ALTHOUGH HAMSTRING strains are a common injury, there is no consensus on how best to rehabilitate the athlete for return to sports. Furthermore, the recurrent nature of hamstring injuries often prolongs or prevents full return to sports. This two-part series will provide a functional approach for managing hamstring strains from the acute phase (Phase 1) up to the final goal of return to sports (Phase 2). Part I presents the early recovery phase of rehabilitation, and Part II will cover the initial reentry to a spectrum of exercises, focusing on return to competition.

Several causes of hamstring strains are presented in the literature, including imbalance in muscle strength between the quadriceps and hamstrings, imbalance between the right and left hamstrings, decreased hamstring flexibility, muscle fatigue, and insufficient warm-up. Recurrent injuries are commonly attributed to incomplete rehabilitation of a hamstring strain before resuming competition. Most research pertinent to hamstring strains has been conducted postinjury, and the aforementioned findings might be results of the injury, not the causes.

In order to effectively treat hamstring injuries it is important to understand the function of the muscle group and the mechanism of injury. During sprinting and jumping, which are the primary causes of hamstring strains, the hamstrings eccentrically decelerate the thigh and lower leg during the last half of the swing phase of gait, help extend the hip and stabilize the knee on foot strike (concentric action), help stabilize the pelvis, and assist in push-off. Most hamstring injuries occur in the late swing phase or when the foot strikes the ground, at which point force production by the hamstrings is high. In this phase of eccentric-to-concentric muscle action, the hamstring is elongated at both the hip and the knee, predisposing it to injury.

Traditional rehabilitation of hamstring injuries has involved a progression from isometric to isotonic to isokinetic exercises. Commonly used exercises include hamstring curls, squats, and a gradual return to running. These exercises strengthen the hamstring group, but they do not mimic hamstring function during running or jumping. It is our belief that if these uniplanar exercises are the only focus of the rehabilitation program, the original injury site will remain a weak link in the kinematic chain from the failure to impart sport-specific stress to the injured area, and thus the athlete will be predisposed to reinjury.

Rest, ice, compression, and elevation are the cornerstones of early management for hamstring strains. If the athlete’s normal gait pattern is affected, crutches should be used to prevent abnormal lower extremity compensations and to reduce strain on the acutely injured leg. A knee immobilizer or functional range-of-motion brace might be used for additional support or to help reduce pain. Crutches can be discontinued when the athlete demonstrates a pain-free normal gait pattern. The efficacy of therapeutic modalities (ultrasound or electrical stimulation) in treating hamstring strains has not been proven in the literature, and further discussion is beyond the scope of this column.

Phase 1 of the rehabilitation program should begin as soon as acute symptoms (worsening pain and declining functional ability) subside. Early rehabilitation focuses not on increasing strength but on providing submaximal levels of stress to the injured
tissue to aid in the proper alignment of collagen fibers during the healing process.

The following exercises are presented in the recommended sequence of performance. This sequence is used in order to actively warm up the muscles before introducing integrated movements. Isolated exercises are performed last to prevent the cool-down effect commonly encountered with isolated movements.

Warm-up can be achieved either by walking (treadmill) if pain free or by riding a stationary bike. Active knee extension to the point of initial tightness can be performed for 20–30 repetitions. Static holding of the pain-free, end-range position can be performed, but is not necessary to regain symmetrical hamstring length. Regaining maximal hamstring flexibility should not be emphasized at this time.

Integrated strengthening consists of running motion, single-leg balance with opposite-leg swings (Figure 1), medicine-ball kicks (Figure 2), quarter-squats, and carioca walk. These exercises emphasize functional movement patterns while placing minimal stress on the acutely injured hamstring region. The integrated exercises should be performed bilaterally so that the injured leg is challenged in both the open and the closed kinetic chain.

Because lower body training options are limited during this phase of rehabilitation, more focus can be placed on core-stability exercises. The side bridge provides a significant challenge to lateral trunk stability while placing a relatively low load on the spine. The woodchopper and diagonal woodchopper should be performed with slight hip and knee flexion in this early phase of recovery. Many other core-stability exercises can be used during this phase, although caution is advised when using techniques that require significant hamstring activity (e.g., supine bridging). Isolated strengthening consisting of stool pulls and standing hamstring curls are the final exercises.

Careful manipulation of the following variables will provide the necessary stimulus for progression without hindering recovery: the range of motion used during the exercise, the speed of leg movement, and the volume of training (total repetitions).

In summary, inappropriate rehabilitation in this early phase and an overzealous advancement of the exercises will most likely result in a recurrent injury. Progression from Phase 1 to Phase 2 may take place when the athlete can perform the exercises through a full range of motion at moderate speed without symptoms. The absence of postexercise muscle soreness is another indicator of readiness for progression to Phase 2.

Disclaimer

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References


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