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Hamstring Strain

ANATOMY

There are three muscles in the back of the thigh that are collectively called the hamstrings. They are named biceps femoris, semitendinosus and semimembranosus. The two attachment sites for the hamstrings are the ischial tuberosity (the bony prominence felt under each buttock when sitting), and the back of the knee at the tibia (shin bone). Contraction of the hamstring can cause the knee to flex, bringing the heel toward the buttock. The hamstrings also cause the hip to extend the thigh backwards when the knee is straight. The hamstring muscles provide control to the pelvis when bending forward with the knees straight.

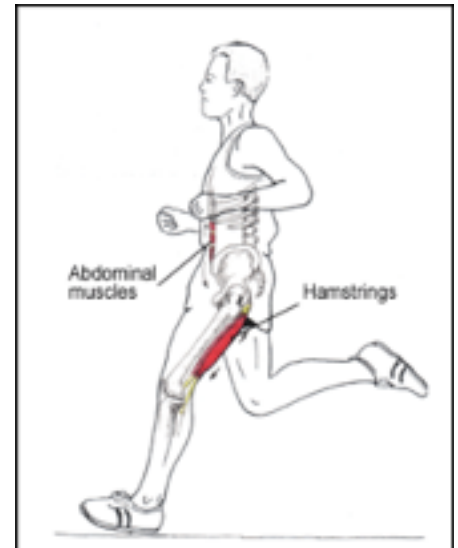
When walking or running, the hamstrings function to decelerate the leg and foot as it rapidly moves forward to land on the ground.

INJURY

A hamstring strain is an excessive stretch or tearing of muscle fibers and related tissues. Hamstring strains can occur at one of the attachment sites or at any point along the length of the muscle. They are classified as either 1st, 2nd, or 3rd degree, with a grade 3 hamstring strain being the most severe.

A pulled hamstring muscle most commonly presents as a sudden pain in the back of the thigh during fast running or sprinting, when there are great force demands on the muscle. Although hamstring strains often occur while sprinting, they also can occur during jumping and other activities where quick starts and stops are required. High risk sports for hamstring strains are: soccer, football, rugby, baseball, basketball, water skiing and many track and field events. Runners are especially susceptible to chronic hamstring strains due to the repetitive nature of the sport.

Also, when there is an imbalance of the strength of the hamstring muscles with relation to the quadriceps muscles, the risk of hamstring strain is greater.



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Severity of Muscle Strains. Muscle strains are graded as mild, moderate and severe. The more severe the strain, the longer the time to recover.

First Degree (Mild). This injury is the most common and usually the most minor. This injury is a 'pulled muscle' with a structural disruption of less than 5 percent. With a first-degree injury, you can expect to be back to sports within 1 to 3 weeks.

Second Degree (Moderate). This injury consists of a more significant, but still incomplete muscle tear. This a partial muscle tear and require 3 to 6 weeks of rest and recovery before you can return to full activity.

Third Degree (Severe). This injury results in complete tearing of the muscle-tendon unit. A third-degree muscle strain can take many weeks or months to fully heal.

TREATMENT

Rest from the activity that caused the muscle strain allows for healing to occur. Immediately following the muscle strain, ice should be applied over the painful area for 20 min. Periodic icing (2-3 times per day) will help to control swelling and reduce pain. Heat should not be applied to the area during the first 7-10 days since this may increase swelling and bleeding within the muscle. An elastic wrap or compressive stocking may be applied to the area to assist with swelling control. If the compressive device causes increased discomfort or "pins and needles" in any part of your leg, it is probably too tight. Lying down periodically with your leg elevated allows gravity to assist with your effort to control the swelling.

Though some experts believe early stretching to be valuable, caution should be taken to avoid aggressive stretching (stretching beyond the point of mild discomfort) which may disrupt healing. **NO** stretching or resistive exercise should be done during the first 3 weeks following injury.

As a general rule of thumb, any activity that elicits pain at or near the injured site may be causing further injury and will only hamper your recovery effort.

A gradual conditioning program, specific to your sport, will prepare the hamstrings for the high demands placed upon them during athletics. Don't forget to incorporate a proper warm-up and stretching session into your conditioning program and athletic competition.

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Rehabilitation Program

Exercises outlined in the rehabilitation program are described and illustrated in the back of the handout. The 'time line' that is illustrated in the following rehabilitation program is typical after grade 2 and 3 injuries. After a grade 1 injury, rehabilitation can usually begin at phase three.

Phase one - The first week after injury

- Rest from painful activities
- Ice 20 minutes, three times a day
- Compression wrap or neoprene sleeve

Phase two – the second and third week after injury

- Ice once a day, 20 minutes, after exercises
- Start active ROM exercises, 1-2 times a day, 10 to 20 repetitions
- Quad sets
- Heel slides (towel assist if painful)
- Toe raises
- Standing hamstring curls
- Standing or prone SLR hip extension
- Stationary bicycle, 10 minutes, no resistance, if pain free • **NO stretching**

Phase three – the 4th, 5th and 6th week after injury

Begin gentle strengthening, 1 time a day, 5 days a week, 15 to 30 repetitions

- Start 11lb ankle weight.
- Standing hamstring curls, add one pound a week to 5 pounds
- Standing or prone SLR hip extension, PRE one pound a week to 5 pounds
- Stationary cycle, add 1 minute per session up to 30 to 40 minutes
- Slow treadmill walking, pain free, start 5 minutes and add one minute per session to 20 minutes or start "Return to Walk\Run Program" (see below).
- Gentle pain-free stretching, two times a day (see stretching illustrations and instructions in the back of the handout).

Phase four – 7 to 12 weeks after injury

- Start gradual hamstring and quadriceps strength training, maintaining a 4:3 Hamstring: Quadriceps ratio, 3 times a week.
- Follow 'Strength Training for the Knee' supplement and Principles of Progressive Resistance exercise.
- Stationary cycle
- Gentle hamstring stretching
- Start "Return to Full Speed Running Program if able to jog 1 mile pain-free.

Phase five – from 12 weeks onward

- Continue above program
 - Start return to sports training

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Return to walk run program

General instructions

1. Walking/jogging should be done no more than every other day.
2. The program should be performed step by step. Do not advance your program until you can successfully complete the initial step. Let pain and swelling be your guide. If the activity creates pain, swelling, or causes your to limp, go back to the previous step.
3. Before starting the program and after completion of the program, allow 15 minutes to preform warm-up and gentle stretching exercises.
4. Cool down by gently stretching all muscle groups.
5. Ice for 20 minutes after cool down stretching

PHASE 1

Day #1 Walk 1/4 mile—easy pace (1/2 speed)
Day #2 Walk 1/4 mile—(3/4 speed)
Day #3 Walk 1/4 mile—full speed (briskly)

PHASE 2

Day #1 Walk 1/2 mile—easy pace (1/2 speed)
Day #2 Walk 1/2 mile—(3/4 speed)
Day #3 Walk 1/2 mile—full speed (briskly)

PHASE 3

Day #1 Walk 3/4 mile—easy pace (1/2 speed)
Day #2 Walk 3/4 mile—(3/4 speed)
Day #3 Walk 1 mile—comfortable pace: 3/4 full speed

PHASE 4

Day #1 Jog 1/4 mile, Walk 3/4 mile, comfortable pace
Day #2 Jog 1/2 mile, Walk 1/2 mile, comfortable pace
Day #3 Jog 3/4 mile, Walk 1/4 mile, comfortable pace

PHASE 5

Day #1 Jog 1/4 mile, Walk 3/4 mile, comfortable pace
Day #2 Jog 1 mile
Day #3 Jog 1 mile

You can continue to increase your distance by 1/4 mile per session until you reach your desired distance. When you have reached your training distance without causing any pain or swelling, and have a normal running form, you can gradually start to increase your running speed and distance.