

**ACCELERATED REHABILITATION PROTOCOL
ACL-PTG RECONSTRUCTION WITH MENISCUS REPAIR**

Chase D. Smith, MD

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 of Protonics

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, 0-30 degrees

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

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

Postoperative Day 2 to 3

Brace – EZ Wrap brace/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 4 to 6 times/day

Exercises: *Multi-angle isometrics at 90 and 60 degrees (knee extension)
 *Knee Extension 90-40 degrees
 *Overpressure into extension (knee extension should be at least 0 degrees to slight hyperextension)
 *Patellar mobilization
 *Ankle pumps
 *Straight leg raises (3 directions)
 *Mini squats and weight shifts
 *Quadriceps isometric setting

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

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

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Postoperative Day 4 to 7

Brace – EZ Wrap brace/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 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 (full extension 0 degrees to 5-7 hyperextension)
 *Patellar mobilization (5-8 times daily)
 *Ankle pumps
 *Straight leg raises (3 directions)
 *Mini squats and weight shifts
 *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)

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: Maintain full passive knee extension (at least 0 to 5-7 hyperextension)
Gradually increase knee flexion
Diminish swelling and pain
Muscle control and activation
Restore proprioception/neuromuscular control
Normalize patellar mobility

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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 (4-5 times daily), emphasis on maintaining full, passive range of motion

KT 2000 Test – (15 lb. Anterior-posterior test only)

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
 *Bicycle (if ROM allows)
 *Proprioception training
 *Overpressure into extension
 *Passive range of motion from 0 to 100 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 use sports RAC with repositioning

Swelling control – Ice, compression, elevation

Week Three

Brace – Continue locked brace for ambulation until week 4

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
 *Pool walking program (if incision is closed)
 *Eccentric quadriceps program 40-100 (isotonic only)
 *Lateral lunges (straight plane)

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- *Front Step Downs
- *Lateral Step-Overs (cones)
- *Stair-Stepper machine
- *Progress Proprioception drills, neuromuscular control drills
- *Continue passive/active reposition drills on sports RAC (CKC, OKC)

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 – No immobilizer or brace, 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

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

Week 4

Brace – Discontinue use of locked brace at end of week 4
Use unlocked brace for weeks 5-6

- 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 0-60 degrees
 - *Standing Toe Calf Raises

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- *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 repositioning on tilt board with sports RAC
- CKC lunges with sports RAC

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
 - *Biodex stability system
 - *Initiate active knee flexion with “light” resistance

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

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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°/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
Perform selected sport-specific drills

Exercises: *May initiate running program (weeks 10-12)
 *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

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- 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 (Month 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