

# The Role of the Physical Therapist as Part of a Multimodal Team Approach in Treating Youth Athletes with Post-Concussion Syndrome: A Case Report

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## Introduction

- Post-concussion syndrome affects between 5 to 43% of concussed individuals.
- Physical therapists play an important role as part of the post-concussion care team through integration of vestibular rehabilitation therapy, manual and therapeutic interventions, and implementation of a prescribed, submaximal exercise program.
- Physical therapists are in a position to communicate with a variety of healthcare professionals to treat the variety of symptoms that may present in an individual with PCS.
- Physical therapists possess the capacity to educate the athlete on proper post-concussion management.

## Patient History/Systems Review

- 14-year-old female softball athlete with a recent history of multiple blows to the head.
- Symptoms include impaired balance, dizziness upon standing, difficulty falling asleep, excessive fatigue upon awakening, sunlight sensitivity, irritability, impaired processing time, blurred vision, intermittent upper cervical pain, and eye strain and fatigue with reading.
- Headaches intermittently triggered by riding in an automobile, with phone and computer use, and while completing schoolwork.

## Examination

- Impaired oculomotor function with saccadic smooth pursuits, slow and uncoordinated saccades and 14 cm near point convergence.
- Impaired balance as noted by a score of 22/24 on the Dynamic Gait Index and 15 errors on the Balance Error Scoring System test.
- Pain and wincing with palpation to the suboccipital region.
- Problem List: saccadic smooth pursuits, slow and uncoordinated saccades, impaired near point convergence, cervical soft tissue dysfunction, and impaired balance.

## Clinical Impression

- Diagnosis: Post-Concussion Syndrome
- Prognosis of the patient was complicated secondary to multiple concussions in the past three months, younger age, family history of migraines, personal history of motion sensitivity, cognitive workload from school, and limited ability to study, read, or engage in athletics.

## Intervention

- Treatment initially prioritized non-exertional oculomotor, adaptation, and convergence training, VOR habituation, static balance training, and cervical strengthening with instruction to complete the exercise as part of the home exercise program.
  - **Oculomotor Training:** a sequence of vision training focusing on improving oculomotor skill
  - **Adaption Training:** exercises that induce a brief and temporary change in sensitivity or perception when exposed to a new stimulus
  - **Convergence Training:** exercises that aim to improve the eyes' ability to turn inward to fixate on a nearby target
- Once the patient was asymptomatic at baseline, a Buffalo Concussion Treadmill Test was administered to determine the patient's submaximal threshold for aerobic exercise.

Intervention type	Intervention
Oculomotor Training	Eye mazes
	Horizontal and vertical smooth pursuits
	Diagonal smooth pursuits
	Horizontal and vertical saccades
	Saccadic workbook
Balance Training	Single leg stance
	Tandem stance
	Walking with horizontal head turns
	Walking with vertical head turns
	Foam balance beam tandem ambulation
Adaptation Training	Horizontal and vertical X1 viewing
	Ambulation with X1 viewing
Convergence Training	Near/far target

Intervention Type	Intervention
VOR Habituation	Ball toss up/down while walking
	Ball toss side-to-side while walking
Cervical Strengthening	Supine chin tucks
	Supine chin tucks with isometric cervical extension
Ankle Strategies	Rocker board anterior/posterior
	Rocker board medial/lateral
	Rocker board anterior/posterior with ball toss over shoulder
	Rocker board medial/lateral with ball toss over shoulder
Exertional Training	Rocker board anterior/posterior with X1 viewing
	Agility ladder side-to-side
	Agility ladder forwards/backwards
	Walking lunges
	Bodyweight squats
	Inclined push-ups
	Planks
	Quick steps
Stationary bike	
Treadmill	

## Outcomes

- Upon completion of 10-weeks of treatment, the patient no longer noted headaches or symptoms with exertional training. She was engaging in regular exercise, had improved grades back to her baseline, and did not report significant irritability.
- Performance on the Dynamic Gait Index improved by 9%; performance on the Balance Error Scoring System improved by 87%; Near Point Convergence improved by 79%.
- Saccades testing was found to be negative as evidenced by a normal rate of eye movements with no accuracy errors, and the patient was negative for pain with palpation to the suboccipital region.

Outcome Measure	Evaluation (10/25/18)	Discharge (1/16/19)	Percent Improvement
Dynamic Gait Index	22/24	24/24	+9%
Balance Error Scoring System	15 errors	2 errors	+87%
Near Point Convergence	14cm	3cm	+79%
Smooth Pursuits	Positive: Slightly saccadic with reported headache onset	Negative: Not saccadic and no reported symptoms	
Saccades	Positive: slowed, involuntary eye movements during tracking	Negative: Normal rate of eye movements with no accuracy errors	
Suboccipital Palpation	Positive: +2 (Pain with wincing)	Negative: 0 (no pain)	

## Clinical Implications

- Physicians, physical and occupational therapists, speech-language pathologists, and school administrators and athletic trainers provided collaborative care in the rehabilitation of the individual.
- This case is limited by restricted access to patient records upon discharge to the athletic trainer initiating the RTP protocol.
- Further research is needed to:
  - establish protocol for interdisciplinary communication
  - develop a protocol that governs the need for referrals and clarifies roles and responsibilities of all members of the post-concussion team
  - standardize return-to-play and return-to-learn policy
  - standardize legislation and policy that educates all individuals involved with the athlete's plan of care regarding recognition, diagnosis, treatment and management