

Comparative Study of the Results of Local Injection of Autologous Whole Blood and Corticosteroid in Tennis Elbow

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ABSTRACT

Background: Tennis elbow (lateral epicondylitis) is a common disease. Although there were many treatment modalities, no one was proved to be the first choice. **Patients and Methods:** A total of 40 patients of recently untreated tennis elbow were included in the study. Two groups were constituted; Group A receiving injection of autologous blood and Group B receiving steroid injection. Both groups were evaluated at 2, 4, 8, 12, and 26 weeks for pain relief (using a visual analog scale [VAS]), stage of disease (using Nirschl staging), function, activity, and use of the affected elbow (using the hospital of special surgery [HSS] scoring system). **Results:** In both groups, the VAS score for elbow pain, Nirschl score, and the HSS scoring system improved significantly after treatment ($P < 0.001$), but the pattern of improvement differed. Compared with Group A, Group B improved all three scores at a faster rate over the first 2 weeks after corticosteroid injection ($P < 0.001$), this improvement started to decrease slightly until the 26th week. After autologous blood injection, all scores improved steadily and the final became better ($P < 0.001$). **Conclusions:** The short-term results showed that autologous blood injection was more effective than corticosteroid injection in improving pain, function, and grip strength. It is recommended as a first-line injection in resistant cases to NSAIDs and physiotherapy. It was simple, cheap, and effective.

Key words: Autologous blood injection, steroid injection, tennis elbow

INTRODUCTION

The prevalence of tennis elbow (lateral epicondylitis) is 1%–3% in the general population, common in the fourth or fifth decade of life.^[1,2] Males and females are affected equally.^[1-3] It is considered a degenerative process rather than an inflammatory process, characterized by angiofibroblastic degeneration or hyperplasia within the common extensor tendon, especially extensor carpi radialis brevis.^[4] Although the diagnosis of lateral epicondylitis is quite straight forward, there is no proof of optimal management strategy.^[5]

There are multiple treatment methods for treating tennis elbow.^[6-10] The most common treatment is local injection of corticosteroid combined with local anesthetics. Autologous blood delivers blood-borne mediators to stimulate the regeneration process within the tendon.^[10]

This study compared the efficacy of autologous blood injection versus corticosteroid injection for the treatment of lateral epicondylitis in terms of pain relief, downstaging of the disease and improvement of function, use, and activity of the affected elbows.

PATIENTS AND METHODS

This study was approved by the local ethics committee and registered with the institutional review board only in the absence of a nationwide trial registry in Egypt at the time the study was instituted. Informed consent was obtained from each patient.

The diagnosis of lateral epicondylitis was made based on the presentation of pain in the lateral epicondyle exacerbated by physical activities, tenderness over the

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origin of extensor carpi radialis brevis 5–10 mm distal to the lateral epicondyle, and finger palpation and pain around the extensor origin during forced dorsiflexion of the wrist.

A total of 40 patients presented with lateral epicondylitis were randomly divided into two groups; Group A to receive autologous blood injection (2 ml of autologous venous blood drawn from the ipsilateral or the contralateral antecubital fossa mixed with 1 ml of 2% lidocaine hydrochloride) [Figure 1a and b] and Group B to receive corticosteroid injection (1 ml of betamethasone sodium phosphate 2.63 mg and betamethasone dipropionate 6.43 mg mixed with 1 ml of 2% lidocaine hydrochloride). Nine men and 11 women with a mean age of 36.45 ± 11.10 years received an autologous blood injection, whereas 10 men and 10 women with a mean age of 35.65 ± 9.25 years received a corticosteroid injection.

Patients were instructed to rest the arm for approximately 24 h. If necessary, patients will be allowed to use acetaminophen, but the use of nonsteroidal anti-inflammatory medication is prohibited. For the following 2 weeks after injection, the patients were given a standard stretching protocol. A formal eccentric muscle- and tendon-strengthening program will be initiated after this stretching.

Patients with a history of recent trauma, rheumatic disease, diabetes, hepatitis, nerve entrapment syndromes (cervical radiculopathy, carpal tunnel syndrome, or posterior interosseous nerve entrapment), local injection treatment in the past 6 months or an allergic reaction to local anesthetics, or corticosteroids were excluded from the study.

Patients were assessed before (initial visit) and after (2, 4, 8, 12, and 26 weeks) treatment for pain relief (using a visual analog scale [VAS]),^[11-13] stage of disease (using Nirschl staging),^[14] function, activity, and use of the affected elbow (using the hospital of special surgery [HSS] scoring system) [Table 1].^[15] All patients completed a period of at least 6 months of follow-up.

Regarding outcome, a total HSS score of 90–100 points indicates an excellent result; 80–89 points, a good result;

70–79 points, a fair result; 60–69 points, a poor result; and < 60 points, a failure. Excellent and good were considered satisfactory while fair and poor were unsatisfactory results.

Continuous and categorical variables were compared using the Student's *t*-test and Chi-square test, respectively. Within-group differences were compared using the paired sample *t*-test. $P < 0.05$ was considered statistically significant.

RESULTS

In both groups, the VAS score for elbow pain, Nirschl score, and HSS score improved significantly after treatment ($P = 0.0001$), but the pattern of improvement differed [Table 2]. Compared with autologous blood injection, corticosteroid injection improved all three scores

Table 1: The hospital for special surgery scoring system^[15]

Variable	Number of points
Pain	
Non or ignored	50
Slight: Occasional use of analgesics	45
Moderate; uses analgesics daily	35
Moderate at rest or night	15
Sever; disabled	0
Function	
No limitation	30
Slight limitation; no restrictions in living daily activities	25
Unable to lift objects > 4.5 kg	20
Moderate restrictions in living daily activities	10
Unable to comb hair or touch head	5
Unable to feed self	0
Activity	
Can perform activities for	
30 min	8
15 min	6
5 min	4
Cannot use elbow	0
Use	
Unlimited use	12
Limited use for recreation	10
Limited to household and employment activities	8
Able to care for self	6
Invalid	0

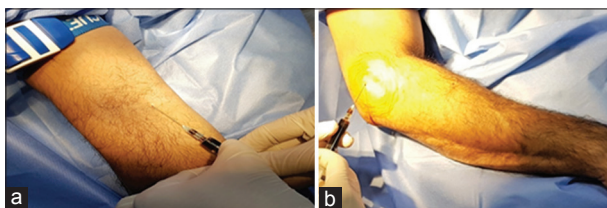


Figure 1: (a) Drawing blood from antecubital fossa. (b) Injection of lateral epicondylitis using blood-anesthetic mixture

Table 2: The score results at different follow-up periods

Variable	0 Weeks	2 Weeks	4 Weeks	8 Weeks	12 Weeks	26 Weeks	P value
Mean±SD VAS for elbow pain							
Group A (autologous blood injection)	62.15±8.29	48.50±6.57	17.60±2.58	13.0±2.75	3.75±3.35	3.75±3.35	<0.001
Group B (corticosteroid injection)	60.20±7.20	34.05±3.99	22.90±3.11	23.55±9.67	26.30±14.23	25.60±17.82	<0.001
P value	0.473	<0.001	<0.001	<0.001	<0.001	<0.001	
Mean±SD Nirschl score							
Group A (autologous blood injection)	5.36±0.62	4.33±0.59	1.69±0.22	1.0±0.0	1.0±0.0	1.0±0.0	
Group B (corticosteroid injection)	5.31±0.51	3.51±0.34	1.60±0.22	1.68±0.63	1.84±1.0	1.99±1.26	<0.001
P value	0.808	<0.001	0.272	<0.001	0.001	<0.001	
Mean±SDHSS score							
Group A (autologous blood injection)	38.39±8.29	51.92±6.09	82.75±2.45	87.40±2.76	96.45±3.55	96.45±3.55	<0.001
Group B (corticosteroid injection)	41.55±8.73	65.60±3.87	77.65±3.80	76.40±9.72	73.55±14.33	75.40±18.04	<0.001
P value	0.303	<0.001	<0.001	<0.001	<0.001	<0.001	

SD: Standard deviation, VAS: Visual analog scale

at a faster rate over the first 2 weeks ($P = 0.0001$) and then started to decline slightly until the 26th week. After autologous blood injection, all three scores improved steadily and were eventually better ($P = 0.0001$). HSS scoring was satisfactory in 20 (100%) of patients with autologous blood injection and 12 (60%) of patients with corticosteroid injection at the final follow-up.

We found insignificant relation between the final results of both groups and gender, age, occupation, hand dominance, and side affected ($P = 0.880, 1.000, 0.193, 0.404, \text{ and } 1.000$, respectively).

There was a strong relation between side affected and hand dominance for both groups. In the whole sample (40 patients), there were 36 right-handed patients and 33 of them (91.7%) were suffering from tennis elbow in the dominant side. While four patients were left handed, all of them (100%) were suffering from tennis elbow in the dominant side. This was statistically significant ($P < 0.001$).

No complications (infection, skin atrophy, neurovascular damage, or tendon rupture) were noted.

DISCUSSION

In this study, comparison between the two groups showed that pain values (VAS score), stage of the disease (Nirschl staging), and the HSS score system were significantly better in corticosteroid group at 2 weeks post-injection. There

was an increasingly statistically significant difference in all values from 4 weeks to 26 weeks of follow-up in the autologous blood group in comparison with corticosteroid group. Statistical analysis concluded that autologous blood was better than local corticosteroid injection in short-term follow-up of tennis elbow patients. This result came in direct consistency with the study of Edwards and Calandruccio^[10] who reported maximal pain relief 3 weeks after injection of autologous blood (clinically pain relief was better at 2 weeks in steroid group in our study). Kazemi *et al.*^[16] also reported in their trial, that the benefits afforded by autologous blood injection outweighed those by local corticosteroid injection.

Autologous blood injection stimulates the inflammatory cascade within the degenerated tendon by providing cellular and humoral mediators for regeneration.^[10] Ultrasonography evidence of tendon reparation such as decreased interstitial clefts and anechoic foci within the tendon and decreased pathological vascularity have been reported.^[17] The recovery rates after autologous blood injection have been reported to be 79% after a mean of 9.5 months,^[10] 94.2% after 6 months,^[17] and 58% after 8 months.^[18] Poorer outcomes may reflect the chronic refractory nature of the condition and longer duration of symptoms.

Lateral epicondylitis was initially assumed to be an inflammatory process, and thus corticosteroid injection was used.^[19] However, histological studies have demonstrated non-inflammatory angiofibroblastic tendinosis, neovascularization, and mucoid degeneration in lateral epicondylitis specimens.^[20-22] The

presence of substance P, calcitonin gene-related peptide, and neurokinin 1-receptors in tendon insertions may be related to pain.^[21,22] Reduction of these neuropeptides by corticosteroid injection can reduce the pain dramatically.^[23] However, the underlying pathology remains and the recurrence rate is high. Corticosteroid injection has superior short-term effects but no intermediate or long-term effects.^[9,24]

In a review of other studies for the treatment of lateral epicondylitis, Ozturan *et al.* stated that extracorporeal shock wave therapy was more effective than corticosteroid injection in the long term.^[25] Wolf *et al.* reported no significant difference between autologous blood injection, corticosteroid injection, and placebo. He also stated that lateral epicondylitis is a self-limiting disease and relief of symptoms is related to duration of time.^[26] Platelet-rich plasma has higher levels of growth factors for stimulation of regeneration and yields similar results to autologous blood in terms of pain reduction and functional improvement at 6 months as stated by Thanasas *et al.*^[27] and Creaney *et al.*^[28] However, the need for surgical intervention was higher after platelet-rich plasma injection than autologous blood injection (20% vs. 10%) as reported by Creaney *et al.*^[28] In addition, preparation and application of platelet-rich plasma requires specialized equipment, which is expensive and time consuming.

The limitation of this study was that the follow-up period was relatively short. Further studies are required to optimize the number and spacing of injections for obtaining desired results.

CONCLUSION

Autologous blood injection was found to be more effective than corticosteroid injection in improving pain, function, and grip strength. It is recommended as a first-line injection in resistant cases to NSAIDs and physiotherapy. It was simple, cheap, and effective.

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