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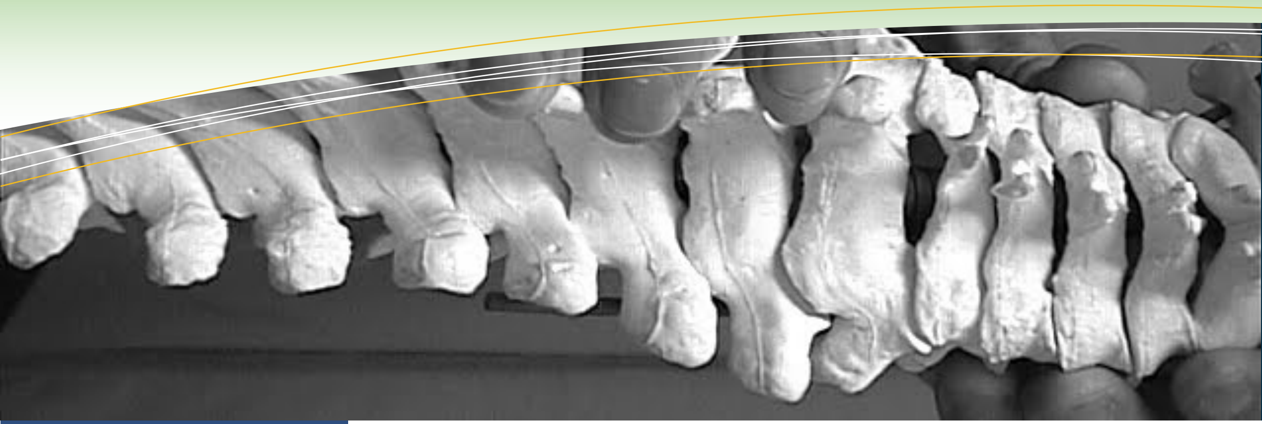

This issue:

Welcome

Welcome to the 18th issue of the Manual Therapy Research Review. In this issue we have another contribution from Nick Kendrick and his team as part of the Musculoskeletal Physiotherapy Australia (MPA) MO investigation into the effects of HVT of the thoracic spine on cervical radiculopathy, we have paper on hip diagnosis reviewed by Dr Steve White from the AUT University Musculoskeletal teaching team (and former IFOMPT Executive Committee member) and a couple from me on cervical ligament lesion testing.

Enjoy. Duncan

Paper One

A review by the Musculoskeletal Physiotherapy National Group (MPA) Queensland Branch Committee of the Australian Physiotherapy Association (APA). Contributors Dr Helen Land, Ben Kasehagen and Nick Kendrick.

ARTICLE FOR REVIEW

Young, I., Pozzi, F., Dunning, J., Linkonis, R., & Michener, L. (2019). Immediate and short-term effects of thoracic spine manipulation in patients with cervical radiculopathy: A randomised controlled trial. Journal of Orthopaedic & Sports Physical, 49(5).

ABSTRACT

BACKGROUND: Thoracic spine thrust manipulation has been shown to improve patient-rated outcomes for individuals with neck pain. However, there is limited evidence of its effectiveness in patients with cervical radiculopathy.

OBJECTIVES: To compare the immediate and short-term effects of thoracic manipulation to those of a sham thoracic manipulation in patients with cervical radiculopathy.

METHODS: In this multi-centre randomised controlled trial, participants with cervical radiculopathy were randomised to receive either manipulation (n = 22) or sham manipulation (n = 21) of the thoracic spine. Outcomes were measured at baseline, im-mediately after treatment, and at a follow-up 48 to 72 hours after manipulation. A repeated-measures analysis of variance was used to analyse neck and upper extremity pain (numeric pain-rating scale), disability (Neck Disability Index), cervical range of motion (ROM), and endurance (deep neck flexor endurance test). The chi-square test was used to analyse changes in neck and upper extremity pain, centralisation of symptoms, and beliefs about receiving the active manipulation treatment using a global rating of change scale.

RESULTS: Neck and upper extremity pain, cervical ROM, disability, and deep neck flexor endurance all showed significant interactions between group and time (P<.01). Immediately after treatment and at the 48-to-72-hour follow-up, the manipulation group had lower neck pain (P<.01), better cervical ROM (P<.01), lower disability (P<.01), and better deep neck flexor endurance (P = .02) compared to the sham manipulation group. The manipulation group had moderate to large effect-size changes over time. No between-group differences for upper extremity pain were found immediately following the intervention (P = .34) and at 48 to 72 hours after the intervention (P = .18). At 48 to 72 hours after treatment, a greater proportion of participants in the manipulation group reported improvement (global rating of change scale score of 4 or greater) in neck and upper extremity symptoms (P<.01), centralisation of symptoms (P<.01), and beliefs about receiving an active manipulation (P = .01) compared to the sham manipulation group.

CONCLUSION: One session of thoracic manipulation resulted in improvements in pain, disability, cervical ROM, and deep neck flexor endurance in patients with cervical radiculopathy. Patients treated with manipulation were more likely to report at least moderate change in their neck and upper extremity symptoms up to 48 to 72 hours following treatment.

LEVEL OF EVIDENCE: Therapy, level 2. J Orthop Sports Phys Ther 2019;49(5):299-309. doi:10.2519/jospt.2019.8150
KEY WORDS: clinical trial, neck pain, radicu-lopathy, thoracic spine, thrust manipulation

Commentary

Young and colleagues have conducted a high quality randomised controlled trial (current reviewers scored this paper as 8/10 on PEDro scale) [1, 2] [3] [4] to "assess the immediate and short-term effects of 1 session of thoracic manipulation in patients with cervical radiculopathy (CR)."[5]

This trial expands the literature regarding the efficacy of thoracic spine manipulation in treating complaints of the cervical spine, adding to previous trials in which the lead author has been involved.[6-8] The clinical implication for this study was based on questions emerging out of the previous paper by Thoomes.[9] Although framed as a systematic review, this paper was a more generalised literature review that suggests there is inconsistent support for individual interventions. This notwithstanding, prior reviews have been unable to conclude that one intervention is superior to another, although short-term reductions in pain and disability were reported.[10-13]

The main focus of this trial was to determine the immediate and short-term effect of thoracic manipulation on neck and upper limb pain (assessed via a NPRS) and on Global Rating of Overall Change for the neck and upper limb (assessed by 15-point GROC) VERSUS sham manipulation. There were three follow-up time points were immediate, 48-hours and 72-hours post-intervention. Multiply these by the four separate primary outcomes and this could put this trial at risk of type 1 errors. The authors account for this by using a Bonferroni correction to adjust their alpha level down to 0.025. They also reported on secondary measures of disability (assessed via NDI), AROM (measured via goniometry), deep neck flexor muscle endurance (assessed via the methods described by Harris et al. (2005)[14] **)**, and a dichotomous yes/no on whether patient symptoms had centralised. The authors went to great length to describe the minimal clinically important difference for each measure and should be commended for this.

The authors concluded that "1 session of thoracic manipulation to patients with CR resulted in improved pain, disability, cervical ROM, and deep neck flexor endurance compared to those patients treated with sham manipulation."[5] However, it could be argued that these conclusions are slightly misleading. Closer analysis of the results shows that indeed the active treatment arm did result in significant improvements in neck pain (reaching MCID), but there wasn't a significant difference in arm pain. Additionally, there were significant differences for their other primary outcome of GROC. However, the study wasn't powered to make conclusions about significant differences in ROM (which were achieved), disability (again achieved but not meeting MCID) and neck flexor muscle endurance (achieved but not meeting MCID). When it comes to secondary measures, the authors should be cautious when stating conclusions as the sample size calculation was based on the effect size for changes in neck pain only. Secondary outcome results may look promising but further studies, with sufficient power, are required to test the new hypotheses that these results generate.

Another criticism of this trial, which was noted by the authors, was the lack of success of the sham manipulation. Only 57% of participants in the control group believed that they had been provided with an active intervention compared with 90% of the active group. This is a potentially large confounding factor, as the placebo effect has been shown to have a substantial effect on pain AND motor performance.[15] Additionally, the description of the applied sham technique leaves you wondering if a better approach could have been used. A previously validated sham thoracic spine manipulation technique has demonstrated no significant difference in *"believability"* between active and sham techniques has been published, and may have been better suited to this trial.[16]

The outcomes of this trial confirm that thoracic manipulation can reduce neck pain in the immediate and short-term in patients with signs of CR and clinicians may consider using this treatment technique as part of their overall clinical management of this condition. However, manual therapy decisions should be made within the broader context of patient goals and encourage movement and active behaviors. Considering the results of this trial via the lens of our contemporary views manual therapy mechanisms, and of pain science, will assist clinicians in integrating this into clinical practice and help promote patient engagement in daily activities.[17, 18]

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Paper Two

A review by Dr. Steve White (PhD), Senior Lecturer, Department of Physiotherapy, School of Clinical Sciences, Auckland University of Technology, Auckland, New Zealand. Dr White's PhD was titled "The diagnostic accuracy of the clinical examination of the hip", so he is well placed to comment on this paper.

Rainville, J Bono, J, Laxer, E et al Comparison of the history and physical examination for hip osteoarthritis and lumbar spinal stenosis. The Spine Journal 19 (2019) 1009–1018

BACKGROUND: Leg pain associated with walking is sometimes incorrectly attributed to hip osteoarthritis (OA) or lumbar spinal stenosis (LSS).
PURPOSE: This study compared physicians' values of signs and symptoms for diagnosing and differentiating hip OA and LSS to their clinical utility.
STUDY DESIGN/SETTING: Musculoskeletal physicians were surveyed with online questionnaires.
Patients were recruited from hip and spine specialty practices.
PATIENT SAMPLE: Seventy-seven hip OA and 79 LSS patients.
OUTCOME MEASURES: Signs and symptoms of hip OA and LSS.
METHODS: Fifty-one of 66 invited musculoskeletal physicians completed online surveys about the values of 83 signs and symptoms for diagnosing hip OA and LSS. Of these, the most valued32 symptoms and 13 physical examination items were applied to patients with symptomatic hip OA or LSS. Positive likelihood ratios (+LR) were calculated for each items' ability to differentiate hip OA from LSS, with a +LR>2 set as indicating usefulness for favouring either diagnosis. Positive LRs were compared with surveyed physicians' values for each test.
RESULTS: All symptoms were reported by some patients with each diagnosis. Only 11 of32 physician-valued symptoms were useful for discriminating hip OA from LSS. Eight symptoms favoured hip OA over LSS: groin pain (+LR=4.9); knee pain (+LR=2.2); pain that decreased with continued walking (+LR=3.9); pain that occurs immediately with walking (+LR=2.4); pain that occurs immediately with standing (+LR=2.1); pain getting in/out of a car (+LR=3.3); pain with dressing the symptomatic leg (+LR=3.1); and difficulty reaching the foot of the symptomatic leg while dressing (+LR=2.3). Three symptoms favoured LSS over hip OA: pain below the knee (+LR=2.3); leg tingling and/or numbness (+LR=2.7); and some pain in both legs (+LR=2.5). Notable symptoms that did not discriminate hip OA from LSS included: pain is less while pushing a shopping cart (+LR=1.0); back pain (+LR=1.1); weakness and/or heaviness of leg (+LR=1.1); buttocks pain (+LR=1.2); poor balance or unsteadiness (+LR=1.2); pain that increased with weightbearing on the painful leg (+LR=1.3), and step to gait on stairs (+LR=1.7). Consistent with physicians' expectations, 7 of 13 physical examination items strongly favoured hip OA over LSS: limited weight-bearing on painful leg when standing (+LR=10); observed limp (+LR=9); and painful and restricted range-of-motion with any of five hip maneuvers (+LR range 21−99). Four of five tested neurological deficits (+LR range 3−8) favoured the diagnosis of LSS over hip OA.
CONCLUSIONS: There is substantial crossover of symptoms between hip OA and LSS, with some physician-valued symptoms useful for differentiating these disorders whereas others were not. Physicians recognize the value of the examination of gait, the hip, and lower extremity neurological function for differentiating hip OA from LSS. These tests should be routinely performed on all patients for which either diagnosis is considered. Awareness of these findings might reduce diagnostic errors.

Commentary

This paper explored the association of specific symptoms in a group of patients with a primary symptom of proximal leg pain induced by walking and relieved by sitting who in the opinion of the enrolling physician had either symptomatic hip osteoarthritis (OA) or lumbar spinal stenosis (LSS). It reports sensitivity and positive likelihood ratios as measures of the diagnostic utility of these symptoms.

Whilst it is important to encourage clinically based research, the findings of this paper need to be carefully considered given the limitations in its design. The authors acknowledge some of these limitations, including the fact that the reference standard was the diagnosis made by the enrolling physicians. Whilst the physicians had the benefit of the findings of medical imaging and diagnostic injections to help inform their diagnosis, the fact that all patients did not undergo all tests creates the potential for significant verification bias(1). For example, it appears that of participants diagnosed with LSS, only 24% had a hip X-ray and just 5% had an intra-articular anesthetic injection (AI) of their hip. It is likely that at least some of the remaining LSS patients could have had radiological evidence of hip OA and a positive response to an IA hip anesthetic. Similarly, only 44 percent of those diagnosed with hip OA had an AI. It is well documented that radiological findings of OA are commonly asymptomatic hence a number of those diagnosed with hip OA may well have had a negative response to IA and should perhaps have been excluded from the hip OA group (2). It is very likely that if all participants underwent all diagnostic tests that the results of this study would be very different.

Additionally, the physicians own assumptions about an individual participants diagnosis dictated which participants would have a hip imaging or diagnostic injections or lumbar spine investigations. This introduces the potential for incorporation bias in that it is highly likely that the physician took into account some of the symptoms that were being evaluated for accuracy e.g. the authors report that physicians considered that the presence of leg tingling or numbness was more likely to be associated with LSS than hip OA, hence, it is likely that patients with these symptoms were referred for lumbar but not hip investigations.

Finally, the reported positive likelihood ratios (LR+) do not include confidence intervals, making it impossible to determine if any of them are statistically significant or not. Even if they are, apart from the presence of groin pain with hip OA (LR+4.9) and perhaps decreased pain with walking in hip OA (LR+ 3.9), the ratios reported suggest that at best, these symptoms generate small changes in probability of the presence of either pathology.

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Paper Three

Von Piekartz H, Maloul, R Hoffmann ,M Hall, T Ruch M& Ballenberger N Diagnostic accuracy and validity of three manual examination tests to identify alar ligament lesions: results of a blinded case-control study. Journal of Manual & Manipulative Therapy, 27:2, 83-91, DOI:10.1080/10669817.2018.1539434

Abstract

INTRODUCTION: Tests to evaluate the integrity of the alar ligaments are important clinical tools for manual therapists, but there is limited research regarding their validity.

METHOD: A single blinded examiner assessed alar ligament integrity using the lateral shear test (LST), rotation stress test (RST) and side-bending stress test (SBST) on a sample of convenience comprising 7 subjects with MRI confirmed alar ligament lesions and 11 healthy people. Alar ligament lesions were identified using both supine and high-field strength upright MRI.

RESULTS: The RST had a sensitivity of 80% and a specificity of 69.2%. The SBST and the LST both showed a sensitivity of 80% and a specificity of 76.9%. In cases where all three tests were positive, the specificity increased to 84.6%.

DISCUSSION: Tests of manual examination of alar ligament integrity have some diagnostic utility; however, these findings require further corroboration in a larger sample.

Commentary

There are only a small number of studies that have examined ligament stability tests in the cervical spine and few that have examined populations that are relevant to manual therapy practice [1-4]. Prior to this study the most recent study by Kaale et al [3] found that with one experienced assessor ligament lesions could be identified with manual therapy tests when compared to the gold standard of MRI. The rotational stress test was the most valid with Kappa scores of 0.69–0.83.

This study builds nicely on this previous study and demonstrates high levels of sensitivity and specificity for the RST and side bending stress test. The nice aspects of this study are the comparison of participants with potential cervical ligament lesions and normal participants, the blinded nature of the assessor and the use if higher quality MRI.

The IFOMPT guidelines for the management of Cervical Artery Dysfunction recommend assessing for ligament lesion but at the time of writing those guidelines the research for testing of ligamentous lesions was not strong. This paper will improve this situation.

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Paper Four

Satpute, K Nalband S and Hall, T. The C0-C2 axial rotation test: normal values, intra- and inter-rater reliability and correlation with the flexion rotation test in normal subjects. JOURNAL OF MANUAL & MANIPULATIVE THERAPY 2019, VOL. 27, NO. 2, 92–98 https://doi.org/10.1080/10669817.2018.1533195

Abstract

OBJECTIVES: Impairment in upper cervical spine mobility is associated with cervicogenic headache severity and disability. Measures of such mobility include the flexion-rotation test (FRT), which requires full cervical flexion and may be influenced by lower cervical spine dysfunction. The C0-C2 axial rotation test also evaluates upper cervical mobility but normal values and reliability have not been reported. Our objective is to determine normal values, and intra-rater and inter-rater reliability of the C0-C2 axial rotation test.
METHODS: Two therapists independently evaluated the FRT and C0-C2 axial rotation test with an iPhone compass application on 32 asymptomatic subjects with mean age 40.53 (SD 11.64) years on two occasions. Measurement procedures were standardised; and order of testing randomised.
RESULTS: For the FRT and C0-C2 axial rotation test reliability was high (ICC > 0.88). For rater one, Mean range to the left during the FRT and C0-C2 axial rotation test was 45.0° (6.04) and 14.43° (2.94), respectively, while range to the right was 44.6° (6.57) and 15.44° (2.68). For the FRT and C0-C2 axial rotation test the standard error of measurement was at most 2°, while the minimum detectable change was at most 4°. A strong positive correlation exists between the FRT and C0-C2 axial rotation test (r = 0.84, P < 0.01).
DISCUSSION: The range recorded during the C0-C2 axial rotation test and FRT have high levels of reliability when evaluated using an iPhone. The strong correlation between the FRT and C0-C2 axial rotation test indicate that both may be measuring similar constructs, but each test needs to be referenced to normal values.

Commentary

Toby Hall has led the way in research relating to the Flexion Rotation Test (FRT). The study builds nicely on his previous work that shows this is a reliable and valid test and helps to differentiate patients with C1/2 dysfunction and headache from those with migraine [1-4] .
What is good about this study is that the reliability examination has been re-examined using an iPhone. The ability to use technology that we all have available at little expense is great and so clinically applicable. Great work!

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