Academy of PHYSICAL MEDICINE

Research Paper Review

This review is published with the permission of Research Review Service (www.researchreviewservice.com)

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 & Physiologic Therapeutics 2014; 37(2): 79-86

Coombes BK, Bisset L & Vicenzino B

ABSTRACT

OBJECTIVE

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, compare 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 sensitization maneuver. 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 ($P = .04$).

CONCLUSIONS

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

ANALYSIS

Reviewed by Dr. Demetry Assimakopoulos DC (Research Review Service)

Author's Affiliations
School of Health and Rehabilitation Sciences, University of Queensland, Australia; Griffith Health Institute, Griffith University, Gold Coast, Queensland, Australia.

Background Information
Lateral epicondylalgia (LE), commonly referred to as 'tennis elbow', is empirically classified as an insertional tendinopathy of the proximal extensor carpi radialis brevis. While valid, this classification does not include the potential association between LE and the cervical spine and radial nerve; chiefly, how these regions together contribute to this injury. This relationship has been elucidated through studies showing a greater prevalence of neck pain in patients with lateral elbow pain, in addition to greater radial nerve mechanosensitivity in the affected arm of patients suffering from this ailment (1-3). Further studies have shown that manual therapy targeted toward the cervicothoracic spine in conjunction with local elbow treatment results in fewer treatment sessions, greater improvement in short term pain and benefit in previously recalcitrant cases (4-6). In spite of this evidence, the true prevalence of related cervical spine and radial nerve pathology in the LE population hasn't been conclusively established. The goal of this study was to evaluate whether there are differences in the manual examination of the cervico-thoracic spinal regions in LE patients compared to healthy control subjects who suffer neither neck nor (other) upper limb symptoms. The authors also sought to shed light on other potential mechanisms of action of manual therapy, by studying the relationships between spinal examination, radial nerve neurodynamic testing and pain severity, duration of injury, and other demographics.

PERTINENT RESULTS

The two groups were comparable in demographics. The restricted segments most commonly found in LE patients were C5/6 (18.9%) and C6/7 (17.7%) on the same side of their LE. A significant group-by-level interaction analysis showed that positive tests were significantly more common in LE than control at the C4/5, C5/6 and C6/7 levels, but not at C7/T1 or T1/2. The analysis also showed that positive tests were significantly more common in LE than control subjects, with greater prevalence on the ipsilateral side than the contralateral side.

Approximately 36% of LE patients had dysfunction of at least 1 spinal palpation site (1 subject demonstrated dysfunction at all sites). The linear regression analysis revealed that the duration of the LE was a significant predictor of cervical dysfunction. Additionally, subjects who suffered from the injury more chronically, showed dysfunction at a greater number of cervical spinal segments. Surprisingly, worst pain levels were not associated with total number of positive palpation sites.

A positive ULNT was found in approximately 41% of LE patients. The severity of the patient's elbow pain at rest and the number of positive palpation sites were significant predictors of this test being positive. Pain level, duration and gender were not significantly associated with neurodynamic responses.

CLINICAL APPLICATION & CONCLUSIONS

The results of this study indicate that bilateral cervical spinal dysfunction exists in patients with LE, who do not otherwise have additional neck, upper back or upper limb pain. The authors also discovered that a longer duration of LE symptoms was associated with greater cervical spinal dysfunction. Further, an association between LE and radial nerve mechanosensitivity was present.

Interestingly, those suffering from greater resting elbow pain and dysfunction at multiple cervicothoracic levels were more likely to also have a positive ULNT.

The authors proposed a mechanism linking cervical dysfunction and LE, where repeated nociceptor inputs from elbow structures converge at the C4-C7 levels, triggering an increase in the excitability and synaptic efficacy of neurons in the central nociceptive pathways. This study echoes the sentiments in other studies reviewed previously by RRS, suggesting that central sensitization plays a chief role in the neurophysiological progression of many painful syndromes.

They also recommend that a thorough examination of the cervical spine and neurodynamic testing be performed as part of a battery of tests which not only test the site of injury, but areas away from the site of pain as well. This represents a holistic, contemporary, evidence-informed approach!

STUDY METHODS

165 subjects were recruited according to the following:

Inclusion criteria

- Unilateral elbow pain over the lateral epicondyle for > 6 weeks
- Pain provoked by at least two of the following: gripping, palpation, resisted wrist or middle finger extension, stretching of forearm extensors with reduced pain free grip.

Exclusion criteria

- Recent injection or physiotherapy
- Neck or other upper limb symptoms requiring treatment, or preventing work-related or recreational activities in the last 6 months
- Exacerbation of elbow pain with neck examination
- Sensory disturbances of the hands
- Fractures
- Elbow surgery
- Malignancy or inflammatory disorders
- Pregnancy or breast feeding
- Contraindication to injection

Sixty-two control subjects age-matched to the experimental group were included. These subjects were excluded if they reported a history of LE, or any other neck/upper limb injury requiring treatment, or preventing work-related or recreational activities in the last 6 months.

A 100mm visual analogue scale (VAS) was used to rate the patients' level of elbow pain over the previous week. Passive motion palpation of the cervical and thoracic spine was performed between the C4-T2 spinal segments bilaterally in the prone position. The examiners rated the intersegmental end feel according to a previously defined scale (7), ranging from 1 (severe hypomobility) to 7 (severe hypermobility), with 4 being a normal amount of mobility. Significant scores for this scale were defined as moderate-to-severe hypomobility or hypermobility (i.e. scores ranging from 1.2-6.7, respectively). An aggregate score based on the sum of positive palpation sites was derived for further analysis. The subject was asked to rate their level of pain at each of the 10 palpated sites, based on an 11-point numerical rating scale. Pain responses of 3 or greater were considered significant.

The radial nerve upper limb neurodynamic test (ULNT) was performed using the following sequence: shoulder girdle depression → elbow extension → shoulder internal rotation → pronation → wrist and finger flexion → shoulder abduction to end range. The test was stopped and considered positive if the patient experienced symptoms along the way. The pain was confirmed as neurogenic or non-neurogenic through the use of sensitizing movements distant to the pain site (i.e. shoulder girdle

elevation or cervical lateral flexion). This was used to modulate tension along the course of the nerve. The test was positive if the subject's symptoms were reproduced at least partially and if symptoms were altered by structural differentiation.

The manual examination of the cervical and thoracic spinal regions was compared between LE and control groups using a repeated-measures analysis of variance. This analysis included the within-subject factors of side and level, and the covariates of age and sex. Linear regression was used to evaluate the association between severity of pain, age, sex and duration on the aggregate score of manual palpation of the spinal sites. Logistic regression was used to reveal the relationship between each of these factors on the ULNT response.

STUDY STRENGTHS/WEAKNESSES

Weaknesses

- The ULNT has been reported as having moderate reliability (Kappa scores of 0.44) in past studies using the above criteria. Knowing this, a number of cases of radial nerve sensitivity could have been missed in this study.
- There weren't an equal number of experimental subjects to control subjects. The researchers never explained why this was the case, and whether or not this might have an effect on the results.

Strengths

- Knowing that various cervical spinal palpation methods have varying degrees of reliability, depending on whether palpation was painful or not, the authors used a composite score to determine significance.
- The authors state that examination of the cervical spine and neurodyanamic testing should not be used in isolation, but as part of a battery of tests for the diagnosis of LE.

Additional References:

1. Wright A, Thurnwald P, O'Callahan J, Smith J, Vicenzino B. Hyperalgesia in tennis elbow patients. J Musculoskel Pain 1994; 2: 83-97.
2. Berglund KM, Persson BH, Denison E. Prevalence of pain and dysfunction in the cervical and thoracic spine in persons with and without lateral elbow pain. Man Ther 2008; 13: 295-9.
3. Yaxley GA, Jull GA. Adverse tension in the neural system. A preliminary study of tennis elbow. Aust J Physiother 1993; 39: 15-22.
4. Gunn CC, Milbrandt WE. Tennis elbow and the cervical spine. Can Med Assoc J 1976; 114: 803-9.
5. Cleland JA, Whitman JM, Fritz JM. Effectiveness of manual physical therapy to the cervical spine in the management of lateral epicondylalgia: a retrospective analysis. J OrthopSports Phys Ther 2004; 34: 713-22.
6. Cleland J, Flynn TW, Palmer JA. Incorporation of manual therapy directed at the cerviothoracic spine in patients with lateral epicondylalgia. A pilot clinical trial. J Man Manip Ther 2005; 13: 143-51.
7. Zito G, Jull G, Story I. Clinical tests of musculoskeletal dysfunction in the diagnosis of cervicogenic headache. Man Ther 2006; 11: 118-29.