MEDIAL PATELLOFEMORAL LIGAMENT RECONSTRUCTION CLINICAL PRACTICE GUIDELINE

Progression is time and criterion-based, dependent on soft tissue healing, patient demographics and clinician evaluation. Contact Ohio State Sports Medicine at 614-293-2385 if questions arise.

Background
The medial patellofemoral ligament (MPFL) is a ligament on the medial aspect of the knee which helps stabilize the patella against lateral movement. This ligament may be injured in a patella dislocation. A MPFL reconstruction surgery uses a ligament from somewhere else in the body to reconstruct this ligament stabilizing the patella.

Summary of Recommendations

Risk Factors
- Patellar instability
- Altered mechanics with functional movement
- Bony morphology
- Quadriceps strength deficits

Corrective Interventions
- Manual for patellar mobility and knee ROM
- Neuromuscular re-training to improve LE strength and normalize mechanics
- NMES for quadriceps activation
- Sport-specific activity training
- Vasopneumatic device for edema control

Precautions
- WBAT with crutches (until no extensor lag with SLR)
- Protected electrical stimulation program if warranted
- Patellar Glides/Mobilization: passive
- superior and medial glide only until 6 weeks
- NO LATERAL PATELLA GLIDES
- Avoid isolated hamstring strengthening if autograft used until 8 weeks

Outcome Testing
- Isometric testing at 10 weeks
- Isokinetic Testing at 12 weeks
- Functional Test: Hop testing

Manual therapy
- Patellar Mobilization: Passive superior glide and medial glide only until 6 weeks
- Knee extension/flexion PROM
- Scar massage
- Soft tissue mobilization as appropriate

Criteria for discharge
- Functional Test
  - Single leg and triple cross-over hop test for distance (within 15% of uninvolved limb)
- Isokinetic Testing
  - ≤10% difference in isokinetic peak torque with knee extension and knee flexion (60º/sec, and 300º/sec) between involved and uninvolved limbs
  - Quadriceps to hamstring isokinetic strength ratio = 60%
- No signs of patellar instability with clinical testing.
- Complete sport-specific drills without compensatory movements, exacerbation of symptoms or reactive effusion
Phase I Weeks 0-2: Protection (Post-Operative 2 weeks)

<table>
<thead>
<tr>
<th>Gait</th>
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<tbody>
<tr>
<td>• WBAT with crutches</td>
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<tr>
<td>o Confirm with surgeon if WB status is not documented in the chart</td>
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<tr>
<td>• Gait training: focus on equal weight distribution bilaterally and normalization of gait mechanics</td>
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<tr>
<td>o Begin ambulation with 2 crutches, then progress to 1 crutch then no support once gait mechanics are normalized</td>
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<tr>
<td>o Evaluate for symmetrical joint loading during stance phase, heel strike with full knee extension at initial contact, appropriate push-off at toe off</td>
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<tr>
<th>ROM</th>
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<tr>
<td>• Begin passive, active-assisted, and active ROM as tolerated</td>
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<tr>
<td>• Biking: bike with ½ revolutions and progress to full revolutions per precautions</td>
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<tr>
<td>• No forced flexion beyond 90° with meniscal repairs</td>
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<tr>
<td>• Patellar mobilization</td>
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<tr>
<td>o Emphasis on superior and inferior mobility</td>
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<tr>
<td>o NO lateral mobilization</td>
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<tr>
<td>• Heel slides</td>
</tr>
<tr>
<td>• IT Band stretch and soft tissue mobilization</td>
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<tr>
<td>• Gastroc/Soleus Stretching in seated position</td>
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<thead>
<tr>
<th>Strengthening</th>
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<tbody>
<tr>
<td>• Quad sets</td>
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<tr>
<td>• Glute sets</td>
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<tr>
<td>• SLR in flexion, abduction</td>
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<tr>
<td>o Avoid extensor lag</td>
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<tr>
<td>o Neuromuscular Electrical Stimulation to quadriceps at 60°-90°</td>
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<tr>
<td>o Multi-angle knee extensor isometrics from 60°-90° are also appropriate for those patients who cannot tolerate high-intensity neuromuscular electrical stimulation</td>
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<th>Pain and Effusion</th>
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<td>• Ice/cryotherapy, compression, elevation to reduce post-operative effusion</td>
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<tr>
<th>Goals to progress to next phase</th>
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<tr>
<td>1. Full active quadriceps contraction with superior patellar glide</td>
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<tr>
<td>2. Full passive knee extension</td>
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<tr>
<td>3. Effusion: ≤ 2+ (effusion can at least be swept out of medial sulcus)</td>
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<td>4. SLR x 10 seconds without extensor lag</td>
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<td>5. Patient is able to tolerate full WB without increased pain or 3+ effusion</td>
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<tr>
<td>6. Patient able to walk with assistive device, without obvious deviations on observation</td>
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### Phase I Weeks 2-4: Protection (Days 14-28)

#### Gait
- WBAT
- Gait training emphasizing avoidance of flexed or stiff-knee gait and normal push-off with gastrocnemius/soleus complex to restore normal gait speed and cadence

#### ROM
- Continue passive, active-assisted, and active ROM as tolerated
- Meniscal repairs: no forced flexion beyond 90°
- Towel stretching, prone hangs, ‘bag hangs’ to achieve and maintain knee extension symmetrical to the contralateral limb
- Bike with NO resistance
- Patellar mobilization with emphasis on superior/inferior glides
- Begin light Quad and HAMSTRING stretching

#### Strengthening
- Continue weeks 0-2
- Quad set progression (i.e. prone QS, supine, TKE)
- SLR in flexion, abduction, adduction, extension
- NMES at 60° knee flexion
- Initiate HAMSTRING activation exercises (heel slide, hamstring sets, bridges)
- Step-ups (2” starting height) progressed without increased pain and good technique
- Begin trunk and lumbopelvic strengthening
  - Bridging, planks, pelvic tilts, teach abdominal bracing
- Shuttle/Leg Press (90° – 0°)
  - bilateral to single-leg presses per patient tolerance and good mechanics/control
  - increase resistance per patient tolerance
- Single leg stance
  - Eyes open to eyes closed
  - Progress to dynamic movements and/or unstable surface
- Heel/toe raises
- Squat correct in modified range

#### Goals to progress to next phase
1. Effusion: ≤ 2+
2. Patient is able to tolerate full WB without increased pain or effusion
3. Patient able to walk on level surfaces without assistive device and normal mechanics
4. Patient able to stand on single-leg at least 30 seconds without loss of balance
### Phase II  Weeks 4-6

| **ROM** |  
| --- | --- |
|  | • Continue passive, active-assisted, and active ROM as tolerated  
  * ***Concerns with limited ROM should be communicated directly with surgeon***  
|  | • Continue patellar mobilization as needed  
|  | • Bike-light resistance  
|  | • Continue with quadriceps and hamstring flexibility  

| **Strengthening** |  
| --- | --- |
|  | • Continue NMES  
|  | • Weighted multi-angle SLRs  
|  | • Resistance exercises for gluteal strengthening  
|  | o Resisted side stepping, and backward walking, clamshells, reverse clamshells  
|  | • Progressive resistance quadriceps and hamstring exercises per patient tolerance  
|  | o Partial ROM lunges  
|  | • Progress WB/CKC (shuttle, aquatics, Total Gym, etc.) strengthening  
|  | • Squat progressions on stable and unstable surface with good mechanics  
|  | • NO JOGGING OR SINGLE-LEG PLYOMETRICS  

| **Goals to progress to next phase** |  
| --- | --- |
| 1. | Patient is able to tolerate therapeutic exercise program without increased pain or effusion grade (≤1+)  
| 2. | Full, pain-free AROM is equal to contralateral limb (***(CONTACT MD IF ABNORMAL***)  
| 3. | Normal patellofemoral mobility without apprehension  
| 4. | Patient demonstrates normal mechanics without pain during reciprocal stair ascent and descent  

### Phase II Week 6-10

| **Strengthening/ Dynamic Control** |  
| --- | --- |
|  | • Progress WB strengthening exercises for quadriceps and hamstring  
|  | o Lunges, shuttle, steamboats, sidestepping, leg press, squats, single leg Romanian dead lifts (RDLs), etc.  
|  | • Step up and step downs (heel touch)  
|  | o Progress step height as tolerated by patient  
|  | • Begin sub-maximal leg extensions, 90° - 45° only  
|  | • Begin bilateral shuttle jumping = 50% body weight (shuttle, Total Gym, etc.)  
|  | o emphasizing symmetry in landing and take-off phases  
|  | • Work on endurance with low impact activities - Treadmill walking, stepper, elliptical  
|  | • Progress single leg balance activities  
|  | • Begin full weight landing mechanics if good mechanics on shuttle with visual cueing  
|  | o Double to single leg loading response  
|  | o Double leg jumping in place  
|  | • Week 8: Initiate isolated hamstrings strengthening per tolerance.  

| **Goals to progress to next phase** |  
| --- | --- |
| 1. | Effusion ≤ 1+ (can be swept out of medial sulcus and returns only with lateral sweep)  
| 2. | Patient is able to tolerate therapeutic exercise program without increased pain or effusion grade  
| 3. | Maintain Full, pain-free AROM is equal to contralateral  
| 4. | Normal patellofemoral mobility  
| 5. | Patient demonstrates normal mechanics with CKC exercise and early jumping activities  

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### Phase III Weeks 10-12

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<tr>
<th>ROM</th>
<th>• Continue with stretching and Bike</th>
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| **Strengthening/Dynamic Control/Functional Activities** | • Full weight bearing (FWB) strengthening exercises  
• Strength progression from stable to unstable surface  
• Progress full range open-chain knee extension exercises as tolerated without pain  
• Progress hamstrings strengthening as tolerated (i.e. Double leg hamstrings curls with physioball, resisted leg curls, etc.)  
• Plyometric progression  
  o Squat jumps/ broad jumps initially at 50% effort for height/distance then progress when correct technique is demonstrated  
• Introduce single leg jumping and rotational activities and jogging with increasing resistance  
• Initiate walk-jog progression  
  o Criteria to initiate jogging  
    • Full active knee extension  
    • Normal landing mechanics and single leg squat pattern  
    • Strength of involved limb is at least 80% of uninvolved limb  
    • Audible rhythmic strike patterns and no gross visual antalgic pattern |

| Goals to progress to next phase | 1. Effusion ≤ 1+ (can be swept out of medial sulcus and returns only with lateral sweep)  
2. Patient is able to tolerate therapeutic exercise program without increased pain or effusion grade  
3. Maintain Full, pain-free AROM is equal to contralateral  
4. Normal patellofemoral mobility  
5. Patient demonstrates normal mechanics with all CKC exercise and early jumping activities |
Phase IV: Return to Sport/Activity  **Weeks 12-16**

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<tr>
<th>ROM</th>
<th>• Maintain ROM equal to uninvolved limb</th>
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| **Strengthening** | • Emphasize performance of the quadriceps, hamstrings and trunk dynamic stability  
• Emphasize muscle power generation and absorption  
• Focus on activities that challenge muscle demand in intensity, frequency, and duration of activity  
• Emphasize sport- and position-specific activities  
**Consider**  
- Double leg and single leg activities and transitions  
- Vary planes of movement and change of direction  
- Perturbations and alter support surface (indoor and outdoor)  
- Challenge multiple muscle groups (lower extremity and core) simultaneously  
**Examples**  
- Weight lifting: squats, leg extension, leg curl, leg press, deadlifts  
- Lunges-forward, backward, rotational, side  
- Rotational trunk exercises on static and dynamic surfaces  
- Unilateral shuttle jumping with increasing resistance and mid-air rotations |
| **Return to Sport Activities** | • Emphasize appropriate symmetry in weight-bearing, joint loading and technique during performance of all therapeutic activities and plyometrics  
• Emphasize sport- and position-specific activities  
  • Add ball, racquet, stick  
  **Consider:**  
  - Impact loading and appropriate attenuation strategy, cue regarding “hard” landings  
  - Double leg and single leg activities and transitions  
  - Vary planes of movement and change of direction  
**Examples:**  
- Single-leg hop downs from increasing height (up to 12” box)  
- Single-leg hop-holds (stable surface .Airex pad)  
- Double and single-leg hopping onto unstable surface (i.e. Airex pad)  
- Tuck jumps (focus on increasing multi-joint flexion during landing and holding stable position)  
  • 90º to 180º jumps  
  **Begin agility exercises between 50-75% (utilize visual feedback to improve mechanics)**  
  - Side shuffling  
  - Hopping  
  - Carioca  
  - Figure 8  
  - Zig-zags  
  - Back pedaling  
  - Resisted jogging (Sports Cord) in straight planes, etc |
| **Goals to progress to Independent Program** | • **Functional Test**  
  - Single leg and triple cross-over hop test for distance (within 15% of uninvolved limb)  
• **Isokinetic Testing**  
  - ≤10% deficit in isokinetic peak torque with knee extension and knee flexion (60º/sec, and 300º/sec) compared to uninvolved limb  
  - Quadriceps to hamstring isokinetic strength ratio = 60%  
• **Complete sport-specific drills without compensatory movements, exacerbation of symptoms or reactive effusion** |

**Authors:** Adam Ingle PT, DPT, Chelseana Davis, PT, DPT  
**Reviewers:** John DeWitt, PT, DPT, SCS, ATC  
**Completion date:** 4/8/15