The Effect of Adverse Neural Tension on Hamstring Strength in Rugby Players

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ABSTRACT

PURPOSE: The slump test is used to assess adverse neural tension (ANT) in athletes with low back or hamstring injuries. Hamstring stretching with the addition of neural tension (Brockett et al, 2004) has been shown to reduce peak torque (Mazza et al, 2013). The purpose of the study was to assess whether rugby players presenting with a positive neural tension sign had associated hamstring weaknesses. 

METHODS: The slump test and hamstring strength were assessed in 30 rugby players in preseason (age 26±4 yr, height 183±8 cm, weight 94±13 kg). In a seated position, the subject was instructed to try and move the knee away from the chest while keeping ankle dorsiflexed. Knee and ankle angles were measured with a goniometer. Tests were performed three times with the best result used. Muscle contractions were performed with the muscle in a lengthened position. Anterior shear force was measured using a force plate. Passive isometric flexion was measured using a force plate. Baseline passive torque due to limb mass and passive muscle tension was subtracted from the measured torque to provide a measure of contractile torque production. The average of the 2 contractions at each angle is reported. When muscle contractions are performed with the muscle in a lengthened position, the effect of adverse neural tension and previous hamstring strain on contractile tension was assessed by angle specific hamstring strength was assessed by angle group anova. The effect of adverse neural tension and previous hamstring strain on angle specific hamstring strength was assessed by angle group anova. RESULTS: Ten of 39 players had a positive neural tension sign (6 bilateral = 16 positive neural tension signs). Twenty players reported a previous hamstring strain (6 bilateral). Six of 26 previously injured hamstrings had a positive neural tension sign. Ten players reported a previous hamstring strain (6 bilateral = 26 previous strains). Six of 26 previously injured hamstrings had a positive neural tension sign (6 bilateral = 16 positive neural tension signs). Ten of 39 players had a positive neural tension sign (6 bilateral = 16 positive neural tension signs). 

RESULTS contd.

DISCUSSION

The slump test is used to assess adverse neural tension and has been shown to be positive in rugby players with recent hamstring strains (Turl and George, 1998). Kromberg and Lew (1989) demonstrated superior outcomes for rehabilitation of grade 1 hamstring strains when adverse neural tension was addressed and treated. More recently hamstring stretching in the slump position was shown to result in marked post-exertion lengthening of the hamstrings (Mazza et al, 2013). The hypothesis was that adverse neural tension results in strength losses when muscle contractions are performed with the muscle in a lengthened position.

METHODS

Experimental Protocol

The slump test and hamstring strength were assessed in 39 rugby players in preseason (age 26±4 yr, height 183±8 cm, weight 94±13 kg).

Stump Test Procedures

The slump test was performed in sitting with 4 different levels of neural tension (Fig. 1):

1. No tension (Fig. 1)
2. Seated knee extension in spinal neutral position with ankle dorsiflexed.
3. Seated knee extension in the slump position with ankle plantarflexed.
4. Seated knee extension in the slump position with ankle dorsiflexed.

A positive test was defined as pain or discomfort during knee extension in the slump position with or without dorsiflexion.

RESULTS

Thirty-nine players had a positive neural tension sign (6 bilateral = 16 positive neural tension signs). Twenty players reported a previous hamstring strain (6 bilateral = 26 previous strains). Six of 26 previously injured hamstrings had a positive neural tension sign. Ten of 39 players had a positive neural tension sign (6 bilateral = 16 positive neural tension signs). Ten of 39 players had a positive neural tension sign (6 bilateral = 16 positive neural tension signs). Ten of 39 players had a positive neural tension sign (6 bilateral = 16 positive neural tension signs).

Statistical Analysis

Effect of neural tension on hamstring strength was assessed using Angle (100°, 80°, 60°, 40°) x Hamstring Strain (yes/no) mixed model ANOVA. Prevalence of positive neural tension sign in previously injured hamstrings was assessed using Fisher’s Exact Test.