

## **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
  - Passive/active reposition at 90, 60, 30 degrees
  - 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

### **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 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

### **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 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 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.

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)

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 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 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
- \*Hamstring Curls standing (active ROM)
- \*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 – Discontinue locked brace (some patients use ROM brace for ambulation)

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)  
                   \*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**

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
  - \*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
  - \*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/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°/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
- 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

Goals: Gradual return to full-unrestricted sports  
Achieve maximal strength and endurance  
Normalize neuromuscular control  
Progress skill training

Exercises \*Continue strengthening exercises  
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