

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

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## Abstract

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.

## Assessment Findings

The patient was referred for physiotherapy by the Neuropsychologist and presented to physiotherapy for an assessment. The date of assessment was well past "spontaneous recovery" and consistent with a definition of post-concussion syndrome. He described with persistent dizziness and headache aggravated by physical and cognitive activity. A multimodal physiotherapy assessment revealed cervical features including neuromotor, sensorimotor dysfunction. He also evidenced vestibular hypofunction and had early symptom onset with physical activity (Vidal, et al., 2012), (Schneider, et al., 2013).

### 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"
- Decreased ability to respond to perturbation testing

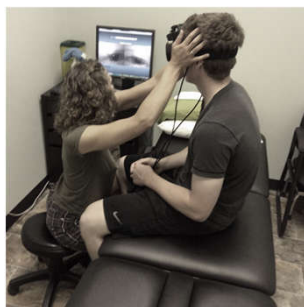
### Vestibular

- Videonystagmography (VNG) detected gaze evoked nystagmus (GEN)
- Central Nervous System
- CNS 3/4/6 Smooth pursuit – emotional response "irritability"

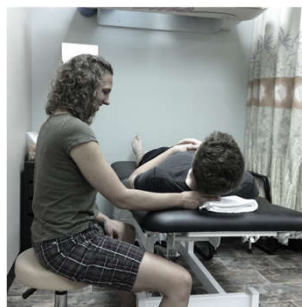
### Exercise Tolerance

- Symptom onset at 107 HR

## Functional Measures



Videonystagmography (VNG)



Cervical Neuromotor Function

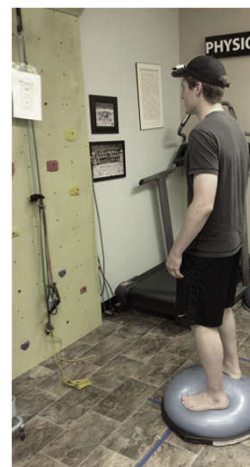
## Methods

Treatments progressed from simple to complex neuromotor, sensorimotor, posture and gaze stabilization exercise (Kristjansson, et al., 2009). After six weeks of cervico-vestibular rehabilitation, dysautonomia was evaluated. Exertional therapy was added with sub-threshold exercise guided by heart rate and symptoms (Leddy, et al., 2011).

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. The total number of treatment sessions was fifteen.



Sport Specific Integration



Cervical Sensorimotor Training

## Discharge Outcomes

Physical Therapy Outcomes on Discharge

### Cervical

- Cervical flexor endurance 120 seconds
- No tenderness
- Postural stability to perturbations normalized

### Vestibular

- Videonystagmography and clinical vestibular exam within normal limits

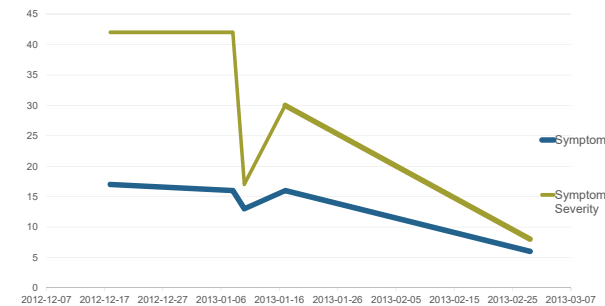
### Exercise Tolerance

- Full exertion to fatigue with no symptom onset
- Completion of full return to play protocol

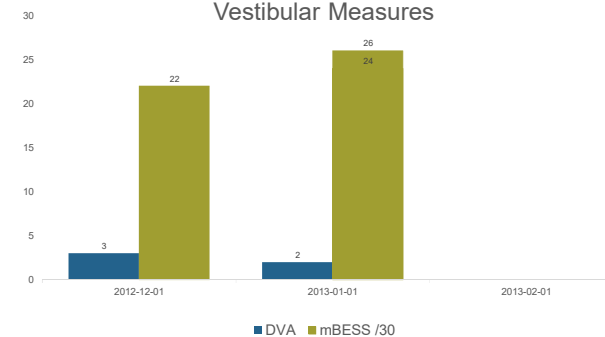
The athlete was cleared for play by his family physician.

## Results

### Concussion Symptom Inventory



### Vestibular Measures



## References

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- Leddy JJ, et al. Reliability of a Graded Exercise Test for Assessing Recovery From Concussion. *Clinical Journal of Sports Medicine*. 2011; 89-94.
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- Vidal PG et al. Rehabilitation Strategies for Prolonged Recovery in Pediatric and Adolescent Concussion. *Pediatric Annals*. 2012; 41: 1-6.

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