SOME OF THE COMMONER INJURIES OF THE KNEE-JOINT.¹


Royal Army Medical Corps.

All the injuries described can be classified as sports injuries, and all come under the care of the general practitioner in his daily work.

Anatomy.

In treating injuries of the knee-joint it is most essential to have a good knowledge of the anatomy of the joint. I propose therefore to deal briefly with the most important anatomical points which are concerned in the injuries under discussion. The knee-joint is a hinge-joint which owes its strength to powerful ligaments and especially to muscles and fasciae which surround it. It derives no strength from the shape of the articular surfaces of the femur and tibia. The most important ligaments are the ligamentum patellæ through which the patella gives the attachment of the quadriceps muscle to the tubercle of the tibia; the two comparatively weak lateral ligaments which are tense in extension and lax in flexion of the joint; the two crucial ligaments, which are very powerful and are more or less tense in all positions of the joint. The anterior crucial ligament resists extension and forward displacement of the tibia, while the posterior resists flexion and backward displacement of the same bone. Both ligaments check internal rotation of the tibia. The most important factor in maintaining the efficiency of the knee-joint is that the muscles surrounding the joint should be in a state of good tone. This applies especially to the quadriceps extensor muscle. The knee-joint is complicated by having the two semilunar cartilages attached to the upper articular surface of the tibia, by the presence of the infrapatellar pad of fat, and by numerous synovial fringes. An important point to be emphasized is that the internal semilunar cartilage is attached to the deep fibres of the internal lateral ligament.

The movements are flexion, extension and rotation, the latter movement being only possible when the joint is flexed.

The commoner injuries to which the knee-joint is liable are:—

1. Simple sprain of the internal lateral ligament; commonly called "sprain of knee."

2. Slipping of the semilunar cartilage, more especially the internal, and popularly termed "putting out the knee."

3. Nipping of the infrapatellar pad of fat. All these injuries may be produced by a twist or fall; all are associated with effusion of fluid into the joint, and in all the patient complains of more or less recurring dis-

¹ A paper read before the Hyderabad, Deccan, Branch of the British Medical Association.
ability after the lesion unless it has been early recognized and efficiently treated. Every case of recurring synovitis has a cause, and each is curable if the cause is recognized and receives proper treatment.

We will now discuss the mechanism of these injuries. The internal semilunar cartilage is closely connected round its convex margin with the deepest fibres of the internal lateral ligament. A severe twist of the knee with the leg abducted and the foot everted stretches this ligament producing sprain of the knee, or it may rupture the ligament which drags the semilunar cartilage with it, straining or tearing its anterior attachment. At this stage the inner side of the joint is opened and the resultant injury depends on what happens when it closes. If the cartilage is caught in the displacement between the bones the knee locks and we have the most important symptom of a dislocated semilunar cartilage. But often the cartilage slips back into position without being crushed or caught, and although the aetiology of the lesion is the same, the patient can easily straighten the knee after the accident. Unless this last mentioned condition is efficiently treated the patient will complain of an occasional "give" in the knee which, with a slight unusual twist, may result in real locking of the joint.

In addition to twisting injuries of the knee-joint a split semilunar cartilage may be readily produced by violent blows on the joint.

Any injury may cause increased vascularity of the infrapatellar pad of fat. As the fat swells it pushes its way into the joint and is liable to be nipped in full extension.

Let us now briefly discuss the signs and symptoms of these injuries:—

1. **Sprain of the Internal Lateral Ligament.**

   There is a history of a twist of the knee, with the knee flexed and foot everted. The patient complains of pain and tenderness over the internal lateral ligament. Pain is localized to the inner side of the knee and no pain or tenderness is found elsewhere. Eversion and external rotation of the leg stretch the ligament and cause pain. Fluid is present.

2. **Slipping of the Internal Semilunar Cartilage.**

   Again there is a history of a twist with the fixed knee and everted foot, but the twist is more severe. Acute sickening pain is felt at the time of the accident. In addition to the symptoms complained of in sprain of the internal lateral ligament there is a history of something slipping in the knee or of the knee locking. Pain and tenderness are felt to the inner side of the ligamentum patellæ at the anterior attachment of the cartilage.

3. **Nipping of the Infrapatellar Pad of Fat.**

   Here we have pain and tenderness in front of the knee with slight fulness at the sides of the ligamentum patellæ. Flexion is painless but passive extension causes pain. There is often recurrent effusion into the joint.
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Diagnosis.—In making a diagnosis of injuries of the knee-joint it is most important that a systematic system of examination of the joint should be carried out. As the same system should always be followed mention will have to be made of some of the rarer injuries to which the knee-joint is liable, and which will not be discussed in this paper. Every case of injury to the knee-joint should be submitted to radiological examination. A radiogram will demonstrate osteo-arthritis of the joint, fracture of the spine of the tibia, fracture of the patella, the presence of bony, loose bodies, foreign bodies, the tearing off of the bony attachment of ligaments, or the presence of Schlatter’s disease, which, you will remember, is epiphysitis of the tubercle of the tibia, when this tubercle is developed from a separate centre.

Examination of the Joint.—Examine the joint and note the presence of fluid; note the presence of tenderness over the internal or external lateral ligaments indicating sprain of these ligaments. Note if there is tenderness on either side of the ligamentum patellae at the anterior attachment of the semilunar cartilages. Tenderness in either of these situations shows injury to the cartilages. Pain over the internal lateral ligament on abduction of the leg indicates sprain or rupture of that ligament, while pain over the external ligament on adduction of the leg shows a similar injury. Tenderness on both sides of the ligamentum patellae, with fullness in this region, indicates swelling of the infrapatellar pad of fat. Limitation of flexion or extension of the joint may be due to locking or to the presence of a large amount of fluid. Pain on passive extension is due to nipping of the infrapatellar pad of fat. Displacement forward of the fully extended leg indicates rupture of the anterior crucial ligament, while displacement backwards of the fully flexed limb indicates a similar injury of the posterior crucial ligament.

Treatment of these injuries:—

1. Sprain of the Internal Lateral Ligament.—The treatment consists of rest in bed with the leg immobilized on a back splint, for fourteen days. This is to enable the injured ligament to return to normal. Evaporating lotion may be applied for a few days and then the joint and muscles should be massaged. At the end of fourteen days if the synovitis has subsided allow the patient up with the knee firmly strapped, and to prevent undue strain on the ligament throw the weight on the outer side of the foot by raising the inner side of the sole of the boot half an inch.

The muscles should be treated as described later.

2. (I) Displacement of the Semilunar Cartilage without Locking.—The treatment for this condition is identically the same as that for sprain of the internal lateral ligament.

(II) Displacement of the Semilunar Cartilage with Locking.—Complete reduction of the locking is absolutely essential. This is best done without an anesthetic. With the patient on his back, the leg flexed on the thigh, and the thigh flexed on the abdomen, tell him to “kick.” On the word
"kick" rapidly rotate the foot inwards and pull, when reduction is usually effected. In a nervous patient an anaesthetic will be necessary. If reduction is successful full extension of the limb will be obtained. The joint is then firmly bandaged and treated as a sprained internal lateral ligament. A case so treated will not give any further trouble.

When locking of the joint becomes recurrent the cartilage must be removed.

(3) Nipping of the Infrapatellar Pad of Fat.—Our aim here is to prevent further nipping. Rest in bed in a back splint is essential to enable the fluid to subside and the swollen pad to return to normal. To prevent further nipping, extension of the joint must be limited. This can easily be done by putting a cork pad, half an inch thick, inside the boot under the heel. When this is ineffective a special cage appliance must be worn which limits extension by 30°. As the subcrureus muscle is attached to the pad of fat, treatment of the quadriceps muscle must be carried out to improve its tone.

When discussing the anatomy of the knee joint you will remember that I said that the integrity of the joint depends very largely on the condition of the muscles and especially of the quadriceps extensor muscle. This muscle atrophies very readily in injuries of the joint, and unless it is brought back to its original condition recurrent synovitis results, making the joint weaker and more liable to reproduction of any of the previously mentioned injuries. In fact much of the success obtained in these cases depends on the ability to get the muscles back to their normal state.

There are two methods of maintaining good muscle tone and in preventing atrophy. The first is by means of faradization and is called by Bristow gradual contraction of the quadriceps, or G.C., quadriceps. A Bristow's coil is the best type for use, the strength of the current being regulated by withdrawing and pushing in the secondary coil. Excellent results have been obtained by Bristow, who even uses it to maintain muscle tone in tubercular lesions. The second method is by means of a simple procedure. Hold the leg below the fully extended knee, and tell the patient to pull up his knee cap without bending the joint. A good contraction of the quadriceps muscle will be obtained. If this simple exercise is performed 100 times daily you will be surprised at the excellent results obtained.

In conclusion, I would like to emphasize the importance of not being satisfied with a diagnosis of synovitis of the knee. Synovitis is after all only a symptom which occurs in many conditions. The cause must be found to enable efficient treatment to be carried out. If this is not done a chronically weak knee may be the result.
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