SURGICAL PROCEDURES IN GENERAL PRACTICE

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INJURIES OF THE SEMILUNAR CARTILAGES—I

BY

A. G. TIMBRELL FISHER, M.C., F.R.C.S.

Injuries of the semilunar cartilages are somewhat frequently encountered in practice, and their prompt recognition and effective treatment are of considerable importance. There is probably no subject which is more apt to cause damage to the practitioner's reputation or to present the osteopath or bone-setter with a gratuitous advertisement.

Definition and Pathology

The term "displaced cartilage," although often used, is perhaps misleading, as in the great majority of cases a definite fracture of the cartilage occurs, and the most striking symptoms are due to the behaviour of the fractured portion and not to displacement of the whole cartilage. Hypermobility of a semilunar cartilage without actual fracture may be present under certain conditions, but is much rarer than is sometimes stated. The types of fracture are very varied, but longitudinal cleavage, either complete or incomplete, occurs most frequently (47.54 per cent. in my series). The complete longitudinal fracture is often called the "bucket-handle" type (Rutherford Morison). Next in order of frequency are fractures involving the anterior (27.86 per cent.), posterior (13.93 per cent.), and middle thirds. Injuries of the internal semilunar occur most frequently. The proportion of external semilunar injuries ranges in published statistics from 7 per cent. (Sir Robert Jones) to 20 per cent. (my figures) and even 28.4 per cent. (Dunn).

Mechanism of Semilunar Cartilage Injuries

In flexion and extension of the knee, and when the femur forms the fixed and the tibia the movable arm of the lever, the semilunar cartilages remain in contact with the upper surface of the tibial head but move slightly forwards in full extension and slightly backwards in full flexion. When the tibia is the fixed arm of the lever, as in certain stages of walking or running, the femoral condyles roll and glide over the upper surface of the tibia and semilunar cartilages. Rotatory movements, which are possible when the knee is flexed, take place on the inner side principally between the internal femoral condyle and the internal semilunar cartilage; but on the outer side a good deal of the movement occurs between the external semilunar cartilage and the tibia, and the cartilage moves to a great extent with the external femoral condyle.

The deep fibres of the internal lateral ligament are firmly attached to the inner convex surface of the internal semilunar cartilage just behind its centre. This ligament normally assists in preventing excessive rotation inwards of the femur upon the fixed tibia or external rotation of the tibia upon the fixed femur. A sudden rotation inwards of the femur upon the fixed tibia with the knee

in partial flexion may cause a rupture of some of the deep fibres of the internal lateral ligament, and a sprain results.

When the ligamentous injury is of a more serious nature the inner side of the joint is opened up, permitting the internal semilunar cartilage to move to a variable degree towards the centre of the joint and, in a continuation of the rotatory movement, the cartilage is ground between the internal condyles of the femur and tibia. Actually, of course, this combination of events takes place in the fraction of a second. The internal semilunar cartilage is thus subjected to both compression and torsion strains and various types of lesion result, particularly the bucket-handle type and lesions of the anterior portion. The bucket-handle lesion is more likely when abduction is a well-marked feature.

This combined form of strain explains the peculiar shape of the fractured surfaces, which often overlap like the approximated blades of scissors. If, however, the attachment of the internal semilunar cartilage to the deep fibres of the internal lateral ligament remains intact this portion acts as a hinge, and the anterior part of the cartilage may be torn, or various forms of tear may occur opposite the fixed portion of the cartilage. Injury to the posterior end of the internal semilunar and some types of bucket-handle lesion are probably caused by forcible external rotation of the femur upon the fixed tibia when the knee is slightly flexed, or, conversely, by internal rotation of the tibia upon the fixed femur. These movements are also probably responsible for injuries of the anterior portion of the external semilunar cartilage. Injury to the posterior portion of the external semilunar cartilage is probably due to internal rotation of the femur upon the fixed tibia, and vice versa, and bucket-handle lesions of the external semilunar to either mode when adduction is prominent.

Signs and Symptoms

There are two principal modes of onset. In the first and most common the early symptoms are severe, and any recurrences tend to become more frequent but associated with less reaction. In the second, symptoms are slight at first but gradually become more definite, until locking occurs, when the onset of the first class is simulated and a similar sequence of events follows. In the first class the patient experiences acute pain, usually more severe over the affected cartilage, and may fall to the ground. Mechanical locking often occurs, and usually takes the form of an immediate inability to straighten the knee completely. It is sometimes very difficult at the time of the original accident to distinguish between this mechanical block to extension and the limitation due to muscular spasm, which is always present in any acute injury to the joint. In some cases of injury to the posterior part of a semilunar cartilage there may be a mechanical block to full flexion. Tenderness over the semilunar cartilage is experienced, its position depending upon the site of the injury. Synovial effusion ensues rapidly in severe injuries and more slowly in the less severe types. In the former the effusion is largely haemorrhagic.

In the second class there is usually a history of recurrent attacks of pain with or without effusion or of "giving way" of the knee before true locking occurs. It is probable that in this class the attachments of the cartilage are gradually stretched and a certain amount of hypermobility of the cartilage precedes the actual fracture. In recurrent cases a history of attacks of mechanical locking or sudden "giving way" of the knee is important, and physical signs between attacks may be few. Tenderness over the semilunar cartilage can frequently be elicited, together with cartilage crepitus on deep palpation. McMurray's test is sometimes positive, and there is often a certain amount of synovial effusion and wasting of the quadriceps extensor. Radiography gives no clear guidance in semilunar cartilage cases; but this should never be omitted, since by means of it we can ascertain whether some coincident condition, such as fracture of the tibial spine, loose or foreign body, osteoma, or osteoarthritis, is present.

Treatment of the Original Injury

This should be carried out on the following lines: If locking is present the displaced portion of the cartilage must be replaced by manipulation without delay. This is followed by rest from weight-bearing until the acuter symptoms have subsided, combined with firm bandaging of the joint over a thick layer of wool. The use of strapping, plaster-of-Paris, or splintage is not advised, although the purely temporary use of a back-splint may be necessary if the patient is restless. Physical treatment in the form of radiant heat, massage of the limb, and careful active movements is instituted from the first, and, provided all rotatory movement is avoided, is of value in aiding the absorption of traumatic effusion, in alleviating pain and spasm, and in preventing adhesion formation and muscular wasting. In the absence of locking, this treatment (which closely resembles that for a severe sprain of the knee) is begun at once. In an average case, when the acuter symptoms and synovial effusion have appreciably diminished, a little walking may be allowed, the compression bandage being still worn. Physical treatment in the form of massage and re-educational exercises for the thigh muscles is continued and steadily increased, although all rotatory movements must be avoided.

MANIPULATIVE TECHNIQUE

The replacement of the fractured portion of the semilunar cartilage may be easy or, in cases such as some varieties of the complete bucket-handle type and when the displacement has remained unreduced for several days or weeks, extremely difficult. Replacement without the aid of anaesthesia is quite possible, but it is made more difficult by associated muscular spasm and is a painful procedure; an anaesthetic is therefore advisable. Gas or gas-and-oxygen, if skilfully administered, usually suffices in early cases. Intravenous evipan or pentothal is a valuable alternative, but should not be given in the surgery or the out-patient department, admission to nursing home or hospital for a short period being desirable. If the cartilage has remained unreduced for some time ether or chloroform may be necessary.

Method 1 (Figs. 1, 2, and 3).—The patient lies upon his back on a couch or operating table. Assuming that we are dealing with the internal semilunar cartilage of the right knee, the practitioner grasps the sole of the patient's right foot with his right hand and the affected knee with his left hand. He first fully flexes the knee and, while abducting to open up the inner side of the joint, rotates

the tibia inwards and outwards. This movement may be repeated with the knee flexed to 90 degrees. In some cases the mere movement of flexion reduces the displaced portion, but usually this takes place during rotation or

FIG. 1.—Method 1. Manipulation of right knee for fracture-dislocation of internal semilunar cartilage. Stage 1: Full flexion.

FIG. 2.—Method 1, Stage 2: Rotation combined with abduction.

FIG. 3.—Method 1, Stage 3: Extension terminating in internal rotation.

during the final movement. This consists in a rapid movement of extension accompanied by internal rotation. In the case of the external semilunar cartilage the outer side of the joint must be opened up by adducting the

leg, and the final movement is one of extension combined with external rotation.

Method 2 (Fig. 4).—The above method usually succeeds in original cases of average severity. When it fails a more effective method of abducting or adducting the

FIG. 4.—Method 2. Manipulation of left knee for fracture-dislocation of semilunar cartilage.

joint and bringing about the necessary rotation should be tried. In the first method described above it is a disadvantage that the abducting and rotating forces are not applied directly to the tibia. The following method overcomes this difficulty, and once the technique is acquired it is extremely effective. In fact, I have often reduced displacements by this means without an anaesthetic when previous attempts elsewhere under anaesthesia have failed. The patient either sits in a chair or lies with the leg hanging over the end of the operating table. The practitioner grasps the upper end of the patient's leg just below the knee with both hands and grips the patient's foot between his thighs. The knee is first flexed through 10 to 15 degrees, and in the case of the internal semilunar cartilage he strongly abducts the joint with his thighs, aided by his hands. Then with the knee in partial flexion and well abducted a very strong movement of external or internal rotation is communicated to the tibia by the practitioner's hands. Replacement is usually accompanied by an audible "snap" which is quite characteristic. The knee should then be extended, particular attention being paid to the "screw-home" movement at its termination, and if the manipulation has been successful this movement should be full and free. The most satisfactory test of reduction, however, is that the patient can forthwith perform the movement of full extension either painlessly or with a minimal amount of pain. This is an important sign, and if active extension is still restricted and painful the displacement has not been rectified. After reduction a firm compression bandage should be applied and the after-treatment described above should be carried out.

THE QUESTION OF EARLY OPERATION

The treatment by manipulation and suitable after-treatment of every original injury of a semilunar cartilage associated with locking has been described. It must be clearly borne in mind, however, that in a somewhat high percentage of cases the original displacement is followed by recurrences, particularly when delay in replacement has occurred and when the lesion has been a serious one. This fact should be explained to the patient, and in view of the extremely satisfactory results following removal of the damaged semilunar cartilage by an experienced

surgeon it may well be that the future will see earlier recourse to operation in certain cases. For example, I was asked to see an international association footballer who severely damaged a semilunar cartilage in the first match of the season. Locking was present, and as this player was a "key" man in the team immediate removal was advised. This, however, was declined by the authorities and manipulation only performed. This was followed by the appropriate after-treatment, and six weeks elapsed before the player was able to take the field. Shortly afterwards the knee broke down again, and I was then asked to remove the offending cartilage. A further eight weeks elapsed before the player was able to resume, so that for the greater part of the season he was incapacitated. If the original advice had been taken the player would have been available for the cup final, and, owing probably to his absence, the cup was won by a rival club. Many managers of football teams now insist on early operation. Every case must, however, be treated upon its own merits. Patients are not all professionals engaged in strenuous and exacting forms of exercise, and in most cases manipulative replacement of the original semilunar cartilage injury associated with locking appears to be at any rate the best short-term policy.

REGIONAL HOSPITAL ORGANIZATION

[FROM A CORRESPONDENT]

In planning for the future there are two distinct lines, followed according to individual temperament. In the one case will be set down what seems to be an ideal plan for providing what is needed. In the other case attention is first and chiefly given to the existing factors, and the question asked is how they may be brought to the state of efficiency required. The history of successful planning is on the side of the second method: existing factors are stubborn elements in any situation, and have a way of taking their revenge if neglected.

Recent Hospital Planning

In the last thirty years several plans of hospital organization have been worked out and offered to the British public. Some of these have made no reference to existing establishments; some have been based upon one existing system and have disregarded others. As the problem is how to produce a system out of our own resources an examination of these resources is surely the first step towards laying our plans. Certain people would, however, have us treat our resources as indefinite, if not infinite. Some among these would scrap the present controls, and therefore their experience, and start anew with a National Control, which for their argument they assume would exercise its powers at least better than any of the present controlling bodies, if not perfectly. It does not need a training in logic to realize that such taking of something as given which is not given robs a scheme of what every sound scheme needs—namely, a foundation in experience.

The efforts which have in fact produced hospitals in this country have been of two sorts—those of people who, in communities small and large, have combined to establish and maintain out of their own pockets the hospital their community needed; and those of people elected to govern, in Parliament and local councils. Efforts of the first sort have been made and sustained in London for centuries, and elsewhere for generations, and have been partly medical, partly lay. Here and there by this means we are still able to build and equip and maintain hospitals.