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Article · January 2023

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Rehabilitation Program For Treatment Tennis Elbow (Lateral Epicondylalgia) Suffered by The Players of Al-Rafidain Sports Club For Tennis League Three Players In Diyala Province

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Abstract

Lateral Epicondylitis (LE) which has been referred to as the Tennis Elbow as well is a lesion affecting common tendinous origins of wrist extensors due to chronic overuse injury that results in damaging common extensor tendons which join forearm extensor muscles to humerus. The aim of the present evidence-based clinical statement is reviewing scientific evidences for efficacy of a variety of the rehabilitation methods, chronic lateral epicondylitis management. It is focused upon treating chronic lateral epicondylitis and the latest developments in physiotherapy area for managing chronic lateral epicondylitis. Due to the fact that primary physical impairments in the LE are decreased is the strength of the grip, fundamentally due to the pain and motor weaknesses, there is a necessity in designing successful program of rehabilitation that is focused upon the physical impairments and not just the symptoms. Which is why, the main aim of the successful management of the condition is electrotherapy and therapeutic exercise, focusing upon the reduction of the pain at the initial stage and later on enhances the functional outcome. The latest advances in the therapeutic approaches such as the manipulations, sports taping had shown good evidences in LE rehab that mainly focuses on the reduction of the pain. Pain reduction in the early stages is helpful in the process of recovery due to the fact that it motivates client to carry on with the physical therapy. Which is why, the latest advancements in the physical therapy with some approaches such as the manipulation, soft tissue release have good clinical evidences in LE management in addition to other musculo-skeletal conditions.

Keywords: habilitation,injuries,tennis elbow, Therapeutic exercises, natural therapy

Introduction

There are more than two hundred regular tennis players in the IRAQ , Owns club Bilad Alrafidain A group of tennis players who suffer frequent injuries to the Tennis elbow, also referred to as Lateral Epicondylalgia (LE), can be defined as a very common clinical condition in the sports medicine, according to Ward (2018). At some point, half of tennis players will feel elbow pain, and 75% to 80% will have LE. Squash, baseball, javelin, and repetitive wrist movements are all impacted by it. According to Bisset (2015), LE is most common in persons

between the ages of 30 and 50. Because of the excessive usage of extensor tendons, inserting into lateral portion of humerus, repetitive tennis strokes can result in LE, a kind of elbow tendinopathy. Compared to extensor digitorum as well as extensor carpi radialis longus, extensor carpi radialis brevis (ECRB) that stabilizes wrist in the elbow extension, has a higher susceptibility to the degeneration throughout elbow flexion and extension (Schwarzman, Hutchinson and Watson, 2017). The most frequent overuse elbow injury is this one (Anderson, Hall and Parr, 2009). Although a fast increase in play, poor fitness, an excessively heavy or oversized racquet, and inappropriate string tension might all be factors, poor technique and body alignment with wrist hyperextension are the main reasons (Prentice, 2011). The lateral epicondyle may experience tenderness and pain due to microscopic tears in the tendon that might cause it to weaken. Extensor muscle weakness, rheumatism, immobility, arthritis, gout, direct trauma, or a subsequent problem in the shoulder, wrist, or back can all contribute to LE. Supinators and extensors of the forearms both insert into lateral epicondyle, therefore inflammation of tendons limits ROM (i.e. the range of movement).

Table 1 :Ice therapy, body mechanics, taping, as well as the lower body, core, and matters pertaining to the heart and blood arteries.workouts to keep in shape.

| Exercise/Treatment | Sets | Reps | Targets | Frequency |
|---|------------------------|---|---|-----------------------------|
| Squat (neutral pain-free arms) | 3 sets | 8-12 reps | Glutes, quads, hamstrings and calves | Alternate days |
| Alternating Side Lunges (neutral pain-free arms) | -3 sets | 10 reps | Adductors, glutes, quads, hamstrings and calves | Alternate days |
| Stationary cycling, running or cross-trainer lower body workout | 18 minutes | Once | Lower body/ Cardiovascular workout | Alternate days |
| Supine both legs together raise | 3 sets | 8-10 reps | Core muscle activation, hamstrings, glutes and quads | Alternate days |
| Russian twists (neutral pain-free arms) | 3 sets | 8-10 reps | Abdominal/ Core | Alternate days |
| Crunches | 3 sets | 8-10 reps | Abdominal/ Core | Alternate days |
| High Knees (neutral pain-free arms) | 3 sets | 16 reps | Quads, glutes, hamstrings and calves | Alternate days |
| The application of kinesiology tape to treat tennis elbow | 3 sets | 8-10 reps | Reduces oedema and offers elbow moderate support | Reapply as necessary |
| Apply Ice to area over thin cloth | -9-12 Mins | 4 to 6 times | Inflammation | Daily for first 2 to 3 days |
| Straight jump landing with legs bent (neutral pain-free arms) | 2 sets | 8-10 reps | Adductors, glutes, quads, hamstrings and calves | Alternate days |
| Calf raises (arms by sides) | 4sets | 8-10 reps | Ankle strength and stability plus calves | Alternate days |
| Standing leg raise (with neutral arms in front) | 2 sets | 8-10 reps on each leg to the front, side and back | Abductors, adductors, glutes, quads, hamstrings and hip flexors | Alternate days |
| Wall sit hold for 20 seconds (arms by sides) | 2 sets with a min rest | 1 rep | Glutes, quads, hamstrings and calves | Alternate days |

Goal / Aim: The aim is to lessen inflammation, which includes swelling and pain. Perform a baseline evaluation that includes the Mill's and Cozen's tests for LE, Apley's scratch testing for the mobility of the shoulders, dynamometer measurements of the strength of the grip, goniometer measurements of pain-free ROM for elbow, shoulder and wrist, and star evaluation of the mobility of the upper limb. Support psychological effects of the injury and keep the training with the lower-limb, core, and cardiovascular activities to provide a comprehensive approach to rehabilitation. Rehabilitation: The athlete must continue to utilize their arms for normal activities while refraining from tennis and upper-limb training. They must also adhere to the taping instructions and perform the exercises listed in Table 1. Introduce self-talk that is supportive of recovery, goal-setting and healing imagery. In a case when the athlete feels like they are in control of their recovery, they will more likely to stick with the plan. Progression Criteria: The injury must be sub-acute and any inflammation (swelling, pain, or redness) must have largely subsided. In the case when testing for increased upper limb mobility, particularly at the elbow, and grip strength, ROM must be noticeably less uncomfortable.

Table 2: *is capable of eccentric and other activities as well as movement awareness.*

| Exercise/Treatment | Sets | Reps | Load | Frequency |
|---|---------------------------------------|--------------|---------------------------|------------------|
| Twist Bar Wrist Extension | 3 sets | 8-10 | FlexBar | Alternate days |
| Maitland's mobilisation – Radioulnar anterior-posterior glide | 18-20 secs | Once | Grade 1 or 2 | Twice a week |
| Mulligan's mobilisation for tennis elbow – Anterior-posterior glide | 3 sets | 6 to 10 reps | | Twice a week |
| Mulligan's mobilisation – Radioulnar supination with anterior-posterior glide | 3 sets | 6 to 10 reps | | Twice a week |
| Gently throwing and catching a foam ball | 3 | 10 | Foam ball | Alternate days |
| Rolling a ball against the wall (left then right hand in both directions) | 3 x (left c/w & a/w, right c/w & a/w) | 10/15 secs | Foam ball | Alternate days |
| Wrist Extension dumbbell curl controlled with elbow at 60 degrees use other hand to aid hand to return to top position | 3 | 10 | 1kg dumbbell | Alternate days |
| Maitland's mobilisation for tennis elbow – extension & adduction | 18 secs | Once | Grade 1 or 2 | Twice a week |
| Supination with a TheraBand – step away with band around hand and supinate wrist resist pronation | 3 | 8-10 | Low resistance TheraBand | Alternate days |
| Racquet rotation – rotate a racquet with control from thumb up to palm down use other hand to return to starting position | 3 | 8-10 | Lightweight small racquet | Alternate days |
| Extension and Supination – within pain free limit | 3 | 8-10 | No load | Alternate days |

Goal / Aim: The goal is to start increasing tensile strength and mobilization while beginning to restore any lost ROM, proprioception, and healthy tissue formation.

Rehabilitation: Tennis must not be played throughout the athlete's training period, and Table 1's lower-limb, cardiovascular, and core exercises must be continued in addition to Table 2's. Criteria for progression: The athlete's grip strength and ROM have improved since the previous evaluation, and they might undertake upper-limb workouts without experiencing any pain.

Table 3 : *consciousness of the body's position and motion*

| Exercise | Sets | Reps | Load | Frequency |
|--|---------------------------------------|------------------|--|------------------|
| Racquet rotation – rotate racquet with control from thumb up to palm down use other hand to return to start | 3-4 | 13-16 | Player's tennis racquet | Alternate days |
| Maitland's mobilisation for tennis elbow - Radioulnar anterior-posterior glide | 18-20 secs | Once | | Twice a week |
| Mulligan's mobilisation for tennis elbow - Anterior-posterior glide | 2-3 sets | 6 to 10 reps | | Twice a week |
| Mulligan's mobilisation - Radioulnar supination with anterior-posterior glide | 3-4 sets | 6 to 10 reps | | Twice a week |
| Throwing and catching a tennis ball both hands | 3 | 10 | Tennis ball | Alternate days |
| Throwing and catching foam ball single handed | 3 | 10 | Foam ball | Alternate days |
| Rolling a ball against the wall (left then right hand in both directions) | 3 x (left c/w & a/w, right c/w & a/w) | 20 to 30 seconds | Tennis ball | Alternate days |
| Wrist Extension dumbbell curl controlled with elbow at 60 degrees use other hand to aid hand to return to top position | 2 sets with 30 secs rest between sets | 15 | 2kg dumbbell | Alternate days |
| Twist Bar Wrist Extension | x2 with 18-20 secs rest | 20 | FlexBar | Alternate days |
| Supination with a TheraBand – step away with band around hand and supinate wrist resist pronation | 3 | 15 | Progress to less elastic TheraBand if exercise if easy | Alternate days |
| Maitland's mobilisation for tennis elbow - extension & adduction | 18-20 secs | Once | | Twice a week |
| Extension and Supination – within pain free limit | 3-4 sets with 20/30 sec rest | 15 | 1kg | Alternate days |

Goal / Aim: Strengthening and stretching with a load are intended to continue enhancing ROM, boost proprioception, and activate collagen type 1. Rehabilitation: The athlete must continue Table 1's cardiovascular, lower-limb, and core exercises in addition to Table 3's. Criteria for progressions: The athlete might perform the upper-limb activities without

experiencing any pain, and their grip strength and increased ROM scores have improved since the initial evaluation.

Table 4a: *Body awareness and exercise.*

| Exercise | Sets | Reps | Load | Frequency |
|---|---------------------------------------|--------------------------------|---|------------------|
| Jog/side stepping/run and change of direction | 2-3 | 25/30mins | | Alternate days |
| Russian twists | 2-3 sets | 10-12 | 2 kg dumbbell | Alternate days |
| Rolling a ball against the wall (left then right hand in both directions) | 2 x (left c/w & a/w, right c/w & a/w) | 25 to 35 seconds | Tennis ball | Alternate days |
| Wrist Extension dumbbell curl into full bicep curl | X2 with 30 secs rest | 14-16 | 2.5kg dumbbell | Alternate days |
| Twist Bar Wrist Extension | X2 with 20 secs rest | 20-22 | FlexBar | Alternate days |
| Supination with a TheraBand – step away with band around hand and supinate wrist resist pronation | 2-3 | 13-15 | Progress to less elastic TheraBand | Alternate days |
| Diagonal pattern extension/flexion with grip tubing handle on resistance band or cable pulley machine | 2 sets of extension 2 sets of flexion | 10 | Moderate resistance | Alternate days |
| Elbow extension - arm bent behind head and straighten arm overhead while stabilising elbow with opposite hand | 2 | 10 | 1.5 kg dumbbell (caution: don't drop on head) | Alternate days |
| Seated press-up - push hands down to raise body with shoulders blades down | 2 | 10 | Bodyweight | Alternate days |
| Push up (if too hard start against wall and progress to full body weight) | 2 | 10 | Bodyweight | Alternate days |
| Plank | x2 with a min rest | Hold for as long as reasonable | Bodyweight | Alternate days |
| Racquet rotation – rotate a racquet with control from thumb up to palm down use other hand to return to start | 3 | 15 | Tennis racquet | Alternate days |
| Gently throwing and catching a tennis ball single handed | 3 sets | 10 reps | Tennis ball | Alternate days |
| Throwing and catching a tennis ball off a trampoline | 2-3 | 15-17 | Tennis ball | Alternate days |
| Supervised practice as shown in table below | | | | |

Table 4b: *A time when low-being compressed tennis balls were used in sports programs.*

| Monday | Wednesday | Friday | Sunday |
|-------------------------|-------------------------|-------------------------|-------------------------|
| Forehand x10 | Forehand x13 | Forehand x16 | Forehand x18 |
| Backhand x10 | Backhand x13 | Backhand x16 | Backhand x18 |
| Serves x4-5 | Serves x8-10 | Serves x12-15 | Serves x16-20 |
| 10/12min rest Repeat x3 | 10/12min rest Repeat x3 | 10/12min rest Repeat x3 | 10/12min rest Repeat x3 |

Table 5a: *Exercises include Thrower's Ten, awareness, and others.*

| Exercise | Sets | Reps | Load | Frequency |
|--|---------------------------------------|--------------------------------|---|------------------|
| Russian twists | 2-3 | 15-20 | 2.5kg dumbbell | Alternate days |
| Plank with hands on an uneven surface (wobble board) | 2 sets with 30secs/1 min rest | Hold for as long as reasonable | Bodyweight | Alternate days |
| Wrist Extension dumbbell curl into full bicep curl | x3 with 30 secs rest | 15 | 2kg dumbbell | Alternate days |
| Twist Bar Wrist Extension | x3 with 20 secs rest | 25 | FlexBar | Alternate days |
| Supination with a TheraBand – step away with band around hand and supinate wrist resist pronation | 3 | 15 | Progress to less elastic TheraBand | Alternate days |
| Diagonal pattern extension/flexion with grip tubing handle on resistance band or cable pulley machine | 2 sets of extension 2 sets of flexion | 10 | Moderate resistance | Alternate days |
| Elbow extension - arm bent behind head holding end of dumbbell and straighten arm overhead. Stabilise elbow with opposite hand | 2 | 10 | 1.5 kg dumbbell (caution: don't drop on head) | Alternate days |
| Seated press-up - push hands down to raise body with shoulders blades down | 2 | 15 | Bodyweight | Alternate days |
| Push up (if too hard start against wall and progress to full body weight) | 2 | 15 | Bodyweight | Alternate days |
| Rolling a ball against the wall (left then right hand in both directions) | 2 x (left c/w & a/w, right c/w & a/w) | 20 to 30 seconds | Tennis ball | Alternate days |
| Run and catch a tennis ball (multi-directional) | 2-3 sets | 12-14 reps | Tennis ball | Alternate days |
| Jog/side stepping/run and change of direction | 1 | 20/30mins | | Alternate days |
| Supervised hitting practice as shown in table below | | | | |

Goal / Aim: The objective is to reestablish complete grip strength, boost proprioception, increase ROM back to normal, and introduce tennis strokes to simulate play. Progression Criteria: The athlete should have the ability of doing exercises without experiencing any pain, have an almost full ROM, and have the strength of the grip of the injured arm measured with the use of a dynamometer within 10% of the non-injured arm.

Table 5b: *preparing for RTP*

| Tuesday | Thursday | Saturday |
|--|--|--|
| Backhand rally involving running and change of direction x20 | Forehand rally involving running and change of direction x25 | Backhand rally involving running and change of direction x30 |
| Forehand rally involving running and change of direction x20 | Backhand rally involving running and change of direction x25 | Forehand rally involving running and change of direction x30 |
| Serves x20 | Serves x25 | Serves x30 |
| 2 reps with 5 min rest | 2 reps with 5 min rest | 2 reps with 5 min rest |
| Tennis game (10-15 mins) | Tennis game (15-20 mins) | Tennis game (25-30 mins) |

Goal / Aim: In order to make the preparations for returning to sports, regaining the full grip strength, improve proprioception, and advance toward full racquet strength and fitness, short tennis games will be introduced again. Criteria for progression: Grip strength, full fitness, and ROM have been recovered, as well as capability of finishing a 30-min. tennis match and exercises with no experiencing any pains. Tests that have been conducted by Cozen and Mill revealed no symptoms. Phase Six Return to Sport Goal: getting back to sports, keeping up with proprioception exercises, and avoiding another sports injury. Rehabilitation: Proprioception exercises should still be done during recovery to lower the chance of reinjury. A staggered RTP could result in initially less stressful games. Discussion: The three stages of injury are sub-acute, acute, and chronic. Bleeding, inflammation, proliferative response, and remodelling are the four phases of soft tissue repair (Watson, 2016). The stage of soft tissue repair known as inflammation or bleeding is present in an acute injury. Chronic in the remodeling phase and sub-acute proliferation. The injury's initial stage is acute, with bleeding that can persist up to six hours. The inflammation stage, which lasts from three hours to three days and is still regarded to be an acute injury, comes next. Swelling, pain, discoloration, heat, and a reduction in function are all brought on by the increased inflammation at the injury site. A full recovery depends critically on early rehabilitation. The optimal course of rehabilitation and treatment, according to Kannus (2000), should start right away with protection, rest, ice, compression, elevation, and support (PRICES). Rehabilitators have more recently adopted the POLICE protocol, which stands for protection, ice, optimal loading, elevation, and compression, for the purpose of stimulating the healing process of the tendon while it is pain-free (Bleakly, 2011). POLICE promote the process of the healing by reducing the inflammations in order to prevent any excessive scarring, also by assisting in minimizing swelling, pain, hemorrhaging, and chemical release. Borra (2015) discovered that while using ice was useful, full immobilization was not. Through muscle contraction, a little exercise can reduce swelling and improve ROM, avoiding problems from developing further (Glasgow, 2015). Kinesiology tape provides a moderate degree of the support to the damaged tissues at the same time as limiting excessive movement in tendons and muscles of the forearm, lowering oedema and pains. LE produces tenderness and

pain in the lateral epicondyle. The athlete will be able to maintain their lower body strength and overall fitness levels during the rehabilitation process by engaging in cardio exercises like running and cycling combined with a core and lower-body workout, which is crucial when returning to sport at an elite level. Continuing to exercise, albeit in a new way, can assist the players stay optimistic emotionally in addition to the physical benefits.

According to Roh, Cramer, and Perna (as described in Gould and Weinberg, p. 465), high levels of stress and despair brought on by an injury might thwart the normal healing process. Offering a holistic method that includes healing imagery, goal-setting, and encouraging self-talk might thus be helpful. Injury will become sub-acute and have entered the stage of the proliferation of the repair of the injury in the case where the type 3 collagen granulation tissue is created via the fibroblasts in uneven patterns. The player could begin the second phase of this plan following inflammation and pain have subsided. Although the muscles are knitted together unevenly and are hence stronger for repair, this stiffness could result in muscular scarring and tightness. According to Jessee and Konin (2012), joint mobilization is recommended in chronic and sub-acute stages for the reduction of the tension of the muscles through the separation of the adhesions to remodel the damaged tissues, improve ROM in articular cartilage through the increase of the lubrication in the capsule of the joint, and alleviate pain through the stimulation of pain-gate nerve fibers. Proprioception, or the knowledge or perception of one's position and bodily motions, is crucial. According to Celik (2016), professional athletes are particularly prone to proprioception deficiencies. Exercises that increase proprioception, such as rolling a ball against a wall, throwing and catching, and completing a plank with your hands on a balance board, reduce the chance of injury while also improving movement pattern and function. Other exercises, like assisting the hand to return to starting position during exercises of the wrist extension dumbbell curl and racquet rotation, as well as resisting the pronation during the exercise of the resistance band supination, isolate eccentric exercise portion. Those exercises result in strengthening and stretching extensor muscles in forearm causing the LE. According to Peterson's (2014) research, eccentric exercises are superior to concentric exercises for LE pain relief and muscle building. Whereas "Tyler Twist," which involves holding TheraBand FlexBar in the two hands and the rotation of every one of the hands in turn, has been considered as effective technique of rehabilitation that has been supported by research. According to Page (2010), when put to comparison with physiotherapy, only patients who used the FlexBar for an average of ten sessions or seven weeks showed an enhancement in grip strength and indicated a pain reduction of 81 %. Just these patients showed a 15 % enhancement in grip strength. In the case when type 3 collagen is smoothed to linear collagen of type 1 and the fascia, muscles, and ligaments, are realigned, chronic injuries are in final stages of the repair of the tissues.

By delivering sport-specific stresses to the healing tissues, the return to striking introduced in Phase 4 and steadily increased amount will progressively strengthen the injury. Phase 5 must only begin after Phase 4 is pain-free before introducing brief rallies and games. Interval sports programs (ISP) (Reinold, 2002) are utilized to describe functional rehabilitation exercises which mimic those seen in sports and are gradually increased to help a player return to competition in a timely and safe way. Exercises should be performed before ISP after a warm-up jog or cycle for maximum benefit. Diagonal pattern extension/flexion, push-up, press-up, wrist extension, supination exercises and elbow extensions have all been modified to include the Thrower's Ten exercises. ISP is recommended by Ellenbecker (2013) for optimal recovery as

well as a reduced chance of re-injury on the alternate days, which allows enough time for the recovery and rest. To lessen impact and raise injury tolerance, this must ideally be gradually increased in time and repetitions with the use of low-compression tennis balls. It is advised to use supervision to prevent overplaying. According to Ibrahim (2018), the player must halt competing and training, rest, and ice injury prior to beginning a program of rehabilitation, and gradually get back to playing in the modest increments as long as the symptoms permit. In the case when all symptoms have vanished, he advises athletes to return their sport. The decision to return to play (RTP) comprises a three-step procedure (Shrier, Creighton, Shultz, Meeuwisse, & Matheson, 2010) and is frequently made outside of the therapist's control. Step 1 involves assessing the injury's health, taking into account their medical history, demography, physical condition, and mental state. In step 2, the risk of involvement is assessed, taking into account the limb dominance, sport, and level of competition. These actions taken collectively allow us to assess the risk connected to participation using a risk-versus-benefit analysis. On the other hand, issues arise since there are no set standards and decisions are frequently made in groups by medical experts, players, coaches, and administrators who disagree or are persuaded by those without medical knowledge, like sponsors and the media. Step 3 is the adjustment of decision, which takes into account the player's desire to perform, outside pressures, financial repercussions, worry about legal action, injury masking, and competition dates. The final conclusion is the consequence of these actions.

Conclusion

In order to provide the athlete with the optimum recovery, rehabilitation of the injury for the LE must not consist of one group of the exercises but rather culmination of several evidence-based techniques which were refined with time. Effective LE injury rehabilitation must begin as soon as possible after the injury, with the player stopping competition and adhering to the POLICE protocol before beginning to exercise and manipulate the elbow as the inflammation goes down. The goal of the rehabilitation program must be to restore full fitness through a holistic workout that trains the entire body. With the establishment of goals and requirements for moving to following stage, as well as support provided for psychological effects of the injury, the athlete is encouraged to buy into the program. Proprioception exercises, mobilization, kinesiology taping, eccentric exercises, and ISP are all techniques that must potentially help with this recovery process. Only in the case when the athlete is totally symptom-free should RTP occur. Unfortunately, the therapist could be forced to handle an RTP choice that is based on business or competitive factors instead of scientific data. But through the help of the eccentric exercises, a better comprehension of the proprioception, mobilization, and acknowledged evidence-based movements like the FlexBar and the Thrower's 10 along with functional rehabilitations ISP, it is hoped that the athlete will go back to playing with a higher degree of the body awareness, pain-free elbow, stronger, and lower risk of re-injury.

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