

Meniscal Root Repair With Mini-Open Medial Collateral Ligament Release



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Abstract: Meniscal root repair is becoming more common with increasing knowledge regarding the function of the meniscal root and its role in long-term joint preservation, as well as improved surgical techniques and instrumentation. Despite this, adequate visualization of the posterior horn of the medial meniscus may be challenging, particularly in those with tight medial compartments. Instrument handling and attempt to visualize and repair the meniscal tear may lead to iatrogenic chondral injuries in these instances. We describe our preferred technique for improved visualization via mini-open release of the distal medial collateral ligament that allows for increased joint distension, increased access to the posterior horn of the medial meniscus, and the ability to repair the released medial collateral ligament.

Defined as a bony or soft-tissue root avulsion or radial tear within 1 cm of the meniscus root attachment,^{1,2} meniscal root tears are an increasingly common injury with a prevalence rate reported to be as high as 9.1% among all patients undergoing knee arthroscopy in one study.³ Furthermore, meniscal root repairs are estimated to account for 10% to 21% of all arthroscopic meniscal surgeries.⁴ To properly diagnose and treat these injuries, it is important to have adequate visualization of the meniscal pathology arthroscopically. Particularly in patients with tight medial compartments, visualization of the posterior

horn of the medial meniscus may present as a challenge to many orthopaedic surgeons.⁵ There are several techniques described in the literature to release the medial collateral ligament (MCL) to allow for increased medial joint distraction when applying a valgus force to the knee. Popular techniques describe releasing the MCL through an arthroscopic pie-crusting method via a large-bore needle.⁵ Chernchujit et al.⁶ described an outside-in release in which they found an exact release point of the MCL, anterior to the saphenous vein, avoiding multiple punctures to the native structure. In this Technical Note, we report our experience performing a MCL release using a mini-open technique at the distal MCL insertion via a small incision that is also used for transtibial meniscal root fixation. This procedure allows for improved visualization of the posterior horn of the medial meniscus in a more controlled fashion than percutaneous pie-crusting techniques and also allows for the MCL to be repaired to its anatomic footprint at the conclusion of the procedure.

Surgical Technique (With Video Illustration)

Surgical Setup and Preoperative Evaluation

The patient is placed in the supine position with a nonsterile tourniquet (Stryker Corporation, Kalamazoo, MI) on the operative thigh. A lateral post (Allen Medical Systems, Acton, MA) is used to allow for valgus stress. The lower extremity is prepped and draped in the standard fashion.

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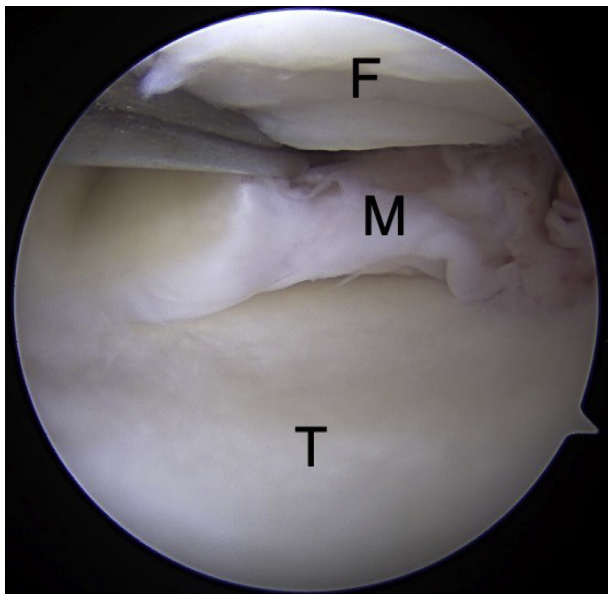


Fig 1. Arthroscopic image of a left knee demonstrating tearing of the posterior root of the medial meniscus. Image taken via 30° arthroscope from the anteromedial portal with the patient in supine positioning. (F, femur; M, meniscus; T, tibia.)

Surgical Approach

A standard 2-portal approach via anterolateral viewing portal and anteromedial instrumentation portal area is created and diagnostic arthroscopy is performed. The joint is insufflated with normal saline, and a 30° arthroscope (Arthrex, Naples, FL) is used. Following diagnostic arthroscopy and identification of the posterior horn medial meniscal root tear (Fig 1), the knee is placed in approximately 30° flexion with valgus force, and the anteromedial portal is created under direct visualization to optimize the trajectory for meniscal instrumentation. If it is determined that even under valgus stress the MCL remains too tight to safely instrument the compartment, we then proceed with mini-open release of the distal MCL.

Mini-Open MCL Release

Full description of MCL release, subsequent root repair, and MCL repair can be seen in [Video 1](#). The posteromedial aspect of the tibia and tibial tubercle are palpated, and an approximate 2- to 3-cm incision is made 1 to 2 cm medial to the tibial tubercle at the approximate location of desired tibial fixation for the meniscal root repair stitches (Fig 2). Bovie electrocautery is used for hemostasis, and sharp dissection is then carried down to the level of the sartorial fascia. The sartorial fascia is then incised, with care taken to lift the fascia while incising to not inadvertently damage the superficial MCL. The MCL is then subperiosteally elevated off the tibia and allowed to retract posteriorly.

At this time, the joint is re-entered arthroscopically, and release is assessed (Fig 3).

Meniscal Root Repair

Once adequate visualization is gained, the root is repaired via our preferred technique. A curette is introduced through the anteromedial portal and the meniscal root footprint is prepared by removing the cartilage. The meniscal root drill guide (Smith & Nephew, London, United Kingdom) is brought into the joint and drilled through the distal tibial incision, which has already been made for the MCL release. Adequacy of the drill hole placement is assessed (Fig 4). Following this, the Fast Pass Mini self-retrieving device (Smith & Nephew) is loaded with a looped over, nonabsorbable suture (FiberWire, Arthrex, Naples FL), allowing a loop to be passed up through the meniscus and retrieved in a single pass, negating the risk of a suture bridge. The free ends of the suture are then passed through the loop outside the body and tightened in a cinch knot configuration. A second stitch is then passed in similar fashion. A Hewson suture passer is then passed retrograde from the tibial drill hole into the joint. Within the joint, a looped suture retriever is brought through the

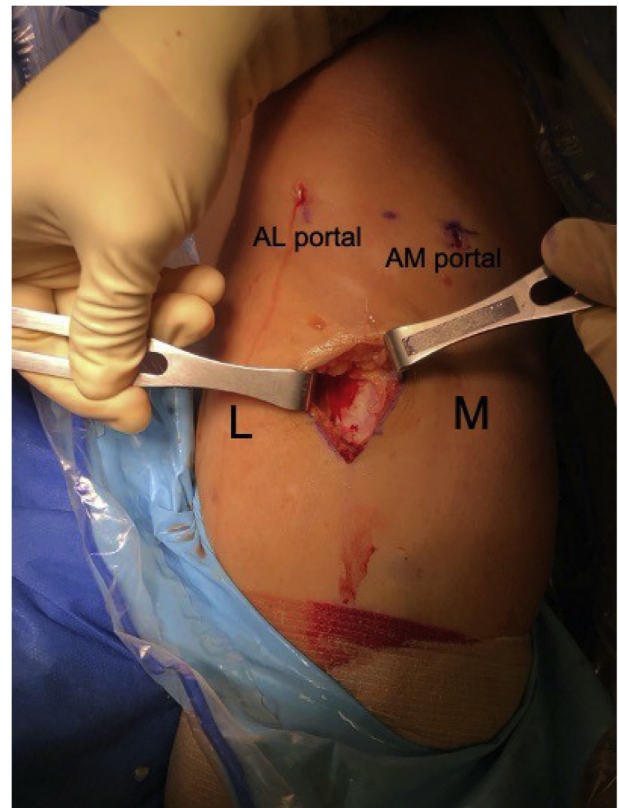


Fig 2. The patient is in a supine position. Initial incision of the left knee medial to the tibial tubercle for visualization of the distal medial collateral ligament as well as location of desired tibial fixation for meniscal root repair sutures. (AL, anterolateral portal; AM, anteromedial portal; L, lateral; M, medial.)

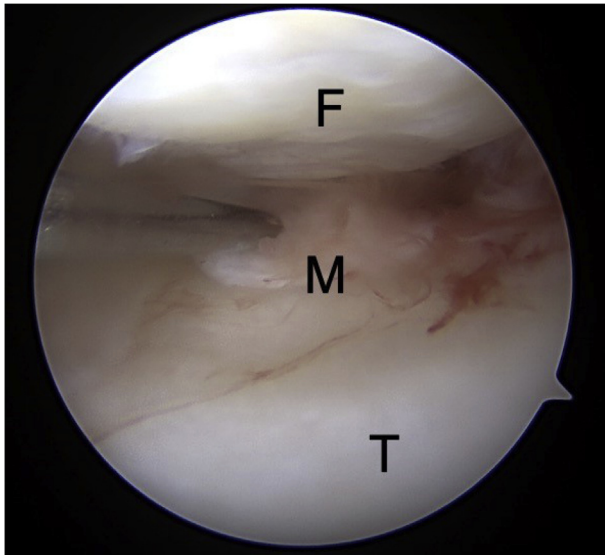


Fig 3. Arthroscopic image demonstrating adequate joint space for instrumentation of the posterior horn of the medial meniscus after a mini-open release of the distal medial collateral ligament attachment. Arthroscopic image of a left knee demonstrating tearing of the posterior root of the medial meniscus. Image is via 30° arthroscope taken from the anteromedial portal with the patient in supine positioning. (F, femur; M, meniscus; T, tibia.)

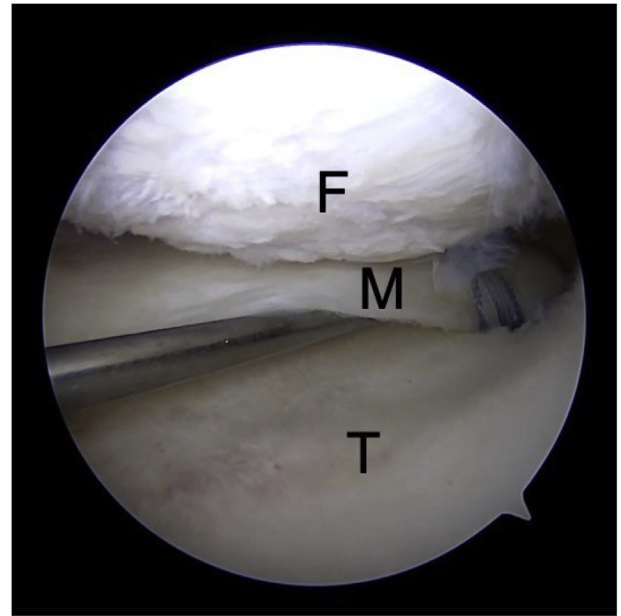


Fig 5. Final reduction of meniscal root confirmed with metal probe. Arthroscopic image of a left knee demonstrating tearing of the posterior horn of the medial meniscus. Image is via 30° arthroscope taken from the anteromedial portal with the patient in supine positioning. (F, femur; M, meniscus; T, tibia.)

Hewson to grab the meniscal stitches, pulling them through the passer, allowing the passer to shuttle the meniscal sutures into the tibial drill tunnel. The sutures are tightened, and the meniscal reduction is assessed

(Fig 5). The sutures are then passed into a SwiveLock (Arthrex) and secured in the tibia distal to the drill tunnel.

MCL Repair

Attention is turned to MCL repair. It is important to recognize that the deep MCL typically retracts posterior with regards to the sartorial fascia, and that both layers need to be retrieved (Fig 6). A double-loaded all-suture FiberTak (Arthrex) is inserted at the distal MCL

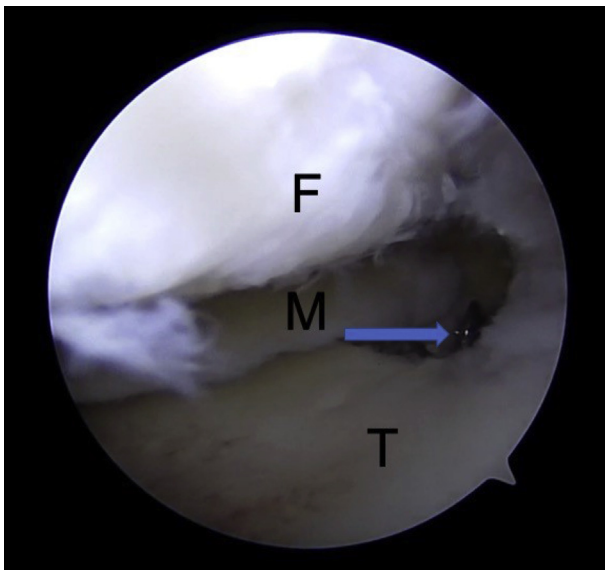


Fig 4. Confirmation of adequate drill hole placement in the meniscal footprint (blue arrow). Arthroscopic image of a left knee demonstrating tearing of the posterior horn of the medial meniscus. Image is via 30° arthroscope taken from the anteromedial portal with the patient in supine positioning. (F, femur; M, meniscus; T, tibia.)

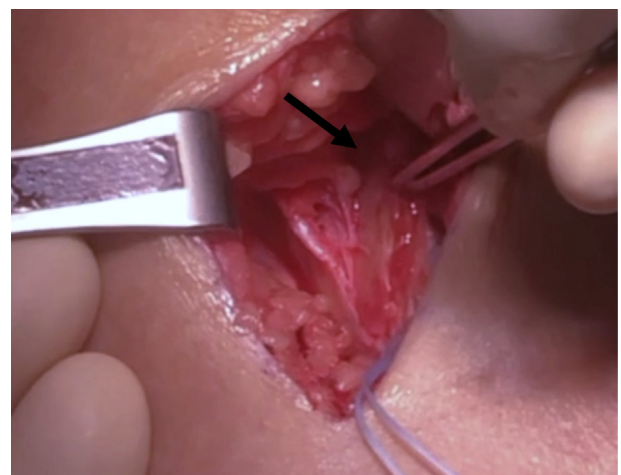


Fig 6. The patient is in a supine position. Black arrowing points to the deep medial collateral ligament in the left knee, which retracts posterior in regard to the sartorial fascia.



Fig 7. The patient is in a supine position. Watertight closure after suturing of the sartorial fascia on a left knee.

footprint. The limbs of the suture anchor are passed through the deep MCL and sartorial fascia in horizontal mattress fashion and tied to reduce to MCL to its native footprint. Free FiberWire (Arthrex) suture is then used to tie the vertical split in the sartorial fascia creating a watertight closure (Fig 7).

Postoperative Rehabilitation

Patients follow our typical meniscal rehabilitation protocol and are kept non-weight-bearing for 6 weeks but allowed to perform motion from 0 to 90° in a hinged knee brace from postoperative day 1. Estimated return to sport is 6 months.

Discussion

Arthroscopic approaches for evaluating meniscal tears may result in iatrogenic cartilage damage during instrument navigation in the narrow joint space. To effectively diagnose and treat meniscal pathologies, adequate visualization is required. This may be

Table 1. Pearls and Pitfalls of Surgical Technique

Pearls	Pitfalls
Careful location of the incision allows the surgeon to release the MCL and drill the transtibial fixation tunnel in the same incision	Incorrect incision placement will obviate need for a large incision to perform proper tunnel drilling
The sartorial fascia should be lifted while incision is made to not damage the MCL inadvertently	Damage to the superficial MCL can make anatomic repair difficult
During anatomic repair, the deep MCL typically retracts posterior and needs to be repaired as a separate layer to achieve correct tensioning	Failure to repair the deep MCL to its footprint results in valgus laxity

MCL, medial collateral ligament.

Table 2. Advantages and Disadvantages of Surgical Technique

Advantages	Disadvantages
Avoidance of iatrogenic cartilage damage	Limited literature on outcomes following technique compared with others
Single incision allows for MCL release as well as root repair suture fixation	Increased risk for injury to superficial MCL
Controlled, reproducible joint distraction	Full release of the MCL versus smaller release with pie crusting
Ability to reduce MCL to its anatomic footprint compared with the pie-crusting technique	Residual laxity if not repaired anatomically

MCL, medial collateral ligament.

challenging in patients with tight medial compartments.

Multiple techniques have been previously described to release the MCL during arthroscopic meniscal procedures. This is frequently done in a percutaneous manner, where a needle is used to trephinate the superficial fibers of the MCL.⁷⁻⁹ Moran et al. described an outside-in technique in which they applied a superficial puncture to the MCL along with multiple subcutaneous disruptions of fibers.¹⁰ Damage to the saphenous vein and greater saphenous nerve are the involved risks with this technique.¹⁰ Chernchujit et al.⁶ described a technique in which multiple punctures to the MCL were avoided by finding a precise point of release anterior to the saphenous vein. However, complete release of the MCL was a noted disadvantage with this technique.⁶ We advocate for the use of a mini-open release of the distal MCL that both creates a working space within the joint in a controlled fashion and allows for anatomic fixation at the end of the case, not afforded by percutaneous release techniques which relies on the MCL to scar in despite trephination.

Similar to our technique, Chung et al.¹¹ reported on outcomes of a mini-open release of the distal superficial attachment of the MCL to gain adequate visualization of the posterior medial meniscal horn. Although 15% of patients experienced pain at 3 months postoperatively, no patients had pain at 12 months.¹¹ Residual valgus laxity was noted in just 7% of patients at 12 months after surgery, and an intact MCL was reported in all 94 patients by performing follow-up magnetic resonance imaging.¹¹ Furthermore, in a comparison of release and non-release groups, Lysholm and International Knee Documentation Committee scores did not differ.¹¹ Pearls and pitfalls and advantages and disadvantages of our technique are described in Tables 1 and 2, respectively.

Conclusions

Our Technical Note describes the senior author's method for a mini-open release of the MCL when performing medial meniscus root repair. This technique allows for adequate arthroscopic visualization as well as the ability to repair the MCL anatomically at the conclusion of the procedure. Given the paucity of literature on this technique, further studies assessing the clinical outcomes of this technique compared with other types of MCL releases are needed.

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