

ACL + PCL Reconstruction Rehabilitation Protocol

Stephanie A. Boden, MD

PT Frequency: 2-4 times per week

ROM Restrictions: 0-90° beginning POD1 in prone position

Brace: Knee immobilizer for 3-7 days until good quad control, then dynamic PCL brace x 6 months

Weightbearing: Toe touch WB x 6 weeks, then advance 25% weekly until full WB by 8 weeks

Weeks 0-6 (Phase I)

- **Weight Bearing:** TTWB with crutches x 6 weeks
- **Brace:**
 - Use immobilizer for 3-7 days until good quadriceps control. Then, transition to Dynamic PCL Brace (to be used for 6 months post-operatively). Off **only** for hygiene.
- **Range of Motion: PRONE ONLY**
 - Passive flexion 0-90° x 6 weeks
 - Active assisted extension 70 to 0 degrees x 2 weeks, then 90-0 degrees until 6 weeks
 - Emphasize maintenance of full extension
 - **NO** active knee flexion or open chain hamstring isometrics x 8 weeks
- **Exercises:**
 - 0-2 weeks
 - Patella mobilization
 - Towel extensions
 - Prone hangs
 - SLR supine with brace locked at 0 degrees
 - Quadriceps isometrics at 60 degrees
 - 2-6 weeks
 - Short crank (90mm) ergometry
 - SLR (all planes): progressive resistance
 - Multiple-angle quadriceps isometrics: 60 to 20 degrees
 - **Hamstring avoidance until 6 weeks post-op**

Weeks 6-12 (Phase II):

- **Weight Bearing:** Advance to 25% WB, then 50% WB, then 75% WB to full WB by 8 weeks
- **Brace:** Dynamic PCL Brace. Discontinue crutches once gait is non-antalgic
- **ROM:** Progress to full ROM
- **Exercises:**
 - 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
 - Leg press, mini-squats (60-0° arc)
 - Standard ergometry (if knee ROM > 115°)

- AAROM exercises
- Stairmaster (6-8 weeks)
- Proprioception training (prop board, BAPS)
- Aquacisor (gait training)
- Retrograde treadmill ambulation
- Initial step-down program (8-10 weeks)

Weeks 12-20 (Phase III):

- **Weight Bearing:** Full
- **Brace:** Dynamic PCL Brace
- **ROM:** Full
- **Exercises:**
 - Leg press: squats (80 to 0° arc)
 - AAROM exercises
 - Proprioception training (prop board, BAPS)
 - Lunges
 - Advanced proprioception training (perturbations)
 - Agility exercises (sport cord)
 - Versaclimber
 - Retrograde treadmill running
 - Quadriceps stretching

Weeks 20-26 (Phase IV):

- **Weight Bearing:** Full
- **Brace:** Dynamic PCL Brace
- **ROM:** Full
- **Exercises:**
 - 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)

> 6 months (Phase V): 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. Gradual return to sport-specific activities, return to sports after completion of functional sports assessment and clearance by MD

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

Quad Series:

- Quad sets (5 sec hold) and quick contractions (NMES to supplement)
- Prone quad sets
- SLR in 0 degrees extension
- 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 post-op
- 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 US 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
- Quadriceps 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

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