



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 8 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