

# THE IMPACT OF CHIROPRACTIC MANAGEMENT ON A 15-YEAR-OLD MALE DIAGNOSED WITH POST-CONCUSSION SYNDROME AND WHIPLASH: A CASE REPORT

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## ABSTRACT

**Objective:** To describe the management of a 15-year-old male who suffered a fall and was diagnosed with post-concussion syndrome and whiplash.

**Clinical Features:** A 15-year-old male experienced a frontal impact injury to the head. He sought chiropractic care for the management of neck pain, dizziness and headache 1 week after his injury.

**Intervention and Outcome:** Manual therapy included high-velocity low-amplitude (HVLA) chiropractic spinal manipulation (SMT) and soft-tissue therapy. Cervical stretches were provided. The patient had a total of 10 treatments over a period of 8-weeks. Additional recommendations included nutritional supplementation, increased hydration, referral for acupuncture and monitoring by a concussion clinic.

**Conclusion:** This case study demonstrates improvements in post-concussion symptoms and whiplash in a 15-year-old male following chiropractic care. Further research is required to investigate the effects of chiropractic treatment on post-concussion syndrome. (*J Contemporary Chiropr* 2020;3:80-85)

**Key Indexing Terms:** Chiropractic; Post-Concussion Syndrome; Whiplash Injuries; Soft Tissue; Therapy; Adolescents

## INTRODUCTION

The World Health Organization (WHO) estimates that approximately 10 million people are affected annually by traumatic brain injury (TBI), and it is an injury that will surpass many fatal diseases as the primary cause of death and disability in 2020. (1) In New Zealand, there were 97,955 claims for TBI, costing the Accident Compensation

Corporation (ACC) NZD 1,450,643,667 for the period of January 2012 to December 2016. (2) This accounts for about 24,000 cases of concussion every year. (3) The incidence of mild traumatic brain injury (mTBI) in the New Zealand population rated moderate to serious was 432 per 100,000. (2)

Post-Concussion Syndrome (PCS), also termed as traumatic brain injury or TBI, is defined as an alteration in brain function or other brain pathology caused by an external force. (4) An example would be a blow to the head, causing coup and contrecoup to the brain. (4) In New Zealand, infants, children and adolescents are at a higher risk than other age groups for TBI. (5) The term post-concussion syndrome, and TBI or mTBI will be used interchangeably, to reflect the current research.

There is a growing research related to the progression of PCS. Studies show that many people affected by mTBI do not report or seek medical treatment. (5) Concussion syndrome involves the following clinical findings as stated by the 5th international conference on concussion in sport held in Berlin, October 2016. (6)

- Symptoms: somatic (e.g.; headache), cognitive (e.g.; feeling like in a fog) and/or emotional symptoms (e.g.; lability)
- Physical signs (e.g.; loss of consciousness, amnesia, neurological deficit)
- Balance impairment (e.g.; gait unsteadiness)
- Behavioral changes (e.g.; irritability)
- Cognitive impairment (e.g.; slowed reaction times)
- Sleep/wake disturbance (e.g.; somnolence, drowsiness)

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Recovery time for concussion has not yet been accurately determined. (7). Previous literature suggests, symptoms of mTBI experienced by adults would resolve within 10 days; however, the symptoms could stay up to 4 weeks. (7) Children aged 10-17 years old show a decrease of post-concussive symptoms over a span of 30 days after injury. (7) However, individuals with PCS would normally recover within the first 3 months. (8) The recovery time for children requires further research to investigate the changes that occur.

Conventional treatment for PCS involves medication, education, support and reassurance initially in mainstream treatment. (9,10) Recently there has been more involvement of psychotherapy, cervical and vestibular rehabilitation. (7,9,11) These are provided by many health practitioners, including chiropractors, among other practitioners. (7,9,11) A limited number of case reports reporting improvement in TBI symptoms through chiropractic management are present in the current research. (12-20)

Whiplash is defined by the Quebec task force on whiplash as "bony or soft tissue injuries" resulting "from rear-end or side-impact, predominantly in motor vehicle accidents, and from other mishaps" as a result of "an acceleration-deceleration mechanism of energy transfer to the neck." (21) In this paper the wording of whiplash and whiplash-associated disorders (WAD) will be used interchangeably, as whiplash by definition is a diverse presentation. There are a series of symptoms that may occur from whiplash that affects the neck. It often affects the cervicothoracic region. This may lead to headache, proprioception issues, dizziness, nausea, visual and auditory dysfunction, cognitive impairment, and similar signs and symptoms associated with concussion. (22,23)

Conventional treatment for whiplash involves medication, chiropractic management, physiotherapy rehabilitation and psychology. (21,23,24) The management of whiplash varies depending on acuteness and chronicity of patient management, such as the use of collars. (21,24-26) Radiographic imaging may be incorporated into the evaluation of a whiplash injury to help rule out fracture or joint dislocation; however, many findings were found in chronic patients compared to acute patients. (24,25,27) There are several research articles reporting improvement in whiplash symptoms through chiropractic management. (28,29)

## CASE REPORT

### *Clinic Features*

A 15-year-old male fell forward headfirst into a bed frame and struck the frontal region of his head. This incident resulted in a hyperextension (whiplash) force being applied to his cervical spine along with external injuries to his head due to impact.

The patient was admitted to hospital for 2 days following the incident. Here a full physical exam, lab examinations and vitals were done, ruling out other pathology. Immediately following the injury, there were no symptoms indicating the presence of a concussion; however, about 1 week after the injury symptoms began to appear.

He initially sought care for neck and posterior occipital pain headaches and dizziness. His chief complaint was his inability to conduct his activity of daily living (ADL) and his parents reported his behavior had changed after the injury. There was a constant dull ache present at the posterior aspect of his occipital and cervical spine, with a visual analog scale (VAS) ranging from 4-7/10. A cervical spine examination was done and included neurological and orthopedic exam procedures. He was referred for an x-ray to rule out fracture and to his general practitioner (GP) for a second confirmatory diagnosis opinion. It is standard protocol in New Zealand for chiropractors to refer to a GP when a patient is suspected of having suffered a concussion in order to monitor their progress and screen for more serious pathology. There were no fractures or other pathologies found on the x-ray. The diagnosis of PCS and whiplash were confirmed by the GP and concussion clinic.

A SCAT5 form was used to evaluate the patient's concussion throughout his care (Table 1). This evaluation form is currently used internationally to assist in the evaluation of patients suspected of suffering a concussion. (6) It looks at the athlete background, symptom evaluation, cognitive screening (including orientation, immediate memory, and concentration) and neurological screening (including balance). (6)

A spinal exam found regions such as occiput, C1, C4, T1, T1 rib, T4, T7, T9, bilateral distal clavicles to have involvement. Muscles involved included the subicular occipitals, levator scapulae, sternoclavicular muscles and scalenes.

The Buffalo Treadmill Test (BTT), performed by the concussion clinic, is designed to show the highest heart rate achieved without presenting symptoms of mTBI (30). There was an increase in heart rate from the first and second BTT from 106 to 135bpm; the only intervention given was chiropractic treatment. No other BTT's were conducted after the second test due to the patient's rapid recovery.

### *Intervention and Outcomes*

The patient was adjusted using diversified technique, in combination with soft tissue therapy and myofascial release. The main spinal segments adjusted were the occiput, C1, C4, T1, T1 rib and T4. Soft tissue therapy treatment was done on mainly subicular occipitals

**Table 1. SCAT 5 Results**  
*\*Due to COVID-19 virus pandemic restrictions*

Date	16/01/20	30/01/20	27/02/20	*26/03/20
Symptom Number (of 22)	15	15	7	3
Symptom Severity Score (of 132)	53	38	12	5
Orientation (of 5)	5	5	5	*
Immediate Memory (of 15)	12	13	15	*
Concentration (of 5)	1	3	2	*
Neuro Exam (of 5)	1	4	4	*
Balance Errors (of 30)	0	0	1	*
Delayed Recall	0	5	5	*
% Feeling Normal	50%	65%	85%	98%

and levator scapulae muscles. Initially, the treatment was twice a week for a duration of 3 weeks, followed by a reduction to once a week for 3 weeks and finally 1 treatment after another 2-week interval. Nutritional supplementation included increasing omega-3 fatty acids along with increased water consumption (31). The patient performed basic stretches to aid with recovery at home. The SCAT5-form was used to measure the improvement to ensure he was improving. (6) He was then referred for 2 acupuncture treatments to help with the imbalance of muscles in his neck and shoulders.

He was also monitored by the concussion clinic and was provided advice for cognitive and physical issues such as time spent at school and exercise level using the BTT. As he improved, the concussion clinic advised him to gradually increase exercise his level in an effort to aid with heart rate and accelerate recovery. This included moving from walking to jogging and finally to running, in combination with isometric exercises at the end of his care.

He reported feeling better about 3-4 weeks before the end of his chiropractic care plan. This was affirmed by the chiropractor who had seen him before the injury. This was also confirmed by the concussion clinic around a similar period. The standard of the final SCAT5 was not to the same level as the initial SCAT5, when the patient reported alleviating symptoms due to the COVID-19 virus pandemic. Improvement is illustrated in Table 1. The patient was referred back to the same GP for clearance of the PCS, and after the GP's assessment he was cleared for normal activities.

## DISCUSSION

Chiropractors see a range of conditions in their offices. They must be up-to-date current guidelines and literature, including the management of individuals suffering from concussion. (32) The most recent concussion guideline

was the 5th international conference on concussion in sport, held in Berlin, in October 2016. (8) Chiropractic educational programs are shown to be competent in the management of concussion, chiropractors are given an option to pursue postgraduate studies to further their management of individuals with concussion. (32) Chiropractors are quite diverse in their manual treatment approaches for the evaluation and management of concussions. Individuals who have sustained a concussion may find manual therapy important as a part of their recovery because of the presence of cervicogenic components (22).

There are several studies investigating the effect of chiropractic on whiplash. (24,28,29,33) One systematic review concluded that there was a baseline of evidence that chiropractic treatment can help manage WAD. (29) However, there are reports for chiropractic treatment for WAD within the paediatric population, mostly in concussion case studies; otherwise, literature only shows cervical manipulation used for pediatric cases. (19,20).

There is limited research for chiropractic management of mTBI symptoms. However, there have been several case reports showing improvement in mTBI symptoms after chiropractic treatment. (12-20) One case report found positive results for 3 young athletes with concussion. Chiropractic treatment including adjustments and soft tissue therapies improved concussion. (19) There have been similar improvements in the paediatric population. (13-17)

PCS and WAD may occur simultaneously since they share similar mechanisms of onset. Symptoms associated with PCS and WAD may be similar, potentially making it difficult to distinguish between these conditions. (6,23) In saying this, the symptoms present in this case are unclear whether the impact to the head damaged structures in the spine or the brain or both. (6,22,27) The chiropractor managed the majority of this case looking

at the musculoskeletal and cognitive issues. Having the GP and concussion clinic involved in the management ensured the patient was following the appropriate recovery for his injury. (8,10) A study performed by Treleven compared individuals suffering from post-concussion headaches to a control group. (33) They discovered that the post-concussion headache group had upper cervical dysfunction with pain, an increased rate of cervical muscle tightness and weaker neck flexion. This provides some initial support to the concept that the upper cervical spine may display dysfunction when post-concussion headaches are present, and may be associated with the symptomatology of PCS and WAD. Additionally, the WHO Collaborating Centre Task Force on mTBI suggests that WAD can result in cognitive deficits seen in mTBI, but more research is needed to establish a stronger relationship (4)

The current research suggests that spinal misalignments can change the way the central nervous system (CNS) processes sensory motor integration. (34) TBI is known to have cognitive alterations resulting in abnormal integration. (4,6) The symptoms seen in TBI are influenced by the integration of sensory information such as balance, visual processing, motor control and proprioception. (8,11,34) The current research demonstrates improvement in sensory integration following spinal manipulations, indicating there is scope for chiropractic research to investigate these sensory integration functions. (34,35) This could also lead to chiropractic treatment playing a role in aiding with the reduction of post-concussion symptoms and whiplash. It is possible that providing the patient with chiropractic treatment has improved their SMI and thus reduced their symptoms.

#### Limitations

A limitation of this case study is that the patient's recovery period falls just within the 3 months of the natural progression period. (8) It is unclear that chiropractic treatment of SMT and soft tissue therapy did reduce the period of recovery or that it followed the natural progression. Although chiropractic compromised the majority of the treatment for this individual, there still were components of treatment provided by the concussion clinic in terms of cognition/exercise advice and acupuncture treatment for muscle imbalances.

## CONCLUSION

This case study demonstrates improvements in PCS and WAD in a 15-year-old male following chiropractic management. Current research has shown improvement for whiplash as discussed; however, further research is required to investigate the effects of chiropractic treatment on post-concussion syndrome.

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## DECLARATIONS

### Ethical Approval and Consent to participate

Not applicable

### Consent for Publication

The patient and their parents gave consent for publication.

### Competing Interest

There are no competing interests

### Funding

This study was self-funded and there is no financial conflict of interest

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