

# Manual Therapy Research Review



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## This issue:

**Changes in Vertebral Artery Blood Flow Following Various Head Positions and Cervical Spine Manipulation - P1**

**Knee Extension and Stiffness in Osteoarthritic and Normal Knees: A Video-fluoroscopic Analysis of the Effect of a Single Session of Manual Therapy - P2**

**Bilateral Cervical Dysfunction in Patients with Unilateral Lateral Epicondylalgia without Concomitant Cervical or Upper Limb Symptoms. A Cross Sectional Case Control Study - P3**

## Welcome

*In this issue we have a contribution from Dr Steve Karas from Chatham University in Pittsburgh. Thanks to Steve, as this is the first contribution to the Research Review other than from me. Steve has reviewed a paper on vertebral artery blood flow. I welcome other such contributions in future. We also have in this issue other papers on the relationship of cervical dysfunction to lateral elbow pain and one on the effects of manual therapy in osteoarthritic knees. Quite a broad mix! Enjoy!!*



## Paper One

**Quesnele, J, Triano, J, Noseworthy, M & Wells, G. (2014). Changes in Vertebral Artery Blood Flow Following Various Head Positions and Cervical Spine Manipulation. *Journal of Manipulative and Physiological Therapeutics* 37 1, 22-31**

**Study Design:** Experimental Pilot

**Summary:** Ten male subjects, mean age 26.8, with no history of neck, arm, neurological symptoms, or headache volunteered for the study. This convenience sample had received cervical spine manipulation in the past with no adverse effects consistent with vertebral artery pathology. Vertebral artery bold flow using phase contrast MRI, which allows artery visualisation even if the artery is inside bone, was measured at C1-2. No arteriography was performed. Four positions were measured: neutral cervical spine, 45 degrees rotation, maximum rotation, and immediately after C1-2 cervical spine rotary manipulation. Each position was held for one minute. The head was returned to neutral after the manipulation. The manipulation was performed in flexion, rotation, and lateral flexion.

**Results:** A trend toward a decrease in mean vertebral artery blood flow and velocity of flow in the vertebral arteries was observed in the four positions (neutral, 45 degrees rotation, maximal rotation, cervical manipulation). The contralateral artery was affected more than the ipsilateral artery. However, none of the overall trends were significant.

**Conclusions:** In this study no statistically significant changes in vertebral artery blood flow were noted in any of the four cervical spine positions given the small sample size. The authors are of the opinion that the changes observed are not clinically relevant.

**Commentary:** This study appears to support IFOMPT's guidelines for arterial assessment prior to cervical OMT intervention. The subjects were healthy males with no history of injury and no current symptoms, therefore seemingly ruling out the need for cranio-vertebral ligament testing, neurological assessment, and symptom differentiation. However, in contrast to IFOMPT, and absent in the authors' evaluation of the subjects, were assessment of blood pressure, carotid pulse, and a true pre-manipulative hold. Also apparent was the use of a high velocity thrust to the upper cervical spine in end range rotation, which is advised against in the IFOMPT guidelines. While small changes were noted in these healthy individuals, perhaps greater questions arise: what changes would occur in unhealthy individuals such as those with a history of upper cervical injury or arterial pathology, or those with atypical upper cervical anatomy? Perhaps clinical reasoning is needed more so than MRI given that the signs and symptoms of arterial pathology discovered while using IFOMPT's guidelines, would potentially lead to a clinical decision not to perform this type of high velocity thrust.

Note the IFOMPT Guidelines for examination of cervical arterial dysfunction are now published in Manual Therapy Rushton, et al (2014). International framework for examination of the cervical region for potential of Cervical Arterial Dysfunction prior to Orthopaedic Manual Therapy intervention. *Manual Therapy* 19 222-228.



## Paper Two

**Taylor, L, Wilken, J, Deyle, G & Gill, N. (2014). Knee Extension and Stiffness in Osteoarthritic and Normal Knees: A Video-fluoroscopic Analysis of the Effect of a Single Session of Manual Therapy. Journal of Orthopaedic and Sports Physical Therapy 2014 44(4), 273-282. February 2014. doi:10.2519/jospt.2014.4710**

**Purpose:** To quantify the response of participants with and without knee osteoarthritis (OA) to a single session of manual physical therapy. The intervention consisted primarily of joint mobilisation techniques, supplemented by exercises, aiming to improve knee extension.

**Methods:** The study included 5 participants with knee OA and 5 age-, gender-, and body mass index-matched healthy volunteers. Knee extension motion and stiffness were measured with video-fluoroscopy before and after a 30-minute manual therapy treatment session. Analysis of variance and intraclass correlation coefficients were used to analyse the data.

**Results:** Participants with knee OA had restricted knee extension range of motion at baseline, in contrast to the participants with normal knees, who had full knee extension. After the therapy session, there was a significant increase in knee motion in participants with knee OA ( $P = .004$ ) but not in those with normal knees ( $P = .201$ ). For stiffness data, there was no main effect for time ( $P = .903$ ) or load ( $P = .274$ ), but there was a main effect of group ( $P = .012$ ), with the participants with healthy knees having greater stiffness than those with knee OA. Reliability, using intraclass correlation coefficient model 3,3, for knee angle measurements between imaging sessions for all loading conditions was 0.99. Reliability (intraclass correlation coefficient model 3,1) for intrasession measurements was 0.97.

**Conclusions:** End-range knee extension stiffness was greater in the participants with normal knees than those with knee OA. The combination of lesser stiffness and lack of motion in those with knee OA, which may indicate the potential for improvement, may explain why increased knee extension angle was observed following a single session of manual therapy in the participants with knee OA but not in those with normal knees. Video-fluoroscopy of the knee appears reliable and relevant for future studies attempting to quantify the underlying mechanisms of manual therapy.

**Comment:** Whilst this study is only a single session of manual therapy, it does show very clearly that manual therapy has a significant physical effect on joint motion. The use of the video-fluoroscopy is a great methodology to help demonstrate this. While these machines are not used in clinical practice, this type of research is great to help inform clinicians that they are actually moving joints with manual therapy. This study would also provide some further validation for a study outlined in a previous research review by Abbott et al (2013) which also demonstrated effectiveness of mobilisation and manipulation in the management of OA of the knee and hip. The results of my own research demonstrated stretching interventions to the OA knee also increased knee extension, would also add to this manual therapy approach (Reid & McNair, 2011). Physiotherapy has a lot to offer to those with OA!

Reference: Reid D and McNair, P. Effects of a six week lower limb stretching programme on range of motion, peak passive torque and stiffness in people with and without osteoarthritis of the knee New Zealand Journal of Physiotherapy, 39(1), 2-9.)



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### Paper Three

**Coombes, B, Bissett, L and Vincezino, B Bilateral Cervical Dysfunction in Patients with Unilateral Lateral Epicondylalgia without Concomitant Cervical or Upper Limb Symptoms. A Cross Sectional Case Control Study. Journal of Manipulative and Physiological Therapeutics 2014 37, 79-86**

**Purpose:** The purposes of this study were to examine the prevalence and distribution of spinal and neurodynamic dysfunction in a population with unilateral lateral epicondylalgia (LE) without concomitant cervical or upper limb symptoms, compared with cervical examination in a healthy control population, and investigate potential associations with clinical and demographic factors.

**Methods:** This cross-sectional study included 165 patients with LE along with 62 healthy controls. Manual examination (C4-T2) was performed by an unblinded examiner with dysfunction defined as pain of 3 or higher on a numerical rating scale in the presence of a severe or moderate hypomobility or hypermobility. Neurodynamic testing (radial nerve) was classified positive if LE symptoms were reproduced and altered by sensitisation manoeuvre.

Repeated-measures analysis of variance was used to compare sides, segmental levels, and groups. Regression analysis was used to determine associations between variables.

**Results:** Thirty-six percent of patients had dysfunction of at least 1 spinal palpation site, and 41% had a positive neurodynamic test. Significant group-by-level ( $P = .02$ ) and group-by-side ( $P = .04$ ) interactions were found for spinal examination, with greater dysfunction bilaterally at C4-7 ( $P = .01$ ) in LE compared with control arms. The number of positive palpation sites was associated with injury duration ( $P = .03$ ), whereas neurodynamic response was associated with severity of resting pain ( $P = .04$ ).

**Conclusion:** Cervical dysfunction is evident in individuals with LE without obvious neck pain and may reflect central sensitisation mechanisms. Further study of the nature of the relationship between cervical dysfunction and LE is required.

**Comment:** It has often been a common clinical finding that those with lateral elbow pain have associated neck symptoms. This study demonstrates that at least a third of those presenting with lateral elbow pain will have associated neck findings even if they do not explicitly complain of neck pain. The other interesting finding is the association between increased neurodynamic responses and the level of resting arm pain. This increase sensitivity of the nervous system is therefore important to take into consideration and examine particularly when the patient has higher levels of irritability whereby symptoms take longer to settle. The ability to look more widely than the area of the presenting symptoms is critical to ensure the patients have a more complete package of care to resolve an often persistent condition. Problems like lateral epicondylalgia are not just about the tendon and the co-existing changes in tendon structure but a wider set of variables.

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### Interested in contributing?

If you would like to make any contributions to the Manual Therapy Research Review please contact Dr Duncan Reid on [duncan.reid@aut.ac.nz](mailto:duncan.reid@aut.ac.nz)

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