ORIGINAL ARTICLE

Autologous blood injection in the treatment of lateral epicondylitis

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Abstract

Objective: To determine mean decrease in visual analogue pain score after autologous blood injection in patients with lateral epicondylitis.

Methods: The quasi-experimental study was conducted at Ghurki Trust Hospital, Lahore, from December 10, 2012, to June 8, 2013, and comprised patients having lateral epicondylitis of elbow. Pre-procedure baseline visual analogue score was measured. Under aseptic conditions, 2ml of autologous blood was drawn from the contra-lateral antecubital fossa of the patient and slowly injected into the site of maximum tenderness. Patients were advised to continue their normal daily activities and were followed up at third and sixth week for assessment of pain intensity. Mean decrease was calculated by subtracting the post-procedure visual analogue score from the baseline value.SPSS 11 was used for data analysis.

Results: Of the 150 patients in the study, there were 127(84.7%) males and 23(15.3%) females. Male-to-female ratio was 5.5:1 Overall mean age of was 33.91±10.23 years. The mean pre-injection pain score was 8.97±1.02 and post-injection was 3.59±1.58. Mean decrease in VAS pain score was 5.37±1.80.

Conclusion: Autolgous blood injection was found to be an effective way to treat patients of epicondylitis elbow.

Keywords: Autologous blood injection, Treatment, Lateral epicondylitis. (JPMA 64: S-38 (Suppl. 2); 2014)

Introduction

Lateral epicondylitis is a common disorder characterised by pain and tenderness over the lateral epicondyle. It occurs most frequently as a result of minor, unrecognised trauma during sports activities and occupation-related physical activities.[1] Pain around the lateral epicondyle is known by a variety of names, and was described as periostitis, extensor carpi radialis brevis (ECRB)-tendinosis and epicondylalgia. The most commonly used names are "tennis elbow" and "lateral epicondylitis". It has been postulated that tendinosis or tendinopathy is acquired by overuse of a hypovascular zone, which leads to subsequent neovascularisation. Chronic lateral elbow epicondylitis is a tendinosis with angiofibrolastic degeneration of the wrist extensors' origin.[2]

A patient affected by tennis elbow will complain of pain around the lateral aspect of elbow, radiating toward the extensor region. Diminished extension forces of the forearm as well as grasp function are often noted, and clinical testing reveals painful resistance against dorsiflexion of the wrist. These complaints could be present during normal daily activities or primarily during sporting activities. This degenerative condition can manifest as an acute process lasting <3 months or a chronic process often refractory to treatment.[3]

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Traditional management of lateral humeral epicondylitis (tennis elbow) relies upon anti-inflammatory medication, rehabilitation, steroid injection, counterforce splinting, and, finally, surgery to the common extensor origin.[4] Non-operative treatment is successful in most patients. Such conservative treatment options include analgesics, tennis elbow support, ultrasonic therapy, and splint immobilisation. Local corticosteroid injections, local autologous blood infiltration, laser therapy, and nitrogen cryotherapy have been used as semi-conservative methods. All of these aim at reducing the pain and improving the functional status of the affected limb. Surgery is offered to resistant cases, and outcomes are not always successful.[5] An injection of autologous blood provides cellular and humoral mediators (transforming growth factor-β and basic fibroblast growth factor) to induce a healing cascade.[6,7]

The most common overuse syndrome is related to excessive wrist extension and commonly referred to as tennis elbow, but it is actually more common in non-tennis players. It is also commonly referred to as lateral epicondylitis, but this is usually a misnomer because, in general, microscopic evaluation of the tendons does not show signs of inflammation, but rather angiofibroblastic degeneration and collagen disarray. Light microscopy reveals both an excess of fibroblasts and blood vessels that are consistent with neovessels or angiogenesis.[8]

The tendons are relatively hypovascular proximal to the tendon insertion. This hypovascularity may predispose

the tendon to hypoxic tendon degeneration and has been implicated in the aetiology of tendinopathies.[9] Most typically, the primary pathology is tendinosis of ECRB tendon 1-2cm distal to its attachment on the lateral epicondyle.

The area of maximal tenderness is usually an area just distal to the origin of the extensor muscles of the forearm at the lateral epicondyle. Most typically the ECRB is involved, but others may include the extensor carpi radialis longus (ECRL), extensor digitorum, and extensor carpi ulnaris.

The radial nerve splits into the superficial radial and posterior interosseus nerve (PIN) at the radiocapitellar joint. The PIN may become entrapped by pericapsular structures, causing radial tunnel syndrome.

Tennis is the most common sport to cause lateral epicondylitis, but the condition can also be seen in those who play squash and badminton. Symptoms can occur after an improper backhand hitting technique, which can occur when the athlete attempts to increase power by increasing forearm force rather than relying on core, rotator cuff, and scapular power. This results in snapping the wrist with supination and irritation of the extensor tendons. Symptoms can also occur when an athlete does not get his or her feet into position and hits the ball late or with a bent elbow. The power of the hit is again generated from the forearm instead of the core.[10,11]

Physical therapy can include such modalities as friction massage,[12] manipulation,[13] and stretching and strengthening the extensor wad when the pain subsides. The therapy programme we consist of oral non-steroidal anti-inflammatory drugs (NSAIDs), rest, activity modification, strengthening exercises and counterforce bracing.[14]

Other therapy modalities may include cryotherapy, phonophoresis, electrical stimulation, ultrasound[15] and iontophoresis.[15] Medications include a variety of oral or topical NSAIDs.[16] Injections of bupivacaine hydrochloride or lidocaine and a steroid are often helpful. However, conflicting data has been published regarding the efficacy of injections. One study[17] demonstrated that injecting lidocaine and triamcinolone in a peppering technique was reliable in treating this disease. Others reported that the beneficial effects of the injections are only transient.[18] A study[19] questioned the results of corticosteroid injections in relieving the early (less than 4 weeks) symptoms of lateral epicondylitis and found that it did not help significantly. Another[20] noted that when compared with extracorporeal shockwave therapy (ESWT), the steroid injections worked better and were less expensive at 3 months. Others[21] found steroid injections to be more beneficial than manipulation using the Cyriax method at six weeks. Other types of injections include botulinum toxin which was tried by a study[22] that compared the results of open surgical treatment and injection with botulinum toxin. One year after treatment, 65% patients injected with botulinum and 75% patients who had surgery had good-to-excellent results. At 2 years after treatment, the success rate for the injection cohort increased to 75%. It is important to be judicious with injections to avoid skin discolouration and fat atrophy at the site of the injection.

Braces can include counterforce or wrist extension braces. The counterforce brace, introduced in the early 1970s, is thought to reduce the load at the lateral epicondyle by preventing the forearm muscles from fully expanding. Although there are several types of braces on the market, but a study[23] showed that any brace that placed a compressive pad just distal to the lateral epicondyle resulted in a higher reduction of load at the lateral epicondyle than braces using the principle of a clasp, and that braces placed just distal to the lateral epicondyle reduced loads greater than pads placed over the lateral epicondyle. The wrist extension brace places the arm in a position of rest for the extensors. ESWT, the vibration of shock waves through tissue, is thought to activate the cycle of inflammation in the hope that it will complete its course to resolution of symptoms. There has been contradicting evidence as to the efficacy of ESWT.

Operative treatment is rarely necessary, and is only indicated after failure of extensive conservative care.

The arteries supplying the joint are derived from an extensive circulatory anastomosis between the brachial artery and its terminal branches. The superior and inferior ulnar collateral branches of the brachial artery and the radial and middle collateral branches of the profunda brachii artery descend from above to reconnect on the joint capsule, where they also connect with the anterior and posterior ulnar recurrent branches of the ulnar artery; the radial recurrent branch of the radial artery; and the interosseous recurrent branch of the common interosseous artery.

Autologous blood injection (ABI) involves injecting a patient's blood into a damaged tendon or musculotendonis junction. Most commonly, this is done into a tendon for the treatment of tendinosis (the medical term for "tendinitis"), though other applications also include injecting ligaments, muscles and joints. ABI for recalcitrant or refractory tennis elbow is based on the

histopathological observation that tennis elbow is not an inflammatory condition, but a fibroblastic and vascular response called angiofibroblastic degeneration more commonly known as tendinosis. This is characterised by invasion of blood vessels, fibroblasts and lymphatics into the symptomatic area of the ECRB.[24] The injection of autologous blood is thought to provide the necessary cellular and humoral mediators to induce a healing cascade.[25]

The injection of a patient's own (autologous) blood into a region that is affected by a soft tissue injury may promote the body's natural healing process.[1] It is stated that blood contains humeral and cellular mediators that initiate an inflammatory process in the injured tissue and result in repair.[26]

ABIs are inexpensive and simple to acquire and prepare; application confers minimal trauma, and there is little risk for immune-mediated rejection.[27]

ABI can be used when other treatments have failed to resolve tendinopathy. Blood taken from the patient by standard venesection is injected into the area around the damaged tendon. The aim is to promote healing by triggering stem cell recruitment, angiogenesis and fibroblast stimulation. A local anaesthetic is usually used and ultrasound may provide guidance. Before injection, 'dry needling' (repeatedly passing a needle through the tendon to disrupt the fibres and cause bleeding) may be performed. After the procedure, patients are instructed to avoid strenuous or excessive use of the tendon for a few weeks (physiotherapy may be provided). The procedure may be repeated.

The procedure of ABI takes approximately 20 minutes and involves the use of ultrasound or computed tomography (CT) to guide the needles into the correct location safely. First the skin is cleansed and prepared. Local anaesthetic is then injected into the skin overlying the tendon. Blood withdrawn from one of the arm veins is then injected directly into the tendon. The amount of blood injected depends on the size of the tendon. The procedure is at this point over and the needle injection site is then dressed with a small bandage.

'Tendinopathy' describes a range of conditions that affect tendons, causing pain, weakness and stiffness. The symptoms are usually associated with overuse. Tendons commonly involved are the lateral epicondyle (elbow), Achilles (heel) and patellar (knee). Tendinopathy also has other names — for example, tendonosis and tendonitis - and it encapsulates a range of pathologies, including inflammatory, non-inflammatory and degenerative changes. Conservative treatments include rest, use of orthotic devices, physiotherapy, analgesic therapy and local injection of steroids. It may take several months for symptoms to resolve. ESWT, or sometimes surgery to release the tendon from the underlying bone or constricting surrounding tissues, can also be used.[28]

Following the procedure clear instructions need to be given to patients when to recommence rehabilitation and post-procedure care. A follow-up appointment with referring doctor should be set for approximately 4 weeks following the injection. If the symptoms have not completely cleared a further injection 5 to 6 weeks after the initial injection may be indicated. If the pain remains unchanged following a second injection, then no further ABI shall be offered except a second one in certain cases. A third injection is rarely offered.

As with all medical procedures, there are risks. There is a small risk of infection of the deep soft tissues or the skin. Signs of redness of the skin and/or swelling at the injections site must be looked for. No recorded tendon ruptures have been documented in literature. Patients consistently report a flare up of their pain in the first week following the procedure, but in most cases this is controlled with either paracetamol and/or an anti-inflammatory medication. Codeine is rarely required.[29]

The current study was planned to determine mean decrease in pain using visual Analogue Score (VAS) after ABI in patients with lateral epicondylitis.

Patients and Methods

The quasi-experimental study was conducted at Ghurki Trust Hospital, Lahore, from December 10, 2012, to June 8, 2013, and comprised patients having lateral epicondylitis of elbow.

A sample size of 50 cases was calculated with 95% confidence interval (CI), d=0.35 and assumed mean ± standard deviation of decrease in pain score i.e. 5.1±2.05 at 6-week follow-up. Using non-probability, consecutive sampling, patients having lateral epicondylitis of elbow not improving with other conservative measured for last 6 months, aged 18-70 years, and with duration of symptoms >6 months were included. Those with coexisting arthritis or arthralgia assessed clinically and on the basis of investigations; coexisting medial epicondylitis of elbow assessed clinically; patients having ulnar nerve neuropathy assessed clinically; patients having later all collateral ligament instability assessed clinically and patients who had a steroid injection or other intervention in preceding three months on available medical records were excluded. Patients fulfilling the inclusion criteria

were selected from the outdoor patient department (OPD). A detailed history was taken, including demographic data (age, gender, address and hand dominance), examination was done along with investigations to rule out other causes of pain, as mentioned in the exclusion criteria. Informed consent was taken from the patients. Pre-procedure baseline VAS pain score was calculated. Under aseptic conditions, 2 ml of autologous blood was drawn from the contra lateral antecubital fossa of the patient and slowly injected into the site of maximum tenderness. Patients were advised to continue their normal daily activities and were followed up in OPD at third and sixth week post-procedure for the assessment of pain intensity through VAS.

Data collected was analysed using SPSS 11. Variables were analysed using simple descriptive statistics; calculating mean and standard deviation (SD) for numerical values like age, baseline VAS pain score and post-procedure VAS. Frequencies and percentages were calculated for qualitative variables like gender. Mean decrease in VAS was calculated by subtracting pain score post-treatment from baseline VAS.

Results

Of the 150 patients in the study, there were 127(84.7%) males and 23(15.3%) females. Male-to-female ratio was 5.5:1 (Table-1). There were 72(48%) patients in 18-35 years age group; 51(34%) in 36-50 years, and 27(18%) in 51-66 years groy. Overall mean age was 33.91±10.23 years (Table-2).

Table-1: Descriptive Statistics.

	N	Minimum	Maximum	Mean	SD
Differen	150	0	7	5.37	1.80
Valid N (listwise)	150				

Table-2: Frequency and percentage of gender (n=150).

Gender	Frequency	Percentage
Male	127	84.7
Female	23	15.3
Male to female ratio	5.5:1	

Table-3: Frequency and percentage of pre-injection VAS (n=150).

Pre-injection VAS	Frequency	Percentage
7 - 8	60	40.0
9 - 10	90	60.0
Mean±SD	8.97±1.02	

VAS: Visual Analogue Score.
SD: Standard deviation.

Table-4: Frequency and percentage of post-injection VAS (n = 150).

Post-injection VAS	Frequency	Percentage
2 - 4	111	74.0
5 - 7	41	36.0
Mean±SD	3.59±1.58	
Mean decrease in VAS	8.97-3.59 = 5.37±1.80	

VAS: Visual Analogue Score.
SD: Standard deviation.

The pre-injection VAS reading was 7-8 in 60(40%) patients and 90 (60%) had 9-10. Mean VAS was 8.97±1.02 (Table-3).

Post-injection VAS was 2-4 in 111(74%) patients, and 41(36%) had VAS 5-7. Mean post-injection VAS was 3.59±1.58. Mean decrease in VAS was 5.37±1.80. (Table-4).

Discussion

Chronic pain compromises quality of life and impairs work performance. While a cure may not be feasible, treatment efforts should aim at pain relief and improvement in the quality of life. The results of our study suggest that there is an important relationship between occupation and epicondylitis. After adjustment for age, gender and psychological distress, lateral epicondylitis was highly significantly associated with repetitive bending/straightening of the elbow for greater than one hour/day. The study also shows positive medium and long-term results from a single ABI. The injection under ultrasound visualisation accompanying treatments, splinting, and occupational therapy were free of adverse events such as severe bruising or infection.[30]

Lateral epicondylitis occurs much more frequently than medial-sided elbow pain, with ratios reportedly ranging from 4:1 to 7:1.[15,31] In the general population, the incidence is equal among men and women, and in tennis players, male players are more often affected than female players. The disorder occurs more often in the dominant extremity. The average age of the patient who has lateral epicondylitis is 42, with a bimodal distribution among the general population.[32] The mean age of the patients included in our study was 33.91 years (18-66), with a peak incidence in the first decade and gender being proportion being 84.7% men and 15.3% women with ratio 5.5:1. A study[33] included a population with age ranging between 14 and 78 years with a mean age of 45 years. Other studies have reported mean ages of approximately 42 years.[34,35] The results of the present study are consistent with international literature.

ABI, also known as autologous conditioned plasma (ACP) injection, is a recent medical procedure whereby a patient's blood is injected into an area of the body for the purposes of healing. It is most commonly used to treat degeneration of tendons, which may occur in association with small tears. This disorder of tendons is frequently referred to as "tendinitis" by the public, but is known as tendinosis or tendinopathy in the medical profession. The procedure is usually performed under ultrasound control by a radiologist.[36]

From recent studies it would appear that ABIs have a more permanent effect on long-term benefit than that achieved with injection of corticosteroid (cortisone injections). This is probably related to the healing benefits of ABI causing the tendon to return to its pre-injury state rather than simply relying on the anti-inflammatory action of corticosteroid injections.[37,38]

The demonstration of an association between physical workplace factors and epicondylitis is not new having been shown in several manually intensive occupations, such as butchers and meat cutters,[39,40] construction workers[41] and automobile assembly workers.[42] However, workplace-based studies can be subject to bias, not least the healthy worker effect. Our results have been good and those patients who have not responded to conservative therapy have returned to their occupation and hobbies. This study thus offers encouraging results of an alternative treatment that addresses the pathophysiology of lateral epicondylitis that has failed traditional non-surgical modalities. However, we feel that with a larger case series, a longer follow-up and refinement of the procedure a fair conclusion can be drawn with regard to the efficacy and otherwise of this treatment modality.

Conclusion

Autolgous blood injection is an effective way to treat patients of lateral epicondylitis as demonstrated by decrease in mean VAS readings. We recommend it as the first-line treatment of patients of lateral epicondylitis.

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