



SPORTS / EXERCISE / FITNESS

The Power of Eccentric Exercise: Hamstring Injury Prevention and Rehab

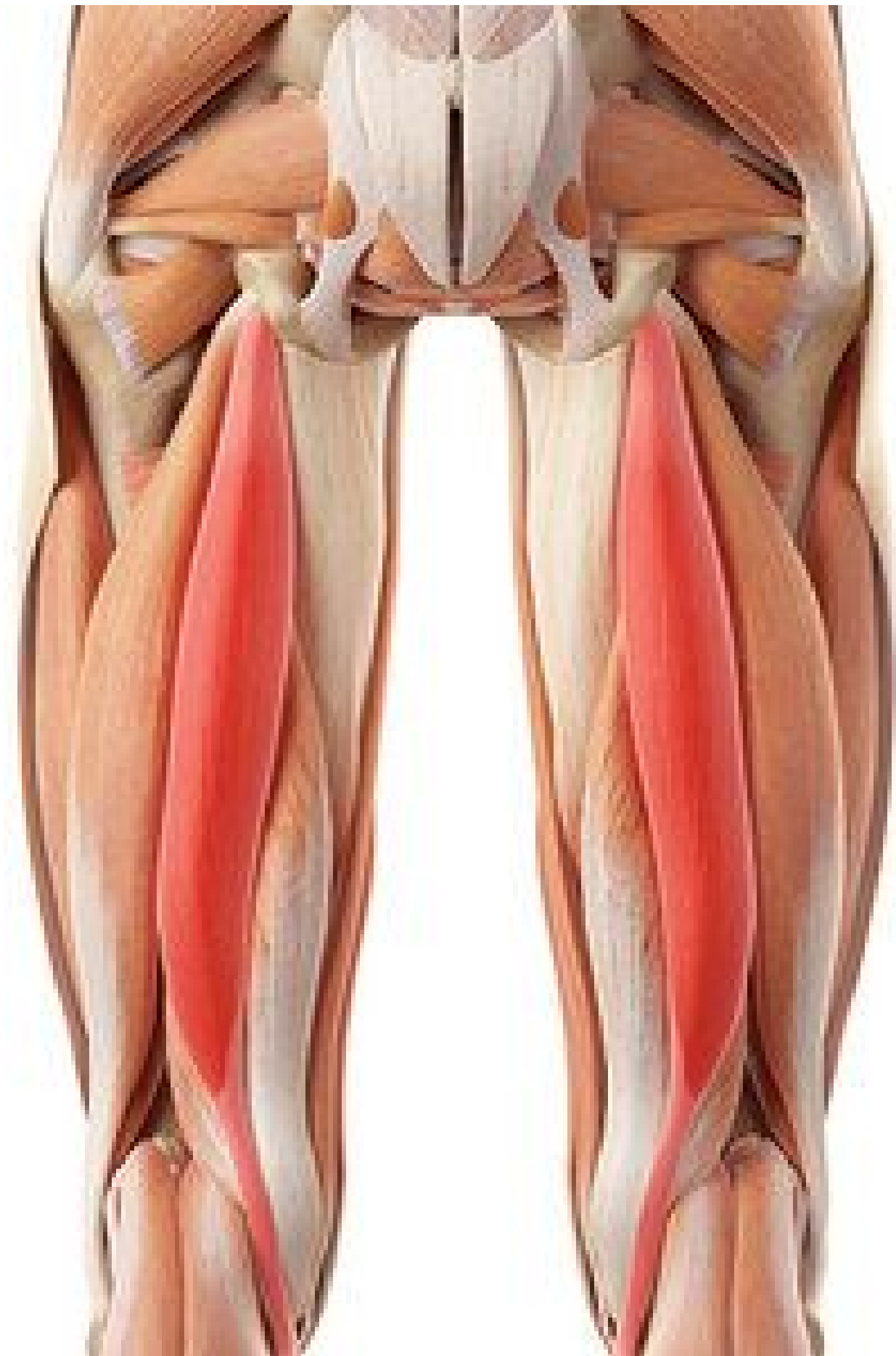
Thomas Feeney, DC

For almost 20 years, I've worked with professional athletes who make a living by running really fast. It goes without saying that hamstring injury (HSI) prevention and rehabilitation is a big part of what they expect from a sports chiropractor. I regularly treat [Premiership footballers](#) (as they are called over here in the U.K.), after they suffer an HSI or groin strain. They are often back on the pitch well before their speed and strength have returned to pre-injury levels.

I've been treating a player recently who went through this scenario. Let's discuss what we did to help him get his speed and strength back.

A Few Facts and Figures

- HSIs have increased by 4 percent annually in men's pro European soccer since 2001.¹
- Interestingly, the increase in HSI has occurred in training, not games.
- Eccentric strength often does not return, even after symptoms abate.²
- Short biceps femoris fascicles and eccentric knee flexor weakness increase the risk of hamstring injury in elite soccer players.³
- Most cases of HSI involve the long head of the biceps femoris (BF_{lh}).⁴
- Flexibility often does not return.



Consequences & Complications

- After the HSI, pain causes the athlete to avoid strengthening the muscle at longer lengths.
- Neuromuscular inhibition sets in.²
- The hamstring atrophies and the muscle fascicles shorten.
- Knee flexor torque joint angles change.
- Traditional rehab (leg curls) doesn't address the shortened fascicles.
- Re-injury risk remains high.

Focused Structural Rehab

Going against the grain of the movement toward "functional" exercise, the structural damage of individual muscles is targeted using eccentric contractions. Eccentric hamstring exercises performed with the muscle in a stretched position are used to lengthen the shortened muscle fascicles post HSI. This is crucial to not only reducing HSI recurrence, but also in getting the athlete's power back.

Eccentric hamstring exercises have been shown to prevent first-time and recurrent HSI.⁵ These exercises are a vital part of breaking the cycle of pain, atrophy, weakness and re-injury. The following exercises provide an eccentric contraction of the hamstring in a lengthened position:

Nordic hamstring curl: While kneeling, lock the ankles down with a piece of gym equipment or with the hands of a helper. Slowly lower the torso forward while keeping the thighs in line with the torso. Attaching a band to the shoulders from behind is helpful in making it easier to near the floor before failure.

Glider: Start in a standing position while holding something sturdy. Slide one foot backward as far as you can comfortably go and then use your arms to pull yourself back to standing. Try to keep only a slight bend at the knees.

Stiff-legged deadlift: Stand with the torso straight, feet shoulder-width apart and knees slightly bent. Keeping the knees stationary, lower the torso by bending at the waist while keeping your back straight. Lower the torso forward as if you were going to pick up something from the floor until you feel a stretch on the hamstrings; then bring the torso up straight again by extending your hips until you are back at the starting position.

Single-leg deadlift: Standing on one foot, bend forward, keeping the back straight while extending the free thigh backward at the same time. The torso and the extended thigh should stay in line and move as a unit.

Building up tolerance to eccentric loading and resilience to muscle damage is important in preseason and during the season. Of course, in-season muscle soreness and sprinting load need to be managed.

What Role Does Neuromuscular Inhibition (NI) Play?

A recent study may have provided some insight into why the HSI recurrence rate is so high. Opar, et al.,⁶ studied 99 Aussie footballers (82 controls) with a history of unilateral HSI. The eccentric strength of the hamstrings was measured (Nordbord) at the start and the end of the preseason training utilizing the Nordic hamstring exercise. Players with a history of HSI displayed *less improvement* in eccentric

hamstring strength across preseason training. The smaller improvements were not restricted to the previously injured limb, as the *contralateral limb* also displayed similarly small improvements in eccentric strength.

Chiropractic and Active Release

The two big factors after an HSI are NI and the structural muscular damage (shortened hamstring fascicles). Manual therapy in the form of chiropractic and soft-tissue work such as ART may help in addressing both. Chiropractic may play a role in decreasing NI through a neurophysiological effect. ART is a movement-based soft-tissue therapy. A patient shortens the hamstring and then fully lengthens the muscle, while the provider maintains a manual tension on the muscle. The provider's hands provide a fixed tension as the hamstring slides under the contact. ART has been proven to be effective at increasing hamstring flexibility⁷⁻⁹ and could play a role in lengthening hamstring muscle fascicles after an HSI.

References

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