

Accelerated Rehabilitation following ACL – PTG Reconstruction

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)

Neuromuscular/Proprioception Training –

- Eliminate quad avoidance gait
- Retro stepping drills
- Joint repositioning on Sports RAC
 - o Passive/active reposition at 90, 60, 30 degrees
 - o 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

Phase I – 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 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 degrees by day 5)
Straight leg raises (flexion, abduction, adduction)
Quadriceps isometric setting
Hamstring stretches
Closed kinetic chain exercises: minisquats, 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 Elevation – Ice 20 minutes out of every hour 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.

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 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)

Continuous Passive Motion – 0 to 90 degrees, as needed

Ice and elevation – 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

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
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)

Continuous Passive Motion – 0 to 90 degrees, as needed

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

Phase 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

Week Two

Brace – continue locked brace for ambulation

Weight Bearing – As tolerated (goal is to discontinue crutches 10-14 days post op)

Passive ROM – Self ROM stretching (4-5 times daily), emphasis on maintaining full, PROM

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
Hamstring curls standing (active ROM)
Bicycle (if ROM allows)
Proprioception training
Overpressure into extension
Passive ROM 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 – Discontinue locked brace (some patients use ROM brace for ambulation)

PROM – Continue ROM stretching and overpressure into extension (ROM should be 0 – 100/105 degrees)

Exercises: Continue all exercises as in week two
PROM 0-105 degrees
Bicycle for ROM stimulus and endurance
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)
Stair Stepper machine
Progress Proprioception drills, neuromuscular control drills
Continue passive/active reposition drills on sports RAC (CKC, OKC)

Phase III – Progressive Strengthening/Neuromuscular Control Phase (Week 4-10)

Criteria to enter Phase III

1. AROM 0-115 degrees
2. Quadriceps strength 60% > contralateral side (Isometric test at 60 degree 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 ROM (0 to 126 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

ROM – 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
 Hamstring Curls (isotonics)
 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
 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 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 listed in weeks 4-6
 Leg press set (single leg) 0-100 degrees and 40-100 degrees
 Plyometric Leg press
 Perturbation Training
 Isokinetic exercises (90 to 40 degrees) (120 to 240 degrees/sec)
 Walking Program
 Bicycle for endurance
 Stair stepper machine for endurance
 Biodex stability system

Sports RAC Neuromuscular training on tilt board and Biodex stability

Week 10

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

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

Exercises: Continue all exercises listed in weeks 6, 8, and 10
Plyometric training drills
Continue stretching drills
Progress strengthening exercises and neuromuscular training

Phase 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 degrees (male), 55% at 180 degrees (females)
 - Hamstrings/quadriceps ratio 66% to 75%
7. Hop Test (80% of contralateral side)
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
- 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

Phase V – Return to Activity Phase (week 16-22)

Criteria to enter Phase V

1. Full ROM
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 test 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