

# A simple meniscectomy

JACK C. HUGHSTON, M.D.

*The following is the text of Dr. Hughston's Presidential Address to the American Orthopedic Society for Sports Medicine, March, 1975, San Francisco, California:*

I wish to meditate with you on an ordinary encounter, common to each of us almost daily, a *simple meniscectomy*.

Reconstructive surgery of the knee seems to be the rage at the moment, consuming a great deal of our conferences and writings these days, but I think it be wrongly so! Maybe we are getting the cart before the horse. Maybe we need to go back to the beginning and look into some of the things we have learned from "ruined knees" wherein the initial operative record indicated a *simple meniscectomy* was performed. In our clinic we see an increasing number of "ruined knees" which have somehow come about following a *simple meniscectomy*. Obviously—in some cases there was more than a simple torn meniscus as the initial pathology, or the pathology was other than a torn meniscus. Sadly, in some it seems the pathology was augmented without recognition. I think that, if you will bear to read through out technique of medial meniscectomy, you may see that our approach is a bit different from the usual, and the concept of a meniscectomy being a simple affair is somewhat erroneous.

"Today" I operated on a 20-year-old girl, college student, tennis player, water skier, and horseback rider. I saw Kay three months ago with a complaint of her right knee initially giving out from under her following water skiing two summers previously. She related a mild amount of swelling at that time but no real specific injury and sufficiently insignificant to consult a doctor. A second episode of difficulty occurred in playing tennis five months ago with a moderate swelling; the knee was then aspirated by her doctor and demonstrated a clear

straw colored fluid. She continued to have some giving away of the knee on twisting and pivoting in playing tennis. She had no definite or localized pain in the knee joint, but continued to have a vague ache, more localized to the lateral aspect of the knee joint. Abduction stress produced pain over the lateral compartment secondary to the compression, with some feeling of a click or snap over the lateral meniscus region. The McMurray test demonstrated some popping on the lateral aspect of the knee joint. Naturally all of these findings relative to the lateral meniscus could have been secondary to popliteal tendinitis or many other things; and I always feel that the lateral side of the knee joint pops pretty easily anyway, and such popping gives me very little information of a definite nature. She demonstrated only the mildest amount of atonia and atrophy of the right thigh as compared to her left. There was a full range of knee motion and no recurvatum. Sitting on the examining table her patellae sat slightly lateral; the Q-angle measured 20° bilaterally with the knees in extension. With the knees extended against gravity at about 45° there was a moderate VMO dyplasia and a mild passive lateral hypermobility, but no apprehension. The right patella was tender on longitudinal and transverse palpation against the femoral condyles; there was also tenderness to palpation of the medial facet of the right patella as compared to the left. In testing ligament stability, there was a 1+ abduction stress test at 30° of flexion and the anterior drawer test was a 1+ with the tibia in neutral and external rotation. I did not find a comparable instability on the opposite knee.

The impression at this moment was that she had a tear of the lateral meniscus, that the mild ligament laxity was probably due to effusion and atonia, and that the patellofemoral findings were not clinically significant. She was scheduled for operation for a lateral meniscectomy, and the day prior to surgery re-evaluated with essentially the same findings.

After pre-operative sedation, further examination demonstrated a mild positive jerk test which had not been evident on the previous evaluation, thus indicating anterolateral instability. The abduction stress test was impressive as being more than a 1+. The anterior drawer test with the tibia in neutral rotation was increased to almost a 2+. General anesthesia was begun and the knee evaluated once again; she now demonstrated a 15° recurvatum bilaterally. Passive hypermobility of the patella was increased to where I could almost dislocate it off the lateral femoral condyle with the knee flexed 45°. The jerk test was now more positive and I rated it moderate or 2+.

What started out as simply a torn lateral meniscus was now clinically determined to be three entities. Where do we begin? What do we correct initially?

I began with an anteromedial incision for evaluation of the knee joint. The medial meniscus was completely visualized with flexing the knee to 30° and applying abduction stress, thus indicating certainly a looseness to the medial compartment and what I graded 2+. The medial meniscus was perfectly normal. The patella demonstrated no chondromalacia. The VMO was mildly to moderately dysplastic. The anterior cruciate ligament was like a limp rope and obviously much too long to be serving any useful purpose. I consider this a typical finding with patients having congenital recurvatum of 15° or more. The posterior cruciate was normal. There was no chondromalacia or roughening of the femoral condyles. The lateral tibial condylar surface demonstrated fraying. The lateral meniscus demonstrated a posterior longitudinal tear.

Next I made a longitudinal incision along the line of the iliotibial band from two inches proximal to the lateral femoral epicondyle

down to the lateral tibial tubercle. At 90° of knee flexion, the posterior retraction of the iliotibial band brought into view the lateral capsular ligament and arcuate complex. A vertical incision in the capsular ligament in line with the popliteus tendon and just anterior to the fibular collateral ligament allowed the anterior half of the lateral meniscus, which had been freed peripherally through the anteromedial incision, to be passed out through this posterolateral capsular incision. Posterior retraction of the popliteus tendon and arcuate complex demonstrated an additional tear of the lateral meniscus at its peripheral margin posteriorly. I would have been remiss if I had freed the lateral meniscus anteriorly through the anteromedial incision and removed only the bucket handle. The meniscus was freed centrally with the meniscotome, retracted out of the knee joint and released from the remaining synovial attachments of the posterior capsule, and on inspection demonstrated evidence of the double bucket handle type tear. It appeared that I had completely removed the lateral meniscus but then on passing the hemostat through the intercondylar notch I dislodged an additional sclerotic tag of the lateral meniscus which had torn off the body of the meniscus, flopped up into the intercondylar notch, and hypertrophied and become sclerotic. It was evident on flexing and extending the knee that there was a definite possibility this additional tag of meniscus could have produced subsequent functional difficulty if it had not been observed and removed.

The tourniquet was removed and hemostasis was secured.

With the anterolateral instability having been graded as a 2+ I could not sufficiently benefit this young lady and give her a functional knee unless I proceeded to do a reconstruction for her anterolateral instability. The iliotibial band was rerouted and the short head of the biceps femoris mobilized and advanced anteriorly as reported. The anterior drawer test now was reduced to a minimal degree.

I was still concerned relative to the patella hypermobility, the lateral patella posture, the tenderness under the medial facet, and

the likelihood of subluxation of this patella increasing at a later date. Through the lateral incision I released the insertion of the vastus lateralis tendon into the superior pole of the patella and some of the lateral retinaculum. These tissues retracted, resulting in immediate improvement in the patella posture.

Returning to the anteromedial incision, I made a proximal extension and released the vastus medialis obliquus insertion from the superior half of the patella and the distal inch of the quadriceps tendon. The VMO was now advanced 1.5 centimeters onto the dorsum of the patella and distal quadriceps tendon. After approximation of the fat pad, the medial retinaculum was advanced 1 centimeter onto the lower third of the patella and patellar tendon, all the way down to its tibial margin. Obviously with the ability to advance the retinaculum this distance with the knee flexed 90°, the medial retinaculum had to be quite loose, whether this be on a congenital or pathological basis. I thought primarily it was on a congenital basis. At 30° of knee flexion the abduction stress test had now been reduced from 2+ medial instability to less than a 1+. The anterior drawer test demonstrated only a minimal give with the tibia in neutral and in external rotation.

Kay could have eventually ended up in the category of a "ruined knee" if I had not continued to re-evaluate her all the way through into the period of anesthesia and if I had not chosen to go ahead with the reconstruction for anterolateral instability, the proximal reconstruction for her subluxing patella, and the advancement of the extensor retinaculum medially for reducing the medial instability.

Kay represents the typical case that we so often see wherein a young athletically inclined person has had a medial meniscectomy, possibly a lateral meniscectomy, and yet that person continues to have disability thereafter. Then a further operation is carried out for removal of one or the other of the menisci, whichever one is left. Continued disability may influence an operative procedure for a subluxing patella or a pes transplant to correct anterior instability. And so

on down the line until the person ends up having three, four, or five operations and is still disabled. The water is so muddied by that time that it is difficult to tell what the problem was at the beginning, and where to go in order to present a functional knee for even sedentary activity. Kay's knee demonstrates so beautifully why we can never be satisfied with a single diagnosis; why we must re-examine, re-examine, and re-examine a knee prior to surgery and during surgery; and why it is so important that all corrective measures possible be undertaken at the initial surgery. A knee subjected to repeated and repeated operations increases the deterioration of the knee joint. During that period of time, while one is procrastinating and contemplating which operation to do next, the muscles and ligaments are becoming more atonic and atrophied. Scar tissue increases and further afferent nerve endings are lost with each operation. Psychological trauma and the socioeconomic forces become severe.

Kay points up the reason I want to discuss the subject of *a simple meniscectomy*.

I position the extremity with the foot planted on the operating table and the knee flexed approximately 80°. An incision is made beginning at the xiphoid prominence of the medial edge of the patellar tendon to the level of the upper tibia. The incision through the synovium lies in that area in which the height of the patella lifts the possible subsequent synovial scar off the area of contact with the medial femoral condyle. The anterior compartment of the knee is inspected. The extremity is then abducted off the side of the table, and slightly flexed at the knee; and with retraction the medial compartment is inspected; the medial meniscus is visualized and is palpated through its entirety with a meniscus hook.

The extremity is then placed back on the table with the hip externally rotated, the thigh abducted, and the knee flexed about 80°. The fat pad is retracted with an Army/Navy or fat pad retractor passed laterally and levered over the surface of the lateral femoral condyle. In viewing the knee in this manner I can visualize the entirety of the

lateral meniscus. One's clinical diagnosis of a torn medial meniscus is not always correct, as the lateral meniscus is well known to sometimes present clinical findings compatible with medial meniscus pathology. Also, there may (at times) be a tear of the lateral meniscus as well as a tear of the medial meniscus, wherein the medial meniscus was the more disabling and was the pre-operative clinical diagnosis. Further, I have seen many cases of anterolateral rotary instability wherein the medial meniscus was the initial operation because this instability so often produces a snapping or popping on carrying out the McMurray test and is associated with medial joint pain.

Jim Andrews, my associate, reported the statistics on findings in the anteromedial approach at the AOA Residents Conference, March 12-14, 1972. Our data run in the neighborhood of 50% tears of the medial meniscus, 35% tears of the lateral meniscus, and 15% tears of both the medial and the lateral meniscus. Thus far, our review of the literature shows that other reported series have demonstrated only a 1 to 3% incidence of combined medial and lateral meniscus tears. We would be hard pressed to find anyone more expert at arthrography of the knee than Frieberg, and yet he and Nicholas reported only 3% bilateral (medial and lateral) meniscus tears. Other reports have given an incidence of 5 to 8 medial meniscus tears to 1 lateral meniscus tear. If one is not investigating the lateral meniscus at the time of doing a medial meniscectomy, according to our findings, he is certainly missing a fair amount of pathology in his knee surgery. As a result, one could anticipate continued postoperative disability in quite a number of his simple medial meniscectomy cases. I do believe the experts in arthroscopy will soon be coming up with a percentage incidence of meniscus tears close to ours.

At the Academy symposium on arthrography and arthroscopy, one of the speakers indicated that one or both of these preoperative "operations" (sometimes called studies or investigations) would soon be mandatory before a meniscectomy procedure. Our findings of incidence of meniscus tears and other pathological findings reported herein are in

disagreement as regards arthrography. Arthroscopy is not yet well enough documented to evaluate; however, I do not think any of us would anticipate it as a diagnostic tool for patella subluxation and ligamentous instability. The whole theme of this address is that there are no ancillary diagnostic aids nor any perfect degree of clinical astuteness that will allow us to operate upon a knee without due consideration for complete operative investigation of the entire joint, and re-examination during the process of the operation.

An initial episode of an acutely swollen and locked knee does not indicate a torn medial meniscus locked into the knee joint. We place this patient on crutches and on quadriceps exercises until he has worked out the hamstring spasm and produced re-absorption of the effusion. At anytime thereafter that we can demonstrate objective evidence of a meniscus tear we are willing to operate. I would agree, that if one felt pressed to operate for a meniscus tear prior to being able to reduce the effusion and the hamstring spasm, then an arthrogram would be in order. A negative arthrogram could thereby encourage an anxious surgeon or an anxious patient to continue on the route of conservative treatment at least for a bit longer. With our routine of initial conservative care, we thus far have a rate of 50% long-term recoveries of our acutely locked and swollen knees.

Any additional pathology noted on complete exploration of the knee joint through the anteromedial incision will have to be corrected, whether this consists of excision of a stump of an old tear of the anterior cruciate ligament, removal of loose bodies, chondrectomy of the patella, partial synovectomy of the suprapatellar plica, etc. Once we have determined that the medial meniscus is torn, a posteromedial vertical incision is made beginning at the area immediately between the adductor tubercle and medial epicondyle, extending distally along the posterior border of the tibial collateral ligament to the upper margin of the tibia. The posteromedial area of the joint is entered through this soft capsular area lying between the anterior edge of the tibial arm

of the posterior oblique ligament and the posterior edge of the tibial collateral ligament. The posterior portion of the meniscus can be visualized through this incision. One may see a peripheral tear of the medial meniscus which was not evident in the anterior exploration of the knee. This is particularly true in double bucket handle tears of the medial meniscus. Andrews and Norwood are reporting the incidence of our double bucket handle tears of the medial meniscus to be in the neighborhood of 43%. If only the bucket handle is removed, this 43% of double bucket handle tears could conceivably produce continued knee disability postoperatively and could produce long-term evidence of joint deterioration.

It is almost ironic that there is a soft spot constituting a door to the posterior half of the meniscus; they must have seen us coming, and they obviously knew that the major meniscal pathology is in the posterior half. Through this posteromedial incision, ganglions and tears in the posterior capsule in the popliteal region can be identified from within the knee joint, wherein these ganglions were not evident on pre-operative clinical evaluation. In such a case, with moderate extension of the incision, the popliteal ganglion can be excised and the capsular tear or opening can be closed.

The two separate skin incisions have been contested, some favoring an anterior incision with reflecting the flap of skin to allow a posterior retinaculum incision. I used to do this. This produces problems. There results scar tissue over the medial compartment, increased chance of hematoma and infection, and a decrease of some afferent spinal reflex impulses. Most important, the two separate skin incisions allow considerable extension of either incision for better access to additional pathology.

Inadvertently, the meniscotibial ligament has been severed in three cases over the past 10 years and immediate 2+ anteromedial rotary instability has resulted. On hearing this noise resembling a tear in a piece of cloth, one's heart sinks. It is a lesson in knee stability, however, proving the extreme importance of the mid-third meniscotibial ligament disruption as etiologic in anteromed-

ial rotary instability in the absence of any associated pathology in the tibial collateral ligament or anterior cruciate ligament. It is vital to always check the medial and anterior instability of the knee joint just prior to removal of the medial meniscus, and immediately following the removal of the medial meniscus to be certain that gross instability has not developed as a result of the meniscectomy.

Following removal of the medial meniscus a hemostat is passed through the anterior incision into the intercondylar notch until it can be seen on viewing through the postero-medial incision. In approximately 3% of the cases, where apparently all of the medial meniscus has been removed, a large sclerotic fragment of the meniscus is dislodged.

For many years it has been my expressed opinion that the medial meniscus constituted an integral part of the stability of the knee joint and that necessary removal resulted in a relative instability. Clinical testing even under anesthesia cannot possibly reproduce the forces applied, for example, by a basketball player suddenly stopping. The tear of the medial meniscus in the younger, athletically active age group is not an isolated injury. I think it is primarily the result of the capsular arm of the semimembranosus not being in correct synergism with knee motion and thereby not retracting the posterior horn of the medial meniscus out of the tibiofemoral joint when the patient progresses from a point of knee flexion to extension. If this capsular arm of the semimembranosus, which attaches firmly to the tibial arm of the posterior oblique ligament, does not contract and thereby retract the medial meniscus out of the joint at the appropriate moment, I feel that not only is the meniscus torn but that the capsular arm of the semimembranosus and the tibial arm of the posterior oblique ligament are stretched in that often violent and painful moment of initial meniscal entrapment. I have operated some acute cases within a week of injury and observed longitudinal striations of hemorrhage in the fibers of the posterior oblique ligament and in the capsular semimembranosus tendon.

Observation of the medial meniscus tears

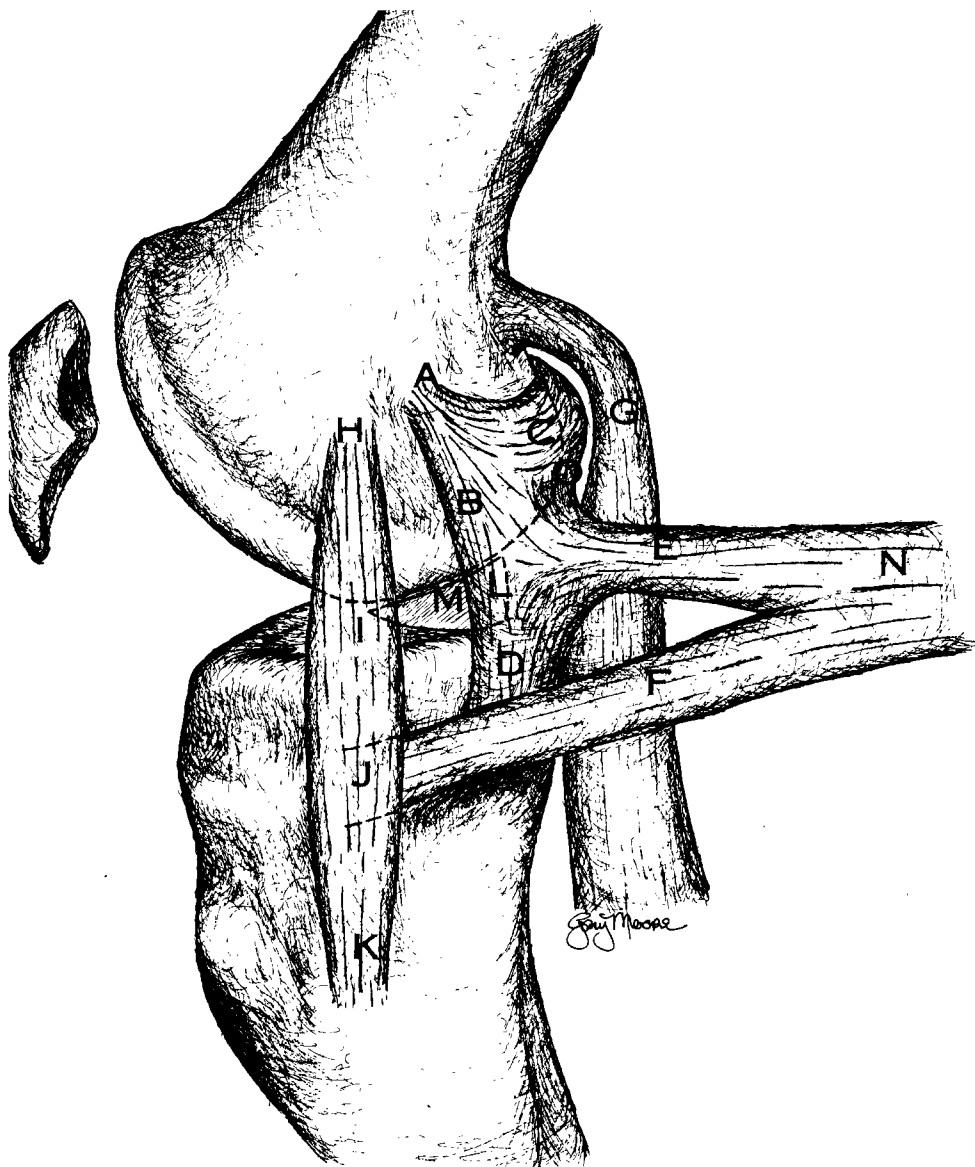


Figure 1—This illustrates the semimembranosus, both the tibial arm (F) and the capsular arm (E), and the common tendon (N). We are primarily concerned in this discussion with the capsular arm (E) as it inserts into the posterior oblique ligament. This ligament is shown as the tibial arm (A, B, D) and the capsular arm (C). The semimembranosus continues across the posterior aspect of the knee joint as the oblique popliteal ligament (O). The confluence of the oblique popliteal ligament and capsular arm of the posterior oblique ligament come together (C and O) and pass beneath the medial gastroc head (G). Also noted is the relationship with the medial meniscus (M) as it sits in the posterior aspect of the joint, forming a wedge type of bursae between the tibia and the femur posterior. The tibial collateral ligament is represented by its attachment on the femur at the medial epicondyle (H) and passing distally over the mid-third of the medial capsular ligament of the level of the joint (I) and then further distally over the tibia arm of the semimembranosus (J) and still further to its attachment onto the tibia beneath the pes anserinus (K).

It is our concept that the capsular arm of the semimembranosus, the tibial arm of the

which have not become extended longitudinally indicates the posteromedial corner as the site most frequently torn. Our statistics show 78% of the pathology of the medial meniscus is in the posterior horn, most often the region of the posteromedial corner. In those tears which have become extended to a bucket handle, often an additional peripheral tear of the meniscus is evident at this area of the posterior oblique ligament attachment. It is beautiful and thought provoking to visualize this unmolested pathology through the posteromedial incision before beginning the removal of the meniscus. I have often stated that if some fictitious circumstance allowed me only one incision for doing a meniscectomy, then I would choose the posteromedial incision, for that is the site of the major meniscal pathology and associated ligamentous involvement. Often the tibial arm of the posterior oblique is obviously looser than normal; but further, with the posterior oblique ligament having the broad peripheral surface of the meniscus as its central point of attachment, some additional laxity results from meniscectomy. This is more noticeable in those cases demonstrating less initial laxity of this ligament. At this point of discussion, it is appropriate to reaffirm that these are the reasons I have continued to hold hard in my belief that the medial meniscus should be saved whenever possible in acute medial compartment ligament tear. In 1973 we reported the saving of the medial meniscus in 68 of 100 consecutively operated medial compartment tears; and while "knocking on wood" for good luck, we can report thus far not a single subsequent tear of these saved menisci with a minimum of four-years follow-up.

In all of our knee surgery, whether a meniscectomy or a total knee, we remove

the tourniquet and obtain hemostasis prior to closure of the wounds. We feel this is extremely important. The patients have much less discomfort postoperatively. The joint is not distended with a hemarthrosis. Effusion in the postoperative course is rare.

The anteromedial incision is closed first. Now, the second major reason for the posteromedial incision: in closing the incision, the posterior oblique ligament is advanced proximally and anteriorly onto the femoral epicondyle, sutured distally onto the tibial condyle, and the central portion is advanced onto the tibial collateral ligament. Thereby stability is regained in the tibiofemoral joint and the dynamic stabilizer (semimembranosus) is shortened so that it can be active in making this ligamentous area taut in the process of cutting, twisting, and pivoting on the flexed knee.

We are studying our ten-year follow-ups operated in this manner and hopefully they will demonstrate a relatively high percentage of good knee joints as a result of restoring this stability to the knees at the time of medial meniscectomy. I firmly believe that this is a great factor in preventing osteoarthritic deterioration of the medial compartment in the long-term follow-up of meniscectomy.

I am not leaving all of these thoughts hanging in midair to possibly suffer a death as being personal impressions and just another individual's way of approaching a meniscectomy. Bill McLeod, Ph.D., our bioengineer and Aldo Moschi, M.D., of the University of Pavia, Italy, who was here with us on a year's Fellowship, are working on the biomechanics of the medial meniscus as related to its being a considerable factor in the stability of the knee. Mervyn Cross, M.D., of Sydney, Australia, also a previous

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*posterior oblique ligament, and the medial meniscus all act as a single unit in rendering increased stability to the knee joint on the posteromedial corner. In longitudinal meniscal tears, which occur in the athlete, we believe that the posterior third of the medial meniscus is trapped between the medial femoral condyle and the medial tibial condyle as a result of the capsular arm of the semimembranosus not being in perfect synergism with the movement of the knee from flexion to extension, thereby not producing the retraction of the meniscus out from between the condyles as the knee comes into extension, thus incurring the longitudinal tear of the meniscus. This in turn produces additional stress, and undoubtedly, some of the fibers of the tibial arm of the posterior oblique ligament and sometimes a stretching interstitial tearing of the capsular arm of the semimembranosus.*

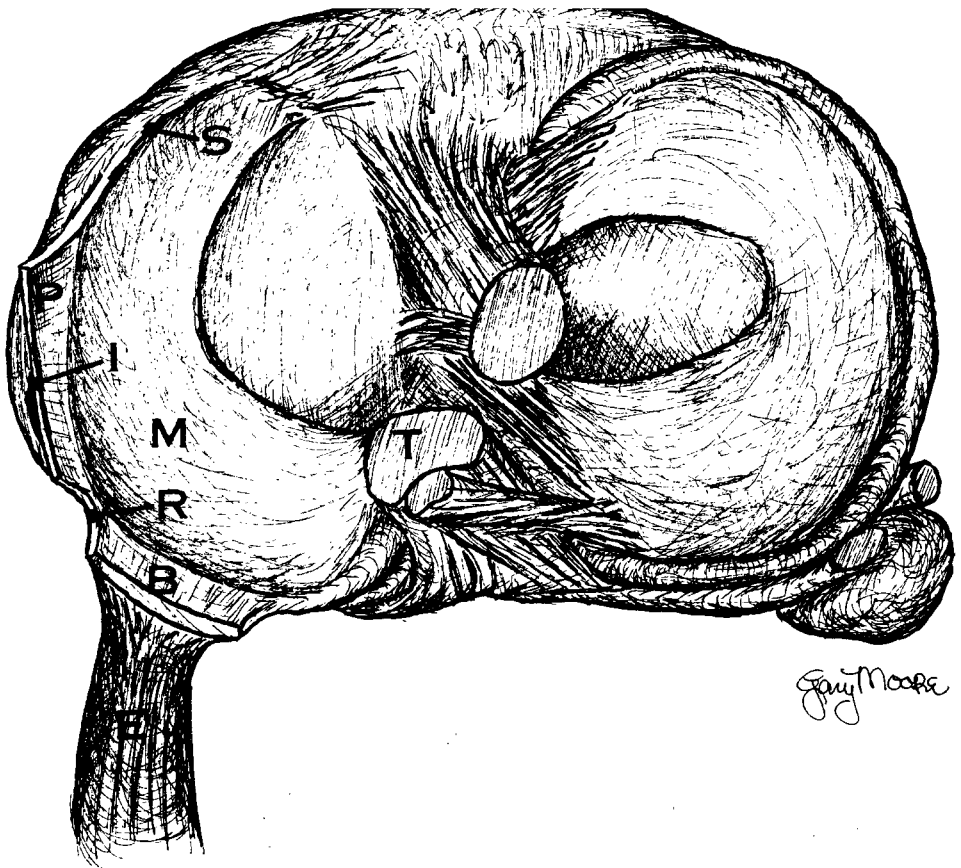


Figure 2—With looking down on top of the tibia, and correlating this with Illustration #1, the capsular arm of the semimembranosus (E) is seen inserting into the tibial arm of the posterior oblique (B) which is a thickened part of the capsule of the knee joint and which is attached quite firmly to the meniscus at the posteromedial corner as indicated. The tibial collateral ligament (I) overlies the mid-third medial capsular ligament (P), the latter also firmly attached to the medial meniscus (M). Anteriorly, the extensor retinaculum and capsular ligament (S) are much thinner. Posteromedially, between the mid-third of the medial capsular ligament and the tibial arm of the posterior oblique ligament is the soft area, or thinly formed capsule, (R). The medial meniscus, posteriorly, is attached in the fovea of the posterocentral part of the tibia in common with the tibial attachment of the posterior cruciate ligament (T). It can be seen how the capsular arm of the semimembranosus working through its insertion into the tibial arm of the posterior oblique actively retracts the major portion of the medial meniscus posteriorly out of the joint at the time of the knee going from flexion to extension.

Fellow, is carrying on with our investigation of the semimembranosus muscle and its relationship to knee stability, especially through its action on the posterior oblique ligament.

In the meantime if the posterior oblique ligament is not tightened to compensate for interstitial tearing at the time of the meniscus tearing, and to compensate for the

resultant laxity from removal of the medial meniscus, and if the capsular arm of the semimembranosus is not restored to sufficient tightness, then these factors along with the lack of the buttress of the medial meniscus, may allow the tibia to gradually and increasingly shift forward in a rotary fashion. Thereby is produced medial joint deterioration and resultant insidious onset



of further instability in the athletically active individuals, sometimes possibly producing fatigue fractures and disappearance of what had been an apparent normal anterior cruciate ligament. And if I still have a bit of doubt as to future stability, I supplement this closure with Slocum and Larson's pes transplant.

When we take all of the above factors into consideration in the process of a simple medial meniscectomy, it certainly does not appear to be quite that simple. I consider it is a rather complex set of circumstances bringing about the injury; and for excellent long-term results, operative intervention necessitates an investigation and correction of the many areas of injury associated with the tear of the meniscus. When I complete an operation for medial meniscectomy, I want to know everything that was possibly wrong in that knee joint and to have corrected it as well as possible. In the postoperative care I do not want to be wondering whether there is a loose fragment flopping out of the intercondylar notch, a suprapatellar plica popping over the medial femoral condyle, a retained posterior meniscal fragment, an associated tear of the lateral meniscus not visualized, a chondromalacia of the patella unrecognized, a subluxing patella, and an anteromedial or anterolateral rotary insta-

bility that was not corrected. In this way I hope to insure as far as possible an excellent *long-term* result.

My second operative case "today" was on a snow skier whose first operation seven years ago was historically a simple medial meniscectomy. Eight operations down the road and the last three years on crutches, she arrived begging for a knee fusion. After many months of putting her off and trying to evolve with some other solution, there was no other way out. It is emotionally traumatic to me to have to do a knee fusion on a young lady in her twenties who has had these multiple operations, one after the other, and having to think that possibly this unsuitable end could have been avoided by a continued, intelligent re-evaluation, and correction up to the point of completion of the initial operative procedure.

I appreciate the honor and privilege of having been your President of the American Orthopaedic Society for Sports Medicine this year 1974. I hope that this message on a *simple meniscectomy* can alert all of us to *deep thought, concern, and thoroughness* in our initial operative attacks upon a *virgin knee*, thereby making repeated procedures and reconstructions less frequently necessary.