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## Accelerated Rehabilitation Following ACL-PTG Reconstruction with Meniscus Repair

### 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  
Provide education to control forces across meniscus repair

**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

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

Precautions:

- 1) No squatting past 70 degrees for 8 weeks
- 2) No active resisted hamstrings for 8 weeks
- 3) No active knee flexion beyond 90 degrees flexion for 8 weeks
- 4) No twisting for 4 months

**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 0-30 degrees

**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
- \*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
  - \*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)
  - \*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
- \*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

- 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
- 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