightness around the waist, as though a band or belt was tied tightly. Along with the tingling in the legs, there is a considerable amount of tightness in the muscles of the thighs, causing a feeling as though cords were pulling when the legs are stretched out straight.

On pressing on the calf of the legs considerable tenderness is complained of, and there is usually a slight amount of œdema over the shins. The feet are also swollen in the more severe stages of the disease. As the disease progresses the patient becomes very weak, and cannot rise from a sitting