Rehabilitation Following ACL- PTG Reconstruction With Acute LCL Repair

I. 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
* *Consider DJ Ortho medial unloader post-op ROM Brace – esp for genu varus knees*

Weight Bearing – As tolerated with crutches – control varus moment with brace

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, lunges, 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

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

II. 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 lock brace or Immobilizer applied to knee, locked in full extension during ambulation – unlock when seated etc

Weight Bearing – Two crutches, weight bearing as tolerated
WB with brace locked in full extension

Exercises: *Ankle pumps
*Overpressure into passive knee extension – only to zero degrees
*Active and Passive knee flexion (90 degree by day 5)
*Straight leg raises (Flexion, Abduction), Pillow Squeezes
*Quadriceps isometric setting
*Hamstring stretches (light)
*Closed kinetic chain exercises: mini squats, weight shifts

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 – Drop lock brace or knee Immobilizer, 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 perform range of motion exercises 6-8 times per day
Perform frequent bouts of ROM to regain knee flexibility

Exercises: *Multi-angle isometrics at 90 and 60 degrees (knee extension)
*Knee Extension 90-40 degrees
*Overpressure into extension (knee extension should be zero degrees)
* 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 – Drop lock brace or knee Immobilizer, 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 7

Exercises: *Multi-angle isometrics at 90 and 60 degrees (knee extension)
*Knee Extension 90-40 degrees
*Overpressure into extension
*Patellar mobilization (5-8 times daily)
*Ankle pumps
*Straight leg raises, Pillow Squeezes
*Mini squats and weight shifts
*Standing Hamstring curls
*Quadriceps isometric setting
*Proprioception and balance activities

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

CKC squats/weight shifts with repositioning on sports RAC

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 REHABILIATION 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 10-14 days post-op)

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

Exercises: *Muscle stimulation to quadriceps exercises
*Isometric quadriceps sets
*Straight Leg raises (4 planes)
*Leg Press (0-60 degrees)
*Knee extension 90-40 degrees
*Half squats (0-40)

*Weight shifts
*Front and side lunges
*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 foam

Swelling control – Ice, compression, elevation

Week Three

Brace – Continue locked brace till 4 weeks post-op

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 0-105 degrees
*Bicycle for range of motion stimulus and endurance (emphasize ROM on bike)
*Pool walking program (if incision is closed)
*Eccentric quadriceps program 40-100 (isotonic only)
*Lateral lunges (straight plane)
*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 – Unlocked brace for ambulation or may use knee sleeve (Physician decision)

* May consider medial unloader functional brace to control varus moment during gait

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

KT 2000 Test – (Week 4, 20 lb. anterior and posterior test)

Week 4

Exercises: *Progress isometric strengthening program
*Leg Press (0-100 degrees)
*Knee extension 90 to 40 degrees
*Hip Abduction and Adduction
*Hip Flexion and Extension
*Lateral Step-Overs
*Lateral Lunges (straight plane and multi-plane drills)
*Lateral Step Ups
*Front Step Downs
*Wall Squats
*Vertical Squats
*Initiate hamstring curls (light)
*Standing Toe Calf Raises
*Seated Toe Calf Raises
*Biodex Stability System (Balance, Squats, etc)
*Proprioception Drills
*Bicycle
*Stair Stepper Machine
*Pool Program (Backward Running, Hip and Leg Exercises)

Proprioception/Neuromuscular Drills

- Tilt board squats (perturbation)
- Passive/active reposition OKC
- CKC squats on tilt board
- CKC lunges onto box

Week 6

KT 2000 Test – 20 and 30 lb. anterior and posterior test

Exercises: *Continue all exercises
*Pool running (forward) and agility drills
*Balance on tilt boards
*Progress to balance and ball throws
*Wall slides/squats

Week 8

KT 2000 Test – 20 and 30 lb. anterior and posterior test

Exercises: *Continue all exercises listed in Weeks 4-6
*Leg Press Sets (single leg) 0-100 degrees and 40-100 degrees

*Plyometric Leg Press
*Perturbation Training
*Isokinetic exercises (90 to 40 degrees) (120 to 240 degrees/second)
*Walking Program
*Bicycle for endurance
*Stair Stepper Machine for endurance
*Biodex stability system

Week 10

KT 2000 Test – 20 and 30 lb. and Manual Maximum Test

Isokinetic Test – Concentric Knee Extension/Flexion at 180 and 300 degrees/second

Exercises: *Continue all exercises listed in Weeks 6, 8 and 10
*Plyometric Training Drills
*Continue Stretching Drills
*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^{o}/s (males) 55% at 180^{o}/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
Perform selected sport-specific drills

Exercises: *May initiate 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
- Standing toe calf
- Seated toe calf
- Step down

- Lateral step ups
- Lateral lunges

*Neuromuscular training

- Lateral step-overs cones
- Lateral lunges
- Tilt board drills
- Sports RAC repositioning on tilt board

Week 14-16

*Progress program
*Continue all drills above
*May initiate lateral agility drills
*Backward running

V. **RETURN TO ACTIVITY PHASE (Week 16-22)**

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

Tests – KT 2000, Isokinetic, and Functional Tests before return

Exercises *Continue strengthening exercises
*Continue neuromuscular control drills
*Continue plyometrics drills
*Progress running and 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