



## ACL Reconstruction Protocol

<b>Applicability:</b> Physician Practice	<b>Date Effective:</b> 09/2013
<b>Department:</b> Rehabilitation Services	<b>Date Last Reviewed:</b> 01/2021
<b>Supersedes:</b> N/A	<b>Or</b> <b>Date Last Revision:</b> 01/2021
<b>Administration Approval:</b> Deanna Orfanidis VP, Chief Nursing Officer	

**Purpose:** To define the guidelines to be followed for patients referred to Physical Therapy at Northwestern Medical Center after ACL Reconstruction by Northwestern Orthopedics

**Policy Statement:** Treatment will follow the defined guidelines below and be carried out by a Physical Therapist, Physical Therapy Assistant and/or Athletic Trainer. You cannot speed the biology of healing. The graft continues to mature and strengthen and the process of ligamentization extends out to about 18 months. During re-vascularization the graft actually weakens before it strengthens again.

**Background:** Rehab Staff will reference the: VT ACL Protocol 2<sup>nd</sup> edition; McClure Musculoskeletal Research Center, University of Vermont Department of Orthopedics and Rehabilitation for suggested exercises.

**Definitions:**

- ACL- Anterior Cruciate Ligament
- ROM- Range of Motion
- WB- Weight Bearing

**Procedure**

Outpatient PT scheduled post-op day 1 (unless surgery on Friday then scheduled on Monday for PT)

**Week 1**

*Goals:*

ROM -0 degrees full extension

FWB- crutches if needed

Good edema control

Muscle Control- perform solid quads and hamstring contraction

*Precautions/Restrictions:*

Brace- keep locked at 0 degrees x 1 week

No sports, no cutting, turning, twisting or jumping



**\*\* If Hamstring graft--** Hamstring resistive strengthening the first 6 weeks to be guided by symptoms-proceed cautiously beginning with AROM

**\*\* If Meniscal Repair-** refer to MD order to determine which protocol to follow

*Dressing Change:*

Remove post op dressing at the first PT visit, cleanse and apply band-aids

If Aquacel AG is used change at post op day 7 being being cautious not to peel off the derma-bond seal. MD f/u at 8-11 days.

*Edema Control (continue edema control until edema resolves typically 4 weeks or less):*

Educate in ice/cryocuff use

Elevation

Tensogrip/kiniesotape as indicated

Estim for edema as indicated

*Suggested Exercises:*

- Ankle Pumps
- QS in 0 degrees flexion
- SLR
- Passive, AA and AROM to tolerance (supine and sitting)
- Co-Contraction in 0 degrees flexion (leg straight tighten muscles in back of thigh pushing heel down and back into floor) while at the same time tightening the muscle on the top of the thigh.
- Gravity Knee Extension (sitting or lying, leg straight with heel propped up, or prone with leg hanging off bed)
- Stationary bike ½ revolutions to assist in ROM no resistance
- Weight shifting- increase weight shift to involved leg 2-3 seconds increasing as tolerated (in clinic with supervision can perform without brace, as HEP with brace ON)
- Gait Training-educate patient in importance of immediate weight bearing with brace and crutches to facilitate graft healing.

**Week 2**

*Goals:*

ROM 0 degrees full extension to 90 degrees flexion

FWB weaned from crutches without limp

Patella Mobility- mild to no restrictions

Patient education/instruction re: brace alignment with center of rotation of the knee. Educate pt that if the brace migrates distally the pt should avoid flexing in the brace as this will apply an anterior drawer against the ACL reconstruction

*Precautions/Restrictions*

Brace- opened to 5-10 less than available PROM if good SLR



Night time wean brace at 2-3 weeks  
No sports, cutting, turning, twisting or jumping

**\*\* If Hamstring graft--** Hamstring resistive strengthening the first 6 weeks to be guided by symptoms-proceed cautiously beginning with AROM

*Suggested Exercises:*

- Co-Contraction at 30 degrees of flexion
- Seated Leg Extension 90-45 degrees
- Heel Slides (initially may use hands to support then progress to Active)
- SLR
- SLR Hip Abduction
- SLR Hip Adduction
- SLR- Hip Extension
- Stationary bike no resistance
- Prone AA Flexion- actively flex as able and use uninvolved LE to push further hold 20-30 seconds repeat x 4
- Gravity Knee Extension 1-2 minutes sitting, lying or prone
- Patella Mobs- leg straight and relaxed, hold patella borders, slide patella up, down, inside and outside.
- Weight shifting and gait training- ((in clinic with supervision can perform without brace, as HEP with brace ON)
- Closed chain terminal knee extension against theraband

**Week 3**

*Goals:*

ROM 0 full extension to full flexion

Gait- WNL with minimal limp

Swelling- minimal

*Precautions/Restrictions:*

Brace- opened to available ROM

Wean from the brace on indoor surfaces without risk of contact

Night time wean brace at 2-3 weeks

No sporting, cutting, turning, twisting or jumping

**\*\* If Hamstring graft--** Hamstring resistive strengthening the first 6 weeks to be guided by symptoms-proceed cautiously beginning with AROM

*Suggested Exercises:*

- Stationary Bike with little resistance
- Flutter kick in pool (no frog kick or whip kick)



- Gait training on treadmill (fws & bkwd) fully extending, heel strike and even weight distribution. Bkwd dig in with toes behind, roll as far back on heel as possible while pushing off
- Seated AA Flexion- overpressure from uninvolved LE
- Seated leg extension 90-45 degrees with MAX 5 pound LIMIT
- SLR all 4 planes with weight increased as tolerated, no limit
- QS at 0 degrees of flexion with weight increased as tolerated, no limit
- Co-Contraction at 30 degrees flexion- weight not applicable
- Prone or Standing Hamstring Curls with weight increased as tolerated, no limit unless hamstring graft.
- Standing Heel raises with weight increased as tolerated, progressed to single heel raise holding weighted ball overhead; no weight limit (stress quality of contraction over quantity)
- Step up exercises with focus on quality and knee alignment
- Single Leg stance- slight bend in the knee, 15-20 seconds progressed to eyes closed, unsteady surface, throwing/catching weighted object (avoid pivoting)
- Gravity Knee Extension with weight increased as tolerated, no limit

#### **Week 4**

##### *Goals:*

ROM 0 full extension to full flexion

WB- full without crutches

Gait- NL with no limp

Swelling- None

*Precautions/Restrictions:* Brace- opened to available ROM

Begin weaning from brace at 4 weeks with goal to be out of brace at 6 weeks.

No sporting, cutting, turning, twisting or jumping

**\*\* If Hamstring graft--** Hamstring resistive strengthening the first 6 weeks to be guided by symptoms-proceed cautiously beginning with AROM

*Suggested Exercises:* Same as week 3 plus

- Co-Constrictions at 30 degrees, 50 degrees and 70 degrees of flexion
- Stability ball bridging- legs straight, feet propped on ball, arms at side, raise hips so that the body creates straight line hold 10-15 seconds repeat x 4

#### **Week 5**

##### *Goals:*

ROM 0 full extension to full flexion

Gait- NL with no limp



Swelling- None

*Precautions/Restrictions:*

Brace- opened to available ROM

Begin weaning from brace at 4 weeks with goal to be out of brace at 6 weeks.

No sporting, cutting, turning, twisting or jumping

**\*\* If Hamstring graft--** Hamstring resistive strengthening the first 6 weeks to be guided by symptoms-proceed cautiously beginning with AROM

*Suggested Exercises –10 reps, 3 sets*

- Stationary Bike
- Swimming with flutter Kick
- Stair Climbing Machine
- LAQ/Seated Leg Extension through entire 90 degrees to 0 degrees **MAX 5 lb limit**
- SLR all 4 planes, weight as tolerated
- SAQ with MAX 5 lbs
- Standing Heel raises- weight as tolerated
- Single Leg Stance- eyes open/closed weight as tolerated
- Stability ball bridging weight N/A

**Week 6 and 7**

*Goals:*

ROM 0 full extension to full flexion

Discontinue use of brace

Gait- NL with no limp

Swelling- None

*Precautions/Restrictions:*

Brace- Discontinue

No sporting, cutting, turning, twisting or jumping

*Suggested Exercises (week 6 and 7)*

**Weight restriction lifted from leg extension; now permitted to use as much weight as tolerated (but start increasing slowly).**

- Stationary Bike
- Swimming with flutter Kick
- Stair Climbing Machine
- Standing squat between 90 degrees and 45 degrees- equal weight distribution
- Step up/down weight as tolerated



- Stability ball squats weight as tolerated
- SLR all 4 planes with weight as tolerated
- LAQ weight as tolerated
- SAQ weight as tolerated
- Standing hamstring curl weight as tolerated
- Standing heel raises weight as tolerated
- Single leg stance eyes open/closed
- Use of Weight Machines with proper instruction

### **Week 8-24**

#### *Goals*

Manual Muscle Strength Test Score 4 out of 5

Gait- NL with no limp

Swelling- None (do not start jogging until swelling has fully resolved)

#### *Precautions/Restrictions*

No sporting, cutting, turning, twisting or jumping

#### *Suggested Exercises (week 8-24)*

- Continue above program plus
- Begin Jogging in a safe environment and without pain ONLY if swelling has resolved. Use cryocuff upon completion and swelling is the guide to progressing jogging
- Suffles and carioca at 16 weeks
- Nordic Track
- Fitter
- BAPs Board
- Elliptical Trainer

### **6-9 months**

#### *Goals:*

Manual Muscle Strength Test- Score 5/5

Exercises- gradually increasing resistance

Gait- NL with no limp

Swelling None

#### *Precautions/Restrictions:*

No sporting, cutting, turning, twisting or jumping outside of therapy sessions until cleared by surgeon

#### *Suggested Exercises*

- Squats with weight/Leg Press
- SAQ/LAQ/Leg Extension machine
- Hamstring curl machine/Standing Hamstring Curls



- Lunges
- Calf Press Machine/Standing Heel Raises
- Step Ups
- SLR all 4 directions
- Single Leg Balance Eyes open/closed
- Stability Ball Squat
- Stationary Bike
- Swimming with flutter Kick
- Stair Climber machine
- Balance Board
- Elliptical machine
- Jogging (if swelling is resolved and normal gait)
- Plyometrics in controlled environment at 6 months
- Non-contact sport specific simulation in controlled environment at 6 months

*Return to Sport:*

Return to sport will be approved by MD between 9-12 months. Dependent upon 90% strength return in involved as compared to uninvolved as demonstrated on the functional return to sport screen as well as clinical assessment by the surgeon. The return to sport screen should be done between 9-12 months post op provided the patient demonstrates adequate strength ROM and proprioception. It is recommended a practice test be performed prior to the official test so the patient is familiar with the procedure. At 9 month follow up patients planning to return to contact sports will be fitted for brace to be worn for 18 months. If patient is participating in the UVM ACL return to sport study they will complete testing at UVM.

**Note Well:** Variances will be communicated by the surgeon directly to Rehabilitation Services. ACL reconstruction Return to Sport Test is included at the end of this protocol.

**Monitoring Plan:** Rehab Chart Auditing

**Related Policies:** N/A

**References:** VT ACL Protocol 2<sup>nd</sup> edition; McClure Musculoskeletal Research Center, University of Vermont Department of Orthopedics and Rehabilitation.

**Reviewers:**

**A. Key Stakeholders:**

- Andrew Myrtue - Ortho Medical Director
- Karen Staniels – Director, Ortho, Rehab

**B. Committees:** N/A

**C. Key Process Owner (KPO):** Kristy Cushing - Manager Rehab Services



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*Not part of policy:* **[ADD Key words for policy search if end user didn't know the name]**





## Post-Op ACL Reconstruction Return to Sport Test Instructions

Patient must tolerate all exercises for strengthening, agility, running, sprinting and plyometrics with no demonstration of compensation strategies, reports of pain or instability, or signs/symptoms of inflammation. Patient must have full AROM. Training with these tests can begin at 6 months with goal of testing just prior to 9 month MD follow up.

All testing items on the involved side must be within 90% of the uninvolved to pass the test. Balance must be held for at least 2 seconds without any extra hops.

### 1. **Single Leg Forward Hop:**

Starting at a designated line, the patient will balance on one leg and hop forward as far as possible, landing on the same leg. The patient must maintain their balance. To pass, the involved leg must measure at least 90% of the distance compared to the uninvolved leg.

### 2. **Timed 6-meter Single Leg Hop:**

Starting at a designated line, the patient will balance on one leg and hop as fast as they can consecutively a distance of 6 meters. To pass, the involved leg must hop 6 meters in at least 90% of the time compared to the uninvolved leg. (6 meters = 19.7 feet)

### 3. **Single Leg Lateral Hop**

Starting at a designated line, the patient will balance on one leg and hop laterally as far as possible, landing on the same leg. The patient must maintain their balance. To pass, the involved leg must measure at least 90% of the distance compared to the uninvolved leg.

### 4. **Single Leg Medial Hop**

Starting at a designated line, the patient will balance on one leg and hop medially as far as possible, landing on the same leg. The patient must maintain their balance. To pass, the involved leg must measure at least 90% of the distance compared to the uninvolved leg.

### 5. **90 degree Squat Max (single leg press)**

Perform 10 repetitions of single leg press to 90 degrees. Weight adjusted until patient unable to perform 10 reps due to fatigue or max weight ability. The one Rep Maximum (IRM) Conversion table will be utilized to determine the one rep max. Uninvolved is compared to involved with passing score at or greater than 90%.

### 6. **Hamstring Curl max (single hamstring curl)**

Perform 10 repetitions of single hamstring curl to 90 degrees. Weight adjusted until patient unable to perform 10 reps due to fatigue or max weight ability. The one Rep Maximum (IRM) Conversion table will be utilized to determine the one rep max. Uninvolved is compared to involved with passing score at or greater than 90%.



### **7. Control Tasks**

Patient will perform single leg step down deceleration off 8 in step, 2 footed jump off 8 in step, lateral shuffle and side step cutting. Therapist will note any knee valgus, hip IR or knees over toes instability.



## Post-Op ACL Reconstruction Return to Sport Test Scoring Sheet

Patient Name and DOB: \_\_\_\_\_

Date of Surgery: \_\_\_\_\_

Date of testing: \_\_\_\_\_

Involved limb: RIGHT LEFT

### 1. Single leg forward hop (feet and inches)

	Right	Left	Average Right	Average Left	Passing (90% or greater)
Trial 1					
Trial 2					
Trial 3					

### 2. Timed 6 meter single leg hop (seconds)

	Right	Left	Average Right	Average Left	Passing (90% or greater)
Trial 1					
Trial 2					
Trial 3					

### 3. Single leg lateral hop (feet and inches)

	Right	Left	Average Right	Average Left	Passing (90% or greater)
Trial 1					
Trial 2					
Trial 3					

### 4. Single leg medial hop (feet and inches)

	Right	Left	Average Right	Average Left	Passing (90% or greater)
Trial 1					
Trial 2					
Trial 3					

### 5. 90 degree squat max (converted to one rep max see attached conversion table)

**Right=**                      **Left=**                      Passing 90% or greater: Y\_\_ N\_\_

### 6. Hamstring curl max (converted to one rep max see attached conversion table)

**Right=**                      **Left=**                      Passing 90% or greater: Y\_\_ N\_\_



7. Control Tasks (make note of any valgus, hip IR or knees over toes instability)

- 8in single leg deceleration step down \_\_\_\_\_
- 2 footed landing off 8 in step \_\_\_\_\_
- lateral shuffle \_\_\_\_\_
- side step cutting \_\_\_\_\_

Additional Comments: \_\_\_\_\_

Recommendations/Clinical

Assessment: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_



### 10 Rep Max Conversion table

10 rep max pounds	One Rep Max conversion (IRM)
50	67
55	73
60	80
65	87
70	93
75	100
80	107
85	113
90	120
95	127
100	133
105	140
110	147
115	153
120	160
125	167
130	173
135	180
140	187
145	193
150	200
155	207
160	213
165	220
170	227
175	233
180	240
185	247
190	253
195	260
200	267

For weights beyond this chart please refer to [https://www.nasm.org/docs/default-source/PDF/nasm\\_one\\_repetition\\_max\\_conversion\\_\(irm\)\\_chart-\(pdf-34k\).pdf](https://www.nasm.org/docs/default-source/PDF/nasm_one_repetition_max_conversion_(irm)_chart-(pdf-34k).pdf)