

# Effectiveness of Mulligan Mobilization Technique Versus Cyriax Technique for Lateral Epicondylitis: A Pilot Study

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## Abstract

**Background:** Eccentric loading of extensor carpi radialis brevis tendon near its origin causes tennis elbow, also known as lateral epicondylitis. Tennis elbow is primarily caused by repetitive wrist extension or loaded gripping overuse injuries and when playing tennis, badminton, or any sport are more likely to experience it. The goal of the study was to determine whether tennis elbow pain might be decreased and improve the functional status. Subjects are divided into two groups, Mulligan mobilization technique and Cyriax technique along with ultrasound.

**Purpose:** To find out the effects of Mulligan mobilization technique and Cyriax technique along with ultrasound in the management of lateral epicondylitis.

**Materials and Methods:** Twenty individuals were chosen with tennis elbow (11 males and 9 females) and received treatment for four times/week for two weeks in RENU'S Physiotherapy & Rehabilitation Centre according to the inclusion and exclusion criteria, explained about the procedure and obtained signed informed consent. Subjects were divided into two groups by simple random sampling -Mulligan mobilization technique of Movement with Mobilization(MWM) and Cyriax technique of Deep Tendon Friction(DTF) massage with Mill's manipulation along with ultrasound.

**Result:** Statistical analysis had slight significant difference between Cyriax and Mulligan group for NPRS and PRTEE. Noticeably Cyriax had more improvement in pain reduction than Mulligan group, while Mulligan had improvement in functional impairment than Cyriax, with a p value of <0.0001.

**Conclusion:** Mulligan mobilization and Cyriax method with ultrasound both reduced discomfort and enhanced functional status.

**Keywords:** Tennis elbow, Patient-Rated Tennis Elbow Evaluation (PRTEE), Lateral epicondylitis, Massage, Physiotherapy

## Introduction

Lateral epicondylitis is an inflammatory condition that is better referred to as tendinosis, a painful and frequent musculoskeletal condition of

the upper limb's soft tissues of the elbow joint. It is also known by the names tennis elbow and lateral epicondylalgia.<sup>1</sup> Tennis players have a prevalence of LE of 40-50%, and it is a repeated upper extremity

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activity.<sup>2,3</sup> Despite the fact that it only affects 1% to 3% of the population overall and is less widespread, it is nonetheless associated with staggering costs and suffering for people.<sup>4</sup> The main cause of epicondylitis is pain and contractile overload. Pain is characterized by discomfort and soreness in the lateral portion of elbow, with resisted dorsiflexion of the wrist, middle finger, or both. Resistive wrist or third metacarpal extension with the elbow extended make the pain worse.<sup>5</sup>

Additionally, the pain may travel distally down the forearm, which could lead to weak grips.<sup>6,7</sup>

The illness is typically thought to have its roots in repetitive usage leading to micro tearing and advantage degeneration because of an immature reparative response. Although there is no initial inflammatory response or infiltration of inflammatory cells in lateral tendinitis and the sensory fibers of the injured tendons include substance P, a chemical that causes pain, and calcitonin gene-related peptide.<sup>8</sup> It is nonetheless a painful condition. The contractile overload, which repeatedly strains the common extensor tendon and its attachment to extensor muscles of the forearm (extensor carpi radialis brevis, extensor digitorum, extensor digiti minimi, and extensor carpi ulnaris) to the lateral epicondyle of the humerus. The muscle that is most frequently impacted is the extensor carpi radialis brevis (ECRB). Although tennis is frequently linked to lateral epicondylitis, other activities that involve excessive and repetitive use of the forearm extensors include typing and various manual tasks.<sup>9</sup> As a result, according to the statistical evidence, lateral epicondylitis is linked to several missed workdays and persistent impairments brought on by extended limitations in job capacity.<sup>10</sup> One of the most frequently seen lesions causing work-or sports-related pain issues is lateral tendinitis (LT).<sup>11</sup>

Manual therapy methods that involve hands-on soft tissue or joint mobilization lessen pain while also improving the extensibility of contractile tissues and joint mobility. Mulligan Mobilization with Movement (MWM) is an approach to treating musculoskeletal pain that is based on the theory that minor position errors in the articulating surfaces of joints following trauma or strains cause movement restriction and pain that is exacerbated by active muscle contractions

within the faulty positions of the joint.<sup>12</sup> Due to MWM's capacity to lessen a bone segment's positional defect, it was able to quickly relieve discomfort and restore. This aids in minimizing discomfort while enhancing grip strength and functional impairment. Deep transverse friction (DTF) massage, commonly referred to as deep friction massage, is a particular form of connective tissue manipulation that is carefully administered to soft tissue structures like tendons. The most popular manipulative method employed by physiotherapists is Mill's manipulation. Cyriax advises performing the operation as soon as possible after the DTF. If the patient can passively extend their elbow all the way, and it entails pushing with a small-amplitude, high-velocity force at the tip of elbow extension while keeping the wrist and palm flexed.

The historical treatment of tennis elbow with ultrasound (US) therapy is common. It's a hand-held device used to create and deliver sound waves by using both heat and non-thermal mechanisms to the interior damaged location in ultrasound therapy, a typical therapeutic approach in physical therapy.<sup>13</sup> It offers the body's soft tissues, such as muscles, tendons, joints, and ligaments, with deep heating and depending on the wave frequency.

### Aim

To find out the effects of Mulligan mobilization technique and Cyriax technique with ultrasound for lateral epicondylitis.

### Material and Method

It was a pilot study conducted on 20 subjects with lateral elbow pain, age between 30-40 years was taken from RENU'S Physiotherapy & Rehabilitation Centre. Simple random sampling was used and samples were gathered in the study period from October 2022 to November 2023.

#### Inclusion criteria:

- Age: 30 - 40 years.
- Pain with gripping.
- Pain with resisted wrist extension analyzed by Cozen's test
- Pain with passive wrist flexion with the elbow extension analyzed by Mill's test

- Tenderness on palpation over the lateral epicondyle of humerus
- Unilateral localization of pain

### Exclusion criteria:

- Cardiovascular disease
- Neuromuscular disease
- Neurological impairment
- Previous trauma
- Surgery
- Peripheral nerve entrapment
- Corticosteroid injection within 6 months
- Inflammatory rheumatic disease

### Outcome measures:

Assessment was taken as pre-test at initial of the study and post-test after two weeks of study.

- Numeric Pain Rating Scale (NPRS)<sup>14</sup>
- Patient Rated Tennis Elbow Evaluation (PRTEE)<sup>15</sup>

### Procedure

A total of twenty people were chosen based on the inclusion and exclusion criteria, and their informed consent was obtained and they were informed about the procedure. Their data was gathered. The patients were instructed to choose an envelope from a container that contained an equal amount of chits for Mulligan and Cyriax group. These sheets with labels were folded so that the physiotherapist and participants could not see the label. Patients in the Cyriax group underwent DTF massage and Mill's manipulation, while patients in a different group underwent Mulligan mobilization method using the MMWM approach. Both the groups underwent four times per week for two weeks.

### Cyriax Group - Deep Transverse Friction Massage and Mill's Manipulation for Lateral Epicondylitis

#### Deep transverse friction massage:

Deep tendon friction massage is used to treat tennis elbow at a relaxed position, with the elbow fully supinated and at 90-degree flexion, position the patient. The anterolateral aspect of the lateral epicondyle (the extensor carpi radialis brevis inserts, and the most common source of pain in people

with tennis elbow) can be found where the pain is located. Apply DTF by pushing the side of the thumb tip in a posterior direction on the teno-osseous junction. The therapist's fingers should be put on the opposite side of the elbow to create counter pressure while continuing to apply DTF while maintaining this pressure. To get the tendon ready for Mill's manipulation once the numbing effect wears off, DTF is applied for 10 minutes.

### Mill's Manipulation

The patient is seated on a chair with a back support, sit behind the patient. Support the patient's arm at the elbow's crook while rotating and abducting the shoulder joint to the medial position to 90 degrees. Forearm pronation will occur naturally. Place the thumb on the web space between the patient's thumb and index finger, fully flex the patient's wrist, and pronate the forearm. Place the hand supporting the patient's elbow in the crook of the arm and extend the elbow until all the slack has been picked up in the elbow.<sup>16</sup>

### Mulligan Group - Movement with Mobilization for Lateral Epicondylitis

Instruct the patient to perform a lateral glide with help of Mulligan mobilization belt at the elbow joint first, then make a fist and open it. The elbow was fully extended, and the forearm was pronated. It was confirmed that the individual had a repeating aggravating activity (same indication) prior to giving glide. The patient was subsequently told to glide while holding onto a hand grip strengthener. The gliding hand was positioned just distal to the elbow joint line over the medial surface of the ulnar side, and the stabilizing hand was positioned at the distal end of the arm. As the patient started to compress the grip strengthener, they utilized a laterally directed glide. When the glide was over, the patient had to release the hold. The glide was applied and sustained for approximately 30 seconds while the patient was instructed to repeat the uncomfortable maneuver up to ten times. There was a break of 30 seconds in between each of the three set.<sup>17</sup>

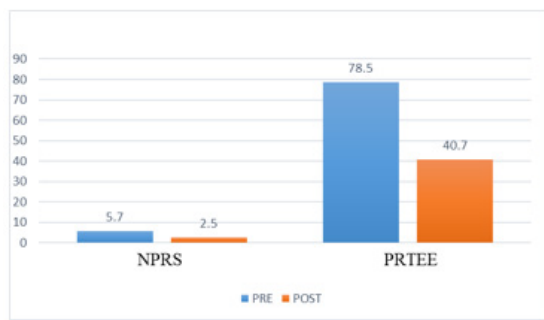
### Ultrasound:

Patient received US over the affected for ten minutes after the mobilization and, skin and the transducer's surface were both covered with gel.

Circular motion of the US head and transducer rate was 3–4 cm square. The dose of US-1 W/cm<sup>2</sup> was chosen for its deeper penetration with the frequency of 1 MHz in continuous mode; this frequency was chosen for the deeper penetration.<sup>18</sup>

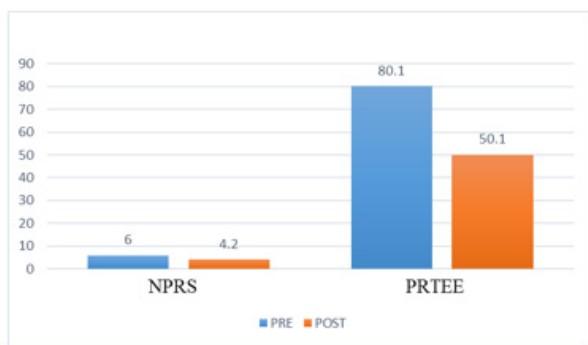
**Data Analysis**

**Cyriax group:**



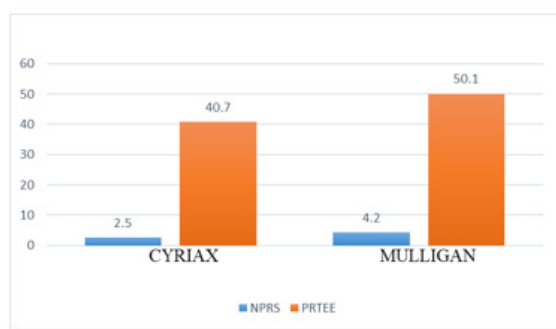
**Graph-1 Comparison of pre and post value of Cyriax group using NPRS and PRTEE scale**

**Mulligan group:**



**Graph-2 Comparison of pre and post value of Mulligan group using NPRS and PRTEE scale**

**Post-test values of both groups:**



**Graph-3 Comparison of post value of Cyriax group and Mulligan group using NPRS and PRTEE scale**

**Results**

Total 20 subjects participated and were divided into 10 each of two groups as the Cyriax group and Mulligan group. There is a significant improvement in NPRS and PRTEE among both the groups.

The NPRS post mean value in Cyriax group is 2.50 and in Mulligan group is 4.20 indicates equally significant in both the groups, with p value equal to 0.0013.

The PRTEE post mean value in Cyriax group is 40.07 and Mulligan group is 50.10 with p value <0.0001.

**Discussion**

The current investigation finds out the effectiveness of Mulligan mobilization and the Cyriax treatment with ultrasound for lateral epicondylitis is the main objective. Prior to and following therapy, the outcomes were evaluated using the Numerical Pain Rating Scale(NPRS) and the Patient-rated Tennis Elbow Evaluation (PRTEE). The benefits of using the Mulligan mobilization technique with ultrasound and the Cyriax technique with ultrasound to reduce pain and improve functional capacity were both noticeably larger. When the responses from the two groups were compared, the results were statistically equivalent for both groups.

More than 40 different therapeutic modalities have been documented, although none has emerged as being more effective than the others. In order to ascertain the efficacy of two MMWM and CA physiotherapy methods it has been reported that physiotherapy treatment methods are successful in controlling LE patients.

Nagrale AV, et al. 2009 according to the study Cyriax was superior to phonophoresis with exercise and stretching in reducing pain, promoting a pain-free grip, and improving functional status. In the current study, Cyriax and Mulligan mobilization were compared, and the results showed that Cyriax was superior in reducing pain than Mulligan were as well as Mulligan was superior in enhancing functional status.<sup>19</sup>

Anap DB et al. (2012) by separating the subjects into two groups established a treatment protocol

with manual therapy, which includes movement in mobilization along with ultrasound, deep friction massage, stretching, strengthening exercise, and another group of conventional therapy. According to the study's findings, manual therapy was more effective than conventional therapy.<sup>20</sup> The current study's findings therefore showed that MMWM and CA were effective in reducing pain levels and improving functional status in LE patients.

According to Abbas S. et al., 2019, this study compared the effectiveness of Mulligan mobilization with movement and tapping to Cyriax mobilization using deep friction massage with Mill's manipulation. Both techniques were successful in reducing pain and improving functional status.<sup>21</sup> Similar to the Abbas S et al., 2019 study, the current study found that using ultrasound instead of tapping technique had an impact in lowering pain and inflammation caused by tendinitis. Both treatments were successful in reducing pain and improving functional status. Additionally, DTF massage combined with Mill's manipulation is beneficial for treating LE-related discomfort. The goal of MMWM is to mobilize the afflicted joint while it is moving. It differs from other types of mobilization techniques in that MMWM is performed while the joint is in motion as opposed to classic mobilization techniques, such as Maitland mobilization, which are applied in a static posture. This aids in adjusting the joint's biomechanics during functional movement. The main finding of the current study was that, whereas CA was superior to MMWM in terms of reducing pain, MMWM was superior to CA in terms of enhancing LE patients' functional status. MMWM is useful in enhancing functional status in LE patients.

### Conclusion

According to the findings, both Mill's manipulation with DTF massage (Cyriax) with ultrasound and Movement with Mobilization (Mulligan) with ultrasound are efficient in reducing pain, enhancing functional ability in lateral epicondylitis. When compared to Mulligan's technique, the Cyriax approach is more effective at reducing pain in lateral epicondylitis. However, Mulligan's method leads to greater improvements in functional ability. By comparing the Cyriax approach,

it has an improvement in functional impairment. Both therapies are equally helpful and ultrasound was given.

**Ethical Clearance:** Taken from the Institutional ethical committee. ISRB number- 03 / 021 /2022/ ISRB/SR/SCPT

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**Conflict of Interest:** Nil

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