

Follow physician's modifications as prescribed

PHASE I: PROTECTION PHASE (WEEKS 0-6)

GOALS:

- Independence in home therapeutic exercise (HEP) program
- Promote healing
- Control post-operative pain / swelling
- Prevent quadriceps inhibition: fair to good quadriceps contraction
- Straight leg raise (SLR) without lag, pain-free
- ROM: 0° KE to ≥ 90° KF
- Independent ambulation WBAT with brace locked in extension, and appropriate assistive device on level surfaces and stairs

PRECAUTIONS:

- Ambulation without brace
- Lateralization of patella
- AA-AROM KE, especially with significant quad atrophy, and articular cartilage injury
- Symptom provocation: quadriceps shut down, joint effusion, active inflammation
- KF ROM as per surgeon's guidelines

TREATMENT RECOMMENDATIONS:

- Emphasize patient compliance to HEP and weight bearing precautions/progression
 - ✓ WBAT with brace locked in extension with appropriate assistive device on level surfaces and stairs
 - ✓ Cryotherapy: home cold therapy unit
 - ✓ **Continuous Passive Motion**: 2-3 hours/ day; with cartilage procedure = 6-8 hours/ day
 - ✓ Electrical stimulation for quadriceps re-education: quadriceps sets with towel roll under knee
- Sitting knee ROM exercise: AAROM KF, PROM KE
- Quad set with towel roll under knee
- Hip progressive resisted exercises: pain-free SLR with brace if lag is present
- Distal strengthening (PF)
- Flexibility exercises (hamstrings, gastrocnemius)

MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE:

- Fair to good quadriceps contraction
- Good patellar mobility in medial direction
- ROM: 0° knee extension to ≥90° knee flexion
- 0/10 pain at rest
- Able to SLR pain-free without quadriceps lag

PHASE II: GAIT PHASE (WEEKS 7-10)

GOALS:

- Independence in HEP, as instructed
- Control pain, inflammation, effusion
- Promote healing
- ROM 0° KE-110° KF (8 weeks), 120° (10 weeks) to full ROM
- Good patella mobility
- Good quad contraction
- Normalize gait with brace and assistive device, prn
- Postural stability, alignment and N-M control in single limb stance
- 0/10 pain with ADLs, therapeutic exercise: Recognize pain-free arc of motion

PRECAUTIONS:

- Sign and symptom provocation: pain, inflammation, quadriceps shut down, joint effusion
- Concomitant procedures: TTT, articular cartilage procedure
- Lateralization of the patella
- Pathological gait pattern (quadriceps avoidance; bent knee)
- Arc of motion during exercise

TREATMENT RECOMMENDATIONS:

- HEP: advance as tolerated. Continue phase I exercises, as appropriate
- Patient education: Activity modification, progression of gait training, cryotherapy
- Patellar mobilization, MD directed
- ROM exercises:
 - Sitting PROM to AAROM KE in a pain-free arc of motion (no cartilage injury) to AAROM KF
 - KF: sitting progressing to stair ROM, supine wall ROM as tolerated (~125°KF in sitting, quad control)
- Gait training: heel toe gait pattern with brace open to 90° or functional brace and assistive device [with adequate quad control (SLR without a lag, ability to achieve terminal knee extension) and knee ROM] to ensure normal loading response; hydro-treadmill (adequate wound healing) or anti-gravity treadmill. Low grade elevation or retro-walking to encourage N-M control with KF during loading response
- Quadriceps strengthening: progress pain-free arc of motion, close chain preferred
 - Continue with Estim, biofeedback, quad sets, submaximal multi angle isometrics, as needed
 - Leg press: monitor arc of motion (bilateral, eccentric)
 - Initiate forward step up (FSU) progression, 6" step with adequate strength
- Bicycle: progressing from short crank to standard crank as ROM allows (115° KF in sitting), 80 RPMs
- Flexibility exercises - evaluation-based: AROM KF with hip extension in standing
- Advance proximal strength and core training: (i.e. hip extension with knee flexion, side planks, bridge)
- Hydrotherapy for gait, single limb alignment and stability, proximal strengthening
- Initiate balance and proprioceptive training: double limb support on progressively challenging surfaces to single limb support on level surface only with demonstration of good alignment, stability and N-M control

MINIMUM CRITERIA FOR ADVANCEMENT:

- ROM 0° KE → 115° KF
- Normal gait pattern
- Good patella mobility
- Postural stability, alignment and N-M control in single limb stance
- 0/10 pain with ADLs and therapeutic exercise
- Independent HEP

PHASE III: STRENGTHENING (WEEKS 11-18+)

GOALS:

- Independent HEP
- Control pain, effusion and inflammation
- 0/10 pain with ADLs, therapeutic exercise
- ROM: WNLs, 130° (12 weeks)
- Normalize gait on level surfaces and stairs
- Address imbalances
- Core stability: Single leg bridge = 30 s, Sahrmann ≥ level 3
- Good single limb dynamic balance
- Eccentric quadriceps and pelvic control with 6"/ 8" FSD
- Initiate running program, plyometrics (bilateral)
- Symmetry, quality, alignment during selected movement patterns: squat, jump in place

PRECAUTIONS:

- Sign and symptom provocation: pain, and active inflammation/ effusion, quadriceps shutdown
- Gait deviations
- "Too much, too soon" progression
- Disregarding quality of movement

TREATMENT RECOMMENDATIONS:

- HEP, as instructed
- Educate patient: Activity modification, individualized, and cryotherapy
- Quadriceps strengthening: progress as tolerated, monitor arc of motion, closed chain preferred
 - FSU progression: 6" step progressing to 8" step (dependent on patient height)
 - Eccentric leg press progressing to:
 - Forward step down (FSD) progression: 6" step progressing to 8" step (dependent on patient height)
 - Squat progression: chair squats, (use ball if necessary with buttocks moving under ball), to free squats
- ROM exercises:
 - (AA) ROM KE (monitor arc of motion) to AAROM KF in sitting to supine wall slides to stair stretch
- Gait training to emphasize heel-toe gait pattern with emphasis on loading response
- Advance proximal strength through functional activities (bridging progression, hip extension with KF, clock, RDL, windmill, lawn mower) and core training (planks, side planks, Sahrmann progression)
- Balance progression with postural alignment and N-M control (static to dynamic, introduce different planes of motion, challenging surfaces)
- Address muscle imbalances – evaluation-based: (i.e. 2 joint hip flexor length)
- Cross training: elliptical trainer initiated with good strength/ quality during 6" FSU, bicycle (80 RPMs), swimming (crawl, back stroke)
- Initiate running program (late phase): with eccentric quadriceps control during 8" FSD and MD clearance
 - ✓ 30 second interval initially
- Initiate plyometric program with MD clearance and evidence of good eccentric quadriceps control
 - ✓ Vertical jumping progression: Jump up to jump in place

CRITERIA FOR ADVANCEMENT:

- ROM WNLs
- No pain or swelling
- Normalize gait
- Ability to demonstrate alignment, control, stability in single limb stance during dynamic activities
- Core stability: Single leg bridge = 30 s, Sahrmann ≥ level 3
- Able to ascend 6"/ 8" step with good control
- Able to descend 6"/ 8" step with good control, and alignment
- Symmetry, quality, alignment during selected movement patterns
- Independence in a home exercise program

PHASE IV: ADVANCED STRENGTHENING AND FUNCTION (WEEKS 19-24)

GOALS:

- Lack of pain, apprehension with sport specific movements
- Maximize strength and flexibility as to meet demands of individual's sport activity
- Ability to demonstrate strategy, symmetry, quality, control and alignment during selected movement patterns: squat, jump (vertical and horizontal), single leg squat
- Isokinetic test: 180° / sec and 300° / sec 85% limb symmetry index (LSI)
- Cardiovascular fitness to meet demands of sport

PRECAUTIONS:

- Pain with therapeutic exercise & functional activities
- Inadequate strength, functional strength, ROM, flexibility, fitness when returning to sport

TREATMENT RECOMMENDATIONS:

- Continue to advance LE strengthening, flexibility, dynamic single limb stability & agility programs
- Continue to address muscle imbalances – evaluation-based
- Advance core stability
- Cross training
- Advance plyometric program with MD clearance and evidence of good eccentric quadriceps control
 - ✓ Vertical jumping progression: Jump down
 - ✓ Horizontal jumping progression: Broad jump, single leg landings
 - ✓ Progress running program
 - ✓ Cutting, deceleration, change of direction with MD clearance and dynamic single limb stability

CRITERIA FOR ADVANCEMENT:

- Isokinetic test at 180° / sec and 300° / sec: 85% limb symmetry index (LSI)
- Demonstrate symmetry, quality, alignment during selected movement patterns
- Medical clearance by surgeon for return to play progression
- Lack of apprehension with sport specific movements
- Flexibility to meet demands of sport

PHASE V: RETURN TO PLAY (WEEKS 25-30)

GOALS:

- Lack of pain, apprehension with sport specific movements
- Maximize strength and flexibility as to meet demands of individual's sport activity
- Ability to decelerate with good control, and alignment on single limb
- Isokinetic test: 180° / sec and 300°/ sec 85% limb symmetry index (LSI)
- Cardiovascular fitness to meet demands of sport
- Hop Test \geq 85% limb symmetry

PRECAUTIONS:

- Pain with therapeutic exercise & functional activities
- Inadequate strength, functional strength, ROM, flexibility, fitness when returning to sport

TREATMENT RECOMMENDATIONS:

- Continue to advance LE strengthening, flexibility, dynamic single limb stability, core stability & agility
- Advance plyometric program: with MD clearance
 - ✓ Horizontal jumping progression: Broad jump to Hop to opposite to Single leg hop
- Advance cutting, deceleration training
- Progress cardiovascular fitness to meet demands of sport

CRITERIA FOR DISCHARGE:

- Isokinetic test: 180° / sec and 300°/ sec 85% limb symmetry index (LSI)
- Ability to decelerate with good control, and alignment on single limb
- Medical clearance by surgeon for return to play
- Hop Test \geq 85% limb symmetry
- Lack of apprehension with sport specific movements
- Flexibility to meet demands of sport
- Independence with gym program for maintenance and progression of therapeutic exercise program
- **Demonstrate quality of movement with required sports specific activities**