Eccentric Strengthening at Long Muscle Lengths Reduces Hamstring Strain Recurrences: Results of Long Term Follow-up

Timothy F. Tyler, Brandon Schmitt, Joshua M. Gellert and Malachy P. McHugh

Orthopaedic Journal of Sports Medicine 2014 2:
DOI: 10.1177/2325967114S00081

Eccentric Strengthening at Long Muscle Lengths Reduces Hamstring Strain Recurrences: Results of Long Term Follow-up

Timothy F. Tyler, MS, PT, ATC[1], Brandon Schmitt, DPT ATC[2], Joshua M. Gellert, DPT[3], Malachy P. McHugh, PhD[4]

[1]PRO Sports Physical Therapy, Scarsdale, NY, USA, [2]PRO Sports PT, Scarsdale, NY, USA, [3]Nicholas Institute of Sports Medicine and Athletic Trauma, Lenox Hill Hospital, New York City, NY, USA, [4]Nicholas Institute of Sports Medicine and Athletic Trauma, Lenox Hill Hospital, New York, NY, USA.

Objectives: Hamstring injuries are among the most common injuries in sports involving sprinting and have a high recurrence rate (20-33% recurrence rates reported in the literature). Rehabilitation protocols that can prevent recurrences are needed. The purpose of this study was to determine if a protocol emphasizing eccentric strength training with the hamstrings in a stretched position resulted in a low recurrence rate after return to play.
Methods: Forty-eight athletes (age 35±16 yr; 31 men, 17 women) with unilateral hamstring strains (3 G1, 41 G2, 4 G3; 27 recurrent injuries) followed a 3-phase rehabilitation protocol (phase 1: isometric and isotonic strengthening at short to intermediate muscle lengths; phase 2: eccentric strengthening at short to intermediate lengths; phase 3: eccentric strengthening in a stretched position). Athletes progressed to the next phase when pain free with maximum contractions and were discharged to sports when pain free with maximal eccentric contractions in a stretched position and with functional tests. Prior to discharge, isometric strength was assessed bilaterally at 80º, 60º, 40º and 20º knee flexion in sitting with the thigh flexed to 40º above horizontal. Eight athletes chose to return to play prior to completing the rehabilitation and were categorized as noncompliant (5 completed phase 2, 3 completed phase 1). Reinjury rates and hamstring strength were compared between compliant and noncompliant athletes using Fisher exact tests and analysis of variance.
Results: None of the 40 compliant athletes had sustained a reinjury at an average of 20±13 months after returning to sports (18>2yr, 7 1-2yr, 15<1yr). Three of the 8 noncompliant athletes sustained reinjuries between 3 and 5 months after return to play ($P<0.01$ vs. compliant athletes). At time of return to sport, noncompliant athletes had significant hamstring weakness, which was progressively worse at longer muscle lengths (20% deficit at 80º, 23% at 60º, 31% at 40º, 43% at 20º; Angle effect $P<0.001$). Compliant athletes had symmetrical strength at all angles ($P=0.99$). Compliant athletes averaged 17±7 treatments over 11±7 wks versus 12±7 treatments over 13±11 wks for noncompliant athletes ($P=0.11$, $P=0.53$).
Conclusion: Rehabilitation with an emphasis on eccentric strength training with the hamstrings in a stretched position resulted in zero recurrent injuries at an average of 1.7 years after return to play.

The Orthopaedic Journal of Sports Medicine, 2(7)(suppl 2)
DOI: 10.1177/2325967114S00081