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Knee Rehabilitation  
ACL Protocol

## ACL Rehabilitation Guidelines

### Phase 0: Pre-operative Recommendations

- Normal gait
- AROM 0 to 120 degrees of flexion
- Strength: 20 SLR with no lag
- Minimal effusion
- Patient education on post-operative exercises and need for compliance
- Educated in ambulation with crutches
- Wound care instructions
- Educated in MOON follow-up expectations

### Phase 1: Immediate Post-operative Phase (Approximate timeframe: Surgery to 2 weeks)

#### Goals

- Full Knee extension ROM
- Good quadriceps control ( $\geq 20$  no lag SLR)
- Minimize pain
- Minimizes swelling
- Normal gait pattern

**Crutch Use:** WBAT with crutches (beginning the day of surgery)

**Crutch D/C Criteria:** Normal gait pattern

Ability to safely ascend/descend stairs without noteworthy pain or  
Instability (reciprocal stair climbing)

**Knee Immobilizer:** None (Exception: First 24 hours after a femoral nerve block)

**Cryotherapy:** Cold with compression/elevation (e.g. Cryo-cuff, ice with compressive stocking)

- First 24 hours or until acute inflammation is controlled: every hour for 15 minutes
- After acute inflammation is controlled: 3 times a day for 15 minutes
- Crushed ice in the clinic (post-acute stage until D/C)

## EXERCISE SUGGESTIONS

### ROM

- *Extension:* Low load, long duration (~5 minutes) stretching (e.g., heel prop, prone hand minimizing co-contraction and nociceptor response)
- *Flexion:* Wall slides, heel slides, seated assisted knee flexion, bike:rocking-for-range

- Patellarmobilization(medial/lateral mobilization initially followed by superior/inferior direction while monitoring reaction to effusion and ROM)

### **Muscle Activation/Strength**

- Quadriceps sets emphasizing vastus lateralis and vastus medialis activation
- SLR emphasizing no lag
- **Electric Stimulation:** *Optional* if unable to perform no lag SLR  
**Discontinue** use when able to perform *20 no lag SLR*
- Doug-leg quartersquats
- Standing theraband resisted terminal knee extension (TKE)
- Hamstring sets
- Hamstring curls
- Side-lying hip adduction/abduction (Avoid adduction moment in this phase with concomitant grade II – III MCL injury)
- Quad/ham co-contractions supine
- Prone Hip Extension
- Ankle pumps with theraband
- Heel raises (calf press)

### **Cardiopulmonary**

- UBE or similar exercise is recommended

**Scar Massage** (when incision is fully healed)

### **CRITERIA FOR PROGRESSION TO PHASE 2**

- 20 no lag SLR
- Normal gait
- Crutch/Immobilizer D/C
- ROM: no greater than 5° active extension lag, 110° active flexion

**PHASE 2: Early Rehabilitation Phase** (Approximate timeframe: weeks 2 to 6)

### **GOALS**

- Full ROM
- Improve muscle strength
- Progress neuromuscular retraining

## EXERCISE SUGGESTIONS

### ROM

- Low load, long duration (assisted/prn)
- Heel slides/wall slides
- Heel prop/prone hand (minimize co-contraction / nociceptor response)
- Bike (rocking-for-range – riding with low seat height)
- Flexibility stretching all major groups

### Strengthening

#### *Quadriceps:*

- Quadsets
- Mini-squats/wall-squats
- Step-ups
- Knee extension from 90° to 40°
- Legpress
- Shuttle **Press without jumping action**

#### *Hamstrings:*

- Hamstring curls
- Resistive SLR with sports cord

#### *Other Musculature:*

- Hip adduction/abduction: SLR or with equipment
- Standing heel raises: progress from double to single leg support
- Seated calf press against resistance
- **Multi-hip machine in all directions with proximal pad placement**

### Neuromuscular training

- Wobble board
- Rocker board
- Single-leg stance with or without equipment (e.g. instrumented balance system)
- Slideboard
- Fitter

### Cardiopulmonary

- Bike
- Elliptical trainer
- Stairmaster

## CRITERIA FOR PROGRESSION TO PHASE 3

- Full ROM
- Minimal effusion/pain
- Functional strength and control in daily activities

- IKDC Question # 10 (Global Rating of Function) score of  $\geq 7$ )

### **PHASE 3: Strengthening & Control Phase** (Approximate timeframe: weeks 7 through 12)

#### **GOALS**

- Maintain full ROM
- Running without pain or swelling
- Hopping without pain, swelling or giving-way

#### **EXERCISE SUGGESTIONS**

##### **Strengthening**

- Squats
- Legpress
- Hamstring curl
- Knee extension 90° to 0°
- Step-ups/down
- Lunges
- Shuttle
- Sports cord
- Wall squats

##### **Neuromuscular Training**

- Wobble board / rocker board / rollerboard
- Perturbation training
- Instrumental testing systems
- Varied surfaces

##### **Cardiopulmonary**

- Straight line running on treadmill or in a protected environment (NO cutting or pivoting)
- All other cardiopulmonary equipment

#### **CRITERIA FOR PROGRESSION TO PHASE 4**

- Running without pain or swelling
- Hopping without pain or swelling (Bilateral and Unilateral)
- Neuromuscular and strength training exercises without difficulty

### **PHASE 4: Advanced Training Phase** (Approximate timeframe: weeks 13 to 16)

## **GOAL**

- Running patterns (Figure-8, pivot drills, etc.) at 75% speed without difficulty
- Jumping without difficulty
- Hop tests at 75% contralateral values (Cincinnati hop tests: single-leg hop for distance, triple-hop for distance, crossover hop for distance, 6-meter timed hop)

## **EXERCISE SUGGESTIONS**

### **Aggressive Strengthening**

- Squats
- Lunges
- Plyometrics

### **Agility Drills**

- Shuffling
- Hopping
- Carioca
- Vertical jumps
- Running patterns at 50 to 75% speed (e.g. Figure-8)
- Initial sports specific drill patterns at 50-75% effort

### **Neuromuscular Training**

- Wobble board / rocker board / rollerboard
- Perturbation training
- Instrumented testing systems
- Varied surfaces

### **Cardiopulmonary**

- Running
- Other cardiopulmonary exercises

## **CRITERIA FOR PROGRESSION TO PHASE 5**

- Maximum vertical jump without pain or instability
- 75% of contralateral on hop tests
- Figure-8 run at 75% speed without difficulty
- IKDC Question # 10 (Global Rating of Knee Function) score of  $\geq 8$

**PHASE 5: Return-to-Sport Phase** (Approximate timeframe: weeks 17 to 20)

## **GOALS**

- 85% contralateral strength
- 85% contralateral on hoptests
- Sport specific training without pain, swelling or difficulty

## **EXERCISE SUGGESTIONS**

### **Aggressive Strengthening**

- Squats
- Lunges
- Plyometrics

### **Sport Specific Activities**

- Interval training programs
- Running patterns in football
- Sprinting
- Change of direction
- Pivot and drive in basketball
- Kicking in soccer
- Spiking in volleyball
- Skill / biomechanical analysis with coaches and sports medicine team

## **RETURN-TO-SPORT EVALUATION RECOMMENDATIONS:**

- Hop tests (single-leg hop, triple hop, cross-over hop, 6 meter timed-hop)
- Isokinetic strength test (60°/second)
- Vertical Jump
- Deceleration shuttle test
- MOON outcomes measure packet (mandatory; should be completed post-testing)

## **RETURN-TO-SPORT CRITERIA:**

- No functional complaints
- Confidence when running, cutting, jumping at full speed
- 85% contralateral values on hoptests
- IKDC Question # 10 (Global Rating of Knee Function) of  $\geq 9$