



Rehabilitation Guidelines for Bone-Tendon-Bone Autograft ACL Reconstruction

The intent of this protocol is to provide the clinician with a guideline to establish and progress a patient through post operative rehabilitation. It is not intended to be a substitute for one's clinical decision making. The plan of care should be based upon the patient's clinical exam and individual goals.

*Prior to initiation of interventions check with surgeon/operative report regarding progression. Need to take into consideration multiple variables including:

- 1) Graft used (patellar bone-tendon-bone, hamstring, Achilles)
- 2) Concomitant procedures (chondral picking, meniscus repair)
- 3) Concomitant injuries (MCL sprain, bone contusion)
- 4) Patient characteristics
- 5) Surgeon specific philosophy/preferences.

Based upon these variables, variations of progressions and patient outcomes may exist - however the following is a basic guideline that can be used for reference.

- ❖ Notify the surgeon ***immediately*** of any concerns for DVT, infection, edema, loss of motion, or quadriceps inhibition.

- ❖ In order to progress across the phases of rehabilitation, the patient must meet ***BOTH*** the time requirement and the criterion requirement.

- ❖ **Pre-Op:**
 - Evaluation of baseline measurements (ROM, Strength, girth)
 - Measure for and fit for surgical brace (functional brace measurements if needed)
 - Dispense Iceman with proper instruction (if indicated)
 - Perform crutch training and issue crutches
 - Evaluation should be scheduled for 2- 3 days after surgery.
 - Post-op instructions and education from surgery date to hospital discharge
 - Weight bearing: WBAT with crutches and brace locked in full extension
 - Ice for swelling/ effusion while leg is elevated 20 minutes per hour

- ❖ **Phase I: 0-6 weeks:**
 - Goals:
 - Maintain integrity of repair
 - Decrease pain and edema
 - Promote tissue healing
 - Progressively increase passive range of motion in a staged pattern
 - Prevent muscle inhibition of the quadriceps
 - Patient education of precautions and progressions
 - Precautions:



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- Monitor edema – edema results in pain, loss of motion, and quadriceps inhibition.
- Monitor for DVT and infection
- Avoid open chain knee extension

- 0-2 weeks
 - PROM 0°-100°
 - Must achieve 0° extension
 - Re-Ed to quadriceps to prevent inhibition
 - Brace locked at 0° and WBAT
 - Beginning with week 2, patient may ambulate with a functional gait pattern without the brace while in the clinic.

- 2-4 weeks
 - PROM 0°-120° with staged ROM achieving 120° by the end of week 4
 - Brace locked at 0° and WBAT

- 4-6 weeks
 - Continue with strength, ROM, and endurance
 - Progress PROM to equal of unaffected side
 - Unlock brace when quadriceps strength permits

- ❖ **Phase II: 6-14 weeks:**
 - Criteria to progress to Phase II
 - Appropriate healing by adhering to precautions in phase I
 - ROM goals achieved
 - Strength of 4+/5 of the lower extremity excluding knee extension
 - Minimal pain and edema
 - Goals for Phase II
 - Normalize AROM
 - Continue to increase strength and endurance
 - Enhance dynamic stability through neuromuscular control

 - 6-12 weeks
 - Continue with strength and endurance
 - Initiate perturbation training on unstable surface progressing from air disc to BOSU with feet in neutral stance to offset stance bilaterally.

 - 12-14 weeks
 - Initiate low intensity SportMetrics
 - Ankle Bounces
 - Fast Steps
 - Initiate functional activities
 - Continue to monitor for improper compensations



❖ **Phase III: 14-24 weeks:**

- Criteria to progress to Phase III
 - Appropriate healing and strength by adhering to precautions in Phase II
 - No pain with AROM and strengthening activities
 - Full AROM
 - 5/5 strength of the lower extremity excluding knee extension
- Goals
 - Enhance dynamic stability
 - Gradual restoration of strength, power, and endurance
 - Advance neuromuscular control
 - Return to full ADLs/work
- **14-16 weeks**
 - If strength is 70% or greater and with PHYSICIANS's OK
 - Start: forward and back running, standing bike, jump rope, leg extension isotonic with a block of last 30° of extension
- **16+ Weeks**
 - Multiplane activities and sport specific movements
 - Start: figure of 8, lateral shuffles, caiacas, sports drills, hops, jumps, cut/ pivots
 - Do above with brace (if has a brace), no sudden starts and stops until physician gives approval
- **Week 20**
 - HEP as above
 - Run up stairs, walk down, advanced cutting drills, jog to run (50-75% sprint speed)

❖ **Phase IV: 24+Weeks:**

- **Discharge**
 - 80-90% strength
 - No pain with ADL's
 - Able to perform without deficiencies
- **Return to competitive sport with doctors OK and the following:**
 - 85% strength quad isokinetically
 - H/S/quad ratio 70- 80%
 - Functional progression of the following:
 - Fast starts and stops
 - Run up and down stairs
 - Single leg hop
 - Successful sport specific drills



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- Discuss brace options with doctor
- Goal 32- 52 weeks 85% to 100% strength



Rehabilitation Guidelines for Bone-Tendon-Bone Autograft ACL Reconstruction With Meniscal Repair

- ❖ Autograft ACL reconstruction with **MENISCUS REPAIR** – avoid compression and shear – **must** communicate with the surgeon for specifics.

- ❖ **Phase I: 0-6 weeks**
 - Goals:
 - Maintain integrity of repair
 - Decrease pain and edema
 - Promote tissue healing
 - Prevent muscle inhibition of the quadriceps
 - Patient education of precautions
 - Precautions:
 - Monitor edema – edema results in pain, loss of motion, and quadriceps inhibition.
 - Monitor for DVT and infection

 - 0-6 weeks
 - Protected weight bearing – must communicate with the physician to determine weight bearing status and location of the meniscus repair.
 - AROM/PROM 0°- 90° to protect meniscus repair.
 - May progress to 120° at week 4 with physician approval.
 - Strength of the lower extremity: clam shells, prone hip flexion with knee flexion, side lying abduction, thera-band hip abduction,
 - 6+ weeks
 - Resume protocol at Phase II as above allowing for a 4 week transition phase to full weight bearing and ROM.

References:

Wilk K.E., Marcina L.C, Cain L.E., Dugas J.R. Recent Advances In The Rehabilitation Of Anterior Cruciate Ligament Injuries. J Orthop Sports Phys Ther. 2012; 43 (3): 153-171

Manal T. J., Hoffman S. A., Lynne S. The Knee: Physical Therapy Patient Management Utilizing Current Evidence. Current Concepts of Orthopedic Physical Therapy. 2011; 3.



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Lepley L. K., Palmieri-Smith R. M. Effect of Eccentric Strengthening After Anterior Cruciate Ligament Reconstruction on Quadriceps Strength. *Journal of Sports Rehabilitation*. 2013; 22: 150-156.

Noyes F. R., Berrios-Torres S., Barber-Westin S. D., Heckmann T. P. Prevention of permanent arthrofibrosis after anterior cruciate ligament reconstruction alone or combined with associated procedures: a prospective study in 443 knees. *Knee Surg, Sports Traumatol, Arthrosc*. 2000; 8: 196- 206

Adams D., Logerstedt D., Hunter-Giordano A., Axe M. J., Snyder-Mackler L. Current Concepts for Anterior Cruciate Ligament Reconstruction: A Criterion- Based Rehabilitation Progression. *Journal of Orthopedic & Sports Physical Therapy*. 2012; 42 (7): 601-614

Logerstedt D. S., Snyder- Mackler L., Ritter R. C., Axe M. J., Godges J. J. Knee Stability and Movement Coordination Impairments: Knee Ligament Sprain. *J Orthop Sports Phys Ther*. 2010; 40 (4): A1- A37

Logerstedt D., Snyder- Mackler L., Ritter R. C. Axe M. J. Knee Pain and Mobility Impairments: Meniscal and Articular Cartilage Lesions. *J Orthop Sports Phys Ther*. 2010; 40 (6): A1- A35

Hewett T. E., Di Stasi S. L., Myer G. D. Current Concepts for Injury Prevention in Athletes After Anterior Cruciate Ligament Reconstruction. *The American Journal of Sports Medicine*. 2013; 41 (1): 216- 224

Beynon B. D., Uh B. S., Johnson R. J., Abate J. A., Nichols C. E., Fleming B. C., Poole R. Roos H. Rehabilitation After Anterior Cruciate Ligament Reconstruction. *The American Journal of Sports Medicine*. 2005; 33 (3): 347- 359

Kim K., Croy T, Hertel J., Saliba S. Effects of Neuromuscular Electrical Stimulation After Anterior Cruciate Ligament Reconstruction on Quadriceps Strength , Function, and Patient- Oriented Outcomes: A Systematic Review. *Journal of Orthopedic& Sports Physical Therapy*. 2010; 40 (7): 383- 391

Noyes F. R., Heckmann T. P. Barber-Westin. Meniscus Repair and Transplantation A Comprehensive Update. *Journal of Orthopedic & Sports Physical Therapy*. 2012; 44 (3): 274-290

Mithoefer K., Hambly K., Logerstedt D., Ricci M., Silvers H., Villa S. D. Current Concepts for Rehabilitation and Return to Sport After Knee Articular Cartilage Repair in the Athlete. *Journal of Orthopedic & Sports Physical Therapy*. 2012; 42 (3): 254- 273



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Tetteh E. S., Bajaj S. Ghodadra N. S., Cole B. J. Basic Science and Surgical Treatment Options for Articular Cartilage Injuries of the Knee. *Journal of Orthopedic & Sports Physical Therapy*. 2012; 42 (3): 243- 253

Moksnes H., Engebretsen L., Risberg M. A. Management of Anterior Cruciate Ligament Injuries in Skeletally Immature Individuals. *Journal of Orthopedic & Sports Physical Therapy*. 2012; 42 (3): 172- 183