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ACCELERATED REHABILITATION FOLLOWING CONTRALATERAL PTG ACL RECONSTRUCTION FOR EARLY RETURN TO COMPETITION

PREOPERATIVE PHASE

Goals: Diminish inflammation, swelling, and pain
Restore normal range of motion (especially 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 to zero
- Passive knee flexion to tolerance
- Straight Leg Raises (3 Way, Flexion, Abduction, Adduction)
- 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)

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
- Recruit the right muscle fibers in preparation for postoperative rehabilitation
- Educate patient on the concept of 2 separate surgeries and 2 different rehabilitation programs
- Same as ACL leg plus a single-leg hop for distance

- StairMaster (30 min)
- Bike (20 min)
- Weights (unilateral)
 - Leg press 5 x 3-6
 - Leg extensions 3 x 10
 - Leg curls 3 x 10
 - Heel lifts 5 x 20
- Lower extremity flexibility
 - Quadriceps

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

Goals: Restore full 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 – EZ Wrap brace/Immobilizer applied to knee, locked in full extension during ambulation on side

Weight Bearing – Two crutches, weight bearing as tolerated

Exercises:

- Ankle pumps
- Overpressure into full, passive knee extension
- 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
- 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 110o flexion by pulling leg further to buttocks with hands
- Leg control -Active quadriceps contraction with quad sets
-Straight-leg raises

Postoperative Day 2 to 3

Brace – EZ Wrap brace/Immobilizer, locked at zero degrees extension for ambulation and unlocked for sitting, etc., or Protonics Rehab System (PRS) as directed by physician

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
- Overpressure
- Patellar mobilization
- Ankle pumps
- Straight leg raises (3 directions)
- Mini squats and weight shifts
- Standing Hamstring curls
- 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 – EZ Wrap brace/Immobilizer, locked at zero degrees extension for ambulation and unlocked for sitting, etc., or Protonics Rehab system (PRS) as directed by physician

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
- Overpressure into extension
- Patellar mobilization
- Ankle pumps
- Straight leg raises (3 directions)
- Mini squats and weight shifts
- Standing Hamstring curls
- Quadriceps isometric setting
- Proprioception and balance activities

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

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 quad

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 – Discontinue brace or immobilizer at 2 to 3 weeks

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

Range of Motion – 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
- 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
- StairMaster
- 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
 - 0-135/130°
 - 0-135°

Week Three

Brace – Discontinue

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
- Lateral Step-Overs (cones)
- Stair-Stepper machine
- Progress Proprioception drills, neuromuscular control drills

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 – No immobilizer or brace, may use knee sleeve

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

Exercises:

- 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
- Biodex Stability System (Balance, Squats, etc)
- Proprioception Drills
- Bicycle
- Stair Stepper Machine
- Poor 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 receive a passed basketball while standing on 1 foot.
- Complete a sport-specific functional progression
- Same as ACL-reconstructed leg
- Decrease repetitions, increase weight
 - Leg press: 5 x 12: 10-8-6-4
 - Leg extension: 3 x 10
 - Leg curl: 3 x 10
 - Calf raises: 5 x 20
 - Functional rehab drills same as ACL reconstructed leg

Week 6

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

Exercises:

- Continue all exercises
- Poor 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
- Isokinetic exercises (90 to 40 degrees) (120 to 240 degrees/second)
- Walking/jogging
- Bicycle for endurance
- Stair Stepper Machine for endurance

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 in Weeks 6, 8 and 10

- Plyometric Training Drills
- Continue Stretching Drills
- Running program/sprinting

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

RETURN TO ATHLETICS PHASE (Week 12-22)

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)



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- 10) Satisfactory clinical exam
- 11) Subjective knee scoring (modified Noyes System) (90 points or better)

Criteria to Enter Phase V – Continued

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