Documenting Pressures Used for Manual Diagnosis and High Velocity Treatment of Cervical Spine Somatic Dysfunction

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BACKGROUND

Somatic dysfunction (SD) is defined as “impaired or altered function of components relating to the somatic (body framework) system: skeletal, arthrodial, and myofascial structures related to the vascular, lymphatic, and neural elements.” Tissue texture and quality of end-feel of motion are objective palpatory findings used to identify spinal SD but these are often difficult characteristics to quantify.

The IsoTOUCH® (Neumococular Engineering LLC; Nashville, TN, USA) is a non-invasive, tactile pressure sensor palpation monitoring system developed to measure forces used in palpatory SD diagnosis and its treatment with Osteopathic Manipulative Treatment (OMT). Capacitance pressure sensors placed over finger pads wirelessly transmit real-time data to a computer (see figures 1-2).

The Spineliner® System (Sigma Instruments; Pittsburgh, PA, USA) is a durometer capable of analyzing and quantifying hysteresis and fixation at various spinal levels by measuring deformation and tactile tissue responses to a specific piezoelectric impulse generated precisely at the end of a 4-pound deformation pressure.

METHODS & MATERIALS

Baseline durometer and palpatory measures of the entire cervical spine using Spineline® and IsoTOUCH® systems were obtained in 265 subjects prior to OMT. Of these, a subpopulation (n=31) was identified for a single NMM/OMM specialty physician (MLK) in which the OA was both diagnosed as the “key SD” and treated with HVLA OMT. Complete data was available for analysis from 25 in this group.

RESULTS

Of 31 subjects with OA SD, 28 (90%) preferred the diagnosis of sidebending right, rotation left; 3 were diagnosed with a sidebending left, rotation right SD.

IsoTOUCH® data analysis revealed similar overall segmental diagnostic palpatory pressures from OA to C7 vertebrae in this population: Preload average 1.35lbs (6.00N) (95%CI=1.31-1.40lbs [5.83N-6.23N]) with end-feel pressures averaging 2.64lbs (11.74N) (95%CI=2.56-2.72lbs [11.39-12.09N]). The average difference between the preload and end-feel pressure was 1.31lbs (5.83N) (p<0.001) (see figure 3).

The overall treatment pressures for the OA SD averaged a preload pressure of 2.89lbs (12.86N) (95%CI=2.42-3.35lbs [10.76-14.90N]) and the final thrust pressures averaged 4.05lbs (18N) (95%CI=3.53-4.57lbs [15.70-20.32N]). The actual HVLA activating force averaged 1.10lbs (4.95N) (95%CI=0.83-1.36lbs [3.69-6.05N]) with a fractional-second duration. There was no significant difference between the end-feel diagnostic barrier and the preload used to contact the SD barrier prior to HVLA OMT (see figure 3).

During HVLA OMT, audible cavitations were appreciated by the treating physician in 80% of the subjects. Manual physical re-examination by the treating physician after OMT was reported to show improved palpatory motion characteristics in 84% of the subjects. By comparison, the independent durometer data (by a blinded physician) documented an objective improvement of tissue texture changes for fixation (resistance) in 76% of the subjects (see figure 4).

DISCUSSION

IsoTOUCH® technology appears capable of quickly and consistently measuring pressures used in the palpatory diagnosis and treatment of SD. Documentation of palpatory pressures will facilitate reproduction of these or similar techniques, helping to expand the evidence base for manual medicine. Furthermore, real-time feedback and comparability of palpation techniques will aid those wishing to enhance manual palpation diagnostic and OMT skills; this could also aid in the agreement phase of both intra- and inter-examiner studies.

Furthermore, objective durometer measurements of documented tissue texture change closely mirrors perceptions of clinical improvement in palpatory motion and tissue texture characteristics after treatment of OA SD using HVLA thrust OMT technique.

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