



## ***ACL and PLC***

### *Rehabilitation Guideline*

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This rehabilitation program is designed to return the individual to their activities as quickly and safely as possible. It is designed for rehabilitation following anterior cruciate ligament (ACL) and posterolateral corner (PLC) reconstruction. Modifications to this guideline may be necessary dependent on physician-specific instruction, concomitant injuries or procedures performed. This evidence-based ACL and PLC rehabilitation guideline is criterion-based; time frames and visits in each phase will vary depending on many factors, including patient demographics, goals and individual progress. This guideline is designed to progress the individual through rehabilitation to full sport/activity participation. The therapist may modify the program appropriately depending on the individual's goals for activity following ACL and PLC reconstruction.

This guideline is intended to provide the treating clinician a frame of reference for rehabilitation. It is not intended to substitute clinical judgment regarding the patient's post-operative care based on exam/treatment findings, individual progress and/or the presence of concomitant procedures or post-operative complications. If the clinician should have questions regarding post-operative progression, they should contact the referring physician.

# General Guidelines/Precautions:

- Expect knee immobilizer in full extension at all times for 6 weeks
  - Functional bracing per physician timeline
- Non-weight bearing for the first week
  - Progress up to 50% weeks 2-6
  - Progress up to 50-100% weeks 6-8
- Avoid hyperextension
- Avoid excessive tibial external rotation for 4 months (crossing legs, toe-out posturing or pivoting away from involved limb during WB)
- PROM 0°-90° first 2 weeks
  - Flexion ROM progress up to 120° by week 6
- Avoid open chain hamstring strengthening until week 14
- Precautions to certain exercises and timeframes listed for those (i.e. running, squatting, elliptical, swimming, overhead throwing)
  - CKC strengthening 0°-70° starting at 8 weeks
  - OKC knee extension 0°-90° starting at 12 weeks
  - Swimming with straight knee starting at 8 weeks
  - Low intensity agility and plyometrics initiated at 5 months
  - Straight line jogging at 5 months per return to running criteria
- Additional ligamentous, meniscal, vascular and nerve injuries may result in slower progression through protocol
- Level 1 testing (see appendix) at or near 6 months post operatively.
  - No impact activities until full ROM, no swelling, adequate strength and biomechanics are demonstrated.
  - Progression to running program at 20-24 weeks based on Level 1 testing, physician preference, when able to demonstrate sufficient symmetry and shock absorption with running mechanics and plyometrics.
- Level 2 testing at or near 10 months post-op (see Lower Extremity Testing guideline)
  - Return to full sport activities when able to complete Level 2 testing with sufficient biomechanics, strength, balance and confidence. (See guideline and appendix for more specific information).

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PHASE	SUGGESTED INTERVENTIONS	GOALS/MILESTONES FOR PROGRESSION
<p><b>Phase I</b> <i>Patient Education Phase</i></p>	<p><b>Discuss:</b> Anatomy, existing pathology, post-op rehab schedule, bracing, and expected progressions</p> <p><b>Pre-Operative Testing:</b> test contralateral isokinetic strength, introduce blood flow restriction training</p> <p><b>Instruct on Pre-Op Exercises:</b></p> <ul style="list-style-type: none"> <li>• Quad setting</li> <li>• Straight leg raises</li> <li>• Towel calf stretching</li> <li>• Blood flow restriction (BFR)</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Regain near normal joint and gait mechanics</li> <li>2. Reduce fear or anxiety prior to surgery</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. No pain or swelling</li> <li>2. Normal gait and motion</li> <li>3. Excellent quad activation</li> </ol>
<p><b>Phase II</b> <i>Maximum Protection Phase</i></p> <p><i>Weeks 0-6</i></p> <p><i>Expected visits: 4-12</i></p>	<p><b>Immediate Post-Operative Instructions:</b></p> <ul style="list-style-type: none"> <li>• Non-weight bearing up to week 2</li> <li>• Partial weight-bearing up to week 8</li> <li>• Knee locked in post-operative bracing; unlocked for exercises only</li> <li>• No biking, no active knee flexion</li> <li>• No hyperextension, excessive tibial external rotation</li> </ul> <p><b>Suggested Treatments:</b></p> <p><b>Modalities as indicated:</b></p> <ul style="list-style-type: none"> <li>• Edema-controlling treatments</li> <li>• NMES for quad activation</li> <li>• BFR with quadriceps and gluteal exercises</li> </ul> <p><b>ROM:</b></p> <ul style="list-style-type: none"> <li>• Passive within protected ROM (0°-90°) first two weeks</li> <li>• May progress as tolerated up to 120° up to 6 weeks</li> </ul> <p><b>Manual Therapy:</b> Patellar mobilizations, prone knee flexion</p> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>• Quad sets (supine), SLR with NMES as needed, BFR</li> <li>• Passive prone knee flexion, heel slides</li> <li>• Towel calf stretch, static knee extension stretch (prone/supine)</li> <li>• Side-lying hip abduction, clamshell</li> </ul> <p><b>Other Activities:</b></p> <ul style="list-style-type: none"> <li>• Upper body CV training, gait training with crutches, strengthening contralateral leg or proprioceptive exercises</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Provide environment of proper healing of repair site</li> <li>2. Prevention of post-operative complications</li> <li>3. Improve quad control</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Control of post-operative pain (0-1/10 with ADLs in brace)</li> <li>2. Resolution of post-operative effusion (trace to 1+)</li> <li>3. Restoration of physiological extension (0°)</li> <li>4. PROM 0°-120°</li> <li>5. Independent SLR without brace with no extension lag</li> </ol>

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<p><b>Phase III</b> <i>Protected Motion Phase</i></p> <p>Weeks 6-12</p> <p>Expected visits: 6-12</p>	<p><b>Specific Instructions:</b></p> <ul style="list-style-type: none"> <li>• Continue with previous exercise program</li> <li>• Progress weight bearing up to 100% by 8 weeks</li> <li>• Strengthening through limited range at 8 weeks</li> </ul> <p><b>Suggested Treatments:</b></p> <p><b>Modalities as indicated:</b> Edema-controlling treatments</p> <p><b>ROM:</b> Progressive ROM program; bike at 105° of knee flexion</p> <p><b>Manual Therapy:</b> continue with patellar mobilizations as indicated</p> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>• Weight shifts to prepare for gait</li> <li>• Multi-angle quad isometrics</li> <li>• Light resisted open chain knee extension (LAQ 90°-30°)</li> <li>• Step-ups (forward, lateral)</li> <li>• Mini squats (0°-45°)</li> <li>• Standing TKE (band placed on femur)</li> <li>• Standing fire hydrant, hip abduction</li> <li>• Leg press, wall squat</li> </ul> <p><b>Other Activities:</b></p> <ul style="list-style-type: none"> <li>• Upper body CV training, strengthening contralateral leg or proprioceptive activities, blood flow restriction</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Prevention of complications through protected motion</li> <li>2. Reduction of post-operative swelling and inflammation (no to trace effusion)</li> <li>3. Re-education and initiation of quad control with active SLR without extension lag</li> <li>4. Level ground ambulation with minimal faults up to 8 weeks</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Normalized gait by 12 weeks</li> <li>2. Achieve full flexion compared to uninvolved side</li> <li>3. Excellent quad control and symmetry with strengthening exercises</li> <li>4. Single-leg balance greater than 15 seconds</li> </ol>
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# ACL and PLC Rehabilitation Guideline

<p><b>Phase IV</b> <i>Motion and Muscle Activation Phase</i></p> <p>Weeks 12-18</p> <p>Expected visits: 4-12</p>	<p><b>Specific Instructions:</b></p> <ul style="list-style-type: none"> <li>• Continue previous hip and quad strengthening exercises</li> <li>• Initiate hamstring strengthening in high-coactivation exercises; no isolated hamstring strengthening until 14 weeks</li> </ul> <p><b>Suggested Treatments:</b></p> <p><b>Modalities:</b> As needed</p> <p><b>ROM:</b> Progression of ROM program</p> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>• Limited depth closed chain quad strengthening (0°-70°) avoiding rotation and dynamic valgus stress at knee, which includes:             <ul style="list-style-type: none"> <li>- Forward and lateral step ups</li> <li>- Squats → offset → Single-leg</li> <li>- Partial squats</li> </ul> </li> <li>• Plank progression for core strength and stabilization</li> <li>• DL hip bridge</li> </ul> <p><b>Week 14</b></p> <ul style="list-style-type: none"> <li>• Resisted hamstring strengthening             <ul style="list-style-type: none"> <li>- SL RDLs, weight with prone and/or standing hamstring curls, etc.</li> </ul> </li> </ul> <p><b>Other Activities:</b></p> <ul style="list-style-type: none"> <li>• Aquatic program (if available) - including pool walking, and closed chain strengthening/balance consistent with restrictions above – no running/jumping, swimming allowed, straight knee activity only</li> <li>• Static proprioception training (double to single leg) with perturbation on variable surfaces (rocker board, airex pads, air discs, etc.) and emphasis on proper hip/knee stability and hip strategy.</li> <li>• Light cardiovascular conditioning program which includes:             <ul style="list-style-type: none"> <li>- Stationary bike</li> <li>- Level ground walking</li> </ul> </li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Progression of ROM program to near full motion</li> <li>2. Improve muscular strength and endurance</li> <li>3. Normalized level ground ambulation</li> <li>4. Normalized single leg static balance with proper proximal control (no valgus and hip medial rotation)</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Achieve full AROM</li> <li>2. Excellent mechanics with closed-chain activity</li> <li>3. Pain at 0-1/10 with ADLs and strength progression</li> </ol>
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<p><b>Phase V</b> <i>Advanced strengthening and eccentric control phase</i></p> <p>Weeks 18-24+</p> <p>Expected visits: 8-20</p>	<p><b>Specific Instructions:</b></p> <ul style="list-style-type: none"> <li>Continue previous exercises; progress weight for progressive overload</li> <li>Structure set and rep schemes for strength and hypertrophy</li> </ul> <p><b>Suggested Treatments:</b></p> <p><b>ROM:</b> Progression of closed and open chain quad strengthening (0°-90°)</p> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>Forward and lateral step down</li> <li>Squat progressions (rocker board, BOSU)</li> <li>Lateral dips</li> <li>Forward step downs</li> <li>Lunge progression (all directions)</li> </ul> <p><b>Week 22</b></p> <ul style="list-style-type: none"> <li>To prepare for level 1 testing: <ul style="list-style-type: none"> <li>Initiate jumping progression (see appendix)</li> <li>Initiate functional movement progression (see appendix)</li> </ul> </li> </ul> <p><b>Week 25</b> - Level 1 Return-to-play testing (see appendix)</p> <ul style="list-style-type: none"> <li>Reorganize home program</li> <li>Continued single-leg strengthening as needed</li> <li>More advanced strength and power lifts <ul style="list-style-type: none"> <li>3-4 sets of 2-8 reps for strength (heavy weight, 2-3 min. rest)</li> <li>3-4 sets of 8-15 reps for hypertrophy (moderate weight, 45-60 sec. rest)</li> <li>3-4 sets of 1-5 reps for power (lighter weight, 5-10 min. rest)</li> </ul> </li> <li>Continued progression of strength training <ul style="list-style-type: none"> <li>Deadlift, RDL, etc.</li> </ul> </li> <li>Progress into power development (pulling derivatives) <ul style="list-style-type: none"> <li>Clean pull, snatch pull, high pull, jump shrug, etc.</li> </ul> </li> </ul> <p><b>Other Activities:</b></p> <ul style="list-style-type: none"> <li>Aquatic program, resisted bike/elliptical intervals, return to sprinting progression</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>Restoration of full pain-free PROM/AROM (equal to contralateral knee) and full resolution of post-operative effusion</li> <li>Normal pain-free ADLs</li> <li>Improved quad strength (85% of contralateral limb)</li> <li>Normalized gluteal strength</li> <li>Proper biomechanics and control with front step down</li> <li>Improved single leg proprioception (85% or greater on anterior and posterior lateral reach of Y Balance test)</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>Quad and HS deficit &lt;30% at 60°/sec.</li> <li>Back squat to 150% body weight with no compensatory movements</li> <li>Excellent mechanics with multiplanar movements</li> <li>Excellent mechanics with plyometric activity</li> </ol>
<p><b>Phase VI</b> <i>Advanced Movement and Impact Phase</i></p> <p>Months 6+</p> <p>Expected Visits: 21-24</p>	<p><b>Specific Instructions:</b></p> <ul style="list-style-type: none"> <li>Progression to running program (with appropriate bracing) with training to improve/normalize form and shock absorption (as cleared by MD)</li> <li>Utilize return to run criteria in separate document</li> <li>Progression of open and closed chain strengthening for the entire LE chain with emphasis on single-limb strengthening</li> <li>Progression to higher level activities and sports specific activities as strength and control dictate (as cleared by MD)</li> </ul> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>Initiating double-limb jump training (around 5 months)</li> <li>Initiate deceleration and single-leg hopping (around 6 months)</li> <li>Initiate cutting activities (around 6 months)</li> <li>Initiate agility (floor ladder and cone drills) and sport-specific activities (around 6 months)</li> </ul>	<p><b>Suggested Criteria for Discharge:</b></p> <ol style="list-style-type: none"> <li>&lt;10% strength deficit in quads and gluteals</li> <li>Limb similarity index of 90% or greater on functional hop tests and Y Balance tests</li> <li>45/50 on biomechanical functional assessment tests (if performed)</li> <li>No pain or complaints of instability with functional progression of sport specific skills</li> </ol>

**\*\*NOTE:** Progression of functional activities should be performed only as pain and proper biomechanics allow. Emphasis should be on proper shock absorption and control of dynamic valgus stress at knee (hip medial rotation with knee valgus) with each task performed. Progression to single-limb based tasks (deceleration, hopping and cutting) should not be performed until double-limb activities have been mastered. Activities requiring dynamic control of rotational stress at the knee (cutting, multiple plane lunges/jumps/hops) should not be performed until sagittal and frontal plane control has been mastered. Return to sport may occur at any time during this stage as cleared by physician and as progress and goal achievement occurs.

#### REFERENCES:

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