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## **Anterior Cruciate Ligament (ACL) Reconstruction Protocol**

Following surgical reconstruction of the ACL, it is important to follow rehabilitative and post-operative instructions to facilitate recovery and avoid injury to the new graft tissue. Emphasis is placed on early physical therapy and home exercises. Please use the following protocol as a general guideline, as your specific protocol may be altered depending on the extent of damage to structures in the knee and how you respond to the surgery and subsequent rehabilitation.

### **PRE-OPERATIVE INFORMATION**

#### **BEFORE SURGERY:**

In the interval period between injury and surgery, it is very important to consistently make an effort to decrease swelling and progress toward normal knee range of motion. This can be accomplished via cryotherapy (icing) and starting the exercises as described under "Week 1" below. You should limit walking and standing to short intervals, with rest, ice and elevation between. Use crutches and/or brace as discussed during your initial office visit.

#### **IMMOBILIZER/POST-OP BRACE:**

The purpose of the knee immobilizer/brace after surgery is to protect-stabilize the knee and to help maintain full extension for the first few weeks. Until instructed otherwise, it should be worn at **all** times **except** to perform exercises that require flexion (bending) or access to the knee.

#### **CRUTCHES:**

You **MUST** use crutches after surgery and the amount of weight you may place on the operative extremity (weight-bearing) depends upon your particular knee pathology. Typically, you may bear as much weight as is comfortable while wearing the knee immobilizer. If meniscal repair or micro-fracture procedures have been performed, weight bearing **WILL be limited** for 4-6 weeks.

## **PHYSICAL THERAPY:**

Appointments should be made to see the physical therapist 1-2 days after surgery, then 3 times per week until instructed otherwise. At your first visit, the therapist will change the dressing.

## **DEFINITIONS:**

***Extension:*** Moving the knee from a bent position toward straight. To prevent formation of scar tissue in the knee, achieving full extension (knee flat on the bed) is your **top priority** initially after surgery.

***Flexion:*** Bending the knee. You should gradually work to progressively flex the knee through a normal range of motion from full extension to beyond 130 degrees.

***Active Motion:*** Using the muscles to move the knee into flexion and extension.

***Passive Motion:*** The knee is moved into flexion or extension by gravity, or by pushing gently on the knee to extend, or pulling the foot toward you to flex. The muscles are relaxed.

***Terminal Extension Isometrics:*** Also known as “**Quad Sets**” – Repetitively contracting the quadriceps muscle in 5-10 second intervals while the knee is straight.

***Patellar Mobilization:*** With the knee straight, the patella is pushed side to side and up and down to prevent scar tissue from forming.

***Weight Bearing as Tolerated:*** Placing as much weight as is comfortable on the operative extremity while in the immobilizer. This is the **typical weight bearing status after ACL reconstruction.**

\*\*See below if you have been advised of a weight bearing restriction due to your specific condition or procedure.

***Partial Weight Bearing:*** Placing 50% or less of your weight on the operative extremity. As a reference, when you stand normally on both legs, each is bearing 50% of your weight.

***Touch-Down Weight Bearing:*** Also called “Toe Touch” weight bearing. This is the equivalent of allowing the weight of your leg to rest on the ground allowing minimal weight on the affected extremity when walking.

## **WEEK 1**

### **Immobilizer/Post-Op Brace:**

Wear the immobilizer at all times, except while performing your exercises.

### **Ice:**

Ice the knee for 20-30 minutes, 4-6 times daily.

### **Wound Care Instructions:**

Keep the incisions clean and dry for **5 days** after surgery. You may shower if able to keep the knee dry. After 5 days you may gently wash with soap and water, standing carefully on your non-operative leg with using the operative side for balance. Avoid ointments or creams on incisions. Apply Band-Aids over small incisions and gauze or a non-stick-pad over the longer incision. **Loosely** apply ACE wrap to protect incisions from the brace. Do not soak in a tub or Jacuzzi for at least 3 weeks following surgery.

### **Exercises:**

**As a rule these exercises should be done at least 3-4 times a day, doing 3 sets of 10-20 repetitions or more.**

1. Standing bilateral heel raises (up on toes) with the knee straight in your immobilizer.
2. Quad sets (See Definitions)
3. Straight Leg Raise – While lying on your back and each side, with the knee slightly bent, left and hold the operative leg for 5-10 seconds. Do in brace at first, then remove brace as strength and quad control improves.
4. Active-assisted knee extension in a sitting position from 90-45 degrees. You may use the non-operative foot under the operative leg to assist. Do not use weights. *Do not perform resisted knee extension (with weights or bands) as this will place too much stress on the graft tissue.*
5. Active-assisted knee flexion (heel slides) – in a seated position, use your hamstring muscles and a towel around the ankle to gently stretch the knee into flexion from 10 to 90 degrees. Relax the muscles and gently allow the knee to extend and then repeat.
6. Patellar mobilization (See Definitions) – 20 times each direction, 3-4 times per day.
7. Continue passive extension (stretching the knee straight) to 0 degrees out of your brace for 15-20 minutes following each exercise session. You may ice the knee during this time.
8. Ankle pumps and circles to enhance circulation when sedentary between sets of exercises.

### **Medications:**

Continue to use prescribed pain medication only as needed. Do not take anti-inflammatory medication (Aleve, Advil, Ibuprofen). Tylenol may be substituted for your pain medication.

**Physician Visit:** 10-14 days after surgery

## **WEEKS 2-3 (Days 8-21)**

### **Immobilizer:**

Continue to use while ambulating until advised otherwise. If you have achieved full extension of the knee, you may sleep without the brace.

### **Crutches:**

If your procedure did **not** include micro-fracture or meniscal repair, you may discard crutches when it is comfortable walking without them and quadriceps contraction/control is adequate, but **stay in the brace**.

### **Wound/Incisions:**

Sutures will be removed at your first office visit. Steri-strips will be applied, which support the incisions for an additional 5-7 days, then may be removed. Massage scars gently 3-4 times per day after 14 days.

### **Ice:**

Continue to ice for 20-30 minutes after activity, exercise, work, and as needed.

### **Exercises:**

Continue all the previous exercises plus:

1. May add light ankle weights during leg lifts, hamstring curls, and 90° – 45° leg extensions.
2. Hip exercises – Abduction, flexion, extension and adduction exercises while standing.
3. Gentle standing squats, just to 30° or 40° of flexion, **not too deep!** Keep knees behind toes.
4. Step-ups of 6 inches, progressing to 12 inches as tolerated.
5. Begin stationary bike. No toe clips, starting with no resistance and gradually increase time.

### **Therapy:**

Arrange to see the therapist at least once a week to monitor progress and to ensure proper technique.

### **Medication:**

Need for pain medication should be decreasing. Tylenol may be substituted for your pain medication.

### Week 4-6 (Days 22-42)

#### Immobilizer/Brace:

During this timeframe your knee immobilizer may be discarded, if you are demonstrating good quad control. You may receive a post-op ACL Brace, to be worn during any significant activity.

#### Crutches:

If meniscal repair or micro-fracture was performed, at the end of 6 weeks you may gradually discontinue crutches if quadriceps strength is adequate.

#### Wound/Incisions:

Continue scar massage daily.

#### Ice:

Continue to ice after activity (exercise, work, etc.)

#### Exercises:

Continue all the previous exercises with the following changes/additions:

1. You may do leg press machine  $90^{\circ}$  to  $45^{\circ}$  with low weights and high repetitions.
2. Continue passive full extension of the knee out of the brace, and patellar mobilization.
3. Continue restricted, active knee extension from  $90^{\circ}$  to  $45^{\circ}$  only. **Do not actively extend the knee against resistance into the terminal 45 degrees until the end of the 12<sup>th</sup> week.**
4. May begin Elliptical machine, slowly progressing the time.
5. Continue step-ups and knee bends, progressing to unilateral (one legged) partial knee bends/quarter squats.
6. Stationary bike, gradually increasing time and resistance. No toe clips.

#### Medications:

Pain medications should be discontinued by now. Tylenol is fine. Continue to avoid anti-inflammatory medications until 6 weeks after surgery.

#### Physician Visit:

2<sup>nd</sup> follow up should be 5-6 weeks after surgery.

**\*REMINDER: Remember that the actual graft strength is weakest from weeks 6-12, so use caution. Avoid any turning, twisting or jumping activities. (NOTHING FUN!!)**

### **WEEK 6-12 (1 ½-3 months)**

#### **Brace:**

Continue use during work and activities or as directed.

#### **Ice:**

Continue after activity (exercise, work, etc.)

#### **Exercises:**

Continue progressing all of the above exercises and advancing weights slowly but maintaining high repetitions. ***Do not actively extend knee beyond 45° against resistance.***

### **WEEK 12-16 (3-4 months)**

#### **Brace:**

Wear ACL brace when running or during work and activity. Brace is not required for exercises except as indicated. You do not need the brace for activities of daily living if strength is adequate.

#### **Exercises:**

Continue all previous activities, but may go to Full extension with light weight of knee extensions.

1. Increase resistance on bike and elliptical
2. May begin straight-line jogging/running on treadmill (in brace). Work up to 6-8 minutes of continuous running – at ***slow pace.***

**\*\*Absolutely no cutting, jumping, twisting or sprinting! \*\***

### **WEEK 16-20 (4-5 months)**

#### **Brace:**

Continue ACL Brace for running, agility drills and work

#### **Exercises:**

1. Continue progressing with all exercises.
2. Swimming may begin.
3. During this time, the patient may progress running to comfortable pace, and then start early agility skills as below for 1 month (jumping rope, side-to-side, cariocas)
4. Begin sports/cord/T-band resistive leg training.
5. Agility Skills (perform in ACL brace)
  - a. **Lateral Running:** (16 weeks)
    - i. Run sideways 50-60 yards on balls of feet with knees and hips slightly flexed. Begin 8-10 reps progressing to 12-15 reps.

- b. **Jumping Rope:** (16 weeks)
  - i. Jump 3 intervals at a comfortable pace with a 30 second rest between. Start with 3 x 30 second intervals, progress to 3 x 60 second intervals, followed by 3 x 90 second intervals.
- c. **Carioca:** (16 Weeks)
  - i. Run sideways crossing legs alternating in front and behind the lead leg 40-50 yards. Start at  $\frac{1}{2}$  speed, progress to  $\frac{3}{4}$  and eventually full speed, starting with 8 reps and working up to 15

### **WEEK 20-24(5-6 months)**

#### **Brace:**

ACL brace should be worn during all sports activities and work.

#### **Exercises:**

1. A Functional test may be performed to evaluate progress and eligibility to return to sport specific activities. Strength, balance and functional ability should be 90-100% of the uninjured side.
2. May progress agility drills, leg hop, and begin practicing sports specific skills if strength is sufficient (see below)
3. Continue routine muscle strengthening, increasing weights as tolerated.
4. May return to sports related activity/practice in brace, if all above is completed and with physician approval.
5. Agility Drills (perform in ACL brace)
  - a. **Backward Running:** (20 weeks)
    - i. Run at  $\frac{1}{2}$  speed 70-80 yards, progress to  $\frac{3}{4}$  speed and then full speed eventually. Begin 5-8 reps, progressing to 10-15 reps.
  - b. **Figure Eight:** (20 weeks)
    - i. Run a figure 8 pattern 30 yards long at  $\frac{1}{2}$  speed 8-10 times. Progress speed and reps until able to perform 15-20 reps at full speed. Then progress to small figure 8 pattern 15 yards long.

### **AFTER 6 MONTHS**

1. May start full sports participation in brace once cleared by Dr. Lawrence.
2. If planning to participate in sports, a maintenance program should be followed 2-3 times a week for the next 3 months.
3. ACL brace should be worn during sports for at least 12 months after surgery, beyond which is optional.