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Hamstring Strain

Hamstring muscles are on the back of the thigh extending from the pelvis to the back of the knee. Strains to the hamstring muscle group are unfortunately often recurrent, with prolonged rehabilitation and persistent disability. Most hamstring injuries involve one of the three hamstring muscles and tear near the muscle-tendon junction. Rarely, a hamstring muscle will rupture away from its bony insertion on the pelvis.

There are several challenges a hamstring strain presents. One challenge is to properly rehabilitate the injury, such that, we avoid re-injury, yet return to full training and competition as soon as possible. Another challenge is to identify predisposing factors, which contribute to hamstring strain.

Traditional Rehabilitation of Hamstring Strain

The classic rehabilitation program is based on the tissues theoretical healing process. Injured muscles must progress through stages of healing. There are 3 stages, the first is called acute cellular reaction phase. The second stage is fibroplasia. The third stage is scar maturation. The time it takes to progress through each phase of repair is dependent on many factors, especially the severity of the original injury. It is important to remember that exercise does not make the healing cells/tissues heal quicker, but may make the healing cells/tissues bigger and stronger.

Each stage has different requirements in terms of what is safe and appropriate exercise and activity. The first stage should involve resting and protecting the injury. The second stage is what I call “being on the fence”. It involves some resting and protecting, but it also involves some strengthening and stretching exercises. The third stage involves stretching strengthening, functional activities, training “pushing and building”.

The rest and protect phase last from 1 to 5 days. Starting exercise in this stage can lead to re-injury and disruption of the healing tissue.

The second stage last from 1 to 5 days after the injury to 6 weeks. This is a good time to begin strengthening adjacent muscles, which have not been injured. Some form of cross training to maintain aerobic capacity with out straining the injured muscle is very appropriate.

The final stage last from 3 to 6 weeks till several months. This is when running can occur in earnest. The goal is to fully strengthen the injured muscle so that it is at least equal in strength and length of the uninjured side. A muscle may be strong enough to

function at sub maximal level, but not strong enough to function at maximum levels. Failure to fully rehabilitate the muscle to 100% can contribute to re-injury.

Recognize in terms of exercise and activity there are two possible mistakes. Beginning exercise and running too soon will disrupt healing process. Beginning to soon also leads to re-injury. Studies of college football players found 25% recurrence of hamstring injuries. The other mistake is not beginning exercise and running soon enough which results in de-conditioning.

It seems to me the safer mistake for a recreational runner is that if you are not sure whether you should begin running or exercising it that it would be safer to not do it. This philosophy matches up well with Dr. Tim Noakes "6 week rule". Dr. Noakes rule of thumb is a majority of running injuries heals up in 6 weeks if allowed to do so.

Risk Factors

There is limited research identifying possible risk factors including improper warm-up, fatigue, previous injury, poor flexibility, and strength imbalance. Burkett, LN (1970) concluded if the hamstring strength was 60% of the strength of the quadriceps muscle there is a 60% chance of injuring the hamstring. He studied professional football players.

In my experience dealing with hamstring strain in long distance runners' I find that they do not have an imbalance with the quadriceps muscle being stronger than the hamstring, but just the opposite the hamstring is stronger than the quadriceps. This can happen if there was a previous injury to the knee leading to residual atrophy of the quadriceps muscle. In many circumstance the quadriceps and hamstring muscle work synergistically to extend the knee. If, the quadriceps muscle is weak the hamstring will compensate in order to extend the knee. This leads to an over worked hamstring muscle.

Another muscle imbalance, which can lead to hamstring strain, is a weak lower abdominal muscle (external oblique abdominal muscle) and an overly developed hamstring muscle. This situation can occur on one side of the body if there is a history of an inguinal hernia. In certain situations both the lower abdominal muscles and the hamstrings act to tilt the pelvis in a posterior direction. If the lower abdominal muscle is deficient in its action to stabilize the tilt the pelvis the hamstring compensates by working harder.

In both of these situations rehabilitation and prevention should address the weak synergistic muscles. Recent work by Sherry (2004) supports this concept. He demonstrated the addition of core stabilization exercises to traditional stretching and strengthening exercises are more effective than just traditional and strengthening exercises for hamstring strain.

If the symptoms of a hamstring strain last longer 6 weeks or reoccur several questions arise. Is it really a hamstring strain? Has the muscle been fully rehabilitated? Are there adjacent muscles, which are weak and need strengthening?

