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Original Article

The effect of platelet-rich plasma injection on lateral epicondylitis following failed conservative management

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ABSTRACT

Objective: We assessed the effect PRP injection on pain and function in patients with lateral epicondylitis where conservative management had failed.

Methods: We prospectively reviewed 34 patients. The mean follow-up was 26 weeks (range 6–114 weeks). We used the Oxford Elbow Score (OES) and progression to surgery to assess outcomes.

Results: 88.2% improved their OES. 8.8% reported symptom progression. One patient had no change. No patients suffered adverse reactions. Two patients underwent an open release procedure. One had the injection repeated.

Conclusion: An injection of PRP improves pain and function in patients suffering from LE where conservative management has failed.

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1. Introduction

“Tennis Elbow”, or lateral epicondylitis (LE) is a condition which affects both sexes equally and is considered common in the UK as between 1% and 3%⁹ of the population suffer from it. The condition mainly affects those of middle age; predominantly those aged between 35 and 55 years.

The condition has been said to affect tennis players more commonly and prevalence between 35 and 51% has been quoted in large studies.¹

The term epicondylitis suggests that this is an acute inflammatory condition however it is more aptly described as a “tendinosis”. The most commonly affected structure is the Extensor Carpe Radialis Brevis (ECRB) which attaches to the lateral epicondyle of the humerus. The other tendons which

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Abbreviations: OES, Oxford Elbow Score; PRP, platelet-rich plasma; LE, lateral epicondylitis; ECRB, Extensor Carpe Radialis Brevis; NSAIDs, non-steroidal anti-inflammatory; MCID, minimal clinically important difference; DASH, disabilities of arm, shoulder and hand; VAS, visual-analogue score; ASES, American Shoulder and Elbow Surgeons; AWB, autologous whole blood.

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join the ECRB on the lateral epicondyle are extensor carpe ulnaris, extensor digiti mini and extensor digitorum.

The chronic degenerative changes which occur in LE as a result of the repetitive strain injury implicated bear the hallmarks of a tendinosis. These include neovascularisation and disorganisation of collagen fibres.⁹ The resultant shift in cell population to include fibroblasts and vascular hyperplasia has been described as angiofibroblastic hyperplasia.¹⁰

There are numerous treatment modalities for LE of which the mainstay is non-operative. Bisset et al.³ concluded that conservative management has very similar or slightly inferior outcomes when compared to steroid injections. Part of conservative management is physical therapy which has been shown to be effective² and generally focuses on eccentric strength exercises and the maintenance of a good range of motion. Conservative management includes using non-steroidal anti-inflammatories (NSAIDs) and corticosteroid injections however their long-term effectiveness has been questioned.¹⁹ Corticosteroid injections have been known to cause skin atrophy, skin depigmentation and fatty atrophy. Three injections within a single year are considered a maximum after which surgical procedures are normally considered.

Platelet-rich plasma contains supra-physiological quantities of growth factors which are implicated in tissue healing. These include: platelet-derived growth factor, transforming growth factor beta, epidermal growth factor¹¹ and vascular endothelial growth factor. Macrophages, mesenchymal stem cells and osteoblasts are attracted to the local tissue and enhance wound healing.¹⁷

2. Methods

We prospectively gathered data on 34 consecutive patients suffering from LE who received platelet-rich plasma injection therapy. The study was approved by the local audit department which enabled us to complete a pre-injection and mid-term follow up Oxford Elbow Scores on each of the patients during clinic appointments and over the phone.

All patients were seen in clinic by the senior author following failed conservative management. The conservative management included analgesia, physiotherapy and importantly all patients had at least one steroid injection. Subsequently these patients were listed for operative treatment of their condition. Prior to their operation all patients were offered platelet-rich plasma Injections as an alternative to improve their symptoms.

For platelet-rich plasma preparation the Arthrex (Arthrex, Inc. Florida, USA) ACP system was used. This is a closed system which uses a double syringe method along with 15 ml of autologous blood drawn from the patient's contralateral arm. The blood is then centrifuged at 1500 rpm for 5 min and 4–7 ml of platelet-rich plasma is extracted. An anticoagulant is not used. Using a 22-ga needle the senior author gained access to the common extensor tendon on the lateral epicondyle using a single skin portal. Local anaesthetic was not employed as it can disrupt the pre-prepared pH of the platelet-rich plasma and result in suboptimal efficacy of the injection. The platelets were injected into the epicondyle using the pepper-pot

method. The patients were asked not to move their arm for 30 min. The affected limb was then placed in a poly-sling for 48 h after which the patients were advised to carry out eccentric elbow exercises. Patients were prohibited from using NSAIDs for three months.

We used the Oxford Elbow Score (OES) to evaluate outcomes following platelet-rich plasma injection.⁶ The OES is a 12 item score which comprises three unidimensional domains: elbow pain, elbow function and psychological-social. Each domain contains four items. The responses to each item range from 0 to 4 where a 4 represents the most significant severity. The scores for each domain can be calculated as the sum of the individual items which related to that particular domain. The maximum score obtainable using the OES is 48 which is a raw scale score. The individual domain scores are then converted to a metric score out of 100 (100 representing the greatest severity).

3. Results

Our study group included 34 (18 women and 16 men) patients who all suffered from LE. The mean age at operation was 45 years (range 33–60 years). All patients were successfully followed up and the mean follow up time was 26 weeks (range 6–114 weeks).

All patients had reported compliance with the post-procedure protocol outlined. There were no reported complications following the injection of platelet-rich plasma. No patients suffered adverse reactions including either infections or neurovascular problems.

Thirty patients (88.2%) showed an improvement in their self reported OES. Three patients (8.8%) reported that their symptoms had progressed in severity following the injection. From this group only one had chosen and undergone surgery successfully at the time of last follow-up and one had been listed for the operation. Three patients who did show a very small improvement in symptoms following injection were listed for an open release procedure; one of them had at the time of writing successfully undergone the procedure. One patient had chosen to undergo a second injection. A single patient (2.9%) was found to have no change in symptoms.

All patients successfully completed pre and post injection OES. In order to determine the success of this procedure we used the figures set by Dawson et al.⁵ on minimal clinically important difference (MCID). These were roughly 10 (metric scores) for elbow function and 18 for pain and psychological-social. 70.6% of our patients reported a clinically important difference in Elbow function while 70.6% and 61.8% reported a clinically important difference in pain and psychological-social, respectively.

To compare pre and post-injection scores a Wilcoxon matched-pairs signed-ranks test was used. The *P* values generated are displayed in Table 1 along with the mean difference. We used a non-parametric test to accommodate for the distribution of results. The results indicate that a single injection of platelet-rich plasma significantly improves each of the domains of the OES.

As there was a varied distribution of follow-up time in our data set we used linear models to investigate if there was a

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