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**Original Research Article**

# Short term results of a single autologous whole blood injection for treatment of resistant tennis elbow

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## ABSTRACT

**Background:** Lateral epicondylitis commonly called tennis elbow is a common cause of elbow pain and involves degeneration of common extensor origin with no unanimously supported algorithm for the treatment. Recently, autologous blood injection has been reported for the treatment of resistant cases. We present the short term results of a single shot of autologous whole blood for the treatment of resistant tennis elbow.
**Methods:** The study was conducted on 56 patients who fulfilled the other inclusion criteria's. 2 ml of autologous whole blood was introduced just proximal to the lateral epicondyle and the contents were injected on the under surface of the extensor carpi radialis group of muscles. Pain severity using VAS and Nirschl Staging was assessed before injection and re-evaluation was done at 4 weeks, 12 weeks and 6 months.
**Results:** Before the procedure average pain score was 7.5(range 5-9). The average Nirschl stage was 5.5 (range 4-7). After autologous blood injections the average pain score decreased to 4 at 4 weeks, 2.8 at 12 weeks and 2.5 at 6 months. The average Nirschl stage decreased to 3.53 at 4 weeks, 2.45 at 12 weeks and 2.3 at 6months. The reduction was statistically significant ($p<0.001$). 28 out of 56 patients (50%) were completely relieved of pain with a pain score of 0 at 6 months. There was no major complication.
**Conclusions:** A single injection of autologous whole blood for resistant tennis elbow is an economical and effective treatment and has an excellent safety profile.

**Keywords:** Autologous whole blood, Injection, Single shot, Resistant tennis elbow

## INTRODUCTION

Tennis elbow or lateral epicondylitis is a common painful condition encountered in the outpatient department. It affects 1-3% of the adult population[1,2] with men and women equally affected and presents most often between ages 35 and 50.[3] The chief complaints usually are pain in the lateral aspect of elbow and weakened grip, especially with wrist extension and activities that require strong gripping or repetitive motion of the wrist and forearm. They also complain of difficulty in lifting objects. Symptoms tend to present between 6 months and 2 years.[2,4]

There is no unanimously supported algorithm for the treatment of lateral epicondylitis. Symptomatic treatment consists of activity modification and nonsteroidal anti-inflammatory medications. Other conservative treatment modalities include various types of physiotherapy, including exercises, bracing, and ultrasound. Local injections including lidocaine, alcohol, and carbolic acid have been tried in the past for patients who do not benefit from conservative treatment.[3] The combination of

corticosteroids with a local anaesthetic is most widely used. Operative intervention is required in approximately 4-11% of the patients who do not benefit from conservative treatment and local injections.[4]

Delivery of autologous blood or platelet derived growth factors to the site of disease has also been shown to significantly help the healing process in tennis elbow with scanty scientific clinical evidence.[5] We in this study see the short term results of a single autologous whole blood injection for treatment of resistant tennis elbow.

## METHODS

This study was performed in a tertiary care orthopaedic centre from 2016 to 2018. 56 consecutive patients with refractory tennis elbow were included in the study after properly explaining the study and procedure to the patient in his native language and obtaining informed consent. Ethical clearance was obtained. Criteria for inclusion in the study were chronic clinically diagnosed lateral epicondylitis(based on symptoms, site of tenderness, and pain elicited with resisted active extension of the wrist in pronation and elbow extension); duration of symptoms more than 6months and pain severity with minimum score of 5, based on 10 scale Visual Analogue Score(VAS), failure of conservative treatment including rest, NSAIDS, physiotherapy and local steroid injection. Exclusion criteria included patients previously treated with surgery for lateral epicondylitis, patients receiving steroid injections within 3 months before blood injections, rheumatoid arthritis of elbow, cervical radiculitis, and trauma around elbow.

### *Injection technique*

2 ml of venous blood was drawn from the ipsilateral or the contralateral upper limb. No anesthetic agent was used. The injection was administered in the procedure room of the trauma operation theatre after observing all aseptic precautions. The needle was introduced just proximal to the lateral epicondyle and the contents were injected on the under surface of the extensor carpi radialis group of muscles. Patients were advised to restrain from activities involving repetitive movements of the wrist and elbow during initial 3 weeks after injection. Gentle passive stretching exercises of the extensor group of muscles were started as soon as the pain permitted. Pain severity was evaluated before injection and re-evaluation was done at 4 weeks, 12 weeks and 6 months after the injection using VAS(range 0, no pain to 10, agonizing pain).[6,7] Nirschl Staging of Lateral Epicondylitis[8](Table 1) was also assessed prior to the procedure, and recorded again at the 4-week, 12 weeks and 6-month post-injection follow-up to evaluate the functional outcome and down staging or upstaging of disease. Statistical analysis was done by using paired student t- test.

**Table 1: Nirschl staging of lateral epicondylitis.[8]**

| | Staging |
|---|---|
| **Phase 1** | mild pain with exercise; resolves within 24h. |
| **Phase 2** | pain after exercise; exceeds 48h. |
| **Phase 3** | pain with exercise; does not alter activity. |
| **Phase 4** | pain with exercise; alters activity. |
| **Phase 5** | pain with heavy activities of daily living. |
| **Phase 6** | pain with light activities of daily living; intermittent pain at rest. |
| **Phase 7** | constant pain at rest; disrupts sleep. |

## RESULTS

The mean follow up of the patients was 7.5 months (range 6-15 months). The patients consisted of 30 males and 26 females. The mean age in the study was 42.5 years (range 21-62). The mean duration of symptoms was 15.5 months (range 7-36 months). Among the 30 males 9 were manual labourers, 6 were bus drivers, 6 were farmers, 5 were carpenters, 3 were gardeners and 1 was a plumber. Among the females 20 were housewives involved in domestic work, 4 were government employees involved in office work and 2 were college students. 48 patients had involvement of dominant extremity (all right side) and 8 patients had involvement of non-dominant extremity (all left side). No patient had bilateral involvement. Before autologous blood injections the average pain score was 7.5 (range, 5–9). The average Nirschl stage was 5.5 (range 4–7). After autologous blood injections the average pain score decreased to 4 at 4 weeks, 2.8 at 12 weeks and 2.5 at 6 months. The average Nirschl stage decreased to 3.53 at 4 weeks, 2.45 at 12 weeks and 2.3 at 6 months. Statistical analysis revealed a significant decrease in the VAS score ($p<0.001$). 28 out of 56 patients (50%) were completely relieved of pain with a pain score of 0 at 6 months. Four patients did not respond significantly to treatment with no or minimal change in VAS scores at 4 weeks, 12 weeks and final follow-up (6 months). Also, there was minimal or no downstaging of disease in these pateints as per Nirschl staging. No patient reported increased pain at 4 weeks, 12 weeks and 6 months. The breakup of VAS score and Nirschl staging of patients before and after the injection is summarized in (Table 3 and 4) respectively. There were no major complications in the study. Four patients had post injection pain which was dealt with acetaminophen and icing. No NSAIDS or steroids were given. Two patients had ecchymosis at the injection site over the lateral aspect of elbow which subsided after giving rest to part. Two patients had a vasovagal syncope during the process of giving injection. They were managed by giving intravenous fluids and raising the foot end of the bed.

## DISCUSSION

Lateral epicondylitis is thought to be secondary to degeneration of the common extensor origin. It is now

accepted that it is not an inflammatory condition but a fibroblastic and vascular response, pathologically known as angiofibroblastic degeneration although more commonly referred to as tendinosis.[9] The origin of the extensor carpi radialis brevis, or less commonly the extensor digitorum communis, is most commonly affected.[10] Two relatively hypovascular zones in the common extensor origin have been described, one at the origin of the lateral epicondyle and the other 2-3 cm distal along the tendinous insertion.[11]

**Table 2: Gender and occupation distribution.**

| Gender | N |
|---|---|
| **Males (n=30, 53.6%)** | |
| Manual labourers | 9 |
| Bus drivers | 6 |
| Farmers | 6 |
| Carpenters | 5 |
| Gardeners | 3 |
| Plumbers | 1 |
| **Females (n=26, 46.4%)** | |
| Housewives | 20 |
| Office workers | 4 |
| College students | 2 |

**Table 3: Breakup of VAS score of patients before and after the injection.**

| VAS | Number of patients (%) | | | |
|---|---|---|---|---|
| | Pre-Injection | Post-injection, 4 weeks | Post-injection, 12 weeks | Post-injection, 6 months |
| **0-3** | 0 | 30 (53.57) | 36 (64.29) | 38 (67.86) |
| **4-7** | 18 (32.14) | 19 (33.93) | 14 (25.00) | 14 (25.00) |
| **8-10** | 38 (67.86) | 7 (12.50) | 6 (10.71) | 4 (7.14) |
| **Total** | 56 | 56 | 56 | 56 |

**Table 4: Breakup of Nirschl staging of patients before and after the injection.**

| Nirschl staging | Number of patients (%) | | | |
|---|---|---|---|---|
| | Pre-Injection | Post-injection, 4 weeks | Post-injection, 12 weeks | Post-injection 6 months |
| **1-3** | 0 | 33 (58.93) | 38 (67.86) | 39 (69.65) |
| **4-5** | 14 (25.00) | 17 (30.36) | 13 (23.21) | 13 (23.21) |
| **6-7** | 42 (75.00) | 6 (10.71) | 5 (8.93) | 4 (7.14) |
| **Total** | 56 | 56 | 56 | 56 |

It remains one of the most perplexing disorders of the musculoskeletal system. It was first described by Runge[12] in 1873. Both the terms lateral epicondylitis and tennis elbow are actually misnomers since it is primarily a disorder related to degeneration in the tendon of common extensor origin (mostly extensor carpi radialis brevis) rather than inflammatory process as was thought to be earlier[13] and is commoner in occupations which involve repetitive forearm rotational activities with only 5-10% of cases occur in tennis players.[14] Maffuli et al.[15] recognised that tendinopathy is a clinical diagnosis while tendinitis or tendinosis terms should be reserved only after histopathological examination has been carried out.

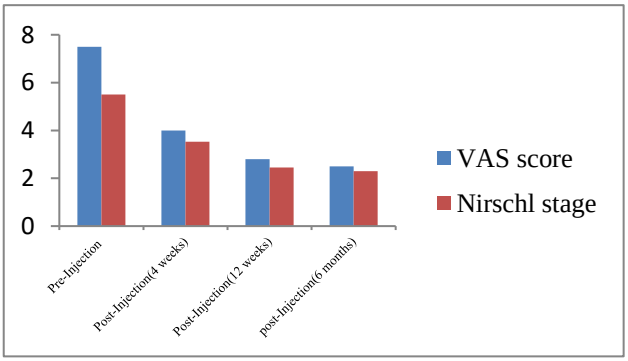


**Figure 1: Pre and post injection mean VAS score and Nirschl stage.**

Autologous blood injection for the treatment of lateral epicondylitis was first described by Edwards et al.[5] The authors noted that techniques such as forceful closed manipulation, traumatic injection, and percutaneous release resulted in improved outcomes for patients, and theorized that this was due to bleeding at the extensor origin following the trauma. This bleeding would then stimulate an inflammatory cascade to begin a healing response for the tendinopathy. They proposed that autologous blood injection, specifically composed of 2-3 ml of autologous blood combined with lidocaine, would deliver the cellular and humoral mediators to the elbow for a similar healing process. In a case series of 28 patients with lateral epicondylitis symptoms present for 6 or more months who had failed conservative therapy, Edwards et al found that after receiving one to three autologous blood injections, pain scores and Nirschl stages decreased at an average follow up of 9.5 months.[5] Overall, they found 79% of patients got complete relief of pain following autologous blood injections. In our study around 70% of patients were completely relieved of pain. The lower percentage may be attributed to the fact that we had a short follow up and used only a single injection whereas in the study by Edwards et al they used 2 to 3 injections in patients who did not improve with a single shot. In 2010, Ozturan compared autologous blood injection to both corticosteroid injection and extracorporeal shock wave therapy in a three-armed randomized trial of 60 patients[16] and concluded that corticosteroid injections provided better short-term relief of symptoms but autologous blood injections showed significantly better long term results with decreased recurrence. In the current study as well the results in terms of pain relief and Nirshl scoring were better at the end of 1 month upto 6months than that at 1 week.

Kazemi directly compared autologous blood to corticosteroid injections in a short-term RCT of 60 patients.[17] As opposed to Ozturan et al. study, the authors found improved outcomes measures in the short-term for autologous blood. At 4 weeks, autologous blood was significantly more effective at decreasing pain scores at rest and with grip, as well as increasing QuickDASH scores. These results persisted at 8 weeks. In 2012, Dojode et al. compared autologous blood injection to steroid injection in 60 patients with chronic tennis elbow. They found that the steroid group demonstrated better pain relief at 1 and 4 weeks follow-up. However, at 12 weeks and 6 months, there was significantly better pain reduction in the whole blood group than in the steroid group. Also, there was a greater recurrence rate in the steroid group compared to the whole blood group.[18] In the current study as well we did not have any recurrence with the longest follow up being 15 months.

Contrary to the results of our study and the studies mentioned above, a RCT performed by Wolf et al. consisting of 28 patients comparing autologous blood, corticosteroid, and a saline injection[19] found improvement in all the three groups but there was no significant difference between groups. Also, recent reviews of clinical trials revealed limited evidence supporting the effectiveness of autologous blood injections for chronic tendinopathies. According to these reviews, even though refractory chronic tendinopathy might be responsive to autologous whole blood but the data available to date are limited by quality and size of study, as well as length of follow up and are currently insufficient to recommend this modality for routine clinical use.[20-23] The limitation of our study was also the relatively small number of cases, absence of a control group receiving no intervention, and short-term follow-up evaluations.

## CONCLUSION

We conclude that a single injection of autologous whole blood for refractory tennis elbow is an economical and effective treatment which can be readily made available to the patient and has an excellent safety profile. However future large, randomized trials will be of importance to determine if these injections prove beneficial and cost effective compared to conservative therapies.

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