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## Nonoperative Rehabilitation Following ACL Injury (3-3-4-4 Program)

### I. IMMEDIATE INJURY 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

#### Post-Injury Day 1- 3

**Brace** – brace/Immobilizer applied to knee, locked in full extension during ambulation as directed by physician

**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/ calf stretches
- \*Closed kinetic chain exercises: mini squats, weight shifts

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

**Ice and Elevation** – Ice 20 minutes out of every hour and elevate with knee in full extension, may use e-stim for edema control

#### Post-Injury Day 3 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
- \*Continue Hamstring and calf stretching

**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. **INTERMEDIATE 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 training  
Restore proprioception  
Patellar mobility

### **Week Two**

**Brace** – Discontinue brace or immobilizer at 2 to 3 weeks per physician

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

**Range of Motion** – Self-ROM stretching (4-5 times daily), emphasis on maintaining full, passive range of motion progress flexion as tolerated

**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
- \*Gait training with cones
- \*Front and side lunges
- \*Hamstring Curls
- \*Bicycle
- \*Proprioception training
- \*Tilt board squats
- \*Dip walking
- \*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
- \*Continue stretching program

**Swelling control** – Ice, compression, elevation, e-stim

Week Three

**Brace** – Discontinue

**Range of Motion** – PROM should be full or near full ROM

**Passive Range of Motion** – Continue range of motion stretching and overpressure into extension

- Exercises:**
- \*Continue all exercises as in week two
  - \*Passive Range of Motion as tolerated
  - \*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
  - \*Lateral cone step overs
  - \*Stair-Stepper machine
  - \*Progress Proprioception drills, neuromuscular control drills

III. ADVANCED STRENGTHENING/NEUROMUSCULAR CONTROL PHASE (Week 4-8)

**Criteria to Enter Phase III**

- 1) Full ROM
- 2) Quadriceps strength 60% > contralateral side (isometric test at 60 degree knee flexion)
- 3) Minimal to no full joint effusion
- 4) No joint line or patellofemoral pain

**Goals:** Maintain 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 or fit for function all brace

**Range of Motion** – Self-ROM (4-5 times daily using the other leg to provide ROM), emphasis on maintaining full ROM

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
- \*Pool program (backward running, hip and leg exercises)

### **Week 6**

- Exercises:**
- \*Continue all exercises
  - \*Pool running (forward) and agility drills, jumping
  - \*Progress to balance and tilt board throws, perturbation training
  - \*Advanced Neuromuscular control drills:
    - CKC on unstable surfaces
    - Lunges onto foam
    - Step ups on foam
    - Perturbation training
  - \*Wall slides/squats
  - \*Muscular training for fast reaction times
    - High speed hamstring curls
    - \*Progress dynamic stabilization drills
    - Tilt board perturbations

## **IV. ADVANCED ACTIVITY PHASE (Week 8-12)**

### **Criteria to Enter Phase IV**

- 1) Full ROM
- 2) Quad strength 75% of contralateral side, knee extension  
flexor:extensor ratio 70% to 75%
- 3) No pain or effusion
- 4) Satisfactory clinical exam
- 5) 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%
- 6) 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
  - \*Advanced Neuromuscular control drills:
  - \*Plyometric program
    - Leg press plyometrics
    - Box jumps

## **V. RETURN TO ACTIVITY PHASE (Month 12-22)**

### **Criteria to Enter Phase V**

- 1) Full Range of Motion
- 2) Isokinetic Test that fulfills criteria
- 3) Quadriceps bilateral comparison (80% or greater)
- 4) Hamstring bilateral comparison (110% or greater)

- 5) Quadriceps torque/body weight ratio (55% or greater)
- 6) Hamstrings/Quadriceps ratio (70% or greater)
- 7) Proprioceptive Test (100% of contralateral leg)
- 8) Functional Test (85% or greater of contralateral side)
- 9) Satisfactory clinical exam
- 10) Subjective knee scoring (modified Noyes System) (90 points or better)

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

**Exercises**

- \*Continue strengthening exercises
- \*Continue neuromuscular control drills
- \*Continue plyometrics drills
- \*Progress running and agility program
- \*Progress sport specific training