



## REHABILITATION GUIDELINES

**Edward S. Chang, MD**  
Orthopaedics and  
Sports Medicine

### OFFICE LOCATIONS

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### CLINICAL NURSE

Eileen Perri, BSN  
(703) 797-6918

## **MULTIPLE LIGAMENT KNEE RECONSTRUCTION**

The intent of this protocol is to provide the physical therapist with guidelines of the post-operative rehabilitation course after multi-ligament surgery. It should not be a substitute for one's clinical decision making regarding the progression of a patient's post-operative course based on their physical exam findings, individual progress, and/or the presence of post-operative complications. The physical therapist should consult the referring physician with any questions or concerns.

### **INDIVIDUAL CONSIDERATIONS:**

#### GENERAL CONSIDERATIONS

- WBAT for PCL/or ACL/PCL injuries
- NWB for combined MCL reconstruction for 5 weeks, then PWB for 1 week, then FWB at 6 weeks
- NWB for combined PLC reconstruction or repair for 6 weeks, then PWB for 6 weeks, then FWB at 12 weeks postop.
- No active hamstring activity for 8 weeks after PLC reconstruction
- No hamstring strengthening for 16 weeks after PLC reconstruction

### **PHASE I (0-2 weeks)**

#### **Goals**

- Control inflammation and pain
- Full active extension
- Achieve quadriceps control

#### **Brace**

- Locked in extension for ambulation for 4 weeks for ACL/PCL and/or MCL reconstructions, then unlocked for ambulation for 2-4 weeks until normal gait is established.
- Locked in extension for ambulation for 12 weeks for PLC reconstruction
- May remove for ROM exercises
- Keep brace locked in extension for SLRs for 6 weeks to prevent posterior sag, may remove when quad control is good enough to prevent extension lag



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### **Weight-Bearing Status**

- WBAT with crutches for ACL/PCL
- NWB for 5 weeks, PWB for 1 weeks, then FWB for MCL
- NWB for 6 weeks, PWB for 6 weeks, then FWB for PLC
  - **NWB for all ambulatory activities and use a long leg brace locked in full extension at all times.**
  - **Allowed to bear weight equally on both legs when standing stationary.**
  - **Begin PWB gait of approximately 20% of body weight and increase incrementally by 20% each week.**

### **Therapeutic Exercises**

- SLR in all planes (with brace locked in extension)
- Calf pumps, quadriceps sets
- Electrical stimulation
- Patellar mobilization
- Cryotherapy, elevation, TENS/NMES, ankle pumps and elevation
- Balancing activities on a stable platform with eyes open and closed

### **PHASE II (2- 6 weeks)**

#### **Criteria**

- Good quad set and SLR with brace
- Full extension
- No active inflammation

#### **Goals**

- Achieve 90 degrees of flexion
- Protect graft fixation

### **Brace/Weight-bearing status**

- As above in Phase I
- **Starting at 5 weeks, long leg brace is opened for full flexion for ROM exercises and patient is encouraged to begin passive or active-assisted flexion WITHOUT active hamstring activity. Brace can be discontinued at night. Stationary bicycling permitted.**



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### Therapeutic Exercises

- Begin ROM
- Prone passive knee flexion to 90 degrees with care to avoid posterior tibial sag
- Wall slides then progress to mini-squats (0-45 degrees) when quad control is good
  - AVOID if PLC reconstruction was performed for 8 weeks
- Pool walking to restore normal gait pattern
- Toe raises
- Gastroc stretches
- Ankle strengthening with sports tubing (Theraband)
- **Continue quadriceps strengthening and patellar mobilization.**
- **Starting at 5 weeks, can begin short and long arc quadriceps strengthening. Hip strengthening can be initiated but should avoid motions that promote increased knee varus or valgus stress depending on involved structures.**

### PHASE III (6-12 weeks)

#### Criteria

- Knee flexion to 90 degrees
- No active inflammation
- Good quadriceps control

#### Goals

- Achieve full flexion
- Establish normal gait
- Progress with strengthening and endurance

### Brace/Weight-Bearing Status

- FWB with brace unlocked, may discontinue brace when normal gait is established for ACL/PCL and/or MCL reconstructions
- PWB with brace locked in extension for PLC reconstruction
- **Starting at week 10, long-leg brace is discontinued and patient is fitted for a functional brace for ADL that may lessen stress the reconstruction.**



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### **Therapeutic Exercise**

- Begin active knee flexion at 6 weeks for ACL/PCL and/or MCL and at 8 weeks for PLC reconstruction
- Begin the following at 6 weeks for ACL/PCL and/or MCL and at 8 weeks for PLC reconstruction
  - Stationary bike (low resistance, high seat, with no toe clips---so as to prevent hamstring contraction)
  - Mini-squats to 45 degrees
  - Leg press to 60 degrees
  - Stairmaster
  - Elliptical trainer
  - **Proper gait mechanics**
  - *Proprioception*
    - Mini-tramp standing
    - Unstable platform (BAPS) with eyes open and closed
    - Standing ball throwing and catching

Postop weeks 10-16.

-long leg brace discontinued and patient fitted for a functional brace for ACL that may stress the reconstruction.

- **Starting at week 10, closed chain exercises initiated in a 0-60 degrees range. ROM exercises are continued and patient should be able to flex to 110 degrees or greater by the end of postop month 4.**

### **PHASE IV (3-6 months)**

#### **Criteria**

- Full, pain-free active range of motion
- No patellofemoral irritation
- Sufficient strength and proprioception to progress to functional activities
- Normal gait

#### **Goals**

- Improve strength and proprioception
- Maintain FROM

### **Therapeutic Exercises**

- Progress with flexibility and closed-chain strengthening program
- Swimming (no breast stroke)
- Stationary bike (may increase resistance)
- Box steps (6 and 12 inches)
- Jogging, straight ahead, may be started around 4-5 months when quad strength is 90% of contralateral side (see below for program)



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- **Isolated hamstring strengthening against gravity without weight is initiated at end of postop month 5 and resistive hamstrings can be introduced at end of postop month 6. ROM of 120 degrees is desirable at this point. A 10-15 degree terminal flexion deficit is typical.**
- **Aggressive quadriceps strengthening is implemented. Can begin low-intensity plyometric program at the end of postop month 5. In addition low-intensity sport-specific activities.**

### PHASE V (6-9 months)

#### Criteria

- Full, pain-free motion
- No effusion
- Sufficient hamstring and quadriceps strength to progress to agility exercises

#### Goals

- Return to recreational and sporting activities by 9-12 months
- Maintain full, painless motion
- Progress with strengthening, agility, and endurance
- **Symmetrical strength and proprioception before returning to unrestricted activity**

#### Therapeutic Exercises

- Progress with closed chain quadriceps and hamstring strengthening
- *Plyometrics*
  - Stair jogging
  - Box jumps (6 to 12-inch heights)
- *Proprioception (see program below)*
  - Mini-tramp bouncing
  - Lateral slide board
  - Ball throwing and catching on unstable surface
- *Functional Training*
  - Running
    - Figure-of-eight pattern
- *Agility (see program below)*
  - Start at slow speed
  - Shuttle run, lateral slides, Carioca cross-overs
  - Plyometrics
  - Stair running
  - Box jumps (1-2 foot heights)
  - At 8 months, may start



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- Sports specific training (start at 25% speed and increase as tolerated)
- Incorporate cutting
- Increase heights for plyometric conditioning

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**Criteria for Return to Sports**

- Usually occurs at 9-12 months post-op
- Full, painless range of motion
- No effusion
- Quadriceps and hamstring strength 90% of contralateral side
- No apprehension with all sports specific drills
- **Functional bracing is used for sports or work activities that put the reconstruction at risk until the patient reaches 18 months postop.**
- Cleared by Dr. Chang



## REHABILITATION GUIDELINES

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### **RETURN TO RUNNING PROGRAM**

#### **PHASE I – Warm Up Walk 15 Minutes, Cool Down Walk 10 Minutes**

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Day	1	2	3	4	5	6	7
<b>Week 1</b>	W5/J1x5*		W5/J1x5		W4/J2x5		W4/J2x5
<b>Week 2</b>		W3/J3x5		W3/J3x5		W2/J4x5	
<b>Week 3</b>	W2/J4x5		W1/J5x5		W1/J5x5		<b>Return to Run</b>

Key: W=walk, J=jog

\*W5/J1x5= Walk (5 minutes), Jog (1 minute); repeat 5 times

#### **PHASE II – Warm Up Walk 15 Minutes, Cool Down Walk 10 Minutes**

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Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<b>1</b>	<b>20 min</b>		<b>20 min</b>		<b>20 min</b>		<b>25 min</b>
<b>2</b>		<b>25 min</b>		<b>25 min</b>		<b>30 min</b>	
<b>3</b>	<b>30 min</b>		<b>30 min</b>		<b>35 min</b>		<b>35 min</b>
<b>4</b>		<b>35 min</b>		<b>40 min</b>		<b>40 min</b>	
<b>5</b>	<b>40 min</b>		<b>45 min</b>		<b>45 min</b>		<b>45 min</b>
<b>6</b>		<b>50 min</b>		<b>50 min</b>		<b>50 min</b>	
<b>7</b>	<b>55 min</b>		<b>55 min</b>		<b>55 min</b>		<b>60 min</b>
<b>8</b>		<b>60 min</b>		<b>60 min</b>			

- Recommendations:
  - Runs should occur on softer surfaces during Phase 1
  - Non-impact activity on off days
  - Goal is to increase mileage and then increase pace; avoid increasing two variables at once
  - 10% rule: no more than 10% increase in mileage per week



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## **AGILITY AND PLYOMETRICS PROGRAM**

This program is designed as a guide for clinicians and patients through a progressive return-to-run program. Patients should demonstrate > 80% on a Functional Assessment and started a running program prior to initiating this program (after lower extremity surgery).

### **PHASE I: ANTERIOR PROGRESSION**

#### **Goals:**

- Safely recondition the knee
- Provide a logical sequence of progressive drills for pre-sports conditioning

#### **Agility:**

- Forward run
- Backward run
- Forward lean in to a run
- Forward run with 3-step deceleration
- Figure 8 run
- Circle run
- Ladder

#### **Plyometrics:**

- Shuttle press: Double leg → alternating leg → single leg jumps
- Double leg:
  - Jumps on to a box → jump off of a box → jumps on/off box
  - Forward jumps, forward jump to broad jump
  - Tuck jumps
  - Backward/forward hops over line/cone
- Single leg (these exercises are challenging and should be considered for more advanced athletes):
  - Progressive single leg jump tasks
  - Bounding run
  - Scissor jumps
  - Backward/forward hops over line/cone

#### **Criteria to Progress:**

- No increase in pain or swelling
- Pain-free during loading activities
- Demonstrates proper movement patterns





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**PHASE II: LATERAL PROGRESSION**

**Goals:**

- Safely recondition the knee
- Provide a logical sequence of progressive drills for the Level 1 sport athlete

**Agility (\*Continue with Phase 1 interventions):**

- Side shuffle
- Carioca
- Crossover steps
- Shuttle run
- Zig-zag run
- Ladder

**Plyometrics:**

- Double leg:
  - Lateral jumps over line/cone
  - Lateral tuck jumps over cone
- Single leg (these exercises are challenging and should be considered for the more advanced athletes):
  - Lateral jumps over line/cone
  - Lateral jumps with sport cord

**Criteria to Progress:**

- No increase in pain or swelling
- Pain-free during loading activities
- Demonstrates proper movement patterns

**PHASE III: MULTI-PLANAR PROGRESSION**

**Goals:**

- Challenge athlete in preparation for final clearance for return to sport

**Agility:**

- Box drill
- Star drill
- Side shuffle with hurdles

**Plyometrics:**

- Box jumps with quick change of direction
- 90 and 180 degree jumps

**Criteria to Progress:**

- Clearance from MD
- Functional Assessment
  - $\geq 90\%$  contralateral side
- Return to Sport Index