

**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	<ul style="list-style-type: none"> <li>*Progress isometric strengthening program</li> <li>*Leg Press</li> <li>*Knee extension 90 to 40 degrees</li> <li>*Hamstring curls</li> <li>*Hip Abduction and Adduction</li> <li>*Hip Flexion and Extension</li> <li>*Lateral Step-Overs</li> <li>*Lateral Lunges</li> <li>*Lateral step ups</li> <li>*Front step downs</li> <li>*Wall Squats</li> <li>*Vertical squats</li> <li>*Toe Calf Raises</li> <li>*Biodex Stability System (balance, squats, etc.)</li> <li>*Proprioception drills</li> <li>*Bicycle</li> <li>*Stair Stepper machine</li> <li>*Pool program (backward running, hip and leg exercises)</li> </ul>
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#### Week 6

Exercises:	<ul style="list-style-type: none"> <li>*Continue all exercises</li> <li>*Pool running (forward) and agility drills, jumping</li> <li>*Progress to balance and tilt board throws, perturbation training</li> <li>*Advanced Neuromuscular control drills:             <ul style="list-style-type: none"> <li>-CKC on unstable surfaces</li> <li>-Lunges onto foam</li> <li>-Step ups on foam</li> <li>-Perturbation training</li> </ul> </li> <li>*Wall slides/squats</li> <li>*Muscular training for fast reaction times             <ul style="list-style-type: none"> <li>- High speed hamstring curls</li> </ul> </li> <li>*Progress dynamic stabilization drills             <ul style="list-style-type: none"> <li>- Tilt board perturbations</li> </ul> </li> </ul>
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### 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)
  - Quadiceps bilateral comparison 75%
  - Hamstrings equal bilateral
  - Quadiceps peak torque/body weight 65% at 180°/s (males) 55% at 180°/s (females)
  - Hamstrings/quadiceps 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) Quadiceps bilateral comparison (80% or greater)
- 4) Hamstring bilateral comparison (110% or greater)
- 5) Quadiceps torque/body weight ratio (55% or greater)
- 6) Hamstrings/Quadiceps 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