



**Orthopaedic Institute of Ohio**  
801 Medical Drive, Suite A, Lima, Ohio 45804  
**Jason W. Levine, MD**

Post-Operative Rehabilitation Protocol  
ACL Reconstruction via Hamstring Tendon Autograft

**REHAB RED FLAGS – IF ANY OF THESE PROBLEMS OCCUR CALL DR. LEVINE’S OFFICE IMMEDIATELY**

- \*Calf Tenderness
- \*Fever
- \*Gross Swelling
- \*Unable to achieve 0 degrees passive extension with ease at post-op week 2
- \*flexion less than 110-120 degrees at post-op week 3

**KNEE FLEXION ROM GOALS**

- Post op week 1    90 degrees
- Post op week 3    110-120 degrees
- Post op week 4-6   Full

**Phase 1: Protective Phase**

**Goals:**

1. Prevent wound infection
2. Minimize post-op swelling
3. Achieve 0 degrees passive extension- NOT HYPEREXTENSION!
4. Achieve good quadriceps isolation (good quad set in extension)
5. Initiate knee flexion range of motion
6. Independent gait with crutches and knee immobilizer

**Day of Surgery**

1. Immobilization in extension, elevation on wedge, compressive dressing, ice
2. Ankle pumps 25 times per waking hour
3. Educate no pillow under the bend of the knee
4. Do not allow elevation of the foot of the bed by the controls on the bed (puts the knee in flexion)

**Post-op Day 1 to 7**

1. Initial dressing change, wound inspection, instruct home dressing changes
2. Continue ankle pumps
3. Quad sets (if poor quad or VMO recruitment, try putting the knee in slight flexion over a pillow and if necessary electrical stimulation for muscle re-education- teaches the idea that when the quad contracts the patella slides up and when the quad relaxes the patella slides back down)



4. Active knee flexion ROM via sitting heel slides (teach to keep the quad relaxed, to stay down on the hip and to slide the heel back using the hamstring muscles; have the patient first try it on the contralateral leg)
5. Hamstring stretching
6. Teach leg control for transfers (ie tightening the quad while the leg is being moved with assistance)
7. Gait NWB with assistive device
8. Ice with elevation and compression in extension
9. Issue home program

#### Post-op Week 1 to 2

1. Ankle pumps
2. Quad sets
3. Standing straight leg raises
4. Active knee flexion ROM in sitting
5. Hamstring stretching
6. Heel cord stretching
7. Assess patella mobility; teach patella mobilizations if appropriate; have patient perform self-mobilizations before quad sets
8. Issue modified home exercise program as appropriate. Do not issue leg raises for home program if no family member for assistance. Recommend educating a family member on proper technique of each exercise.

#### **Phase 2: Controlled Stability Phase**

##### **Goals:**

1. Continue to minimize swelling
2. Supine SLR with no extensor lag
3. Achieve full flexion ROM
4. Independent gait with good mechanics without assistive device
5. Begin to achieve single leg stability

#### **Post-op Week 2-8**

Before the start of every therapy session evaluate for swelling. If increased from previous session start with ice and elevation and compression. Modify exercise program including home program. Emphasize ice, elevation and compression. If mild swelling, perform only quad sets, SLR's, side-lying hip abduction, knee flexion ROM,



hamstring stretching and heel cord stretching. If moderate swelling, Perform quad sets, gentle knee flexion ROM, hamstring stretching and heel cord stretching. If significant swelling with no history of trauma perform only quad sets and hamstring and heel cord stretching and have patient go back on crutches.

Continue to begin and end rehabilitation program with the knee in extension.

1. If good wound healing at post-op week 3 instruct scar massage 2 minutes three times per day.
2. Progress weightbearing to weightbearing as tolerated by Week 2 and off crutches by week 4. Work on proper gait mechanics. Evaluate gait mechanics every session. May wean off crutches at Week 6 if consistent good mechanics.
3. Continue active knee flexion ROM. Can add assistance if necessary but do not be too aggressive. When maxed out in sitting progress to supine heel slide. Continue hamstring stretching and heel cord stretching. If 0 degrees passive extension (not hyperextension) is not achieved with ease, have patient start using a towel under heel 10 minutes three times per day at home while lying supine.
4. Open kinetic chain strengthening
  - Quad sets- assess quality of contraction every session
  - Straight leg raise progression- at 4 weeks post-op seated to supine-assess Extensor lag every session
  - Side-lying hip abduction- begin when performing straight leg raises in supine
  - Sitting hip flexion
  - Standing hamstring curls 0 at 6 weeks post-op

Do not add weight until 6-8 weeks post-op and for supine leg raises only if no extensor lag!

If having problems eliminating extensor lag with a supine straight leg raise, try a mini heel lift- no more than a two inch towel roll under the knee.

5. Closed kinetic chain strengthening
  - Can begin at post-op week 5 and if supine SLR with <5 degree extensor lag and no swelling. Add one exercise at a time. Re-evaluate next exercise session. If swelling present discontinue exercise until resolved. If unable to determine which exercise is contributing to the swelling, discontinue all closed chain activities. Consider going back on crutches. Emphasize elevation, ice, compression.
  - Standing bilateral heel raises
  - ¼ bilateral wall slides



stationary bike- at 6 weeks post-op keep seat high- ie only 10-15 degrees knee flexion at down pedal  
stair stepper (4 inch step max)  
walking program when off crutches (start forward, add backward and sidestepping; progress to incline on treadmill forward and backward)

**6. Balance/Proprioception**

Begin at 5 weeks if good quad set and at least a seated straight leg raise with less than 5 degree extensor lag

Start with weight shifts with support, make sure patient is contracting quad.

Progress to no support. If no problems progress to single leg stance.

Progression:

Eyes open level surface

Eyes open uneven surface (standing on a pillow)

Eyes closed level surface

Eyes closed uneven surface

7. Continue ice, elevation and compression after exercises.

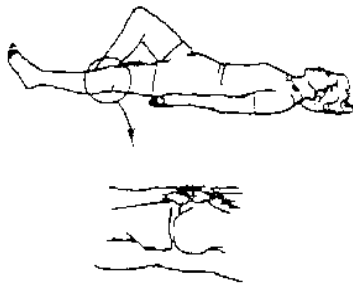
8. Continue to issue modified home exercise program as appropriate

**Phase 3: Functional Strengthening:** Criteria for progressing to Phase 3:

1. Satisfactory clinical examination per MD
2. Full active flexion ROM and 0 degrees passive extension
3. No extensor lag with supine SLR
4. Unassisted ambulation with proper mechanics

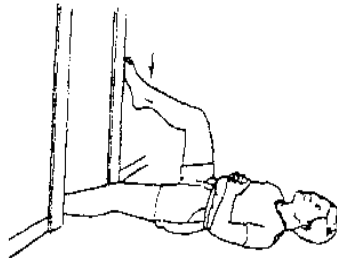
**Goals:**

1. Increase strength
2. Improve proprioception
3. Improve cardiovascular and muscular endurance
4. Achieve good single leg stability



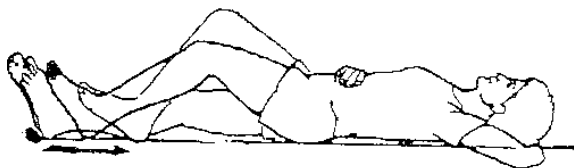
Exercise 1 of 6  
Quad Sets/Extension

1. Sit or lie on your back with operated leg straight
2. Press the back of your operated knee downward
3. This will tighten the muscle on top of your thigh and move your kneecap as shown
4. Hold 5 seconds
5. 50 Repetitions, 3 times a day



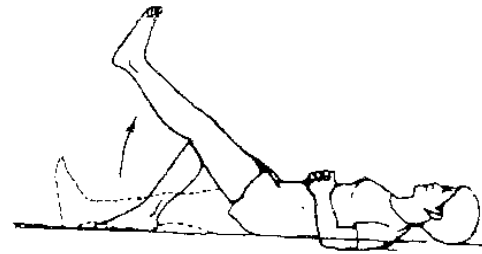
Exercise 3 of 6  
Knee Flexion

1. Lie on floor as shown with toes lightly touching wall
2. Let the weight of gravity bend your knee, as you let your toes slide down the wall
3. Hold 3 seconds
4. 30 repetitions, 2 times per day



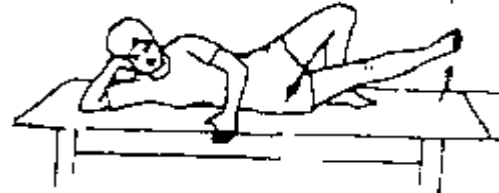
Exercise 5 of 8  
Hamstring/Flexion

1. Lie flat on back
2. Slide heel toward your buttocks, bending the knee
3. Hold 3 seconds and slowly lower
4. 30 repetitions, 2 times per day



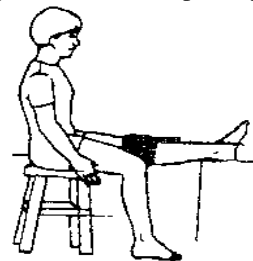
Exercise 2 of 6  
Straight Leg Raise

1. Lie on back with operated knee straight and the other knee bent as shown
2. Keep the leg completely straight, then raise it to match the height of the bent knee
3. Hold 3 seconds and slowly lower
4. 30 repetitions, 2 times per day



Exercise 4 of 8  
Hip Adduction

1. Lie on side as shown, with operated leg on the bottom
2. Raise leg up toward ceiling
3. Hold 3 seconds, slowly relax
4. 30 repetitions, 2 times per day



Exercise 6 of 6  
Knee Extension

Lying or sitting: Place foot on a rail or table. Make sure there is nothing supporting the leg under the thigh or calf. Point toes toward the ceiling; do not let your foot roll to the side. Perform 5-10 min **EVERY WAKING HOUR**. May use a weight on top of the leg to increase the amount of extension.