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**ACL Reconstruction Rehabilitation Protocol**

The goals of this protocol are to protect the reconstructions while preventing knee stiffness, so early passive ROM exercises are very important. In addition, preventing excessive anterior and/or posterior tibia translation is also very important.

**PHASE I – IMMEDIATE POST-SURGICAL PHASE (WEEK 0-2):**

- Goals:
  - Maintain integrity of reconstructed tissue
  - Gradually increase PROM
  - Decrease pain and inflammation
  - Prevent muscular inhibition
  
- Cryotherapy for pain/inflammation:
  - Ice 20-30 minute intervals day and night for first 48 hours then 20 minutes every hour when able
  
- Sleeping:
  - Sleep in brace/knee immobilizer
  
- Weight Bearing:
  - As tolerated in hinged brace (unless meniscus repair, then defer to ROM/WB restrictions in appropriate meniscus repair protocol as directed in op note)
    - Brace locked in extension for ambulation until return of quadriceps control
  - Pt usually instructed to be 50% WB until PT begins
  - Crutches as needed
  - Crutch D/C Criteria:
    - Normal gait pattern
    - Ability to safely ascend/descend stairs without noteworthy pain or instability (reciprocal stair climbing)
  
- Brace:
  - Hinged brace locked in extension for ambulation until good quad control
  - Once good quad control, may unlock brace for ambulation
  
- ROM:
  - As tolerated (unless meniscus repair, then defer to ROM/WB restrictions in appropriate meniscus repair protocol as directed in op note)
  - Goal full extension, at least 90 degrees flexion by 2 weeks post op
  
- Muscle Retraining:
  - Quadriceps isometrics, SLR
  - Heel slides
  
- Patellar Mobilizations

- Exercise suggestions:
  - ROM
    - Extension: Low load, long duration (~5 minutes) stretching (e.g., heel prop, prone hang minimizing co-contraction and nociceptor response)
    - Flexion: Wall slides, heel slides, seated assisted knee flexion, bike: rocking-for-range
    - Patellar mobilization (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
    - Double-leg quarter squats
    - 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-contraction 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:
  - SLR without quad lag
  - Normal gait
  - Crutch/Immobilizer D/C
  - ROM: no greater than 5° active extension lag, 90° active flexion

## PHASE II – EARLY REHABILITATION (WEEK 2-6):

- Goals:
  - Allow healing of soft tissue
  - Do not overstress healing tissue
  - Gradually increase to full ROM
    - Progression based on swelling/inflammation
  - Decrease pain and inflammation
  - Good patellar mobility
- Week 2-4:
  - Continue use of ice as needed
  - Continue ROM progression
  - Weight bearing
    - May discontinue crutches when appropriate
  - Brace

- Worn during ambulatory activities. May remove at night and for sleep
  - Unlocked with no ROM restrictions (unless meniscus repair)
  - Core strengthening, Quad activation, Glute/Hip Strengthening
- Week 4-6:
  - May use heat prior to exercises
  - Gradually increase ROM
  - Wean from brace at home and with therapy. Continue use outside of the home
  - Muscle retraining
  - Stationary bicycle if pain permits (in brace)
  - Proprioception training
  - Core strengthening
- Exercise Suggestions:
  - ROM
    - Low load, long duration (assisted prn)
    - Heel slides/wall slides
    - Heel prop/prone hang (minimize co-contraction / nociceptor response)
    - Bike (rocking-for-range → riding with low seat height)
    - Flexibility stretching all major groups
  - Strengthening
    - Quadriceps
      - Quad sets
      - Mini-squats/wall-squats
      - Steps-ups 4
      - Knee extension from 90° to 40°
      - Leg press
      - 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)
      - Slide board
      - Fitter
    - Cardiopulmonary
      - Bike
      - Elliptical trainer
      - Stairmaster
- CRITERIA FOR PROGRESSION TO PHASE 3:
  - Full ROM
  - Minimal effusion/pain
  - Functional strength and control in daily activities
  - Normal gait pattern

### PHASE III – INTERMEDIATE PHASE (WEEK 7-12):

- Goals:
  - Maintain Full ROM
  - Eliminate swelling
  - Hopping without pain, swelling or giving-way
  - Quad strength 70% of uninjured side
- Discontinue hinged knee brace
  - Optional: fitting and use of ACL sport brace
- Exercise Suggestions:
  - Strengthening
    - Squats
    - Leg press
    - Hamstring curl
    - Knee extension 90° to 0°
    - Step-ups/down
    - Lunges
    - Shuttle
    - Sports cord
    - Wall squats
  - Neuromuscular Training
    - Wobble board / rocker board / roller board
    - Perturbation training
    - Instrumented testing systems
    - Varied surfaces Cardiopulmonary
    - Straight line running on treadmill or in a protected environment (NO cutting or pivoting)
    - All other cardiopulmonary equipment
    - Initiate two leg hopping and landing progression at 10-12 weeks

#### **\*\*Strength and biomechanical testing with PT or Training Haus (TRAC ACL)\*\***

- CRITERIA FOR PROGRESSION TO PHASE 4:
  - Full knee ROM during functional movement and exercise
  - Quad strength 70% of uninjured side
  - Neuromuscular and strength training exercises without difficulty
  - No knee effusion lasting >24 hours

### PHASE IV – ADVANCED TRAINING (WEEK 13-18):

- Goals:
  - Running without pain
  - 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)
  - Begin ACE Strength program for preparation of return to sport

- Return to Running
  - Straight running/jogging progression at 14-16 weeks depending on patient readiness
  - Equal stride length and heel strike without pelvic drop
- Exercise Suggestions:
  - Aggressive Strengthening
    - Squats
    - Lunges
    - Plyometrics
  - Dynamic Control
    - Advance hopping and landing progression with one leg
    - Shuffling
    - 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 / roller board
    - Perturbation training
    - Instrumented testing systems
    - Varied surfaces
  - Cardiopulmonary
    - Running
    - Other cardiopulmonary exercises
- Functional Testing
  - Single leg reach or Y-Balance testing
  - Single leg hop tests (triple and crossover hops if appropriate)
- CRITERIA FOR PROGRESSION TO PHASE 5:
  - Maximum vertical jump without pain or instability
  - 75% of contralateral on hop tests
  - Pain free running with symmetrical heel strike and stride length

## PHASE V –RETURN TO SPORT PHASE (WEEK 19-24+):

- Goals:
  - 90% contralateral strength
  - 90% contralateral on hop tests
  - Running patterns (Figure-8, pivot drills, etc.) at 75% speed without difficulty
  - Sport specific training without pain, swelling or difficulty
  - Strength/Biomechanical testing at 6 and 9 months
  - Begin ACE Sport testing at 6 months for return to sport
- Exercise Suggestions:
  - Aggressive Strengthening
    - Squats
    - Lunges
    - Plyometrics
    - Sport Specific Activities
  - Interval training programs
  - Running patterns in football
  - Sprinting
  - Change of directions/agility
  - Continued neuromuscular training
  - 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
  - Y-balance

**\*\*Strength and biomechanical testing with PT or Training Haus (TRAC ACL)\*\***

**RETURN-TO-SPORT CRITERIA:**

*Full return to all sports and games*

- Atleast 9 months from surgery
  - No functional complaints, full range of motion & no effusion
  - Confidence when running, cutting, jumping at full speed
  - >90% isometric quadriceps strength
  - >90% contralateral values on hop tests
  - >90% Quad Index LSI with Biodex or HHD
  - >90% Quad peak torque/body weight on Biodex (if applicable)
  - Excellent ACL-RSI
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## RETURN TO SPORT PLAN AND TIMELINE



### ACE STRENGTH

- Small group training sessions 2-3 times per week with ATC
- In coordination with formal rehabilitation, ACE Strength will assist athletes with regaining appropriate muscle strength and movement control, aiding with the transition into the next phase of rehabilitation regardless of injury
- Focuses: muscular strength, fundamental movement mechanics, conditioning
- Approximate duration: 12-16 weeks

### ACE SPORT

- Small group training sessions 2-3 times per week with PT/PTA/ATC
- Late phase return to performance program allowing for increased intensity in strength, power, speed, agility and overall conditioning
- Focuses: acceleration, deceleration, jumping, landing, sprinting, agility, reactive decision making, conditioning
- Approximate duration: 12 weeks

#### Price per month for all ACE programs (Sport and Strength)

1x/week = \$125 (4 wks)

2x/week = \$200 (4 wks)

3x/week = \$285 (4 wks)

4x/week = \$375 (4 wks)

5x/week = \$465 (4 wks)