



MCL Reconstruction Guideline

This rehabilitation program is designed to return the individual to their activities as quickly and safely as possible. It is designed for rehabilitation following MCL reconstruction performed with an arthroscopic approach. Modifications to the protocol may be necessary dependent on type of graft used, primary reconstruction versus MCL revision, or concomitant injuries or procedures performed. This evidence-based MCL rehabilitation protocol is criterion-based and time frames in each phase will vary depending on many factors including patient demographics, goals, and individual progress. This protocol is designed to progress the individual through rehabilitation to full sport participation. The therapist must modify the program appropriately depending on the individual's goals for activity following reconstruction.

This guideline is intended to provide the treating clinician with a guideline for rehabilitation. It is not intended to substitute for making sound clinical decisions regarding the patient's post-operative care based on exam/treatment findings, individual progress, and/or the presence of post-operative complications. If the clinician should have questions regarding post-operative progression, they should contact the referring physician.

General Guidelines/Precautions:

- Therapist will monitor pain and swelling and adjust program appropriately.
- Neutral knee extension achieved by 2 weeks.
- Full flexion equal to other side in 6-8 weeks.
- Post-operative drop lock knee brace used for the first 6 weeks, unlocked for walking when patient can complete a SLR with no extension lag.
- Non-weight bearing to toe-touch weight-bearing expected per MD preference.
- Caution against excessive resisted open-chained exercises for first 12 weeks post-op
- Closed chain strengthening limited to 70 degrees for first 16 weeks post-op
- If available, Blood Flow Restriction (BFR) training can begin after suture removal and progress along with recommendations per physician approval.
- Level 1 testing (see Lower Extremity Testing Guideline) at or near 5 months post operatively.
 - No impact activities until full ROM, no swelling, adequate strength and biomechanics are demonstrated.
 - Progression to running program at 16-20 weeks based on Level 1 Return to Play testing, physician preference, when able to demonstrate sufficient symmetry and shock absorption with running mechanics and plyometrics.
- Level 2 testing (see Lower Extremity Testing Guideline) at 7+ months post-op
 - Return to full sport activities when able to complete Level 2 Return to Play testing with sufficient biomechanics, strength, balance and confidence. (See guideline and appendix for more specific information).

MCL Rehabilitation Guideline (6-12 months depending on patient goals and progress)

PHASE	SUGGESTED INTERVENTIONS	GOALS/MILESTONES FOR PROGRESSION
<p>Phase 0 Patient Education Phase Pre-operative Phase</p>	<p>Discuss: Anatomy, existing pathology, post-op rehab schedule, bracing, and expected progressions.</p> <p>Pre-Operative Testing: Test contralateral isokinetics at 60/180/300o/sec, introduce to blood flow restriction training.</p> <p>Instructions on Pre-Operative Exercises:</p> <ul style="list-style-type: none"> • Quad setting • Straight leg raises • Heel slides • Towel calf stretching • Immediate Post-Operative instructions: • Use ice and medication as instructed • Quad setting every hour • Heel propped to tolerance every 3 hours 	<p>Goals of Phase:</p> <ol style="list-style-type: none"> 1. Regain near normal joint and gait mechanics 2. Reduce fear or anxiety prior to surgery <p>Criteria to Advance to Next Phase:</p> <ol style="list-style-type: none"> 1. No pain or swelling 2. Normal gait and motion 3. Excellent quad activation
<p>Phase I Maximum Protection Phase Weeks 0-6 Expected visits: 6-12</p>	<p>Specific instructions:</p> <ul style="list-style-type: none"> • Non-weight bearing to toe touch weight bearing in locked brace per MD preference, unlocked with home program exercises • Crutches for the first 6 weeks <p>Suggested Treatments:</p> <p>Modalities as Indicated:</p> <ul style="list-style-type: none"> • Edema controlling treatments • NMES for quad activation <p>Range of Motion:</p> <ul style="list-style-type: none"> • Full extension to neutral at 2 weeks • Flexion ROM to 90o at 2 weeks, 130o by 6 weeks <p>Manual Therapy: Patellar mobilizations, focused on superior glide</p> <p>Exercise Examples:</p> <ul style="list-style-type: none"> • Quad set, straight leg raise, isometric quad set at 60o with strap • Towel calf stretch, static knee extension stretch • Seated PROM knee flexion, wall slide, towel heel slide • Clamshells, SL hip abduction, calf raises • Initiation of blood flow restriction training if applicable <p>Other Activities:</p> <ul style="list-style-type: none"> • Recumbent bike, upright bike when ROM allows or week 4; no resistance, using strobe glasses, or other vision challenges with balance exercises 	<p>Goals of Phase:</p> <ol style="list-style-type: none"> 1. P1. Prevention of post-operative complications 2. Reducing fear with regaining ROM. 3. Prevention of arthrofibrosis through ROM program 4. Reduction of post-operative swelling and inflammation (zero to trace effusion) <p>Criteria to Advance to Next Phase:</p> <ol style="list-style-type: none"> 1. Control of post-operative pain (0-2/10 with ADL's in brace) 2. Restoration of full extension 3. PROM 0-130o 4. Independent SLR without brace with no extension lag

(continued on next page)

MCL Rehabilitation Guideline (6-12 months depending on patient goals and progress)

<p>Phase II <i>Early Rehabilitation Phase</i> Weeks 6-12 Expected visits: 6-9</p>	<p>Specific Instructions:</p> <ul style="list-style-type: none"> • Continue with previous exercise program • Progress to light CKC program with good knee control; limited to 70 degrees • Progress out of drop-lock brace with good quad control • No pivoting on planted foot; full OKC exercises <p>Suggested Treatments:</p> <p>Modalities:</p> <ul style="list-style-type: none"> • Edema controlling treatments • NMES for quad activation <p>ROM:</p> <ul style="list-style-type: none"> • Continue to reinforce full extension • Progressive flexion as tolerated <p>Manual Therapy: Continue with patellar mobilizations as indicated</p> <p>Exercise Examples:</p> <ul style="list-style-type: none"> • HS stretching • Leg extensions 90-45 (see general guidelines above) • 4-8 inch eccentric step ups • Mini squats to table, wall sits, band walks • HS isometrics, AROM hamstring at 6 weeks • DL or SL leg press to tolerance, eccentrics • Proprioceptive progressions <p>Other Activities:</p> <ul style="list-style-type: none"> • Recumbent bike, upright bike for light cardiovascular exercise 	<p>Goals of Phase:</p> <ol style="list-style-type: none"> 1. Re-education and initiation of quad control with easy CKC program 2. Protect the graft 3. Normalize gait <p>Criteria to Advance to Next Phase:</p> <ol style="list-style-type: none"> 1. Symmetrical hyperextension to 130°+ flexion 2. Normal walking 3. Good knee control and symmetry with CKC exercises
---	--	--

(continued on next page)

MCL Rehabilitation Guideline (6-12 months depending on patient goals and progress)

<p>Phase III Controlled Ambulation and Strengthening Phase</p> <p>Weeks 12-20</p> <p>Expected visits: 10-20</p>	<p>Specific Instructions:</p> <ul style="list-style-type: none"> Weight training program on their own 1-2 times per week <p>Suggested Treatments:</p> <p>ROM: Progress to full flexion ROM (kneeling), progress strength training</p> <p>Exercise Examples:</p> <p>Week 12:</p> <ul style="list-style-type: none"> Initiation of resisted hamstring curls, progressing as tolerated Single leg calf raises Leg extensions 90-45 with gradual increase in ROM (see general guidelines above) Plank progressions Leg press progressions Eccentric focused program Goblet squat Offset squats (biased for surgical side) DB eccentric step ups (forward and lateral) Lateral step downs Standing fire hydrant holds Single leg squats Higher level proprioceptive progressions <p>Week 14:</p> <ul style="list-style-type: none"> Reorganize home program to address current deficiencies Front/back squat Lunge progressions (all directions) Progress weight with previous exercises Leg extensions 90-0 at week 12 (see general guidelines above) <p>Week 19: To prepare for Level 1 testing</p> <ul style="list-style-type: none"> Initiate jumping progressions (see appendix) Initiate functional movement progressions (see appendix) <p>Week 20: Level 1 Return to Play testing (see appendix)</p> <p>Other Activities:</p> <ul style="list-style-type: none"> Aquatic program, resisted bike/elliptical intervals 	<p>Goals of Phase:</p> <ol style="list-style-type: none"> Improve muscular strength and endurance Improve cardiovascular endurance and conditioning Reduce fear and improve confidence in the limb <p>Criteria to Advance to Next Phase:</p> <ol style="list-style-type: none"> Full pain free active and passive ROM Quad and HS deficit <25% 60o/sec Single leg step down with good form with no compensatory movements Back squat 70% body weight with no compensatory movements
--	--	---

(continued on next page)

MCL Rehabilitation Guideline (6-12 months depending on patient goals and progress)

<p>Phase IV Advanced Strengthening and Power Phase</p> <p>Weeks 20-24+</p> <p>Expected visits: 8-16</p>	<p>Specific Instructions:</p> <ul style="list-style-type: none"> Reorganize home program to address current deficiencies <p>Suggested Treatments:</p> <ul style="list-style-type: none"> Depending on specific demands of the patient's goal for an activity level Continued single leg strengthening as needed More advanced strength and power lifts <ul style="list-style-type: none"> 3-4 sets of 2-8 reps for strength (heavy weight, 2-3 min rest) 3-4 sets of 8-15 reps for hypertrophy (moderate weight, 45-60 sec rest) 3-4 sets of 1-5 reps for power (lighter weight, 5-10 min rest) <p>Exercise Examples:</p> <ul style="list-style-type: none"> Continue progression of strength training <ul style="list-style-type: none"> Dead lift, RDL Progress into power development (pulling derivatives) <ul style="list-style-type: none"> Clean pull, snatch pull, high pull, jump shrug 	<p>Goals of Phase:</p> <ol style="list-style-type: none"> Improve muscular strength, power, and endurance Improve cardiovascular endurance and conditioning Reduce fear and improve confidence in the limb Improved quad strength (80% of contralateral limb) Normalized gluteal strength <p>Criteria to Advance to Next Phase:</p> <ol style="list-style-type: none"> Quad and HS deficit < 30% at 60 deg/sec Back squat to 80% body weight with no compensatory movements Excellent form with RTP movements
<p>Phase V Advanced Movement Phase</p> <p>Weeks: 20+</p> <p>Expected Visits: 8-24</p>	<p>Specific Instructions:</p> <ul style="list-style-type: none"> Reorganize home program to address current deficiencies <p>Suggested Treatments:</p> <ul style="list-style-type: none"> Depending on specific demands of the patient's goal for an activity level: Return to Run program (see Guideline); Interval Intensity Running Program (see appendix), Plyometric Progressions, Movement Retraining Progressions <p>Exercise Examples:</p> <ul style="list-style-type: none"> Initiate double limb jump training Initiate running program (sport specific) Initiate deceleration and single leg hopping Initiate cutting activities Initiate agility (floor ladder and cone drills) 	<p>Criteria for Beginning Phase V Activities:</p> <ol style="list-style-type: none"> <25% strength deficit in quad, HS, gluteals <p>Selected Criteria for Discharge:</p> <ol style="list-style-type: none"> <10% strength deficit in quads and gluteals Limb symmetry index of 90% or greater on functional hop tests and Y balance tests 40/50 on biomechanical functional assessment tests (if performed) No pain or complaints of instability with functional progression of sport specific skills >90% on outcome measures

(continued on next page)

****NOTE: Progression of functional activities should be performed only as pain and proper biomechanics allow. Emphasis should be on proper shock absorption and control of dynamic valgus stress at knee (hip medial rotation with knee valgus) with each task performed. Progression to single limb based tasks (deceleration, hopping, and cutting) should not be performed until double limb activities have been mastered. Activities requiring dynamic control of rotational stress at the knee (cutting, multiple plane lunges/jumps/hops) are initiated only after sagittal and frontal plane control is achieved. Return to sport may occur at any time during this stage per physician clearance and goal achievement. Return to sport may occur at any time during this stage as cleared by physician and as progress and goal achievement occurs.**

REFERENCES:

- Laprade RF, Wijdicks CA. The management of injuries to the medial side of the knee. J Orthop Sports Phys Ther. 2012;42(3):221-233.
- Logan CA, O'Brien LT, Laprade RF. Post-operative rehabilitation of grade III medial collateral ligament injuries: evidence based rehabilitation and return to play. Int J Sport Phys Ther. 2016;11(7):1177-1190.
- Bakshi NK, Khan M, et al. Return to play after multiligament knee injuries in national football league athletes. Sport Health. 2018;10(6):495-499.
- Lynch AD, Chmielewski T, Bailey L, et al. Current concepts and controversies in rehabilitation after surgery for multiple ligament knee injury. Curr Rev Musculoskeletal Med. 2017;10:328-345.

Interval Sprinting/Running Program

Guidelines

- Increase total distance by 10% per workout
- To be complete with no pain and or swelling
- Repeat 3 times at same distance with no swelling or pain prior to 10% increase

Stage I: Purpose: build up work capacity and improve technique

1. 5 x 20 yds or 5 x $\frac{3}{4}$ court
2. 4 x 50 yds or 4 x 2 full court
3. 5 x 40 yds or 5 x 1 $\frac{1}{2}$ court
4. 2 x 50 yds or 2 x full court
5. 1 x 100 yds or 1 x 3 courts

Stage II: Purpose: work on increased speed and build intensity

1. 5 x 20 yds or 5 x $\frac{3}{4}$ court (63 feet)
2. 4 x 50 yds or 4 x 2 full court (168 feet)
3. 5 x 40 yds or 5 x $\frac{3}{4}$ court (63 feet)
4. 2 x 50 yds or 2 x full court (168 feet)
5. 1 x 100 yds or 1 x 3 courts (252 feet)

Stage III: Purpose is to build into max speed with bias towards sports specific speed/distance and metabolic demands.

*These sprint intervals should be developed based on the needs of the individual patient and the demands of the sport they are planning to return to, the program does not need to be 5 different levels, but intensity should be high.

- 1.
- 2.
- 3.
- 4.
- 5.

Work:Rest Ratio or based on sports specific demands: _____:_____
INTENSITY 90-100%

Plyometric Progressions

Guidelines

- Must be able to perform full, free-weight squat 1.5-2.5 times body weight or squat 60% of body weight five times in five seconds.³
- Add to sessions 1-2x/wk – 3 days between sessions.
- Begin with 30-40 foot contacts per session and increase as able.
- No more than 80-120 foot contacts per session.

Step 1

- Jumping TO box (decreased landing forces)
- 2 legs to 2 legs
- 2 legs to 1 leg
- 1 leg to opposite leg
- 1 leg to same leg

Step 2

- Jumping FROM box
- Landing on 2

Step 3

- Squat jumps
- 1 leg jump -> 2 leg land
- 2 leg jump -> 1 leg land
- Split squat jumps -> scissor jumps
- 1 leg jump -> opposite leg land
- 1 leg jump -> same leg land

Step 4

- Progress to various planes of movement as able.
ie: Double leg broad jumps, single leg lateral hops, skater lateral jumps, bounding, drop jumps to jumps over hurdles forward or lateral, etc.

REFERENCES:

1. Bedoya AA, Milltenberger MR, Lopez RM. Plyometric training effects on athletic performance in youth soccer athletes: a systematic review. JSCR 2015.
2. Performance Enhancement in Rehabilitation: "Bridging the Gap", Dan Lorenz DPT,PT,LAT,CSCS,USAW: March 5-6, 2016.
3. Davies G, Riemann BL, Manske R. Current concepts of plyometric exercise. Int J Sports Phys Ther. 2015;10(6):760-86.
4. Chmielewski TL, George SZ, Tillman SM, et al. Low- Versus High-Intensity Plyometric Exercise During Rehabilitation After Anterior Cruciate Ligament Reconstruction. Am J Sports Med. 2016;44(3):609-17.

Movement Retraining Progressions

Guidelines

- Single skill blocked practice
- Single skill variable practice
- Combination of multiple skills in blocked practice
- Combination of multiple skills in variable practice
- Combination of multiple skills with reactive cueing
- Use sport specific work:rest ratios

Excellent lateral lunge at multiple speeds -> lateral shuffle cone drills

- Progressing to reactive drills

Excellent forward and reverse lunge at multiple speeds -> decelerations

- 3 step walking deceleration cone drill
- Jogging deceleration drills, increasing speed as able
- Reactive deceleration drills

Excellent lateral shuffle and deceleration at multiple speeds -> cutting

- Shallow cuts jogging (45 degrees)
- Deceleration to lateral shuffle cone drills, increasing speed as able
- Deceleration to 90 degrees cuts, increasing speed as able
- Reactive cutting drills

Excellent lateral shuffle, deceleration, cutting, and jumping

- Reactive, variable, combined drills
 - Utilize strobe glasses, resistance cords, cones, sport specifics, varied surfaces, perturbations