

ACL Reconstruction Rehabilitation Protocol

One of the most common complications following ACL reconstruction is loss of motion, especially loss of extension.

The risk of developing a stiff knee after surgery can be significantly reduced if the surgery is delayed until the acute inflammatory phase has passed, the swelling has subsided, a normal or near normal range of motion (especially extension) has been obtained, and a normal gait pattern has been re-established.

I-Preoperative Rehabilitation Phase

Goals: *

- Control pain and swelling
- Restore normal range of motion
- Develop muscle strength sufficient for normal gait and ADL
- Mentally prepare the patient for surgery

Before proceeding with surgery the acutely injured knee should be in a quiescent state with little or no swelling, have a full range of motion, and the patient should have a normal or near normal gait pattern.

More important than a predetermined time before performing surgery is the condition of the knee at the time of surgery.

Control Pain and Swelling

Icing along with nonsteroidal anti-inflammatory medications such as Advil, Nuprin, Motrin, Ibuprofen, are used to help control pain and swelling.

The nonsteroidal anti-inflammatory medications are continued for 7 - 10 days following the acute injury.

Restore normal range of motion

You should attempt to achieve full range of motion as quickly as possible. Quadriceps isometrics exercises, straight leg raises, and range of motion exercises should be started immediately.

Full extension is obtained by doing the following exercises:

1) Passive knee extension.

- Sit in a chair and place your heel on the edge of a stool or chair.
- Relax the thigh muscles.
- Let the knee sag under its own weight until maximum extension is achieved.

2) Heel Props:

- Place the heel on a rolled towel making sure the heel is propped high enough to lift the thigh off the table.
- Allow the leg to relax into extension.
- 3 - 4 times a day for 10 - 15 minutes at a time.

3) Prone hang exercise.

- Lie face down on a table with the legs hanging off the edge of the table.
- Allow the legs to sag into full extension.

Bending (Flexion) is obtained by doing the following exercises:

1) Passive knee bend

- Sit on the edge of a table and let the knee bend under the influence of gravity.

2) Wall slides are used to further increase bending.

- Lie on the back with the involved foot on the wall and allow the foot to slide down the wall by bending the knee. Use other leg to apply pressure downward.

3) Heel slides are used to gain final degrees of flexion.

- Pull the heel toward the buttocks, flexing the knee. Hold for 5 seconds.
- Straighten the leg by sliding the heel downward and hold for 5 seconds.
- In later stages of rehabilitation, do heel slides by grasping the leg with both hands and pulling the heel toward the buttocks.

Develop muscle strength

Once 100 degrees of flexion (bending) has been achieved you may begin to work on muscular strength:

- 1) Stationary Bicycle. Use a stationary bicycle two times a day for 10 - 20 minutes to help increase muscular strength, endurance, and maintain range of motion.
- 2) Swimming is also another exercise that can be done during this phase to develop muscle strength and maintain your range of motion.
- 3) Low impact exercise machines such as an elliptical cross-trainer, leg press machine, leg curl machine, and treadmill can also be used.

This program should continue until you have achieved a full range of motion and good muscular control of the leg (you should be able to walk without a limp).

Mentally prepare

- Understand what to realistically expect of the surgery
- Make arrangements with a physical therapist for post-operative rehabilitation
- Make arrangements with your work

clear travel, flight or holiday abroad for at least 6 weeks.

- Make arrangements with family and/or friends to help during the post-operative rehabilitation
- Read and understand the rehabilitation phases after surgery

Understanding Surgery

This section provides an understanding of the pre and post-operative phases of surgery.

Key terms: Pain control, Drainage tube, Knee Immobilizer, TED

Stocking

II- Post-operative Rehabilitation Phase

Prior to leaving the operating room a knee immobilizer and an ice machine will be applied to

your knee.

- The postoperative knee brace helps to maintain extension and is to be worn at all times while walking and during sleeping. Otherwise it can be removed.
- After surgery, your leg will be wrapped in soft cotton bandage. You can slide the bandage down to change the dressings as needed.

After the anesthesia has worn off, your vital signs are stable and your pain is under control you will be discharged from the hospital or surgical center.

You will not be allowed to drive a car. Therefore prior to your discharge, you must arrange for transportation.

Postoperative week 1-2:

Goals:

- Control pain and swelling
- Care for the knee and dressing
- Early range of motion exercises
- Achieve and maintain full passive extension
- Prevent shutdown of the quadriceps muscles
- Gait training

Control Pain and Swelling

1) Control Swelling. Following discharge from the hospital you should go home elevate your leg and keep the knee iced. You may get up to use

the bathroom and eat, but otherwise you should rest with your leg elevated.

2) Do not sit for long periods of time with your foot in a dependent position (lower than the rest of your body), as this will cause increased swelling in your knee and leg. When sitting for any significant period of time, elevate your leg and foot.

- 3) Control Pain. You will be sent home with a prescription for pain control
- 4) As your pain and swelling decrease you can start to move around more and spend more time up on your crutches.

Caring for your knee

1) The first night and day after the surgery you can expect the white elastic stocking and bandages to get bloody. This is normal! We want the blood to drain out of the knee on to the dressings rather than build-up in your knee and cause swelling and pain.

If the dressings become extremely bloody or wet you should contact the hospital to reinforce the dressing as needed.

you could add extra bandage to cover the bleeding area but do not expose the wound otherwise will bleed more.

2) you could limit weight bearing to prevent swelling.

3) You can start using a stationary bike. Cycling is an excellent conditioning and building exercise for the quadriceps. Start with the seat fairly high and use a short diameter pedal if available so that the knee doesn't bend too much.

At this early stage, you should just "spin" without any resistance. Use your good leg to turn the pedal.

4) You may shower, but you must keep your incisions dry for the first 7-10 days. This can be achieved by placing a waterproof dressing or plastic bag over your leg.

5) A follow-up visit should be scheduled 2 weeks following the operation at the time of discharge from the ward.

7) You may remove the knee brace while doing exercises or if you are in a safe, protected environment.

Early Range of Motion and Extension

1) Passive extension of the knee by using a rolled towel.

2) Active-assisted extension is performed by using the opposite leg and your quadriceps muscles to straighten the knee from the 90 degree position to 0 degrees.

Hyperextension should be avoided during this exercise.

3) Passive flexion (bending) of the knee to 90 degrees.

- Sit on the edge of a bed or table and letting gravity gently bend the knee.
- The opposite leg is used to support and control the amount of bending.
- This exercise should be performed 4 to 6 times a day for 10 minutes. It is important to achieve at least 90 degrees of passive flexion by 5 - 7 days after surgery.

Exercising Quadriceps

1) You should start quadriceps isometric contractions with the knee in the fully extended position as soon as possible.

- Do 3 sets of 10 repetitions 3 times a day.
- Each contraction should be held for a count of 6 sec.

This exercise helps to prevent shut down of the quadriceps muscle and decreases swelling by squeezing fluid out of the knee joint.

2) Begin straight leg raises (SLR) with the knee immobilizer on 8 sets of 10 repetitions 3 times a day. Start by doing these exercises while lying down.

- This exercise is performed by first performing a quadriceps contraction with the leg in full extension. The quadriceps contraction "locks" the knee and prevents excessive stress from being applied to the healing ACL graft.
- The leg is then kept straight and lifted to about 45-60 degrees and held for a count of six.
- The leg is then slowly lowered back on the bed. Relax the muscles.

This exercise can be performed out of the brace when the leg can be held straight without sagging (quad lag). Once you have gained strength, straight leg exercises can be performed while seated.

Exercising Hamstrings

1) For patients who have had ACL reconstruction using the hamstring tendons it is

important to avoid excessive stretching of the hamstring muscles during the first 6 weeks after surgery.

- The hamstring muscles need about 6 weeks to heal, and excessive hamstring stretching during this period can result in a "pulled" hamstring muscle and increased pain.
- Unintentional hamstring stretching commonly occurs when attempting to lean forward and put on your socks and shoes, or when leaning forward to pick an object off the floor.
- To avoid re-injuring the hamstring muscles, bend your knee during the activities below, thus relaxing the hamstring muscles.

2) The hamstring muscles are exercised by pulling your heel back producing a hamstring contraction. See Figure 4

- This exercise should be performed only if your own patellar tendon graft was used to reconstruct the ACL.
- If a hamstring tendon graft from your knee was used to reconstruct the ACL, this exercise should be avoided for the first 4 - 6 weeks, as previously mentioned.

Returning to Work

1) As far as returning to work, if you have a desk type job you can return to work when your pain medication requirements decrease, and you can safely walk with your crutches. Typically this is around 2 weeks days after surgery.

2) Patients who have jobs where light duty is not permitted; policemen, firemen, construction workers, laborers, will be out of work for a minimum of 6 - 12 weeks.

Postoperative Week 3

Goals:

- Maintain full extension

- Achieve 100 – 120 degrees of flexion
- Develop enough muscular control to wean off knee immobilizer
- Control swelling in the knee

Maintain Full Extension

1) Continue with full passive extension (straightening), gravity assisted and active flexion,

active-assisted extension, quadriceps isometrics, and straight leg raises.

2) Work toward 90-100 degrees of flexion (bending)

Develop Muscular Control

1) Start Partial Squats.

- Place feet at shoulder width in a slightly externally rotated position.
- Use a table for stability, and gently lower the buttocks backward and downward.
- Hold for 6 seconds and repeat.
- Do 3 sets of 10 repetitions each day.

2) Start Toe Raises.

- Using a table for stabilization, gently raise the heel off the floor and balance on the ball of the feet.
- Hold for 6 seconds and ease slowly back down.
- Do 3 sets of 10 repetitions each day.

3) Continue to use the knee brace for walking even if you have good muscle control of the leg. This will protect your graft.

4) You can continue using a stationary bike. Cycling is an excellent conditioning and building exercise for the quadriceps.

- The seat position is set so when the pedal is at the bottom, the ball of the foot is in contact with the pedal and there is a slight bend at the knee.
- No or low resistance used. Maintain good posture throughout the exercise.
- As your ability to pedal the bike with the operative leg improves, you may start

to increase the resistance (around 5-6 weeks).

- Your objective is to slowly increase the time spent on the bike starting first at 5 minutes and eventually working up to 20 minutes a session.
- The resistance of the bike should be increased such that by the time you complete your work-out your muscles should "burn".

OPERATE A MOTOR VEHICLE!

- First, you must not be taking any prescription pain medications.
- Patients who have had surgery on the left knee, and who have an automatic transmission may drive when they can comfortably get the leg in and out of the car, usually 2 weeks.
- Patients who have had surgery on the left knee and have standard transmissions, should not drive until they have good muscular control of the leg. This usually takes 3-4 weeks.
- Patients who had surgery on the right knee should not drive until they have good muscular control of the leg. This usually takes 4-6 weeks.

Postoperative Weeks 4 - 6

Goals:

- 125 degrees of flexion pushing toward full flexion
 - Continued strength building
- 1) Your expected range of motion should be full extension to 125 degrees. Start to push for full flexion. Walls slides added if your flexion range of motion is less than desired.
 - 2) Continue quad sets, straight leg raises, partial squats, toe raises, stationary bike, elliptical machine, leg presses, and leg curls.
 - 3) Tilt board or balance board exercises. This helps with your balance and proprioception (ability to sense your joint in space)

Postoperative Weeks 6 – 12

Goals:

- 135 degree of flexion
- Continued strength
- Introduce treadmill

1) Continue quad sets, straight leg raises, partial squats, toe raises, stationary bike, elliptical machine, leg presses, and leg curls.

2) Hamstring reconstruction patients can start leg curls in a sitting position. If you develop

hamstring pain then decrease the amount of weight that you are lifting, otherwise you can increase the weight as tolerated.

3) Continue tilt board and balance board for balance training.

4) Continue swimming program.

5) Start treadmill (flat only).

6) You may begin outdoor bike riding on flat roads.

Postoperative 3-6 months:

Goals:

- Continued strength
- Introduce jogging and light running
- Introduce agility drills
- Determine need for ACL functional brace

1) Continue all of week 6 -12 strengthening exercises.

2) Start straight, forward and straight, backward jogging and light running program.

3) Start functional running program after jogging program is completed.

4) Optional fitting for ACL functional brace.

5) Start agility drills, zig-zags and cross over drills.

Postoperative -6 months

Goals: * Return to sports

To return to sports you should have:

- Quadriceps strength at least 80% of the normal leg
- Hamstring strength at least 80% of the normal leg
- Full motion
- No swelling
- Good stability
- Ability to complete a running program