

OUTCOMES OF AUTOLOGOUS BLOOD INJECTION FOR TREATMENT OF TENNIS ELBOW

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ABSTRACT

Introduction

Lateral tendinosis of the elbow, sometime called tennis elbow, refers to the degenerative process in the common source of the extensor group of forearm muscles. In orthopedic clinics, it is the most prevalent cause of elbow discomfort and pain. The condition caused by repeated muscular motions is a typical cause of elbow discomfort.

Objectives

To assess the clinical and functional outcomes of autologous blood injection for the treatment of tennis elbow.

Methodology

This is a hospital based cross-sectional study, conducted in Birat Medical College teaching hospital. Here, the patients diagnosed with a Tennis elbow in orthopedic OPD during the study duration of September 2020 to August 2021 were included in the study. Total 93 samples were studied. Two ml of the patient's blood has withdrawn from the right antecubital vein and has been injected around the affected common extensor tendon origin. Data was analyzed using SPSS version 23.

Result

Total Ninety Three (59% females, 41% male) patients were treated with the diagnosed concerned disease. The mean age of the patients was 45.39 ± 10.109 years. At the end of the trial, 90% of the patients were satisfied fully with the treatment. The overall performance of the regression model is significant in all scenarios.

Conclusion

Given the satisfactory results, the blood injection in question can be deemed a suitable medication alternative to the conventional therapy.

KEYWORDS

Tennis Elbow, Blood injection, Regression Modeling

INTRODUCTION

Lateral elbow tendinosis, more commonly referred to as tennis elbow, is a degenerative condition affecting the common origin of the forearm extensor group of muscles. It is the most often seen cause of elbow discomfort in individuals who seek treatment at orthopedic clinics. Lateral epicondylitis is not inflammatory tendinopathy but degenerative, producing prolonged recalcitrant suffering in the Elbow joints.¹ Elbow pain and discomfort is frequently caused by the disease that develops due to repeated motions of the affected muscles. Micro-tears in the tendon resulting in bleeding, the development of rough granulation tissue, and subsequent healing.

For the treatment of tennis elbow, Botulinum toxin (BoNT-A) injections were also used. It showed a good result, but the result obtained from this showed short-duration relief; henceforth, this treatment is unfavorable for long-term consequences. Lateral epicondylitis (LE) is a highly common enthesopathy in athletic medicine. The main symptoms were lasting discomfort and pain around the lateral epicondyle and failure to conduct daily work.^{2,3}

Lateral epicondylitis is a frequent disease with pain on the side of the elbow and weakness.⁴ Obesity, smoking and physical loading are often related to exercise as well as tennis. The general population aged between 45 and 54 years is frequent in 1% to 3%.⁵ The name lateral epicondylitis is misnomer since it is primarily distress rather than an inflammatory procedure, owing to degeneration of the common extending tendon. A study recognized that tendinopathy is a clinical diagnosis while tendinitis or tendinosis terms should be reserved only after the histopathological examination has been carried out.⁶ A cadaveric study by Baleset al. showed two zones of hypovascularity in the region of the lateral epicondyle, one between the lateral epicondyle and the supracondylar ridge and the other on the deep surface of common extensor tendon 2-3 cm distal to lateral epicondyle.⁷ This is probably the area where the degenerative changes set in. Tennis elbow disorder is common in occupations that involve repetitive forearm rotational activities. It is differentiated from other causes of elbow pain, typically by history and clinically by appearance of pain with resisted wrist extension, also known as Cozen test. It has been estimated that only 5-10% of cases occur in tennis players. Treatment can be conservative or surgical.⁸ Non-operative treatment is successful in the resolution of symptoms in 90% of the patients.⁹ The remaining 10% who do not respond to conservative treatment are labeled as resistant or refractory cases. Autologous blood injections are thought to work by initiating an inflammatory response and delivering nutrients and components necessary to promote the healing process.¹⁰

The Rung characterized Tennis Elbow (TE) as the first frequent my tendinosis in 1873.¹² It is a diagnosis clinically confirmed by ultrasound and MRI imagery.^{13, 14} A range of therapeutic methods includes repeated low-energy shock waves, physical therapy, and open surgical treatments.¹⁵⁻¹⁷ However, no technique of therapy has shown superior to

others. Corticosteroid injection is one of the common treatments.¹⁸ The idea of inflammatory illness is founded on the reasoning underlying its usage. Recent research has shown that TE is a proliferative process called angiofibroblastic or hyperplastic degeneration. Even those patients that were not healed through other techniques submitted their papers addressing the use of autologous blood in TE therapy.¹⁹ Blood includes humeral and cell mediators that begin an inflammatory response and remedy the damaged tissue.

While several therapeutic approaches have been explained for lateral epicondylitis, including bracing, physical therapy, corticosteroid injections, and platelet-rich plasma injections, the optimal treatment has consistently demonstrated no superiority to the natural pathway of the illness. The objective is to analyze the results of autologous blood injection at the Birat Medical College Teaching Hospital for tennis elbow treatment. Only a few research have explored self-injected blood as a lateral epicondylitis treatment technique. This study was conducted to assess the effects of autologous blood injection lateral epicondylitis treatment. Objectives of our study are to assess the clinical and functional outcomes of autologous blood injection for the treatment of tennis elbow and to analyse the clinical and functional outcomes of autologous blood injection for the treatment of tennis elbow.

METHODOLOGY

A hospital based cross-sectional study was carried out in Birat Medical College teaching hospital, a tertiary level hospital of Province 1 in Nepal. The sample was selected through the patients diagnosed with a Tennis elbow case in orthopedic OPD during the study duration September 2020 to August 2021. All the patients during this one year study period were included and total 93 patients were studied. Treatment was given and quantitative data were recorded. In the data collection method, specifically designed semi-structured questionnaires were used. The follow-up study was taken from Pre-injection score to 24-week follow-up.

Treatment: two ml of the patient's blood has withdrawn from the right antecubital vein and has been injected around the affected common extensor tendon origin. For initial relief of pain oral NSAID was prescribed for first three days.

In that process, following inclusion and exclusion criteria were considered,

- i) Inclusion Criteria- All newly diagnosed patients were presenting in orthopedic OPD and who gives consent.
- ii) Exclusion Criteria-
- iii) Patients who have received any surgical treatment earlier for same problem.
- iv) Steroid injection patients three months before injection of the blood.
- v) Patients suffering with any form of Diabetes mellitus and Rheumatoid arthritis.

There were following variables were considered:

- A) Dependent variables- Clinical – pain, Grip strength, post-injection infection.



- B) Independent variables- Age, Occupation, gender.
 C) Confounding variables- Cervical radiculopathy.

All the collected data were checked, compiled, and entered in MS Excel and analyzed by SPSS version 23. The anonymity and confidentiality of study participants were maintained. The regression modeling has been used as a statistical analysis of this study. Detail of regression modeling is given in the below sections:

Regression Modeling: Regression modeling were used for the data analysis in this study. Regression analysis collects statistical methods in statistical modeling to estimate links between a dependent variable and one or more independent variables. Linear regression is the most frequently used regression assessment in quantitative data, in which the line that best fits the data according to a particular mathematical criterion is considered.¹¹

RESULTS

Among total 93 samples were studies the females (59%) were proportionately higher than males (41%). The mean age of study participants was 45.23 years with SD 10.2 years. Graphical Presentation: In Figure 1, we observe that data for the current study were obtained from males and females. Here we also observe that females were higher than males (Figure 1). In Figure 2, we see that histogram of age is showing a skewed pattern. Most respondents were from the age group 55 to 60 years. (Figure 2).

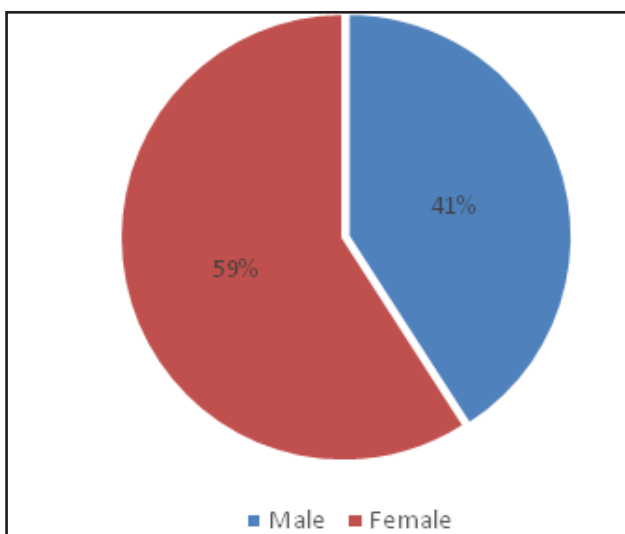


Figure 1: Pie Chart of Gender Distribution

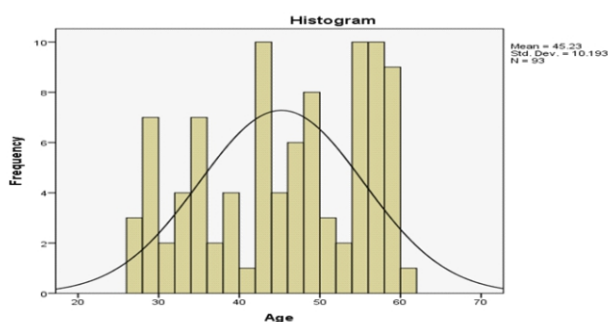


Figure 2: Histogram of Age Distribution

In Table 1, the summary statistics of VAS Score and Nirschl Scale is given. Here, in the first column follow up period is stated, in second and third column mean and standard deviation of VAS score is given respectively, and in fourth and fifth column mean and standard deviation of Nirschl Scale are given respectively. From this table it is seen that mean and standard deviation of VAS score for pre-injection is 7.71 and 0.63, the mean and standard deviation of VAS score for two week follow up is 5.96 and 0.65, the mean and standard deviation of VAS score for six week follow up is 3.35 and 0.48 respectively. Similarly, the mean and standard deviation of VAS score for twelve week follow up is 0.67 and 0.47 and the mean and standard deviation of VAS score for twenty four week follow up is 0.26 and 0.57 respectively. The data trend showed the VAS score has decreased gradually in each successive follow-up. Similarly, the mean and standard deviation of Nirschl Scale for pre-injection is 5.96 and 0.65, the mean and standard deviation of Nirschl Scale for two week follow up is 4.58 and 0.66, the mean and standard deviation of Nirschl Scale for six week follow up is 2.57 and 0.56 respectively. Moreover, the mean and standard deviation of Nirschl Scale for twelve week follow up is 0.53 and 0.50 and the mean and standard deviation of Nirschl Scale for twenty four week follow up is 0.19 and 0.39 respectively. The Nirschl scale had also decreased along with the successive follow-ups. Hence, it is observed that along with increasing time duration of follow-up the mean value of VAS and Nirschl Scale also have decreased.

Table 1: Summary Statistics of VAS Score and Nirschl Scale

Follow- up Period	VAS Score		Nirschl Scale	
	Mean	S.D	Mean	S.D
Pre-Injection	7.71	0.63	5.96	0.65
Two Week	5.96	0.65	4.58	0.66
Six Week	3.35	0.48	2.57	0.56
Twelve Week	0.67	0.47	0.53	0.50
Twenty Four Week	0.26	0.57	0.19	0.39

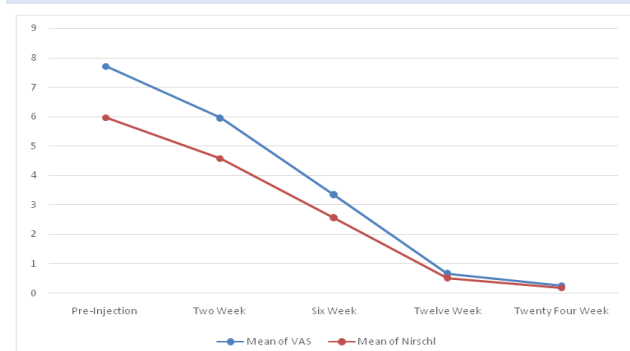


Figure 3: Decrease in mean of VAS and Nirschl Scale according to follow-up duration

In this study, one way ANOVA has been used to show the mean differences in VAS and Nirschl score according to follow-up duration. Follow-up is done in 2 weeks, 6 weeks, 12 weeks and 24 weeks. Table 2 and 3 presents the significant test (One way ANOVA) of Visual Analog Scale in different follow-up period. Researcher would like to see whether the mean differences in VAS was significant in each

follow up. The analysis result showed, there was significant decrease in VAS in aggregate with P-value <0.001. Furthermore, post-hoc test also done using LSD method to see the decrease in each follow-ups. Result showed the significant decrease in VAS in all follow-up duration including 2 weeks, 6 weeks, 12 weeks and 24 weeks.

Table 2: Significant test using One Way ANOVA of VAS in different follow-up duration

Source of variation	Sum of Squares (SS)	Mean Square (MS)	F	Sig.
Between Groups	3949.45	987.36	3130.23	0.000
Within Groups	145.097	0.315		
Total	4094.55			

Table 3: Post-hoc test of one way ANOVA showing the decreasing pain in VAS in different follow duration

Follow-up Time Comparison		Mean Difference	95% Confidence Limit		P-Value
			Lower	Upper	
PI	2 WEEKs	1.742*	1.58	1.90	0.000
	6 weeks	4.344*	4.18	4.51	0.000
	12 weeks	7.043*	6.88	7.20	0.000
	24 weeks	7.473*	7.31	7.63	0.000
2 WEEKs	PI	-1.742*	-1.90	-1.58	0.000
	6 weeks	2.602*	2.44	2.76	0.000
	12 weeks	5.301*	5.14	5.46	0.000
	24 weeks	5.731*	5.57	5.89	0.000
6 weeks	PI	-4.344*	-4.51	-4.18	0.000
	2 WEEKs	-2.602*	-2.76	-2.44	0.000
	12 weeks	2.699*	2.54	2.86	0.000
	24 weeks	3.129*	2.97	3.29	0.000
12 weeks	PI	-7.043*	-7.20	-6.88	0.000
	2 WEEKs	-5.301*	-5.46	-5.14	0.000
	6 weeks	-2.699*	-2.86	-2.54	0.000
	24 weeks	.430*	0.27	0.59	0.000
24 weeks	PI	-7.473*	-7.63	-7.31	0.000
	2 WEEKs	-5.731*	-5.89	-5.57	0.000
	6 weeks	-3.129*	-3.29	-2.97	0.000
	12 weeks	-.430*	-0.59	-0.27	0.000

*.The mean difference is significant at the 0.05 level.

Similarly, one way ANOVA also conducted to show the mean differences in NirschlScale according to same follow-up duration. Table 4 and 5 presents the one way ANOVA result of Nirschl Scale according to follow-up period. The result showed, there was significant decrease in Nirschl Scale in aggregate and also in post-hoc test with P-value <0.001. Post-hoc result also showed the significant decrease in Nirschl Scale in all follow-up duration (2 weeks, 6 weeks, 12 weeks and 24 weeks).

Table 4: Significant test using one way ANOVA of Nirschl Scale

Source of variation	Sum of Squares	Mean Square	F	P-Value
Between Groups	2341.73	585.43	1853.53	0.000
Within Groups	145.29	0.316		
Total	2487.02			

Table 5: Post-hoc test of one way ANOVA showing the decreasing pain in Nirschl Scale

Follow-up Time Comparison		Mean Difference	95% Confidence Interval		P-Value
			Lower Bound	Upper Bound	
PI	2 Weeks	1.366*	1.20	1.53	0.000
	6 Weeks	3.376*	3.21	3.54	0.000
	12 Weeks	5.430*	5.27	5.59	0.000
	24 Weeks	5.763*	5.60	5.93	0.000
2 Weeks	PI	-1.366*	-1.53	-1.20	0.000
	6 Weeks	2.011*	1.85	2.17	0.000
	12 Weeks	4.065*	3.90	4.23	0.000
	24 Weeks	4.398*	4.24	4.56	0.000
6 Weeks	PI	-3.376*	-3.54	-3.21	0.000
	2 Weeks	-2.011*	-2.17	-1.85	0.000
	12 Weeks	2.054*	1.89	2.22	0.000
	24 Weeks	2.387*	2.23	2.55	0.000
12 Weeks	PI	-5.430*	-5.59	-5.27	0.000
	2 Weeks	-4.065*	-4.23	-3.90	0.000
	6 Weeks	-2.054*	-2.22	-1.89	0.000
	24 Weeks	.333*	0.17	0.50	0.000
24 Weeks	PI	-5.763*	-5.93	-5.60	0.000
	2 Weeks	-4.398*	-4.56	-4.24	0.000
	6 Weeks	-2.387*	-2.55	-2.23	0.000
	12 Weeks	-.333*	-0.50	-0.17	0.000

*. The mean difference is significant at the 0.05 level.

DISCUSSION

Tennis elbows is a frequent disease-causing discomfort and weakness on outer region of the elbow. Obesity, physical stress during the activity and smoking are often related to lateral epicondylitis. Almost all studies suggest that over 12 months, if left untreated, 90 percent of all patients will receive complete relief, and the typical lateral epicondylitis route is automated although one quarter of them usually have recurrence. The bracelet extensors of the body are overuse tendinopathies.²⁰Chronic lateral epicondylitis results from repeated micro-traumatic events that damage the inside tendon structure and degenerate into the normal tendon and matrix.²¹Histopathologic investigations have revealed that samples of tendons derived from chronic overuse do not include substantial inflammatory cells.²²⁻²⁴ This word tendinitis is commonly used to refer to the disease that develops from overuse. Many therapies, such as splinting, massage, nonsteroidal anti-inflammatory injections, iontophoresis, laser therapies, botulinum toxin, are available. A steroid injection, extracorporeal, and duties change, but no ideal treatment far has been consistently superior to natural illness history. Tendinopathy pathophysiology is linked to oxidative stress and cartilage gene activation.Both processes cause apoptosis and matrix integrity loss and contribute to vascular infiltration, nerve regrowth, and degradation.²⁵As a result, the effectiveness of NSAIDs in lateral epicondylitis has faced difficulties in recent years.Kachooei et.al found that, while the injection of corticosteroids delayed surgery for lateral epicondylitis, it was linked with high surgical performance vs. non-injected

patients.²⁶ The biotherapy approach has recently developed in tendinopathy, incorporating autologous full-blood injections and plasma-rich injections and stem cell therapy.²⁷

Autologous blood injections may have good outcomes. This study also got very good result with over 90% success. Autologous blood injections are considered to occur through inflammatory reactions and the provision of the required nutrients and components for the healing procedure. Only several research has investigated autologous blood injection as a lateral epicondylitis treatment option.

CONCLUSION

Based on given acceptable outcomes, it is concluded that the concerned blood injection can be considered a good treatment option for the Tennis-elbow. It is a simple, cheap and effective method.

RECOMMENDATIONS

This study recommends the effective, safe, and successful

method for the long-term therapy of the illness concerned for autologous blood injectors with no extra brace or exercise.

LIMITATIONS OF THE STUDY

This study has limitations on the lack of a randomized control group.

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CONFLICT OF INTEREST

We have no conflict of interest to our study.

FINANCIAL DISCLOSURE

There is no financial support for this study.

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