PLC

Rehabilitation Guideline

This rehabilitation program is designed to return the individual to their activities as quickly and safely as possible. It is designed for rehabilitation following posterolateral corner (PLC) reconstruction. Modifications to this guideline may be necessary dependent on physician specific instruction, concomitant injuries or procedures performed. This evidence-based 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 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.

SANFORD HEALTH

General Guidelines/Precautions:

- Expect knee immobilizer in full extension at all times for 6 weeks.
- Functional bracing per physician timeline.
- Weight bearing:
- Non-weight bearing for the first week.
- Progress up to 40% weeks 2-6.
- Progress from 40-100% weeks 6-8.
- Avoid hyperextension for 4 months.
- Avoid excessive tibial external rotation for 4 months (crossing legs, toe-out posturing, or pivoting away from involved limb during WB)
- PROM 0-90 degrees first 2 weeks
- Flexion ROM progress up to 120 by week 6
- Open chain hamstring strengthening at week 14.
- Precautions to certain exercises and timeframes listed for those (IE: Running, squatting, elliptical, swimming, overhead throwing)
- CKC strengthening 0-70 degrees starting at 8 weeks.
- OKC knee extension 90-0 starting at 6 weeks.
- Swimming with straight knee starting at 8 weeks.
- Low intensity agility and plyometrics initiated at 4 months.
- Straight line jogging at 4 months per return to running criteria.
- Additional ligamentous, meniscal, vascular and nerve injuries may result in slower progression through protocol.
- Level 1 testing (see LE Testing Guideline) at or near 5 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 (see LE Testing Guideline) at or near 9 months post-op
- 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).

PLC Rehabilitation Guideline (6-9 months)

PHASE	SUGGESTED INTERVENTIONS	GOALS/MILESTONES FOR PROGRESSION
Phase I *Patient Education Phase*	***Discuss:*** *Anatomy, existing pathology, post-op rehab schedule, bracing, and expected progressions* ***Pre-operative testing:*** *test contralateral isokinetics at 60 and 300o/sec, introduce to blood flow restriction training* ***Instruct on Pre-op exercises:*** • Quad setting • Straight leg raises • Towel calf stretching • Blood flow restriction (BFR)	***Goals of Phase:*** 1. Regain near normal joint and gait mechanics 2. Reduce fear or anxiety prior to surgery. ***Criteria to Advance to Next Phase:*** 1. No pain or swelling 2. Normal gait and motion 3. Excellent quad activation
Phase II *Maximum Protection Phase* *Weeks 0-6* *Expected visits: 4-12*	***Immediate Post-Operative Instructions:*** • Non-weight bearing first week • Progress up to 40% over weeks 2-6 • Progress from 40-100% weeks 6-8 • Knee locked in extension with post-operative bracing; unlocked for exercises only • No Biking, no active knee flexion • No hyperextension, no excessive tibial external rotation ***Suggested Treatments:*** **Modalities as indicated** • Edema controlling treatments • NMES for quad activation • BFR with quadriceps and gluteal exercises **ROM:** • Passive within protected ROM (0-90°) first 2 weeks • May progress as tolerated up to 120° **Manual Therapy:** Patellar mobilizations, prone knee flexion ***Exercise Examples:*** • Quad sets (supine), SLR with NMES as needed, BFR • Passive prone knee flexion, heel slides • Towel calf stretch, static knee extension stretch (prone/supine) • Side-lying hip abduction, clamshell	***Goals of Phase:*** 1. Provide environment of proper healing of repair site 2. Prevention of post-operative complications 3. Improve quad control ***Criteria to Advance to Next Phase:*** 1. Control of post-operative pain (0-1/10 with ADL's in brace) 2. Resolution of post-operative effusion (trace to 1+) 3. Restoration of physiological extension (0°) 4. PROM 0-120° 5. Independent SLR without brace with no extension lag

(continued on next page)

PLC Rehabilitation Guideline (6-9 months)

Phase III

Protected Motion Phase

Weeks 6-12

Expected visits: 6-12

Specific Instructions:

- Continue with previous exercise program
- Progress weight bearing up to 100% at 8 week
- Strengthening through limited range at 8 weeks

Suggested Treatments:

Modalities Indicated: Edema controlling treatments

ROM: Progressive ROM program; Bike at 105° of knee flexion

Manual therapy: continue with patellar mobilizations as indicated

Exercise Examples:

- Weight shifts to prepare for gait
- Multi-angle quad isometrics
- Light resisted open chain knee extension (LAQ 90-30°)
- Step-ups (Forward, lateral)
- Mini squats (0-45°)
- Standing TKE (band placed on femur)
- Standing fire hydrant, hip abduction
- Leg press, wall squat

Other Activities:

- Upper body CV training, strengthening contralateral leg or proprioceptive activities, blood flow restriction

Goals of Phase:

1. Prevention of complications through protected motion
2. Reduction of post-operative swelling and inflammation (no to trace effusion)
3. Re-education and initiation of quad control with active SLR without extension lag
4. Level ground ambulation with minimal faults at 8 weeks

Criteria to Advance to Next Phase:

1. Normalized gait at 12 weeks
2. Achieve full flexion compared to uninvolved side
3. Excellent quad control and symmetry with strengthening exercises
4. Single-leg balance greater than 15 seconds

Phase IV

Motion and Muscle Activation Phase

Weeks 12-18

Expected visits: 4-12

Specific Instructions:

- Continue previous hip and quad strengthening exercises
- Initiate hamstring strengthening in high-coactivation exercises; no isolated hamstring strengthening until 14 weeks

Suggested Treatments:

Modalities: As needed

ROM: Progression of ROM program

Exercise Examples:

- Limited depth closed chain quad strengthening (0-70°) avoiding rotation and dynamic valgus stress at knee

  Which Includes:
  - Forward and lateral step ups
  - Squats → offset → Single-leg
  - Partial squats
- Plank progression for core strength and stabilization
- DL hip bridge

Other Activities:

- 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
- Static proprioception training (double to single leg) with perturbation on variable surfaces (rocker board, airex pads, air discs, etc.) & emphasis on proper hip/knee stability and hip strategy.
- Light cardiovascular conditioning program which includes:
  - Stationary bike
  - Level ground walking

Goals of Phase:

1. Progression of ROM program to near full motion
2. Improve muscular strength and endurance
3. Normalized level ground ambulation
4. Normalized single leg static balance with proper proximal control (no valgus and hip medial rotation)

Criteria to Advance to Next Phase:

1. Achieve full AROM
2. Excellent mechanics with closed-chain activity
3. Pain at 0-1/10 with ADL's and strength progression

(continued on next page)

PLC Rehabilitation Guideline (6-9 months)

Phase V

Advanced strengthening and eccentric control phase

Weeks 18-24+

Expected visits: 8-20

Specific Instructions:

- Continue previous exercises; progress weight for progressive overload
- Structure set and rep schemes for strength and hypertrophy

Suggested Treatments:

ROM: Progression of closed and open chain quad strengthening (0-90 degrees)

Exercise Examples:

- Forward and lateral step down
- Squat progressions (rocker board, BOSU)
- Lateral dips
- Forward step downs
- Lunge progression (all directions)

Week 20

To prepare for Level 1 testing:

- Initiate jumping progression (see appendix)
- Initiate functional movement progression (see appendix)

Week 22 - Level 1 testing (see LE Testing Guideline)

- Reorganize home program
- Continued single leg strengthening as needed
- More advanced strength and power lifts
  - 3-4 sets of 2-8 reps for strength (heavy weight, 2-3 min rest)
  - 3-4 sets of 8-15 reps for hypertrophy (moderate weight, 45-60 sec rest)
  - 3-4 sets of 1-5 reps for power (lighter weight, 5-10 min rest)

Exercise examples:

- Continued progression of strength training
  - Deadlift, RDL, etc.
- Progress into power development (pulling derivatives)
  - Clean pull, snatch pull, high pull, jump shrug, etc.

Other Activities:

- Aquatic program, resisted bike/elliptical intervals, return to sprinting progression

Goals of Phase:

1. Restoration of full pain-free PROM/AROM (equal to contralateral knee) and full resolution of post-operative effusion
2. Normal pain-free ADL's
3. Improved quad strength (70% of contralateral limb)
4. Normalized gluteal strength
5. Proper biomechanics and control with front step down

Criteria to Advance to Next Phase:

1. Quad and HS deficit < 30% at 60°/sec
2. Back squat to 150% body weight with no compensatory movements
3. Excellent mechanics with multiplanar movements
4. Excellent mechanics with plyometric activity

(continued on next page)

PLC Rehabilitation Guideline (6-9 months)

Phase VI	***Specific Instructions:***	***Suggested Criteria for Discharge:***
Advanced Movement and Impact Phase *Months 6+* *Expected Visits: 21-24*	• Progression to running program (with appropriate bracing) with training to improve/normalize form and shock absorption (as cleared by MD) • Progression of open and closed chain strengthening for the entire LE chain with emphasis on single limb strengthening. • Progression to higher level activities and sports specific activities as strength and control dictate (as cleared by MD) • Level 2 testing (see LE Testing Guideline) ***Exercise Examples:*** • Initiating double limb jump training (around 4 months) • Initiate deceleration and single leg hopping (around 5 months) • Initiate cutting activities (around 5 months) • Initiate agility (floor ladder and cone drills) and sport specific activities (around 5 months)	1. <10% strength deficit in quads and gluteals 2. Limb similarity index of 90% or greater on functional tests 3. 45/50 on Biomechanical functional assessment tests (if performed) 4. No pain or complaints of instability with functional progression of sport specific skills

**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:

1. Bakshi NK, Khan M, et al. Return to play after multiligament knee injuries in national football league athletes. Sport Health. 2018;10(6):495-499.
2. Chahla J, Moatshe G, et al. Posterolateral corner of the knee: current concepts. Arch Bone Jt Surg. 2016;4(2):97-103.
3. Chahla J, Murray IR, et al. Posterolateral corner of the knee: an expert consensus statement on diagnosis, classification, treatment, and rehabilitation. Knee Surg Sport Tr A. 2019;27(8):2520-2529.
4. Lunden JB, Bzdusek PJ, et al. Current concepts in the recognition and treatment of posterolateral corner injuries of the knee. J Orthop Sports Phys Ther. 2010;20(8):502-516.
5. LaPrade RF, DePhillipo NN, et al. Partial controlled early postoperative weightbearing versus nonweightbearing after reconstruction of the fibular (lateral) collateral ligament. Am J Sport Med. 2018;46(7):1-11.
6. LaPrade RF, Tso A, Wentorf FA. Force measurements on the fibular collateral ligament, popliteofibular ligament, and popliteus tendon to applied loads. Am J Sport Med. 2004;32(7):1695-1701.

Revision Dates: 06/2021, 04/2021

SANFORD HEALTH

sanfordhealth.org

420-607-706 10/21