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## Autologous blood injection works for lateral epicondylitis

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### Abstract

**Purpose:** This study explored the effect of autologous blood injection (with ultrasound guidance) to the elbows of patients who had radiologically assessed degeneration of the origin of extensor carpi radialis brevis and failed cortisone injection/s to the lateral epicondylitis.

**Methods:** This prospective longitudinal series involved preinjection assessment of pain, grip strength, and function, using the patient-rated tennis elbow evaluation. Patients were injected with blood from the contralateral limb and then wore a customised wrist support for five days, after which they commenced a stretching, strengthening, and massage programme with an occupational therapist. These patients were assessed after six months and then finally between 18 months and 2 years after injection, using the patient-rated tennis elbow evaluation.

**Results:** 50 patients completed the study, showing significant improvement in pain; the worst pain decreased by two to five points out of a 10-point visual analogue for pain. Self-perceived function improved by 11–25 points out of 100. Women showed significant increase in grip, but men did not.

**Conclusions:** Autologous blood injection improved pain and function in a worker's compensation cohort of patients with chronic lateral epicondylitis, who had not had relief with cortisone injection.

**Keywords:** Autologous blood, tennis elbow, lateral epicondylitis

### Introduction

Pathologic process has been studied numerous times and notably no inflammatory cells suggestive of either an acute or chronic inflammatory process have been identified on surgical specimens. The natural history of tennis elbow is widely regarded to be self-limiting, with a duration of symptoms of 6-24 months, and with approximately 90% of individuals exhibiting complete resolution of their symptoms at 1 year. Only 4-11% of patients will subsequently require surgical intervention. With reports of tennis elbow being a degenerative process rather than an inflammatory one, the entire plethora of modalities including bracing, physical therapy, corticosteroid injections, iontophoresis, and laser therapy aimed at arresting the inflammatory cascade seem ineffective and others options as botulinum toxin A injections, platelet rich plasma injections, and extracorporeal have been attempted to treat the lateral epicondylitis, however to date yet no optimal treatment has been proven to be consistently superior to the natural history of the disease. Growth factors delivered at the site of disease by injection of whole blood or platelet concentrate has also been shown to significantly help the healing process in tennis elbow. However scientific evidence supporting incorporation of such modalities into routine clinical practice is weak at present.

### Materials and Methods

The protocol of this study has been approved by the relevant ethical committee related to our institution in which it was performed. All subjects gave full informed consent to participate in this study. During October 2017 to October 2019, 50 patients diagnosed with tennis elbow, visiting our center(SSIMS) T Begur & Harsha hospital with failed conservative treatment involving a trial of nonsteroidal antiinflammatory drugs (NSAIDs) and physiotherapy were treated with ABI and results were evaluated with Visual Analog Score (VAS), Disability of Arm Shoulder and Hand (DASH), and Foot Health Status Questionnaire (FHSQ).

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### Inclusion criteria for tennis elbow

1. Pain and tenderness over the lateral aspect of the elbow.
2. One of the following tests being positive: wrist extension (Cozen's test), Mill's maneuver, jar lifting test, wringing test, broom, or stir frying test.

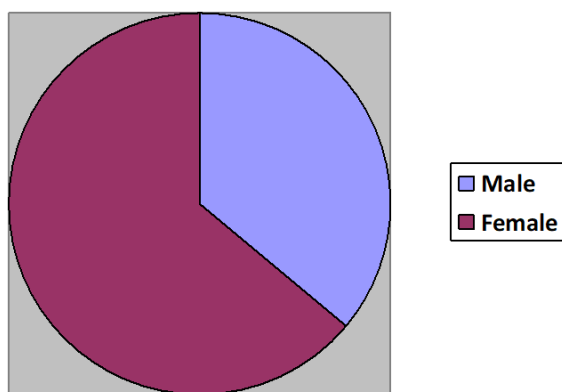
### Overall exclusion criteria

1. Patients with history of anemia (hemoglobin < 7.0 g/dL).
2. Thrombocytopenia (platelets <  $150 \times 10^3 \mu\text{L}$ ).
3. Pregnancy.
4. Local malignancy.
5. Local corticosteroid injections for lateral epicondylitis in previous 1 mo.
6. Rheumatoid disease and previous surgery or elbow dislocation.
7. Diabetes mellitus.

NSAID's were avoided for 1 week before and after the procedure.

### Results

50 consecutive patients were eligible for this study and 50 consented to participate. There were initially 18 men and 32 women aged 33 to 56 years, mean 47 years (SD 5.7). 5 patients had shoulder pain or wrist pain on the same side as their lateral epicondylitis.



Graph 1

The duration of patients' symptoms ranged from 6 months to 2 years. Thirty-seven were under workers' compensation, and 13 were private patients. All had one or more cortisone injection, plus either electric shock wave therapy, ultrasound, NSAIDS, braces to the forearm and wrist, and exercise therapy without satisfactory relief from symptoms. Radiologic assessment of all included patients described degeneration or discontinuity in the tendinous origin of extensor carpi radialis brevis, some with calcification of the tendon.

No patients experienced severe bruising, and none had infection on the donor arm or on the injected arm. Significant improvements occurred in self-perceived measures of pain and upper limb function and in women's hand grip strength. Two of the eight men lost hand grip strength, one by five kilograms and the other by seven.

### Discussion

This study of chronic patients shows positive medium and long-term results from a single injection of autologous blood. The injection under ultrasound visualization accompanying treatments, splinting, and occupational therapy were free of adverse events such as severe bruising or infection.

This study was slightly different to past studies in patient selection; all were symptomatic for at least six months and

had failed cortisone injection treatment. Radiology reports suggested degenerative changes and "discontinuity" or tears, in the tendinous origin at the lateral epicondyle. This suggests that these patients had a more degenerative than inflammatory condition, despite their diagnosis being lateral epicondylitis.

One limitation of this study was the absence of randomization into a control group. The reason for this was that most patients were under worker's compensation and the doctor treating them felt it unethical to deny the injection to those with chronic and resistant symptoms. A comparison group was initially formed but these patients were unlike those in the study, in their duration of symptoms.

More recent studies of ABI for lateral epicondylitis have injected plasma-rich proteins (PRPs) which have been injected in the same manner as untreated autologous blood. Preparation of PRP involves withdrawing approximately 27 millilitres of anticoagulated blood and placing it in a centrifuge, before adding anaesthetic and injecting. Platelet-rich plasma has positive effects, but in many studies these results have not been significantly different to ABI results.

Considerable thought was given to the issue of comorbidity. In this study, eight patients had diagnoses of carpal tunnel syndrome, shoulder overuse, ulnar neuropathy, and osteoarthritis of the wrist. Two patients were excluded from the follow-up analyses because they had surgery to their elbows, but other patients had procedures of carpal tunnel release, wrist fusion, and arthroscopic shoulder repair in the years following their elbow surgery. Although the symptoms from these conditions may affect the results of pain and functional evaluation, these results are representative of occupational overuse syndromes of the upper limbs.

A further limitation of this study was that some patients declined to return to the clinic for their six-month assessment of grip function. These patients were under worker's compensation, and it was not reasonable to request that they return to occupational therapy in work hours. Intention to treat analysis was not used as this would likely show an inaccurate picture of their function.

When the patient-rated tennis elbow evaluation was completed with the occupational therapist, the patients' comments were recorded; numerous patients said that they had no functional limitations, scoring the highest marks on this evaluation. These patients also said that they now did things differently, had altered their work duties, or ceased certain activities. In one case, a woman changed her vacuum cleaner to a self-propelling model, and she had no pain or difficulty with vacuuming. These strategies were all successful but perhaps give more positive functional results than can be compared with the patients' original activities. Despite these limitations, this study still describes dramatic improvement in the functional ability of patients with chronic degenerative tennis elbow, who had autologous blood injection wrist immobilisation and a home exercise program, including those under worker's compensation, and having upper limb comorbidities.

### Conclusions

ABI when given with proper care appears to be helpful in tennis elbow. It is safe and a significant improvement has been observed in VAS and DASH scores for tennis elbow and VAS and FHSQ for plantar fasciitis.

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