Handicap after acute whiplash injury
A 1-year prospective study of risk factors

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FROM INCLUDED ABSTRACT

BACKGROUND:
Exposure to a whiplash injury implies a risk for development of chronic disability and handicap, with reported frequencies ranging from 0% to 50% in follow-up studies.

The exact risk for development of chronic whiplash syndrome is not known.

OBJECTIVE:
To prospectively determine the sensitivity and specificity of five possible predictors for handicap following a whiplash injury.

METHODS:
In a 1-year prospective study of persons with acute whiplash injury (n = 141) and control subjects who had acute ankle distortion (n = 40), pain intensity, number of nonpainful neurologic complaints, cervical mobility, and workload during extension and flexion of the neck, and results of psychometric assessment were recorded.

The consecutively sampled injured persons were assessed with structured and semistructured questionnaires, and underwent neurologic examination after 1 week and 1, 3, 6, and 12 months.

After 3 to 4 years, participants with whiplash injury were questioned about legal issues.

RESULTS:
After 1 year, 11 (7.8%) persons with whiplash injury had not returned to usual level of activity or work.

The best single estimator of handicap was the cervical range-of-motion test, which had a sensitivity of 73% and a specificity of 91%.

Accuracy and specificity increased to 94% and 99% when combined with pain intensity and other complaints.

Initiation of lawsuit within first month after injury did not influence recovery.

CONCLUSION:
The cervical range-of-motion test has a high sensitivity in prediction of handicap after acute whiplash injury.

The value of cervical range-of-motion test is further improved by additional recording of symptoms and pain intensity.

THESE AUTHORS ALSO NOTE:

INTRODUCTION

Following whiplash injury, some patients develop long-term sequelae known as late whiplash syndrome.

"The proportion of persons developing chronic disability after acute whiplash injury varies considerably, with figures ranging from 0% to 50%, and even rising to 75% in a cohort with 15-year follow-up."

0% [Obelieniene D, Schrader H, Bovim G, et al. Pain after whiplash: a prospective controlled inception cohort study. J Neurol Neurosurg Psychiatry 1999; 66: 279–283.]

50% [Gargan MF, Bannister GC. The rate of recovery following whiplash injury. Eur Spine J 1994; 3:162–164.]

75% [Squires B, Gargan MF, Bannister GC. Soft-tissue injuries of the cervical spine: 15 year follow up. J Bone Joint Surg 1996; 78: 955–957.]

In prospective whiplash studies, reported symptoms include
(1) Neck pain
(2) Neck stiffness
(3) Headache
(4) Shoulder pain
(5) Arm pain
(6) Numbness in the shoulder, arm, or hand
(7) Dysphagia
(8) Dizziness
(9) Visual disturbance
(10) Auditory disturbance

The pathophysiology for late whiplash symptoms is unclear.

Risk factors for developing late whiplash syndrome include:

(1) A previous head injury
(2) Severe initial headache
(3) Severe neck pain intensity
(4) Restricted neck movement

PATIENTS AND METHODS

Patient inclusion factors:
(1) Involvement in a rear-hit motor vehicle accident
(2) No loss of consciousness during collision
(3) No amnesia after the accident
(4) ER visit within 2 days with complaints of neck pain or headache
(5) Between 18 and 70 years of age

Patient exclusion factors:
(1) Previous neck or low-back disorder or head injury
(2) Severe headache, migraine, or widespread pain
(3) A record of severe psychiatric disease
(4) Known drug or alcohol abuse

Persons with acute ankle distortion (that did not occur during sporting activity) served as control subjects.

METHODS

All subjects were examined and evaluated at 1 week and 1, 3, 6, and 12 months after injury.

Legal issues were also assessed at 3 years after injury.

Patients were instructed to rate their present pain on a visual analogue scale from 0 (no pain) to 100 (unbearable pain).

All persons were asked if they had experienced within the last 7 days any of 15 nonpainful complaints: exhaustion, anxiousness, forgetfulness, sleep disturbance, irritability, impaired ability to concentrate, imbalance, dizziness, nausea, increased sensitivity to noise, tinnitus, paresthesia in upper limbs, dysphagia, blurred vision, or diplopia or other vision disturbances.

Work capacity and handicap was determined by asking to select one of six items, after 6 months and 1 year:

(1) My work capacity is the same as before injury.
(2) I work the same hours as before injury, but my tasks have been simplified or reduced due to problems after injury.
(3) I have reduced working hours and reduced work capacity due to problems after injury.
(4) I have been dismissed from my job or have changed job due to problems after injury.
(5) I am in job training due to problems after injury.
(6) I have applied for or have received disability pension due to problems after injury.

A person was regarded as handicapped by selecting number 3, 4, 5, or 6.

Number of days until return to work or daily activities after injury was also obtained.

Active cervical range of motion (CROM) was assessed seated to obtain maximal voluntary movement in three different planes (flexion and extension, left and right lateral flexion, and left and right rotation).

A neck-trainer instrument with a computerized device for measuring maximal force was used to examine muscle strength and static work of neck muscles.

RESULTS

"Of 141 patients with whiplash injury, 8% had not returned to daily activity after injury and an additional 4% had returned only to modified job functions 1 year after trauma."

The majority of patients with whiplash injury had recovered after 1 month.

"The CROM test predicted handicap after acute whiplash injury with a sensitivity of 73% and a specificity of 91%."

The combined measure of high pain intensity and 7 to 15 nonpainful symptoms on the interview showed an accuracy of 94%, and a specificity greater than 99%.

"Risk for long-term handicap was increased by a factor of 2.5 in persons with reduced cervical mobility after 1 year, and by 2.1 in those with reduced mobility after 6 months."

"Other initial factors—pain intensity, number of nonpainful complaints, workload in neck muscles, and psychometric score—did not, as single factors, significantly predict long-term handicap after whiplash injury at 1 year or 6 months."

"The types of therapy chosen by patients with whiplash injury at first visit—soft collar (45%), active physiotherapy (3%), passive physiotherapy (6%), manipulation (4%), and weak analgesics (48%)—did not influence long-term recovery."

"A lawsuit filed within the first month after whiplash injury was not a significant risk factor" for poor outcome.

DISCUSSION

"This prospective study showed that long-term handicap after whiplash injury is predictable by measuring neck mobility in a standardized manner, by means of a CROM device."

"Further accuracy is added when this test is supplemented with assessment of pain intensity and nonpainful complaints."

These authors, in a study in SPINE (2001), showed that patients with whiplash injury have reduced neck mobility, which is inversely related to neck pain intensity. **[GATE THEORY]**

"From the current quantitative assessment, it was shown that poor prognosis is related to reduced neck mobility and high initial pain intensity."

"In the present study, persons with whiplash injuries who began a lawsuit within 30 days after injury were not at higher risk for handicap than other participants."

The current study indicates that testing of CROM in patients with acute whiplash injury predicts subsequent handicap in terms of reduced daily activity.

A 1998 study showed that randomly assigned patients, with acute whiplash injury, to soft collar or early mobilization, reduced long-term pain and complaints was observed in the early mobilization group.
[Borchgrevink GE, Kaasa A, McDonagh D, et al. Acute treatment of whiplash neck sprain injuries. A randomized trial of treatment during the first 14 days after car accident. Spine 1998; 23: 25–31.]

A 2000 study showed that mobilization within 96 hours could reduce whiplash pain significantly more than mobilization initiated after 2 weeks. [Rosenfeld M, Gunnarsson R, Borenstein P. Early intervention in whiplash-associated disorders. A comparison of two treatment protocols. Spine 2000; 25: 1782–1787.]

These authors found a significant inverse relationship between pain and reduced CROM and between nonpainful complaints and increased CROM in patients with acute whiplash. **[GATE THEORY, AGAIN]**

"The fact that we are able to identify persons at risk in the early phase after whiplash injury using the CROM test indicates the need for future intervention studies, with early onset of treatment in persons at risk for long-term disability after acute whiplash injury."