Rehabilitation Protocol for Arthroscopic Meniscal Repair

This protocol is intended to guide clinicians through the post-operative course for meniscal repair. 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 of exercises. Therapeutic interventions should be included and modified based on the progress of the patient and under the discretion of the clinician.

Considerations for the Post-operative Meniscal Repair
Many different factors influence the post-operative meniscal repair rehabilitation outcomes, including type and location of the meniscal tear and repair. Consider taking a more conservative approach to range of motion, weight bearing, and rehab progression with more complex tears or all-inside meniscal repairs. Additionally, this protocol does not apply to meniscus root repairs or meniscus transplants. It is recommended that clinicians collaborate closely with the referring physician regarding intra-operative findings and satisfaction with the strength of the repair.

Post-operative considerations
If you develop a fever, intense calf pain, excessive drainage from the incision, uncontrolled pain or any other symptoms you have concerns about you should call your doctor.

PHASE I: IMMEDIATE POST-OP (0-3 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Protect repair
	• Reduce swelling, minimize pain
	• Restore patellar mobility
	• Restore full extension
	• **Flexion < 90 degrees**
	• Minimize arthrogenic muscle inhibition, re-establish quad control, regain full active extension
	• Patient education
	  ◦ Keep your knee straight and elevated when sitting or lying down. Do not rest with a towel placed under the knee.
	  ◦ Do not actively bend your knee; support your surgical side when performing transfers (i.e. sitting to laying down)
	  ◦ Do not pivot on your surgical side.

Weight Bearing	*Walking* • **Brace locked, crutches** • **Partial weight bearing** • When going up the stairs, make sure you are leading with the non-surgical side, when going down the stairs, make sure you are leading with the crutches and surgical side.

Interventions	*Swelling Management*
	• Ice, compression, elevation (check with MD re: cold therapy)
	• Retrograde massage
	• Ankle pumps
	
	Range of motion/Mobility
	• Patellar mobilizations: superior/inferior and medial/lateral
	• Seated assisted knee flexion extension and heel slides with towel
	  ○ ****Avoid active knee flexion to prevent hamstring strain on the posteromedial joint*
	• Low intensity, long duration extension stretches: prone hang, heel prop
	• Seated hamstring stretch
	
	Strengthening
	• Quad sets
	• NMES high intensity (2500 Hz, 75 bursts) supine knee extended 10 sec/50 sec, 10 contractions, 2x/week during sessions—use of clinical stimulator during session, consider home units distributed immediate post op
	• Straight leg raise
	  ○ **Do not perform straight leg raise if you have a knee extension lag
	• Hip abduction: side lying or standing
	• Multi-angle isometrics 90 and 60 deg knee extension

Criteria to Progress	• Knee extension ROM 0 deg • Knee flexion ROM 90 degrees • 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 repair • Reduce pain, minimize swelling • Maintain full extension • **Flexion < 90 degrees unless further direction from MD**
Weight Bearing	*Walking* • **Continue partial weight bearing unless directed otherwise by MD** • **Consult with referring MD regarding unlocking brace**
Additional Interventions **Continue with Phase I interventions*	*Range of motion/Mobility* • Stationary bicycle: gentle range of motion only (see Phase III for conditioning) *Cardio* • Upper body ergometer *Strengthening* • Calf raises • Lumbopelvic strengthening: Sidelying hip external rotation clamshell in neutral, plank, bridge with feet elevated *Balance/proprioception* • Double limb standing balance utilizing uneven surface (wobble board) • Joint position re-training
Criteria to Progress	• No swelling (Modified Stroke Test) • Flexion ROM 120 degrees • Extension ROM equal to contra lateral side

PHASE III: LATE POST-OP (6-9 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Continue to protect repair • Maintain full extension

	• Normalize gait. • Flexion within 10 degrees of contra lateral side. • Safely progress strengthening. • Promote proper movement patterns. • Avoid post exercise pain/swelling.
Weight Bearing	• May discontinue use of brace/crutches after 6 weeks per MD and once adequate quad control is achieved and gait in normalized.
Additional Interventions **Continue with Phase I-II Interventions as indicated*	*Range of motion/Mobility* • Supine active hamstring stretch • Gentle stretching all muscle groups: prone quad stretch, standing quad stretch, kneeling hip flexor stretch, standing gastroc stretch and soleus stretch • Rotational tibial mobilizations if limited ROM *Cardio* • Stationary bicycle, flutter kick swimming, pool jogging *Strengthening* • Partial squat exercise 0-60 degrees • Ball squats, wall slides, mini squats from 0-60 deg • Hamstring strengthening: prone hamstring curls, standing hamstring curls • Lumbopelvic strengthening: bridges on physioball, bridge on physioball with roll-in, bridge on physioball alternating, hip hike • Gym equipment: leg press machine, standing hip abductor and adductor machine, hip extension machine, roman chair, seated calf machine • Progress intensity (strength) and duration (endurance) of exercises *Balance/proprioception* • Single limb balance progress to uneven surface including perturbation training
Criteria to Progress	• No swelling/pain after exercise • Normal gait • ROM equal to contra lateral side • Joint position sense symmetrical (<5 degree margin of error)

PHASE IV: TRANSITIONAL (9-12 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Maintain full ROM. • Safely progress strengthening. • Promote proper movement patterns. • Avoid post exercise pain/swelling.
Additional Interventions **Continue with Phase I-III interventions as indicated*	*Cardio* • Elliptical, stair climber *Strengthening* ○ **The following exercises to focus on proper control with emphasis on good proximal stability • Squat to chair • Lateral lunges • Single leg progression: partial weight bearing single leg press, slide board lunges: retro and lateral, step ups and step ups with march, lateral step-ups, step downs, single leg squats, single leg wall slides • Knee Exercises for additional exercises and descriptions • Gym equipment: seated hamstring curl machine and hamstring curl machine • Romanian deadlift
Criteria to Progress	• No episodes of instability • 10 repetitions single leg squat proper form through at least 60 deg knee flexion • KOOS-sports questionnaire >70%

	• Functional Assessment
	  ○ Quadriceps index ≥80%; HHD mean preferred (isokinetic testing if available)
	  ○ Hamstring, glut med, glut max index ≥80%; HHD mean preferred (isokinetic testing for HS if available)

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.

Additional Interventions **Continue with Phase II-IV interventions* as indicated	• Interval running program
	  ○ Return to Running Program
	• Progress to plyometric and agility program (with functional brace if prescribed).
	  ○ Agility and Plyometric Program

Criteria to Progress	• Clearance from MD and ALL milestone criteria below have been met
	• Completion of jog/run program without pain/swelling
	• Functional Assessment
	  ○ Quad/HS/glut index ≥90%; HHD mean preferred (isokinetic testing if available)
	  ○ Hamstring/Quad ratio ≥ 70% with isokinetic testing if available)
	  ○ Hop Testing ≥90% compared to contra lateral side
	• KOOS-sports questionnaire >90%
	• International Knee Committee Subjective Knee Evaluation >93
	• Psych Readiness to Return to Sport (PRRS)

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* as indicated	• 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
Criteria to Discharge	• Quad/HS/glut index ≥90%; HHD mean preferred (isokinetic testing if available) • Hop Testing ≥90% compared to contra lateral side

Revised 4/2021

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

References:

1. Adams D, Logerstedt D, et al. Current Concepts for Anterior Cruciate Ligament Reconstruction: A Criterion-Based Rehabilitation Progression. *JOSPT* 2012 42(7): 601-614.

2. DeFroda SF, Bokshan SL, et al. Variability of online available physical therapy protocols from academic orthopedic surgery programs for arthroscopic meniscus repair. *The Physician and Sports Medicine.* 2018. 46 (3): 355-360.

3. Glazer DD. Development and Preliminary Validation of the Injury-Psychological Readiness to Return to Sport (I-PRRS) Scale. *Journal of Athletic Training.* 2009;44(2):185-189.

4. Harput, G., Guney-Deniz, H., Nyland, J., & Kocabey, Y. (2020). Postoperative rehabilitation and outcomes following arthroscopic isolated meniscus repairs: A systematic review. *Physical Therapy in Sport*, *45*(2020), 76–85.

5. Irrgang JJ, Anderson AF, Boland AL, et al. Development and validation of the International Knee Documentation Committee Subjective Knee Form. *Am J Sports Med*. 2001;29:600-613.

6. Mandelbaum BR, Silvers HJ, Watanabe DS, et al. Effectiveness of a Neuromuscular and Proprioceptive Training Program in Preventing Anterior Cruciate Ligament Injuries in Female Athletes: 2-year follow-up. *Am J Sports Med.* 2005;33:1003-1010.

7. Noyes, FR, Heckmann TP, et al. Meniscus Repair and Transplantation: A Comprehensive Update. *JOSPT* 2012 42(3): 274-290.

8. VanderHave KL, Perkins C, et al. Weightbearing versus nonweightbearing after meniscus repair. *Sports Health.* 2015. 7 (5): 399-402.

9. Vedi V, Williams A, et al. Meniscal movement: an in-vivo study using dynamic MRI. *JBJS.* 1999. 81: 37-41.

10. Wilk KE, Macrina LC, et al. Recent Advances in the Rehabilitation of Anterior Cruciate Ligament Injuries. *JOSPT* 2012 42(3): 153-171.

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
	• KOOS-sports questionnaire >90%
	• International Knee Committee Subjective Knee Evaluation >93
	• Psych Readiness to Return to Sport (PRRS)