

Whiplash injury and oculomotor dysfunctions: clinical–posturographic correlations

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FROM ABSTRACT:

Oculomotor dysfunctions are hidden causes of invalidity following whiplash injury.

Many patients with whiplash injury grade II present oculomotor dysfunctions related to input disturbances of cervical or vestibular afferents.

We used static posturography to investigate 40 consecutive patients with whiplash injury grade II and oculomotor dysfunctions.

We demonstrated a relation between length and surface of body sway: the surface value (A) was higher than the length value (L) and this led to an open graph of body sway in the statokinesigram.

Oculomotor rehabilitation can resolve the impairment of vestibular function but if therapy is delayed or the patient has been wearing an orthopaedic neck collar, more therapeutic sessions are required. **[IMPORTANT]**

In conclusion, without rehabilitation of the oculomotor muscles other therapies are not sufficient to recover the impairment caused by whiplash injury.

THESE AUTHORS ALSO NOTE:

Whiplash injuries can produce neck pain, headache, nausea, vertigo, emotional and cognitive disturbance.

The ophthalmic and oculomotor complications from whiplash are largely unknown, but are known to include impaired ocular accommodation, convergence and stereoacuity, which can be caused by brain stem lesions.

“Oculomotor muscle disorders deserve greater attention because they may be responsible for many symptoms and perpetuate neck pain.”

“The proprioceptive system of the neck muscles can influence the oculomotor and vestibular systems.” **[Very Important]**

The oculomotor system is an indispensable structure that supplies useful information for both the stabilization of the human body and for postural control. **[Important]**

Oculomotor dysfunction is present in 62% of patients affected by whiplash injury.

There is a "strict correlation between oculomotor system impairment and the alterations of cervical afferents." **[Very Important, because the subluxation complex is an alteration of cervical afferents.]**

Oculomotor dysfunction can be an early sign of myelopathy of the central nervous system or a lesion of the brain stem.

Oculomotor abnormalities following whiplash injuries are usually mild and have a good prognosis.

"Involvement of the oculomotor system is evident if we consider that stretching of the cervical spine and the consequent traction exercised on the brain structures (medulla, brain stem, cerebellum) can damage the oculomotor system causing visual alterations and vestibular disorders without any evident organic intrinsic vestibular problem." **[Very Important]**

Several studies have documented oculomotor abnormalities from whiplash injury.

Postural problems and oculomotor problems are linked.

The labyrinth and proprioception maintain upright posture.

"The area of body sway increased more than length when a patient with labyrinthine disorder closes his eyes."

There is oculomotor impairment and a deficit of ocular convergence caused by hypofunction of the eye muscles in patients with whiplash injury. **[Important]**

Each of the 40 patients in this study were also suffering from one or more of other clinical oculomotor dysfunctions, including diplopia, altered oculomotor divergence, nausea or vertigo after convergence test.

Each patient was evaluated from 7 to 270 days after whiplash trauma.

The control group comprised 40 consecutive patients with a history of whiplash injury grade II without oculomotor disorders.

Static posturography was performed on each patient using a normalized computerized static posturography platform. [This specialized equipment is at Life Chiropractic College West, and many of my neurology diplomate friends also have the equipment.] The tests were recorded with the patient's eyes open (EO) and closed (EC).

OCULOMOTOR REHABILITATION

The 40 consecutive patients with whiplash injury grade II and oculomotor dysfunctions underwent from one to four consecutive cycles of oculomotor rehabilitation (ten sessions per cycle). [This means up to 40 sessions]

An oculomotor rehabilitation session consisted of 20 minutes in which oculomotor convergence and mobility exercises were executed.

RESULTS

"Static posturography disclosed that patients with whiplash injuries and oculomotor disorders presented a characteristic pattern of body oscillation."

DISCUSSION

The analysis of posture by static posturography provides information on overall postural performance.

"Oculomotor function studies in patients with whiplash injury suggested that some patients who claimed to have no symptoms after trauma showed oculomotor dysfunctions. These dysfunctions might be related to cervical afferent input disturbances." **[This is very important because it indicates that individuals with no symptoms following whiplash can still have objective signs of neurological injury.]**

"Oculomotor dysfunction was also present in patients who claimed to have no vestibular symptoms."

"The oculomotor system can be indirectly considered the "surface monitor" of body sway like the vestibular system. This is due to the interactions between these two systems."

"Oculomotor rehabilitation led to a gradual resolution of vestibular symptomatology."

These authors "noted the importance of limiting the use of a neck collar" because "using a neck collar for as long as 3 weeks reduces the probability of obtaining remission from the signs and symptoms observed" with rehabilitation.

This study confirms the "validity of oculomotor rehabilitation."

CONCLUSIONS:

Oculomotor system dysfunction induces a dysfunction of the vestibular system.

"Oculomotor dysfunctions are encountered in many subjects with whiplash injury grade II and should be diagnosed as soon as possible after whiplash injury as they are responsible for a wide range of symptoms such as vertigo and chronic cervical pain." **[Key Point]**

"A neck collar should be worn for only a short time after injury."

"If oculomotor dysfunctions are evident, oculomotor rehabilitation must be initiated immediately after injury."

"Underestimation of oculomotor dysfunction risks failure of other types of therapy."

KEY POINTS FROM DAN MURPHY

- 1) Whiplash injuries can produce neck pain, headache, nausea, vertigo, emotional and cognitive disturbance.
- 2) Many patients with whiplash injury grade II present oculomotor dysfunctions related to input disturbances of cervical or vestibular afferents.
- 3) Oculomotor rehabilitation can resolve the impairment of vestibular function but if therapy is delayed or the patient has been wearing an orthopaedic neck collar, more therapeutic sessions are required. **[IMPORTANT]**
- 4) Without rehabilitation of the oculomotor muscles other therapies are not sufficient to recover the impairment caused by whiplash injury.
- 5) Oculomotor muscle disorders may be responsible for many symptoms and perpetuate neck pain.
- 6) "The proprioceptive system of the neck muscles can influence the oculomotor and vestibular systems." **[Very Important]**
- 7) The oculomotor system is an indispensable structure that supplies useful information for both the stabilization of the human body and for postural control. **[Important]**
- 8) Oculomotor dysfunction is present in 62% of patients affected by whiplash injury.

- 9) Oculomotor dysfunction and alterations of cervical afferents are linked.
[Very Important, because the subluxation complex is an alteration of cervical afferents.]
- 10) Whiplash stretching of the cervical spine and the consequent traction on the brain structures (medulla, brain stem, cerebellum) can damage the oculomotor system causing visual alterations and vestibular disorders without any evident organic intrinsic vestibular problem.
- 11) Oculomotor dysfunction is known to be caused by whiplash injury.
- 12) Postural problems and oculomotor problems are linked.
- 13) The inner ear and proprioception maintain upright posture.
- 14) Oculomotor dysfunctions can include diplopia, altered oculomotor divergence, nausea or vertigo after convergence test.
- 15) Oculomotor dysfunction patients may require as many as 40 sessions of oculomotor rehabilitation.
- 16) Oculomotor dysfunctions and static posture are correlated, and both can be accurately assessed by static posturography sway (requiring specialized equipment).
- 17) Whiplash patients with no symptoms after trauma may still have oculomotor dysfunctions related to "cervical afferent input disturbances." **[This is very important because it indicates that individuals with no symptoms following whiplash can still have objective signs of neurological injury that are consistent with the chiropractic subluxation.]**
- 18) Neck collar use should be avoided because "using a neck collar for as long as 3 weeks reduces the probability of obtaining remission from the signs and symptoms observed" with rehabilitation.
- 19) "Oculomotor dysfunctions are encountered in many subjects with whiplash injury grade II and should be diagnosed as soon as possible after whiplash injury as they are responsible for a wide range of symptoms such as vertigo and chronic cervical pain." **[Key Point]**
- 20) "If oculomotor dysfunctions are evident, oculomotor rehabilitation must be initiated immediately after injury."
- 21) "Underestimation of oculomotor dysfunction risks failure of other types of therapy."