



Standard of Care: Medial Collateral Ligament Sprain

ICD 10 Codes: S83.41 Sprain of medial collateral ligament of knee.

Case Type / Diagnosis: (diagnosis specific, impairment/ dysfunction specific/ ICD 9 codes)

The anatomy of the medial side of the knee is complex, being composed of three tissue layers and multiple components with interconnections to the joint capsule, the muscle-tendon units, and the medial meniscus. According to Warren and Marshall's three-layer concept, Layer I consists of superficial sartorial fascia; layer II is the superficial MCL; layer III is the deep MCL.¹⁻² Hughston described the posterior aspect of the ligament as a continuum of oblique fibers referred to as the "posterior oblique ligament" that arises as a conjoined structure from the second and the third layers forming the posteromedial capsule.³ The superficial MCL is considered the primary static stabilizer to rotational stresses along the anterior border.⁴ The deep MCL and posteromedial capsule are secondary valgus restraints at full extension.¹

The primary mechanism of injury to the MCL is most commonly a valgus force.⁴ However, due to the position of the knee and the force vectors, injury usually occurs from a combined flexion/valgus/external rotation force. The vast majority of MCL injuries are from a direct blow to the outer aspect of the lower thigh or upper leg, although non-contact valgus external rotation injuries are common in skiing¹. Valgus force and external rotation together can cause injury to the MCL and/or anterior cruciate ligament (ACL).⁴ It is important to note that the deep fibers of the MCL are firmly attached to the outer border of the medial meniscus, thus injury to this aspect could also involve meniscus injury.

Classification of MCL injuries: Hughston standardized MCL injury classification in 1974, with further clarification in 1994, into two related systems: The severity system (grade I, II, III) and the laxity system (grade 1+, 2+, 3+).³ Under this combined classification system, grade I, a first-degree tear, involves a few fibers resulting in localized tenderness but no instability. Grade II, a second-degree tear, is a disruption of more fibers, with more generalized tenderness and valgus laxity but still no instability. Grade III, a third-degree tear, is a complete disruption of the ligament, with resultant instability. Grade III injuries are subdivided according to the extent of laxity as determined by the amount of absolute joint separation from valgus stress with the knee in 30 degrees of flexion. Grade 1+, 2+, and 3+ laxities indicate 3-5 mm, 6-10 mm, and more than 10 mm of absolute medial separation respectively. The location of a tear, the presence or absence of a firm end-point, and other modifications have been added to the American Medical Association (AMA) classification system.¹ A patient with a first-degree sprain presents with

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tenderness over the MCL but no instability. With a second-degree sprain, there is increased valgus laxity, but a firm end-point still exists. A third-degree sprain is complete tears of the ligament with no end-point to valgus stress.⁵

Indications for Treatment:

Indications for treatment include pain, swelling, instability, decreased ROM, weakness, loss of mobility and function. In the acute setting, a grade I or II MCL can be managed conservatively. Conservative treatment can also be indicated in grade III MCL tears with neutral or varus limb alignment.⁶

Contraindications / Precautions for Treatment:

The treatment of medial-sided knee injuries has evolved from aggressive surgical treatments to mostly non-operative management with surgery reserved for chronic MCL deficiency that failed non-operative treatment or more severe, complex injuries.⁷ If there is severe valgus alignment, intraarticular MCL entrapment, or large bony avulsions, an acute MCL repair is indicated.⁶ The presence of a large and generalized knee effusion could be indicative of a meniscal tear, cruciate injury or fracture. Those with combined ligamentous injuries may require acute operative care.⁷

Evaluation:

Medical History: Review past medical history (PMH) and surgical history, pertinent diagnostic tests, imaging, workup, and physicians' notes in Epic.

History of Present Illness: Chief complaint or mechanism of injury. The vast majority of MCL injuries are from a direct blow to the outer aspect of the lower thigh or upper leg. Other important information from the clinical history includes non-contact sensation of the knee "giving away" and "popping",⁸ the location of pain, the ability to ambulate after the injury, time and onset of swelling, the presence of deformity, and the immediate site of tenderness.¹ Note date of injury or duration of symptoms, treatment to date, reason for referral, prior level of function, current functional limitations, previous Physical Therapy, and past or current use of orthotics. Also inquire about patient's own goals.

Social History: Family/social support, employment, physical activity level, hobbies, sports, ADL's and any pertinent functional limitations.

Medications: Note relevant medications including NSAIDS, muscle relaxants and other analgesics. However, it remains controversial if inhibiting the inflammatory response is uniformly advantageous. A study suggested that in the short term, joint function is sometimes improved; in the medium term, the ligament's resistance to tension is increased, decreased or remains the same; in the long term, potentially deleterious effects on healing have been observed.⁹

Examination (Physical / Cognitive / applicable tests and measures / other)

This section is intended to capture the most commonly used assessment tools for this case type/diagnosis. It is not intended to be either inclusive or exclusive of assessment tools.

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- **Pain:** Typically, well-localized to medial aspect of knee,¹⁰ and most often near its proximal insertion site.⁸ Collect visual analog scale (VAS) scores.
- **Palpation:** For the MCL, palpate for tenderness along the medial joint line and along the course of the MCL from the medial femoral condyle to the insertion along the medial tibia.⁴ However, it is often difficult to distinguish a midsubstance MCL tear from an injury to the medial meniscus.⁵ The exact location of injuries of the deep MCL and the posterior oblique ligament were found to be difficult to palpate because of their deep-seated position.³ It is also important to assess medial patellofemoral ligament, semimembranosus tendon, medial gastrocnemius tendon, adductor magnus tendon and pes anserine tendon.¹¹
- **ROM:** Assess full range of motion, note any pain and where in the arc of knee movement pain occurs.
- **Joint Mobility:** patellar glides, tibiofemoral glides, proximal tibiofibular glides.
- **Strength:** Core strength; hip, knee and ankle musculature; note quality of VMO recruitment.
- **Sensation:** may be impaired to light touch due to localized swelling.
- **Girth measurement:** Swelling is usually located over medial side of the knee. Joint effusions are not common in low grade and isolated MCL sprains. The absence of swelling may also indicate a severe tear that allows fluid to extravasate into the surrounding tissue outside the joint. An acute effusion, within two hours of injury, indicates hemarthrosis, whereas swelling that appears 12-24 hours after injury usually indicates a synovial effusion.¹ Effusion suggests a more significant injury or concomitant damage to the ACL, PCL, or meniscus.⁵
- **Special Tests:** Apply valgus stress to the knee with the knee flexed to 30 degrees to fully assess the integrity of MCL. The long fibers of the superficial MCL are best assessed at 30 degrees and the posterior oblique fibers at 0 degrees.⁴ Perform Lachman, anterior drawer, pivot shift; Apley's, McMurray, Thessaly tests to assess concomitant injuries.
- **Posture/alignment:** Note any varus or valgus deformities at knee joints, knee hyperextension, patellar tracking, weight bearing avoidance or intolerance on affected lower extremity.
- **Proprioception:** Romberg with eyes closed and open, single leg stance on even and uneven surfaces with eyes closed and open.
- **Gait:** Note if antalgic, decreased weight bearing, uneven stride, cadence; ask patient to increase speed to brisk walk and note further impairments; note balance and safety with locomotion; assess stair climbing ability. Note, if any, type of device(s)- walker, crutch, cane, shoe lift, orthotics.
- **Activity limitation and participation restriction measures:** Utilize easily reproducible physical performance measures, such as single-limb hop tests, squatting, lunging, kneeling, shifting center of gravity, kicking, walking on different surfaces /around obstacles, climbing, running, jumping, sports,¹² and isometric quadriceps strength using hand-held dynamometer.¹³ Also, Y Balance Test has shown predictive validity for injury risk in an athletic population.¹⁴
- **Functional Outcomes:** LEFS (lower extremity functional scale), The minimum clinically important difference (MCID) is 9 points. IKDC (International knee

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documentation committee), the higher the score out of 100 represents higher level of function and lower levels of symptoms.

Differential Diagnosis (if applicable): ACL injury, PCL, bone contusions on lateral femoral condyle,⁶ Meniscus tear, pes anserine bursitis, medial plica syndrome,⁵ tibial plateau fracture, deep vein thrombosis,¹² patellar subluxation or dislocation, osteochondritis dissecans, proximal medial gastrocnemius strain, distal medial hamstring strain, and physeal plate injuries (in skeletally immature patient).

Assessment:

(Establish Diagnosis and Need for Skilled Services)

Problem List (Identify Impairment(s) and/ or dysfunction(s))

- Pain and associated symptoms
- Postural/alignment deficits
- Tenderness to palpation and abnormal soft tissue integrity such as swelling
- Decreased ROM
- Decreased muscle performance (Including Strength, Power, Endurance, and Length)
- Decreased muscle length
- Impaired gait
- Decreased proprioception
- Functional limitation
- Impaired joint mobility (e.g. patellofemoral, tibiofemoral, proximal tibiofibular joints)
- Increased laxity

Prognosis:

Grades I and II: Studies have shown excellent outcomes with nonoperative treatment and adequate rehabilitation. Roach and colleagues reported that Grade 1 injuries resulted in a median 13.5 days lost, whereas grade 2 and grade 3 injuries resulted in a median 29 days of time lost before being cleared for return to sports.¹⁵

Grade III: Athletes with grade 3 injuries treated nonoperatively may return as early as 5 to 7 weeks from injury, whereas those whose MCL injuries were treated with surgery may require 6 to 9 months before returning to play.¹⁶ Non-operative treatment for chronic MCL may lead to chronic valgus or rotatory instability with subsequent arthritis.⁸

Goals (Measurable parameters and specific timelines to be included on eval form)

Short term (2-4 wks) and long term (6-8 wks) goals may include but are not limited to:

1. Resolve pain
2. Decrease swelling

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3. Restore active and passive ROM
4. Normalize gait pattern without assistive device
5. Improve muscular strength, muscle performance, and endurance
6. Regain normal proprioception, balance, and coordination
7. Return to normal ADL's/IADL's, mobility of walking, squatting and stairs
8. Independence with home exercise program
9. Athletes perform sports-specific drills and return to play. Functional brace may be warranted to provide medial and lateral knee support.

Treatment Planning / Interventions

Interventions most commonly used for this case type/diagnosis.

This section is intended to capture the most commonly used interventions for this case type/diagnosis. It is not intended to be either inclusive or exclusive of appropriate interventions.

- **Modalities:** Rest, ice, compression, and elevation and analgesics as needed in the acute phase. NSAIDs are no longer recommended for chronic soft tissue (ligament) injuries, and for acute ligament injuries should be used for the shortest period of time.¹⁷
- **Orthotics/Assisted Device:** Weight bearing as tolerated with assistive device. Edson suggests that a longer period of immobilization is important, to protect against valgus stress and external rotation, therefore to promote the healing of both the superficial and deep fibers of the MCL. Brace may be locked in extension for 1 to 2 weeks depending upon pain, valgus opening, and anatomic alignment. Severe grade II or grade III injuries may require 6 weeks of bracing.¹⁸
- **Therapeutic exercises:** A protocol including immediate knee range-of-motion exercises, early weight-bearing, and progressive strength training has been reported to produce excellent results and a high rate of return to the prior activity level.¹⁹ Stationary bike is encouraged to improve range of motion, resulting in accelerated healing. Quadriceps reactivation should be initiated in the initial hours to days after injury, e.g. quadriceps sets and SLR.²⁰ When 90° of knee flexion is present, the use of resistive exercises is added to the treatment regimen.²¹ Resistive exercise is progressing through isometric, isotonic, and eventually isokinetic. It is also important to improve muscle strength of hamstring, pelvic stabilizers, gluteals, gastrocnemius and soleus, to improve flexibility, and to restore normal gait mechanics and proprioception.
- **Joint mobilization:** Patellar mobilization and joint distraction of the tibiofemoral joint decrease pain and improve joint mobility. Soft tissue / Transverse-friction mobilization applied for recent minor sprain or chronic sprain to MCL decreases pain, improves blood flow, and promotes desired collagen alignment. Loghmani's study²² in animal models with MCL injuries, instrument-assisted cross-fiber massage (IACFM) was found to accelerate early ligament healing (4 weeks post-injury), possibly via favorable effects on collagen formation and organization, but minimal improvement was demonstrated in later healing (12 weeks post-injury).
- **Therapeutic Taping Technique:** As an adjunct to treatment, McConnell medial patellar glide taping and Kinesiotaping are used by clinician based on clinical judgement.
- **Agility drills and sport-specific exercise:** Running is allowed once full ROM and functional strength is attained. Readiness may be determined with single-leg squat test

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functional hopping test and Y-balance test etc. Reider²¹ reported the running program started with one mile jog followed by successively faster 80-yard dashes and finally, cutting drills. Initially, basic double-leg plyometric drills are recommended, followed by progression to single-leg activities and more challenging, dynamic drills.²³ Return to sports is permitted once patient demonstrated 1) full ROM in the knee, 2) subjectively minimal pain. 3) quadriceps and hamstrings strength within 90% of the unaffected leg, and 4) the ability to complete the entire running program in one session.²¹

Frequency & Duration: 1-2/week, for duration of 6-12 weeks, depending on grade of injury, patient's progress, patient's goals with respect to returning to sports, and/or presence of any concomitant injuries.

Patient / family education

1. Pain and edema management
2. Home exercise program
3. Orthotics
4. Gait training
5. Sports specific training

Recommendations and referrals to other providers.

1. Orthopedist
2. Orthotist
3. Rheumatologist
4. Physiatrist
5. Pain management specialist
6. PCP

Re-evaluation

Standard Time Frame- 30 days or less if appropriate

Other Possible Triggers-

1. A significant change in signs and symptoms, fall, trauma or post-op
2. Failure to progress per established short-term goals
3. Complications or worsening of associated conditions
4. New PT orders or referrals

Discharge Planning

Commonly expected outcomes at discharge:

1. Resolution of pain
2. Increased AROM and strength
3. Increased lower extremity muscle flexibility
4. Improved gait and proprioception

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5. Return to prior level of function and sports activities

Transfer of Care (if applicable)

1. If patient needs services such as aquatic therapy, dry needling or pain consultant, these are offered by certain locations.
2. If patient needs PT services that is more accessible to them.

Patient's discharge instructions

1. Progressed home exercise program
2. Sports specific training. Continue with personal trainer if necessary.
3. Education regarding injury prevention; functional bracing may be used for contact sports to prevent against valgus forces if feeling medial instability but often is not necessary if the athlete can perform all activities without pain.¹⁸

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