

Surgical Repair Procedure of Medial Collateral Knee Ligament: Review

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Abstract: The main purpose of this article was to review the surgical repair procedures for medial collateral knee ligament (MCL), but first anatomy and diagnostic approaches must be discussed to give a fully understand to the operative techniques. Online search was performed using a computer-based search through the well-known medical databases: PubMed, and Medline, to identify all publications describing repair of the MCL of the knee, until January, 2017. Electronic search was limited by study of English language of publication and human subject articles. MCL and medial-sided knee injuries are still significant issues in the modern-day age of sports medicine. With advances in imaging techniques and refined grading of injuries, surgical treatment for medial-sided knee injuries, present review showed that repair of the MCL and posteromedial corner of the knee might be a dependable and efficient treatment for medial-sided knee injuries, resulting in enhanced valgus stability and patient-reported functional ratings with low rates of secondary failure. However, repair work strategies might differ substantially depending upon the chronicity and level of median ligamentous knee injuries, and proper patient selection is vital in figuring out ultimate clinical results.

Keywords: medial collateral knee ligament (MCL), medical databases, injuries, surgical treatment.

1. INTRODUCTION

The median collateral ligament (MCL) is one of the most commonly hurt ligamentous structures of the knee joint ^(1,2). The appeal of sports, especially those including valgus knee filling such as ice football, snowboarding, and hockey, has actually contributed to the regular event of MCL injuries ^(3,4). The role of prophylactic bracing has actually been biomechanically and clinically studied, and in the majority of studies was of limited benefit ^(3,5,6). Other preventive measures such as ability training, rule modifications, correct devices, and promotion of fair play have been proposed, however the efficacy of these modifications is not known ^(2,5). Most of patients who sustain MCL injuries of differing severity can accomplish pre-injury activity level with nonoperative treatment alone ^(7,8). The most serious injuries, specifically those with multiple ligament involvement, might need operative repair or enhancement on an acute basis. In addition, surgical reconstruction is indicated for isolated symptomatic chronic MCL laxity ⁽⁸⁾.

With a projected annual occurrence in between 0.24 and 7.3 per 1,000 individuals, ^(9,10) the medial collateral ligament (MCL) is amongst the most frequently hurt ligamentous structures of the knee ⁽¹⁰⁾. Yet regardless of the historically higher prevalence of MCL sprain among athletic associates, the anatomy and management of medial-sided ligament knee injuries have been formerly insufficiently investigated. More recent literature has actually specified a more comprehensive spectrum of medial and posteromedial corner (PMC) injuries that impart crucial functional contributions to valgus and rotatory stability of the knee, ^(11,12) consisting of the shallow and deep MCL, posterior oblique ligament (POL), semimembranosus, and posteromedial joint pill (**Figure 1**). A number of contemporary paradigms for the medical management of median knee injuries have actually also challenged the standard dogma dictating nonoperative treatment. Eventually, this has resulted in a renewal in the dispute about the optimal treatment of MCL and PMC injuries, making it a crucial location for further standard science and medical examination ^(13,14).

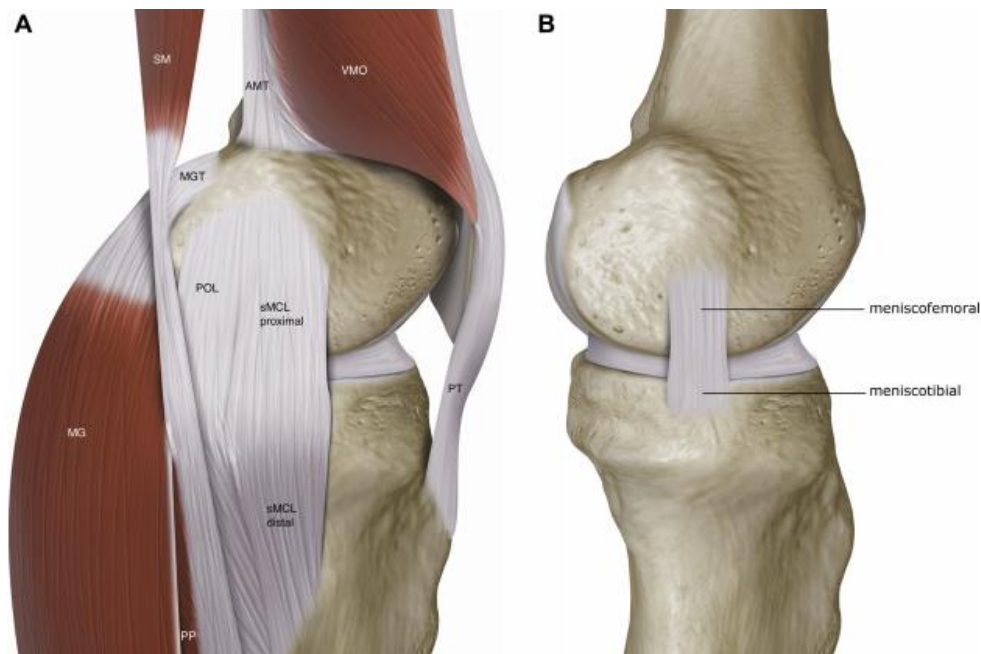


Figure 1: Medial and posteromedial ligament anatomy of the knee, (A) superficial and (B) deep.

The main purpose of this article was to review the surgical repair procedures for medial collateral knee ligament (MCL), but first anatomy and diagnostic approaches must be discussed to give a fully understand to the operative techniques.

2. METHODS

Online search was performed using a computer-based search through the well-known medical databases: PubMed, and Medline, to identify all publications describing repair of the MCL of the knee, until January, 2017. Electronic search was limited by study of English language of publication and human subject articles. The following terms were used as keywords and medical subject headings and appeared in the title, abstract or keyword fields: (“MCL” OR “Medial Collateral Ligament, Knee” OR “medial collateral ligament”) AND (“knee” OR “knee joint” OR (“knee” OR “knee joint” AND “repair”).

3. RESULTS

• Clinical diagnosis of MCL injury:

The mechanism of injury can be acquired either from direct observation of the injury or by mindful history taking. Valgus stress is the most typical system of injury. However, due to the position of the force and the knee vectors, a combined flexion/valgus/external rotation injury is normally the end outcome^(15,16). The vast bulk of MCL injuries are from a direct blow to the outer element of the lower thigh or upper leg, although non-contact valgus external rotation injuries are common in skiing⁽¹⁷⁾. Other essential information from the scientific history includes the location of pain, the ability to ambulate after the injury, time and onset of swelling, the feeling of a pop or tear, the presence of defect, and the instant site of tenderness⁽¹⁸⁾. The lack of swelling might show an extreme tear that enables fluid to extravasate into the surrounding tissue outside the joint. An acute effusion, within two hours of injury, suggests hemarthrosis, whereas swelling that appears 12-24 hours after injury normally indicates a synovial effusion. Seventy-six percent of patients with total MCL tears might walk into the workplace unaided with no assistance, and pain was discovered to be worse in incomplete tears than total tears⁽¹⁹⁾. The best time for examination of the knee is right away after the injury before muscle spasm happens. Lots of times this opportunity is only readily available to group physicians present at the time of injury. In those patients with extreme muscle spasms, a 24-hour duration of immobilization is typically sufficient for relaxation, and examination under anesthesia is rarely required⁽¹⁹⁾. While keeping the patient unwinded, a valgus stress test should be carried out with the knee in 30 degrees of flexion, and compared to the contralateral knee as a control. The evaluation is then repeated with the knee in 0 degrees of flexion to recruit the function of staying posteromedial structures. Any laxity appreciated from the latter test shows a total medial-sided injury and needs to lead the inspector to suspect involved injuries to the secondary restraints such as the cruciate ligaments and the posterior pill (Figure 4)^(1,20).

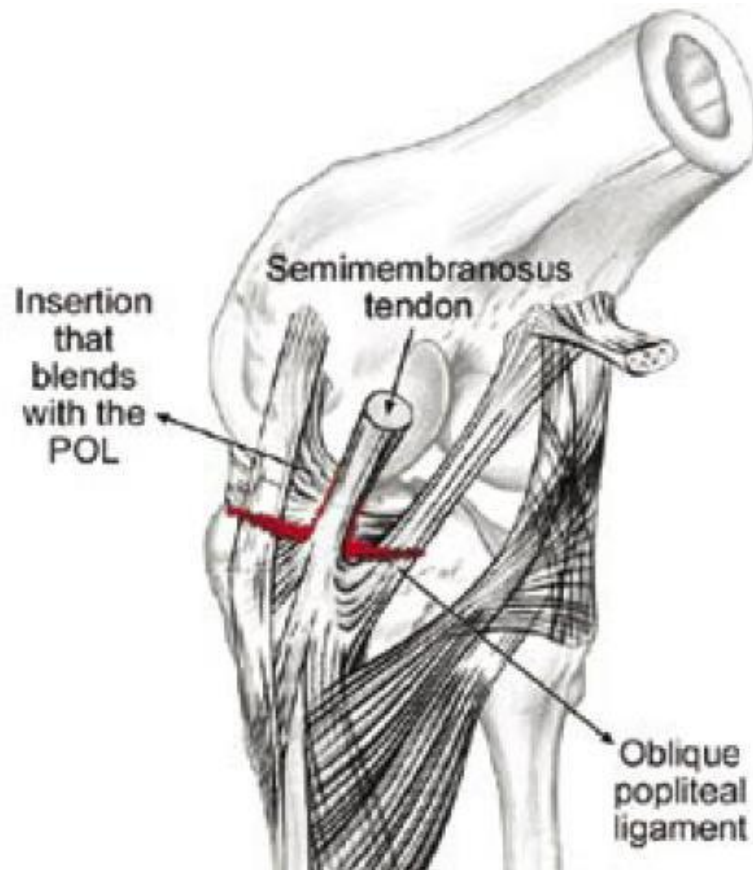


Figure 2: In complete medial-sided knee injuries, the injury completely tears the superficial and deep MCL

Roles of imaging techniques in diagnosis of MCL injury:

The requirement for knee radiographs after injury ought to be identified in accordance with the Ottawa knee guidelines⁽²¹⁾. If indicated, anteroposterior, lateral, and merchant views are gotten. Tension x-rays are handy in teenagers to leave out physeal plate injuries⁽²²⁾. Efforts have actually been made to assess laxity using combined tension radiographs and tension machines, however this technique has cannot end up being typical practice, possibly due to the size and complexity of the device^(23,24). The role of MRI in the category and treatment preparation of medial-sided knee injuries has been increasing. Hayes et al. classified complicated knee injuries into 10 types based upon the mechanism of injury⁽¹⁵⁾. Acknowledgment of these patterns might help evaluate the complete level of knee injuries, particularly those including the posterolateral and posteromedial corners of the knee. A research study by Nakamura et al. revealed that the location of the injury in the shallow layer on MRI could help predict the outcome after conservative treatment of grade III MCL lesions integrated with ACL injuries⁽²⁴⁾. After six weeks of immobilization in a knee brace, six out of 17 patients provided with residual valgus laxity on examination under anesthesia and were shown for a medial security development or reconstruction at the time of the ACL reconstruction. 5 from the six patients had proof of injury "over the whole length of the shallow layer"⁽²⁴⁾. Indelicato suggested either a regular MRI or an arthroscopic research study in all patients with laxity > 10 mm to identify intraarticular injuries, because a capsular tear may mask a significant effusion⁽¹⁸⁾. The authors' preference is normally to use MRI just to eliminate any other associated injury. In isolated Fetto and Marshall's grade I or II injuries, an MRI is not suggested. In grade III injuries, we suggest MRI assessment to entirely assess the level of the injury and for preoperative preparation.

- **Surgical indication MCL injury:**

Though most of isolated medial-sided knee injuries can be handled nonoperatively with great outcomes, surgeons may think about personnel interventions in specific scenarios including total ligament disturbance. Examples include the presence of intraarticular entrapment of the end of the ligament, a big bony avulsion, a tibial plateau fracture, a complete tibial side avulsion in professional athletes, or when anteromedial rotatory instability is present on physical exam^(25,26,27). One research study⁽²⁶⁾ summary of operative signs for medial-sided knee injuries is shown in (Table 1).

Table 1: Summary of surgical indications for medial-sided injuries of the knee

Operations	Surgical Indications
Acute repair	<ul style="list-style-type: none"> • list-behavior=unordered prefix-word= mark-type=disc • Presence of intraarticular ligamentous entrapment • A large bony avulsion • Associated tibial plateau fracture • MRI finding of complete tibial side avulsion in athletes • Presence of AMRI* • Presence of valgus instability in 0 degrees of flexion in an underlying valgus knee alignment
Delayed repair	<ul style="list-style-type: none"> • list-behavior=unordered prefix-word= mark-type=disc • Combined with anterior cruciate or other ligament reconstruction if the examination under anesthesia shows valgus laxity in 0 degrees of flexion
Augmentation	<ul style="list-style-type: none"> • list-behavior=unordered prefix-word= mark-type=disc • Combined with any repair if local tissue is deficient
Reconstruction	<ul style="list-style-type: none"> • list-behavior=unordered prefix-word= mark-type=disc • Symptomatic chronic valgus laxity
Distal femoral varus osteotomy	<ul style="list-style-type: none"> • list-behavior=unordered prefix-word= mark-type=disc • Chronic valgus laxity with valgus bony alignment

*= Anteromedial rotary instability

• Surgical procedure:

Primary repair work of the MCL is normally carried out within seven to 10 days after the injury. Place of the tear and the quality of the tendon as assessed by MRI or arthroscopic examination aid guide surgical planning⁽²⁴⁾. Femoral avulsion of the ligament leaves the very best tissue for repair and the ligament can be approximated using stitch anchors, staples, or a screw and washer. However, repair in this place might lead to the most problems with postoperative movement because of capsular adhesions and dysfunction of the extensor mechanism⁽²⁵⁾. Acute complete injuries with avulsion of the superficial and deep elements off of the tibia can be fixed straight. Repair work can be performed utilizing either stitch anchors or staples to secure the ligament back to its structural area on the proximal medial tibia after tension has been restored⁽²⁶⁾. Frequently mid-substance, and occasionally tibial-sided injuries, need enhancement or an allograft reconstruction due to the quality of the staying tendon. Arthroscopy is carried out to dismiss any other associated injuries. In addition, arthroscopy can help identify the site of the deep MCL injury, either above or below the meniscus). In an acute setting, arthroscopy must be carried out rapidly and effectively to decrease fluid extravasation. Alternatively, the cosmetic surgeon might opt to do any extended arthroscopic treatments after the direct exposure is made, allowing it to function as a channel for the drainage of arthroscopic fluid⁽²⁴⁾.

A cut is made on the medial side of the knee over the suspected site of injury. To expose the entire MCL, an incision is made from the median proximal tibia to the medial femoral epicondyle, curving posteriorly in line with the median intermuscular septum of the thigh. For isolated repair works either distally or proximally, a more restricted approach is used. In the case of combined treatment of acute total MCL tear and an ACL tear, we have actually found exposure of the MCL simpler if approached through a different median incision instead of extending the tibial incision for the ACL reconstruction. If possible^(25,26,27), Care is essential to preserve the infrapatellar branch of the saphenous nerve. The sartorial fascia is identified without undermining of the subcutaneous tissue sleeve. The sartorial and crural fascia is incised longitudinally. If dealing with a distal injury, the ruptured ends of the shallow MCL are identified underneath the gracilis and semitendinosus tendons. Hematoma may be encountered in this airplane and needs to be removed to allow direct visualization of all the injuries. The deep MCL is identified, and the tear is taken a look at. The opening to the joint produced by the tear and any injury to the meniscal accessory is checked. We tend to use Hughston's idea of fixing all of

the hurt structures in structural position⁽²⁸⁾. The repair should start from the deepest structure outside. A peripheral tear of the medial meniscus is frequently seen (33 percent) and nearly all of these are repairable⁽²⁹⁾. This can be done using an open technique under direct visualization. The stitch knots ought to be placed on the outdoors aspect of the posterior oblique ligament in order to recreate the vibrant function of the meniscus⁽³⁰⁾. A meniscofemoral ligament tear can be straight repaired utilizing stitches alone, or suture anchors if required. Suture anchor fixation into the tibial plateau is preferred for the meniscotibial ligament tear. If it is injured, the posterior oblique ligament is repaired by direct stitch back to the thigh.

4. CONCLUSION

MCL and medial-sided knee injuries are still significant issues in the modern-day age of sports medicine. With advances in imaging techniques and refined grading of injuries, surgical treatment for medial-sided knee injuries, present review showed that repair of the MCL and posteromedial corner of the knee might be a dependable and efficient treatment for medial-sided knee injuries, resulting in enhanced valgus stability and patient-reported functional ratings with low rates of secondary failure. However, repair work strategies might differ substantially depending upon the chronicity and level of median ligamentous knee injuries, and proper patient selection is vital in figuring out ultimate clinical results.

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