Cervical Range of Motion Discriminates Between Asymptomatic Persons and Those With Whiplash

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FROM ABSTRACT:

Study Design.
A comparative study of cervical range of motion in asymptomatic persons and those with whiplash.

Objectives.
To compare the primary and conjunct ranges of motion of the cervical spine in asymptomatic persons and those with persistent whiplash-associated disorders, and to investigate the ability of these measures of range of motion to discriminate between the groups.

Summary of Background.
Evidence that range of motion is an effective indicator of physical impairment in the cervical spine is not conclusive.
Few studies have evaluated the ability to discriminate between asymptomatic persons and those with whiplash on the basis of range of motion or compared three-dimensional in vivo measures of range of motion in asymptomatic persons and those with whiplash-associated disorders.

Methods.
The study participants were 89 asymptomatic volunteers (41 men, 48 women; mean age 39.2 years) and 114 patients with persistent [3 months - 2 years] whiplash-associated disorders (22 men, 93 women; mean age 37.2 years) referred to a whiplash research unit for assessment of their cervical region.

Range of cervical motion was measured in three dimensions with a computerized, electromagnetic, motion-tracking device. The movements assessed were flexion, extension, left and right lateral flexion, and left and right rotation.
Results.
Range of motion was reduced in all primary movements in patients with persistent whiplash-associated disorder.

Sagittal plane movements were proportionally the most affected.

On the basis of primary and conjunct range of motion, age, and gender, 90.3% of study participants could be correctly categorized as asymptomatic or as having whiplash.

Conclusions.
Range of motion was capable of discriminating between asymptomatic persons and those with persistent whiplash-associated disorders.

THESE AUTHORS ALSO NOTE:

“Assessment of range of motion (ROM) forms a basic tenet of clinical examination of the cervical spine.”

In whiplash-associated disorders (WAD), cervical ROM is commonly used as an outcome measure after treatment or to quantify disability.

Cervical ROM is an important component of the American Medical Association Guides to the Evaluation of Permanent Impairment.


Also in 1997, Jordan et al noted a reduction in cervical ROM in persons with whiplash injury when compared to matched asymptomatic persons. [Jordan A, Mehlsen J, Oestgaard K. A comparison of physical characteristics between patients seeking treatment for neck pain and age-matched healthy people. J Manipulative Physiol Ther 1997; 20: 468–75.]

This study examined the primary and conjunct ROM of the cervical spine in an asymptomatic group and a group with persistent WAD.

It was expected that patients with whiplash would demonstrate reduced primary ROM, as well as altered movement patterns as evidenced by conjunct motion.
Patients were evaluated with:

(1) Date of the accident.
(2) Visual analogue scale ratings of resting neck pain.
(3) Whiplash patients completed the Northwick Park Neck Disability Index.
(4) Seated cervical range of motion was measured in three dimensions with a computerized, electromagnetic, motion-tracking device.

Results

“The visual analogue ratings of pain at rest (mean, 4.4 ± 2.1) and Northwick Park Neck Disability Index (mean, 51.3% ± 11.9) from the WAD group indicated that the group had moderate pain and disability.”

“The results indicated that ROM was reduced in all primary movements in patients with persistent WAD.”

“In this group of patients with persistent WAD, sagittal plane movements [extension / flexion] were proportionally the most affected.”

“When primary ROM was adjusted for conjunct ROM, the differences between asymptomatic and whiplash groups remained statistically significant for all movements.”

“The discriminant analysis resulted in correct categorization of 90.3% of participants, by use of all primary and conjunct ROM, as well as age and gender, as predictor variables.”

“A second analysis with only primary ROM as predictors resolved with 79.5% of participants correctly categorized.”

Discussion

“The results of the analyses support previous assertions that individuals with persistent WAD have reduced primary ROM.”

“Whether the reduction in ROM is caused by mechanical changes in the tissues, pain inhibition, or other factors is unclear from the results of this study.”

“Few differences were demonstrated in conjunct ROM [segmental relationships] in this comparison of patients with whiplash and asymptomatic persons.” This lack of abnormal [segmental] movement patterns in the WAD group may be because the authors used a ROM device that only considered the relative movement of the head to the trunk and not intersegmental or regional
movement variations. Segmental or regional movement abnormalities could have been minimized by compensatory mechanisms. “Abnormalities of lower cervical movement may have been compensated by upper cervical motion to maintain orientation of the head relative to vestibular or other cues.”

Also, “the measurement of conjunct motion at end-of-range may not describe all abnormal cervical movement patterns.”

“If out-of-plane movements typically occur in midrange rather than at end-of-range, the measure described here will be unsuitable for the purpose of describing abnormal movement patterns.”

“The results of the present study indicate that ROM was a significant discriminator between asymptomatic persons and those with persistent WAD.”

“This discriminative ability strengthens the case for using ROM as an indicator of physical impairment.”

“It is important to note that conjunct ROM, age, and gender must be taken into account for optimal discrimination between asymptomatic persons and those with WAD.”

“The analysis correctly identified 11% more cases when conjunct ROM, age, and gender were included.”

“This may explain the difficulties noted in the past when disability was assessed by use of tables without corrections for age and gender.”

“Furthermore, the comparison of all movements with adjustment for age and gender, rather than a combined score, has been shown in this study to be a more powerful means of recognizing group differences in ROM.”

Key Points From Authors:

(1) “Range of cervical motion was reduced in persons with persistent whiplash-associated disorders.”

(2) “Movement in the sagittal plane [extension / flexion] exhibited the greatest comparative restriction.”

(3) “Ninety percent of study participants were correctly categorized as asymptomatic or having whiplash on the basis of primary and conjunct range of motion, age, and gender.”
KEY POINTS FROM DAN MURPHY:

(1) In this study cervical range of motion (adjusted for age and gender) was over 90% accurate in correctly categorized people as asymptomatic or as having chronic whiplash symptoms.

(2) Extension / flexion movements were proportionally the most reduced in the whiplash group as compared to the asymptomatic population.

(3) Individuals with chronic whiplash symptoms lasting between 3 months and 2 years, suffer from moderate pain and disability.

(4) Cervical ROM is an important and significant indicator of physical impairment and chronic whiplash symptoms.