Rehabilitation Protocol for MPFL Reconstruction

This protocol is intended to guide clinicians through the post-operative course for MPFL reconstruction. This protocol is time based (dependent on tissue healing) as well as criterion based. Specific intervention should be based on the needs of the individual and should consider exam findings and clinical decision making. The timeframes for expected outcomes contained within this guideline may vary based on surgeon's preference, additional procedures performed, and/or complications. If a clinician requires assistance in the progression of a post-operative patient, they should consult with the referring surgeon.

The interventions included within this protocol are not intended to be an inclusive list. Therapeutic interventions should be included and modified based on the progress of the patient and under the discretion of the clinician.

Considerations with concomitant procedures:
Many different factors influence the post-operative MPFL reconstruction rehabilitation outcomes, including additional procedure such as tibial tuberosity osteotomy (TTO). It is recommended that clinicians collaborate closely with the referring physician regarding early range of motion, weight bearing status, and use of assistive devices.

Post-operative considerations:
If you develop a fever, excessive drainage from incision, severe heat and/or redness along incision, uncontrolled pain, or any other symptoms that concern you please call your doctor.

PHASE I: IMMEDIATE POST-OP (0-2 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Protect surgical site • Reduce swelling, minimize pain • Restore full extension, gradually improve flexion ≥90 deg • Minimize arthrogenic muscle inhibition, re-establish quad control, regain full active extension • Patient education • Keep your knee straight and elevated when sitting or laying down. Do not rest with a towel placed under the knee
Weight Bearing	*Walking* • Initially brace locked, PWB (0-1 week) → WBAT with crutches (per MD recommendation) • May start walking without crutches as long as there is no increased pain, effusion, and proper gait • When climbing stairs, make sure you are leading with the non-surgical side when going up the stairs, make sure you are leading with the crutches and surgical side when going down the stairs
Interventions	*Swelling Management* • Ice, compression, elevation (check with MD re: cold therapy) • Retrograde massage • Ankle pumps *Range of motion/Mobility* • PROM • Heel slides with towel • Low intensity, long duration extension stretches: prone hang, heel prop • Seated hamstring stretch, seated calf stretch *Strengthening* • Calf raises

	• Quad sets
	  ○ *NMES high intensity (2500 Hz, 75 bursts), with quad sets and functional exercises as appropriate. Consider home unit distributed immediate post op if poor quad activation*
	• Straight leg raise
	  ○ **Do not perform straight leg raise if you have a knee extension lag
	• Hip abduction
	• Standing hamstring curl

Criteria to Progress	• Knee extension ROM 0 deg • Quad contraction with superior patella glide and full active extension • Able to perform straight leg raise without lag

PHASE II: INTERMEDIATE POST-OP (3-6 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Continue to protect surgical site • Maintain full extension, restore full flexion (contralateral side) • Normalize gait • Patient education
Weight Bearing	*Walking* • WBAT: May unlock brace when able to perform straight leg raise without lag • Discontinue use of brace after 6 weeks (or per surgeon) and when gait is normalized
Additional Interventions **Continue with Phase I interventions*	*Range of motion/Mobility* • Stationary bicycle • Gentle patellar mobilizations: superior/inferior and medial/lateral ***Not necessary unless stiffness present** *Strengthening* • Ball squats, wall slides, mini squats from 0-60 *Balance/proprioception* • Single leg standing balance (knee slightly flexed) static progressed to dynamic and level progressed to unsteady surface
Criteria to Progress	• No swelling (Modified Stroke Test) • Flexion ROM > 90 deg • Extension ROM equal to contralateral side

PHASE III: LATE POST-OP (7-12 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Continue to protect surgical site • Maintain full ROM • Safely progress strengthening • Promote proper movement patterns • Avoid post exercise pain/swelling • Avoid activities that produce pain at repair site
Weight Bearing	• FWB without assistive device
Additional Interventions **Continue with Phase I-II Interventions*	*Range of motion/Mobility* • Gentle stretching all muscle groups: prone quad stretch, standing quad stretch, standing hip flexor stretch *Cardio* • ~8 weeks: Elliptical, stair climber, flutter kick swimming, pool jogging *Strengthening* • Gym equipment: leg press machine, seated hamstring curl machine and hamstring curl machine, hip abductor and adductor machine, hip extension machine, roman chair, seated calf machine **The following exercises to focus on proper control with emphasis on good proximal stability

	• Proximal Strengthening: Double leg bridge, bridge with feet on physioball, single leg bridge, lateral band walk, standing clamshell/fire hydrant, hamstring walkout, TA brace with UE and LE progression • Squat to chair • Lateral lunges • Romanian deadlift (single and double leg) • Single leg progression: single leg press, slide board lunges: retro and lateral, split squats, step ups and step ups with march, lateral step-ups, step downs, single leg squats, single leg wall slides/sit *Balance/proprioception* • Progress single limb balance including perturbation training
Criteria to Progress	• No effusion/swelling/pain after exercise • Normal gait • ROM equal to contra lateral side • Quad/HS/glut index ≥70%; HHD mean or isokinetic testing @ 60d/s

PHASE IV: TRANSITIONAL (13-16 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Maintain full ROM • Safely progress strengthening • Promote proper movement patterns • Avoid post exercise pain/swelling • Avoid activities that produce pain
Additional Interventions **Continue with Phase II-III interventions*	*Strengthening* • Progress intensity (weight) and volume (repetitions) of exercises *Plyometric activities* • Phase I plyometrics and Agility - Bilateral FWB plyometrics progressed to single leg plyometrics *Balance/proprioception* • Progress single limb balance including perturbation training

Criteria to Progress	• Clearance from MD and ALL milestone criteria below have been met
	• Functional Assessment
	  ○ Quad/HS/glut index ≥80%; HHD mean or isokinetic testing @ 60d/s
	  ○ Hamstring/Quad ratio ≥66%
	  ○ Hop Testing ≥80% compared to contra lateral side, demonstrating good landing mechanics

PHASE V: EARLY RETURN TO SPORT (3-5 MONTHS AFTER SURGERY)

Rehabilitation Goals	• Safely progress strengthening • Safely initiate sport specific training program • Promote proper movement patterns • Avoid post exercise pain/swelling • Avoid activities that produce pain at graft donor site

Additional Interventions **Continue with Phase II-IV interventions*	*Strengthening*
	• Progress intensity (weight) and volume (repetitions) of exercises
	
	Interval running program
	  ○ Return to Running Program (below)
	
	Progress to plyometric and agility program (with functional brace if prescribed)
	  ○ Agility and Plyometric Program Phase II and Phase III

Criteria to Progress	• Clearance from MD and ALL milestone criteria below have been met
	• Completion jog/run program without pain/effusion / swelling
	• Functional Assessment
	  ○ Quad/HS/glut index ≥95%; HHD mean or isokinetic testing @ 60d/s
	  ○ Hamstring/Quad ratio ≥66%
	  ○ Hop Testing ≥95% compared to contra lateral side, demonstrating good landing mechanics
	• Lysholm >90%
	• KOOS-sports questionnaire >90%
	• International Knee Committee Subjective Knee Evaluation >93
	• Psych Readiness to Return to Sport (PRRS)
	• Kujala > 90

PHASE VI: UNRESTRICTED RETURN TO SPORT (6+ MONTHS AFTER SURGERY)

Rehabilitation Goals	• Continue strengthening and proprioceptive exercises • Symmetrical performance with sport specific drills • Safely progress to full sport
Additional Interventions **Continue with Phase II-V interventions*	• Multi-plane sport specific plyometrics program • Multi-plane sport specific agility program • Include hard cutting and pivoting depending on the individuals' goals • Non-contact practice→ Full practice→ Full play (~6-7 mo)
Criteria to Progress	• Last stage, no additional criteria

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Contact	Please email MGHSportsPhysicalTherapy@partners.org with questions specific to this protocol

References:

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Clark D, Walmsley K, Schranz P, et al. Tibial tuberosity transfer in combination with medial patellofemoral ligament reconstruction: Surgical technique. Arthrosc Tech 2017;6:591-597.

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Return to Running Program

This program is designed as a guide for clinicians and patients through a progressive return-to-run program. Patients should demonstrate > 80% on the Functional Assessment prior to initiating this program (after a knee ligament or meniscus repair). Specific recommendations should be based on the needs of the individual and should consider clinical decision making. If you have questions, contact the referring physician.

PHASE I: WARM UP WALK 15 MINUTES, COOL DOWN WALK 10 MINUTES

Day	1	2	3	4	5	6	7
Week 1	W5/J1x5		W5/J1x5		W4/J2x5		W4/J2x5
Week 2		W3/J3x5		W3/J3x5		W2/J4x5	
Week 3	W2/J4x5		W1/J5x5		W1/J5x5		**Return to Run**

Key: W=walk, J=jog

***Only progress if there is no pain or swelling during or after the run*

PHASE II: WARM UP WALK 15 MINUTES, COOL DOWN WALK 10 MINUTES

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	20 min		20 min		20 min		25 min

2		25 min		25 min		30 min	
3	30 min		30 min		35 min		35 min
4		35 min		40 min		40 min	
5	40 min		45 min		45 min		45 min
6		50 min		50 min		50 min	
7	55 min		55 min		55 min		60 min
8		60 min		60 min			

Recommendations

- Runs should occur on softer surfaces during Phase I
- Non-impact activity on off days
- Goal is to increase mileage and then increase pace; avoid increasing two variables at once
- 10% rule: no more than 10% increase in mileage per week

Agility and Plyometric Program

This program is designed as a guide for clinicians and patients through a progressive series of agility and plyometric exercises to promote successful return to sport and reduce injury risk. Patients should demonstrate > 80% on the Functional Assessment prior to initiating this program. Specific intervention should be based on the needs of the individual and should consider clinical decision making. If you have questions, contact the referring physician.

PHASE I: ANTERIOR PROGRESSION

Rehabilitation Goals	• Safely recondition the knee • Provide a logical sequence of progressive drills for pre-sports conditioning
Agility	• Forward run • Backward run • Forward lean in to a run • Forward run with 3-step deceleration • Figure 8 run • Circle run • Ladder

Plyometrics	• Shuttle press: Double leg→alternating leg→single leg jumps
	• Double leg:
	  ○ Jumps on to a box→ jump off of a box→ jumps on/off box
	  ○ Forward jumps, forward jump to broad jump
	  ○ Tuck jumps
	  ○ Backward/forward hops over line/cone
	• Single leg (these exercises are challenging and should be considered for more advanced athletes):
	  ○ Progressive single leg jump tasks
	  ○ Bounding run
	  ○ Scissor jumps
	  ○ Backward/forward hops over line/cone

Criteria to Progress	• No increase in pain or swelling • Pain-free during loading activities • Demonstrates proper movement patterns

PHASE II: LATERAL PROGRESSION

Rehabilitation Goals	• Safely recondition the knee • Provide a logical sequence of progressive drills for the Level 1 sport athlete
Agility **Continue with Phase I interventions*	• Side shuffle • Carioca • Crossover steps • Shuttle run • Zig-zag run • Ladder

Plyometrics
**Continue with Phase I interventions*
	• Double leg:
	  ○ Lateral jumps over line/cone
	  ○ Lateral tuck jumps over cone
	• Single leg (these exercises are challenging and should be considered for more advanced athletes):
	  ○ Lateral jumps over line/cone
	  ○ Lateral jumps with sport cord

Criteria to Progress	• No increase in pain or swelling • Pain-free during loading activities • Demonstrates proper movement patterns

PHASE III: MULTI-PLANAR PROGRESSION

Rehabilitation Goals	• Challenge the Level 1 sport athlete in preparation for final clearance for return to sport
Agility **Continue with Phase I-II interventions*	• Box drill • Star drill • Side shuffle with hurdles
Plyometrics **Continue with Phase I-II interventions*	• Box jumps with quick change of direction • 90 and 180 degree jumps

Criteria to Progress	• Clearance from MD
	• Functional Assessment
	  ○ Quad/HS/glut index ≥90% contra lateral side (isokinetic testing if available)
	  ○ Hamstring/Quad ratio ≥70%
	  ○ Hop Testing ≥90% contralateral side
	• Patient Outcome Measures:
	  ○ KOOS-sports questionnaire >90%
	  ○ International Knee Committee Subjective Knee Evaluation >93
	  ○ ACL-RSI