



## ***Meniscal Allograft Transplantation Rehabilitation Guideline***

This rehabilitation program is designed to return the individual to their activities as quickly and safely as possible. It is designed for rehabilitation following meniscal allograft transplantation. Modifications to this guideline may be necessary dependent on physician specific instruction, concomitant injuries or procedures, or patient specific co-morbidities that are present. This evidence-based meniscal allograft transplant guideline is criterion-based; time frames and visits in each phase will vary depending on many factors- including patient demographics, goals, and individual progress. This guideline is designed to progress the individual through rehabilitation to full sport/ activity participation. The therapist may modify the program appropriately depending on the individual's goals for activity following meniscal allograft transplantation.

This guideline is intended to provide the treating clinician a frame of reference for rehabilitation. It is not intended to substitute clinical judgment regarding the patient's post-operative care based on exam/ treatment findings, individual progress, and/or the presence of concomitant procedures or post-operative complications. If the clinician should have questions regarding post-operative progression, they should contact the referring physician.

### ***General Guidelines /Precautions:***

- Patient will be non-weight bearing for the first 3-6 weeks post-operatively with progression to weight bearing in locked knee brace (with physician clearance/approval).
- ROM expectations include terminal knee extensions (0 degrees) in the first week and progression of flexion ROM to 45 degrees by week 3, 90 degrees by week 4, and full (symmetrical) ROM by weeks 10-12.
- Patient will be placed in a hinged knee brace locked in full extension for the first 6 weeks, with weight bearing beginning per physician clearance.
- Hyperextension should not be forced or stretched for the first 6 weeks.
- Walking, elliptical, and stair master (single step depth only) for cardiovascular exercise are allowed at week 12.
- Procedures to address chondral issues (micro-fracture, orthobiologic repair) may require further modifications to weight bearing progression and appropriate open and closed chain strengthening progressions.
- Straight line running and return to sporting activities are not considered until week 24.
- Patient should complete return to sport testing prior to participation in sports requiring explosive lateral movements and pivoting activities.

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PHASE	SUGGESTED INTERVENTIONS	GOALS/MILESTONES FOR PROGRESSION
<p><b>Phase I</b> <i>Patient Education Phase</i></p>	<p><b>Discuss: Anatomy, existing pathology, post-op rehab schedule, bracing, and expected progressions</b></p> <p><b>Instruct on Pre-op exercises:</b></p> <ul style="list-style-type: none"> <li>Progressive ROM (goal of full pain-free ROM by surgery)</li> <li>Progressive quad, hamstring, and gluteal strengthening.</li> </ul> <p><b>Immediate Post-Operative instructions:</b></p> <ul style="list-style-type: none"> <li>Post-operative edema management strategies (RICE)</li> <li>Manual lymphatic drainage</li> <li>Patella mobilizations</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>Verbalized techniques for post-operative edema and pain management</li> <li>Verbalize understanding of post-operative guidelines and progressions.</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>Progress to Phase II post-operatively.</li> </ol>
<p><b>Phase II</b> <i>Maximum Protection Phase</i></p> <p><i>Weeks 0-3</i></p> <p><i>Expected visits: 0-1</i></p>	<p><i>The patient is typically performing this stage of rehab at home after instruction in therapy or physician's office</i></p> <p>Specific Instructions:</p> <ul style="list-style-type: none"> <li>No active knee flexion</li> <li>Non-weight bearing only</li> </ul> <p>Suggested Treatments:</p> <p>Modalities as indicated: Edema controlling treatments (RICE)</p> <p>ROM: Maintenance of terminal extension</p> <p>Manual Therapy: Patellar mobilizations</p> <p>Exercise Examples:</p> <ul style="list-style-type: none"> <li>Ankle Pumps</li> <li>Heel-cord and hamstring stretching to tolerance</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>Provide environment of proper healing of transplant</li> <li>Prevention of post-operative complications</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>Control of post-operative pain (0-1/10 with ADL's in brace)</li> <li>Resolution of post-operative effusion (trace to 1+)</li> <li>Restoration of full extension (compared to contralateral side)</li> </ol>
<p><b>Phase III</b> <i>Protected Motion Phase</i></p> <p><i>Weeks 3-6</i></p> <p><i>Expected visits: 4-9</i></p>	<p>Specific Instructions:</p> <ul style="list-style-type: none"> <li>Continue with previous exercise program</li> <li>Initiation of formal physical therapy</li> <li>Initiate weight bearing to tolerance in locked brace per physician approval</li> <li>No hamstring activation (avoid active knee flexion until 12 weeks post-op)</li> </ul> <p>Suggested Treatments:</p> <p>Modalities Indicated: Edema controlling treatments, NMES for quad activation and re-education</p> <p>ROM: Progressive PROM program with progression to 90 degrees by week 4 and 120 degrees by week 6</p> <p>Manual Therapy: continue with Patellar mobilizations as indicated</p>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>Prevention of complications through gentle protected motion (full extension to approximately 120 degrees flexion)</li> <li>Reduction of post-operative swelling and inflammation (no to trace effusion)</li> <li>Re-education and strengthening of quad control with active SLR without extension lag</li> <li>Level ground ambulation with brace locked in full extension</li> </ol> <p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>0-120 degrees PROM</li> <li>Independent SLR without extension lag</li> <li>Trace to 1+ joint effusion</li> <li>Ambulating FWB with brace locked in full extension</li> </ol>

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<p><b>Phase III</b> (continued)</p>	<p>Exercise Examples:</p> <ul style="list-style-type: none"> <li>-Quad sets</li> <li>-Open chain knee extensions in available pain free range (90-0 degrees) without additional resistance</li> <li>-Leg raises into hip flexion, progressing to abduction and adduction once extension lag is resolved</li> </ul> <p>Other Activities: Double and single leg balance training in locked brace avoiding rotation stress at the knee.</p>	
<p><b>Phase IV</b>  <i>Motion and Muscle Activation Phase</i></p> <p>Weeks 6-12</p> <p>Expected visits: 12-24</p>	<p><i>Specific Instructions: physician's office</i></p> <ul style="list-style-type: none"> <li>-Continue previous hip and quad strengthening exercises</li> <li>-Weight Bearing: Full weight bearing with brace unlocked 0-90 degrees (as tolerated)</li> </ul> <p>Suggested Treatments:</p> <p>Modalities: Continue compression and cryotherapy as needed for pain and edema management, Electrical stimulation for quad re-education, and pain/edema management.</p> <p>ROM: Progression of ROM program - (Bike for ROM only)</p> <p>Exercise Examples:</p> <ul style="list-style-type: none"> <li>-Light resisted open chain knee extension in pain-free ROM</li> <li>-Progress open chain hip strengthening to include clamshell and fire hydrant progression.</li> <li>-Static proprioception training (double to single leg) with perturbation on variable surfaces (rocker board, air-ex pads, air discs, etc.) &amp; emphasis on proper hip/knee stability and hip strategy.</li> <li>-Limited depth closed chain quad strengthening (0-60 degrees) avoiding rotation and dynamic valgus stress at knee:             <ul style="list-style-type: none"> <li>Which Includes:                 <ul style="list-style-type: none"> <li>-Forward and lateral step ups</li> <li>-Mini-squats (BW only)</li> <li>-Wall squats</li> <li>- Leg press in limited depth (beginning week 10)</li> </ul> </li> </ul> </li> <li>-Plank progression for core strength and stabilization</li> </ul> <p>Other Activities:</p> <ul style="list-style-type: none"> <li>-Aquatic program (if available) - including pool walking, and closed chain strengthening/balance consistent with restrictions above- no running/jumping, swimming allowed but no flutter kicks (straight knee activity only)</li> <li>-Light cardiovascular conditioning program which includes:             <ul style="list-style-type: none"> <li>-Stationary bike</li> <li>-Level ground walking</li> </ul> </li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Progression of PROM program to near full motion (full extension to 135+ degrees flexion)</li> <li>2. Improve muscular strength and endurance</li> <li>3. Control of forces on extensor mechanism</li> <li>4. Normalized level ground ambulation</li> <li>5. Normalized single leg static balance with proper proximal control (no valgus and hip medial rotation)</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Full passive motion (Equal to the contralateral limb)</li> <li>2. Normalized gait on level ground</li> <li>3. Trace to no joint effusion</li> <li>4. 4/5 strength in quads, hip abductors, and hip external rotators.</li> </ol>

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<p><b>Phase V</b> <i>PAAdvanced strengthening and eccentric control phase</i></p> <p><i>Weeks 12-24</i></p> <p><i>Expected visits: 12-20</i></p>	<p>Specific Instructions: Continue previous exercises</p> <p>Suggested Treatments: ROM: Progression of closed and open chain quad strengthening (0-60 degrees)</p> <p>Exercise Examples: -Squat progressions (rocker board, BOSU) -Lateral dips -Forward step downs once hip and knee control is adequate -Front lunges or step back lunges within limited ROM Other Activities: -Elliptical, stair master (single leg step depth only)</p>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Restoration of full pain-free PROM/ AROM (equal to contralateral knee) and full resolution of post-operative effusion.</li> <li>2. Normal pain-free ADL's</li> <li>3. Improved quad strength (80% of contralateral limb)</li> <li>4. Normalized gluteal strength</li> <li>5. Proper biomechanics and control with front step down</li> <li>6. Improved single leg proprioception (85% or greater on anterior and posterior lateral reach of Y Balance test)</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Full pain-free ROM</li> <li>2. No joint effusion</li> <li>3. Normal performance of ADL's with minimal to no pain (&lt;1/10)</li> <li>4. Satisfactory physical Exam</li> </ol>
<p><b>Phase VI</b> <i>Advanced Movement and Impact Phase</i></p> <p><i>Months 6+ months</i></p> <p><i>Expected Visits: 21-24</i></p>	<p>Specific Instructions: -Progression to running and return to sport activities is considered at this stage after consultation and approval by surgeon</p> <p>Suggested Treatments: Progression to running program (with appropriate bracing) with training to improve/ normalize form and shock absorption (as cleared by MD) Progression of open and closed chain strengthening for the entire LE chain with emphasis on single limb strengthening to address remaining deficits Progression to higher level activities and sports specific activities as strength and control dictate (as cleared by MD)</p> <p>Exercise Examples: -Progression of closed chain strengthening to 90 degrees knee flexion depth at 24 weeks -Initiating double limb jump training (around 6 months) -Initiate deceleration and single leg hopping (around 7 months) -Initiate agility (floor ladder and cone drills) and sport specific activities (around 7 months) -Initiate cutting activities (around 8 months)</p>	<p><b>Suggested Criteria for Discharge:</b></p> <ol style="list-style-type: none"> <li>1. &lt;10% strength deficit in quads and gluteals</li> <li>2. Limb similarity index of 90% or greater on functional hop tests and Y balance tests</li> <li>3. See Knee Return to Sport Testing on guideline website.</li> <li>4. No pain or complaints of instability with functional progression of sport specific skills</li> </ol>

**\*\*NOTE:** Progression of functional activities should be performed only as pain and proper biomechanics allow. Emphasis should be on proper shock absorption and control of dynamic valgus stress at knee (hip medial rotation with knee valgus) with each task performed. Progression to single limb based tasks (deceleration, hopping, and cutting) should not be performed until double limb activities have been mastered. Activities requiring dynamic control of rotational stress at the knee (cutting, multiple plane lunges/jumps/hops) should not be performed until sagittal and frontal plane control has been mastered. Return to sport may occur at any time during this stage as cleared by physician and as progress and goal achievement occurs.

**REFERENCES:**

Lee, Andrew (2012). Allograft Meniscus Transplantation. *Sports Med Arthrosc Res*, 20:106-114.

Noyes, Frank (2012). Meniscal Repair and Transplantation: A Comprehensive Update. *Journal of Orthopaedic & Sports Physical Therapy*, 43(3):274-290.

Samitier, Gonzaslo (2015). Meniscal allograft transplantation. Part 2: systematic review of transplant timing, outcomes, return to competition, associated procedures, and prevention of osteoarthritis. *Knee Surg Sports Traumatol Arthrosc*, 23:323-333.

Chalmers, Peter (2013). Return to High-Level Sport after Meniscal Allograft Transplantation. *Arthroscopy: The Journal of Arthroscopic Related Surgery*, 29(3):539-544.