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Case Report
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The Effectiveness of 448 kHz Capacitive Resistive Monopoles Radiofrequency in Acute Lateral Elbow Tendinopathy: A Case Report

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Abstract

Background: The effectiveness of the physiotherapy modalities have been investigated in chronic LET. To our knowledge, there have been no studies to find out the effectiveness of physiotherapy modalities in acute LET. The aim of the present report is to find out the effect of 448 kHz capacitive resistive monopolar radiofrequency (CRMRF) in acute LET.

Case Report: A patient with left unilateral LET for 48 hrs participated in the present case study. The patient followed a course of 448 kHz CRMRF twice per day for five consecutive days. Outcome measures were pain and function, using a visual analogue scale, the Patient-Rated Tennis Elbow Evaluation and the pain-free grip strength. The evaluation of the patient occurred before and after the end of treatment. There was a decline in pain and a rise in function in all evaluations.

Conclusion: The results of the present trial suggest that a course of 448 kHz CRMRF as described in the present trial can produce significant improvements in terms of pain and disability in acute LET.

Keywords: Lateral elbow tendinopathy; 448 kHz capacitive resistive monopolar radiofrequency; Tennis elbow; Lateral epicondylitis; Indiba

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Introduction

Lateral Elbow Tendinopathy (LET) commonly referred to as lateral epicondylitis or tennis elbow is the most common tendinopathy in the elbow area. Pain and decreased function are the main symptoms of LET [1]. Diagnosis is simple. The symptoms are reproduced by (1) gripping activities; (2) palpation on the site of pain (facet of the lateral epicondyle); (3) clinical tests such as resisted middle-finger extension and/or cozen's test [1].

The management of LET is usually conservative. A plethora of physiotherapy techniques have been recommended for the management of LET. The effectiveness of the recommended physiotherapy modalities have been investigated in chronic LET. Chronic LET is degenerative or failed healing tendon response rather than inflammatory [2]. To our knowledge, there have been no studies to find out the effectiveness of physiotherapy modalities in acute LET. More recently, physiotherapists are able to use a new modality called 448 kHz Capacitive Resistive Monopolar Radiofrequency (CRMRF). However, the evidence of the 448 kHz CRMRF in the management of LET, acute or chronic, is minimal. Therefore, the objective of the present report is to find out the effect of 448 kHz CRMRF in acute LET.

Case Presentation

Mr. J., a 46- year-old male complained of acute pain (less than 48 hours) in the lateral aspect of his left elbow, of his dominant hand. The pain was on the facet of the lateral epicondyle. He lifted up a suitcase about 48 hrs ago. He experienced pain immediately. Since then, he complained of constant pain. He was not able to sleep. He did not receive any NSAIDs. He did not have any other symptoms or any problems in peripheral joints or in the spine. In the Cozen's test (extension of the wrist with the elbow in extension) the power was 1 on the Oxford scale and there was pain over the facet of the lateral epicondyle of the humerus, 9/10 on the VAS. Resisted extension of the middle finger was painful (9/10 on the VAS) on the facet and the power was 1 on the Oxford scale. The reported pain of the patient in the handgrip dynamometer test was 9/10 on the VAS. All the other movements (passive, active and under resistance movements of the elbow, wrist and neck) were pain free, with full range of motion and strength. Finally, the pain was reproduced by palpation over

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
Before treatment	9	1	15	96
After treatment	2	7	52	18

the common extensor tendon on the facet of the lateral epicondyle of the humerus.

The patient received 448 kHz CRMRF intervention. The CRMRF at 448 kHz was delivered using 'INDIBA Activ 902', a new factory calibrated device with a peak power of 200 W, which delivered continuous-wave RF energy in two modes: Capacitive (CAP) and Resistive (RES), using metallic electrodes *via* a coupling medium. The CAP mode was delivered in thermal dose (according to patient feedback on his perception of moderate heating) in muscles around the elbow (biceps, triceps, extensor muscles of wrist). CAP mode was delivered 5 minutes for each muscle. The RES mode was delivered in non-thermal dose (inflammatory stage) to the more symptomatic area. The RES mode was delivered for 10 minutes. Finally, CAP mode in non-thermal dose was delivered in the symptomatic area for 5 minutes. The return electrode was placed in the scapular area. Treatment was delivered twice a day (morning and afternoon) for five consecutive days providing ten sessions in total.

Function and pain were measured in the present study. The patient was evaluated before and after the treatment period. Pain and function were measured on a Visual Analogue Scale (VAS), a valid and sensitive approach of the LET [3]. In addition, pain-free grip strength was used to measure function as described in previous trial [4]. Finally, pain and function were measured using the Patient-Rated Tennis Elbow Evaluation (PRTEE). The PRTEE questionnaire, provides a very quick (it takes less than 5 min to complete), easy, and standardized quantitative description of pain and functional disability in patients with LET. It has been translated and culturally adapted into Greek [5].

Results

Pain on VAS was 9, function on VAS was 1, pain-free grip strength was 15lb and the score of the PRTEE questionnaire was 96 at the initial evaluation. At the end of the treatment (session 10), there was a decline in pain on VAS of 7 units, a rise in function on VAS of 6 units, a rise in pain-free grip strength of 37 units and a decline in the score of the PRTEE questionnaire of 78 units (Table 1).

Discussion

The present case report has looked at the effect of 448 kHz CRMRF in a patient experiencing acute LET and its findings have demonstrated significant improvements in terms of pain and disability. The results obtained from this case report are novel; as to date, similar studies have not been conducted.

The most common physiotherapy treatment for LET is a supervised or in clinic exercise program [2,6]. However, the patient with acute LET was not able to perform an exercise program due to pain. The patient was advised by the clinician to follow an exercise program after completing the 448 kHz CRMRF treatment.

448 kHz CRMRF is a relatively new treatment approach, but it is reported to be used by clinicians worldwide. Many clinicians think that Shortwave Diathermy (SWT) and 448 kHz CRMRF is the same. However, the 448 kHz CRMRF differs from SWT mainly in two ways - firstly the operating frequency (SWT commonly operates at 27.12 MHz) and secondly, unlike SWT it is applied using a coupling medium since CRMRF cannot be delivered through air [7]. Hence, one hypothesized advantage of 448 kHz CRMRF over SWT is that scattering of the RF waves is potentially considerably lower [7].

Since pain relief and improvements in function were noted in the present case study on a short term, it is proposed that the 448 kHz CRMRF energy may potentially have promoted an anti-inflammatory effect in the soft tissues [7]. However, to understand the potential changes to the tissues in response to 448 kHz CRMRF treatment, future studies should consider employing outcome assessments that are capable of monitoring the changes in deeper tissues.

The present case study was the first report to examine the effectiveness of 448 kHz CRMRF on acute LET. One previous study assessed the effectiveness of this treatment on chronic knee osteoarthritis [7]. However, LET and knee osteoarthritis are two different conditions and the results are not comparable. The two previously reported trials found that a course of 448 kHz CRMRF may improve patients' symptoms. The findings of these two trials encourage the design of future well-designed RCTs that might produce strong evidence for the effectiveness of 448 kHz CRMRF on sports/musculoskeletal injuries.

A course of 448 kHz CRMRF treatment was applied in the present study based on manufacturers' claims. It is a dose-response modality and the optimal treatment dose has obviously not yet been discovered. Future studies are needed to standardize 448 kHz CRMRF parameters in the management of LET (acute, chronic and calcific).

Although the positive effects of such a treatment approach in acute LET have been reported in the present study, its study design limits the generalization of these results. Future well-designed trials are needed to confirm the results of this case report establishing the effectiveness of such a treatment approach in the management of LET (acute, chronic and calcific). In addition, structural changes in the tendons related to the treatment interventions are needed to investigate. Further research is needed to establish the cost-effectiveness of such treatment, because reduced cost is an important issue for the recommendation of any given treatment and the possible mechanism of action of this treatment approach [8].

Conclusion

A course of 448 kHz CRMRF treatment had reduced the pain and improved the function in a patient with acute LET at the end of the treatment. Further well-designed trials to confirm the results of the present case study are needed.

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