MEDIAL PATELLOFEMORAL LIGAMENT RECONSTRUCTION CLINICAL PRACTICE GUIDELINE

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-traning 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
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) • 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

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

Phase II (Weeks 2-4)

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 90º • 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 60º 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 (90º – 0º)
	  ○ 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

Criteria for Progression	• Effusion: ≤ 2+ • Patient is able to tolerate full WB without increased pain or effusion • Patient able to walk on level surfaces without assistive device and normal mechanics • Patient able to stand on single-leg at least 30 seconds without loss of balance

Phase III (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 ○ Resisted side stepping, and backward walking, clamshells, reverse clamshells

	● Progressive resistance quadriceps and hamstring exercises per patient tolerance ○ 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**
Criteria for Progression	● Patient is able to tolerate therapeutic exercise program without increased pain or effusion grade (≤1+) ● Full, pain-free AROM is equal to contralateral limb (***CONTACT MD IF ABNORMAL***) ● Normal patellofemoral mobility without apprehension ● Patient demonstrates normal mechanics without pain during reciprocal stair ascent and descent

Phase IV (Weeks 6-10)

Strengthening / Dynamic Control	● Progress WB strengthening exercises for quadriceps and hamstring ○ Lunges, shuttle, steamboats, sidestepping, leg press, squats, single leg Romanian dead lifts (RDLs), etc. ● Step up and step downs (heel touch) ○ Progress step height as tolerated by patient ● Begin sub-maximal leg extensions, 90º - 45º only ● Begin bilateral shuttle jumping = 50% body weight (shuttle, Total Gym, etc.) ○ 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 ○ Double to single leg loading response ○ Double leg jumping in place ● Week 8: Initiate isolated hamstrings strengthening per tolerance.
Criteria for Progression	● Effusion ≤ 1+ (can be swept out of medial sulcus and returns only with lateral sweep) ● Patient is able to tolerate therapeutic exercise program without increased pain or effusion grade ● Maintain Full, pain-free AROM is equal to contralateral ● Normal patellofemoral mobility ● Patient demonstrates normal mechanics with CKC exercise and early jumping activities

Phase V (Weeks 10-12)

ROM	● Continue with stretching and bike
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 ○ 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 ○ 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
Criteria for Progression	● Effusion ≤ 1+ (can be swept out of medial sulcus and returns only with lateral sweep) ● Patient is able to tolerate therapeutic exercise program without increased pain or effusion grade ● Maintain Full, pain-free AROM is equal to contralateral ● Normal patellofemoral mobility ● Patient demonstrates normal mechanics with all CKC exercise and early jumping activities

Phase VI: Return to Sport/Activity (Weeks 12-16)

ROM	● Maintain ROM equal to uninvolved limb
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 ●
Return to Sport Activities	● Effusion ≤ 1+ (can be swept out of medial sulcus and returns only with lateral sweep) ● Patient is able to tolerate therapeutic exercise program without increased pain or effusion grade ● Maintain Full, pain-free AROM is equal to contralateral ● Normal patellofemoral mobility ● Patient demonstrates normal mechanics with all CKC exercise and early jumping 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
Goals to Progress to Independent Program	● **Functional Test** ○ Single leg and triple cross-over hop test for distance (within 15% of uninvolved limb) ● **Complete sport-specific drills without compensatory movements, exacerbation of symptoms or reactive effusion**

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