

Accelerated Rehabilitation Following ACL-PTG Reconstruction with PCL Repair with LCL and Posterolateral Corner Repair

PREOPERATIVE PHASE

Goals: Diminish inflammation, swelling, and pain
Restore normal range of motion (gradual knee extension)
Restore voluntary muscle activation
Provide patient education to prepare patient for surgery

Brace – Elastic wrap or knee sleeve to reduce swelling

Weight Bearing – As tolerated with or without crutches

Exercises: *Ankle Pumps
*Passive knee extension (gradual progression)
*Passive knee flexion to tolerance
*Straight Leg Raises (3 Way, Flexion, Abduction), Pillow Squeezes
*Quadriceps Setting
*Closed kinetic chain exercises: mini squats, , step-ups

Muscle Stimulation – Electrical muscle stimulation to quadriceps during voluntary quadriceps exercises (4 to 6 hours per day)

Neuromuscular/Proprioception Training -

- Eliminate quad avoidance gait
- Retro stepping drills
- Joint repositioning drills
 - Passive/active reposition at 90, 60, 30 degrees
 - CKC squat/lunge repositioning on screen

Cryotherapy/Elevation – Apply ice 20 minutes of every hour, elevate leg with knee in full extension (knee must be above heart)

Patient Education – Review postoperative rehabilitation program
Review instructional video (optional)
Select appropriate surgical date

I. IMMEDIATE POST-OPERATIVE PHASE (Day 1 to Day 7)

Goals: Gradual passive knee extension
Diminish joint swelling and pain
Restore patellar mobility
Gradually improve knee flexion
Re-establish quadriceps control
Restore independent ambulation

Postoperative Day 1

Brace – Drop locked brace at 15-20 deg for comfort

Weight Bearing – Two crutches, weight bearing as tolerated

- Exercises:**
- *Ankle pumps
 - *Overpressure into passive knee extension
 - *Active and Passive knee flexion (75 degree by day 5)
 - *Straight leg raises (Flexion, Abduction), Pillow Squeezes
 - *Quadriceps isometric setting
 - *No Hamstring stretches

Muscle Stimulation – Use muscle stimulation during active muscle exercises (4-6 hours per day)

Continuous Passive Motion – As needed, 0 to 45/50 degrees (as tolerated and as directed by physician)

Ice and Evaluation – Ice 20 minutes out of every our and elevate with knee in full extension

Postoperative Day 2 to 3

Brace – Locked brace at 15-20 deg – come out of brace and perform ROM exercises

Weight Bearing – Two crutches, weight bearing as tolerated

Range of Motion – Remove brace perform range of motion exercises 6-8 times per day
Perform frequent bouts of ROM to regain knee flexibility

- Exercises:**
- * Continue exercises listed above
 - * Emphasize restoring knee extension
 - *Patellar mobilization
 - *Ankle pumps
 - *Straight leg raises, Pillow Squeezes
 - *Mini squats and weight shifts
 - *Quadriceps isometric setting

Muscle Stimulation – Electrical muscle stimulation to quads (6 hours per day)

Continuous Passive Motion – 0 to 90 degrees, as needed

Ice and Evaluation – Ice 20 minutes out of every hour and elevate leg with knee in full extension

Postoperative Day 4 to 7

Brace – Progress brace to Drop locked brace, locked at zero degrees extension for ambulation and unlocked for sitting, etc.

Weight Bearing – Two Crutches weight bearing as tolerated

Range of Motion – Remove brace to perform range of motion exercises 6-8 times per day, knee flexion 90 degrees by day 5, approximately 100 degrees by day 7

- Exercises:**
- *Multi-angle isometrics at 60 & 40 deg extension
 - *Active knee extension 60 to 30 deg
 - *Light Overpressure into extension
 - *Patellar mobilization (5-8 times daily)
 - *Ankle pumps
 - *Straight leg raises, Pillow Squeezes
 - *Mini squats and weight shifts
 - *No hamstring contractions for 8-10 weeks

- *Quadriceps isometric setting
- *Proprioception and balance activities

Neuromuscular training/proprioception – OKC passive/active joint repositioning at 90, 60 degrees

CKC mini- squats & weight shifts

Muscle Stimulation – Electrical muscle stimulation (continue 6 hours daily)

Continue Passive Motion – 0 to 90 degrees, as needed

Ice and Elevation – Ice 20 minutes of every hour and elevate leg with knee full extension

II. **EARLY REHABILITATION PHASE (Week 2-4)**

Criteria to Progress to Phase II

1. Quad Control (ability to perform good quad set and SLR)
2. Full passive knee extension
3. PROM 0-90 degrees
4. Good patellar mobility
5. Minimal joint effusion
6. Independent ambulation

Goals: Gradual increase to full passive knee extension

Gradually increase knee flexion

Diminish swelling and pain

Muscle control and activation

Restore proprioception/neuromuscular control

Normalize patellar mobility

Week Two

Brace – Continue locked brace for ambulation

Weight Bearing – As tolerated (goal is to discontinue crutches 14 days post-op)

Passive Range of Motion – Self-ROM stretching (6-8 times daily), emphasis on maintaining full, passive range of motion

Exercises: *Muscle stimulation to quadriceps exercises

*Isometric quadriceps sets

*Straight Leg raises (4 planes)

*Leg Press (0-60 degrees)

*Knee extension 75 to 30 degrees

*Half squats (0-40)

*Weight shifts

*Uni-cam bicycle (low intensity cycling)

*Proprioception training

*Overpressure into extension

*Passive range of motion from 0 to 105 degrees

*Patellar mobilization

*Well leg exercises

*Progressive resistance extension program – start with 1 lb., progress 1 lb. per week

Proprioception/Neuromuscular Training

- *OKC passive/active joint repositioning 90, 60, 30 degrees
- *CKC joint repositioning during squats/lunges
- *Initiate squats on tilt board

Swelling control – Ice, compression, elevation

Week Three

Brace – Drop locked brace (some patients use ROM brace for ambulation)

Passive Range of Motion – Continue range of motion stretching and overpressure into extension (ROM should be 0-100/105 degrees)

Exercises: *Continue all exercises as in week two

- *Passive Range of Motion 0-100 degrees
- *Bicycle for range of motion stimulus and endurance (emphasize ROM on bike)
- *Eccentric quadriceps program 40-100 (isotonic only)
- *Front Step Downs
- *Lateral Step-Overs (cones)
- *Progress Proprioception drills, neuromuscular control drills
- *Frequent bouts of ROM exercises

III. PROGRESSIVE STRENGTHENING/NEUROMUSCULAR CONTROL PHASE (Week 4-10)**Criteria to Enter Phase III**

1. Active Range of Motion 0-115 degrees
2. Quadriceps strength 60 % > contralateral side (isometric test at 60 degree knee flexion)
3. Unchanged KT Test bilateral values (+1 or less)
4. Minimal to no full joint effusion
5. No joint line or patellofemoral pain

Goals: Restore full knee range of motion (0 to 125 degrees)

- Improve lower extremity strength
- Enhance proprioception, balance, and neuromuscular control
- Improve muscular endurance
- Restore limb confidence and function

Brace – Discontinue immobilizer or brace when Physician determines, may use knee sleeve to control swelling/support

Range of Motion – Self-ROM (4-5 times daily using the other leg to provide ROM), emphasis on maintaining zero degrees passive extension
- PROM 0-125 degrees at 4 weeks

Week 4

Exercises: *Progress isometric strengthening program

- *Leg Press (0-75 degrees)
- *Knee extension 90 to 40 degrees
- *Hip Abduction and Adduction
- *Hip Flexion and Extension
- *Lateral Step-Overs
- *Lateral Lunges (straight plane)
- *Lateral Step Ups
- *Front Step Downs
- *Wall Squats

- *Vertical Squats
- *Standing Toe Calf Raises
- *Seated Toe Calf Raises
- *Proprioception Drills
- *Bicycle

Proprioception/Neuromuscular Drills

- Tilt board squats
- Passive/active reposition OKC
- CKC repositioning on tilt board with sports RAC
- CKC lunges with sports RAC

Week 6

- Exercises:** *Continue all exercises
- *Pool walking
 - *Balance on tilt boards
 - *Progress to balance and ball throws
 - *Wall slides/squats

Week 8:

- Exercises:** *Continue all exercises listed in Weeks 4-6
- *Leg Press Sets (single leg) 0-100 degrees and 40-100 degrees
 - *Still no hamstrings
 - *Perturbation Training
 - *Emphasize quads
 - *Walking Program
 - *Bicycle for endurance
 - *Stair Stepper Machine for endurance
 - *Biodex stability system

Week 10

- Exercises:** *Continue all exercises listed in Weeks 6, 8 and 10
- *Progress hip strengthening (especially hip abd, ext, ER)
 - *Progress strengthening exercises and neuromuscular training

IV. ADVANCED ACTIVITY PHASE (Week 10-16)

Criteria to Enter Phase IV

1. AROM 0-125 degrees or greater
2. Quad strength 75% of contralateral side, knee extension flexor:extensor ratio 70% to 75%
3. No change in KT values (Comparable with contralateral side, within 2 mm)
4. No pain or effusion
5. Satisfactory clinical exam
6. Satisfactory isokinetic test (values at 180 degrees)
 - Quadriceps bilateral comparison 75%
 - Hamstrings equal bilateral
 - Quadriceps peak torque/body weight 65% at 180°/s (males) 55% at 180°/s (females)
 - Hamstrings/quadriceps ratio 66% to 75%
7. Hop Test (80% of contralateral leg)
8. Subjective knee scoring (modified Noyes System) 80 points or better

Goals: Normalize lower extremity strength
Enhance muscular power and endurance
Improve neuromuscular control

Exercises: *May initiate pool running program (weeks 10-12) if good quad control and ROM

*May initiate light sport program (golf)

*Continue all strengthening drills

- Leg press
- Wall squats
- Hip Abd/Adduction
- Hip Flex/Ext
- Knee Extension 90-40
- Hamstring curls (maybe ??)
- Standing toe calf
- Seated toe calf
- Step down
- Lateral step ups
- Lateral lunges

*Neuromuscular training

- Lateral step-overs cones
- Lateral lunges
- Tilt board drills

Week 14-16

*Progress program

*Continue all drills above

*Progress LE strengthening & stabilization drills

V. GRADUAL RETURN TO ACTIVITY PHASE (Week 17-26)

Criteria to Enter Phase V

1. Full Range of Motion
2. Unchanged KT 2000 Test (within 2.5 mm of opposite side)
3. Isokinetic Test that fulfills criteria
4. Quadriceps bilateral comparison (80% or greater)
5. Hamstring bilateral comparison (110% or greater)
6. Quadriceps torque/body weight ratio (55% or greater)
7. Hamstrings/Quadriceps ratio (70% or greater)
8. Proprioceptive Test (100% of contralateral leg)
9. Functional Test (85% or greater of contralateral side)
10. Satisfactory clinical exam
11. Subjective knee scoring (modified Noyes System) (90 points or better)

Goals: Gradual return to full-unrestricted sports

Achieve maximal strength and endurance

Normalize neuromuscular control

Progress skill training

Exercises *Continue strengthening exercises

*Continue neuromuscular control drills

*Continue plyometrics drills (gravity eliminated)

*Progress running and progress to agility program

*Progress sport specific training

- Running/cutting/agility drills
- Gradual return to sport drills

6 MONTH FOLLOW-UP

Isokinetic test
KT 2000 test
Functional test

12 MONTH FOLLOW-UP

Isokinetic test
KT 2000 test
Functional test