



KNEE PATELLOFEMORAL PAIN NON-OPERATIVE GUIDELINES

Phase 1: Activity Modification

PRECAUTIONS

- Be mindful of unusual symptoms such as effusion and multi-joint symptoms
- Avoid exercises and activities that are painful and/or exacerbate symptoms

TREATMENT RECOMMENDATIONS

- Patient education
 - Understanding PF loads
 - Improved neuromuscular control/muscle activation
 - Standing posture
 - Deficits identified and plan of care including goals
 - Movement strategies (importance of hip strategy versus knee strategy)
- Lower extremity (LE) soft tissue and joint mobility
- Proximal and distal stretching as tolerated
- Knee PROM/active assisted range of motion (AAROM)/AROM without increasing irritability
- Core stabilization
- Proximal and distal strengthening
- Knee isometric strengthening as tolerated
- External supports, as needed (bracing or taping)
- Modalities
 - Pain, swelling (e.g., ice, compression, TENS)
 - Strength: NMES, biofeedback
 - Consider Blood Flow Restriction (BFR) for muscle activation/strengthening, with referring provider clearance
- Cardiovascular exercise

CRITERIA FOR ADVANCEMENT

- Pain controlled with ambulation on level surfaces with appropriate assistive device
- No gross effusion at knee
- Active quadriceps contraction

EMPHASIZE

- Patient understanding of condition/PF loading
- Control pain and effusion/inflammation
- Pain-free exercise and activities
- Active quadriceps contraction
- Light cardiovascular exercise



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Phase 2: Addressing Impairments/Building Foundation of Strength

PRECAUTIONS

- Sign/symptom provocation: pain during or after activity, joint effusion, active inflammation, quadriceps shutdown
- Avoid activities that cause pain or inflammation

TREATMENT RECOMMENDATIONS

- Patient education
 - Progress to performance of modified function (0/10 pain with activities of daily living (ADL) and non-rehabilitation specific exercise, e.g., cardiovascular)
 - Reinforce compliance with updated home exercise program (HEP)
- Address flexibility and ROM deficits
 - Foam rolling
 - Stretching
 - Joint mobilization, as needed (patella, ankle, hip)
- Proximal muscle activation and limb alignment in single limb
- Knee control and distal alignment in single limb
- Hip strategy during functional movements
- Strengthening
 - Core
 - Hip and gluteal
 - Quadriceps
 - Ankle and foot
- Neuromuscular control, bilateral progressing to single limb balance
- Continued external supports (bracing, taping, shoe inserts), as needed
- Modalities
 - Consider Blood Flow Restriction (BFR) for muscle activation/strengthening
- Cardiovascular training

CRITERIA FOR ADVANCEMENT

- Able to stand on 1 leg with good alignment and control
- Able to perform pain-free 6" step up

EMPHASIZE

- Good neuromuscular control/alignment with single limb support
- Progress home exercise program



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Phase 3: Restoration of Function

PRECAUTIONS

- Too much, too soon: monitor volume and load
- Avoid compensatory movement patterns
- Monitor movement strategies during fatigue situations
- Avoid inadequate rest and recovery
- Avoid inadequate strength to meet demands of activity level

TREATMENT RECOMMENDATIONS

- Patient education
 - Functional progression
 - Adequate rest and recovery
- Flexibility/mobility
- Evaluation based strengthening progression
 - Core
 - Gluteals
 - Quadriceps (closed chain in pain free arc)
- Functional strength
 - Squat progression
 - Eccentric progression
- Progression of body weight exercise
 - Double leg to single leg exercise
 - Deadlift to single leg deadlift
- Neuromuscular control
- Cardiovascular training via low/non-impact activities such as elliptical, bicycle, etc.
- Aquatic therapy, if available

CRITERIA FOR DISCHARGE OR ADVANCEMENT TO PHASE 4 (IF RETURNING TO SPORT)

- Independent control of symptoms
- Able to demonstrate bilateral body weight squat with proper alignment and control
- Able to descend a 6-8" step with good control and alignment (depending upon patient's height)
- **Discharge to long term HEP and modified activity or progress to Phase 4 if patient wants to return to dynamic activities or sport**

EMPHASIZE

- Progression of pain free PF loading
- Eccentric quadriceps control



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Appendices

APPENDIX 1: PHASE 1

- Cardiovascular exercises
 - Upper body ergometer
 - Airdyne® or stationary bike
 - Swimming (use of pool buoy and avoidance of breaststroke)

APPENDIX 2: COMMON GAIT DEVIATIONS

- Lack of knee control resulting in knee hyperextension during stance
- Femoral internal rotation, valgus and/or increased pronation during stance
- Femoral internal rotation during swing
- Medial heel whip during swing
- Increased pelvic rotation with decreased hip extension

APPENDIX 3: PHASE 2 TREATMENT RECOMMENDATIONS

- For proximal muscle activation in single limb
 - Weight shifting medial/lateral, anterior/posterior to single limb stance
 - Proprioceptive board/wobble board
 - Contralateral hip extension and/or abduction
 - Hip hiking
 - Retro walking on treadmill or over ground
 - Single leg isometric leg press with slight knee flexion at less than body weight
- Emphasize hip strategy for movement
 - Initiate and continue to drive movement with the hips, e.g. hip hinging, butt taps
- Core strengthening
 - Transverse abdominis activation in hook lying
 - Pallof press
 - Front planks
 - Side planks
- Gluteal strengthening
 - Bridge progression
 - Side lying hip abduction with ankle weight
 - Prone hip extension with ankle weight
 - Clamshell
- Closed chain quadriceps strengthening
 - Double limb to single limb leg press at less than bodyweight



- Progress body weight strengthening (start with double limb support). Consider continued use of BFR to address continued muscle activation or strength deficits
 - Squat into chair
 - Romanian dead lifts
 - Band walks
 - Step ups
 - Step downs
- Ankle and foot
 - Heel raises
 - Intrinsic foot exercises
- Cardiovascular training
 - Increase volume before intensity (e.g. increase time before resistance)
 - Bicycle 80 RPM
 - Swimming, progress from pool buoy
 - Walking program
- Aquatic therapy
 - Address gait deviations (forward, retro ambulation)
 - Flexibility: address patient flexibility needs
 - Core stability: noodle push downs, med ball trunk rotation
 - Strengthening: sidesteps, standing leg lifts with ankle weights, double limb squats, step ups, standing hip/knee extension with noodle under foot, calf raises (if applicable utilizing laminar flow to provide resistance)
 - Balance: single limb stance activity with UE/LE movements

APPENDIX 4: PHASE 3 TREATMENT RECOMMENDATIONS

- Hydrotherapy
 - Progress step ups, step downs, prone hip kicking (flutter, hip abduction/adduction), single limb squats, lunges, progress intensity of single limb activity against laminar flow, initiate light aqua jogging

APPENDIX 5: PHASE 4 TREATMENT RECOMMENDATIONS

- Light agility: ladder, jump rope, anti-gravity treadmill, if able, at low intensity and low volume
- Hydrotherapy
 - Plyometrics: double and single leg jumps, jumping jacks, split stance hops, lateral push-offs, cariocas, sprinting to test patient tolerance for return to sports activity