Rehabilitation Following
ACL repair

I. Phase 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

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)

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Patient Education:
- Review postoperative rehabilitation program
- Review instructional video (optional)
- Select appropriate surgical date

A. Immediate Post-Operative Phase (Day 1 to 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

1) Postoperative Day 1

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

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 7)
- Straight leg raises (Flexion, Abduction, Adduction)
- Quadriceps isometric setting
- Hamstring stretches
- Closed kinetic chain exercises: mini squats, weight shifts

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 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 and unlocked for sitting, etc.

**Weight Bearing:**
- Two crutches, weight bearing as tolerated

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

**Postoperative Day 2 to 3 - Continued:**

**Exercises:**
- 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)

**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 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:**
- 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
- Standing hamstring curls

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• Quadriceps isometric setting
• Proprioception and balance activities

Muscle Stimulation:
• Electrical muscle stimulation (6 hours daily)

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

A. Week 2:

Brace:
• Continue locked brace for ambulation

Weight Bearing:
• As tolerated (goal is to discontinue crutches 10-14 days post op)

Exercises:
• Muscle stimulation to quadriceps exercises
• Isometric quadriceps sets
• Straight leg raises (4 planes)
• Leg press (0-60 degrees) or Total Gym
• Knee extension 90-40 degrees
• Half squats (0-40)
• Weight shifts
• Hamstring curls standing (active ROM)
• 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:**
• Discontinue locked brace (some patients use ROM brace for ambulation)

**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 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:**

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• 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 0-125 degrees at 4 weeks

**A. Week 4:**

**Exercises:**
• Progress isometric strengthening program
• Leg press (0-100 degrees)
• Knee extension 90-40 degrees
• Knee extension 90-40 degrees
• Hamstring curls (isotonics)
• Hip abduction and adduction
• Hip flexion and extension
• Lateral step overs
• Lateral lunges (straight plane and multi-plane drills)
• Lateral step ups
• Lateral step downs
• Wall squats
• Vertical squats
• 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)

**B. Week 6:**

**Exercises:**
• Continue all exercises
• Pool running (forward) and agility drills

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• Balance on tilt boards
• Progress to balance and ball throws
• Wall slides/squats
• Bosu ball drills

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
- Isokinetic exercises (90-40 degrees) (120-240 degrees/second)
- Walking program

*Week 8: Exercises - Continued*

- Bicycle for endurance
- Stair stepper machine for endurance
- Biodex stability system

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 (females)  
   - Hamstrings/quadriceps ratio 66% to 75%  
7) 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 with MD permission (weeks 10-12)
- May initiate light sport program with MD permission (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

**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. Proprioceptive Test (100% of contralateral leg)
9. Functional test (85% or greater or contralateral side)
10. Satisfactory clinical exam

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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