It is possible to restore the fragment to its normal position even after an interval of two months, although such a delay is never advisable. In that time much new bone will have formed both below the fracture surface of the shaft and from the fracture surface of the fragment. But this new bone at first will be found to be very soft and easily wiped away with a curette. The cavity from which the fragment came and the fragment itself may be restored to their original shapes and placed in their normal relations.

After an interval of more than two months, however, it will be impossible to differentiate between the old bone and the new. Adaptive changes in the shapes of the bones will have occurred. The problem will no longer be one of restoring a displaced fragment to the place from which it came, but will be one of securing the best possible functional result under abnormal conditions. The treatment must, of course, be determined by the conditions in each case, but as a rule, the excision of the enlarged and useless fragment will give better results than any plastic bone repair.

The after-treatment of the early cases is simple. No suture of any sort need be put in the bone. Usually it is impossible to stitch the periosteum. There is no tendency to displacement once the fragment is replaced. Acute flexion locks the fragment in place. Stitches in the fascia and skin hold everything securely. These are usually inserted while the elbow is held flexed. It is much easier under these conditions to adjust the edges of the skin wound if the incision has been made L shaped rather than curved.

Acute flexion may be maintained for a fortnight. The arm may then be put in an internal angular splint and later in a sling. Normal motion is promptly restored unless prevented by meddlesome passive motion.

DISCUSSION.

DR. SCUDDER: I have seen two or three of these cases. One was some time after the injury, and another was a comparatively recent case. In one I excised the fragment, and in the other the fragment was put back in place. I found that the acutely flexed position, as Dr. Stone has suggested, is all that is necessary to keep the fragment in place.

THE APPLICATION OF THE MEDIAN PATELLA INCISION FOR A KNEE ARTHROTOMY.*

By E. G. BRACKETT, M.D., BOSTON,

Surgeon to Orthopedic Department, Massachusetts General Hospital.

THE median patella route of the knee joint is indicated in those conditions demanding an exploration of the anterior chamber of the joint, as well as the removal of definitely loose bodies,

not permanently located, for osteochondritis dissecans, and for the repair of crucial ligaments. It is an incision of considerable magnitude, but under proper precautions, and with the necessary care, it is a safe procedure, to be used when there is real reason for its use. It is not followed by a reaction proportionate to its apparent radicalism, as a rule, no more than in the usual arthrotomy. The operation is facilitated very considerably by the attention to a few details of technic, and since this route is comparatively new, it may be of value for those who have used it to some extent, to record their experience in regard to these details.

The incision must be long, particularly above, where it must extend to above the upper border of the lower third of the thigh, and below to beyond the tubercle of the tibia. Above, the incision should slant distinctly to the outside, to follow the line of direction of the tendon of the quadriceps. The dissection of the tissues overlying the tendons need be carried laterally only far enough to disclose the edges of both the quadriceps and patella tendons. This much is necessary to insure a median division of these tendons, which otherwise is not easy. The periosteum of the patella is cut through, but not retracted, and extended into but not through the quadriceps and patella tendons sufficiently to mark the line of incision. The patella is split by a saw cut, a little to the inside of the middle line, to leave the outside fragment a little larger than the inner, and to aid still further in this, the saw cut may be slanted inward, to make the under side of the outer fragment wider than the upper. This also gives firm apposition in closing, as the tension of the tendon crowds the overhanging inner fragment down on the outer. This is not easy except with a small and fine saw, and the tendons must be first split; otherwise they will be frayed by this procedure. Ordinarily the straight cut is sufficient and often better. The saw cut is most easily begun with the knee in the extended position, and when the groove is well made, completed with the knee flexed at 45° or more, in which position it is held firmly in place. The patella tendon can be divided by a single cut, but with the quadriceps it is necessary to divide it in layers, particularly in its upper part, as the fibers here are placed in a kind of spiral arrangement, the under fibers having a direction toward the inside, and the outer towards the outside, and this separation is carried on horizontally.

The alar ligaments and sub-patella fat pad are divided directly in the middle line, with the knee flexed, taking care to preserve the attachment of the ligamentum mucosum, which will usually be found on the inner half. By this median division, the fat pad, with its synovial covering, can be brought together again, and leaves no raw surface exposed to the inner surface of the joint. It frequently is necessary to detach the alar ligament and the pad from the middle of

* Read before the Boston Surgical Society, January 10, 1917.

the anterior surface of the tibia, to which it is only lightly attached. For a good view of the crucial ligaments it is necessary, and particularly so to find and remove a cartilage. This is easily stitched back to the place of its old attachment and apparently does no harm. This is, however, not a good approach for cartilage, and is unnecessarily extensive.

Sterilized absorbent cotton wet in normal salt solution, is preferable for sponging, for all possible friction to the synovial membrane is to be avoided. The author has used silk for all parts of the closure. Nos. 6 to 8 for the synovial membrane, quadriceps pouch and both edges of the tendons. No. 14 for the patella suture—one on either edge, above and below, taking in a bit of the tendon, which gives a firm, strong hold; and one or two between, taking in the periosteum and expansion of the tendon of the quadriceps. It apparently is not necessary to sew through the patella to insure good apposition, for the tension of the tendon is sufficient to keep the fragments in firmly together. Fixation is not used, except by posterior Cotton splint, which keeps the knee from full extension, and gives sufficient protection, yet allows a little motion, which is desirable. When leaving the bed, the patient wears a split plaster, which is used during the time of being up for a month or six weeks,—passive motion is allowed from the first, and given after two weeks, but never to beyond the point of pain. Weight-bearing in the plaster is allowed in a month, and full normal use expected at the end of two months.

DISCUSSION.

DR. PAINTER: I think this operation has probably done more for joint surgery at the knee joint than almost any other innovation that has been introduced, certainly since the aseptic handling of the operative field.

The points that Dr. Brackett has made, I think, are particularly worth bearing in mind; particularly the point concerning the careful readjustment of the synovial membrane and the structures that have been divided, because it is the leaving of these in an unsatisfactory condition which is responsible for some of the discomfort and retardation in restoration of function after joint surgery. Of course, one of the things that militates against the interference with conditions in the joint has been the fear that motion could not be restored after major operations, and this method of approaching the joint has done away with this to a very considerable extent. I have not had the opportunity of doing this operation very many times, but it has seemed to me that one of the ways in which this may be of great service to us is in making exploratory incisions in cases where they are necessary. For those of us who believe there is such a thing as primary synovial tuberculosis,—which is very difficult to diagnose,—this operation offers an opportunity to explore the joint much more satisfactorily than any other incision with which I am acquainted, and it does so with very much less likelihood of any permanent interference with the mobility of the joint in case the condition which is expected, and to find out which the operation is per-

formed, is not present, and the real condition is one which does not necessitate more radical procedure. If it should not prove to be a synovial tuberculosis, the joint would not be damaged. If it did prove to be synovial tuberculosis, the appropriate operative procedure could be carried out.

DR. ROBERT B. OSGOOD: In observing these cases I have been struck with two things: First, the lack of operative reaction and, second, the speed with which function has returned. The convalescences have been entirely uneventful.

This incision was devised by Mr. Robert Jones and Alwynne Smith and illustrated by them in an article appearing in the *British Journal of Surgery*, April, 1913, upon Rupture of the Crucial Ligaments and Fractures of the Spine of the Tibia.

Dr. Corner has advocated it also in several articles (*Lancet*, May 9, 1914; *Journal A. M. A.*, Sept. 26, 1914), believing that rupture of the crucial ligaments is not uncommon in severe injuries to the knee. He advances the theory that foreign bodies (joint mice) do not as a rule come from injuries to the condyles and subsequent separation of the cartilage, but from tears of the synovial membrane, closely adherent as it is to the crucial ligaments and therefore easily torn. A flake of fibrin collects and a foreign body nucleus is formed and, as Dr. Codman has shown, gradually increases in size.

The diagnosis of complete rupture of the crucial ligaments is interesting. The ligaments are made tense by any attempt at forward and backward displacement of the tibia on the femur and by inward rotation of the tibia on the femur. The anterior prevents forward and back motion in extension of the leg, the posterior in flexion of the leg, and if both are ruptured there would be an excess of internal rotation of the tibia on the femur.

Corner believes that the repair of these ligaments ought to be done through this incision, the torn ligament being reefed by a non-absorbable ligature which is then carried up through a drill hole in the condyle and tied.

Mr. Jones is sure that they nearly all recover more successfully if they are simply put at complete rest for several months as soon as they can be diagnosed, and advises against operation in the majority of cases.

I believe this is not the incision of choice when a definite diagnosis of a slipping or torn semilunar cartilage has been made. These cartilages can be reached more easily by the lateral L-shaped incision of Mr. Jones, the knee being flexed over the end of the table.

DR. SOUTER: There is very little to add to what has already been said. The anterior median incision at the knee will give a very complete exposure. When the incision is used in low-grade infectious conditions, in the aged, the operation must be done rapidly. A very fine approximation of the patella is necessary. In these cases the tendon above, sutured rapidly, has been sufficient for later function, in cases infected. This incision allows a pannus to be carefully removed and the joint wiped out. Using this incision in infectious cases, any necessary drainage is possible by tubes inserted into lateral punctures (one inch long) made from within outward, similar to the axilla drainage which is used following breast amputation. One case, an old man, had constant night and day pain, only

slightly relieved by morphine after using the median incision. The joint was very much better drained and cleaned out than by two lateral incisions. The latter would have injured the capsules to a greater degree than the lateral punctures for drainage just described. The operation was done hastily, with careful approximation of the patella and rapid suture of the tendon above, with hardly any pain following the operation and ninety degrees of ultimate motion.

DR. CHEEVER: I have operated on 4 or probably 5 cases by this method. Dr. Brackett properly lays great stress on causing as little trauma as possible, and has mentioned that he does not divide the ligamentum mucosum for this reason. In my cases, this ligament has usually been divided, in order to facilitate exploration of the joint, and there have been no noticeable ill effects, since the cases have all made uncomplicated recoveries.

I should like to suggest the use of sterile rubber dam or gutta percha tissue to cover the articular cartilage of the condyles of the femur during their exposure to prevent the desiccation that occurs and which undoubtedly constitutes an injury.

DR. BRACKETT (closing): Dr. Osgood has said that the incision is not adapted for the removal of the cartilage, which fact should be emphasized, yet although it is not the route of election, the cartilage may be removed through it. The difficulty lies in reaching far enough posteriorly to detach thoroughly the cartilage, but in cases of doubtful diagnosis, when an exploratory opportunity is desirable, this route may be chosen.

THE MANAGEMENT OF OPERATIVE CASES PRESENTING URINARY BACK PRESSURE.*

BY ARTHUR L. CHUTE, M.D., BOSTON.

IN order that we may have urinary back pressure acting on both kidneys, it is necessary that the obstruction be either at, or external to, the bladder outlet. There are only two common conditions that fulfil this requisite,—prostatic obstruction and tight stricture of the urethra. Practically the condition is always limited to adult males. Congenital strictures in children and strictures of the urethra in women are known, but are too rare to have any real importance.

This subject of the management of cases showing urinary back pressure seems to me of the greatest importance, though it has as yet received relatively little attention, especially from the general surgeons, due, largely, I believe, to the limited conditions under which it is found, partly to a more or less vagueness that surrounds certain phases of it. My opportunity to study this condition has been mostly with cases having back pressure due to prostatic obstruction. I have seen relatively few cases in which

the back pressure has followed a tight stricture, but with the exception that the stricture patients are younger and, therefore, a little better risks, the conditions and dangers have seemed the same.

In my earlier prostatic work, which was done wholly under ether anesthesia, I lost patients whom I should not have lost, and lost them often when I least expected to do so. These patients were often fair operative risks from the general surgical point of view, that is, they showed a moderately good heart; often a urine that was not bad, and sometimes even a clear urine; their blood pressures were not necessarily high; some of them were not very old; on the whole, they were not men whom one would consider good risks, but were patients on whom any reasonable operation should be followed by recovery. The one thing, however, which these patients invariably showed was a residual urine, usually considerable in amount, often turbid, sometimes clear. The fatalities in these cases came usually in from three to five days after operation, and in many instances were supposed to be due to hemorrhage, since the urine was rarely clear of blood by that time. Sometimes the fatal outcome was considered due to a myocardial heart, or delayed shock, or some other vague or rather unsatisfactory cause, but rather directly due to the operative procedure carried out on the prostate.

Some years ago, I lost, within a few days of one another, two patients that raised a question in my mind as to whether the operation on the prostate was the real cause of death in these cases. One of these patients was a doctor, with a large amount of clear residual, whom I sent into a hospital and catheterized, at first intermittently, later continuously. This procedure, which was preparatory to getting him into condition for a prostatectomy, I carried out with the greatest care it was possible for me to exercise. A very competent medical man coöperated with me in the care of this patient, and yet we saw him develop the dry tongue, slightly distended abdomen, hiccough, mental dulness, nausea, bloody and then diminished amount of urine, and the same general picture, ending in death, that I had seen in fatal post-operative prostatic cases. It seemed evident that this man died of pyelonephritis as the result of infection following my catheterization.

In the case of the other patient, I determined to avoid the danger of what one might call "closed" bladder infection by supplying adequate drainage from the start. This man also had a complete retention with an infected urine; he had vomiting and showed marked dyspepsia urinaria. I opened his over-distended bladder under ether. He developed the same signs as the first patient except that he had suppression of urine from the start, and his vomiting continued without intermission. He died 28 hours after operation. It was perfectly clear that pros-

* Read before the Boston Surgical Society, January 10, 1917.