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Role of Plyometric Exercises in Lateral Epicondylitis – A Case Report

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Abstract –

Objective: To find the efficacy of plyometric exercises in lateral epicondylitis.

Clinical Features: Lateral epicondylitis also known as tennis elbow is characterised by pain over lateral epicondyle of the humerus during active wrist extension or passive wrist flexion.

Intervention and Outcome: The main intervention in this case involved plyometric exercises for wrist extensors along with conventional physiotherapy which included pulsed ultrsound therapy for 4 weeks. The treatment goal was to reduce inflammation, pain and restore wrist extensor muscle strength to avoid reccurence.

The treatment outcome was measured by 11 point Numerical Pain Rating scale, hand grip strength, functional score (Patient Rated Tennis Elbow Evaluation-PRTEE) and amplitude analysis by electromyograph(EMG). All the outcome measures were taken and analysed at baseline and after end of treatment.

Conclusion: Combination of conventional physiotherapy which included pulsed ultrasound therapy along with plyometric exercises had promising result in rehabilitation of lateral epicondylitis and thus allowing return to work and play as qucikly as possible.

Keywords - Lateral Epicondylitis, Plyometric Exercises, Tennis Elbow, EMG.

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1. INTRODUCTION

Lateral epicondylitis known as lateral epicondyalgia or tennis elbow is the common pathology occurring in both athletes and non-athletes which affects common extensor of the hand with predominant complaint of pain over lateral epicondyle of the humerus. In a community it occurs in 1 % to 3 % population at the large with prevalence in between 30-60 years [1, 2]. It mainly occurs because of repetitive or overuse of extensors of the wrist mainly extensor carpi radialis brevis muscle The failed healing tendon response is due to increased fibroblasts, proteoglycans, vascular hyperplasia and glycosaminoglycan and collagen disorganization [3].

However, there is no definite treatment available for this condition. There is vast number of treatment options available but with anecdotal evidence [4]. The treatment option for this condition comprises of both conservative and surgical.

With number of theurapeutic treatment modalities availables, very few have been proven with sceintific evidence4. Most of the therapeutic exercise programme will include graded strengtheening and strectching programme for this condition. In recent past one of the study has cliamed the effectiveness of plyometric exercises when used with therapeutic LASER5.The study mentioned that with plyometric exercises local inflmmation and collagen alignment is improved.

The main aim of this paper is to find the efficacy of plyometric exercises in lateral epicondylitis.

This paper will focus on the course of one patient with lateral epicondylitis with its detailed examination, pathology and treatment given with its improvement.

2. CASE REPORT

A 42- year old male patient, left hand dominant senior accountant at a private firm and recreational badminton player predominately with chief complaints of pain over left epicondyle that had lasted for over 3 months. The pain increased gradually after patient played badminton in a club tournament and later hand grip strength was also affected. The patient initially went to orthopaedic surgeon in Gandhinagar, Gujarat where he was prescribed with analgesic and anti-inflammatory medications which included aceclofenac and paracetamol molecule and local topical analgesic spray for one week. After one week patient was referred for physiotherapy.

In physiotherapy department while assessing the outcome measures at baseline; pain was characterized as dull achy and stiff which rated 7 out of 10 on 11 point numerical pain rating scale (Zero being no pain and l0 being worst pain ever)6. Functional score was taken by Patient-rated tennis elbow evaluation in Gujarati (PRTEE) which was 66 out of 100 (Higher scores indicates more pain and functional disability)7. The hand grip measurement which was measured by Jamar Hand Dynamometer 2 was 22 lb. (average of 3 trials) and amplitude in surface emg8 was 80µV (best of 5). With this patient had no other systemic illness or never had undergone any major surgery in past. The patient was only earning member in his family which comprised of his wife and one child aged 12 years. Patient was in this occupation since last 17 years.

On examination, tenderness grade 3 was present over lateral epicondyle region and localized swelling was also present with no ecchymosis when compared with opposite side. All active range of motion of elbow was full with soft end feel in elbow flexion and hard end feel in elbow extension. Wrist extension was limited because of pain with empty end feel. Passive range of motion of wrist extension was also reduced primarily because of pain and discomfort mainly at the end range of motion. End range wrist flexion passively also caused pain over left lateral epicondyle of the humerus. Resisted isometric testing of left wrist extension was weak and painful. Special test were done to confirm the diagnosis were cozen's test and mill's test which were positive.

Thus, the patient was diagnosed with left side Lateral Epicondylitis predominately involving wrist extensors mainly extensor carpi radialis brevis.

Figure: 1 Starting Position

Figure: 2 Mid Position

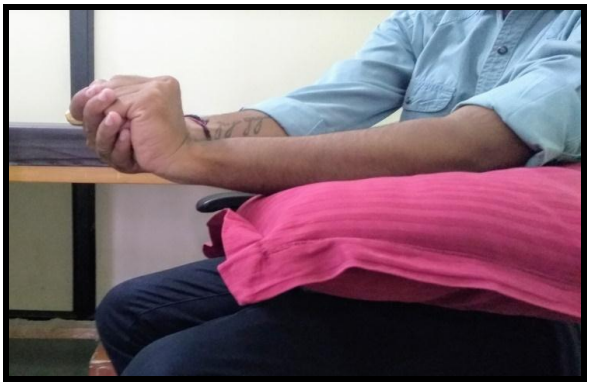

Figure: 3 End Position

The treatment protocol was than designed which included pulsed ultrasound therapy and plyometric exercises as mentioned in Table: 1 which was duly explained to the patient and due inform consent was taken. The treatment was scheduled for 4 weeks with 3 times per week sessions.

The detailed description of the figure is given below:

Figure 1 explains about the starting position for plyometric exercises with elbow extension, forearm pronation and wrist in full extension.

Figure 2 explains about the mid position with elbow extension, forearm pronation and wrist flexion by the count of 20.

Figure 3 is the end position where patient extends the elbow with the help of opposite hand.

Table: 1

Treatment	Procedure
Pulsed Ultrasound Therapy [3]	**Site:** Tenoperiosteal junction of the extensor carpi radialis brevis, At 1:4 Pulse Ratio, **Frequency:**1MHz, **Intensity:** 1.5 W/cm2, **Duration:** 5 minutes.
Plyometric Exercises[3],[5]	From, staring position (wrist full extension) patient flexes their wrist slowly while counting to 20, and then returns to the starting position with the help of the other hand. The load was increased using free weights, when the patient was able to perform the eccentric exercises without experiencing any minor pain or discomfort.

After the first treatment session patient reported to feel 60 percent better. All the outcome measures; pain (11point NPRS), Hand Grip Strength (Hand Dynamometer), Functional Score (PRTEE-Gujarati) and EMG amplitude were taken at the end of treatment i.e. 4th week. Comparison of the same is mentioned in table 2.

Table: 2

Outcome	Pre	Post
Pain	7	1
Hand Grip Strength (lb.)	22	70
PRTEE	66	8
EMG- Amplitude (μV)	80	1125

After the treatment sessions were over, patient was also recommended to purchase a light, non-vibrational professional racquet with moderate string tension and was also taught proper stroke techniques to avoid anuy recurrences.

3. DISCUSSION

Treatment goal for any of the rehabilitation program is made taking into consideration reduction of pain and restoration of muscle function.

The main aim of this paper was to design a treatment protocol which not only reduces pain and restores muscle function but also to see that soft-tissue injuries like lateral epicondylitis who have more rate of recurrence, can be prevented from recurrence.

Lateral epicondylitis is a painful condition of the elbow which is common in racquet sports players and also occurs in non-athletes. This is mainly due to repetitive stress and thus causes significant “down time” for the patients limiting their day to day activities [9,10,11].

Thus, biomechanics of elbow play a very important role in this; the tension and repetitive stress on common extensors of the wrist is directly related to the technique of the stroke used and muscle strength [12]. The studies related to elbow biomechanics using electromyography as an outcome measures have shown that in racquet sports serving motion has more demands compared to ground stroke13. The main reason for this is improper backhand technique which increased includes wrist extension and proanation activity.

Lateral epicondylitits and tennis elbow both are synoymns, though the term epicondylitits suggest inlammation but boyer had suggested that there is no evidence of inflammation both acute or chronic in his study14. It is suggested that repetitive muscle contraction causes micro trauma and if the natura healing process fails this leads to angifibroblastic degeneration. This mainly occurs at the lateral epicondyle of the humerus which is origin of extensor carpi radialis brevis muscle [15,16,17,18].

Many studies have suggested that over 90% of patients respond well to conservative care [15,19,20,21,22]. In one of the meta-analysis done by Labelle etl in 1992 which reviewed around 185 articles on lateral epicondylitis treatment, it concluded that there was not a sufficient evidence for any single treatment [23].

This was also supported by a study done by Bisset et al, who said that there was minimum evidence for the long term benefit of physical therapy intervention [24].

Majority of conservative treatment plan is made with the aim of aligning collagen fibres and improving the tensile strength of the muscle. Thus, the rehab focuses on increasing the strength and flexibility of wrist extensor and flexor muscles making them stiffer and capable to absorb more force, this indeed transfers less force to the elbow.

The phenomenon was supported by Svemlov in his pilot study which stated that eccentric exercise programme reduces the symptoms of lateral epicondylitis [25].

Thus, to find out best possible treatment for lateral epicondylitis which not only reduces pain but also improves the functional performance of the patient and also prevents recurrence this case study was done. As mention in table 2, at the end of 4 weeks of treatment as mentioned in table 1 there was significant improvement in all the outcome parameters. Even the amplitude analysis was in favour of the treatment.

Plyometric exercises are performed rapidly and with high intensity to improve speed and power. It includes

eccentric phase, rebound phase and concentric phase; the phenomenon behind this is neurophysiological biomechanical response. Plyometric exercises are combination of stretch and shorten cycle. Thus, this is the reason of improving the hand grip strength and muscle amplitude in emg analysis and improving the functional outcome [3,5].

Ultrasound has proven effects on reducing the inflammation and improving the tissue healing; this would indeed improve muscle strength and power [3,24].

4. CONCLUSION

We conclude that there are positive and promising result in lateral epicondylitis patient who was treated with plyometric exercises and pulsed ultrasound therapy.

As this was a case report, we would recommend the same protocol to be studied under larger group of people.

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