I. **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
- 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

Select Appropriate Surgical Date

A. 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

1) Postoperative Day 1

Brace:
• Brace/immobilizer applied to knee, locked in full extension during ambulation

Weight Bearing: Two crutches, weight bearing as determined by physician

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

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

B. Postoperative Day 2 to 3:
Brace:
  • Brace/immobilizer locked at zero degrees extension for ambulation

Weight Bearing:
  • Two crutches, weight bearing as determined by physician

Range of Motion:
  • Remove brace perform range of motion exercises 4-6 times a day

Exercises:
  • Overpressure into extension (knee extension should be at least 0 degrees to slight hyperextension)
  • Patellar mobilization
  • Ankle pumps
  • Straight leg raises (3 directions)
  • Quadriceps isometric setting

Muscle Stimulation: Electrical muscle stimulation to quads (6 hours per day)

Ice and Elevation: Ice 20 minutes of every hour and elevate leg with knee full extension

C. **Postoperative Day 4 to 7:**

Brace:
  • Brace/immobilizer locked at zero degrees extension for ambulation

Weight Bearing:
  • Two crutches, weight bearing as determined by physician

Range of Motion:
  • Remove brace to perform range of motion exercises 4-6 times per day

Exercises:
  • Overpressure into extension (full extension 0 degrees to 5-7 hyperextension)
  • Patellar mobilization (5-8 times daily)
  • Ankle pumps
  • Straight leg raises (3 directions)
  • Quadriceps isometric setting
  • Proprioception and balance activities

Muscle Stimulation:
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
- Gradually increase knee flexion
- Diminish swelling and pain
- Muscle control and activation
- Restore proprioception/neuromuscular control
- Normalize patellar mobility

A. Week 2:

**Brace:**
- Continue locked brace for ambulation

**Weight Bearing:**
- Per physician’s request

**Passive Range of Motion:** Self ROM stretching (4-5 times daily), emphasis on maintaining full, passive range of motion

**Exercises (Closed Chain Exercises only if WB Status Allows):**
- Muscle stimulation to quadriceps exercises
- Isometric quadriceps sets
- Straight leg raises (4 planes)
- Knee extension 90-40 degrees
• Half squats (0-40) (**Pending WB Status**)  
• Weight shifts  
• 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  

Swelling Control:  
• Ice, compression, elevation  

B. Week 3:  

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)  
• Front step downs  
• Lateral step overs (cones)  
• Stair stepper machine  
• Progress proprioception drills, neuromuscular control drills  

III. Progressive Strengthening / Neuromuscular Control Phase (Week 4-10)  

Criteria to Progress to 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 (0-125 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 0-120 degrees at 4 weeks

A. 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 90-40 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
• 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)

B. Week 6:

Exercises:
C. **Week 8:**

**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
- Walking program
- Bicycle for endurance
- Biodex stability system
- Initiate active knee flexion with “light” resistance

D. **Week 10:**

**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 Progress to 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)
   - Hop Test (80% of contralateral leg)

**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

A. 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 Progress to Phase V:
1) Full range of motion
2) Unchanged KT 2000 Test (with 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) Functional test (85% or greater or contralateral side)
9) Satisfactory clinical exam

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
  o Running/cutting/agility drills
  o Gradual return to sport drills