

KNEE MEDIAL COLLATERAL LIGAMENT (MCL) SPRAIN NON-OPERATIVE GUIDELINE

The following guideline for the non-operative management of medial collateral ligament (MCL) sprains of the knee was developed by HSS Rehabilitation. It is divided into four phases dependent on patient presentation and grade of the sprain (grade 1-3). Progression is both criteria based and patient specific. The rehabilitation program initially emphasizes reduction of pain and edema while not overstressing the involved tissue and progresses to restoration of stability and functional activity in later phases. Timing for advancement through the phases varies depending on the severity of the sprain and concomitant injuries, if present. Additionally, progression through the phases should be in alignment with patient goals.

Grades of Sprain

- Grade 1 sprains involve a minimal number of fibers torn with localized tenderness and no laxity. These sprains typically present with full or near full range of motion (ROM), with little or no edema or accompanying quadriceps inhibition. Athletes with grade 1 sprains usually progress quickly and return to contact sports in 1-2 weeks with physician clearance.
- Grade 2 sprains involve a greater degree of ligamentous disruption with slight to moderate laxity and require an element of protection (weight bearing precautions). Grade 2 sprains in athletes typically result in 2-4 weeks of rehabilitation and return to contact sports wearing a brace if the sport allows.
- Grade 3 sprains involve a complete tear of the ligament with disruption of fibers and demonstrable laxity. Grade 3 sprains require protection and are usually season ending with an 8+ week course of rehabilitation required.

FOLLOW REFERRING PROVIDER'S MODIFICATIONS AND BRACE GUIDELINES AS PRESCRIBED

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Phase 1: Weeks 0-2 (up to 4 weeks if grade 3 sprain)

PRECAUTIONS

- Screen for fractures with Ottawa Knee Rules
- Assess for injury to supporting structures
 - Anterior cruciate ligament
 - Posterior cruciate ligament
 - Medial and lateral meniscus
 - Patella instability in grade 2-3 sprains
- Avoid exercises and activities that increase pain and/or edema
- Avoid activities that place valgus stress on the knee
- Avoid end range stretching if empty end feel is present
- Weight bearing (WB) precautions and bracing as prescribed by referring provider (grades 2 and 3)

CONSIDERATIONS

- Know grade of sprain and tissues involved
- Grade 1 sprains typically progress more quickly than time frames noted in guideline

ASSESSMENT

- Lower Extremity Functional Scale (LEFS)
- Pediatric International Knee Documentation Committee Subjective Knee Evaluation Form (Pedi-IKDC) validated for ages 10 -18 years
- Numeric Pain Rating Scale (NPRS)
- Edema measurements
- Neurovascular assessment
- Palpation of pain generators
- Lower extremity (LE) active range of motion (AROM) and passive range of motion (PROM)
- LE flexibility, where appropriate
- LE strength, where appropriate
- Patellar mobility and apprehension
- Special tests for ligamentous laxity and irritability
- Quality of quadriceps contraction: good, fair, poor
- Straight leg raise (SLR) in supine: with or without lag
- Gait: with/without assistive device
- Prior/current level of function

TREATMENT RECOMMENDATIONS

- Patient education
 - Understanding valgus stress on the knee
 - Activity modifications to decrease or eliminate pain and edema/effusion
 - Understanding the importance of compliance with the home exercise program (HEP)
 - Management of pain and edema/effusion
- Functional training
 - Gait
 - Follow referring provider's prescribed brace and WB instructions, typically:
 - Grade 1: weight bearing as tolerated (WBAT)
 - Grade 2-3: protected WB as per referring provider's instructions
 - Progressively wean off assistive device based on referring provider's recommendation and gait normalization
 - Aquatic therapy or antigravity treadmill if available
 - Stairs
 - Progress from non-reciprocal to reciprocal stair negotiation as tolerated and per referring provider's instructions
 - Weight shifting while adhering to WB precautions, if any
 - Flat, static surface
 - Progress to uneven surfaces
- Edema management
 - Protect, optimal loading, ice, compression, elevation (POLICE)
 - Modalities: i.e. cryotherapy
- Manual therapy
 - Joint mobilizations
 - Patella mobilizations in all planes if appropriate
 - Soft tissue mobilization (STM)
 - Myofascial release
 - Edema management
- Range of Motion (ROM)/flexibility
 - Active assisted range of motion (AAROM) and AROM exercises (if braced, may remove or unlock unless otherwise noted by referring provider)
 - Stretching
 - Stationary bike
 - Foam rolling – caution with positioning, avoid valgus knee stress
 - Aquatic therapy if available
- Neuromuscular electric stimulation (NMES) quadriceps

- Strengthening
 - Progressive resistance exercises (PREs)
 - Quadriceps sets
 - SLR – all planes
 - Lock brace at 0° knee extension if there is a quadriceps lag
 - Grade 1: SLR hip adduction when pain-free (hold for grade 2-3)
 - Terminal Knee Extension (TKE)
 - Consider weight bearing status
 - If pain-free at end range extension
 - LE stabilization proximal/distal to the knee, as tolerated
 - Upper Extremity (UE) and core strengthening
 - UE or core workouts as tolerated that do not affect the injured knee
 - Consider blood flow restriction (BFR) with low demand exercises with FDA approved device and qualified therapist

CRITERIA FOR ADVANCEMENT

- Minimal to no edema/effusion present
- Improved knee ROM
 - Full knee extension
 - 110° knee flexion
- SLR without quadriceps lag
- Normalized gait mechanics with appropriate assistive device, if necessary

EMPHASIZE

- Pain-free exercises
- Edema management
- Limit activities that stress healing tissues
- Avoid valgus stress
- Normalize gait

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Phase 2: Weeks 3-6 (up to 8 weeks if grade 3 sprain)

PRECAUTIONS

- Avoid exercises and activities that increase pain and/or edema
- Avoid activities that place valgus stress on the knee
- Avoid stretching or overloading the injured ligament
- Avoid premature return to activity

ASSESSMENT

- LEFS
- Pedi-IKDC
- NPRS
- Edema measurements
- Patellar mobility
- Quality of quadriceps contraction: good, fair, poor
- LE AROM and PROM
- LE flexibility
- LE strength, handheld or fixed dynamometry preferred
- Gait without assistive device (if cleared by referring provider)
- Functional assessment
 - Squat: bilateral
 - Single leg balance
 - Forward step up

TREATMENT RECOMMENDATIONS

- Patient education
 - Progressive activity modification based on pain
 - Reinforce compliance with HEP
 - Movement strategies (importance of hip strategy versus knee strategy)
 - Edema management: POLICE, modalities
- Manual therapy
 - Joint mobility
 - Patella all planes
 - Tibiofemoral anterior/posterior
 - STM as needed

- ROM/Flexibility
 - Achieve full and pain-free knee AROM
 - Stretching
 - Foam rolling
- Strength
 - PRE for quadriceps, hamstrings, hip abductors/adductors (Grade 3: hold isolated adductor strengthening until weeks 4-6)
 - Emphasize closed kinetic chain exercises $\leq 90^\circ$ knee flexion
 - TKE
 - Leg press: double leg $\rightarrow$ eccentric $\rightarrow$ single leg
 - Avoid hyperextension
 - Open kinetic chain quadriceps strengthening isometrics progressing to limited arc isotonic
 - Upper Extremity (UE) and core strengthening
 - UE or core workouts as tolerated that do not affect the injured knee
- Functional training
 - Gait: retrograde treadmill, antigravity treadmill
 - Squat emphasizing hip strategy
 - Bilateral to chair, progress depth as tolerated to 90°
 - Forward step ups (FSU)
 - Progress from 4 $\rightarrow$ 6 $\rightarrow$ 8 inch step
 - Forward step downs (FSD)
 - Progress from 4 $\rightarrow$ 6 inch step
- Balance and proprioception, adhering to WB precautions
 - Progress from double limb to single leg balance
 - Static $\rightarrow$ dynamic
 - Add opposite LE movement/UE movements
 - Stable surfaces $\rightarrow$ unstable surfaces $\rightarrow$ eyes closed
- Cardiovascular
 - Stationary bicycle
 - Elliptical

CRITERIA FOR ADVANCEMENT

- Full knee ROM
- Pain and edema managed as activity increases
- 80% or greater quadriceps strength compared to contralateral leg with handheld or fixed dynamometer
- Ability to perform symmetrical squat with proper alignment and control
- Ability to perform single leg balance without compensation
- Ability to perform pain-free FSU 8 inch and FSD 6 inch with proper alignment and control

EMPHASIZE

- Importance of adherence to HEP
- Pain-free exercise
- Edema management
- Quadriceps strength
- Activity modification as appropriate

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Phase 3: Weeks 7-10 (up to 12 weeks if grade 3 sprain)

PRECAUTIONS

- Avoid overloading and premature return to activity
- Avoid compensatory movement strategies

ASSESSMENT

- LEFS
- Pedi-IKDC
- NPRS
- LE flexibility
- LE strength, handheld or fixed dynamometry preferred
- Functional assessment
 - Squat: bilateral, unilateral
 - Dynamic single leg balance
 - Step up and step down
- Effects of muscle fatigue on movement patterns, quality or pain

TREATMENT RECOMMENDATIONS

- Patient education
 - Functional progression
 - Importance of adequate rest and recovery
 - Compliance with brace per physician recommendation
- Manual therapy
 - STM to musculature, as needed
- Flexibility
 - Stretching, as needed
 - Foam roller, as needed
- Strength
 - Progression of isotonic exercises
 - Double leg → single leg exercises
 - Body weight → external resistance
 - Full kinetic chain exercises and core strengthening
- Isokinetic exercise if available (high to moderate velocities)

- Balance and proprioception
 - Dynamic proprioceptive exercises and perturbation training
- Functional training
 - FSD 8 inch
 - Single leg squat
 - Jumping
 - Bilateral vertical onto box → jump in place → forward → lateral → double leg drop squat
 - Hopping
 - Single alternating → single unilateral
 - Vertical → forward → lateral
 - Running program
 - Utilize antigravity treadmill or aquatic therapy if available to introduce running
 - Progress distance and speed as appropriate
 - Refer to HSS Return to Run guidelines
- Cardiovascular conditioning
 - Elliptical
 - Stationary bike

CRITERIA FOR DISCHARGE OR ADVANCEMENT TO PHASE 4 (IF RETURNING TO SPORT)

- Demonstrate 8 inch FSD with proper form and control
- Demonstrate unilateral squat with proper alignment and control
- Proper utilization of kinetic chain during exercise
- Complete running program without limitations, if applicable

EMPHASIZE

- Importance of adherence to HEP
- Pain-free exercise
- Quality of functional activities
- Proper knee alignment with functional strengthening
 - Avoid dynamic valgus

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Phase 4: Return to Play

PRECAUTIONS

- Avoid premature return to play
- Ensure adequate rest and recovery with increasing activity
- Avoid dynamic valgus alignment during sport specific training

CONSIDERATIONS

- Sport and position
- Need for functional athletic brace

ASSESSMENT

- LEFS
- Pedi-IKDC
- NPRS
- Functional movement screen
 - Quality of movement, e.g., symmetry, pain
- Strength: handheld or fixed dynamometry preferred
- Physical performance tests
 - Star excursion test
 - Hop tests, e.g.:
 - Single hop for distance
 - Crossover hop
 - Triple hop for distance
 - 6-meter timed hop
- Psychological readiness, e.g.:
 - Single Assessment Numeric Evaluation (SANE)
 - Anterior Cruciate Ligament-Return to Sport after Injury (ACL-RSI)

TREATMENT RECOMMENDATIONS

- Running
 - Progress to shuttle runs, sprinting
 - Distances required by sport
- Plyometrics
 - Progress resistance and endurance, sport specific
- Agility
 - Ladder, hurdles, cutting drills
- Sport specific drills
 - Emphasize ability to decelerate
 - Twisting, pivoting, and change of direction without limitation

CRITERIA FOR DISCHARGE

- Strength testing: $\geq 90\%$ strength of contralateral limb
- Demonstrate good quality of movement on functional movement screen
- $> 90\%$ of contralateral limb on hop tests
- $> 90\%$ of contralateral limb on star excursion test
- No symptoms with sprinting, sport-specific multidirectional movements and plyometrics
- Achieved established performance levels for their sport and position
- Physician clearance to return to sport

EMPHASIZE

- Sport specific drills without valgus
- Importance of recognizing fatigue
- Collaboration with performance trainer or coach, as needed
 - Gradual introduction of specific sport drills → practice → contact → competition

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