Smooth pursuit neck torsion test in whiplash-associated disorders: relationship to self-reports of neck pain and disability, dizziness and anxiety

Journal of Rehabilitation Medicine

July 2005, Vol. 37 No. 4, pp. 219-23

Treleaven J, Jull G, LowChoy N.

FROM ABSTRACT:

OBJECTIVE:
The smooth pursuit neck torsion test is thought to be a measure of neck afferent influence on eye movement control and is useful in assessing subjects with whiplash, especially those complaining of dizziness.

Nevertheless, it is not known whether impairments identified relate only to abnormal cervical afferentation or are influenced by levels of anxiety or neck pain.

DESIGN: A prospective, 3-group, observational design.

SUBJECTS:
One hundred subjects with persistent whiplash (50 complaining of dizziness, 50 not complaining of dizziness) and 50 healthy controls.

METHODS:
The smooth pursuit neck torsion test was performed and analysed taking into account subjects' reported levels of pain, anxiety and dizziness. [This test requires special equipment, which we have at Life Chiropractic College West. Many of my neurology diplomate friends also have the equipment in their offices and are well trained on utilization and interpretation.]

RESULTS:
The results confirm that there are significant differences in the smooth pursuit neck torsion test between subjects with persistent whiplash both with dizziness and without dizziness compared with healthy control subjects.

The results suggest that the test is not influenced by a patients' level of anxiety, but may be influenced by both nociceptive and proprioceptive factors.

CONCLUSION:
The results provide further evidence of the usefulness of the smooth pursuit neck torsion test to identify eye movement disturbances in patients with whiplash, which are likely to be due to disturbed cervical afferentation.
THESE AUTHORS ALSO NOTE:

“Patients with whiplash-associated disorders often present with complaints of dizziness, unsteadiness as well as visual disturbances in association with their neck pain syndromes.”

A number of studies document abnormal smooth pursuit eye movement in these whiplash patients and also in other patients with neck pain.

Whiplash injury causes dizziness, unsteadiness, visual disturbances and pain syndromes as a result of injury to:
1) Vestibular structures in the brain stem
2) Cervical input into the vestibular system
3) Brain injury

Whiplash injury patients may also have dizziness, unsteadiness, visual disturbances and pain syndromes secondary to:
1) Anxiety
2) From pain drugs they may be taking
3) Compensation amplification for secondary gain

The Smooth Pursuit Neck Torsion Test tests neck proprioception, the cervical-collic reflex, and the cervical-ocular reflex.

Abnormal Smooth Pursuit Neck Torsion Test values are primarily from erroneous proprioceptive activity from the neck.

[Very Important For Chiropractors]

Smooth Pursuit Neck Torsion Test tests the efficiency of eye movement with the head in the neutral position and with the head turned [torsion] to one side, with the following evidence:

1) Normal controls have normal eye movements with their head in the neutral position and with the head turned.

2) Abnormal eye movements [smooth pursuit] with the head turned indicates the cause is cervical proprioceptors.

Subjects with neck pain from trauma have greater abnormalities in Smooth Pursuit Neck Torsion Tests compared to non-trauma neck pain subjects.

The Smooth Pursuit Neck Torsion Test is “able to differentiate neck injured patients from healthy controls.” [Important]

The patients in this study had persistent whiplash symptoms lasting at least 3 months.
50 subjects had dizziness or unsteadiness at least twice per week since injury, and the other 50 subjects had no dizziness, but did have other ongoing whiplash symptoms. The authors excluded patients with brain injury, unconsciousness, a pre-whiplash injury history of dizziness, or a history of vestibular pathology such as BPPV.

Subjects were also evaluated for anxiety using the State-Trait Anxiety Inventory, for pain and disability using the Neck Disability Index, and for current level of pain using the Visual Analogue Scale.

All subjects were evaluated with computerized electrooculography to measure eye movements while following a moving target.

RESULTS

The Smooth Pursuit Neck Torsion Test was significantly worse in the whiplash subjects with dizziness compared to the whiplash subjects without dizziness, and all whiplash subjects were significantly worse than the control subjects.

There were no differences in The Smooth Pursuit Neck Torsion Test as related to “medication use, compensation status, age, duration of symptoms, current pain levels” or anxiety levels.

DISCUSSION

“The results of this study confirm that The Smooth Pursuit Neck Torsion Test can detect deficits in those subjects with persistent whiplash associated disorders who do, and do not complain of dizziness and or unsteadiness compared with healthy control subjects.”

Whiplash subjects with dizziness have greater deficits in eye movement than whiplash subjects without dizziness.

“The results add support to the validity of The Smooth Pursuit Neck Torsion Test to detect physiological impairments in patients following a whiplash injury.” [Again, we have this equipment at Life Chiropractic College West]

“The lack of influence of anxiety, medication and compensation status on the differences found in The Smooth Pursuit Neck Torsion Test in this study suggests that the differences between whiplash and control subjects are most likely due to disturbances to the postural control system, specifically, primary altered afferent input from the cervical spine.” [Very Important]

“Our contention is that the most likely primary cause of the disturbances in our whiplash group is abnormal cervical afferent input from damaged neck joint and muscle receptors.” [Very Important]
“Altered proprioceptive input could arise from tissue/receptor damage.”

[Important]

“In conclusion, this study has determined that smooth pursuit neck torsion eye movement disturbances are present in patients with persistent neck pain following whiplash injuries.”

“These disturbances were not influenced by the subjects’ reported levels of anxiety, medication or compensation status and are likely due to altered afferent input from the cervical spine.” [Very Important]

KEY POINTS FROM DAN MURPHY

1) Whiplash-injured patients often present with complaints of dizziness, unsteadiness and visual disturbances in association with their neck pain.

2) The smooth pursuit neck torsion test measures the influence of neck afferent input on eye movement control and is useful in assessing subjects with whiplash injury.

3) Abnormal eye movements [smooth pursuit] when the head is turned [torsion] are caused by aberrant cervical proprioceptors.

4) There are significant abnormalities in the smooth pursuit neck torsion test between subjects with persistent whiplash, both with dizziness and without dizziness, compared with healthy control subjects.

5) Abnormal Smooth Pursuit Neck Torsion Test values are primarily from erroneous proprioceptive activity from the neck. [Very Important For Chiropractors]

6) The Smooth Pursuit Neck Torsion Test is “able to differentiate neck injured patients from healthy controls.” [Important]

7) Differences in The Smooth Pursuit Neck Torsion Test is not related to “medication use, compensation status, age, duration of symptoms, current pain levels” or anxiety levels.

8) The differences found in The Smooth Pursuit Neck Torsion Test are most likely due to disturbances to the postural control system, primary from altered afferent input from the cervical spine from damaged neck joint and muscle receptors. [Very Important]

9) The Smooth Pursuit Neck Torsion Test identifies eye movement disturbances in patients with whiplash, which are likely to be due to disturbed cervical afferent input.