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## Can extracorporeal shock-wave therapy be used for the management of lateral elbow tendinopathy?

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### Abstract

Lateral elbow tendinopathy (LET) is one of the two most common tendinopathies of the upper limb. The

most effective treatment in the management of LET is the exercise program. Clinicians combine exercise program with other physiotherapy, electrotherapeutic and no, techniques. Extracorporeal shock wave therapy (ESWT) is one of the most common recommended electrotherapeutic modalities for the management of LET. Further research is needed to find out the optimal treatment protocol of ESWT in the management of LET

**Key words:** Lateral elbow tendinopathy; Extracorporeal shock wave therapy; Exercise program; Electrotherapy; Tennis elbow; Lateral epicondylitis; Physiotherapy; Calcific tendinopathy

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**Core tip:** Extracorporeal shock wave therapy (ESWT) is one of the most common recommended electrotherapeutic modalities for the management of lateral elbow tendinopathy (LET). ESWT does not use as a substitute for exercise but as a supplement to exercise program. More research is needed to find out the optimal treatment protocol of ESWT in the management of LET.

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Lateral elbow tendinopathy (LET) commonly referred as lateral epicondylitis or tennis elbow is a common sports/musculoskeletal injury. LET is usually defined as a syndrome of pain in the area of the lateral epicondyle which may be degenerative rather than inflammatory. The main complaints of patients with LET are de-

creased function and pain both of which may affect daily activities. Pain and function can be assessed by a variety of outcomes like gripping activities, palpation on the facet of the lateral epicondyle and specific clinical tests like middle finger extension and mill's test. Moreover, the Patient - Rated tennis elbow evaluation questionnaire provides a quick, standardized and easy quantitative description of functional disability and pain in LET patients. Physiotherapy is usually proposed for the treatment of LET. Many physiotherapy maneuvers, electrotherapeutic and non-electrotherapeutic modalities, has been recommended for the rehabilitation of LET. These treatments have different theoretical mechanisms of action, but all have the same aim, to improve function and reduce pain. Thus, there is need for more research in order to find out the most effective treatment technique in LET patients since this variety of treatment modalities suggests that the most proper treatment approach is not known.

The most common physiotherapy treatment for LET is a supervised or in clinic exercise programme. One program consisted of isometric exercises of extensor carpi radialis brevis (ECRB), the most common site injury of LET, as well as isotonic (concentric and eccentric mainly) and static stretching exercises of ECRB is usually recommended<sup>[1]</sup>. The exercise program should include exercises not only for ECRB strengthening but also for supinator strengthening<sup>[2]</sup>. In addition, rotator cuff and scapular muscles strengthening is also needed<sup>[3]</sup>. Finally, therapists should use techniques to improve the proprioception since LET patients have also reduced proprioception<sup>[4]</sup>.

Electrotherapeutic modalities, have also been recommended in the management of LET. Extracorporeal shock wave therapy (ESWT) is one of the most common recommended electrotherapeutic modalities for the management of LET. The available literatures on the use of ESWT therapy for LET have revealed contradictory results. ESWT does not use as a substitute for exercise but as a supplement to exercise program. The mechanism of this method is not yet completely understood, but many mechanisms have been described in clarifying its effects, including direct stimulation of healing, neovascularization, direct suppressive effects on nociceptors and a hyper stimulation mechanism that would block the gate control mechanism. It seems that it can increase the number of neovessels at the normal tendon-bone junction, through the release of growth factors and some other active substances<sup>[5]</sup>. Therefore, ESWT does not reverse the pathology of LET (disorganized collagen, an increased presence of fibroblasts, the absence of prostaglandins and inflammatory cells) but it can improve the symptoms of LET. The question that arises is whether ESWT can be used for any kind of LET, *i.e.*, acute, chronic and calcification.

ESWT is not applied in acute LET when the inflammatory signs are active. It is recommended in the management of chronic LET. However, the term chronic

LET is not clear in the literature. The term chronic LET is ranged in the literature from 4 wk to 6 mo after the first onset. A patient with 4 wk of LET does not have the same symptoms with a patient with 6 mo of LET, so the ESWT is applied in a different way in a patient with four weeks of LET and in a patient with 6 mo of LET. There is not a standard protocol in the management of chronic LET using the ESWT. There is not a standard protocol in the management of chronic LET because the medical society does not define the term chronic LET. If the medical society defines the term chronic LET, a standard recommended protocol of ESWT in the management of chronic LET will be applied.

ESWT is usually recommended when the symptoms persist for more than 6 mo or all the other types of conservative therapy fail. However, there is lack of strong evidence in the literature to support the above recommendations. Why someone recommend the use of ESWT 6 mo after the first onset? Can it be used earlier than 6 mo after the first onset? I think the above will be solved when the medical society defines the term chronic LET. Moreover, the exercise program is the most effective conservative treatment approach in the management of LET, as mentioned above. The ESWT is recommended when the exercise program fails or other conservative techniques fail. It is known that all the other types of conservative therapy are less effective than the exercise program in the management of LET. In addition, ESWT does not use as a substitute for exercise but as a supplement to exercise program, as mentioned previously.

Although there are conflicting results on the effectiveness of ESWT in the management of chronic (need definition as mentioned previously) LET, it cannot be ruled out from research, as it is a dose-response modality and the optimal treatment dose (ESWT parameters such as focused or radial ESWT, anaesthesia or not, energy flux density, frequency, number of sessions, and impulses) has obviously not yet been discovered in order to be used in rehabilitation protocols<sup>[6]</sup>. It is worth to mention one more time that ESWT does not use as a substitute for exercise but as a supplement to exercise program. The optimal protocol can be formulated taking information from RCTs, reviews (systematic and narrative) and experts opinion.

The ESWT is usually recommended in the management of calcific tendinopathies (CT). The majority of research on ESWT for CT that has been carried out involved calcific shoulder tendinopathy (CST). One of the mechanisms of the therapeutic effect of ESWT for the treatment of CST is destruction of calcifications<sup>[7]</sup>. There is a lack of *in vitro* studies to explain how the increasing pressure produced by ESWT causes fragmentation and cavitation effects inside amorphous calcifications, leading to disorganization and disintegration of the deposits<sup>[8]</sup>. Alternatively, disintegration of calcifications in shoulder tendinopathy after ESWT has been shown in *in vivo* studies<sup>[8]</sup>. High-energy ESWT under anaesthesia effectively treats



(strong and moderate evidence) CST in the short, mid, and long terms<sup>[9]</sup>. Focus on the calcific deposit is more effective (moderate evidence) than focus on the tuberculum majus<sup>[9]</sup>. However, further studies are needed to standardize ESWT parameters (energy flex density, number of sessions, and impulses) to be used in rehabilitation protocols<sup>[10]</sup>. It is believed that ESWT is an effective treatment approach for LET with calcification using the same, under investigation, parameters for CST. However, more research is needed to support this belief.

ESWT is applied only in the area of pain, in the case of LET in the ECRB. I wonder if it can be applied in a different way, like scanning the whole area for example muscles of the forearm or parallel to the elbow joint line. Perhaps, the combination of the above two ways of application, scanning and painful (sensitive) point, leads to a better clinical result. More research is needed to support the above recommendation.

Finally, the aim of this editorial is two-fold, which suggests the following: First, future studies are needed to standardize ESWT parameters in the management of LET (chronic and calcific), and secondly, well-conducted trials are needed to find out the effectiveness of ESWT in the treatment of any kind of LET. A cost-effectiveness analysis should be incorporated into the analysis of the effectiveness of such a treatment approach in future trials.

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