

**Study On Manual Therapy Interventions On Vertebral And Internal Carotid Arterial Blood Flow and Cerebral Inflow**

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A recent study that appeared in Physical Therapy Journal conducted by Thomas et al investigated the changes in vertebral and internal carotid blood flow during selective positions that are commonly associated with manual therapy techniques were assumed. This study provides additional evidence toward understanding the role of neck position on blood inflow to the brain. Twenty participants (10 male, 10 female) with a mean age of 33.1 years were recruited into the study. All participants had normal anatomy of their craniocervical arterial circulation, however three participants (15%) had dominance of one vertebral artery. Inclusion criteria were Healthy subjects, between the ages of 18 and 65 years old, no reported mechanical neck pain or headache. Exclusion criteria were Diagnosed inflammatory joint disease, any history of serious cervical spine trauma (i.e. fractures), any congenital disorder recognized as being associated with hypermobility or instability of the upper cervical spine, diagnosed vertebrobasilar artery insufficiency (VBI), claustrophobia or discomfort in confined spaces (standard contraindication for MRI), and any contraindication identified by the local health authority MRI safety screening questionnaire. While the MRI was being performed, the patients' cervical spine was positioned in 9 distinctly different positions that simulate positions used in manual therapy techniques. These positions included: neutral position, left rotation, right rotation, left rotation with distraction, right rotation with distraction, left rotation localized to C1 C2, right rotation localized to C1 C2, distraction, and post-test neutral. Blood flow in craniocervical arteries was measured with MRI using a phase-contrast flow quantification sequence. The arterial plane of section was selected to intersect the top of the atlas loop of the vertebral arteries at the level of the C1 vertebra, with imaging extending to just below the atlas loop. Average blood flow volume measured in milliliters per second was used as the primary test variable and was analyzed in neutral and each of the neck positions for each artery. The average blood flow volume in each artery then was compared between the neutral position and each of the experimental neck positions. Additionally, total blood supply to the brain was determined from the sum of average flow volume (mL/s) in both vertebral and both internal carotid arteries. A meaningful difference between the neutral position and any of the experimental conditions was determined to be > 10%. Average inflow to the brain in neutral was 6.98 mL/s and was not significantly changed by any of the test positions. According to the data collected, the lowest total blood inflow level was recorded during left rotation (6.52 mL/a). There was no significant difference in flow in any of the 4 arteries in any position from neutral, despite large individual variations. Although mean values of average flow volume were not significant for any position, there were certain individuals with marked flow changes in some positions. Flow generally decreased slightly for both the end-range rotation and distraction positions but increased in the other positions in comparison to neutral. Flow changes were all less than 10%, which is considered to be the normal variation for cerebral inflow. Secondary to restraints of the MRI and positioning of patients, full end-range rotation may not have been achieved. Additionally, some of the hand positions had to be altered from typical manual therapy techniques due to the constraints of the MRI set-up. None of the tested positions also included the thrust manipulation commonly used concurrently during a manual therapy procedure. Most notably, the results of this study should be cautioned as no subjects were included that presented with neck pain and/or headache symptoms. Cervical manipulation is a polarizing topic amongst physical therapists and healthcare professionals as a whole. Many believe the risks are not worth the clinical benefits it provides to individuals suffering from mechanical neck pain. This study investigated blood flow to the brain during positions commonly associated with manipulative techniques and found only marginal changes in blood flow with multiple positions. What this study is not able to do (and wasn't designed to do) is confirm the utility of positional tests for identifying those with blood flow restrictions or confirm that cervical thrust procedures do not involve blood flow changes (the subjects were healthy and there was no thrust used in this study). This sophisticated study adds nicely to the literature but clinicians still face the conundrum of identifying who may and may not be at risk during a thrust manipulation.

Prior to intervening with cervical manipulative techniques, clinicians are urged to follow a thorough evaluation framework similar to that proposed by Flynn et al and the International Federation of Orthopaedic Manipulative Physical Therapists. Cervical manipulation should be implemented with caution and following a thorough subjective and physical examination when indicated by individual patient presentation. Authors: Thomas LC, Rivett DA, Bateman G, Stanwell P, Levi CR. Effect of Selected Manual Therapy Interventions for Mechanical Neck Pain on Vertebral and Internal Carotid Arterial Blood Flow and Cerebral Inflow. *Physical Therapy*. 2013; 93(11): 1563-1574. Copied from: [www.medbridgeeducation.com](http://www.medbridgeeducation.com)