

Overuse Injury and Running: A Biomechanical and Functional Movement Approach



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Abstract

The purpose of this case report is to describe how exercises designed to promote neuromuscular control and strength of the hip musculature in conjunction with other physical therapy interventions were used to treat a runner with medial tibial pain. The evaluation and treatment of a patient with a 3-month history of bilateral shin pain are described as an example of when proximal control could be affecting distal components of the kinetic chain. This case report demonstrates that a patient was able to return to participation in running competition without pain following a hip stabilization exercise program.



Case Description

This case involves a 16 year-old female high school track/cross country runner. The patient presented to physical therapy with bilateral shin pain of approximately 3 months duration. At this time of pain development the patient was participating in track season. The patient ran recreationally prior to joining the track team. The patient's bilateral shin pain presents after 2-3 days of consecutive running without a rest day; pain is experienced throughout the day even after cessation of running. Factors contributing to an increase in symptoms include running on cement surfaces and running long distances with the latter being the largest contributor. The patient runs in a year old pair of shoes with an over the counter orthotic that provides medial support. The patient's goal for physical therapy is to be able to run pain free. The patient has no significant past medical history, social history, or medications.

Interventions

After initial evaluation the patient received 5 treatment sessions over the course of 7 weeks. Physical therapy included removal of the orthotic in the right shoe, ice bottle massage to decrease inflammation, myofascial release techniques, stretching to warm up the musculature, therapeutic exercise to address neuromuscular and strength deficits, and treadmill training to improve running mechanics.

Exercise Programming				
Session 1	Session 2	Session 3	Session 4	Session 5
Recumbent bike 5 minutes	Treadmill Running 5 spd/5 minutes	Treadmill Running 5 spd/5 minutes	Treadmill Running 5 spd/5 minutes	Treadmill Running 6 spd/5 minutes
Stretching 2x30sec glutes hamstrings quadriceps	Stretching 2x30sec glutes hamstrings quadriceps	Stretching 2x30sec glutes hamstrings quadriceps	Stretching 2x30sec glutes hamstrings quadriceps hip add Piriformis	Stretching 2x30sec glutes hamstrings quadriceps hip add Piriformis
Box Squats 2x10	Overhead Squat to a 16 inch box w/ blue theraband around knees/ 3x10	Overhead Squat w/ blue foam/ 2x10	Overhead Squat to a 16 inch box/ 5lb bar/ with green theraband around knees/ 3x10	Overhead Squat to a 14 inch box/ 5lb bar/ with blue theraband around knees/ 3x12
Lateral Ambulation 2x20ft/ blue theraband	High plank hip abductions / yellow theraband/ 2x10 each	Lateral Ambulation w/ black theraband 2x20ft	Lateral Ambulation w/ black theraband/ 2x20 ft/ 15 kickouts at each end	Lateral Ambulation w/ black theraband/ 2x20 ft/ 15 kickouts at each end
Single leg dead lift 1x15 each leg	Quadruped hip abduction 5lbs/2x10 each leg	Single leg stance w/ ball toss off rebounder/ yellow dynamics/2x10 each leg/ 2.2lb ball	Box jumps 12inch box/ 18inch box/ 10 reps each box	Alternate lunge jumps 10lb vest sport card/ 2x 1 minute intervals
Treadmill Running 5spd/25 miles/3:30sec	Butterfly sit ups 2x10	Butterfly sit ups 2x12	5 dot drill 1 minute 49 seconds	Box jumps 24 inch box/ 2x10
			Single leg stance w/ ball toss off	Single leg stance w/ ball toss off

Outcomes

Outcome measures selected in the clinical management of the patient include the numeric pain scale and manual muscle testing. At time of discharge, the patient demonstrated 5/5 muscle strength for all ankle motions, hip abduction, and hip extension. The patient reported being able to run continuously for 8 miles at cross-country practice without reproduction of symptoms.

Manual Muscle Test at Evaluation				Manual Muscle Test at Discharge		
	Right Ankle Strength	Left Ankle Strength		Right Hip Strength	Left Hip Strength	
Dorsiflexion	4+/5	5/5	Hip Extension	5/5	5/5	
			Hip Abduction	5/5	5/5	
Plantar Flexion	5/5	5/5		Right Ankle Strength	Left Ankle Strength	
			Dorsiflexion	5/5	5/5	
Inversion	4+/5	5/5	Plantar Flexion	5/5	5/5	
			Inversion	5/5	5/5	
Eversion	4+/5	5/5	Eversion	5/5	5/5	

Summary and Conclusions

Evaluation of the runner requires a comprehensive evaluation taking into consideration multiple factors including but not limited to mileage changes, running surface, shoe wear, nutrition, muscle strength, joint range of motion, tissue extensibility, and gait analysis. One of the most important aspects of treating the runner is that the symptomatic area might not be the causative area. The clinician should examine the areas along the kinetic chain that lie above and below the symptomatic region. If the patient with a lower extremity overuse injury demonstrates a hip musculature strength deficit or neuromuscular deficit it is possible that the deficit is a contributing factor to the injury. Exercises to address the deficit should be implemented in conjunction with other treatments deemed necessary. For the case patient it is difficult to discern whether the implementation of hip exercises was the sole contributor to her success. However, it can be hypothesized that hip exercises did play a role in her recovery including normalization of running biomechanics and the ability to run pain free.