

# (Stubbornly) Persistent Concussion Symptoms and Multimodal Physiotherapy in an Athletic Youth: Case Study

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### ABSTRACT

**TITLE:**  
**(Stubbornly) Persistent Concussion Symptoms and Multimodal Physiotherapy in an Athletic Youth: Case Study. 2014**

**BACKGROUND:**  
 The following is a case study of a 17 year-old male hockey player. In the context of a game, the athlete was hit from the front and had a loss of balance resulting in a fall. His initial symptoms included fatigue, headache, and nausea. He experienced retrograde amnesia for events approximately 1-10 seconds prior to the injury and anterograde amnesia for 1-5 seconds after the injury. He had a prior history of migraines, but was otherwise healthy. The patient was referred to a sports medicine physician 4 days following injury and diagnosed with a concussion, with severe self-reported symptoms of balance, dizziness, headaches, photophobia, and phonophobia. Follow-up appointments 7 days later continued to identify severe headaches and dizziness. The patient had not returned to school, and had essentially isolated himself at home due to severe headaches. Initial neurocognitive at 3 weeks post-injury identified impaired visual memory and processing speed. Subjective self-report symptoms were rated at severe levels (a 5 or higher on a 7 point Likert scale) on 15 of 22 symptoms. The patient's symptoms persisted with only minimal improvement over the next 4 months. Follow up appointment with a physiatrist at 95 days post-injury identified severe subjectively reported symptoms. Neurological functioning was normal. The patient had not returned to school due to severe migraine headaches. The patient returned for a neuropsychological consultation at 234 days post-injury. Neurocognitive functioning had improved to fall in the average range but subjective symptoms were rated at severe levels for 12 of 22 symptoms. The patient had returned to school part-time. Primary symptoms included migraine headaches, dizziness, photophobia, and phonophobia.

**OBJECTIVE:**  
 The patient presented to physiotherapy with persistent dizziness and headache aggravated by physical and cognitive activity. A multimodal physiotherapy assessment revealed neuromotor, sensorimotor, postural and vestibular deficiencies (Vidal, et al., 2012), (Schneider, et al., 2013).

**METHODS:**  
 Treatments progressed from simple to complex neuromotor, sensorimotor, posture and gaze stabilization exercise (Kristjansson, et al., 2009). Six weeks into rehabilitation, dysautonomia was evaluated and added to treatment with sub-threshold exercise guided by heart rate and symptoms (Leddy, et al., 2011).

**RESULTS:**  
 Six treatments took place over ten weeks to facilitate a complete "return to learn" and an additional nine treatments to achieve sport specific exertion requirements. On discharge, neuromotor, sensorimotor, vestibular and exertion outcomes had returned to normal. Subjective reports indicated complete symptom resolution.

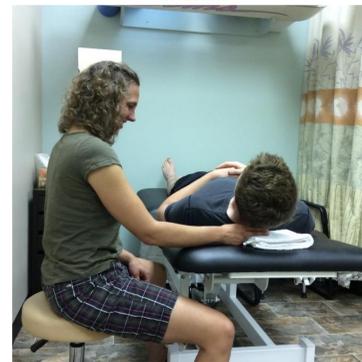
**CONCLUSIONS:**  
 The athlete was cleared for play by his family physician.

### ASSESSMENT

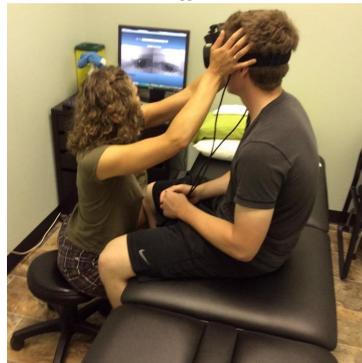
#### Physical Therapy Assessment Findings

- Cervical
  - Cervical flexor endurance 25 seconds with symptom onset
  - Decreased postural endurance and stabilizing against perturbations
  - Sub-occipital tenderness and reproduction of "pressure in head"
- Vestibular
  - Infrared Goggle detected gaze evoked nystagmus (GEN)
- Central Nervous System
  - CNS 3/4/6 Smooth pursuit – emotional response "irritability"
- Exercise Tolerance
  - Symptom onset at 107 HR

Cervical Flexor Endurance



Infrared Goggle Assessment



Advanced gaze stabilization, posture & balance



### REHABILITATION

#### Physical Therapy Treatment

- Cervical
  - Soft tissue techniques
  - Neuromotor control and endurance
  - Postural correction
- Vestibular
  - Gaze stabilization
  - Static & dynamic balance

Advanced gaze stabilization, posture & balance



### OUTOMES

#### Physical Therapy Outcomes on Discharge

- Cervical
  - Cervical flexor endurance 120 seconds
  - No tenderness
  - Postural stability to perturbations normalized
- Vestibular
  - Infrared Goggle and other tests normal
- Exercise Tolerance
  - Full exertion to fatigue with no symptom onset
  - Completion of full return to play protocol

### CONCLUSIONS

The athlete was cleared for play by his family physician.

### REFERENCES

Kristjansson E. & Treleaven J. Sensorimotor Function and Dizziness in Neck Pain: Implications for Assessment and Management. *Journal of Orthopedic & Sports Physical Therapy*. 2009; 364-377.

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Schneider KJ et al. Cervico-vestibular physiotherapy in the treatment of individuals with persistent symptoms following sport related concussion: a randomised controlled. *British Journal of Sports Medicine*. 2013; 47.

Vidal PG et al. Rehabilitation Strategies for Prolonged Recovery in Pediatric and Adolescent Concussion. *Pediatric Annals*; 2012; 41: 1-6.

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