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Invited Topical Review

Physiotherapy management of lateral epicondylalgia

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Introduction

Lateral epicondylalgia (LE), more commonly known as tennis elbow, is the most common chronic musculoskeletal pain condition affecting the elbow, causing significant pain, disability and lost productivity. Despite decades of research investigating treatments and the underlying mechanisms of LE, it remains a challenging condition for physiotherapy clinicians and researchers alike. This topical review outlines the prevalence, burden and risk factors associated with LE. Diagnosis, assessment and the principles of management are also presented. The contemporary evidence for treatment efficacy and directions for future research are also discussed.

Prevalence of lateral epicondylalgia

Approximately 40% of people will experience LE at some point in their life.[1] It most commonly presents in men and women aged between 35 and 54 years.[2–4] The reported point prevalence of LE is between 1 and 3% within the general population,[5–7] and four to seven per 1000 patients visiting general medical practitioners.[3,6,8,9] Up to 50% of all tennis players also experience some type of elbow pain, with 75 to 80% of these elbow complaints attributable to LE.[1,10,11]

The burden of lateral epicondylalgia

LE most commonly affects the dominant arm, particularly when performing repetitive activity, so it is not surprising that the greatest burden of LE is among manual working populations where musculoskeletal upper limb injuries account for some of the longest work absences.[12] Up to 17% of workers within industries that involve highly repetitive hand tasks, such as meat processing and factory workers, experience LE.[13–16] This results in an absence from work of up to 219 workdays, with direct costs of US$8099 per person.[17,18] Data from Workcover Queensland indicates that upper limb (shoulder and elbow) injuries account for 18% of all work-related claims (2009 to 2013), which is equal to the prevalence of back injuries.[19]

Clinical course and risk factors for lateral epicondylalgia

In his seminal paper on tennis elbow in 1936, Dr James Cyriax proposed that the natural history of LE was between 6 months and 2 years,[20] which has since been widely cited. In contrast, recent reports have shown that symptoms may persist for many years and recurrence is common.[21–25] Over 50% of patients attending general practice for their elbow pain report not being recovered at 12 months.[21,26] Follow-up of participants in a clinical trial[23] of non-surgical treatments for LE identified that 20% of respondents (27/134) reported ongoing pain after 3 to 5 years (mean 3.9 years) regardless of the treatment received, and that those with high baseline severity were 5.5 times more likely to still have symptoms of LE. Therefore, LE is not self-limiting and is associated with ongoing pain and disability in a substantial proportion of sufferers.

Workers in manual occupations involving repetitive arm and wrist movements are at increased risk of LE[27,28] and are more resistant to treatment, with a poorer prognosis.[29,30] Office work, older age, being female,[31] previous tobacco use and concurrent rotator cuff pathology are also significantly associated with LE.[32]

One plausible reason for persistent pain in LE is the presence of sensitisation of the nervous system,[33,34] given the reduced thresholds to nociceptive withdrawal[35] and greater temporal summation.[36] It has previously been shown that people with LE exhibit widespread hyperalgesia (ie, enhanced pain response to various stimuli), which is associated with high pain scores, decreased function and longer symptom duration.[33,34,37,38]

Diagnosis and assessment

LE is a diagnosis based on clinical history and physical examination, with diagnostic imaging best used when a differential diagnosis is likely. LE is typically diagnosed by the presence of pain over the lateral humeral epicondyle that may radiate distally into the forearm. This pain is aggravated by palpation, gripping and resisted wrist and/or second or third finger extension.[2,39] While LE is thought to result from an overload of the forearm extensor muscles,[11] the pain may have an insidious onset with no specific causal activity.[21]

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To assist prognosis, assessment of pain and disability should be performed at baseline, as there is some evidence to show that people who present with higher pain and disability are more likely to have ongoing pain at 12 months.[37,40] The Patient Rated Tennis Elbow Evaluation is a condition-specific questionnaire that includes both pain and function subscales, which are aggregated to give one overall score of 0 (no pain or disability) to 100 (worst possible pain and disability).[41,42] A minimum change of 11 points or 37% of the baseline score is considered to be clinically important.[43] The most common functional limitation in LE is pain on gripping, and this can be measured as pain-free grip strength, which is a reliable and valid measure that is more sensitive to change than maximal grip strength.[44] With the patient lying supine, the elbow in relaxed extension and the forearm pronated, the patient is asked to grip a dynamometer until the first onset of pain, and the mean of three tests at 1-minute intervals is then calculated.[45]

Elbow, wrist, and forearm range of motion, stress testing of the medial and lateral collateral elbow ligaments, and specific tests for elbow instability (eg, Posterolateral Rotary Drawer Test,[46] and Table Top Relocation Test[47]) should be assessed to aid the differential diagnosis of intra-articular and ligamentous pathology. The clinician needs to be aware that there may be co-pathologies and an overlap in symptoms, particularly in patients presenting with signs of central sensitisation, which may be sensory in nature, or associated with neuropathic lesions such as posterior interosseous nerve entrapment as it passes between the two heads of the supinator muscle. In patients with posterior interosseous nerve entrapment, they may report pain over the dorsal aspect of the forearm and exhibit muscle weakness of the finger and thumb extensors without sensory loss.[48,49]

Evaluation of the cervical and thoracic spine and neurodynamic testing of the radial nerve are also helpful in identifying spinal contribution to pain. While it is currently unclear as to what impact the presence of cervical and thoracic impairments have on the condition, exploratory research indicates that neck pain is more common in people with LE compared with their healthy counterparts.[50] Furthermore, people with LE who also report shoulder or neck pain have a poorer prognosis in both the short term and long term,[40] and impairment at C4 to C5 spinal levels has been identified on manual examination in people with localised symptoms of LE.[51] The role of cervical and thoracic spine impairments in the prognosis of LE requires validation; however, in light of these exploratory studies, the clinician should include cervical and thoracic spine assessment in their examination of the patient presenting with LE.

Imaging studies, such as ultrasound (US) and magnetic resonance imaging, have high sensitivity but lower specificity in detecting LE.[52–54] Structural abnormalities identified on imaging tend to be consistent across all tendinopathies, and include focal hypoechoic regions, tendon thickening, neovascularisation, disruption of fibrils and intrasubstance tears.[52–55] Importantly, structural changes on imaging are present in approximately 50% of healthy, asymptomatic age-matched and gender-matched individuals,[53,54] indicating that caution must be applied in interpreting the relevance of such findings. Notwithstanding this, negative image findings can be used to rule out LE as a diagnosis[52,53] and assist with alternative diagnoses such as instability and/or joint pathology.[54,56] A notable differential diagnosis is the presence of a large tear ($\geq$ 6 mm) within the tendon or lateral collateral ligament, which has been linked to failed conservative treatment.[57]

Management of lateral epicondylalgia

Physical interventions for LE have been widely investigated, with the publication of more than 200 clinical trials and several systematic reviews. Conservative management is recommended as the first line of treatment for LE.

In order to facilitate summary and interpretation of this volume of literature, the present review has focused on summarising the findings for conservative interventions that have been compared to a control, placebo or other interventions in randomised, controlled trials (RCTs) of sound methodological quality (defined for this review as a rating $\geq$ 5/10 on the PEDro scale). It has predominantly focused on physical therapies and has not comprehensively reviewed other medical interventions, including injection therapies (see Coombes et al[58] for further information).

A prevailing notion in tendinopathy management is to regard exercise and load management[59,60] as the key element, with all other physical modalities being adjuncts to speed the recuperation or to enhance the effects of exercise and outcomes. While acknowledging that a variety of outcomes and follow-up times are reported in the literature, this review has focused on short-term follow-up data, wherein the primary aim of adjunctive treatment is to speed up recovery. Outcomes of pain (converted to a 0 to 100 scale; 0 = no pain, 100 = worst pain imaginable) and global rating of success are presented in terms of point estimates of effect (eg, MD, RR), whereas other outcomes are qualitatively reported. A summary of the findings from English language papers (or reports therein of non-English original papers), along with the level of evidence that underpins their use, is provided. The interventions reported in this review include exercise, manual therapy/manipulation, orthoses, laser, US, acupuncture, shock wave therapy (SWT), and multimodal physiotherapy treatment – many of which have been compared to placebo or control.

Figure 1 is a graphic representation of the number of patients in RCTs that have investigated the effects of different interventions in LE, which interventions have demonstrated a superior effect compared to the comparator group, as well as where interventions have not yet been compared head-to-head.

Exercise

Exercise is rarely delivered as a treatment in isolation, with many RCTs studying a variety of exercise types in combination with other interventions. This review identified eight RCTs of sound methodological quality from five systematic reviews[61–65] that investigated the effects of isometric, isokinetic, concentric and eccentric exercises in LE. Three of the trials compared eccentric exercise to other treatments. Tyler et al (n = 21)[66] found a significant benefit of 9 (SD 2) sessions of eccentric exercise over 10 (SD 2) sessions of isotonic extensor exercises, with participants in both groups receiving a multimodal program of stretches, US, friction massage, heat and ice. The eccentric exercises produced greater pain relief and functional improvement, with nine of the 11 participants reporting at least 50% improvement in their pain following eccentric exercise, compared to three out of 10 reporting the same level of improvement in the comparator group. Viswas et al (n = 20)[67] also found that a supervised program of eccentric exercises improved pain and function more than friction massage with Mill's manipulation at short-term follow-up. Similarly, a program of eccentric exercises with an elbow orthosis may provide greater global improvement at the end of treatment (6 weeks RR 4.7, 95% CI 1.1 to 19.8) but no difference in pain relief compared with an elbow orthosis alone (n = 37).[68] In contrast, a 3-month home program of eccentric exercises produced variable results when compared with a program of concentric forearm exercises, with both exercise interventions demonstrating significant improvement over short-term and long-term follow-up.[69]

For exercise programs other than eccentric-only regimens, there was evidence from one RCT that isometric, concentric and eccentric exercises may be superior to US for pain relief (MD 21, 95% CI 1 to 41) and grip strength (MD 101 N, 95% CI 11 to 1914) at 8 weeks.[70] Compared to placebo US, Selvanetti et al (n = 62)[71] found a significant benefit after 4 weeks of eccentric exercises in combination with contract/relax stretching for pain relief at the end of treatment (MD, 95% CI 17 to 21). A 3-month home program of concentric/eccentric forearm exercises reportedly produced greater reductions in pain but not function, when compared with a wait-and-see approach.[72] However, one other study found no