

## Whiplash Injuries - the effect of early interventions and the value of smooth pursuit eye movement testing

### Summary

**Background.** A large number of people suffer from whiplash-associated disorders (WAD), which is also an enormous economic burden to society. There is a need to learn more regarding the treatment of acute WAD, mechanisms responsible for the development of chronic WAD, and predictors of chronicity. Tests of eye movements have been used in an attempt to identify mechanisms involved in chronic WAD, but results on this topic have so far been inconclusive.

This work was performed to contribute to answering the following research questions:

1. Is there any difference of the effect of immobilisation, advice to ‘act-as-usual’, and active mobilisation initiated early after a whiplash injury on pain and disability one year later?
2. Does smooth pursuit eye movement testing early after a whiplash injury predict 1-year outcome?
3. Is smooth pursuit eye movement testing useful as a diagnostic tool separating patients with chronic WAD from healthy individuals?

**Methods.** Data were collected in two study populations: 1) one consisting of 753 patients enrolled within 10 days after a whiplash injury, whereof 458 were enrolled in an intervention trial and 295 in an information study, and 2) one consisting of a sample of 34 persons reporting WAD of at least 6 months duration. The first study sample was used to investigate all three research topics, whereas the second study sample was only dedicated question 3.

Research question 1: Participants were randomly allocated to one of three intervention regimes: Semi-rigid neck collar for 2 weeks followed by active mobilisation, advice to “act-as-usual”, and active mobilisation (Mechanical Diagnosis and Therapy). Outcome was measured after 3, 6 and 12 months in terms of neck pain, headache, neck disability and working capability.

Research question 2: Participants in the randomised intervention trial and a sub-sample from the information study went through a test of smooth pursuit eye movements within 2 weeks after the injury. The test consisted in three eye-movement recordings. One obtained in a neutral seated position and two while participants were seated with right rotation and left rotation of the cervical spine. The results of these smooth pursuit tests were correlated with the same 1-year outcome measures as for question 1.

Research question 3: The smooth pursuit tests were repeated in the same cohort at 1-year follow-up. Results were compared between participants who had recovered after the whiplash injury and those who had not. Similarly, results of such smooth pursuit eye movement tests were compared between the other group of patients with chronic WAD and a group of healthy subjects who had not been exposed to a neck or head injury.

**Results.** There were no differences between the effects of the three intervention groups. Smooth pursuit testing could not predict the one-year outcome, and, in spite of an association between lasting neck-pain and altered eye movements, it could not be used to separate patients with chronic WAD from healthy subjects.

**Conclusions.** There is no overall difference in the effect of principally different interventions used in acute WAD. Whether this should be interpreted as a general absence of therapeutic effect is not sufficiently elucidated. The test for eye movements was not useful as a prognostic or a test diagnostic.