**Non-Operative Treatment of MCL Sprain**

**Rehabilitation Protocol**

These are guidelines for the non-operative management of medial collateral ligament (MCL) sprains of the knee. They are 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 swelling 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 swelling 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 a 8+ week course of rehabilitation required.

**KNEE MCL SPRAIN NON-OPERATIVE GUIDELINES**

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 o 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 swelling
* 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 swelling
	+ Understanding the importance of compliance with the home exercise program (HEP)
	+ Management of pain and 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 (will take longer for grade 3 sprain)
		- 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
* Manual therapy
	+ Joint mobilizations
		- Patella mobilizations in all planes if appropriate
	+ Soft tissue mobilization (STM)
	+ Myofascial release
	+ Edema control
* ROM/flexibility
	+ Active assisted range of motion (AAROM) and AROM exercises (if braced, may remove or unlock unless not permitted by referring provider)
	+ Stretching
	+ Foam rolling
	+ Stationary bike
	+ Aquatic therapy if available
* Neuromuscular electric stimulation (NMES) quadriceps
* Strengthening
	+ Progressive resistance exercises (PREs)
		- Consider blood flow restriction (BFR) with low demand exercises with FDA approved device and qualified therapist
		- Quadriceps sets
		- SLR – all planes
			* Lock brace at 0\* if there is a quad lag
			* Grade 1: hip adductors when no pain (delay for grade 2-3)
		- Terminal Knee Extension (TKE)
			* Consider weight bearing status
			* If no pain at end range extension
		- LE stabilizers proximal/distal to the knee, as tolerated
	+ Upper Extremity (UE) and core strengthening
		- No limits on UE or core workouts that do not affect the injured knee

**CRITERIA FOR ADVANCEMENT**

* Minimal to no swelling present
* Improved knee ROM
	+ Full knee extension
	+ 110° knee flexion
* SLR without quadriceps lag
* Normalized gait mechanics with appropriate assistive device, if appropriate

**EMPHASIZE**

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

**KNEE MCL SPRAIN NON-OPERATIVE GUIDELINES**

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

**PRECAUTIONS**

* Avoid premature return to activity
* Avoid stretching or overloading the injured ligament

**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 dynamometry preferred (HHD)
* 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 painless 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 </= 90° knee flexion
		- TKE
		- Wall Sits
		- Static lunges
		- Leg press: double leg → eccentric → single leg
			* Avoid hyperextension
	+ Open kinetic chain quadriceps strengthening isometrics progressing to limited arc isotonics
	+ UE and core strengthening
		- No limits on UE or core workouts that do not affect the injured knee
* Balance and proprioception, while adhering to WB precautions
	+ Progress from double limb to single leg balance
		- Stable surfaces → unstable surfaces → eyes closed
		- Add opposite LE movement
* Function 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 4-6-8 inch (“) step
	+ Forward step downs (FSD)
		- Progress from 4-6” step
* Cardio
	+ 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 HHD
* Able to perform symmetrical squat with proper alignment and control
* Able to perform single leg balance without compensation
* Able to perform pain-free FSU 8” and FSD 6” with proper alignment and control

**EMPHASIZE**

* Importance of adherence to HEP
* Pain-free exercise
* Edema management
* Quadriceps strength
* Activity modification that is age appropriate

**KNEE MCL SPRAIN NON-OPERATIVE GUIDELINES**

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 (HHD)
* Functional assessment
	+ Squat: bilateral, unilateral
	+ Dynamic single leg balance
	+ Step up and step down
* Effects of muscle fatigue on movement patterns, quality or pain
* Ongoing efficacy of external support (brace)

**TREATMENT RECOMMENDATIONS**

* Patient education
	+ Functional progression
	+ Importance of adequate rest and recovery
* 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
* Isokinetic exercise if available (high to moderate velocities)
* Balance and proprioception
	+ Dynamic proprioceptive exercises and perturbation training
* Functional training
	+ FSD 8”
	+ Single leg squat
	+ Double leg drop squat
	+ Jumping
		- Bilateral vertical forward lateral
	+ Hopping
		- Single alternating single unilateral
		- Vertical forward lateral
	+ Running program
		- Use antigravity treadmill or aquatic therapy if available to introduce running
	+ Progress distance and speed
* Cardiovascular conditioning
	+ Elliptical
	+ Stationary bike – progressively increase resistance

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

* Demonstrate FSD 8” with proper form and control
* Demonstrate unilateral squat with proper alignment and control
* Proper utilization of full 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

**KNEE MCL SPRAIN NON-OPERATIVE GUIDELINES**

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: HHD
* Physical performance tests
	+ Star excursion test
	+ Hop tests, e.g.
		- Single hop for distance
		- Crossover hop
		- Triple hop for distance
		- 6-meter timed hop

**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

**CRITERIA FOR DISCHARGE**

\*\*HHD Testing: >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

**EMPHASIZE**

* Sport specific drills without valgus
* Importance of recognizing fatigue
* Collaboration with performance trainer or coach, as needed

**RETURN TO ACTIVITIES**

Running: 4-5 months when functional criteria are met

Golf: Short irons at 4 months, full swing with long irons at 5 months.

Delay 4-6 weeks if lead leg.

Pivoting/cutting sport: When functional criteria are met and cleared by surgeon, typically

6+ months at earliest