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INJURIES TO THE SEMILUNAR CARTILAGES

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No operation can be more satisfactory to both surgeon and patient than that for fracture of the semilunar cartilage of the knee, yet no surgeon of much experience can look back upon all his cases of internal derangement of the knee-joint with complete satisfaction with the results. The difficulties are, in the first place, those of accurate diagnosis, and, secondly, those of the actual technical procedure. It is disconcerting to discover no evidence of injury to a cartilage by the ordinary anterior exposure when the symptoms beforehand have been very suggestive, and it is disturbing to find that the removal of a supposedly offending cartilage has not led to the promised relief. McMurray¹ has recently dealt with these problems in a most informative fashion. He emphasizes the importance of diagnosis before operation, as by no practically expedient method can the condition of the cartilages be ascertained on the operation table. Splitting the patella vertically or displacing it laterally does not seem to be quite justifiable for exploratory purposes, so that clinical diagnosis is essential.

The Diagnosis of Injury to the Cartilage

In my experience as a general surgeon injuries to the external cartilage have been rare compared with injuries to the internal cartilage. In those I have seen the damage has obviously been to the outer side of the joint; there have been the attacks of sudden inability fully to extend the knee-joint, and frequently there has been the characteristic loud clicking. I have never met an example of fracture of the external semilunar cartilage with symptoms referred to the inner side of the joints, such as some surgeons have reported. It is with the inner cartilage that difficulty occurs, because the clinical features do not always conform to the typical textbook description. The usually accepted signs and symptoms mean an injury to the anterior part of the cartilage. When, however, the posterior part of the meniscus has suffered damage they depart from type. Always there is a history of a severe primary injury to the joint, but there is no history of attacks of pain followed by inability to extend. The erroneously labelled "locking" feature is absent. So also is the tender point at the anterior attachment of the cartilage at the side of the ligamentum patellae. The characteristic description by the patient is that, with no apparent relation to any particular movement, the knee

will suddenly give way, and he will feel a sharp, crippling pain. Often he will say the pain is inside the joint itself. He can always get his leg straight. As in the typical attacks fluid may be poured out. That is all there is.

Fortunately there is one sign which, when it can be detected, is, so far as I know, infallible. It is the special sign described by McMurray: the presence of a click at a definite stage in extension when the fully flexed and everted leg is slowly straightened on the thigh. I find it easiest to elicit if the examiner holds the limb firmly in the required position and the patient gives active assistance in the slow movement of extension. The firm bracing up of his muscles seems to help to produce the click, which is sometimes perceptible to the observer's ears as well as to his fingers. An x-ray examination will nearly always show up a loose body, so that this source of error can be eliminated as a cause of the symptoms.

FIG. 1.—Method of reducing a displaced cartilage.

Reduction of Displaced Cartilage

There does not seem to be any reason to alter the practice of refraining from operating after the primary injury. If it were true that a split in the cartilage never heals, as is categorically stated by McMurray, logically there would be no choice but to have recourse to surgery. But we have no proof of this inability of cartilage to heal. It is true that repair of cartilage is sluggish, and, as in repair of other tissue, a fibrous junction results. What is known definitely is that some patients have an undoubted injury to a cartilage and never experience any further

trouble. It is quite conceivable that in a "bucket-handle" tear reduction may bring the raw edges of cartilage into contact in their normal position and that fibrous union should result. Such patients are not operated upon, so evidence is lacking. If, however, the edges remain apart and become rounded off, all hope of union is lost. Further trouble is then certain. It is such considerations which suggest that it is better to wait for a second attack of derangement before recommending operative removal.

The usual method of reduction of a displaced cartilage by flexion, inversion, and rather sudden extension of the knee-joint is not always successful. When it fails the movement is brought to an end with a sudden jerk, which, unless there is anaesthesia, is extremely painful, and which can scarcely help but do further injury to the cartilage. A method I have used for many years is free from this objection (Fig. 1).

¹ McMurray, T. P.: *British Medical Journal*, 1934, i, 709.

The knee-joint is fully flexed while the patient lies on his back. The muscles must be relaxed. Anaesthesia is thus an advantage. The surgeon stands on the affected side facing the head of the patient, and with rapid movements strikes with the palms of his hands alternately the inner condyle of the femur and the external tuberosity of the tibia, so that the fully flexed relaxed knee-joint flops from side to side over a foot or more range. When about ten movements have been made the joint is slowly extended. This movement is quite painless, and reduction is revealed by the possibility of full extension without any pain or resistance. This method is so simple and effective that I have often made students carry out the manipulation on patients who have arrived in the out-patient department with unreduced cartilages.

Management after Reduction

The subsequent management after reduction at the primary attack requires some consideration. It is essential that no strain should be put upon the internal lateral ligament, which has usually received some damage. The treatment most effective for this—namely, immobilization in plaster-of-Paris—is not altogether desirable, because it leads to excessive wasting of the thigh muscles and perhaps to adhesions within the joint (since there is certain to be a haemarthrosis), which will need afterwards to be torn by manipulation under anaesthesia. The excessive wasting of the thigh muscles leads to a passive effusion into the joints when the patient gets about. Sir Robert Jones recommended confinement to bed, with a back splint for a week. What is really required is movement of the joint without strain to the internal lateral ligament, an object rather difficult to realize.

Having tried many plans I think the best is to keep the patient in bed with his knee on a back splint for the few days required to fit him with a Thomas walking calliper splint. The back splint should be removed twice daily for the patient to practise active movements of his knee without weight-bearing. In three or four days, a walking calliper having been made, he is allowed to be up and about. In this way serious wasting of the quadriceps muscle is avoided, and with care the internal lateral ligament is not subjected to strain. The splint should be worn for two weeks; after which the patient is allowed to go free except for a bandage around the joint. The trouble entailed in having a calliper made is not very great, and is offset by the prospect of avoidance of a major surgical operation on the knee.

Operative Treatment

When more than one attack of displacement has occurred an operation becomes necessary. There is sharply divided opinion as to how much of the cartilage should be removed. There are those surgeons who advocate the removal of the whole of the cartilage in every case; there are others who claim that it is necessary to remove only the portion which is partly detached. Both groups would appear to be right under varying circumstances. When the joint is opened by the usual incision in front to the medial side of the patella it is frequently immediately obvious that there is a "bucket-handle" tear, or a pedicled piece of cartilage split off from the thin, free margin of the meniscus lying between the condyles of the femur. It is extremely easy to remove the obstructing piece of cartilage, leaving the attached rim intact.

On the other hand, should the tear be situated posteriorly, or should the posterior part of the cartilage have acquired undue mobility from stretching of its peripheral attachments, nothing will be seen from the front. There are those who practise removal of the whole cartilage from

the front in these cases. It is done by detaching the anterior end, severing by knife the rim of the cartilage from the inner tuberosity of the tibia as far back as possible, and forcibly dislocating the cartilage into the intercondylar space, where it is removed by cutting it across as far back as possible. I do not consider this a satisfactory procedure, owing to the fact that sometimes it is impossible, from the front, to separate the cartilage back to the loose or detached part. Attempts then to dislocate the cartilage are attended with more trauma than is desirable, and sometimes the posterior part of the cartilage is left to give subsequent trouble. There is more

FIG. 2.—Incision for removal of the whole of the internal semilunar cartilage, showing its relation to the bones and surrounding muscles.

FIG. 3.—Removal of internal semilunar cartilage. A, vastus internus. B, condyle of femur; C, internal lateral ligament with branch of superior internal articular artery; D, sartorius.

reaction in the joint than follows the operation immediately to be described. Therefore the best plan would seem to be:

1. Where the anterior end of the cartilage is split off, or there is a "bucket-handle" injury with intercondylar dislocation, to remove the part detached or pedicled portion only, as this does the least damage to the joint structures, and success is assured. However, a warning must be given here to ascertain whether the periphery of the cartilage is normally firmly attached or has been separated. In one of my patients from whom I removed a "bucket handle," subsequent symptoms of derangement recurred in a few months. On opening the joint the whole of the periphery of the cartilage was separated, except for the two extremities, making a new "bucket handle." I can only conclude that some looseness of its attachment must have been present at the first intervention.

2. Where, on opening the joint in front, the cartilage appears fixed and undamaged, to make another opening in the joint posteriorly to investigate the condition of the posterior end of the cartilage and remove the whole meniscus if this is damaged.

REMOVAL OF WHOLE OF INTERNAL SEMILUNAR CARTILAGE

This is best done by a combination of the usual anterior incision and that for drainage of the postero-internal compartment of the knee-joint. It is convenient to use the

FIG. 4.—Incision for removal of external semilunar cartilage.

FIG. 5.—Removal of external semilunar cartilage. A, condyle of femur; B, synovial membrane; C, ilio-tibial band; D, external lateral ligament; E, tendon of popliteus beneath capsule; F, tendon of biceps; G, external popliteal nerve.

semilunar flap of skin recommended by Timbrell Fisher. The situation of this incision is indicated in Fig. 2. A tourniquet is not used, as it is preferable to see what vessels bleed at the operation and to tie them. Neither are the knees flexed over the end of the table, because the unaffected limb gets in the way. It is better to have the patient lying on his back with the knee to be operated upon bent to a right angle and held in this position by an assistant, who grasps the foot. While it is inadvisable for the assistant or instrument nurse to touch any instrument, ligature, or swab with the hands there is really no objection to the operator himself using his gloved hands to tie ligatures or to palpate the anatomy of the joints through a sterile cloth. He will be sufficiently skilled to avoid puncture of his gloves or other mishap which might lead to infection. The skin is protected by over-folding cloths in the usual way, and a fresh knife and forceps are used for the deeper structures.

The front of the capsule having been opened and the cartilage inspected, another vertical incision is made in the capsule just behind the internal condyle. A branch of the superior medial articular artery may be met here. It must be divided and ligated. The anatomy of this posterior approach is shown in Fig. 3. A condition of the cartilage having been found which requires removal, the surgeon returns to the anterior incision. He detaches the anterior extremity of the cartilage and separates its periphery from the tibia as far back beneath the internal lateral ligament as he can reach. Grasping the detached anterior extremity of the cartilage in a pair of artery forceps, he delivers it into the posterior wound and makes it emerge, where it is grasped with another pair of forceps. It is now comparatively easy to complete the separation, as there is more space in the posterior compartment of the knee-joint than at first appears. The synovial membrane capsule and skin are sewn up in separate layers. Fine silk may be used as ligature or suture material for everything but skin; it perhaps causes less reaction than catgut. A thick encircling layer of wool with a firm bandage completes the operation. The limb is kept semi-flexed over a pillow; no splint is required. Active contractions of the quadriceps without movement of the joint are begun as soon as the patient can be induced to make them. Active movements of the joints in bed are begun in a few days. He may be up on the eighth day, and encouraged to walk with a stick.

REMOVAL OF WHOLE OF EXTERNAL SEMILUNAR CARTILAGE

This is an operation much less frequently called for, and this is well, since the external cartilage is less accessible than the internal meniscus. The anatomy of the operation is shown in Figs. 4 and 5. The procedure is very similar to that just described, but care must be taken not to cause damage to the tendon of the popliteus muscle. The after-treatment is carried out in the same way.

Conclusions

1. The clinical features are of the utmost significance in the treatment of semilunar cartilage injuries. Typical "locking" is not always present. Its absence in combination with sudden attacks of disability casts suspicion upon the integrity of the posterior part of the cartilage.
2. When clear symptoms have been present, and the anterior part of the cartilage appears normal on exposure, the posterior end must be examined.
3. It is not possible to remove the whole of the cartilage from the front of the joint. A supplementary incision in the capsule should be made behind.
4. When there is a typical "bucket-handle" tear or a pedicled fragment these separated portions of cartilage may be removed without interference with the rest of the cartilage (provided its attachments are firm) and a successful result obtained.

A paragraph in the *Medical Journal of Australia* for July 13th announces that a fund is to be raised to perpetuate the memory of Sir Richard Stawell, who was to have presided over the annual meeting of the British Medical Association in Melbourne. The income from the fund will provide a triennial prize to be awarded for an essay on some medical subject of clinical significance. The award will coincide with each Australasian medical congress, and will be open to all graduates of Australian universities of not more than three years' standing. The honorary treasurer of the fund is Dr. C. H. Mollison, 41, Spring Street, Melbourne, to whom contributions may be sent. It will be administered by trustees appointed by the Council of the Victorian Branch of the Association.