essential skills

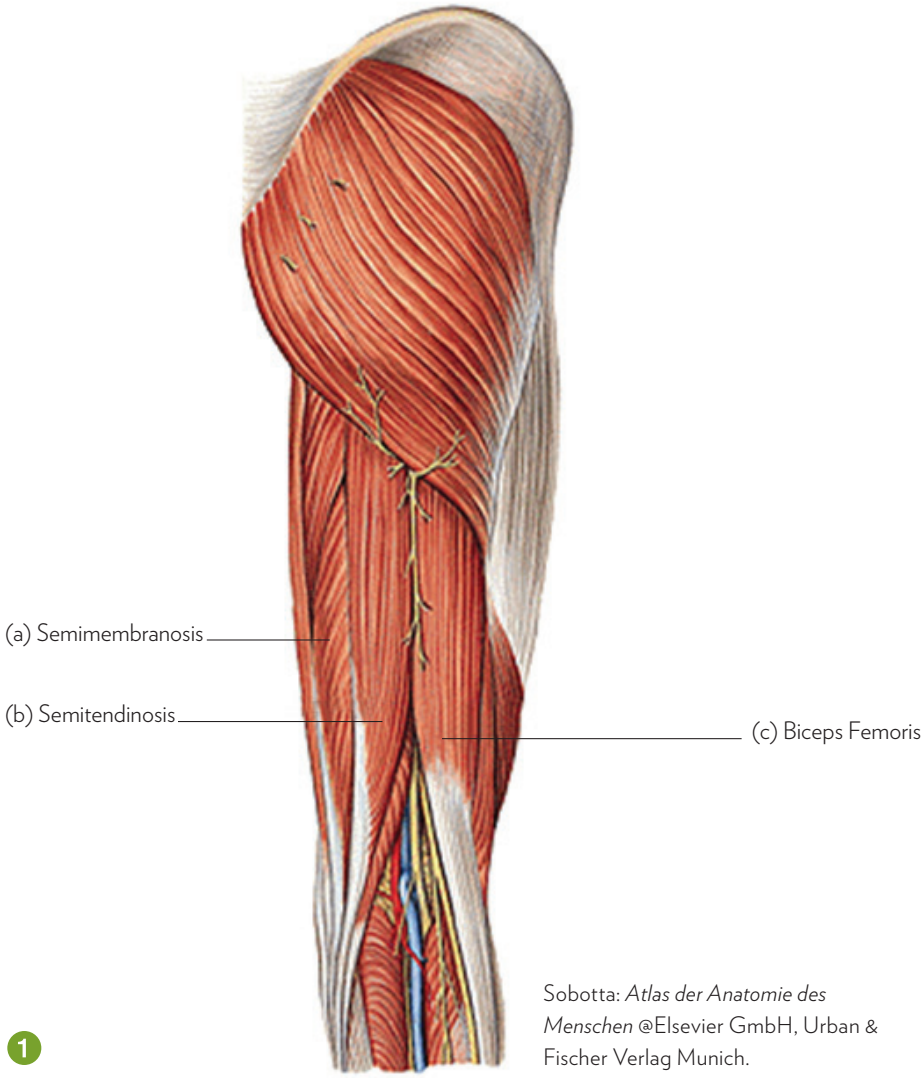
BY BEN E. BENJAMIN

PULLED HAMSTRING, PART 1

Pulled hamstring is a term often used to describe pain in the back of the thigh, but the hamstring can also be "pulled" in the lower buttock, behind the knee, or near the front of the knee—either medially or laterally.

What this indicates is that some fibers—belonging to either a hamstring muscle or tendon—are strained. The pain can be felt anywhere along the three important muscle tendon units.

There are three hamstrings: a) the semimembranosis on the medial side, b) the semitendinosis in the middle, and c) the biceps femoris on the lateral aspect (Image 1). All of the hamstrings begin at a common tendon at the ischial tuberosity at the base of the pelvis. This is the part of the pelvis that makes contact with the chair when seated. These muscles in the posterior thigh are among the longest in the body and span two joints: the hip and the knee. They extend the hip and flex the knee to help you walk, run, jump, and climb stairs. The semimembranosis and the semitendinosis control the medial half of the posterior thigh and attach just below the anterior medial knee. The biceps femoris covers the lateral half of the posterior thigh and attaches at the head of the fibula at the lateral aspect of the knee. Injuries to parts of the hamstring near the knee joint can easily be mistaken for problems in the knee itself.



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HOW AND WHY IT HAPPENS

Suddenly it appears—pain in the back of the thigh. Hamstring injuries usually occur without warning. Running hurts, climbing stairs may be painful, and bending forward to stretch is the worst. It's common to just wake up and find the hamstring painful.

If a client has pain in the posterior thigh when using the hamstring muscles, there's a good chance that the person has a pulled hamstring. A painful sensation in the middle section of the back thigh means that there are microtears in the muscle fibers and adhesive scar tissue is continually forming. Pain high up at the base of the

buttock around the ischial tuberosity means that a part of the common tendon attaching the hamstring to the sit bone is affected. The tendons at the distal aspect of the hamstrings are quite long and can be strained anywhere from 4–6 inches superior to the back of the knee. And finally, the tendons can be strained at their distal attachments at the knee. The muscle belly may also become injured. In severe strains, both the tendon and muscle are injured.

Injuries to the muscle belly may heal quickly because of the rich blood supply; however, these muscles often heal with poor scar-tissue formation, and a recurring problem can develop if appropriate treatment and/or rehabilitation exercises are not performed until healing has fully occurred. Hamstring tendon injuries heal more slowly and need more care because the blood supply is more limited. The initial injury often occurs while stretching or during running activities, especially when there has been no prior warm-up. The cold muscles resist stress when tension is suddenly placed on them, and fibers tear. This injury is also likely to happen if the muscle is fatigued. People tend to keep using the thigh and stretching it because it often gives temporary relief by freeing the scar tissue for a short period of time. Unfortunately, what usually happens is that these overexertions create more and more scar tissue until the thigh cannot be used beyond a certain point of exertion without pain.

Confusion arises with hamstring injuries because similar pain patterns can be caused by injuries to the low back or hip joint. Differentiating the cause can be challenging even for highly trained and skilled health-care professionals. When a client has difficulty locating the precise location of the pain, or feels an amorphous pain deep within the back thigh, especially after prolonged sitting, it could be

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a referred pain phenomenon from the low back. A disc protrusion, or a ligament injury in the low back, could be causing the pain. For instance, when injured, the sacrotuberous and sacrospinous ligaments in the lower pelvis frequently refer pain down the back of the thigh and sometimes as far as the calf and heel. If the pain goes below the knee and into the calf, then the picture becomes clearer—hamstring tears don't refer pain to the lower leg. But if the pain is exclusively in the posterior thigh, assessing the problem can be confusing. Another tip is that if bending backward or sideways while standing recreates the pain, then it is more likely to be a back injury.

Hip-joint injuries will also refer pain to the thigh, but usually the pain is felt deep within the thigh, and it is difficult for the person to bring the knee to the chest without significant pain. (For more details on how to differentiate back pain from hamstring injuries, see Ben Benjamin's webinars on low back and the hip and thigh, "The Mystery of Low Back Pain, Part 1," December/January 2006, 102–108; "The Mystery of Low Back Pain, Part 2," February/March 2006, 108–115; and "The Mystery of Low Back Pain, Part 3," April/May 2006, 106–111.)

A hamstring injury can continue for months or years if not treated properly. A young athlete once came to me with a chronic hamstring problem and said, "I've been really stretching my hamstrings religiously—every day for seven months. I can't understand why it's not better." He showed me the stretches, which were done forcefully and without a warm-up prior to his routine. The lack of improvement he experienced resulted from this daily stretching. The improper stretching was tearing apart the new tissue that was forming; the fibers did not have time to heal and become strong. His stretching routine was creating more poorly formed scar tissue, causing mini-reinjuries. The original injury could have healed and disappeared with rest and gentle stretching and strengthening exercises, but it became chronic because of premature and too-vigorous activity.

INJURY VERIFICATION

In order to differentiate a hamstring injury from a low-back injury, a therapist would use several different types of tests to stress the muscle tendon unit. Pain or discomfort with an isometric movement against resistance tells you it's the hamstring that is injured. Pain while stretching the back thigh is a positive indicator, but this type of pain can also be associated with an injury to the low back. During testing, it is important to be aware that pain down the back of the thigh can be the result of a number of causes.

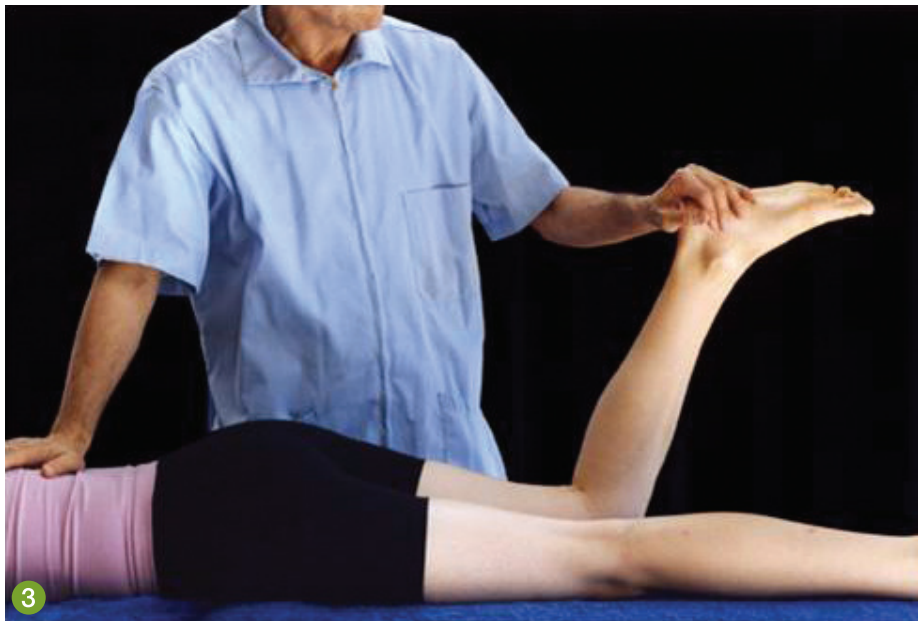
A sciatica-type pain in the hamstring region can be caused by

a variety of dysfunctions. Sciatica simply means a referred pain going down the leg. The pain may stop in the thigh or continue all the way to the foot. In addition to a nerve root being compressed by a herniated disc, this same type of pain can be produced by injury to a portion of the posterior sacroiliac, sacrotuberous, or sacrospinous ligaments. Additionally, an injury to the posterior hip joint capsule may refer pain to the upper hamstring area as well. When a disc is affected, there will be noticeable weakness in certain movements. When a ligament is the root cause, pain while sitting will often cause pain in the thigh and will frequently come and go depending on the type of activity the person is engaged in.

Resisted flexion of the knee supine.

RESISTED FLEXION OF THE KNEE SUPINE

A hamstring test against resistance can be done in several positions. Each position puts a slightly different kind of stress on the hamstring. In this first test (Image 2), the client is lying supine with the injured leg bent at a 90-degree angle, and their foot starts on the table. The practitioner places his or her hands around the back of the heel as the client attempts to pull the heel toward the buttock. The practitioner is giving equal resistance, and there is no movement. If there is pain, this indicates a hamstring strain. In this position, stress is placed more on the distal portion of the hamstrings, close to the knee.



Resisted flexion of the knee prone.

RESISTED FLEXION OF THE KNEE PRONE

In the second test (Image 3), which applies greater stress to the upper portion of the thigh, the client is lying prone with the lower leg bent at a 90-degree angle. Standing at the level

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of the client's waist, the practitioner places his or her hand on the client's heel and resists as the client tries to bend the knee. The practitioner doesn't try to overpower the client, but simply meets the resistance. If there is pain or discomfort, the hamstring is injured.

Sometimes, during testing, the back thigh cramps. If this occurs, perform the test at an 80-degree angle—this usually eliminates the cramping. The hamstring may be weak and more prone to cramping because it has been injured and out of full use for awhile, but the thigh may also be weak and cramp easily because of a nerve-root compression.

PALPATION TO LOCATE THE STRAIN

Next, the practitioner locates the precise part or parts of the muscle-tendon unit that may be strained and scarred. In order to give effective treatment, all the affected fibers need to be located and treated. If the hamstring is injured, locating the injured areas is not difficult. While the client is lying prone, palpate along the length of the hamstring for the painful areas (Image 4). Since there is no referred pain from a hamstring injury, the client can usually direct you to the general area of injury—low, high, or in the midsection. Having the client resist during palpation testing often makes identifying the precise location of the injury easier because the hamstring fibers are under stress.

If identifying the location of the injury is difficult, it is likely that the pain in the hamstring area is a referred pain from the back or hip joint.

In Part 2 of this article, we will cover self-treatment, friction therapy, and therapeutic exercises. **m&b**

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Editor's note: *Massage & Bodywork* is dedicated to educating readers within the scope of practice for massage therapy. Essential Skills is based on author Ben E. Benjamin's years of experience and education. The column is meant to add to readers' knowledge, not to dictate their treatment protocols.