



PLC Reconstruction (+/- PCL Reconstruction)

Post-Operative Rehabilitation Protocol

0-6 weeks

- NWB for 6 weeks with crutches
- Brace locked in extension for ambulation and sleeping x 6 weeks
- Avoid tibial rotation, hypertension and varus force to the knee
- **If PCL reconstruction dynamic knee brace used for 6 months ROM 0-90 for weeks 0-2, then progress as tolerated. Emphasize maintenance of full extension
- **If PCL reconstruction, perform ROM in prone position to avoid tension on PCL graft via posterior tibial glide from gravity
- **If PCL reconstruction, NO active knee flexion and open chain hamstring isometrics x 8 weeks
- **ROM:**
 - Wall slides/supine heel slide with strap
 - Seated knee flexion with contralateral LE assist
 - **If PCL reconstruction perform prone knee flexion PROM with strap
- **Neuromuscular control:**
 - Quad Set, Prone TKE, SLR in brace
 - Use of NMES if insufficient volitional quad activation.
 - Quad isometrics at 90, 60, 30 and 0 deg knee flexion S/L hip ABD in brace
 - Prone hip extension brace
 - Ankle mobility and resisted motions in all planes in supine, long sit or seated position.
 - Supine and seated core stabilization.
 - Seated/supine anti rotation/pallof
 - Supine core isometrics with UE and LE dissociative movements

Weight Bearing Status

NWB x 6 weeks

Brace Settings

Locked straight x 6 weeks when ambulating or sleeping. Otherwise open brace once good quad control

ROM Restrictions

PROM 0-90° beginning POD 1



- **Criterion to progress**
 - Pain free ROM 0-90
 - Pain/swelling controlled
 - SLR without extensor lag

6-12 weeks

- No kneeling for 12 weeks post op
- Progress to PWB and then FWB/wean off assistive device
- Discharge crutches then brace when adequate quad activation/strength
- **ROM:**
 - Stationary bike
- **Proprioception and balance:**
 - Initiate balance training
- **Strengthening**
 - Closed chain functional exercise
 - Mini squat, Stepup, lunging in sagittal plane (no flexion >70 deg)
 - Bridge
 - Side steps
 - Keep band proximal to minimize varus force on knee
 - Core strength and endurance
- **Criterion to progress:**
 - Pain free, non-antalgic gait without assistive device for limited distances
 - PROM normalized to contralateral side 100%
 - Dynamometry 80% compared contralaterally with muscle testing

12-20 weeks

- Initiate transverse plane and multiplanar motions
- Initiate plyometrics
- Restore power
- **Criterion to progress:**
 - Y-balance test >90%
 - 60 sec continuous SL squat to 60 deg without femoral and lumbo-pelvic compensations
 - Plank and side plank 60 sec without compensations



- Dynamometry 90% compared contralaterally with muscle testing
- Return to prior level of function with minimal symptoms

>20 weeks

- Alter G initiated at 20 weeks for running
- Full body running at 24 weeks
- Sport specific dynamic exercises
- **If PCL reconstruction, discharge dynamic brace if kneeling stress X-rays demonstrate less than 2mm of difference



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

Adapted from post-operative protocol created by Howard Head Physical Therapy, Jill Monson, PT, OCS and Jon Schoenecker, PT, OCS, CSCS



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 at 7 months post-op with subsequent test at 9 months



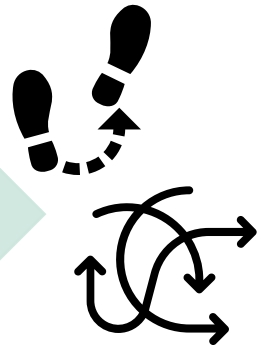
Return to Running Criteria

- 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 (< 2cm 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

