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A Progressive Loading Supervised Exercise Program and Manual Therapy for The Management of Lateral Elbow Tendinopathy: A Case Report

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ABSTRACT

The purpose of the case study was to find out the effect of a supervised exercise program combined with Transverse Friction (TF) and Mulligan Mobilization With Movement (MMWM) on disability and pain in a patient experiencing chronic Lateral Elbow tendinopathy (LET). A patient with unilateral LET for 6 months was included in the present study. The patient followed the exercise program five times per week for 4 weeks. The programme was individualized on the basis of the patient's description of pain experienced during the procedure. TF and MMWM were applied 3 times per weeks for 4 weeks, 12 sessions totally. Outcome measures were function using the Patient-Rated Tennis Elbow Evaluation, a visual analogue scale and the pain-free grip strength and pain using a visual analogue scale. The patient was evaluated at baseline (week 0), at week 4 (end of treatment), at week 8 (1 month after the end of the treatment) and at week 32 (six months after the end of treatment). At the end of the treatment and at the follow – up there was a rise in function and a decline in pain. The findings of the case report suggest that a physiotherapy approach as described in the present case report can produce significant improvements in terms of disability and pain in a patient with chronic LET.

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Introduction

Lateral elbow tendinopathy (LET) is the most common tendinopathy in the elbow area. Although the diagnosis of LET is simple and quick, the gold standard approach for the management of LET does not exist. A conservative treatment is usually advocated by the majority of physicians. Therefore, physiotherapy is provided. A lot of physical therapy approaches has been provided for the management of LET such as manual therapy, soft tissue manipulation, external support, physical agents and heavy-slow resistance exercise. Such a plethora of approaches suggests that the gold standard treatment strategy is unknown, and further research is needed to find the most effective treatment approach in LET patients.

The most effective physical therapy approach for LET is an exercise programme, supervised or in clinical placement [1,2]. The LET exercise programme should be based on a progressive loading of the whole upper limb [3,4]. An exercise program is usually combined with a plethora of physiotherapy techniques. One of the provided physiotherapy treatments is the manual therapy.

Many manual techniques, delivered to the periphery and to the spine, for the treatment of LET have been provided [5,6]. Two of the most common manipulative techniques for the management of LET are Cyriax physiotherapy (transverse friction [TF] and Mill's manipulation) and Mulligan mobilization with movement (MMWM) [5,6]. Cyriax physiotherapy consisted of 10 minutes of TF (after the numbness of the area) immediately followed by one man oeuvre of Mill's manipulation [7]. TF is connective tissue massage applied precisely to the tendons [7] Mill's manipulation is performed at the end of the elbow extension range passively (high-velocity extension thrust at the elbow once the full range of elbow extension has been taken up [7]. MMWM involves the application of a lateral glide to the elbow joint which is sustained while a gripping action of the hand is performed [8].

To our knowledge, there have been no studies to combine a progressive loading supervised exercise program and TF with MMWM. Therefore, the purpose of the present case report was to find out the effect of a progressive loading supervised exercise program with TF immediately followed by MMWM in chronic LET.

Case Report

History

Mr. C., a 46- year-old male complained of six months pain in the lateral aspect of his right elbow (non-dominant hand). With his finger pointed the site of pain. It was about three - four cm distally to the lateral epicondyle of the humerus. The pain was mainly there. Sometimes spread down until the middle of the forearm, since he worked in pc about ten hours per day. He experienced pain after working, at the beginning, which he could tolerate. He had pain during his activity, later, which was intolerable he had to stop his job. The pain subsided within one hour, once he had stopped. His GP prescribed rest and NSAIDs. His GP referred

him to a course of physiotherapy after a little improvement. He could sleep but during gripping the pain was intolerable. He did not complain of stiffness, paraesthesia, crepitus, locking, swelling or cervical pain. He did not have any previous problems in the the peripheral joints or in the spine. He did not have diabetes, epilepsy or cancer and none in his family did. He did not have any operation in the past. Finally, he did not take any medications at the time of assessment.

Examination findings

Hıs gait, face and posture were noted in observation. He was calm. He slept without having any kind of pain disturbing him. His gait as well as his posture was normal. The position of the head, the cervical lordosis and the position of both shoulders were normal. The carrying angle was normal in comparison with the other side and there were not muscles wasting, swelling or colour changes. Signs of inflammatory activity like swelling synovial, thickening and heat were not found.

The movements of the neck and shoulder were with full power, full range of motion and pain free. The movements of the elbow joint, which were tested, were flexion and extension. The passive movements were with full range of motion, normal end feel and pain free. The resisted movements were with full power (meaning 5 on the Oxford scale) and pain free.

Supination and pronation were the movements of the proximal radioulnar which were tested. The passive movements with full range of motion, normal end feel and pain free. The resisted movements were with full power (meaning 5 on the Oxford scale) and pain free.

Flexion and extension of the wrist joint were tested. The passive extension of the wrist with the elbow in extension was pain free, with normal end feel and full range of motion. The passive wrist flexion with the elbow in extension was slightly painful on the facet of the lateral epicondyle, but it involved with normal end feel and full range of motion. The resisted flexion of the wrist with the elbow in extension was with full power (meaning 5 on the Oxford scale) and pain free. In the resisted extension of the wrist with the elbow in extension there was pain over the facet of the lateral epicondyle of the humerus, 9/10 on the VAS and the power was 2 on the Oxford scale. In the resisted extension of the middle finger the power was 2 on the Oxford scale and the pain on the facet was 9/10 on the VAS.

The patient in the handgrip dynamometer test reported pain 9/10 on the VAS.
There was pain on the facet of the lateral epicondyle by palpation.

Procedure

The patient followed a supervised exercise programme as reported in previous case studies [9,10] and trials [11-18]. The patient was followed the supervised exercise programme five times per week for 4 weeks. It was individualized on the basis of the patient's description of pain experienced during the procedure. The patient was instructed to use his limb during the study but to avoid activities that irritated the elbow such as handwriting, using a screwdriver, knitting, lifting, driving a car and grasping. He was also informed to refrain from taking anti-inflammatory drugs during the course of the trial. A treatment diary was used to monitor patient compliance with this request.

The patient apart from the above daily exercise program, received three times per week, 12 sessions totally, TF followed by MMWM. TF was applied as described in previous trial [7,12]. MMWM was applied as described by Vicenzino et al (2001) [8]

Communication and interaction (verbal and non-verbal) between the therapist and patient was kept to a minimum, and behaviors sometimes used by therapists to facilitate positive treatment outcomes were purposefully avoided. For example, patient was given no indication of the potentially beneficial effects of the treatments or any feedback on their performance in the pre-application and post-application measurements [19].

Function and pain were measured in the present case report. The patient was evaluated at week 0 (baseline), week 4 (at the end of treatment), week 8 (1 month after the end of the treatment) and at week 32 (6 months after the end of treatment).

Pain was measured on a visual analogue scale (VAS), a valid and sensitive approach on LET [20]. Function was measured using a VAS, a valid and sensitive approach on LET [20]. In addition, function was measured by pain-free grip strength as described in Vicenzino et al (1996) study [19]. Finally, pain and function were measured using the Patient-Rated Tennis Elbow Evaluation (PRTEE), a 15-item questionnaire specifically designed for patients with LET. It has been translated and culturally adapted into German Italian Swedish and Greek [21-24].

Results

At week 0 the pain on VAS was 9, the function on VAS was 3, the pain-free grip strength was 19 lb and the score of the PRTEE questionnaire was 88. At week 32 (6 months after the end of the treatment) the pain on VAS was 0, function on VAS was 10, the pain-free grip strength was 75 lb and the score of the PRTEE questionnaire was 0 (Table 1).

Table 1: Pain, function, pain-free grip strength and PRTEE questionnaire over the 24 h before each evaluation

	Pain (cm)	Function (cm)	Pain-free grip strength (lb)	PRTEE questionnaire
WEEK 0	9	3	19	88
WEEK 4	0	10	65	8
WEEK 8	0	10	72	6
WEEK 32	0	10	75	0

Discussion

The present case report has looked at the effect of TF immediately followed by MMWM in chronic LET, three times per week, 12 sessions totally. In addition, a progressive supervised exercise program based on patients' symptoms was followed 5 times per week for four weeks, 20 sessions totally. The findings of the present case report demonstrated significant improvements in terms of pain and disability. However, the results obtained from this case report are novel; as to date, similar studies have not been conducted.

The management of LET is changing, and in our days eccentric training is not the only exercise option [1]. Physicians should consider eccentric-concentric training alongside or instead of eccentric training for the management of LET [25]. Martinez-Silvestrini et al stated that, LET patients are required isometric contraction, which would be more beneficial than the eccentric contraction because LET is often related to forceful grip activities [26]. Isometric exercises have also been recommended to manage and reduce tendon pain, increasing the strength at

the angle of contraction without producing inflammatory signs [27,28]. However, conflicting results have been found in terms of immediate and short-term pain relief [29]. More research is needed to carry out to draw definitive conclusions about the effectiveness of isometric exercise in tendinopathy [29]. It was hypothesized that static stretching exercises and the simultaneous use of these two kinds of contractions (isometric and isotonic) will further enhance the analgesic effect of contractions in the management of LET, improving the arm function. The results obtained from a randomized clinical trial showed that the eccentric – concentric training combined with isometric contraction produced the largest effect at the end of treatment and at the follow up [14]. The exercise program in LET should include exercises not only for ECRB strengthening but also for rotator cuff, scapular and supinator muscle strengthening [17,30]. Using rotator cuff, scapular and supinator muscles strengthening loading, simple motion might have been restored, resulting in resolution of pain with actions and a return to painless gripping for the patient. Finally, tendon neuroplastic training (TNT) is required to combine isotonic or isometric strength training with a visual cue or externally paced audio [9] Evidence suggests that the central nervous system play a role in the treatment of tendinopathy [31]. TNT is recommended to address the central nervous system component of tendinopathy [32]. Compared to other conservative treatments, TNT addresses the motor control deficits present in tendon disorders [32].

TF is a way to facilitate the regeneration process of the soft tissues, including tendinous tissue such LET [7]. It uses passive mobilization of soft tissues producing therapeutic benefits by breaking down the adhesions between repairing connective tissue and surrounding tissues, thus softening the scar tissue and mobilizing the cross-links between the mutual collagen fibers [7]. Moreover, TF massage produces vasodilatation and increased blood-flow to the affected area [7]. This facilitates the removal of chemical irritants and increases the transportation of endogenous opiates, resulting in a decrease in pain [8].

MMWM aims at providing mobilization during movement of the affected joint [33]. It is different from other types of mobilization techniques because traditional mobilization techniques, such as Maitland mobilization, are applied in static position, while MMWM is provided during movement of the joint [34]. This helps in correcting biomechanics of the joint in functional movement [35]. Studies have also reported that MMWM is effective in improving functional status in LET patients [36]. Although the exact mechanism is not clearly known, the most compelling argument for the immediate effect of pain relief and strength improvement is through a complex interaction between the mechanical stimulus at the joint and a neurophysiological reflex mechanism [37]. The direct effects on joint structures including the stimulation of mechanoreceptors and proprioceptors may trigger sympathetic sensory and motor function changes through afferent and efferent pathways in the spinal cord and/or brain that may result in pain modulation and improvement of grip strength [36].

The load of exercises was increased according to the patients' symptoms otherwise the results are poor [38]. Furthermore, exercise programme was performed at a low speed in every treatment session because this allows tissue healing [39]. Finally, the avoidance of painful activities is crucial for tendon healing, because training during the treatment period increases patients' symptoms and delays tendon healing [40].

Although a home exercise programme can be performed any time during the day without requiring supervision from a therapist, our research has shown that patients fail to comply with the regimen of home exercise programmes [11]. Although many ways can be recommended to improve the compliance of patients with the home exercise programme such as exercise monitors, better self-management education and phone calls, it is believed that this problem can be really solved by the supervised exercise programmes performed in a clinical setting under the supervision of a physiotherapist. It is believed because our experience has shown that a lot of patients stopped the home exercise programme without giving explanations, whereas patients completed the supervised programme. One possible reason why they continue the supervised exercise programme could be the cost. In the supervised exercise programme, the patients visit the therapist more times than the home exercise programme, and this is more expensive. A future study will combine the both types of exercise programmes in order to maximize the compliance of the patients.

Even though the positive effects of such a physiotherapy approach in the management of LET have been reported in the present report, its study design limits the generalization of these findings. Future well-designed clinical trials are needed to confirm the positive results of this case study in the management of LET. In addition, structural changes in the tendons related to the treatment interventions and the long-term effects (6 months or more after the end of treatment) of these treatments are needed to investigate. Further research is needed to establish the possible mechanism of action of this treatment approach, and the cost-effectiveness of such treatment, because reduced cost is an important issue for the recommendation of any given treatment.

Conclusion

A physiotherapy approach, consisting of TF, MMWM and a supervised exercise program reduced the pain and improved the function in a patient with chronic LET at the end of the treatment and at the follow-ups. Further well-designed trials are needed to confirm the results of the present case report.

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