



ACL + PCL + MCL Reconstruction

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
- Avoid tibial rotation, hypertension and valgus force to the knee
- 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
- **Neuromuscular control:**
 - Quad Set, Prone TKE, SLR in brace
 - Use of NMES if insufficient volitional quad activation.

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



- 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/palof
- Supine core isometrics with UE and LE dissociative movements

- **Criterion to progress**

- Pain free ROM 0-90
- Pain/swelling controlled
- SLR without extensor lag

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)
- 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)
- No kneeling for 12 weeks post-op
- AAROM exercises
- Stairmaster (6-8 weeks)
- Proprioception Training (Prop Board, BAPS)
- Aquacisor (gait training)
- Retrograde treadmill ambulation
- Initiate Step Down Program (8-10 weeks)
- Band strengthening exercises. Keep band proximal to minimize valgus force on knee

12-20 weeks

- Leg Press: Squats (80 to 0 degree arc)
- AAROM exercises
- Proprioception Training (Prop Board, BAPS)
- Lunges
- Can begin kneeling at 12 weeks post-op



- 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	[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						[Green bar from Day 9 to Day 12]														
Step up/Lunge Progression						[Green bar from Day 8 to Day 24]														
Beginning cord exercises						[Green bar from Day 10 to Day 12]														
Proprioception/Balance Training						[Green bar from Day 10 to Day 24]														
Dead Lift (2 → 1)						[Green bar from Day 10 to Day 24]														
Squat/Leg Press (ISO →reps, 2→1 leg)										0-45°				0-70° (70° Max on press)						
Sports Test Exercises						[Green bar from Day 24 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						[Green bar from Day 9 to Day 24]														
Aqua jogging						[Green bar from Day 12 to Day 24]														
Treadmill-walking 7% incline						[Green bar from Day 10 to Day 24]														
Swimming with fins-light flutter kick						[Green bar from Day 10 to Day 24]														
Elliptical Trainer						[Green bar from Day 12 to Day 24]														
Rowing						[Green bar from Day 12 to Day 24]														
Stair stepper						[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 24 to Day 24]														
Initial-Single Plane						[Green bar from Day 24 to Day 24]														
Advance-Multi Directional						[Green bar from Day 24 to Day 24]														
Functional Sports Test						[Green bar from Day 24 to Day 24]														
High Level Activities:																				
Golf Progression	NWB					[Green bar from Day 24 to Day 24]														
Outdoor biking, hiking, running						[Green bar from Day 24 to Day 24]														
Return to Full Sport at 9 months post-op						[Green bar from Day 24 to Day 24]														



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

Sport Test Exercises:

- 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.



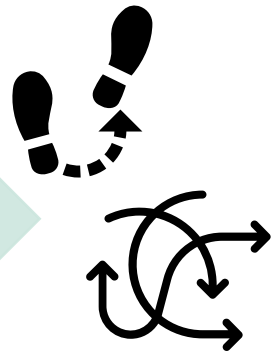
Return to Running Criteria

- 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 (< 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

