



PCL Repair

Post-Operative Rehabilitation Protocol

0-2 weeks

- NWB x 6 weeks with crutches
- Use immobilizer for 3–7 days until good quadriceps control. Then, transition to Dynamic PCL Brace (Rebound Brace).
 - Dynamic PCL brace to be used for 6 months post-operatively.
- ROM (**Prone only**) → to avoid tension on PCL graft via posterior tibial glide from gravity
 - Passive flexion 0-90 degrees,
 - Active Assisted extension 70 to 0 degrees
 - Emphasize maintenance of full extension
 - **NO** active knee flexion and open chain hamstring isometrics x 8 weeks
- Patella mobilization
- Towel extensions
- Prone hangs
- SLR supine with brace locked at 0 degrees
- Quadriceps isometrics at 60 degrees

2-6 weeks

- ROM (**Prone only**):
 - Active Assisted extension 90-0 degrees
 - Passive flexion 0-90 degrees
- Short crank (90mm) ergometry
- SLR's (all planes): Progressive Resistance
- Multiple-angle Quadriceps Isometrics: 60 to 20 degrees

6-12 weeks

- Begin WBAT progression advance TTWB to PWB (25% then 50%) starting at 6 weeks
- Full WB by 8 weeks post-op
- Discontinue crutches when gait is non-antalgic (6-8 weeks)
- Initiate Forward Step-Up program (6-8 weeks)

Weight Bearing Status

NWB x 6 weeks

Brace Settings

-Immobilizer for about 3-7 days
- Transition to PCL brace once good quad control obtained.
-Wear PCL brace x 6 months

ROM Restrictions

PROM 0-90° beginning POD 1 in Prone Position



- Stationary bike with low resistance settings and leg presses to a maximum of 70° of knee flexion is initiated
- Leg Press, Mini-Squats (60-0 degree arc)
- Standard ergometry (if knee ROM > 115 degrees)
- AAROM exercises
- Stairmaster (6-8 weeks)
- Proprioception Training (Prop Board, BAPS)
- Aquacisor (gait training)
- Retrograde treadmill ambulation
- Initiate Step Down Program (8-10 weeks)

12-20 weeks

- Leg Press: Squats (80 to 0 degree arc)
- AAROM exercises
- Proprioception Training (Prop Board, BAPS)
- Lunges
- Advanced Proprioception training (perturbations)
- Agility exercises (sport cord)
- Versaclimber
- Retrograde treadmill running
- Quadriceps stretching

20-26 weeks

- Start forward running (if descend 8" step satisfactorily)
- Continue lower extremity strengthening, flexibility, proprioceptive & agility programs
- Initiate plyometric program (if sufficient strength base)
- Functional Hop Test (>85% contralateral)

>26 weeks

- Dynamic brace can be discontinued if kneeling stress x-rays demonstrate less than 2mm of difference.
- Continue lower extremity strengthening, flexibility, proprioceptive & agility programs
- Advance plyometric program
- Advance agility and sport specific program



| Exercise | Week | | | | | | | | | | | | | | |
|---|---|---|---|---|----------|-----------------------------------|---|---|---------------------|--------------------------|----|----|-------------------|----|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 16 | 20 | 24 | |
| Initial Exercises: | | | | | | | | | | | | | | | |
| ROM Goals | 0-90° | | | | 0-125° | | | | Progress to full | | | | | | |
| Flexion/extension- prone with brace | [Green bar from Day 1 to Day 12] | | | | | | | | | | | | | | |
| Flexion/extension- seated/ calf-assisted or prone | [Green bar from Day 8 to Day 12] | | | | | | | | | | | | | | |
| Patella/Tendon mobilization | [Green bar from Day 1 to Day 8] | | | | | | | | | | | | | | |
| Quad Series | 0° ISOs, SLR | | | | 60° ISOs | | | | 70-30° arc-resisted | | | | Full arc resisted | | |
| Hamstring Sets | [Green bar from Day 12 to Day 24] | | | | | | | | | | | | | | |
| Sit and Reach for Hamstrings (no hyperextension) | [Green bar from Day 5 to Day 9] | | | | | | | | | | | | | | |
| Ankle Pumps | [Green bar from Day 1 to Day 10] | | | | | | | | | | | | | | |
| Crutch weaning | NWB [Green bar from Day 7 to Day 9] | | | | | | | | | | | | | | |
| SLR (w/ brace until quad control restored) | [Green bar from Day 1 to Day 7] | | | | | | | | | | | | | | |
| Toe and heel raises | [Green bar from Day 8 to Day 12] | | | | | | | | | | | | | | |
| Weight-bearing Strength Exercises: | | | | | | | | | | | | | | | |
| Double Knee Bends | NWB | | | | | [Green bar from Day 8 to Day 12] | | | | | | | | | |
| Double Leg Bridges | NWB | | | | | [Green bar from Day 9 to Day 12] | | | | | | | | | |
| Step up/Lunge Progression | NWB | | | | | [Green bar from Day 8 to Day 24] | | | | | | | | | |
| Beginning cord exercises | NWB | | | | | [Green bar from Day 10 to Day 12] | | | | | | | | | |
| Proprioception/Balance Training | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Dead Lift (2 → 1) | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Squat/Leg Press (ISO →reps, 2→1 leg) | NWB | | | | | 0-45° | | | | 0-70° (70° Max on press) | | | | | |
| Sports Test Exercises | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Cardiovascular Exercises: | | | | | | | | | | | | | | | |
| Bike with both legs-no resistance | NWB | | | | | [Green bar from Day 7 to Day 9] | | | | | | | | | |
| Bike with both legs- resistance | NWB | | | | | [Green bar from Day 9 to Day 24] | | | | | | | | | |
| Aqua jogging | NWB | | | | | [Green bar from Day 12 to Day 24] | | | | | | | | | |
| Treadmill-walking 7% incline | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Swimming with fins-light flutter kick | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Elliptical Trainer | NWB | | | | | [Green bar from Day 12 to Day 24] | | | | | | | | | |
| Rowing | NWB | | | | | [Green bar from Day 12 to Day 24] | | | | | | | | | |
| Stair stepper | NWB | | | | | [Green bar from Day 16 to Day 24] | | | | | | | | | |
| *Cardio Exercises | Must tolerate daily walking with no limp & no significant increase in pain/swelling prior to initiating WB cardio (walk, elliptical, stepper) | | | | | | | | | | | | | | |
| Agility Exercises: | | | | | | | | | | | | | | | |
| Running Progression* | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Initial-Single Plane | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Advance-Multi Directional | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Functional Sports Test | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| High Level Activities: | | | | | | | | | | | | | | | |
| Golf Progression | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Outdoor biking, hiking, running | NWB | | | | | [Green bar from Day 10 to Day 24] | | | | | | | | | |
| Return to Full Sport at 9 months post-op | | | | | | | | | | | | | | | |



Quad Series:

- Quad sets (5 sec hold) also quick contractions (NMES to supplement)
- Prone quad sets
- SLR with no extension leg
- Progression of Quad Strengthening (WB exercises at 6 weeks)
 - LAQ in safe range -no added resistance to begin
 - Once weight bearing tandem stance TKE with 5 sec hold
 - Isometric wall sit
 - SLR with resistance
 - Step up progression
 - Squat progression
 - Leg press progression
 - Lunge progression

Hamstring Series:

- Hamstring stretching (supine/prone)
- Hamstring set (heel dig)- contract hamstring with knee flexed pressing heel into the floor (5 sec hold)
- Hamstring curls
- Progress to resisted hamstring curl

Sport Test Exercises:

- Goals: impact training and introduction of directional drills
- Double leg squat jumps
- Box jumps
- Speed skaters
- Double leg jumps for height and distance progress to single leg as tolerated
- Blaze pod change of direction drills

Further Clarifications and Considerations

- May begin to implement BFR as early as 1 week into post-op period
- Functional Sports Test: Baseline completed around 7 months post-op with subsequent test at 9 months



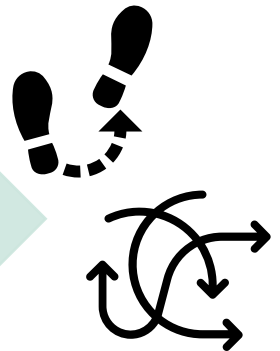
Return to Running Criteria

- Trace effusion, flexion within 5 degrees of contralateral side
- LSI on anterior reach Y balance test $\geq 90\%$
- LSI on quadriceps torque output on isometric measurement $\geq 75\%$
- 12" SL squat tolerance
- Able to walk > 1 mile with no limping or pain
- Able to "hop" with UE assist on operative leg 5 times without pain or compensation
- SL balance with eyes closed 30 seconds without loss of balance



Return to Agility/Change of Direction Criteria

- Return to running criteria listed above met
- No effusion
- Full ROM
- Quad LSI on isokinetic $\geq 85\%$
- Hamstring LSI on isokinetic $\geq 85\%$
- LSI on anterior reach Y-balance $\geq 95\%$
- SL hopping pain-free and effusion free



Return to Sport Criteria

- In order to test must demonstrate full AROM, no pain, no/trace effusion, 5/5 strength, negative lachman and pivot shift, LSI $\geq 95\%$ hamstring curl and leg press
- Quadricep strength $\geq 95\%$ of contralateral side (< 2 cm of atrophy)
- Able to perform single leg squat with correct form
- LSI SL hop $\geq 95\%$
- Y-Balance $\geq 95\%$ (mean of 3 trials in anterior, posterolateral, posteromedial/100)
- Vertical jump test, single leg hop distance, and timed single leg hop over 20 -feet $\geq 90\%$ of contralateral side

