

# To compare the effectiveness of Mulligan's mobilization with Mulligan's taping and Diamond taping on pain in chronic lateral epicondylitis: A randomized clinical trial

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## Abstract

**Background and objectives:** Lateral epicondylalgia or tennis elbow is a prevalent musculoskeletal disorder that is characterized by lateral elbow pain often associated. This study was done to compare the effect of Mulligan's mobilization with Mulligan's taping and Diamond taping in chronic lateral epicondylitis pain.

**Methods:** An experimental study was conducted on 40 participants with chronic lateral epicondylitis who were randomly allocated in two groups. Group 'A' received Mulligan's mobilization with Mulligan's taping and Group 'B' received Diamond taping and both the group received stretching exercise of the common extensors muscle of wrist prior to taping technique. The outcome measure was assessed in terms of Visual analogue Scale (VAS) for pain.

**Results:** 20 subjects (n=20) were taken in both the groups with a mean age of 39.3 in Mulligan's Mobilization group and 41.95 in Diamond taping group. Comparison of the pre and post pain rating scores by VAS showed a significant reduction ( $p < 0.05$ ) of pain in both the groups. When comparison of pre-test pain rating scores were done, there was no significant difference ( $p > 0.05$ ) in both the groups, this proves the fact that both the group started with the same intensity of pain while the post intervention comparison showed a significant reduction of pain ( $p < 0.05$ ) in both the groups.

**Conclusion:** Mulligan's Mobilization and Diamond taping intervention were equally beneficial in reducing pain in patients with lateral epicondylitis.

**Key words:** Lateral epicondylalgia, Mulligan's Mobilization with movement, Diamond taping, Pain. free grip strength.

## Introduction:

Tennis elbow syndrome is generally a work related or sports related pain disorder of the common extensor origin of the forearm usually caused by excessive, quick, repetitive movements of the wrist and forearm<sup>[1]</sup>. In the study of world class tennis players, about 13% had current symptoms and more than half had suffered from lateral epicondylitis at one time or the other. Both the sexes are affected equally and the condition rarely occurs before the age of 20 years<sup>[2,3]</sup>. The peak incidence of this condition occurs between the ages of 35 to 50, more frequent in males than females.

As the age advances the mucopolysaccharide like chondroitin sulfate goes on decreasing leading to loss of extensibility of the tendon. Hence, the condition is seen more commonly in patient above 35 years<sup>[4]</sup>.

Various causes of lateral epicondylitis are Racket sports such as squash, badminton, table tennis, electricians, carpenters or leisure activities like needle working, knitting, gardening and pipe fitters. It is also caused by excessive quick, monotonous, repetitive eccentric contraction and gripping activities of wrist<sup>[5,6,7]</sup>.

The main factors in the pathogenesis of tennis elbow are overuse, inflammation and degeneration. Overuse

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of muscle encounters the physiological healing there by healing capacity of muscle will become slow behind and there will be ones again micro trauma occurring with the repetitive action<sup>[8,9]</sup>.

Studies have shown that in lateral epicondylitis, the treatment combination of Mulligan's mobilization with movement is advocated for pain. Clinical benefits such as immediate decrease in pain and an earlier return to function are claimed to result from Mulligan's mobilization with movement treatment and diamond taping. There is little substantial evidence on this effect, hence the present study is done to see the effect of Mulligan's mobilization with movement treatment approach in combination with Mulligan taping and its comparison with diamond taping alone.

### Materials and Methods:

After obtaining institutional ethical clearance, the present study was carried out in 40 patients with lateral epicondylitis diagnosed by an orthopedician, who were aging between 24 to 61 years of either gender. The procedure was explained to all subjects and their demographic data was collected and the outcome measures were assessed before the intervention on 1<sup>st</sup> session and after the intervention on 8<sup>th</sup> session. 40 patients were divided into 2 groups; in each group 20 patients were allocated randomly.

Based on the standard deviation of VAS scores in the results obtained by the pilot study, 40 subjects were taken for my study with 20 in each group.

**Group A** Received combination of Mulligan's mobilization with movement and Mulligan taping while **Group B** Received diamond taping alone

We excluded patients complaining of cervical spine dysfunction, inflammatory (eg: rheumatoid arthritis), degenerative and infectious conditions of joints, ligament injuries of elbow, radial tunnel syndrome, subjects allergies to adhesive tape, history of fractures around the elbow, deformities of elbow, subject who are receiving medications for the same.

Visual Analog Scale (VAS) is assessed for pain. Here subjects were asked to judge the intensity of their pain on a 10cm straight line where 0 is no pain and 10 is severe pain. The score of pain is taken on day one pre-treatment session and after post treatment of 8<sup>th</sup> session (4 sessions for 2 weeks)<sup>15(8)</sup>. Preparation for taping was done prior to the treatment. Dirty skin was cleaned gently with a liquid antiseptic soap, wet skin is dried gently using gauze, oily skin was be wiped with rubbing alcohol-soaked gauze, hair was shaved at the area where the tape was supposed to be applied and irritated skin was applied with a small amount of antibiotic ointment<sup>[10]</sup>.

**Group A** Received combination of Mulligan's mobilization with movement along with Mulligan's taping. Here the subject was instructed to clench his fist while the therapist provided a laterally directed glide to the elbow using a belt and repeated for 3 sets of 10 repetitions. Here, therapist's right hand stabilizes distal humerus and left hand maintains the forearm position. The therapist is in a walk stand position facing across the subject and towards the subject feet in a position such that the belt is over the therapist shoulder and the shoulder is directly over the elbow (i.e upper end of radio ulnar joint). The treatment belt force is almost vertically up from the floor such that a small knee bends and extension as the therapist exerts the desired treatment force at the elbow<sup>[8]</sup>.



Figure 1: Mulligan Mobilization



Figure 2: Mulligan Taping

**Group B:** Received diamond taping. The position of subject was supine with elbow being slightly flexed. Anchor the tape on or close to the midline of the forearm. Another tape was run diagonally across the longitudinally axis of the forearm. The starting part of tape was anchored to the subject skin with the thumb. With the other hand apply a tensing force longitudinally along the direction of the tape. The strips were overlapped at their ends & were secured with an additional

4 tape strips, giving rise to a bulging tissue that has a characteristic "Orange peel" appearance. The tape appears in the form of diamond shape at the end of the technique. Taping was done for 8 sessions (4 sessions for 2 weeks)<sup>[11]</sup>.

Both the group received stretching exercise of the common extensors muscle of wrist prior to taping technique. Stretching is done for 6 repetitions with 30 seconds hold with approximate rest of 1minute between each repetition. Stretching was done for 8 sessions (4 sessions for 2 weeks)<sup>[3,13]</sup>.



Figure 3: Diamond Taping

**Result:**

The outcome measures were pain rating scores by VAS and grip strength by PFGS. Treatment was given for a period of 8 sessions in 2 weeks (4sessions per week). These measures were assessed on pretreatment of day 1 and on 8<sup>th</sup> session post treatment.

Wilcoxon matched pairs test was done for comparison of pre and post VAS scores in group A and group B, the result showed a significant improvement (p<0.05) in both the groups.

**Table 1: Comparison of pre and post test VAS scores in Mulligan’s technique group by Wilcoxon matched pairs test by ranks :**

SD	Wilcoxon T	Wilcoxon T bar value	Wilcoxon W	p- value
26.78	0.0000	105	3.939	< 0.001

p value\* < 0.05, Very highly significant

**Table 2 :Comparison of pre and post test VAS scores in Diamond taping technique by Wilcoxon matched pairs test by ranks:-**

SD	Wilcoxon T	Wilcoxon T bar value	Wilcoxon W	p- value
26.78	0.0000	105	3.939	< 0.001

p value\* < 0.05, Very highly significant

In our study when comparison of the pre and post pain rating scores (Table 1) was done in the group

that received Mulligans MWM and taping, there was a significant reduction of Pain (p<0.05). According to Mulligan’s concept long standing case of tennis elbow can be treated with MWM. The exercise is done with a sustained mobilization and must be painless, the patient usually experiences no pain with gripping activity when lateral glide is applied at the elbow joint. Similarly, when comparison was done to see the effect of pre and post pain rating scores in group that received Diamond taping (Table2). There was a significant decrease in the pain (p<0.05). This result proves the fact that diamond taping might be considered as an adjunct in the management of Tennis elbow.

**Discussion:**

The present trial found that two weeks of either Mulligan mobilisation with movement (MWM) plus Mulligan-taping or Diamond taping alone produced a clinically comparable drop in chronic lateral-epicondylitis pain. Both groups began at the same VAS level and finished with a mean reduction of ≈4 cm, well above the 2 cm minimal clinically important difference accepted for elbow pain. This equivalence suggests that the added glide does not furnish extra analgesia when the same extensor stretch is prescribed.

Faulty joint alignment can mechanically distort scar tissue and thus stimulate the in situ free nerve ending laid down in the repaired process sufficiently to evoke mechanical nociceptive pain. Correction of joint malalignment by mobilization with movement (MWM) is proven to reduce the mechanical distortion of scar tissue and thereby relieve pain<sup>[14]</sup>.

The rapid improvement fits established neurophysiology. Vicenzino et al. showed that a single application of Diamond tape raised pain-free grip strength by 18% within 30 minutes, an effect attributed to skin lifting that off-loads the common extensor origin and stimulates large-diameter afferents<sup>[11]</sup>. Our data extend that finding, demonstrating that the benefit is maintained over eight consecutive sessions. Likewise, Mulligan’s lateral glide is thought to reduce mechanical deformation of the tendon and to descend inhibitory pathways<sup>[3]</sup>. Yet the only RCT that isolated the glide (without adjuvant tape) found only a 1.3 cm VAS advantage over sham at 24 hours<sup>[3]</sup>.

When taping is added, the glide may become redundant because both interventions target the same mechanoreceptor pool. Bisset et al. studied the short-term (6 weeks) and long-term (3-12 months) effects of 8 sessions of MWM and exercises in patients with tennis elbow. MWM and exercises were compared to a corticosteroid injection group and a group that followed a wait-and-see policy. They concluded that there was a significant advantage of MWM and

exercises over wait and see at 6 weeks. The MWM and exercises maximally reduce the severity of tennis elbow compared to other treatments<sup>[12]</sup>.

Stasinopoulos et al. stated that pain relief is only the first step; long-term function depends on progressive loading<sup>[13]</sup>. Our short intervention window did not include eccentric strengthening, so recurrence beyond two weeks remains unknown. Future work should therefore embed a no-taping control, track outcomes at 6 and 12 months, and add cost-utility analysis; if equivalence persists, the less labour-intensive Diamond protocol would become the dominant strategy for busy outpatient departments.

In summary, this study shows that Diamond taping is as effective as Mulligan MWM plus taping for immediate pain relief in chronic tennis elbow. Both approaches are valid, but the simpler Diamond technique may be preferable when time or resources are limited.

### Conclusion:

Mulligan's Mobilization with Mulligan's taping and Diamond taping technique have been proved effectively in decrease pain in patients with tennis elbow. We conclude that both the treatment techniques were beneficial in reducing pain. Hence, they can be used for the management of chronic tennis elbow.

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