Late-Stage Rehabilitation for a Recurrent Hamstring Injury in a Division 1 Men's Lacrosse Athlete

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Introduction

- **Introduction:** Hamstring strain injuries(HSI) are one of the most common injuries in athletics, accounting for 10% of all injuries in field sport athletes(Maniar et. al., 2021). Return to sport can typically be achieved within weeks, although subsequent athletic performance may be impaired and reinjury rates can be as high as 54% at the distal musculotendinous junction of the biceps femoris(Entwisle et, al., 2017). While the cause of HSI are multifactorial, certain causes are: increased age, previous hamstring injury, flexibility, strength imbalances, and degree of anterior pelvic tilt and forward trunk lean during sprinting(Opar et. al., 2012).
- **Case Description:** The patient is a junior men's lacrosse player for the University of Maryland who suffered an initial R HSI in September 2024 during practice. He participated in formal rehabilitation for 4 weeks and during a game in October, felt a subsequent pop in his hamstring which limited him further.
- **Question:** How does strength testing affect late-stage rehabilitation for a college athlete?
- **Purpose:** To determine effectiveness of high intensity hamstring training on force development.

Methods

Participant:

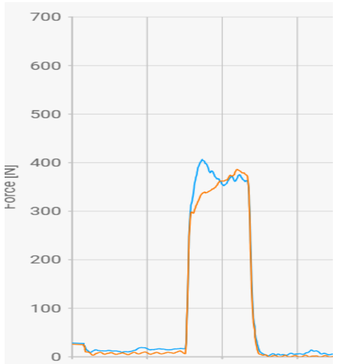
- 21-year-old male division 1 lacrosse player for the University of Maryland.

Procedures:

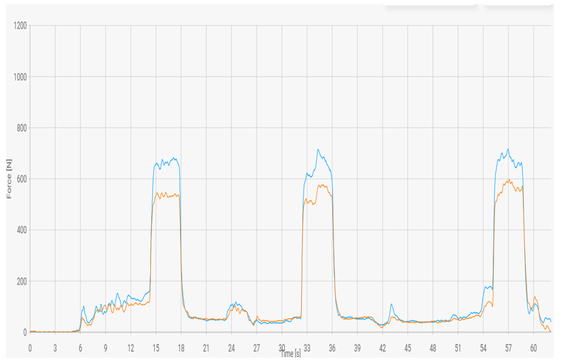
- Strength testing performed using VALD Nordbord to measure force and observe qualitative properties for the force curve. Force values were compared with normative data collected by Owoeye et. al., 2024.
- Patient was positioned kneeling on the Nordbord with hooks that have integrated strain gauges placed around the tops of the ankles, 1" proximal to the lateral malleolus. Hands were placed resting on the floor with the knees placed in 30 degrees of knee flexion, as this position is typically associated with peak hamstring torque (Onishi et. al., 2001). Patient was then instructed to maximally pull against the strain gauge for a minimum for 3 seconds. This was repeated 3 total times.
- Time to peak force can be qualitatively observed on the Force-Time-Trace. The time to peak force is where the force reaches its highest value.
- Trunk angle when sprinting measured with and without a 20# weight vest using Dartfish gait analysis app and landmarks at a vertical axis, greater trochanter, and the ear.

Results

Pre-test



Post-test



Y-axis = force in Newtons (N), X-axis = time in seconds (s), Blue line = left leg force, Orange line = right leg force

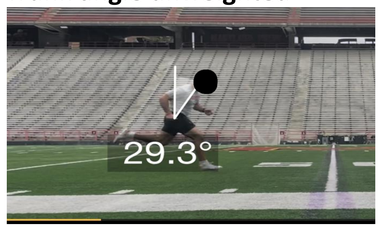
Laterality	Pre-test	Post-test
Left	• Peak force: 487 N • 5.5 N/kilogram (kg) of bodyweight (BW)	• Peak force: 717 N • 8.1 N/kg of BW
Right	• Peak force: 462 N • 5.2 N/kg of BW • 95% limb symmetry index (LSI)	• Peak force: 598 N • 6.7 N/kg of BW • 83% LSI

Normative Hamstring Strength Values	
Dominant	90th percentile: 4.08 N/kg of BW
Non-Dominant	90th percentile: 4.07 N/kg of BW

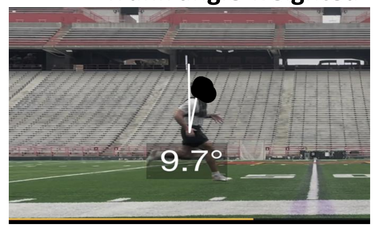
(Owoeye et. al., 2024)

Measurements

Trunk angle unweighted



Trunk angle weighted



Nordbord 30-degree isometric

Conclusions

During late-stage hamstring rehabilitation, athletes need exposure to high stress activities like sprinting to simulate demands of sport, build confidence at higher speeds, and build tissue resilience in a position that the hamstrings are typically vulnerable. Implementation of a weight vest allowed for positive changes in trunk angle while sprinting which allowed the hamstrings to be trained in a less injury prone position. Based off the results from initial testing, the deficits in time to peak force on the force curve led to rehabilitation with an emphasis on rate of force development (RFD) with this athlete. He showed improvements in peak force but a larger deficit in LSI. This increased deficit is potentially due emphasis on the speed of which force is produced and not pure strength training.

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