

## **Proximal/Mid Hamstring Strains 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 proximal/mid hamstring injuries. Modifications to this guideline may be necessary dependent on physician specific instruction, specific tissue healing timeline, chronicity of injury and other contributing impairments that need to be addressed. This evidence-based proximal/mid hamstring injuries 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 proximal/mid hamstring injuries.

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 injury care, based on exam/treatment findings, individual progress, and/or the presence of concomitant injuries or complications. If the clinician should have questions regarding progressions, they should contact the referring physician.

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

- General healing timeline expected
- Precautions to certain exercises for this injury
- ROM/ Strength expectations at beginning of therapy
- Severity/ Irritability/ Nature/ Chronicity of symptoms that may affect progressions
- Progression through the protocol should be individualized to the patient's presentation with typical return to activity occurring anywhere from 2 to 8 weeks.

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PHASE	SUGGESTED INTERVENTIONS	GOALS/MILESTONES FOR PROGRESSION
<p><b>Phase I</b> Acute Phase</p> <p>Weeks:</p> <p>Expected Visits:</p>	<p><b>Types of Hamstring Strains:</b></p> <p><b>a. Type I-Mid-Substance</b></p> <ul style="list-style-type: none"> <li>i. Acute strains of the hamstring, predominantly involving the long head of the biceps femoris</li> <li>ii. Commonly in high speed running at Maximal or Near Maximal Speed               <ul style="list-style-type: none"> <li>1. Sudden deceleration during terminal swing phase</li> <li>2. Preinjury level-Range 6-50 wks., median 16 wks.</li> </ul> </li> </ul> <p><b>b. Type II-Proximal</b></p> <ul style="list-style-type: none"> <li>i. Strain of the hamstring during combination of hip flexion and knee extension               <ul style="list-style-type: none"> <li>1. Dance, sliding, high kicking (sprinters)</li> <li>2. Can be chronic, degenerative due to repetitive or excessive stretching and mechanical overload from training errors (increasing volume/intensity too quickly, sudden introduction of sprinting/lunging/deep squatting/hurdles/hills).</li> <li>3. Even sudden increase in sitting volume (compression load) may be the provoking factor.                   <ul style="list-style-type: none"> <li>a. May not recall specific injury, but rather slow progressive increase in pain in the posterior thigh (cramping/tightness may also be reported)</li> <li>b. Pain may initially be present with the start of exercise, but resolve after warming up, and then slowly progress to failing to resolve with warming up and becoming present with daily activities and at rest, especially sitting and driving, especially on firm surfaces.</li> </ul> </li> </ul> </li> <li>iii. Commonly involve the proximal Semimembranosus, close to the ischial tuberosity</li> <li>iv. Sciatic nerve irritation may concomitantly present, particularly in chronic conditions.</li> <li>v. Middle aged male athletes (29-37 yrs.) most frequent.</li> <li>vi. Typically prolonged recovery. ~30-76wks, median 50 wks.</li> </ul> <p><b>Specific Instructions:</b></p> <p><b>Protection:</b> Avoid end range hamstring lengthening while hamstring weakness is present</p> <p>Avoid isolated resistance training of the injured hamstring muscle</p> <p>For proximal hamstring, suggestion of hip to be near neutral flexion/extension position or and minimal flexion 20° to 30°</p> <p><b>Suggested Treatments:</b></p> <p><b>Modalities as indicated:</b> Edema controlling treatments</p> <p><b>ROM:</b> Passive and AAROM within ROM tolerance, light stretching</p> <p><b>Manual Therapy:</b> If positive active slump test during the examination, neural flossing techniques are recommended as part of the rehab program</p> <p><b>Exercise:</b> Progressive loading progression: isometric (phase I) &gt; isotonic in reduced hip flexion (phase II) &gt; isotonic in increasing hip flexion motion (phase II) &gt; energy storage loading (phase III &amp; IV)</p> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>• Isometric lumbopelvic musculature–front plank, side plank</li> <li>• Trunk extension</li> <li>• Single limb balance exercises</li> <li>• Frontal plane stepping drills–marching, Grapevine, lunge walk</li> <li>• Double leg bridge holds with hip in neutral for proximal hamstring progressing to single leg bridge holds</li> <li>• Longer lever bridge was progressing from 2 legs to one leg</li> <li>• 20°–30° hip flexion, SLR pull downs</li> <li>• Isometric leg curl</li> </ul> <p><b>Other Activities:</b> Bike as appropriate</p> <p style="text-align: right;"><i>(continued on next page)</i></p>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Minimize pain, inflammation and edema</li> <li>2. Minimize scar development</li> <li>3. Minimize atrophy</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Normal pain-free walking symmetry</li> <li>2. Pain-free isometric contraction against submaximal (50-70%) resistance</li> <li>3. Pain free low-speed jog</li> <li>4. Tolerate single leg bent knee bridge and long lever bridge</li> <li>5. Subjective pain scale 0-3/10 during exercise loading</li> <li>6. Tolerate bent knee stretch test–patient supine with hip and knee maximally flexed examiner slowly straightens patient’s knee</li> </ol>

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<p><b>Phase II</b> Intermediate Phase</p> <p>Weeks: variable based on response to therapy</p> <p>Expected Visits: variable based on response to therapy</p>	<p>(continued from previous page)</p> <p><b>Specific Instructions:</b> Avoid end range stretching/flexibility of hamstring if hamstring weakness persists</p> <p><b>Suggested Treatments:</b> <b>Modalities as indicated:</b> Edema controlling treatments, ice after rehab exercises to help decrease possible associated pain and inflammation <b>ROM:</b> Gradual increase in hamstring lengthening <b>Manual Therapy:</b> Continue if still positive slump test, neural mobilization <b>Exercise:</b> Progressive loading progression: isometric (phase I) &gt; isotonic in reduced hip flexion (phase II) &gt; isotonic in increasing hip flexion motion (phase II) &gt; energy storage loading (phase III &amp; IV)</p> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>• Rotating body bridge</li> <li>• Boxer shuffle</li> <li>• Supine bent knee bridge walkouts</li> <li>• Single limb windmill touches</li> <li>• Prone leg curl</li> <li>• Bridging from double to single leg without weight progressing to adding weight</li> <li>• Supine leg curl with bridge progressing double to single leg</li> <li>• Nordic hamstring starting with assistance with the upper body</li> </ul> <p><b>Other Activities:</b> May start utilize elliptical equipment as tolerated, continue bike</p>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Regain pain-free hamstring flexibility</li> <li>2. Progress to full active and passive ROM</li> <li>3. Movements primarily in the transverse and frontal planes to avoid overstretching.</li> <li>4. Begin to restore hamstring strength and functional range of motion</li> <li>5. Develop neuromuscular control of trunk and pelvis with progressive increase in speed of movement</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Pain-free prone knee flexion test</li> <li>2. Pain-free moderate forward backward jog</li> <li>3. 3Tolerate arabesque movement 3/10 or less</li> <li>4. Tolerate modified bent- knee stretch-patient is supine with legs fully extended, examiner maximally flexes patient's hip and knee and rapidly straightens knee</li> </ol>
<p><b>Phase III</b> Advanced Strengthening</p> <p>Weeks: variable based on response to therapy</p> <p>Expected Visits: variable based on response to therapy</p>	<p><b>Specific Instructions:</b> For proximal hamstring progressive hip flexion 70-90 degrees</p> <p><b>Suggested Treatments:</b> <b>Modalities as indicated:</b> Edema controlling treatments as needed <b>Manual Therapy:</b> Soft tissue techniques as well as dry needling as needed <b>Exercise:</b> Progressive loading progression: isometric (phase I) &gt; isotonic in reduced hip flexion (phase II) &gt; isotonic in increasing hip flexion motion (phase II) &gt; energy storage loading (phase III &amp; IV)</p> <p><b>Exercise Examples: All performed at 0-3/10 subjective pain or less, with speed and stride</b></p> <ul style="list-style-type: none"> <li>• Bilateral RDL's progressing to single leg dead lift</li> <li>• Step ups</li> <li>• Single leg chair bridge-slow to fast speeds</li> <li>• Rotating body bridge with weight , (i.e.5 sec hold each side, 2x10)</li> <li>• Hip thrust</li> <li>• Walking lunges with rotation</li> <li>• Lateral lunges</li> <li>• windmill touches single limb with weight</li> <li>• Side shuffle, moderate to high intensity (i.e. 30 yards, 3x 1 min)</li> <li>• Boxer shuffle, moderate to high intensity (i.e. 10 yards, 3x1 min)</li> <li>• Carioca, moderate to high intensity (i.e. 30 yards, 3x 1 min)</li> <li>• "A" skip progressing to "B" skip-start with low knee height and progressive increment that are pain-free</li> <li>• Forward-Backward accelerations progressing distance, start at 5 yards-&gt;10 yards-&gt;30 yards</li> </ul> <p style="text-align: right;">(continued on next page)</p>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Symptom-free during all activities</li> <li>2. Normal concentric and eccentric strengthening through full range of motion and speeds</li> <li>3. Integrate sport specific movements</li> <li>4. For proximal hamstring injury progression into greater hip flexion</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Minimal pain 0-3/10 with loading tests, arabesque</li> <li>2. Within 85% strength and single leg exercises</li> <li>3. For proximal hamstring, loading of hamstring origin in sport specific ranges should be comfortable with minimal provocation after activity.</li> </ol>

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<p><b>Phase IV</b> Return to Performance Phase</p> <p>Weeks: variable based on response to therapy</p> <p>Expected Visits: variable based on response to therapy</p>	<p>(continued from previous page)</p> <p><b>Specific Instructions:</b> Required for athletes returning to sports involving energy storage and /or impact loading. Pain again should not go above 0-3/10 with activities during loading</p> <ul style="list-style-type: none"> <li>Exercises chosen per individual functional and sport demands</li> <li>Gradual exposure to provocative activity in training prior to return to full competition</li> <li>Conservative approach would be to perform exercises in this phase every third day, Stage 1 exercises, stage 2-3 day ( high/low/medium tendon load cycle)</li> </ul> <p><b>Suggested Treatments:</b></p> <p><b>Modalities/Manual:</b> At this stage any increase in irritability use of modalities to diminish (ice, instrument assisted soft tissue work, dry needling)</p> <p><b>Exercise:</b> Progressive loading progression: isometric (phase I) &gt; isotonic in reduced hip flexion (phase II) &gt; isotonic in increasing hip flexion motion (phase II) &gt; energy storage loading (phase III &amp; IV)</p> <ul style="list-style-type: none"> <li>Start with 1-2 exercises</li> <li>Max 3-4 exercises adding 1-2/week</li> <li>Multidirectional sports include lateral rotational and cutting movements</li> </ul> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>Sprinter leg curl with theraband</li> <li>Sprinter follow through with high knee with theraband</li> <li>Continuation of “A” skip and “B” skip</li> <li>Fast sled push and pull</li> <li>Kettlebell swings</li> <li>Alternate leg split squat jumps</li> <li>Bounding lateral and forward</li> <li>Stair or hill bounding</li> <li>Cutting</li> </ul> <p><b>Diagnostic Tests: Proximal Hamstring Tendinopathy (PHT)</b></p> <p><b>Load Test Assessment:</b></p> <ol style="list-style-type: none"> <li><b>Single leg bent knee bridge (low load clinical test)</b> - opposite knee/hip flexed</li> <li><b>Single leg long lever bridge (moderate load test)</b> - opposite knee/hip extended</li> <li><b>Arabesque (high load clinical test)</b> - a single leg deadlift with arms extended forward</li> </ol> <p><b>Passive Stretch Tests Assessment:</b> Moderate to high validity and high sensitivity and specificity</p> <ol style="list-style-type: none"> <li><b>Bent knee stretch</b> - patient supine with hip and knee maximally flex, examiner slowly straightens their knee</li> <li><b>Modified bent- knee stretch</b> - patient is supine with legs fully extended, examiner maximally flexes their hip and knee and rapidly straightens the knee</li> <li><b>Puranen-Orava Test</b> - stretch hamstring in a standing position with hip flexed to 90°, knee fully extended and foot is resting hop on another chair or bench</li> </ol>	<p><b>Goals of Phase:</b> Graded return to sport with subjective symptoms 0-3/10 or less</p> <p><b>Criteria for Return to Sport:</b></p> <ol style="list-style-type: none"> <li>Full strength without pain             <ol style="list-style-type: none"> <li>4-5 reps of maximum effort manual strength test in prone knee flexed position</li> <li>&lt;5-10% deficit bilateral eccentric hamstrings, concentric quadriceps ratios</li> <li>&lt;5-10% deficit in knee flexion isokinetic concentric peak torque</li> </ol> </li> <li>Full range of motion without pain</li> <li>Ability to replicate sport specific movements near maximal speed without pain</li> </ol>
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## REFERENCES:

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