

Immediate Effect of Diamond Taping Technique in Treatment of Tennis Elbow

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ABSTRACT

Purpose: Aim of this study is to investigate the immediate effect of diamond taping on wrist extensors strength, and pain in patients with tennis elbow. **Materials and Methods:** Thirty patients (18 men and 12 women) with tennis elbow, with age ranging from 35 to 45 years have participated in this study. They were randomly assigned into one of two equal groups. Group A received diamond taping added to ultrasonic, while group B received ultrasonic only. The Lafayette Manual Muscle Test System and visual Analog Scale (VAS) were used for evaluation of wrist extension isometric strength at 20 degrees extension, and pain intensity respectively before and immediately after the treatment. **Results:** Group A showed significant improvement of each of wrist extension isometric strength at 20 degrees extension, and pain intensity during wrist extension, while group B showed significant improvement of pain only. Among the variables, significant differences were found in wrist extension strength, and pain between both groups, in favor of group A receiving diamond taping added to ultrasonic. **Discussion and Conclusion:** Kinesio taping in the form of diamond technique demonstrated an impressive effect on wrist extension strength and pain in individuals with tennis elbow. Therefore, it is recommended that diamond taping technique may be useful in the management of tennis elbow.

Key words: Diamond taping technique, ultrasonic, wrist extension strength, pain intensity, tennis elbow.

INTRODUCTION

Tennis elbow is a common disorder amongst tennis players, but all individuals exposed to repetitive stress on the wrist extensors are at risk for developing the condition². Typical examples include typists, workers and builders⁶.

The common physical signs of lateral epicondylitis are pain to direct palpation over the lateral epicondyle and reproduction of pain and weakness during grip strength testing. Commonly, resisted contractions of the

extensor muscles of the forearm, particularly the extensor carpi radialis brevis are also painful¹¹. Pain from lateral epicondylitis originates at the site of attachment of the common extensors to the lateral epicondyle and may radiate into the forearm and dorsum of the wrist⁹.

The treatment of tennis elbow aims at reducing pain, increasing strength and improving the quality of life of the patient, while minimizing the possible side effects of treatment. Physiotherapy (ultrasound, phonophoresis, electrical stimulation, manipulation, soft tissue mobilization, friction massage, and stretching and strengthening exercises) has an important role in the conservative treatment of tennis elbow².

McConnell⁴ has proposed the application of tape as a mean of alleviating pain, improving muscle function, and restoring functional movement patterns. Clinically, in musculoskeletal conditions, by minimizing the aggravation of symptoms during the performance of therapeutic exercise, the use of a taping technique may facilitate the compliance to exercise rehabilitation programs⁴.

Vicenzino et al.,¹⁰ reported that taping technique reduces pain on lateral epicondyle, so that it facilitates rehabilitation program and improves grip strength and wrist extension muscles force in patients with lateral epicondylalgia¹⁰.

The aim of the present study was to study effect of diamond taping technique on wrist extension strength, and pain intensity of individuals with lateral epicondylitis immediately after application.

MATERIALS AND METHODS

Thirty patients with lateral epicondylitis (18 men and 12 women) on their dominant arm participated in this study. They were randomly assigned into one of two equal groups. Group A (study group) received

diamond taping added to ultrasonic, while group B (control group) received ultrasonic only. The study was applied at the physical therapy outpatient clinic of faculty of Physical Therapy, Cairo University.

Inclusion criteria were: Pain during stretching and/or resisted contraction of the wrist extensors, lateral epicondylitis was for more than 6 weeks.

Exclusion criteria were: Dominant hand fracture through the last year, history of rheumatoid or neurologic disease of dominant hand.

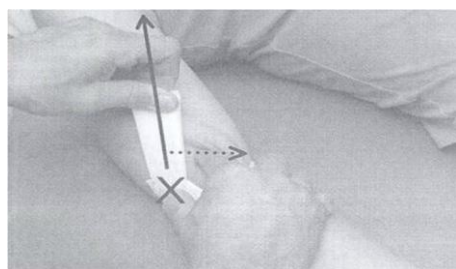
In our study, the measured outcomes were wrist extension strength using Lafayette Manual Muscle Test System, and pain intensity using Visual Analogue Scale.

Instrumentations and procedures

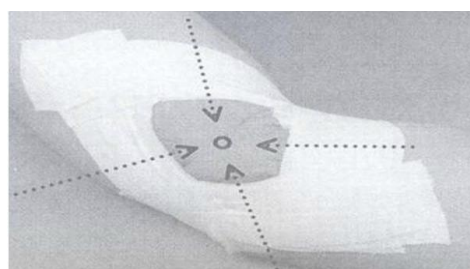
For evaluation

Lafayette Manual Muscle Test System. The Lafayette Manual Muscle Test System (Model 01163) (Figure 1) features a lightweight (10.6 oz.) microprocessor-control unit that measures peak force (pounds or kilograms), time to reach peak force, and total test time, while storing up to 52 tests.

Test times can range from 1–10 second, and an audible tone indicates the end of the preset time which was for six second. The unit provides a built-in calibration routine that verifies a valid calibration⁷.



(a)



(b)

Fig. (2): Diamond taping technique (a, b) (Adapted from Shamsoddini et al., 2010).

The shape of this taping technique (diamond) is used here to differentiate the technique from other taping techniques of the elbow¹⁰. The treatment measures were evaluated in pre-treatment (baseline) and immediately post-treatment (0 minutes).

Ultrasound. It was used in both of the study group A and the control group B.



Fig. (1): Lafayette Manual Muscle Test System (Model 01163, Lafayette Instrument Company, Lafayette, Indiana, USA).

Visual Analogue Scale. Pain was measured on a visual analogue scale (VAS), where 0 (cm) was least pain imaginable and 10 (cm) was worst pain imaginable^{3,12}.

For treatment

Kinesio tape. This technique was received in the study group A. The diamond taping technique was used in which 4 pieces of approximately 80 to 100 mm long, 3.8 cm wide, non-elastic, adhesive sports tapes (Premium quality zinc oxide tapes) were used¹⁰.

These tapes were laid on the skin distally to proximally in a diamond shape, while simultaneously applying a traction force on the soft tissues towards the lateral epicondyle and perpendicular to the line of the tape. The strips overlapped at their ends and were secured with an additional 4 tape strips (figure 2). This was applied in sitting with the elbow in a slightly flexed position⁷.

Ultrasonic device with a frequency of 1 MHz, with an intensity of 1 W/cm² and pulsed mode was used in the study. The ultrasound head was applied to the muscle where digital pressure of the tender spot reproduces the patient's pain complaint^{1,5}.

RESULTS

There was a statistically significant difference before and after treatment, as

regards the wrist extension isometric strength mean values of group A, while there was no statistically significant difference of group B, Table 1.

Table (1): Wrist extension isometric strength variable of group A and B before and after treatment.

wrist extension isometric strength	Before program	After program	T-value	P-value
Group A	8.067 (\pm 3.056)	13.62 (\pm 2.445)	7.14	< 0.0001*
Group B	7.687 (\pm 1.654)	7.74 (\pm 1.824)	0.5214	0.6102**

* = significant ** = non-significant

There was a non-statistically significant difference between both groups, as regards the wrist extension isometric strength mean values

before treatment, while there was a statistically significant difference between groups after treatment, Table 2.

Table (2): Wrist extension isometric strength variable between group A and group B before and after the exercise program.

wrist extension isometric strength	Group (A)	Group (B)	T-value	P-value
Before program	8.067 (\pm 3.056)	7.687 (\pm 1.654)	0.4235	0.6751**
After program	13.62 (\pm 2.445)	7.74 (\pm 1.824)	7.4656	< 0.0001*

* = significant ** = non-significant

There was a statistically significant difference before and after treatment as

regards the pain intensity mean values of both groups A and B, ($P < 0.001$), Table 3.

Table (3): Pain intensity variable of both groups A and B before and after treatment.

Pain intensity	Before program	After program	T-value	P-value
Group A	7.40 (\pm 0.63)	3 (\pm 0.84)	26.94	< 0.0001*
Group B	7.33 (\pm 0.72)	4.20 (\pm 0.77)	16.32	< 0.0001*

* = significant

There was a non-statistically significant difference between both groups, as regards the pain intensity mean values before treatment,

while there was a significant difference between both groups after treatment in favor of group (A) ($P < 0.001$), Table 4.

Table (4): Pain intensity variable between group (A) and group (B) before and after treatment.

Pain intensity	Group (A)	Group (B)	T-value	P-value
Before program	7.40 (\pm 0.63)	7.33 (\pm 0.72)	0.26	0.79**
After program	3 (\pm 0.84)	4.20 (\pm 0.77)	4.05	< 0.0001*

* = significant ** = non-significant

DISCUSSION AND CONCLUSION

A patient affected by tennis elbow complains of pain around the lateral elbow, radiating toward the extensor region. Diminished extension forces of the forearm, and clinical testing reveals painful resistance against dorsiflexion of the wrist. These complaints could be present during normal daily activities or primarily during sporting activities².

This study examined the initial effect of taping technique on wrist extension isometric

strength at 20 degrees extension, and pain intensity during wrist extension in patients with tennis elbow.

The data of our study demonstrated that the application of taping technique (diamond tape) improved wrist extension isometric strength and pain immediately after application in participants with lateral epicondylitis, while only pain was improved in the control group receiving ultrasonic.

These results come in agreement with the results of Shamsoddini et al.,⁷ who demonstrated a statistically significant increase

in wrist extension strength due to the use of diamond tape on the arm affected by tennis elbow⁷.

We postulate that the significant increase in wrist extension occurred because taping technique disperses stresses generated by muscle contraction, thereby reducing painful inhibition and allowing the subject to contract more forcefully.

Data of our study also showed that application of diamond tape resulted in positive changes of pain scores compared pre and post application of diamond taping.

According to results, data of our study have compatibility with study by Vicenzino in which the authors reported that application of diamond tape resulted in positive changes of pressure pain threshold scores compared to a placebo control condition¹⁰.

A possible model of the mechanism of action for diamond taping in lateral epicondylitis relates to its neurophysiologic effects on the nervous system, particularly the nociceptive system. In this neurophysiological model the tape may exert an effect on pain by primarily altering pain perception, either locally at the elbow by inhibiting nociceptors, facilitating large afferent fiber input into the spinal cord and/or possibly by stimulating endogenous processes of pain inhibition^{9,10}.

The main results of this study demonstrated an impressive effect of a diamond tape technique on wrist extension and pain in individuals with tennis elbow. Hence it was concluded that this method of treatment may be useful in the management of this condition during exercise and functional rehabilitation.

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الملخص العربي

التأثير المباشر للرباط الماسي في علاج مرفق التنس

الهدف : هدف هذه الدراسة هو بحث التأثير المباشر للرباط الماسي على قوة فرد الرسغ ، والألم في مرضى مرفق التنس . **الوسائل والطرق :** شارك في هذه الدراسة ثلاثون مريضاً (18 رجل و 12 سيدة) ، تتراوح أعمارهم بين 35 و 45 سنة . تم تقسيم المرضى عشوائياً على مجموعتين . تم علاج المجموعة (أ) بالرباط الماسي ، بالإضافة إلى الموجات فوق الصوتية ، والمجموعة (ب) بالموجات فوق الصوتية فقط . تم تقييم قوة فرد الرسغ ، والألم قبل وبعد العلاج مباشرة . **النتائج :** أظهرت النتائج في المجموعة (أ) تحسن ملحوظ في كلا من قوة فرد الرسغ ، وشدة الألم ، بينما أظهرت المجموعة (ب) تحسن ملحوظ في الألم فقط . أظهرت النتائج فروق ذات قيمة بين المجموعتين في كلا من قوة فرد الرسغ ، وشدة الألم لصالح المجموعة (أ) التي تم علاجها بالرباط الماسي ، بالإضافة إلى الموجات فوق الصوتية . **الاستنتاج :** للرباط الماسي تأثير مفيد على كلا من قوة فرد الرسغ ، والألم في مرضى مرفق التنس . لذا يوصى باستخدام الرباط الماسي لعلاج مرفق التنس .

الكلمات الدالة : الرباط الماسي ، الموجات فوق الصوتية ، قوة فرد الرسغ ، شدة الألم ، مرفق التنس .