

## REVIEW

## Cyriax physiotherapy for tennis elbow/lateral epicondylitis

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Tennis elbow or lateral epicondylitis is one of the most common lesions of the arm with a well defined clinical presentation, which significantly impacts on the community. Many treatment approaches have been proposed to manage this condition. One is Cyriax physiotherapy. The effectiveness and reported effects of this intervention are reviewed.

**T**ennis elbow (lateral epicondylitis) is one of the most common lesions of the arm. This disorder challenges the clinician daily, as it is an injury that is difficult to treat, is prone to recurrent bouts, and may last for several weeks or months. The average duration of a typical episode of tennis elbow is between six months and two years.<sup>1</sup>

It is a degenerative or failed healing tendon response characterised by the increased presence of fibroblasts, vascular hyperplasia, and disorganised collagen in the origin of the extensor carpi radialis brevis, the most commonly affected structure.<sup>2</sup>

It is generally a work related or sport related pain disorder with macroscopic and microscopic tears in the extensor carpi radialis brevis, usually caused by excessive quick, monotonous, repetitive eccentric contractions and gripping activities of the wrist.<sup>3–4</sup> The dominant arm is commonly affected, with a prevalence of 1–3% in the general population, but this increases to 19% at 30–60 years of age and appears to be more long standing and severe in women.<sup>5–6</sup>

It has a well defined clinical presentation, the main complaints being pain and decreased grip strength, both of which may affect activities of daily living. Diagnosis is simple and can be confirmed by tests that reproduce the pain, such as palpation over the facet of the lateral epicondyle, resisted wrist extension, resisted middle finger extension, and passive wrist flexion.<sup>7</sup>

“Such a variety of treatment options suggests that the optimal treatment strategy is not known”

Although the signs and symptoms of tennis elbow are clear and its diagnosis is easy, to date no ideal treatment has emerged. A myriad of conservative treatments have been used. Over 40 different methods have been reported in the literature.<sup>8</sup> These treatments have different theoretical mechanisms of action, but all have the same aim, to reduce pain and improve function. Such a variety of treatment options suggests that

the optimal treatment strategy is not known, and more research is needed to discover the most effective treatment in patients with tennis elbow.

A common intervention is Cyriax physiotherapy. The purpose of this article is to describe its use in the treatment of tennis elbow and its effects.

### CYRIAX PHYSIOTHERAPY

Cyriax and Cyriax<sup>9</sup> claimed substantial success in treating tennis elbow using deep transverse friction (DTF) in combination with Mill's manipulation, which is performed immediately after DTF. For it to be considered a Cyriax intervention, the two components must be used together in the order mentioned. Patients must follow the protocol three times a week for four weeks.<sup>9–10</sup>

### Deep transverse friction

Although the word friction is technically incorrect and would be better replaced by “massage”, this name will be used in this article. DTF is a specific type of connective tissue massage applied precisely to the soft tissue structures such as tendons. It was developed in an empirical way by Cyriax and Cyriax and is currently used extensively in rehabilitation practice.<sup>11–15</sup>

It is vital that DTF be performed only at the exact site of the lesion, with the depth of friction tolerable to the patient.<sup>9–10–12–14–16</sup> The effect is so localised that, unless the finger is applied to the exact site and friction given in the right direction, relief cannot be expected.<sup>9–10–14–15</sup> DTF must be applied transversely to the specific tissue involved, unlike superficial massage given in the longitudinal direction parallel to the vessels, which enhances circulation and return of fluids.<sup>9</sup> The therapist's fingers and patient's skin must move as a single unit, otherwise subcutaneous fascia could lead to blister formation or subcutaneous bruising.<sup>14</sup>

As a general guideline, DTF is applied for 10 minutes after the numbing effect has been achieved, every other day or at a minimum interval of 48 hours, because of the traumatic hyperaemia induced, to prepare the tendon for the manipulation.<sup>9–10–12–14–16</sup> There is only empirical evidence to support the times suggested above. Unfortunately, the technique has developed a reputation for being very painful.<sup>15–17–18</sup> However, pain during friction massage is usually the result of a wrong indication, a wrong technique, or an unaccustomed amount of pressure. If this form of massage is applied correctly, it will quickly result in an analgesic effect over the treated area and is not at all painful for the patient.<sup>9–10–14–16</sup> On the other hand, treating clinicians claim this technique places considerable strain on their hands.<sup>3–4–12–13–19</sup>

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There is very little scientific evidence on mode of action and effectiveness of DTF. Only a few studies exist, and more research is urgently needed. However, although the exact mode of action is not known, some theoretical explanations have been put forward. It has been hypothesised, with no scientific proof, that DTF has a local pain diminishing effect and results in better alignment of connective tissue fibrils.

It is a common clinical observation that application of DTF leads to immediate pain relief: the patient experiences a numbing effect during the session, and reassessment immediately after shows reduction in pain and increase in strength and mobility.<sup>15</sup> A number of hypotheses to explain the pain relieving effect of DTF have been put forward.

Pain relief during and after DTF may be due to modulation of the nociceptive impulses at the level of the spinal cord: the "gate control theory". The centripetal projection into the dorsal horn of the spinal cord from the nociceptive receptor system is inhibited by the concurrent activity of the mechanoreceptors located in the same tissues.<sup>16-20</sup> According to Cyriax and Cyriax,<sup>9</sup> DTF also leads to increased destruction of pain provoking metabolites, such as Lewis's substances. This metabolite, if present in too high a concentration, causes ischaemia and pain. It has also been suggested that a 10 minute DTF treatment of a localised area may give rise to lasting peripheral disturbance of nerve tissue, with local anaesthetic effect.<sup>15</sup> Another mechanism by which reduction in pain may be achieved is through diffuse noxious inhibitory controls, a pain suppression mechanism that releases endogenous opiates. The latter are inhibitory neurotransmitters which diminish the intensity of the pain transmitted to higher centres.<sup>20-21</sup>

In addition, the application of DTF can produce therapeutic movement by breaking down the strong cross links or adhesions that have been formed, softening the scar tissue and mobilising the cross links between the mutual collagen fibres and the adhesions between repairing connective tissue and surrounding tissues.<sup>14-16, 20-22</sup> Moreover clinicians claim, without support from clinical studies, that the rhythmical transverse stress of DTF stimulates fibre orientation with the result of enhancing tensile strength.<sup>14-15</sup>

Finally, DTF produces vasodilatation and increased blood flow to the area. This may facilitate the removal of chemical irritants and increase the transportation of endogenous opiates, resulting in a decrease in pain.<sup>14-16, 20-22</sup>

Absolute contraindications to DTF are few. It is never applied to active infections, bursitis and disorders of nerve structures, ossification and calcification of the soft tissues, or active rheumatoid arthritis, and care is required if there is fragile skin or the patient is having anticoagulant treatment.<sup>9-10, 14-15</sup>

DTF for tennis elbow is applied as follows.<sup>9-10</sup> Position the patient comfortably with the elbow fully supinated and in 90° of flexion. Locate the anterolateral aspect of the lateral epicondyle (facet of the lateral epicondyle, where the extensor carpi radialis brevis inserts, the most common site of pain in patients with tennis elbow, as mentioned in the introduction), and identify the area of tenderness. Apply DTF with the side of the thumb tip, applying the pressure in a posterior direction on the teno-osseous junction. Maintain this pressure while imparting DTF in a direction towards your fingers, which should be positioned on the other side of the elbow for counter pressure. DTF is applied for 10 minutes after the numbing effect has been achieved, to prepare the tendon for Mill's manipulation.

### Mill's manipulation

Mill's manipulation is the most common manipulative technique used by physiotherapists.<sup>12-13, 23</sup> Cyriax and Cyriax<sup>9</sup> state that it should be performed immediately after the DTF

provided that the patient has a full range of passive elbow extension. If passive elbow extension is limited, the manipulative thrust will affect the elbow joint, rather than the common extensor tendon, possibly causing traumatic arthritis.<sup>9-10</sup> It is defined as a passive movement performed at the end of range—that is, once all the slack has been taken up—and is a minimal amplitude, high velocity thrust.<sup>9-10</sup> The aim of this technique, again without properly designed controlled studies to prove this, is to elongate the scar tissue by rupturing adhesions within the teno-osseous junction, making the area mobile and pain free.<sup>9-12, 13, 23</sup>

Mill's manipulation for tennis elbow should be conducted as follows.<sup>9-10, 23</sup> Position the patient on a chair with a backrest and stand behind the patient. Support the patient's arm under the crook of the elbow with the shoulder joint abducted to 90° and medially rotated. The forearm will automatically fall into pronation. Place the thumb of your other hand in the web space between the patient's thumb and index finger and fully flex the patient's wrist and pronate the forearm. Move the hand supporting the crook of the elbow on to the posterior surface of the elbow joint and, while maintaining full wrist flexion and pronation, extend the patient's elbow until you feel that all the slack has been taken up in the tendon. Step sideways to stand behind the patient's head, taking care to prevent the patient from leaning away either forwards or sideways, which would reduce the tension on the tendon. Apply a minimal amplitude, high velocity thrust by simultaneously side flexing your body away from your arms and pushing smartly downwards with the hand over the patient's elbow.

Cyriax and Cyriax<sup>9</sup> cautioned that, if poor manipulation is performed by failing to maintain full wrist flexion, the thrust is absorbed mainly by the elbow joint, potentially causing traumatic arthritis. Depending on the magnitude of the thrust, full wrist flexion probably does little to protect the joint from such a manipulation if this is a really serious consideration.

This manoeuvre is conducted once only at each treatment session because it is not a comfortable procedure for the patient, and the effects of treatment often become fully apparent over the following few days.<sup>9-10, 23</sup>

### Studies in which Cyriax physiotherapy for tennis elbow has been used

Computerised searches were performed using Medline (from 1966 to March 2004), Embase (from 1988 to March 2004), Cinahl (from 1982 to March 2004), Index to Chiropractic literature (from 1992 to March 2004), and Chirolears (from 1994 to March 2004) databases. Only English language publications were considered. The search terms "tennis elbow", "lateral epicondylitis", "Cyriax physiotherapy", "treatment", "management", "physiotherapy", "randomised control trials" were used individually or in various combinations. Other references identified from existing reviews and other papers cited in the publications were searched. Moreover, we tried to identify further citations from the reference sections of papers retrieved, by contacting experts in the field, and from the Cochrane Collaboration, an international network of experts who search journals for relevant citations, but we did not find any more studies. Unpublished reports and abstracts were not considered.

Only one study was found in which Cyriax physiotherapy had been used in the management of tennis elbow. Verhaar *et al*<sup>24</sup> compared the effects of corticosteroid injections with Cyriax physiotherapy in treating patients with tennis elbow. The results showed that the corticosteroid injection was significantly more effective on the outcome measures (pain, function, grip strength, and global assessment) than Cyriax physiotherapy at the end of the treatment, but at the follow

up one year after the end of treatment, there were no significant differences between the two treatment groups. This study is not helpful for practicing physiotherapists, because most do not use injections to manage this condition. It is better to compare Cyriax physiotherapy with other physiotherapy treatments in order to assess its effects. In two studies,<sup>4, 19</sup> only DTF was used to treat patients rather than all the components of Cyriax physiotherapy. Therefore we do not know if Cyriax physiotherapy, which is mainly based on clinicians' claims, is effective as the sole treatment for tennis elbow or if it is better than other methods. Randomised controlled trials are needed to confirm the clinicians' claims.

## CONCLUSIONS

Although Cyriax physiotherapy is commonly used in the treatment of tennis elbow, more research is needed to assess firstly its effectiveness and secondly the effects of both its components.

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