

MPFL Reconstruction Protocol

Rehabilitation of the extensor mechanism after patellar stabilization surgery is based on an appropriate understanding of lower limb mechanics, anatomy, and careful evaluation of the individual patient. Abnormal anatomy, poor lumbo-pelvic-hip control, and quadriceps control deficits can affect the function of the patellofemoral joint. Dynamic lower extremity function is addressed and specific care should be taken to avoid dynamic knee valgus and femoral internal rotation which can cause abnormal loads on the healing graft. Treatment to enhance proximal control can be started immediately after surgery. Patients should perform non-weight bearing exercises targeting the hip abductors, external rotators, and extensors. Maintenance of neutral lower extremity alignment should be stressed during exercise and functional activities. This involves alignment of the lower extremity such that the anterior superior iliac spine and knee remain positioned over the second toe. Any abnormal foot alignment or mechanics should also be addressed, as this can contribute to excessive stress to the anterior knee.

This is a phase and time-based protocol that serves strictly as a guideline. Joint surface integrity and degenerative articular lesions may call for variations from the rehabilitation protocol. Goals and criteria for progression are explicitly outlined in each phase. All criteria should be met before the patient progresses to the next phase of the rehabilitation process. Each patient will be progressed by the physician/physical therapy team recommendations. Progression of the rehabilitation program is based on surgical findings, complications, and success in attaining the goals established by the team.

PHASE I: 0-6 WEEKS POST OPERATIVE:

GOALS:

1. Protect fixation and surrounding soft tissue
2. Control inflammation
3. Regain active quadriceps contraction
4. Minimize adverse effects of immobilization
5. Full Knee Extension

BRACING and WEIGHT BEARING STATUS:

0-2 Weeks:

- Brace locked in extension
- PWB with crutches

2- 4 Weeks:

- Brace locked in full extension for ambulation, daily activities, sleeping; Unlock or remove only for CPM, therapeutic exercises
- PWB with crutches advancing to WBAT in the knee brace

4-6 Weeks:

- Brace can be incrementally unlocked starting at 0-30 degrees and advancing as quad control returns. Unlock brace for CPM and therapeutic exercises. May sleep without brace.
- Full WB in the brace

ROM and CPM unit GUIDELINES:

0-2 Weeks:

- Week 1: 0- 30 degrees
- Week 2: 0-45 degrees

2-4 Weeks:

- Week 3: 0-60 degrees
- Week 4: 0-90 degrees

4-6 Weeks:

- 90 degrees and advance as tolerated

THERAPEUTIC EXERCISES:

- CPM (see guidelines above for ROM restrictions)
- Quadriceps sets with biofeedback, (NMES may begin at 4-6 weeks)
- Prone quad set with foot/ankle on pillow/foam roll
- Active assistive Heel slides with towel, within ROM guidelines
- Isotonic hamstrings within ROM guidelines (consider not doing if poor quad recruitment)
- PFJ mobilization (no lateral glides)
- Improve soft tissue and scar mobility. Instruct patient in self-scar tissue mobilization once the incisions have healed.
- Gastroc/soleus stretches
- Hamstrings stretches
- 4-way SLR (hip abduction w/ slight hip ER, adduction, extension, flexion with slight ER): on table or standing with brace locked in full extension if patient does not have sufficient quadriceps control
- Resisted ankle ROM with theraband
- Bike: may begin at 4-6 weeks within ROM restrictions: begin with partial revolutions w/o resistance and progress as ROM allows
- Total Gym or Partial Wall Squat (0-45 degrees): may begin at 4-6 weeks with sufficient quad recruitment and good PFJ tracking
- Begin double leg heel raises at 4-6 weeks if patient has sufficient control into terminal knee extension
- Begin Proprioception and Kinesthetic Awareness Training: may begin at 4-6 weeks: start double leg → progress to single leg once patient has sufficient quadriceps control. *Unprotected single- leg stance on the operated knee should be avoided until satisfactory proximal limb control has been achieved.*
- Core training in appropriate positions
- Encourage UE strengthening in appropriate positions
- Patellofemoral taping as indicated

CRITERIA FOR PROGRESSION TO THE NEXT PHASE:

- No signs of active inflammation
- Patient is able to establish a good volitional quadriceps set in terminal knee extension
- Approximately 90 degrees of flexion
- Patellar mobility is improving and near normal

PHASE II: 6-8 WEEKS POST OPERATIVE:

GOALS:

1. Progress towards full flexion ROM
2. Avoid over stressing fixation site (i.e. watch for excessive dynamic valgus, lateral patellar tracking, etc.)
3. Improve quadriceps control in order to restore normal patellar tracking

BRACING AND WEIGHT BEARING STATUS:

6-8 Weeks:

- FWB with brace unlocked, with/without assistive device depending on mechanics; discontinue brace for sleeping
 - Brace is unlocked for ambulation if patient demonstrates good quadriceps control and is cleared by the physician

ROM GUIDELINES: Progress to full ROM

THERAPEUTIC EXERCISES:

- Patellofemoral taping as needed
- Quadriceps sets with biofeedback, NMES
- Prone quad set with foot/ankle on pillow/foam roll; add weight behind knee as strength allows
- Active assistive heel slides with towel to improve flexion
- Isotonic hamstrings within ROM guidelines (consider not doing if poor quad recruitment)
- PFJ mobilization (no lateral glides)
- Scar mobilization
- Gastroc/soleus stretches and Hamstrings stretches
- 4-way SLR (hip flexion with slight hip ER, extension, abduction with slight hip ER, adduction): on table or standing without brace if patient has sufficient quadriceps control
- Seated Active Knee Extension (if no cartilage pathology), in pain free ranges (90-40)
(if patient has PFJ lesions: consider joint contact areas: inferior margin of patella contacts trochlea at 10-20 degrees of flexion; inferior facets contact trochlea at 30 degrees of flexion; middle facet articulates with the trochlea at 60 degrees; at 90 degrees of flexion: femoral condyles contact the superior facets)
- WB gastroc/soleus strengthening
- Bike: start with high seat; add low resistance
- Total Gym and/or Wall Squat (0-45 degrees): monitor PFJ tracking
- Balance and Proprioception Training; Single limb balance training only if *satisfactory proximal limb control has been achieved*. Otherwise, progress double leg proprioception and kinesthetic awareness exercises.
- Core training

CRITERIA FOR ADVANCEMENT TO THE NEXT PHASE:

- Able to perform a supine SLR without extension lag; good quadriceps tone
- Non-antalgic gait pattern
- Good PFJ mobility and control: no lateral tracking or signs and symptoms of instability
- Patient able to perform double leg partial squat to 30-45 degrees of knee flexion with good trunk, hip, and LE control, and without pain
- Near normal tibiofemoral ROM

PHASE III: 8 WEEKS- 4 MONTHS POST OPERATIVE

GOALS:

1. Progress strength
2. Progress dynamic stability
3. Good single limb stability
4. Full tibiofemoral ROM
5. No lateral patellar tracking or signs and symptoms of patellar instability
6. Improve cardiovascular endurance
7. Protect surgical site
8. Normal patellar and soft tissue mobility
9. Normal gait mechanics

BRACING AND WEIGHT BEARING STATUS:

- Full Weight Bearing
- Discontinue brace and assistive device if meets the following criteria:
 - a. No extension lag with supine SLR
 - b. Non – Antalgic gait pattern
 - c. Full extension ROM
- Possible use of a patella stabilizing knee sleeve for strenuous exercise (at physician's discretion) i.e. lateral "J" brace

THERAPEUTIC EXERCISES:

- Step Ups: start at 2" and progress towards 6-8 inches
- Partial lunges in sagittal plane; start with involved leg in front from 0-45 degrees; monitor PFJ tracking and progress as indicated
- Emphasize functional gluteal control: begin **controlled** lateral movement if patient has sufficient gluteal strength and leg and trunk control
- Stationary Bike, with moderate resistance; advance resistance as indicated
- 4 way SLR (flexion, extension, adduction, abduction)
- Total Gym, Leg Press, Wall Sit: start at 0-45 degrees of flexion and progress as strength allows; monitor PFJ tracking; use taping as indicated
- Partial Squats with resisted terminal knee extension
- Hamstring Curls
- Continue with Heel Raises

- Continue with balance/proprioception exercises: *caution with single leg balance on unstable surfaces prior to 3 months post operative unless patient demonstrates good proximal postural control*
- Continue with flexibility exercises; add quadriceps and ITB stretches as indicated
- Continue with core stability exercises
- Swimming
- Begin jogging program at 12 weeks with physician's clearance (may start in pool and progress to land PRN)
- *May introduce low impact, agility, and plyometric tasks

Running Progression:

- Meet Criteria for Return to jogging (i.e. good lumbo/pelvic/hip control, good eccentric quadriceps control, etc. during single leg squat and step downs)
- Treadmill walk/jog intervals (self-paced to begin with)
- Treadmill running
- Track: run straight parts, walk the turns
- Track: run straight parts and the turns
- Run on the road
- Run on the surface specific to the athlete's sport

Initially, take 1-2 days off between running days or as instructed by medical professional

CRITERIA FOR PROGRESSION TO THE NEXT PHASE:

- No signs or symptoms of patellar instability
- Normal gait mechanics
- Clearance from the physician before resuming full activity
- Good quadriceps strength

PHASE IV: 4 MONTHS – 6 MONTHS POST OPERATIVE

GOALS:

1. Quadriceps strength progression
2. Functional strength progression
3. Resume appropriate activity level

*****Experience has shown that patients can expect to return to unrestricted activities by 6 months to 1 year after surgery*****

Rehabilitation during the return-to-sport phase should be **criteria-driven**:

- a. Advancement to full contact and pivot sports is based on development of confidence, strength, agility, coordination, balance, postural control, endurance, and mechanical and functional stability (SEE SPECIFIC CRITERIA BELOW).
 - b. Return to cutting and pivoting sports **ONLY** after clearance by the M.D.
2. **Start with controlled activities** (i.e. avoid uneven surfaces, contact situations, and fatigue.)
 3. **Avoid high-risk activity to START** i.e. jumping, twisting, pivoting, cutting, etc.
 4. Use **Sport-specific Drills** to determine progression to unrestricted activities. Patient must be able to dynamically stabilize the knee in sport and activity positions before return to sport.
 5. Patient may be fit with Femoral Strapping Brace (Power Strap, Don Joy)

THERAPEUTIC ACTIVITIES:

- Progress CKC activities
- *May begin higher level plyometric and agility activities at 4 months: begin with single plane activities and progress to multi-planar activities*
- Sport specific training

Plyometric and Agility Progressions:

- Double leg jumps → Single leg hops
- Single plane → Multiple planes
- Stable → Unstable surfaces
- Controlled → Uncontrolled situations
- Teach the 3 L's
 - 1) Soft *L*anding following jumps at all times.
 - 2) Stay *L*ow while running at all times
 - 3) Keep your knees in *L*ine with your feet at all times

CRITERIA FOR PROGRESSION TO SPORT:

1. Patient tolerates functional progression to sport program without difficulty and without exacerbation of symptoms.
2. No effusion.
3. Full ROM
4. Before returning to their sport, the athlete **MUST DEMONSTRATE** the confidence, strength, agility, coordination, balance, postural control, endurance, and mechanical and functional stability to the degree necessary for their specific sport.
 - a) Confidence: Use patient reported outcome measures: IKDC, Tegner-Lysholm Knee Score (Tegner Lysholm Knee Score = "Excellent": > 90)
 - b) Strength: (MMT, Isokinetic strength, functional strength)
 - Quadriceps/thigh circumference should be within 1 cm of the uninvolved (if normal) side.
 - Quadriceps MVIC should be within 90% of the uninvolved side
 - Isokinetic Strength tests: Quadriceps and Hamstrings are 85-90% of the uninvolved side (isokinetic, 180 degrees/sec. and 300 degrees/sec.)
 - c) Functional stability: mimic functional activities specific to their sport to make correlations for readiness for return to sport
 - Testing can guide your treatment: assess for bilateral asymmetries (use . timed or measured trials)
 - All hop tests should be within 85-90% of the uninvolved side before return to sport.

Examples:

- Drop vertical jump
- Single limb hop for distance
- Single leg triple hop
- Single leg cross over hop
- Single leg timed hop
- Single leg vertical hop
- Shuttle runs
- Side shuffle runs
- Carioca running

“Soreness Rules”: use as a guide to activity progression (Adapted from University of Delaware Physical Therapy Clinic)

Criterion	Action
Soreness during warm-up that continues into the activity/training session	2 days off, drop down intensity level
Soreness during warm-up that goes away during the activity/training session	Stay at intensity level that led to soreness
Soreness during warm up that goes away but redevelops during activity/training session	2 days off, drop down 1 intensity level
Soreness the day after the activity/training session (not muscle soreness)	1 day off, do not advance program to next intensity level
No soreness	Advance 1 intensity level/week or as instructed by healthcare professional