Use of a kinematic parameter for an evidence-based assessment of a manual medicine diagnostic technique

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Abstract

Purpose: Neck impairment affects 70% of the population at some time. While evidence-based medicine seeks proof of diagnostic consistency for these impairments, currently there are no published and scientifically accepted objective measures to support many manual medicine diagnostic techniques. This project provides preliminary data for the use of an objective kinematic parameter in conjunction with palpatory findings from a standard clinical diagnostic test of cervical motion.

Relevance: Palpatory examinations are a staple of manual medicine and other body-based diagnostic procedures to diagnose somatic dysfunction/physical impairment. However, difficulties arise because palpatory findings may differ between clinicians depending on skill and experience, and also the criteria used to make clinical judgments, even though the diagnostic tests being performed are the same. Also, the lack of objective measures makes it difficult to monitor and document treatment progression.

Methods/Analysis: After proper consent was obtained, two examiners performed a blind screening of 85 volunteers for the presence of palpable symmetry/asymmetry in response to passive cervical lateral flexion tests. Examiner agreement on four fixed criteria determined 19 subjects eligible for the kinematic assessment. Two subject categories were established: symmetric/asymptomatic and asymmetric/symptomatic (4 or higher on a 10 point Visual Analog Pain Scale). Next, an examiner passively guided eligible subjects through the same diagnostic motion test in front of a five-camera, Qualisys video system. Three-dimensional head/neck angles were generated; the primary motion (lateral flexion) and secondary (axial rotation) motions were plotted and evaluated. Specifically, the variability (distance) between repeated trials throughout the time-angle trajectory was compared. These data were then examined statistically using non-parametric testing

(Wilcoxon Signed Rank Test) and a Simple Dichotomous Logistic Model to determine what impact the sample variability had relative to subject diagnostic category.

Results: Statistical examination of the kinematic data revealed that the first motion data trials were significantly different than the second and third trials for each subject group. However, second and third trials did not differ from one another. Further, significant differences were observed for the second and third trials of the primary movement (lateral flexion) between symmetric and asymmetric/symptomatic subjects (P-value <0.10). These data indicate repeated trials for symmetric subjects were more consistent than data obtained from subjects demonstrating pain.

Conclusions: Symmetric/asymptomatic subjects established significantly greater consistency for time-angle motion trajectories than asymmetric/symptomatic (pain) subjects. This consistency shows excellent promise as a parameter for objectifying aspects of manual medicine diagnoses. Differences were also observed for variations between the initial trial and subsequent trials. These differences suggest a possible warm-up affect occurring during the diagnostic procedure.

Implications: Evidence-based kinematic criteria can be generated for a specific manual-medicine diagnostic technique (cervical lateral flexion). These kinematic measures can also serve as a foundation for documenting treatment outcomes. The authors anticipate the results of this project and future research will establish the efficacy for using kinematic parameters to develop standards and guidelines for clinicians to use in teaching, training and in quantitative assessment of inter-examiner reliability. Experts agree that work of this nature is needed to clarify what constitutes normal and clinically impaired cervical motion based on palpatory diagnosis and symptomology. In addition, there is a need for studies that identify continuous paths of 3-dimensional cervical coupling.

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