INTERNAL DERANGEMENT OF THE KNEE-JOINT.\footnote{A paper read as President of the Surgical Section, Mysore Medical Association, Madras District, at the Association’s Annual Congress.}

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The unfortunate phrase “internal derangement of the knee-joint” has crept into surgical nomenclature purely as a result of the difficulty in arriving at an exact diagnosis in so many conditions arising in the knee-joint. By many surgeons the phrase is used as denoting that the patient has a loose internal or external semilunar cartilage, by others it applies or is used as a diagnosis for many conditions. I have decided to bring this subject to your notice because I see an enormous number of these cases. In these days physical fitness plays such an enormous part in the lives of adult men and women that knee trouble is very common as a result of their efforts to maintain fitness. Knee troubles are commoner amongst Europeans than Indians, and are a serious menace to the man power of the Services both at home and abroad. In 1934, in Bangalore, forty-two cases were admitted to the British Military Hospital and twenty-one were operated on. In the Indian Military Hospital twenty-two cases were admitted and eleven operated on. In the Army at home 203 cases were operated on in the year. I shall in this paper confine my remarks to the commoner traumatic lesions of the knee, their diagnosis and treatment, and regret that time will only allow me merely to touch upon the fringes of this interesting subject.

The knee is especially liable to derangement on account of its mechanical weakness relative to the important work demanded from it. It is mechanically a bad joint because, enfeebled by the inward angling that normally occurs there, the weight of the body transmitted through a line that falls to the lateral side of the mid-point of the articulation causes undue strain to be thrown on the internal lateral ligament and the structures in relation with it, such as the coronary ligament and the internal semilunar cartilage. The flatness of the articular surface of the tibia and its looseness of articulation with the condyles of the femur strongly predispose to the sliding of the joint, which is only controlled by ligamentous and muscular strength and tone.

The powerful crucial ligaments have an important function in this connexion; it will be remembered that the anterior crucial ligament is tense during extension of the knee, and that it prevents excessive extension; it is attached above to the posterior part of the inner aspect of the external condyle, and below to the upper aspect of the tibia in front of the tibial
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spine and either in front of or just mesial to the anterior corner of the external meniscus. The posterior crucial ligament, on the other hand, is taut in flexion; it is attached above and in front to the anterior part of the lateral aspect of the internal condyle of the femur, and runs backwards to be inserted in the mid-line of the joint into the most posterior part of the upper tibial surface and to the posterior surface of the tibia for about a quarter of an inch. Rupture of the crucial ligaments, therefore, produces a form of internal derangement that causes serious disability, difficult to cure. Much of the integrity of the knee depends on the internal lateral ligament, which is attached above to the internal epicondyle of the femur just below the adductor tubercle, and divides below into two bands, a short or posterior one that inclines slightly backwards to its insertion into the medial aspect of the tibia proximal to the groove for the semi-membranous tendon, and a long or anterior band that passes slightly forwards to secure a long attachment to the medial surface of the tibia just below and behind the level of the tuberosity. Tears of this ligament are apt to occur either alone or in association with damage to the internal meniscus. The synovial membrane of the knee is a complicated one with numerous folds and fringes; in some of these, notably behind and at the medial side of the patella, fibro-fatty tissue is apt to accumulate, especially in joints affected with rheumatoid arthritis and osteoarthritis; nipping of these fringes cause a minor but troublesome derangement. Naturally, freedom from nipping of synovial membrane during violent extensor movements, as in kicking, is secured by the action of the subcrureus muscle, working co-ordinately and simultaneously with the crureus and other parts of the quadriceps extensor; patients with inco-ordinate, ill-developed or paralysed subcrurei are therefore liable to nipping of the synovial membrane when the leg is thrown forward when walking. I have come to regard the tone and development of the quadriceps as of great prognostic importance in cases of internal derangement, for not only is this action in preventing nipping important, but the knee depends for much of its integrity and solidity not only on its ligamentous strength but on the strength, tone and co-ordination of all the muscles playing over it; and of these the quadriceps is the most likely to go wrong. Almost any alteration in the normal intra-articular arrangements may render the joint liable to those recurrent attacks of sudden pain, usually followed by synovial effusion, the causes of which have been grouped under the title "internal derangement of the knee." Amongst the commonest causes are: (1) A crucial ligament may be torn or separated from one of its attachments and cause weakness of the joint and sliding of its component bones one on another; (2) the internal lateral ligament may be lacerated or stretched and may imperfectly perform its binding function; (3) an intra-articular cartilage may be ruptured or distorted and become liable to nipping when sudden movements are made; (4) the offending body subjected to pressure may be a loose small fragment of bone and cartilage, separated by fracture; (5) an osteo-
arthritic-osteophyte detached from its bony base and loose or swinging on a fibrous pedicle; (6) an hypertrophied synovial villus that has become bulbous and pedunculated; (7) a thickened or lipomatous synovial fringe; and (8) a loose melon seed body (rice body) composed of concentric laminæ or fibrin.

Occasionally similar symptoms may be due to trapping of the synovial fold during a sudden movement; thus in sudden extension of the knee partly performed by the swinging of the leg (as when a patient with incomplete muscular tone and co-ordination kicks forward violently) the subcrureus fibres may fail to pull out the synovial membrane from between the bones in time. Analogous effects are sometimes seen in patients with paralysed muscles and weakened internal lateral ligaments.

Lacerations and displacements of the semilunar cartilages, frequently encountered in young adults, especially athletic males, are primarily due to trauma. In flexion of the knee the menisci slide to some extent with the femoral condyles, and also rotation, which cannot occur in the extended position, becomes possible; it is some sudden movement of flexion with rotation, insufficiently governed by bracing of the muscles, that permits tearing of the menisci.

During some violent jumping or turning movement, or as the result of stubbing the out-turned toe against a fixed object and thus throwing the whole body-weight forward, the leg is suddenly rotated on the thigh while the knee is flexed. As a result a semilunar cartilage, usually the internal, is injured. The primary accident may be a simple mis-step. The damage to the cartilage may consist of an oblique split, frequently into its anterior end, or of a partial or complete transverse tear, or of a complete separation from all anterior attachments. The detached portion may slip in and out between the joint surfaces, and therefore liable to be frequently trapped, or it may be folded over to form a definite thickening. In old standing cases the cartilage degenerates, becomes friable, and may almost disappear, while the pressure of a twisted or folded semilunar cartilage may cause erosion of the articular cartilage on the femoral condyle or the upper aspect of the tibia. Associated partial laceration of the internal lateral ligament is extremely common; it may be severe or may merely consist of some separation of its fibres; the capsule is often torn at the same time.

Clinical Features.—In the most typical cases, at the time of the primary accident the patient suffers a sudden, severe, and peculiarly nauseating pain in the knee, and may fall to the ground with the knee flexed. On attempting to stand he cannot immediately extend the knee or bear weight on the limb. When the internal semilunar is the one damaged, there is tenderness over the internal lateral ligament, either along joint line or at the upper or lower attachment of the ligament. The displaced cartilage can sometimes be felt, but it is usually dislocated towards the centre rather than to the periphery of the joint.

By swinging the leg at the knee the patient sometimes snaps the
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cartilage back into place; but often he cannot fully extend the leg until the surgeon has replaced the cartilage. A synovial effusion follows which may entail from six to eight weeks' rest.

The onset is not always so dramatic, and definite "locking" may not be prominent. But nearly always a history of some accident can be elicited, even if it consists only of a fall on the feet, followed by local tenderness and pain on movement or on bearing weight.

The first attack may be the last, but too often it leads to others. The weakening of the joint, especially of its internal lateral ligament, by the trauma and by the presence of the effusion predisposes to further injury; the loose cartilage may be nipped so often and so readily that the patient cannot even walk with safety. Muscular atony and atrophy occur, especially in the quadriceps extensor muscle, and with the ligamentous laxity, permit undue lateral mobility of the joint. After damage to the internal meniscus, a point of tenderness often persists at a site just above the upper margin of the tibia and about half-way between the inner margin of the ligamentum patellae and the internal tuberosity of the tibia.

Prognosis is poor and recurrence is almost always constant in adults with athletic tendencies or with livings to earn on their feet.

Treatment.—If reduction has not already taken place as a result of the patient's efforts or those of his friends, the cartilage must be replaced by full flexion followed by extension and rotation of the knee. In many cases an anesthetic is necessary.

The synovial effusion if at all pronounced should, in my opinion, be treated by aspiration. This definitely limits the time of convalescence and later damage to ligaments and muscles round the joint. Aspiration should be done in the theatre with the same precautions as a radical knee operation. The quadriceps muscle must be placed in the hands of the electro-therapeutic department from the first. The knee is kept between sand-bags, tightly bandaged until effusion, pain and tenderness have vanished and the patient after some fourteen days is allowed to commence exercises of a nature not more strenuous than walking or cycling.

Generally the condition calls for operation, especially in patients with occupations in which a sudden fall or turn may be expected. If operation is delayed the subsequent permanent damage to the knee and its supporting structure must be pointed out.

I do not intend to weary you with the technique of the most successful and safe operation of meniscectomy. I would draw attention to the fact that convalescence is in my opinion no longer after the operation than in non-operative treatment. It cures 97 per cent of cases and the allied conditions of nipped fringes, small foreign bodies, sub-patella pads of fat causing trouble so frequently associated with the mobile cartilage and discovered only at the operation, can be dealt with.

Rupture of crucial ligaments generally results from great violence and is associated in many cases with fracture of the tibial spine. Pain is great
and movements are abnormally free and partial luxation backwards or laterally may be demonstrated.

Treatment consists of absolute immobility of the joint for a prolonged period followed by the wearing of an apparatus for limiting flexion for some months.

I am unable to express an opinion on repair or reconstitution of the ligaments by open operation, but understand that there is a considerable variation in opinion as to the success of these operations. In any case they should not be undertaken except in chronic cases. All knee cases with a history of trauma must in these days be X-rayed. It is always sound to X-ray both knees and an antero-posterior and lateral view should be taken and the two sides compared. You will find that radiological evidence of cartilage trouble is rarely met with and the chief value of radiology lies in the demonstration of injury to the tibial spine, of foreign bodies, and osteo-arthritic changes, etc.

In all cases dealt with, either by operation or other treatment, I lay stress on the fact that unless the musculature of the thigh is kept in good condition by electricity, hot baths, radiant heat, massage, etc., and later by exercises, and cycling, results, although apparently excellent from a purely surgical point of view, will functionally be poor. I must finally draw your attention to the fact that the diagnosis "internal derangement of the knee-joint" has for some years been deleted from the Nomenclature of Diseases drawn up by the joint committee of the Royal College of Physicians of London.