

A low cost autologous platelet-rich plasma injection in tennis elbow and plantar fasciitis (A Multicentric Study)

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I. Background

The introduction of platelet rich plasma (PRP) as a possible adjunct to conservative and operative treatment has motivated significant research into this topic. PRP is a set of autologous platelet products used to accelerate recovery from injury by bringing to the site of injury a set of molecules that will accelerate the functional recovery of the tissue by trying to regenerate it rather than merely repair with scar tissue. In this prospective study, we evaluate the results of PRP in tennis elbow and plantar fasciitis.

II. Methods

30 Patients with tennis elbow and 20 plantar fasciitis, who will visit our center with failed conservative treatment will be treated with PRP, and results will be evaluated with VAS, DASH and FHSQ scores.

Aims and purpose of the proposed research

The overall aim of this trial is to investigate if PRP injection, as a patient-controlled adjunct to routine primary care for tennis elbow & Plantar fasciitis, can provide superior short-term pain relief and functional improvement compared with routine primary care alone, without increasing the risk of long-term recurrence. The primary objective of the trial is to investigate, at six weeks, pain relief from a self-management package of treatment that includes PRP injection in addition to primary care management (analgesia with advice and information regarding tennis elbow self management), compared with primary care management alone, in patients presenting to their general practitioner (GP) with a first or new clinical diagnosis of tennis elbow.

Since being cost effective treatment with a very minimal skill, it can be of vast national interest and can be done at even primary care level.

Results: Post-PRP injection significant differences observed between VAS and DASH score at baseline and after 4 wk and 8 wk. Will form the base line for result Platelet-Rich Plasma Injections: in Lateral epicondylitis & plantar fasciitis



Platelet-Rich Plasma Injections: in Tennis Elbow (Lateral epicondylitis) and plantar fasciitis

Lateral epicondylitis (LE), also known as tennis elbow, is a relatively common condition in India and abroad, estimated to affect 1-2% of the population per year. The annual incidence in tennis players (amateur or professional) is much higher, at 9-35% per year. Notably, LE also has a 5 to 9-times higher incidence than medial epicondylitis.³ The majority (80%) of cases of LE do not require treatment and resolve on their own, while surgical treatment is resorted to in 4-11% of cases.

Pathogenesis of Lateral Epicondylitis

LE results from overuse of the extensor muscles of the forearm, leading to damage and degeneration of the affected tendons. Tendon repair is typically slow due to a relatively low blood supply. Recent histopathological studies of LE have found surprisingly low levels of inflammatory cells at the site of the affected tendon, suggesting that the term “epicondylitis” may be a misnomer. Recent research has led to the hypothesis that the pathogenesis of LE involves “hypertrophy of fibroblasts, abundant disorganized collagen, hyperplasia of vascular elements, and eventually apoptosis and extracellular matrix breakdown.” This degenerative mechanism has largely supplanted the older suspected inflammatory mechanism of LE. The dominant symptom of LE is pain in the region of the common extensor tendon insertion on the humerus (lateral elbow), which is worsened on performing activities involving forearm extension.

The Role of Platelets in Healing

Platelets are an integral component of the healing process, acting as a reservoir for growth factors involved in the repair process. Following injury, the endogenous inflammatory response leads to platelets being activated and delivering an array of growth factors to the site of injury, including platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), insulin-like growth factor (IGF), epidermal growth factor (EGF), and vascular endothelial growth factor (VEGF).⁷ The respective effects of each of these growth factors on injured tissue can be seen in Table 1.

Table 1. Role of Specific Growth Factors in Tissue Repair

Growth Factor	Effect on Tissue Repair
PDGF	Encourages proliferation of fibroblasts, enhances collagen synthesis
TGF-β	Stimulates fibroblast proliferation, formation of collagen, and extracellular matrix components
IGF	Mediates growth and repair of skeletal muscle
EGF	Stimulates cellular proliferation
VEGF	Promotes angiogenesis

(Adapted from Middleton, 2012⁸)

Platelet-Rich Plasma Therapy

Mechanism of Action

Data available on platelet-rich plasma (PRP) point to it having a “2- to 8-fold increase in platelet concentration and 1- to 25-fold growth factor concentrations” of that of blood. It has been suggested that PRP causes an exponential increase in growth factors at the site of injection, including PDGF, TGF-β, IGF, EGF, and VEGF, and that this enrichment of growth factors stimulates healing. In-vitro studies have corroborated PRP treatment leading to an increase in growth-factor concentration, as well as an increase in angiogenesis, enhanced cell proliferation, and increased total collagen production of tenocyte cells. The proposed proliferative and angiogenic effect of PRP makes mechanistic sense as a treatment for the typical poor vascularity and extracellular matrix breakdown involved in common extensor tendon injury.

PRP Preparation

Platelet-rich plasma is isolated by drawing and centrifuging a person’s own blood (autologous blood) with an anticoagulant agent. Blood is collected from the patient’s vein on the day of the procedure and is centrifuged (Figures 1,2). The centrifuged blood separates into 3 layers: platelet-poor plasma (50%), platelet-rich plasma (5%), and red blood cells (45%) (Figure 3). The PRP layer (rich in platelets) is collected and used for injecting into injured or otherwise-affected areas of the body. Standards have not been established for an optimum preparation method of PRP; as a result, clinical trials have varied in preparation methods. Centrifuging speed, centrifuging time, usage of specialized collection kits, and usage of platelet activation factors (typically calcium chloride) have varied among the available clinical trials. It has been suggested that anticoagulant use is necessary when preparing PRP, to avoid activation of platelets within the centrifuge and premature release of growth factors.



Figure 1. Blood Collection



Figure 2. Centrifugation



Figure 3. Layers of Blood

PRP Efficacy: Clinical Trials

The first clinical trial investigating the effect of PRP in the treatment of LE was published only 10 years ago in 2006. However, over the past 10 years, there has been a large number of clinical trials published on PRP's treatment of LE. The clinical trials are heterogeneous, with differences in the preparation and administration of PRP, as well as trial design.

Preparation & Administration

PRP has been prepared and administered differently by different investigators. Most investigators have used specialized kits for separating PRP from whole blood along with an anticoagulant and centrifugation, while some have simply centrifuged whole blood with an anticoagulant and manually collected PRP after centrifugation. There is currently no evidence that preparing PRP with a particular kit yields superior PRP compared to any other kit, or by centrifuging and extracting manually. Two trials have used calcium chloride for platelet activation, with the goal of stimulating growth-factor release, while most have not. It has been hypothesized that external platelet activation is not necessary for effective PRP treatment, as platelets are activated endogenously once injected. Also, while differing methods may be used to prepare PRP, it has been suggested that attaining a platelet concentration 4 to 6-times that of whole blood is the most important factor for achieving favorable treatment results. All but 1 of the available clinical trials gave only 1 injection of PRP in total, while a single trial gave 3 injections of PRP over the course of 3 weeks.

PRP vs Corticosteroid Injections

Most of the clinical trials investigating the treatment of LE have demonstrated a significant benefit of PRP over corticosteroid injections for pain-related endpoints. A single clinical trial found that PRP injections had no beneficial effect on pain compared to corticosteroid injections.

Safety of Platelet-Rich Plasma

Because PRP is prepared from a patient's own blood, there are no concerns about transmissible diseases as long as proper sterile technique is followed. Adverse effects of PRP injections have been rare but may include a short-term increase in inflammation and pain at the site of injection. Conversely, corticosteroid injections, which are a current standard of care for LE, tend to have a long-term degenerative effect on tendon integrity, encouraging "permanent adverse structural changes in the tendon. "The limited evidence that sonographic ally compares PRP injections to corticosteroid injections for LE has found that PRP encourages tissue healing while corticosteroid injections provided "short-term relief but resulted in tendon degeneration." PRP injections are not recommended for pregnant women, those on anticoagulants, or those with active cancer, infection, or a bleeding disorder.

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