

## HAMSTRING STRAIN NON-OPERATIVE GUIDELINE

The following Hamstring Strain Guideline was developed by HSS Rehabilitation. Progression is both criteria-based and patient specific. Phases and time frames are designed to give the clinician a general sense of progression but do not replace clinical judgement. Hamstring strains are a common occurrence in athletic activity, have a high recurrence rate, and can account for considerable time off from playing if not treated appropriately. Hamstring strains are common in sprinting, kicking, and sports that require high-speed skilled movements and extensive lengthening movements. It is imperative to perform an evaluation and exam since a wide range of hamstring related injuries could be present.

Hamstring strains are treated conservatively with physical therapy. There are both intrinsic (non-modifiable) and extrinsic (modifiable) risk factors that can be present. Physical therapy will focus on the extrinsic risk factors via lumbopelvic stability, lower extremity (LE) flexibility, LE strength (specifically posterior chain), cardiovascular endurance and neuromuscular control all while decreasing the risk of recurrence.

The more proximal the site of maximum palpable pain to the ischial tuberosity, a longer recovery time is expected. Hamstring strains associated with a stretch, combined hip flexion and knee extension, involving the proximal free tendon and the semimembranosus also tend to require a longer recovery time. Hamstring strains involving the intramuscular tendon and the adjacent muscle fibers, like the biceps femoris, injured during explosive movements, typically require a shorter recovery time.

### Grades of Strains

- Grade 1 strains involve a minimal number of torn muscle fibers with localized tenderness. These are usually sprinting related and involve the biceps femoris long head.
- Grade 2 strains involve a significant number of muscle fibers and the proximal free tendon of the semimembranosus and may require an element of protection.
- Grade 3 strains involve a complete tear of the muscle or tendon. These require increased protection, are season ending, and may require surgical intervention.

### FOLLOW REFERRING PROVIDER MODIFICATIONS AS PRESCRIBED

## **HAMSTRING STRAIN NON-OPERATIVE GUIDELINES**

### **Phase 1: Acute/High Irritability Phase**

#### **PRECAUTIONS**

- Avoid pain with Activities of Daily Living (ADLs)
- Avoid hamstring stretching
- Avoid any sports specific activity

#### **CONSIDERATIONS**

- Determine the grade of strain and the tissues involved
- Grade 1 strains may progress more quickly through the phases

#### **ASSESSMENT**

- Lower Extremity Functional Scale (LEFS)
- Numeric Pain Rating Scale (NPRS)
- Observation (i.e. bruising, edema, posture)
- Neurovascular assessment
- Location and size of palpable defect
- Lower extremity (LE) active range of motion (AROM) and passive range of motion (PROM)
- LE flexibility, as appropriate
- LE strength with manual muscle testing (MMT) or handheld dynamometry (HHD), as appropriate
- Lumbar spine screen
- Hip Special tests
- Straight leg raise (SLR) in supine, as tolerated
- Pain with active knee flexion
- Gait: with/without assistive device (AD)
- Prior and current level of function
- Functional assessments: single leg stance, bilateral LE squat, single leg squat

## TREATMENT RECOMMENDATIONS

- Patient education
  - Activity modification (sitting posture, stair negotiation)
  - Icing compliance
  - Home exercise program (HEP)
- Gait training
  - May need to shorten stride length
  - Follow referring provider's prescribed weight bearing (WB) restrictions, typically:
    - Grade 1: weight bearing as tolerated (WBAT)
    - Grade 2-3: protected WB as per referring provider's instructions
- Soft tissue mobility: avoid location of injury
  - Neural tissue mobilization to decrease adhesions
- Flexibility: Hip flexors, quadriceps, gastrocnemius, soleus
- Strengthening
  - Pelvic tilts/core stabilization
  - Quadriceps sets
  - Prone gluteal sets
  - Isometric hip abduction and adduction
  - Initiate supine isometric hamstring strengthening
    - Must be pain free
- Upper Extremity (UE) and core strengthening: no limitations
- Modalities
  - Ice frequently throughout the day
- Cardio-based activities
  - Upper Body Ergometer (UBE)
  - Avoid Swimming

## CRITERIA FOR ADVANCEMENT

- Compliance with patient education and activity modification
- Pain management with ADLs and ambulation
- Good isometric hip and core activation
- Pain free isometric knee flexion (supine)
- Independence with HEP

## EMPHASIZE

- Limit activities that stress healing tissues
- Pain management
- HEP compliance

## MODIFICATIONS TO PHASE 1

- Imaging, pain, and activity tolerance may affect the length of duration of the phases

## **HAMSTRING STRAIN NON-OPERATIVE GUIDELINES**

### **Phase 2: Sub-Acute/Moderate Irritability Phase**

#### **PRECAUTIONS**

- Avoid progressing activity too quickly

#### **CONSIDERATIONS**

- Understand the biology of tendon and tissue healing with respect to loading
- Discuss timeline for return to sport/activity with multidisciplinary team

#### **ASSESSMENT**

- LEFS
- NPRS
- Observation (i.e. bruising, edema, posture, etc.)
- Neurovascular assessment
- Palpation
- LE AROM and PROM
- LE flexibility, as appropriate
- LE strength with MMT or HHD, as appropriate
- Lumbar spine screen
- Hip Special tests
- SLR in supine, as tolerated
- Pain with active and resisted knee flexion
- Gait: with/without AD
- Prior and current level of function
- Functional assessments: i.e. Single leg squat, step up and step down (6-8" step), knee flexion against gravity

#### **TREATMENT RECOMMENDATIONS**

- Patient education
  - Activity modification (load tolerance)
  - Icing compliance
  - HEP
- Gait training: Restore normalized gait pattern
- Soft tissue mobility
  - Scar tissue mobilization
  - Anterior, lateral, posterior hip and thigh, as needed

- Flexibility
  - Hip flexors, quadriceps, gastrocnemius, soleus
  - Hamstrings
    - Active in 90/90
    - Passive with strap, must be pain free
- Strengthening
  - Progress core stabilization
    - Modified to full planks: front and lateral
    - Bent knee fall out, ab set with marches, ab set with heel taps from tabletop
    - Cable column: Pallof press, chops, rotations
    - Bird-dog
  - Mini squats
  - Side stepping, three point taps (clocks)
  - Bridge progression
  - Standing and side-lying hip abduction and adduction
  - Hamstring eccentrics
    - Initiate prone and/or standing hamstring eccentrics
    - Bilateral LE and single LE deadlifts, windmills, lawnmower
- UE and core strengthening: no limitations
- Balance/Proprioception
  - Single limb stance (SLS)
  - Static/stable surface to dynamic surface
- Modalities: Ice frequently throughout the day
- Cardio-based activities
  - Upright stationary bike, pain free
  - UBE

## **CRITERIA FOR ADVANCEMENT**

- Compliance with patient education and activity modification
- Pain management with ADLs and activity progression
- Pain free AROM knee flexion
- 4/5 MMT of the LE
- Independence with HEP

## **EMPHASIZE**

- Limit activities that stress healing tissues and increase symptoms
- Pain management
- Hip and trunk stabilization and strength (frontal and transverse planes of motion first)
- HEP compliance

## **MODIFICATIONS TO PHASE 2**

- If there is a flare up, reassess and treat appropriately

## **HAMSTRING STRAIN NON-OPERATIVE GUIDELINES**

### **Phase 3: Chronic/Low Irritability Phase**

#### **PRECAUTIONS**

- Avoid progressing activity too quickly

#### **CONSIDERATIONS**

- Understand the biology of tendon and tissue healing with respect to loading
- Progress timeline for return to sport/activity with multidisciplinary team

#### **ASSESSMENT**

- LEFS
- NPRS
- Palpation
- LE AROM and PROM
- LE flexibility
- LE strength with MMT or HHD
- Lumbar spine screen
- Hip Special tests (including Bunkie test)
- SLR in supine
- Pain with resisted knee flexion
- Posterior chain firing sequence
- Gait/observation
- Prior and current level of function
- Functional assessments

#### **TREATMENT RECOMMENDATIONS**

- Patient education
  - Activity modification (load tolerance)
  - Icing compliance
  - HEP
- Soft tissue mobility
  - Scar tissue mobilization
- Anterior, lateral, posterior hip and thigh, as needed
- Flexibility
  - Hip flexors, quadriceps, gastrocnemius, soleus

- Hamstrings
  - Active in 90/90
  - Passive with strap, must be pain free
- Strengthening
  - Progress core stabilization
    - Dynamic core stability
    - Progress to full plank: front and lateral
    - Cable column: Pallof press, chops, rotations
    - Bird-dog
  - Squats
  - Wall runs (can use resistance band at feet)
  - Bilateral and single leg bridges
  - Stability ball bridges and hamstring curls
  - Resisted multidirectional and combined movements
    - Side stepping with chops/medicine ball slams
    - Resistance bands with lateral, sagittal and transverse movements
  - Hamstring eccentrics
    - Initiate Nordic hamstring strengthening progression
    - Progress bilateral LE and single LE deadlifts, windmills, lawnmower with weights and varied surfaces
- Balance/Proprioception
  - Dynamic single limb stance (SLS)
  - Star Excursion Test
  - Dynamic lunges in different planes of motion
- Plyometrics and running
  - Initiate light plyometrics as tolerated (jump rope, agility ladder, etc.)
  - Initiate running progression
    - Anti-gravity treadmill or aquatics if available
- Modalities: Ice, as needed
- Cardio-based activities
  - Upright stationary bike
  - Elliptical
  - UBE

## CRITERIA FOR ADVANCEMENT

- Compliance with patient education and activity modification
- Pain management with ADLs and activity progression
- Pain free resisted knee flexion
- 5/5 MMT of the LE
- Hop tests without hesitation/insecurity
- Ability to perform 30 single leg bridges
- Ability to tolerate plyometric and running progression

- Bunkie test normative values
- Completion of activity specific, functional program prior to return to sport (RTS)
- Independence with HEP

### **EMPHASIZE**

- Limit activities that stress healing tissues
- Hip and trunk stabilization and strength, multidirectional strength
- LE flexibility
- Kinetic chain linking and posterior chain firing sequence
- HEP compliance
- Endurance training
- Sport-specific activities with proper form and mechanics

### **MODIFICATIONS TO PHASE 3**

- If there is a flare up, reassess and treat appropriately



## **HAMSTRING STRAIN NON-OPERATIVE GUIDELINES**

### **Phase 4: Return to Sport Phase**

#### **PRECAUTIONS**

- No increase in pain with sport specific activity
- Monitor for fatigue

#### **CONSIDERATIONS**

- Timeline for return to sport/activity with multidisciplinary team

#### **ASSESSMENT**

- LEFS
- NPRS
- LE AROM and PROM
- LE flexibility
- LE strength with MMT or HHD
- SLR in supine
- Pain with resisted knee flexion
- Posterior chain firing sequence
- Prior and current level of function
- Functional assessments

#### **TREATMENT RECOMMENDATIONS**

- Patient education
  - Activity modification, as needed
  - Icing compliance, as needed
  - HEP
- Soft tissue mobility
  - Scar tissue mobilization
  - Anterior, lateral, posterior hip and thigh as needed
- Flexibility
  - Static and dynamic LE stretching
  - Foam rolling
- Advanced Strengthening
  - Continue LE strengthening and progressions, especially hamstring strengthening
  - Advanced dynamic core strengthening
- Advanced Balance/Proprioception
  - Focus on pelvic stability and control

- Initiate and progress through interval sports programs
  - Multiplanar movement patterns
  - Cutting and pivoting
  - Forward and backwards skips
  - Power
    - Medicine ball slams, rotations, etc. in varied positions
  - Plyometrics
    - Squat jumps
    - Box jumps
    - A and B skips
    - Split jumps
    - Bounding
    - Speed skaters
  - Progress running progression
    - Flat surfaces, hills, trail running
- Modalities: Ice, as needed
- Cardio-based activities, for cross training
  - Upright stationary bike
  - Elliptical
  - UBE

## **CRITERIA FOR ADVANCEMENT/DISCHARGE**

- Completion of interval sports programs with no increase in pain, fatigue or hesitation
- Full and pain free PROM and AROM
- Functional Testing
- Varies for each patient
- Sport specific testing
  - Star Excursion Test
  - Hop testing within 10% of uninvolved LE
  - Objective strength testing (HHD) within 10% of uninvolved LE
- Movement and agility testing, as needed

## **EMPHASIZE**

- Progress through interval sport program
- Proper mechanics with sports activity
- Endurance training and power development
- Sport-specific activities
- HEP compliance
- Full return to sport and training with team/coach

## **MODIFICATIONS TO PHASE 4**

- If there is a flare up, reassess and treat appropriately

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### References

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