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KNEE PATELLAR INSTABILITY 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 RETURN 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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Phase 4: Return to Play/Dynamic Activities

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

ASSESSMENT
• Dynamic single leg alignment and control
• Running/walking gait in various conditions (uphill, downhill, uneven surfaces, hiking)
• Movement strategy (squat, forward step up 6-8”/step down 6-8”, single leg squat, jump in place, jump side to side)
• Dynamic double leg movement patterns and dynamic single leg movement patterns
• Address ongoing efficacy of external supports (brace, shoe inserts, tape)

TREATMENT RECOMMENDATIONS
• Progressively increase volume and PF load to mimic load necessary for return to activity
• Introduce movement patterns specific to patient’s desired sport or activity
• Introduction of light agility work (see Appendix 5)
• Increase cardiovascular load to match that of desired activity
• Consider collaboration with certified athletic trainer (ATC), performance coach/strength and conditioning coach (CSCS), skills coach and/or personal trainer for complex sports specific movements, if available

CRITERIA FOR DISCHARGE
• Ensure that there is a plan in place for a graded return to full or modified activity based on patient’s maximal therapeutic activity (e.g., ATC, skills coach, CSCS)

EMPHASIZE
• Progression of pain-free PF loading
• Eccentric quadriceps control
• Movement quality with functional activities

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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

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• 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