

Accelerated Rehabilitation Following Contralateral PTG ACL Reconstruction with LCL Primary Repair

PREOPERATIVE PHASE

Goals: Diminish inflammation, swelling, and pain
Restore normal range of motion (especially knee extension – may not be full extension because of LCL)
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 to zero
- *Passive knee flexion to tolerance
- *Straight Leg Raises (3 Way, Flexion, Abduction, Adduction)
- *Quadriceps Setting
- *Closed kinetic chain exercises: mini squats (0-45)

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

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

Donor Knee

- *Strengthen what will be the donor knee (especially the quadriceps)
- *Improve Quadriceps recruitment in preparation for postoperative rehabilitation
- *Educate patient on the concept of 2 separate surgeries and 2 different rehabilitation programs
- *Bike (20 min)
- *PREs for both lower extremities

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

Goals: Restore full passive knee extension
Diminish joint swelling and pain
Protect LCL & PL capsule – Promote LCL healing
Restore patellar mobility
Gradually improve knee flexion
Re-establish quadriceps control
Restore independent ambulation

Postoperative Day 1

Brace – Knee brace applied to knee, locked at 30 degrees of flexion

Weight Bearing – Two crutches, weight bearing as tolerated

- Exercises**
- *Ankle pumps
 - *Passive knee extension to 30 degrees of flexion
 - *Active and Passive knee flexion (90 degree by day 5)
 - *Straight leg raises (Flexion, Abduction, Adduction)
 - *Quadriceps isometric setting
 - *Hamstring stretches
 - *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

- Donor Knee**
- *Full knee ROM
 - *Especially full extension
 - *Independent straight-leg raise
 - *Weight bearing as tolerated
 - *ROM
 - *Ice to PTG placed on the patient's knee immediately after surgery to provide compression and cold to minimize pain and swelling.
 - *Over pressure into extension
 - *Knee flexion
 - Continue to increase bend beyond 110 degrees flexion
 - *Leg control
 - Active quadriceps contraction with quad sets
 - Straight-leg raises
 - Knee extension 90-0 with lock out at terminal extension

Postoperative Day 2 to 3

Brace – Knee brace locked at 30 degrees of knee flexion

Weight Bearing – Two crutches, weight bearing as tolerated

Range of Motion – Remove brace perform range of motion exercises 4 to 6 times a day

- Exercises**
- *Multi-angle isometrics at 90 and 60 degrees (knee extension)
 - *Knee Extension 90-40 degrees
 - *Patellar mobilization
 - *Passive knee extension to 30 degrees (based on end feel)
 - *Ankle pumps
 - *Straight leg raises (3 directions)
 - *Mini squats and weight shifts
 - *Quadriceps isometric setting

Exercises for Donor Knee: Continue all quadriceps & LE exercises

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

Continuous Passive Motion – 30 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 – Knee brace locked at 30 degrees for first 4-5 days then gradually increase extension

Weight Bearing – Two Crutches weight bearing as tolerated

Range of Motion – Remove brace to perform range of motion exercises 4-6 times per day, knee flexion 90 degrees by day 5, approximately 100 degrees by day 7

Exercises

- *Multi-angle isometrics at 90 and 60 degrees (knee extension)
- *Knee Extension 90-40 degrees
- *Passive knee extension – progress to 20 degrees of knee flexion
- *Patellar mobilization
- *Ankle pumps
- *Straight leg raises (3 directions)
- *Mini squats and weight shifts
- *No hamstrings for 2-3 weeks
- *Quadriceps isometric setting
- *Proprioception and balance activities

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

Continue Passive Motion – 20 to 90 degrees, as needed

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

Donor Knee

- *ROM exercises
- *Heel slides if needed
- *Step downs (1-4"): 2 x 20
- *Leg extensions with cuff weight (0-10 lb.): 3 x 12-15
- *Heel lifts: 3 x 12
- *Ice
- Patellar mobilization
- Soft tissue mobilization
- *Electrical stimulation of quads

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: Maintain full passive knee extension
 Gradually increase knee flexion
 Diminish swelling and pain
 Muscle training
 Restore proprioception
 Patellar mobility

Week Two

Brace – Knee brace is locked at full extension for ambulation

Weight Bearing – As tolerated (goal is to discontinue crutches 10 days post op)

Range of Motion – Gradually increase passive knee extension

Base the progression of knee extension on end feel* (if tight push it more)

Day 8: 10- 100>

Week 14: 0 - 115>

Week 4: 0- 125>

Self-ROM stretching (4-5 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
- *Knee extension 90-40 degrees
- *Half squats (0-40)
- *Weight shifts
- *Front and side lunges
- *Hamstring Curls (light resistance at 4 weeks)
- *Bicycle
- *Proprioception training
- *Overpressure into extension
- *Passive range of motion from 0 to 50 degrees
- *Patellar mobilization
- *Well leg exercises
- *Progressive resistance extension program – start with 1 lb., progress 1 lb. per week

Swelling control – Ice, compression, elevation

Donor Knee

- *Active heel height with good quadriceps tone indicated by no extensor lag when performing a straight-leg raise
- *ROM
- *Bike
- *Quadriceps stretching (4 x 30 sec)
- *Weights (unilateral)
 - Leg press: 4 x 12-15
 - Leg extension: 3 x 12
 - Leg curls: 3 x 12
 - Heel lifts: 4 x 15
- *Continue quad strengthening exercises

Week Three

Brace – Continue use of knee brace (if able open ROM limits to allow motion during walking)

Range of Motion – Continue range of motion stretching and overpressure into extension

Exercises

- *Continue all exercises as in week two
- *Passive Range of Motion 0-115> degrees

- *Bicycle for range of motion stimulus and endurance
- *Pool walking program (if incision is closed)
- *Eccentric quadriceps program 40-100 (isotonic only)
- *Lateral lunges
- *Lateral Step Ups
- *Front Step Ups
- *Fwd/Bwd cone stepping
- *Lateral Step-Overs (cones)
- *Hip ER/IR strengthening
- *Sidelying clams
- *Progress Proprioception drills, neuromuscular control drills

III. CONTROLLED AMBULATION 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 – Knee brace continues with motion (consider unloader brace if physician prefers)

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

Week 4

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| Exercises | <ul style="list-style-type: none"> *Progress isometric strengthening program *Leg Press *Knee extension 90 to 40 degrees *Hamstring Curls *Hip Abduction and Adduction *Hip Flexion and Extension *Lateral Step-Overs *Lateral Lunges *Lateral Step Ups *Front Step Downs *Wall Squats *Vertical Squats *Toe Calf Raises *Balance Board Squats *Proprioception Drills *Bicycle *Stair Stepper Machine *Pool Program (Backward Running, Hip and Leg Exercises) |
|------------------|---|

- Donor Knee**
- *Full ROM
 - *Quadriceps tone continues to improve with noticeable quadriceps definition returning
 - *Return to full activity and 70% strength
 - *Proprioceptive/agility specific program, including having the patient Catching ball when thrown
 - *Progress hip strengthening exercises (hip ER/IR)
 - *Same as ACL-reconstructed leg
 - *Decrease repetitions, increase weight
 - Leg press:
 - Leg extension:
 - Leg curl:
 - Calf raises:

Week 6

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

- Exercises**
- *Continue all exercises
 - *Emphasize hip, quadriceps, hamstring strengthening
 - *Pool running (forward) and agility drills
 - *Balance on tilt boards
 - *Progress to balance and board throws

Week 8

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

- Exercises**
- *Continue all exercises listed in Weeks 4-6
 - *Plyometric Leg Press
 - *Perturbation Training
 - *PRE strengthening
 - *Walking for exercise
 - *Bicycle for endurance
 - *Elliptical machine
 - *Stair Stepper Machine for endurance

IV. ADVANCED ACTIVITY PHASE (Week 10-16)

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 above
 - *Advance all exercises listed
 - *Unloading running in treadmill or pool initiated week 12 (Physician decision)
 - *Emphasize functional drills, proprioception drills & perturbation drills

Criteria to Enter Phase IV

- 1) AROM 0-125 degrees or greater

- 2) Quad strength 79% 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
 - 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 *Continue all exercises

V. RETURN TO ACTIVITY PHASE (Week 16-26)

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 (65% or greater)
- 7) Hamstrings/Quadriceps ratio (70% or greater)
- 8) Proprioceptive Test (90% 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)
- 12) Ability to run 2 miles

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

6 MONTH FOLLOW-UP

Isokinetic test
 KT 2000 test
 Functional test

12 MONTH FOLLOW-UP

Isokinetic test
 KT 2000 test
 Functional test