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

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BACKGROUND: Palpatory assessment of free or restricted motion patterns is part of the diagnosis of spinal somatic dysfunction (SD). Diagnostically, local soft tissues are compressed (pre-loaded) over the structure of interest followed by one or more test impulses to assess the quality of the “end-feel” motion in several planes. These barrier sensations are often described qualitatively but have not been objectively quantified. Noninvasive, tactile pressure sensors built into a digital palpation monitoring system (IsoTOUCH®; Neuromuscular Engineering; Nashville TN, USA) were used to document loading and impulse pressures for palpatory segmental diagnosis and to first engage and then quickly move through a restrictive SD barrier using an osteopathic manipulative treatment (OMT) technique.

MATERIALS & METHODS: Subjects were monitored using the IsoTOUCH® to measure representative force levels used during cervical spinal palpatory diagnosis and High Velocity Low Amplitude (HVLA) OMT of SD identified at the occipitoatlantal (OA) articulations specifically. Measurements included diagnostic pressures (preload and end-feel forces used to assess functional and restrictive barriers), and OMT pressures (preload and thrust applied during HVLA to correct SD). Within a few minutes pre- and post-OMT, a second, blinded physician objectively quantified segmental tissue texture (hysteresis) characteristics using a durometer (Spineliner®; Sigma Instruments, Pittsburg PA, USA). 25 out of 31 subjects were then treated by the same osteopathic neuromusculoskeletal medicine specialty physician (MLK) with a single, direct-method HVLA technique to the OA. With the occiput in slight loose-pack flexion regardless of any sagittal plane diagnostic component, preload pressure to the barrier was applied primarily with lateral translation and sidebending. Each corrective HVLA curvilinear force (introduced primarily through a single fingertip placed over the occiput) was directed at the SD barrier towards the opposite orbit.

RESULTS: Of 31 relatively asymptomatic subjects all with OA SD, 28 were diagnosed as preferring sidebending right, rotation left and 3 with sidebending left, rotation right. Overall diagnostic palpatory pressures (OA-C7), preload pressures averaged 1.35lbs (95%CI=1.31-1.40lbs; p<0.001) and end-feel pressures averaged 2.64lbs (95%CI=2.56-2.72lbs; p<0.001), or about 1.31lbs difference between preload and end-feel pressures (p<0.001).

Overall treatment pressures for the OA averaged 2.89lbs pre-load (95%CI= 2.42-3.35lbs; p<0.001), 4.05lbs final thrust level (95%CI=3.53-4.57lbs; p<0.001), and an actual HVLA activating force averaging 1.10lbs (95%CI=0.83-1.36lbs; p<0.001).

During OMT, audible cavitations were appreciated in 80% of subjects. Post-OMT palpatory motion improvement was noted by the treating physician in 84% and independent durometer improvement of tissue texture changes for fixation (resistance) was appreciated in 80%. No change was noted in 12%.

CONCLUSION: In this population, intraoperator palpatory pressures used in cervical diagnosis were fairly consistent (averaging 1.35lbs tissue loading with an additional 1.31lbs to assess barrier end-feel.) Intraoperator OMT parameters using a singular form of HVLA to correct OA SD were also fairly consistent (employing an additional fractional-second force averaging 1.10lbs focused over occipital tissues preloaded with less than 3.5lbs of pressure.)

Documenting the pressures used in manual diagnosis and treatment should permit other researchers and clinicians to reproduce those techniques described in the expanding evidence-base for these modalities and perhaps aid those wishing to enhance their manual skills.

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