

Rehabilitation Protocol for Hamstring Injury Non-op

This protocol is intended to guide clinicians and patients through the non-operative course for hamstring injury. This protocol is time based (dependent on tissue healing) as well as criterion based, and may vary greatly depending on severity of injury, grade of strain and location of injury (muscle, myotendinous junction, tendon). Specific intervention should be based on the needs of the individual and should consider exam findings and clinical decision making. If you have questions, contact the referring physician.

Considerations for the non-operative Hamstring injury

Many different factors influence the injured hamstring rehabilitation outcomes, including chronicity of injury, area affected (proximal, mid belly, distal), number of tendons/muscles involved, pre-injury gluteal motor control/strength and presence of any concomitant sciatic neural tension. It is recommended that clinicians collaborate closely with the referring physician regarding the above.

PHASE I: EARLY (0-2 WEEKS AFTER INJURY)

Rehabilitation Goals	<ul style="list-style-type: none"> • Allow healing of injured tissue • Initiate early protected ROM • Prevent muscular atrophy • Decrease pain and inflammation
Weight Bearing	• As tolerated, unless otherwise noted by clinician
Precautions/Guidelines	• Limit stretching hamstring (trunk flexion, knee extension)
Range of Motion	<ul style="list-style-type: none"> • Active assisted and passive hip and knee flexion • Limit stretching and hip/knee ROM to avoid a “stretch/strain” sensation to injured area
Intervention	<p><i>Manual Therapy:</i></p> <ul style="list-style-type: none"> • STM along hamstring muscle group as needed • Myofascial (no lotion) release to posterolateral glute and lateral hamstring fascia/muscle (proximal 1/3 of lateral thigh) as needed • Attain and maintain neutral ilial position ipsilateral and contralateral to injured side with manual posterior rotations to ilium <p><i>Stretching:</i></p> <ul style="list-style-type: none"> • Do not stretch the hamstring, but <u>nerve gliding (sciatic neural flossing) may be needed if neural tension exists</u> • <u>Hip flexors in Thomas test position (maintain neutral pelvis/spine throughout stretch)</u> • <u>Gastrocnemius/calf stretching</u> <p><i>Therapeutic Exercise:</i></p> <ul style="list-style-type: none"> • <u>Quad sets</u> • <u>Glute sets</u> • *must be mastered before progressing any gluteal or hamstring muscle strengthening* • <u>AA and PROM hip and knee flexion</u> • <u>Upper body and core circuit training (avoiding positions which lengthen hamstring)</u> • <u>Upper body ergometer (UBE)</u>
Criteria to Progress	• 1-2 weeks post-injury depending on severity of injury

PHASE II: INTERMEDIATE (2-4 WEEKS AFTER INJURY)

Rehabilitation Goals	<ul style="list-style-type: none"> • Reduce/resolve pain and edema • Good motor control and pain-free functional movements
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Weight Bearing	<ul style="list-style-type: none"> • As tolerated
Precautions/Guidelines	<ul style="list-style-type: none"> • Carefully begin gentle, pain-free hip flexion with knee extension
Range of Motion	<ul style="list-style-type: none"> • Active and passive hip and knee flexion may begin
Additional Intervention <i>*Continue with Phase I interventions as indicated</i>	<p><i>Manual Therapy:</i></p> <ul style="list-style-type: none"> • Gentle cross friction massage to injured area if tendinous insertion proximally (including proximal to attachment on ischial tuberosity) or distally (any or all tendons involved) • Manual trigger point release as needed throughout muscle belly • Manual trigger point release as needed with ART (active release therapy) to piriformis, quadratus femoris • Anterior hip glides with and without external rotation at the hip (hip in neutral to slightly extended, prone with pillow under thigh can help maintain this position) as needed • Posterior/inferior belted hip mobilizations as needed for full flexion (belted quadruped position with active movement into child's pose) as needed <p><i>Stretching:</i></p> <ul style="list-style-type: none"> • <u>Hip external rotation in flexion</u> • Gentle, slow, pain-free non weighted hamstring stretching (supine with strap) <p><i>Therapeutic Exercise: (continuation of above)</i></p> <ul style="list-style-type: none"> • <u>Low Double Leg (DL) Bridge</u> • <u>Side-lying hip abduction</u> • <u>Standing calf raises</u> • Strengthening of uninvolved limb ok <p><i>Cardiovascular Exercise:</i></p> <ul style="list-style-type: none"> • Stationary bike • Progressive speed walking on level surfaces • Elliptical at week 4 if pain-free
Criteria to Progress	<ul style="list-style-type: none"> • 4-6 weeks post-injury depending on severity of injury

PHASE III: TRANSITIONAL (4-8 WEEKS AFTER INJURY)

Rehabilitation Goals	<ul style="list-style-type: none"> • Normalized gait • Gradually progress to full ROM • Improve neuromuscular control • Increase strength • Enhance proprioception and kinesthesia
Weight Bearing	<ul style="list-style-type: none"> • Full weight bearing, no assistive device
Precautions/Guidelines	<ul style="list-style-type: none"> • Per tolerance
Range of Motion	<ul style="list-style-type: none"> • Progressive active hip and knee flexion • Active stretching all muscle groups
Additional Intervention <i>*Continue with Phase I-II Interventions as indicated</i>	<p><i>Manual Therapy:</i></p> <ul style="list-style-type: none"> • Per above phases as needed <p><i>Therapeutic Exercise:</i></p> <ul style="list-style-type: none"> • <u>DL Bridge with thera-band around thighs</u> • <u>DL Bridge with ball squeeze</u> • <u>DL Bridge with Upper back on the bench</u> • <u>Plank with alternating leg lifts</u> • <u>Side plank with leg lift (on left knee until stronger) or oblique twists</u> • <u>Straight Leg Raise (SLR)</u> • <u>Hamstring (HS) curls antigravity</u> • <u>Hip extension antigravity</u>

	<p>At 6 weeks, add:</p> <ul style="list-style-type: none"> • <u>Single Leg (SL) bridge, back on floor, foot on bench</u> • <u>Progress to ankle weight for all leg lifts PRE</u> • <u>Wall slides</u> • <u>Clam shells</u> • <u>Partial squats</u> • <u>Step ups</u> • <u>Step downs</u> <p><i>Cardiovascular Exercise:</i></p> <ul style="list-style-type: none"> • Stationary bike • Swimming arms and legs • Progressive speed walking on level surfaces • Jog/walk may be initiated at week 6 if full, symmetrical ROM and strength
Criteria to Progress	<ul style="list-style-type: none"> • Good control with functional movements without antalgic movement patterns • Hamstring strength 5/5 in prone with knee at 90deg flexion • Good neuromuscular control in all planes without pain • HHD testing: <ul style="list-style-type: none"> • To initiate plyos: <ul style="list-style-type: none"> ○ LSI hamstring >70/80% ○ LSI glute med >80% ○ LSI quad >80% • To run: <ul style="list-style-type: none"> ○ LSI hamstring >80/90% ○ LSI glute med >90% ○ LSI quad >90% • Single leg hop cluster (distance, triple, cross over, 6 meter timed) >85%

PHASE IV: EARLY RETURN TO SPORT (8-12 WEEKS AFTER INJURY)

Rehabilitation Goals	<ul style="list-style-type: none"> • Full ROM • Improve neuromuscular control • Improve strength/power/endurance • Enhance dynamic stability
Precautions/Guidelines	<ul style="list-style-type: none"> • No pain during strength training or cardiovascular activity
Additional Intervention <i>*Continue with Phase I-III interventions as indicated</i>	<p><i>Manual Therapy:</i></p> <ul style="list-style-type: none"> • Per above phases as needed <p><i>Therapeutic Exercise:</i></p> <ul style="list-style-type: none"> • <u>Dynamic and static hamstring stretching</u> • Weight training machines: Leg Press, Standing Hip Abduction, Hamstring Curl, Leg Extension • Single leg closed chain exercises • <u>Resisted step ups using sports cord around waist from behind</u> • <u>Double Leg Hamstring ball roll out (eccentric portion only) --> DL eccentric and concentric --> SL eccentric portion only --> SL eccentric and concentric</u> • <u>Double Leg dead lift, short range --> progressing to Single Leg no rotation</u> • <u>Double Leg Dead lift – wide abducted leg stance with black band around forefeet – pushing into abduction during eccentric trunk lowering deadlift phase</u> • <u>Progress to single leg with spine rotation dead lift to work hamstrings three-dimensionally</u> • <u>Bridge on ball – eccentric portion only double leg → progressing to single leg</u>

	<p><i>Cardiovascular Exercise:</i></p> <ul style="list-style-type: none"> • Continue to increase speed and distance for walking, incorporate uneven surfaces • Continuous jogging • Initiate interval jogging and running
Criteria to Progress	<ul style="list-style-type: none"> • Full ROM • No pain/tenderness • Satisfactory clinical exam including isokinetic testing

PHASE V: UNRESTRICTED RETURN TO SPORT (12+ WEEKS AFTER INJURY)

Rehabilitation Goals	<ul style="list-style-type: none"> • Emphasis on gradual return to recreational activities • Progressively increase activities to prepare for unrestricted functional return
Precautions/Guidelines	<ul style="list-style-type: none"> • Neoprene support as needed
<p>Additional Intervention <i>*Continue with Phase II-IV interventions as indicated</i></p>	<p><i>Manual Therapy:</i></p> <ul style="list-style-type: none"> • Per above phases as needed <p><i>Therapeutic Exercise:</i></p> <ul style="list-style-type: none"> • Progressive strengthening avoiding overload to HS • Progress speed of resisted steps and add forward lean • <u>SL dead lift with Black tband under stance leg and hold for resistance</u> • <u>Reverse Lunge on Slider: Progress load bearing and add concentric/eccentric phase:</u> <ul style="list-style-type: none"> ○ <u>Part 1: Eccentric hamstring with core strength exercise: injured leg is weight bearing leg, from standing, lunge backward (weightless leg slides back on slide board) into full lunge, bend forward and then push through weightbearing leg/heel as raise back up</u> ○ <u>Part 2: in full lunge position: leg slides back as weight bearing knee bends, back leg slides forward as weight bearing leg straightens)</u> • <u>Short range Nordic HS to physio ball height → progress range to ground depth</u> • <u>Kettle bell swing</u> • <u>Retro lunge slide (working leg in front, slide board slider for back leg)</u> • <u>Jump Training</u> <p><i>Cardiovascular Exercise:</i></p> <ul style="list-style-type: none"> • Continue above, progressing speed, distance • Progress step ups to resisted jump onto steps • Plyometric progression <ul style="list-style-type: none"> ○ <u>Double leg up/down</u> ○ <u>Double leg forward/back</u> ○ <u>Alternating lateral bounding</u> ○ <u>Single leg jump</u> ○ <u>Progress plyos to resisted plyos using sports cord around waist</u> • <u>Agility using ladder drills</u> • <u>Falling start runs (fall forward, then run) - see below for details</u> • <u>Mini hurdle runs</u> • <u>Sprint progressions (5 times each)</u> <u>10 yard → 20 yd → assisted deceleration with band around waist → deceleration lean</u> • <u>40 yard sprints at 90%</u>

Criteria to Progress	<ul style="list-style-type: none"> • To RTP: <ul style="list-style-type: none"> ○ LSI Hamstring > 95% ○ LSI Glute >95% ○ LSI quad >95% ○ Single leg hop cluster (distance, triple, cross over, 6 meter timed) >95%
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	<ul style="list-style-type: none"> ○ Good acceleration, deceleration, change of direction control ○ 60 second timed step-down test 80 bpm, excellent control ○ 60 second timed Lateral leap 60 bpm, excellent control <ul style="list-style-type: none"> ● Last stage, no additional criteria ● Proceed with caution
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Revised 12/2021

Contact	Please email MGHSportsPhysicalTherapy@partners.org with questions specific to this protocol
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Functional Assessment

	Operative Limb	Non-operative Limb	Limb Symmetry Index
Range of motion (X-0-X)			-
Pain (0-10)			-
Standing Heel Rise test			
Hop Testing			
Single-leg Hop for Distance			
Triple Hop for Distance			
Crossover Hop for Distance			
Vertical Jump			
Y-Balance Test			
Calculated 1 RM (single leg press)			
Psych. Readiness to Return to Sport (PRRS)			

Patient Name: _____

MRN: _____

Date of Injury: _____

Surgeon: _____

Concomitant Injuries/Procedures: _____

Ready to jog? YES NO

Ready to return to sport? YES NO

Recommendations: _____

Examiner: _____

Range of motion is recorded in X-0-X format: for example, if a patient has 6 degrees of hyperextension and 135 degrees of flexion, ROM would read: 6-0-135. If the patient does not achieve hyperextension, and is lacking full extension by 5 degrees, the ROM would simply read: 5-135.

Pain is recorded as an average value over the past 2 weeks, from 0-10. 0 is absolutely no pain, and 10 is the worst pain ever experienced.

Standing Heel Rise test is performed starting on a box with a 10 degree incline. Patient performs as many single leg heel raises as possible to a 30 beat per minute metronome. The test is terminated if the patient leans or pushes down on the

table surface they are using to balance, the knee flexes, the plantar-flexion range of motion decreases by more than 50% of the starting range of motion, or the patient cannot keep up with the metronome/fatigues.

Hop testing is performed per standardized testing guidelines. The average of 3 trials is recorded to the nearest centimeter for each limb.

Return to Running Program

This program is designed as a guide for clinicians and patients through a progressive return-to-run program. Patients should demonstrate > 80% on the Functional Assessment prior to initiating this program (after a knee ligament or meniscus repair). Specific recommendations should be based on the needs of the individual and should consider clinical decision making. If you have questions, contact the referring physician.

PHASE I: WARM UP WALK 15 MINUTES, COOL DOWN WALK 10 MINUTES

Day	1	2	3	4	5	6	7
Week 1	W5/J1x5		W5/J1x5		W4/J2x5		W4/J2x5
Week 2		W3/J3x5		W3/J3x5		W2/J4x5	
Week 3	W2/J4x5		W1/J5x5		W1/J5x5		Return to Run

Key: W=walk, J=jog

****Only progress if there is no pain or swelling during or after the run**

PHASE II: WARM UP WALK 15 MINUTES, COOL DOWN WALK 10 MINUTES

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	20 min		20 min		20 min		25 min
2		25 min		25 min		30 min	
3	30 min		30 min		35 min		35 min
4		35 min		40 min		40 min	
5	40 min		45 min		45 min		45 min
6		50 min		50 min		50 min	
7	55 min		55 min		55 min		60 min
8		60 min		60 min			

Recommendations

- Runs should occur on softer surfaces during Phase I
- Non-impact activity on off days
- Goal is to increase mileage and then increase pace; avoid increasing two variables at once
- 10% rule: no more than 10% increase in mileage per week

Agility and Plyometric Program

This program is designed as a guide for clinicians and patients through a progressive series of agility and plyometric exercises to promote successful return to sport and reduce injury risk. Patients should demonstrate > 80% on the Functional Assessment prior to initiating this program. Specific intervention should be based on the needs of the individual and should consider clinical decision making. If you have questions, contact the referring physician.

PHASE I: ANTERIOR PROGRESSION

Rehabilitation Goals	<ul style="list-style-type: none"> • Safely recondition the knee • Provide a logical sequence of progressive drills for pre-sports conditioning
Agility	<ul style="list-style-type: none"> • Forward run • Backward run • Forward lean in to a run • Forward run with 3-step deceleration • Figure 8 run • Circle run • Ladder
Plyometrics	<ul style="list-style-type: none"> • Shuttle press: Double leg→alternating leg→single leg jumps • Double leg: <ul style="list-style-type: none"> ○ Jumps on to a box→ jump off of a box→ jumps on/off box ○ Forward jumps, forward jump to broad jump ○ Tuck jumps ○ Backward/forward hops over line/cone • Single leg (these exercises are challenging and should be considered for more advanced athletes): <ul style="list-style-type: none"> ○ Progressive single leg jump tasks ○ Bounding run ○ Scissor jumps ○ Backward/forward hops over line/cone
Criteria to Progress	<ul style="list-style-type: none"> • No increase in pain or swelling • Pain-free during loading activities • Demonstrates proper movement patterns

PHASE II: LATERAL PROGRESSION

Rehabilitation Goals	<ul style="list-style-type: none"> • Safely recondition the knee • Provide a logical sequence of progressive drills for the Level 1 sport athlete
Agility <i>*Continue with Phase I interventions</i>	<ul style="list-style-type: none"> • Side shuffle • Carioca • Crossover steps • Shuttle run • Zig-zag run • Ladder
Plyometrics <i>*Continue with Phase I interventions</i>	<ul style="list-style-type: none"> • Double leg: <ul style="list-style-type: none"> ○ Lateral jumps over line/cone ○ Lateral tuck jumps over cone • Single leg (these exercises are challenging and should be considered for more advanced athletes): <ul style="list-style-type: none"> ○ Lateral jumps over line/cone ○ Lateral jumps with sport cord
Criteria to Progress	<ul style="list-style-type: none"> • No increase in pain or swelling • Pain-free during loading activities • Demonstrates proper movement patterns

PHASE III: MULTI-PLANAR PROGRESSION

Rehabilitation Goals	<ul style="list-style-type: none">• Challenge the Level 1 sport athlete in preparation for final clearance for return to sport
Agility <i>*Continue with Phase I-II interventions</i>	<ul style="list-style-type: none">• Box drill• Star drill• Side shuffle with hurdles
Plyometrics <i>*Continue with Phase I-II interventions</i>	<ul style="list-style-type: none">• Box jumps with quick change of direction• 90 and 180 degree jumps
Criteria to Progress	<ul style="list-style-type: none">• Clearance from MD• <u>Functional Assessment</u><ul style="list-style-type: none">○ ≥90% contralateral side• <u>Achilles Tendon Rupture Score (ATRS)</u>• <u>Psych Readiness to Return to Sport (PRRS)</u>

Psychological Readiness to Return to Sport

Patient Name: _____

MRN: _____

Injury: _____

Date of Injury: _____

Surgeon: _____

Please rate your confidence to return to your sport on a scale from 0 – 100

Example: 0 = No confidence at all
 50 = Moderate confidence
 100 = Complete confidence

1. My overall confidence to play is _____
2. My confidence to play without pain is _____
3. My confidence to give 100% effort is _____
4. My confidence to not concentrate on the injury is _____
5. My confidence in the injured body part to handle demands of the situation is _____
6. My confidence in my skill level/ability is _____

Total: _____

Score: _____

Examiner: _____

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