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Clinical and goniometric evaluation of patients with spasmodic torticollis

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Abstract

Background. Patients with cervical dystonia have been evaluated prospectively by the Toronto Western Spasmodic Torticollis Rating Scale and by cervical electrogoniometry.

Methods. Nineteen patients with cervical dystonia were studied. The Toronto Scale interobserver reliability was evaluated by two observers. An electrogoniometer was used to quantify cervical range of motion and velocity. The correlation between goniometric measurements and clinical evaluation was calculated.

Findings. The interobserver reliability was excellent for the total score ($r_s = 99$) and good for the disability and the pain score ($r > 0.88$). However, global severity scale was shown to have a moderate reliability ($r = 0.63$) with r ranging from 0.37 to 0.98 for the individual items. The average loss of range of motion for flexion and extension, lateral bending and rotation was 18%, 12% and 21% respectively. For the velocity of movement, the average loss was proportionately greater than for the range of motion. (41%, 43% and 52% respectively). Correlation between the severity scale and range of motion was moderate but significant ($r_s = -0.52$ to -0.67). Correlation between the Toronto severity score and the sum of movement velocities was significant for flexion–extension and lateral bending velocity sums ($r_s = -0.51$; $r_s = -0.61$). The lateral bending and rotation velocities were significantly correlated with pain and total scores ($r_s = -0.51$). No significant correlation was observed for the disability score.

Interpretation. Three-dimensional electrogoniometry is helpful to quantify the velocity of neck movements and range of motion in patients with cervical dystonia.

Keywords: Torticollis; Cervical dystonia; 3-D goniometry

1. Introduction

Cervical dystonia (CD) is the most frequent form of focal dystonia. The availability of reasonably effective symptomatic treatments, like botulinum toxin (BTX) injections or selective denervation of cervical muscles, has enhanced the interest for reliable, simple and easy ways to measure the severity of the disorder, its impact on patients lives and to quantify the response to treatment. Most clinical studies rely on clinical rating scales

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like the Tsui scale (Tsui et al., 1986) or the Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS) (Consky et al., 1994). The latter has gained widespread acceptance in clinical studies and has been shown to have a good interobserver reliability (Comella et al., 1997). However dystonia is a complex disorder and despite the undoubted clinical value of robust clinical rating scales, several aspects of the movement disorder, like for example the velocity of movement, are not fully appreciated.

Measuring techniques like three-dimensional goniometry have been developed allowing a three-dimensional description of the displacement of the head relative to the thorax with an excellent reliability (Feipel et al., 1999a,b; Mannion et al., 2000). Velocity and acceleration can also be measured with these devices. We thus decided to evaluate prospectively CD patients with TWSTRS and cervical goniometry. We hypothesized that, in patients with CD, quantitative measurements, and particularly measures of movement velocities of the cervical spine may be correlated with the clinical rating scale. We specifically addressed three questions:

What is the interobserver reliability of the TWSTRS?

Is range of motion (RoM) reduction similar to velocity reduction during voluntary movements in CD patients?

Is there a correlation between goniometric measures of range and velocity of movement and clinical evaluation?

2. Methods

2.1. Patients

The study was approved by the Local Medical Ethics Committee of Erasme Hospital. Patients with a clinical diagnosis of adult onset spasmodic torticollis were included after written informed consent. All were referred to the movement disorder clinic for diagnosis or treatment. Excluded were patients with previous cervical or cranial surgery, previous hospital admission for cranial or cervical trauma, present symptoms or signs of cervical radiculopathy or myelopathy, and present symptoms of psychiatric disorder. The history of the onset and evolution of torticollis and of previous and present treatments was taken. Full neurological examination was performed. If patients were treated with botulinum toxin injections a minimal interval of three months between last injections and inclusion was requested. Nineteen patients were enrolled in the study. The results of two patients were excluded because of the inability to repeat the requested neck movements four times. The remaining 17 patients, 15 women and 2 men, were on average 54.7 (SD 15.1) years old, had an average weight of 55.0 (SD 12.3) kg and an average height of 165 (SD 8.5) cm. Patients had longstanding neck dystonia with an average duration of 9.9 (SD 6.1) years.

2.2. Assessment methods

Clinical rating was performed with the Toronto Western Spasmodic Torticollis Rating Scale, which evaluates severity, disability and pain (Consky et al., 1994). The total TWSTRS ranges from 0 to 85 with a subscore of 0–30 for disability and 0–20 for pain. The severity score (maximum value: 35) includes assessment of the dystonic position of the head, neck and shoulder, effectiveness of sensory gestes, the duration the patient is able to keep his head in a straight position and the range of head and neck movements. To assess interobserver reliability of TWSTRS, two observers independently and simultaneously scored the patients following two training sessions focused on the use of the scale. On the same day, quantitative measures of cervical movements were performed with a six degrees-of-freedom electrogoniometer (CA6000 OSI, Union City, CA, USA) with an accuracy better than 2° and a precision better than 1° (Feipel et al., 1999a,b). This device consists of six rotary potentiometers and seven links. One of the end links considered as fixed was attached to a strapping system at the level of the first thoracic vertebra. The other end-link was mounted on the head using an adjustable helmet (Fig. 1). The whole system is very light and allows tracking of three-dimensional continuous and unrestricted head displacement (rotation and

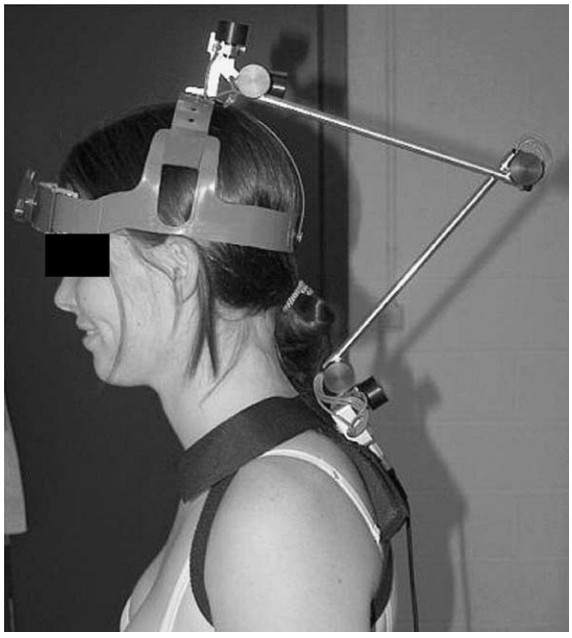

Fig. 1. The electrogoniometer on a normal subject.