

ACL Reconstruction: Patellar Tendon Graft/Hamstring Tendon Graft

Patellar Tendon Graft/Hamstring Tendon Graft

General Information:

The intent of these guidelines is to provide the therapist with direction for the postoperative rehabilitation course of a patient that has undergone an ACL reconstruction. It is not intended to be a substitute for appropriate clinical decision-making regarding the progression of a patient's post-operative course. The actual post surgical physical therapy management must be based on the surgical approach, physical exam/findings, individual progress, and/or the presence of post-operative complications. If a therapist requires assistance in the progression of a post-operative patient they should consult with the orthopedic surgeon.

The following are exclusionary criteria for this protocol:

- Concomitant meniscal repair
- Concomitant ligament reconstruction
- Concomitant patellofemoral realignment procedure or high tibial osteotomy
- ACL revision reconstruction
- MRI evidence of severe bone bruising or articular cartilage damage noted

The protocol is divided into several phases according to postoperative weeks and each phase has anticipated goals for the individual patient to reach. The overall goals of the reconstruction and the rehabilitation are to:

- Control joint pain, swelling, hemarthrosis
- Regain normal knee range of motion
- Regain a normal gait pattern and neuromuscular stability for ambulation
- Regain normal lower extremity strength
- Regain normal proprioception, balance, and coordination for daily activities
- Achieve the level of function based on the orthopedic and patient goals

The present protocol for accelerated ACL rehabilitation emphasizes early extension, unrestricted weight bearing and a more expedient return to athletic activity. The more traditional protocols limited weight bearing and did not allow for full extension. Research suggests that early weight bearing with a return of terminal extension results in a return to previous level of activity much quicker than traditional protocols. Ligamentous stability does not appear to be compromised by this aggressive return to activity.

Three factors are important:

- 1) early terminal knee extension equal to the contralateral side,
- 2) early weight bearing
- 3) closed and open kinetic chain strengthening exercises.

Early knee extension establishes the foundation for the entire rehabilitation program. The incidence of knee flexion contracture with associated quadriceps weakness and extensor mechanism dysfunction following ACL reconstruction has significantly decreased with accelerated knee extension immediately after surgery. Quadriceps strength is enhanced with early extension and weight bearing. The combination of early knee extension, early weight bearing, and closed kinetic quadriceps strengthening allows the patient to progress through the post-operative rehabilitation period at a rather rapid pace without compromising ligamentous stability.

Note: Specific Hamstring Graft guidelines are indicated throughout the guideline information.

Rehabilitation following ACL reconstruction consists of four distinct phases. It is possible to overlap phases depending on the individual progress of the patient.

Phase 1: Pre-operative

With this protocol, patients presenting with an ACL deficient knee must be seen in physical therapy prior to ACL reconstruction. The area of focus with the pre-operative visits includes preparing the knee for surgery and mental preparation of the patient to deal with surgery and the post-operative rehabilitation course. Patients with acute ACL tears will be placed on appropriate rehabilitation to decrease swelling and restore range of motion and strength to near normal levels. Appropriate patient education of the surgical technique and post-operative rehabilitation will assist in mental preparation of the patient.

Clinical Goals

- Restore full ROM and normal strength prior to ACL reconstruction
- Control swelling prior to ACL reconstruction
- Regain normal heel-to-toe gait pattern
- Ensure complete understanding of the basic principles of accelerated rehabilitation including
 - 1) Full terminal knee extension
 - 2) Early weight bearing
 - 3) Closed and open chain strengthening

Exercises

- Prone hangs
- Patellar mobilization
- Heel slides
- Quad sets
- Straight leg raises (**not for Dr. Kim clients**)
- Closed kinetic chain strengthening including:
 - Leg press
 - ¼ squats
 - Step downs
 - Bike

Phase 2a: 1 to 6 Days

Clinical Goals

- Full passive knee extension and 110° flexion
- Independent straight leg raise
- Weight bearing as tolerated

Testing

- Bilateral ROM

Note: patient may be non-weight bearing if they have had:

Microfracture.

PCL repair.

Collateral repair.

High tibial osteotomy

Bracing

Clients will be fitted with a post-operative brace with adjustable hinges for use during approximately the first 2 weeks post-operative. The brace is to be locked in full extension for night, and can be opened up for 0-90 degrees motion for the day (Note: Dr. Ernst prefers to lock the brace out for the entire first week post-op). The brace is to be removed for exercises and icing/cold therapy.

Exercises

- A cryotherapy device is placed on the patient's knee as directed post-operatively. This provides compression and cold to minimize pain and swelling.
- Extension range of motion exercises hourly during the day:
 - The knee is allowed to fully extend to terminal extension for ten minutes during each exercise bout.
 - Elevate the heel on pillows at the foot of the bed. Full extension allows the newly reconstructed ligament to fit perfectly into the intercondylar notch. Restricting full extension will allow the notch to fill with scar and become a block to extension.
- Knee flexion
 - Continue to increase bend beyond 110° by pulling leg further to buttocks
- Leg control
 - Active quadriceps contraction with quad sets
 - Straight leg raises (**not for Dr. Kim clients**)
- During the first week the patient is to remain lying down as much as possible. However when getting up to go to the bathroom the patient is encouraged to be full weight bearing as tolerated with the crutches

Clinical Follow-up

- Patient will report to physical therapy one week after surgery and should have:
 - Full terminal extension and flexion to 110°
 - Minimal swelling and soft tissue healing

Phase 2b: 7 to 14 Days

Clinical Goals

- Full terminal extension and flexion to 110°
- Minimal swelling and soft tissue healing
- Normal gait without assistive devices
- Demonstrate ability to lock knee with weight shifted to ACL leg

Testing

- Bilateral ROM

Exercises

- Regaining full extension range of motion is the most critical factor in this phase. Early terminal extension has been demonstrated through many clinical research studies to be the key to a successful result. The patient is encouraged to push extension by performing the following exercises:

Towel extensions

Prone hangs

Wall slides

Heel slides

- The patient is encouraged to progress from partial to full weight bearing without crutches. It is very important to emphasize leg control early in the rehabilitation program. Through early extension and normal gait the patient is able to regain good quadriceps tone and leg control. This combination of clinical variables will set the pace for the entire rehabilitation program and a successful outcome.

Weight shifts (side/side, fwd/bkwd)

Single leg balance

Plyotoss

- Once the patient has regained full knee extension and is ambulating normally it will be possible to implement strengthening exercises. Closed and open kinetic strengthening will be used. It is felt that this type of exercise facilitates return of lower extremity strength with minimal stress to the joint.:

Bilateral doorway partial squats

Calf raises
General leg exercises, hip Add/Abd, and glutes.
Gait re-education – wean off splint and crutches.

Hamstring Graft – gentle hamstring stretches initiated at first visit

Check all exercises are performed with knee positioned over centre of foot including cycling.

Clinical Follow-up

- The patient will return 2 weeks following surgery
- The patient should have full terminal extension and full flexion to 130°

Phase III - 2 to 4 weeks

Clinical Goals

- Full terminal extension and full flexion to 130°
- Consistent weight room and moderate speed strengthening
- Early return to agility and sport specific drills

Testing

- Bilateral ROM

Exercises

- If the patient does not have full passive terminal extension or full flexion:
 - Extension exercises will be given to the patient for frequent home use in addition to routine clinic visits to restore full extension.
 - Heel slides are the most effective means of regaining terminal flexion.
- Weight room activities (once the patient has sufficient leg control to perform a unilateral knee bend without difficulty):
 - ¼ squats
 - Unilateral leg press
 - Unilateral calf raises
 - StairMaster continued at greater intensity levels.
 - Unilateral step-downs
 - Unilateral leg extensions
 - Bicycling workouts are started. Once the patient has gained 110° flexion they can use the bike for moderate speed strengthening workouts.
 - Swimming and other hydrotherapy exercises can be started once the incisions have healed.

Hamstring Graft - Hamstring stretches, prone SLR, cycle without toe clips. Open non-resisted hamstring curls at 2-3 weeks depending on comfort. If hamstring becomes aggravated treat as muscle tear i.e. stretches, frictions, electrotherapy.

Clinical Follow-up

- After Phase III, the patient will return to physical therapy every 3-4 weeks until 6 months, then again at 9, 12, and 24 months following surgery.
- At the 4-week follow-up visit the patient will work on:
 - Full terminal extension and full flexion to 135°
 - Improved quadriceps tone
 - 70% strength

Phase IV - 4 weeks on

Clinical Goals

- Full ROM including terminal extension
- Quadriceps tone continues to improve with noticeable quadriceps definition returning by this time.

- Return to full activity
- At least 70% strength
- Proprioceptive/agility specific program
- Complete a sport specific functional progression

Testing

- The first isokinetic evaluation can be performed 4 weeks following surgery, at 180°/sec
- An isometric leg press test is done at this time as well.
- Bilateral ROM
- Subjective questionnaire
- Beginning with the 2-month follow-up visit: Single leg hop — patient is instructed to perform a single leg hop for distance with take off and landing on the same leg. A side-to-side percentage is calculated for comparison.

Exercises

- Full squat (<90°) as tolerated
- Unilateral leg press
- Unilateral leg extensions
- Straight leg dead lift
- Stool crawl
- Forward & Lateral Lunges
- Unilateral step-downs
- Unilateral calf raises
- Wobble board & ½ foam roller
- StairMaster
- Bicycle

Hamstring Graft - Resisted hamstring curls commenced around 6 – 8 weeks if comfortable.

Agility & Functional Training

- Factors influencing the patient's return to controlled agility training and sport specific activity include patient subjective rating, as well as strength & functional test results.
- Agility training and limited sports participation not only help the patient to regain fast speed strength but also help to restore confidence in getting back to aggressive athletic activities as tolerated in the program.

6 weeks +

Include progressions including single leg, BOSU, wobble board

10 – 12 Weeks

Return to run progression on treadmill. Only walk/jog or run on alternate days

12 – 16 Weeks

Return to solo sports skills when have good strength, control and proprioception.

Running progressions, backward running

180° jump on floor / tramp / mat.

16 – 24 Weeks

Return to training for specific sport including:

Figure of 8 running

Jump Rope

Lateral slides

Shuttles.

Hopping.

Vertical jumps.

6 – 9 Months

Earliest return to contact sport.

Clinical Follow-up

- From this point forward the patient will return to physical therapy every 3-4 weeks until 6 months, then again at 9, 12, and 24 months following surgery. More frequent visits may be necessary pending individual circumstances and progression.

Advanced weight training and sports specific drills are advised to maintain a higher level of sport participation & competition.

Updated: 10/09/08

Guidelines adapted from ACL Reconstruction Rehab – Methodist Sports Medicine Center, Indianapolis, IN; Cincinnati Sports Medicine & Orthopedic Center, Cincinnati, OH; Orthopedic Specialists of Austin, Austin, TX; Missouri Sports Medicine, Rehabilitation Program, University of Missouri-Columbia