



REHABILITATION PROTOCOL: MOON ACL RECONSTRUCTION

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PRE-OPERATIVE PHASE (“Prehab”)

- Isokinetic test (chronic)
- Crutch ambulation training
- Post-op exercise instruction
 - Quad sets
 - Leg lifts
 - Active flexion/passive extension
 - Patella mobilization
 - Quadriceps/Hamstrings isometrics at 90°
- Quadriceps re-education
- Restoration/Improvement of ROM
- Reduction of edema/inflammation

POST-OPERATIVE PHASE

Phase 0: Pre-operative Recommendations

- Normal gait
- AROM 1-120 degrees of flexion
- Strength: 20 SLR with no lag
- Minimal effusion
- Patient education on post-operative exercises and need for compliance
- Education in ambulation with crutches
- Wound care instructions
- Educated in MOON follow-up expectations

PHASE 1: Immediate Post-operative Phase (Approximate time frame: Surgery to 2 weeks)

GOALS:

- Full knee extension ROM
- Good quadriceps control (≥ 20 no lag SLR)
- Minimize pain
- Minimize swelling
- Normal gait pattern

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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: three 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 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
- **Electrical 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 movement in this phase with concomitant grade II-III MCL injury)
- Quadriceps/hamstring 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)

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CRITERIA FOR PROGRESSION TO PHASE 2

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

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

GOALS

- Full ROM
- Improve muscle strength
- Progress neuromuscular retraining

EXERCISE SUGGESTIONS

ROM:

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

Strengthening:

Quadriceps:

- Quad sets
- Mini-squats/wall-squats
- Step-ups
- 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**

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- **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
- IKDC Question #10 (Global Rating of Function) score of ≥ 7 (*see page 8*)

PHASE 3: Strengthening & Control Phase (Approximate timeframe: weeks 7-12)

GOALS

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

EXERCISE SUGGESTIONS

Strengthening:

- Squats
- Leg press
- Hamstring curls
- Knee extension 90° to 0°
- Step-ups/downs
- Lunges
- Shuttle
- Sports cord
- Wall squats

Neuromuscular Training:

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

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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: Strengthening & Control Phase (Approximate timeframe: weeks 13-16)

GOALS

- 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 to 75% effort

Neuromuscular Training:

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

Cardiopulmonary:

- Running
- Other cardiopulmonary exercises

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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 ≥ 8 (*see page 8*)

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

GOALS

- 85% contralateral strength
- 85% contralateral on hop tests
- 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 hop tests
- IKDC Question #10 (Global Rating of Knee Function) score of ≥ 9 (*see page 8*)

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IKDC Question #10:

How would you rate the function of your knee on a scale of zero to 10 with 10 being normal, excellent function and 0 being inability to perform any of your usual daily activities which may include sports?

CURRENT FUNCTION OF YOUR KNEE:

Please circle only one number below

Cannot perform

Daily activities

No Limitations

0.

1.

2.

3.

4.

5.

6.

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