Platelet-rich plasma (PRP) versus autologous whole blood for the treatment of lateral elbow epicondylitis: a randomized clinical trial

Raeissadat SA, MD; Sedighipour L, MD; Rayegani SM, MD; Bahrami MH, MD; Rahimi R, MD

1. Assistant professor, Department of Physical Medicine & Rehabilitation, Shahid Modares Hospital, Shahid beheshti University of Medical Sciences, Tehran, Iran, email: raessadat@yahoo.com

2. Assistant professor, Department of Physical Medicine & Rehabilitation, Shohadaye Tajrish Hospital, Shahid beheshti University of Medical Sciences, Tehran, Iran, email: lsedighy@yahoo.com

3. Professor, Department of Physical Medicine & Rehabilitation, Shohadaye Tajrish Hospital, Shahid beheshti University of Medical Sciences, Tehran, Iran, email: rayegani@gmail.com

4. Associate professor, Department of Physical Medicine & Rehabilitation, Shohadaye Tajrish Hospital, Shahid beheshti University of Medical Sciences, Tehran, Iran, email: bahrami@yahoo.com

5. Resident, Department of Physical Medicine & Rehabilitation, Shohadaye Tajrish Hospital, Shahid beheshti University of Medical Sciences, Tehran, Iran, email: kingehsan1@yahoo.com

Corresponding author:
Rosa Rahimi, MD
Department of Physical Medicine and Rehabilitation, Shahid Modarres Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
E-mail: lsedighy@yahoo.com Tel: +98 21 88214931 Fax: +9821 22731112

Word count: 4003

Registration ID in IRCT
IRCT2013052313442N1

Iranian Registry of Clinical Trials

Running head: PRP versus whole blood in lateral epicondylitis

Conflict of interests:

There was no contributorship or conflicts of interest for this study.

Funds: This research received no specific funding
Abstract

**Background.** Chronic lateral elbow epicondylitis known as tennis elbow is an angiofibrolastic tendinosis of the wrist extensors' origin. Healing of this lesion is reported with the use of autologous blood and platelet-rich plasma (PRP). The aim of the present study was to compare the effects of PRP versus autologous whole blood local injection in patients with chronic tennis elbow.

**Methods:** Forty patients with chronic lateral epicondylitis with duration of symptoms more than 3 months were randomly divided into 2 groups. Group 1 was treated with a single injection of 2 mL of autologous PRP and group 2 with 2 mL of autologous blood. Tennis elbow strap, stretching and strengthening exercises were administered for both groups during 2 month follow up. Pain and functional improvements were assessed using visual analog scale (VAS), Mayo score (modified Mayo Clinic performance index for the elbow) and pressure pain threshold (PPT) at 0, 4 and 8 weeks.

**Results:** All pain variables including VAS, PPT and Mayo scores improved significantly in both groups 4 weeks after injection. No statistically significant difference was noted between groups regarding pain scores in 4 week follow up examination (P >0.05). At 8 week reevaluations, VAS and Mayo scores had improved significantly only in PRP group. Despite clinical improvement in whole blood group, these changes were not significant at 8 week follow up. (P> 0.05).

**Conclusion:** PRP and autologous whole blood injections are both effective methods to treat chronic lateral epicondylitis. However, regarding pain reduction and functional improvement, PRP treatment seems to be more effective and superior to autologous blood in the short term, as its efficacy continued in longer follow up.

**Key words.** Lateral epicondylitis, Platelet Rich Plasma, Autologous whole blood
Lateral epicondylitis known as tennis elbow is a repetitive strain injury caused by repetitive overuse of the extensor muscles of the wrist. It is the most frequent type of myotendinosis occurring in the lateral side of the elbow region, more specifically at the common extensor tendon that originates from the lateral epicondyle[1].

Epicondylitis was initially believed to be an inflammatory process but in 1979, it was described as the disorganization of normal collagen architecture by invading fibroblasts in association with an immature vascular reparative response, which termed “angiofibroblastic hyperplasia”[1,2]. This process later was described as “angiofibroblastic tendinosis” because no inflammatory cells were identified in this process[2]. The frequency of lateral epicondylitis is reported between 1 to 3% among normal non-athlete population[3]. It causes pain and functional impairment in daily activities and typically results from specific occupational and sports-related activities[2,3]. The treatment of this condition includes conservative therapy and surgical interventions. There is relatively little evidence from well-designed clinical trials to support the numerous treatment strategies and priorities of different therapies employed for lateral epicondylitis[3,4]. The effectiveness of oral non-steroidal anti-inflammatory agents, topical and injectable medications including corticosteroids, botulinum toxins, splinting, physical therapy and inotophoresis have been evaluated in many studies[4]. However, these traditional therapies do not alter the tendon’s inherent poor healing properties secondary to poor vascularization [5,6]. Given the inherent nature of the tendon, new treatment options including Platelets Rich Plasma (PRP), autologous blood, prolotherapy, and extracorporeal shockwave therapy are aimed at inducing inflammation rather than suppressing it[7-9]. PRP is quite a new treatment used for chronic tendinitis[4]. Platelet Rich Plasma is defined as a volume of the plasma fraction of autologous blood having a platelet concentration above baseline[6]. Both PRP and autologous blood contain platelets, and these platelets have strong growth factors that may help in the healing process of chronic injuries. Platelet alpha and dense granules contain the clotting and growth factors that have critical role in the healing process[7]. These granules release the growth factors, which stimulate platelet activation and initiate the inflammatory cascade and healing[8]. Due to higher concentration of platelets in PRP than whole blood, it was shown to have greater effect in the healing and repair process[4,9]. Therapeutic PRP should have a platelet concentration 4 to 6 times greater than that of whole blood(200000/mm3). The
concentrations less than or greater than this amount may be ineffective or inversely lead to suppression of
the healing process [4,6,7]. Some studies have shown that local injection of autologous whole blood has
greater therapeutic effect than steroid injection in treating tennis elbow[5,10,11], also there are studies
showing the greater efficacy of local autologous PRP than corticosteroids in relieving the symptoms of this
disorder[4,8]. Considering higher concentration of platelets and consequently an abundance of growth
factors in PRP than whole blood, PRP is believed to be more potent than whole blood in the healing process
and tissue regeneration in treatment of chronic non-healing tendinopathies including tennis elbow[8], but
only a few studies have been conducted to compare the efficacy of these two treatments. A comparative
study of these 2 treatments was conducted by Thanasas in 2011 in an effort to investigate the possible
advantages of PRP versus autologous whole blood for the treatment of chronic lateral elbow epicondylitis.
Six weeks after initiating the therapy, PRP treatment seemed to be more effective than autologous blood in
reducing pain[12]. However, this study and most of the other similar studies lacked objective evaluations of
symptom improvements after whole blood or PRP injection.

Considering the high cost of autologous PRP therapy and lack of a study comparing autologous whole blood
versus PRP injection objectively, we aimed to evaluate the efficacy of autologous whole blood injection as a
less costly treatment versus PRP in patients suffering from chronic lateral epicondylitis.
Methods:

Patients & Setting:
All patients with clinical signs and symptoms of chronic lateral epicondylitis during May 2011-May 2012 referring to the physical medicine and rehabilitation clinic of Shahid Modarres Hospital which is a general educational hospital were evaluated to enter this randomized, single blind study.

Inclusion criteria:
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); with duration of symptoms more than 3 months and pain severity with minimum score of 5 (based on 10 scale VAS(Visual Analogue Score)).

Exclusion criteria:
Patients were excluded if they were pregnant, older than 75 years old, had history of trauma, any platelet dysfunction syndrome (Critical thrombocytopenia), any other coagulopathies (such as hypofibrinogenemia), local infection at the site of the procedure, any recent febrile or infectious disease, consistent use of NSAIDs within 48 hours before procedure, recent use of corticosteroids during last 2 weeks, a history of local injection of any medications (steroid, whole blood, PRP or dry needling) into the site of lateral epicondyle, hemoglobin <10 gr/dl, plasma platelets count<100000/mm3, history of any malignancy (including hematologic and non hematologic malignancies), carpal tunnel syndrome, cervical radiculopathy or peripheral radial nerve injury, systemic illnesses including ischemic heart disease, diabetes, rheumatoid arthritis, hepatitis, any bony malformations, bony or articular lesions at elbow(diagnosed by radiographic imaging), a history of vasovagal syncope or hemodynamic instability.

Ethical considerations:
From the ethical point of view, all of the patients who were included in this study filled the consent form. The process of the treatment was simplified and explained to the patients, once the physician assured that the
patient completely understood the study protocol and became aware of his rights during the study, the written consent form was signed or fingerprinted by the patient. The institutional review board of Shahid Beheshti University of Medical Sciences approved the protocol of this study. The process of treatment had no harm for their health, and they had authority to stop the process of treatment freely.

In case of very rare incidence of side effects associated with PRP or autologous blood injection (persistent pain and swelling, infection and fibrosis or any neuromuscular complications at injection site) patients had access to the project’s physician in order to contact him if they encountered any of the possible adverse reactions to injection.

**Randomization and patients’ enrollment:**

The block covariate adaptive randomization method is designed to randomize subjects into the treatment groups. This led to equal sample sizes within each group and balance the important covariates. Thus, a new participant is sequentially assigned to particular treatment groups by taking into account the specific matched covariates and previous assignments of participants.

**Intervention:**

**Group 1 (Autologous PRP group):**

The treatment protocol for patients in this group was a single injection of 2 mL of autologous PRP, deep at the origin of wrist extensors, into maximal tenderness point at elbow region under aseptic technique.

Patients were referred to Shahid Modarres laboratory to extract and prepare PRP.

**PRP preparation:**

The patient was placed in an appropriate and comfortable position that allows for sterility and access to the site of injection.

At first, 20 cc of venous blood was drawn with aseptic technique from venous anticubital vein and transferred to the centrifuge.

For the PRP preparation, the Royagen PRP Kit, Aria mabna approved by Iran Ministry of Health& Medical Education was used. This system used, under aseptic technique, 20 mL of autologous peripheral blood with 2 mL of Acid Citrate Dextrose anticoagulant (ACD-A), centrifuged it twice; first at 1600 rpm for 15 minutes
(to extract red blood cells), and then at 2800 for 7 minutes (to extract platelets). Finally, 2 cc of leukocyte rich PRP was extracted. To estimate the concentration of the PRP extraction and negativity of any microbial contamination, the samples were sent to the hospital laboratory to be tested by Sysmex KX 21, a fully automated hematology analyzer. After results of blood sample analysis were obtained, the PRP preparation was injected to patients within an hour.

By the above-mentioned method, compared with whole blood, the concentration of platelets were found to have raised to 5 times of normal platelet count on average.

PRP injection:

Under sterile conditions, the patient received a PRP injection at maximal point at elbow using a peppering technique spreading in a clock-like manner to achieve a more expansive zone of delivery.

Group 2 (Autologous whole blood):

The patient is placed in an appropriate and comfortable position that allows for sterility and access to the site of injection.

Group 2 treatment protocol included a single injection of 2 mL of autologous peripheral whole blood under the same technique as the PRP group. Two ml of lidocaine 1% was injected 8 minutes before PRP or whole blood injection for patients in both groups.

Patients in both groups were observed in a supine position for 15–20 min afterwards to look for any adverse reaction to injection, then were discharged home.

No cortisone or nonsteroidal anti-inflammatories were prescribed during follow-up. For pain relief only, oral paracetamol and ice therapy were used. Patients of both groups were requested to refrain from heavy labor activities for a week. Tennis elbow strap (Oppo trademark) was administered for all patients and they were instructed to apply the strap 2 centimeters below the maximal tenderness point at elbow.

The patients were followed via weekly telephone calls and instructed how to use elbow splint and perform exercises. Three days after the injection, each patient was asked to start a simple program of extensor muscles stretching and 2 weeks after injection eccentric loading exercises were prescribed to be performed on an individual basis twice every day for 5 weeks. The patients were allowed to perform full activities of daily living after 4 weeks.
Outcome measures:

Pain intensity:

Pain severity was evaluated before injection and reevaluation was done at 4 and 8 weeks, after the injection. Visual analog pain scale (VAS) (range, 0 [no pain] to 10 [agonizing pain]). The validity and reliability of self-rating scales like the VAS have previously been well described [13,14]. Modified Mayo Clinic performance index score was used to evaluate functional outcome after the treatment.

Functional outcome measures:

Modified Mayo Clinic performance index:

“Modified Mayo Clinic performance index” for the elbow was used as a valid and reliable measure to evaluate the functional improvement after therapy [15,16]. The Mayo Clinic performance index for the elbow has 4 parameters: Pain, motion, stability and daily function. The maximum score is 100 and the minimum index is 0, the results are interpreted as excellent (>90), good (75-89), fair (60-74) and poor (<60). The pain parameter carries the highest points (45) (16). The modified mayo questionnaire was very specific to changes in elbow function. The questions were found to be reliable, reproducible and sensitive to change in elbow function[15]. Its construct validity is good for patient-rated variables and excellent for physician-rated variables. A minimal clinically important difference of 15 was reported for patients with rheumatoid arthritis after arthroplasty or synovectomy[17]. Mayo questionnaire was filled out via interviewing each patient before and after therapy.

PPT:

Pressure Pain Threshold (PPT) was assessed by algometer, Commander trademark. The PPT test is precise and reliable measurement reliable for assessing pain (Cronbach’s alpha ≥ 0.92) Pressure algometry has been shown to have good validity when assessed by pain and disability questionnaires (18). The algometer is comprised of a gauge attached to a hard rubber tip. Pressure was applied though the rubber surface area of 1 cm² at a rate of 2Kg/Cm² per second. The instrument was placed perpendicular to the skin’s surface. In each algometric assessment, we tested PPT at two different sites with 2 centimeters distance from each other at lateral epicondyle (site of maximal tenderness) and the mean of two values was considered as pain threshold. The method was demonstrated one time at each site before testing to ensure that the participants...
were familiar with the test. The participants were asked to indicate when the pressure became painful based on this definition: “When you feel the sensation changes from pressure to the slightest pain inform us.” Each measure site was tested three times with 2 minutes between each test, but the site was changed at each measure. The scale unit was Kg/cm².

Statistical analysis:

SPSS-16 (SPSS Inc Chicago, Illinois, United States of America) was used for data analysis. According to the Shapiro-Wilks normality tests, age, duration of symptoms, pain and functional measurements had normal distribution therefore parametric tests including T-test, also Fisher’s exact test were run to compare these variables between two groups at the beginning of the study. Elbow functional status and pain threshold variables were evaluated by using GLM repeated measure and Greenhouse-Geisser test ran to assess pain variables. P-value less than 0.05 was considered significant. The assessors filling out the questionnaire and performing PPT, also the statistician were blinded to the group of the patient.
Results:

Patients’ characteristics:

In this study, fifty six patients were initially evaluated and but 45 patients who had inclusion criteria entered the study and in the end, 40 patients completed the study and their data was analyzed (twenty patients in each PRP and autologous group) (CONSORT flow chart).

The mean age of patients was 46.25 ± 7.5 years old. Thirty two patients were female (80%) and 8 patients were male (20%). All patients were right handed. The mean duration of symptoms in both groups was 14.5 ± 3 months. The patients’ characteristics at study entry were shown in table 1. There were no between-group differences at baseline in demographic characteristics and pain intensity at baseline (table-1).

<table>
<thead>
<tr>
<th>Table-1: demographic characteristics of patients in PRP and AWB groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Groups</strong></td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Side of involvement</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
</tr>
</tbody>
</table>

PRP characteristics:

The mean platelets count of all patients at baseline was 220000/mm$^3$ ±23000, which increased to $990000±43000$(4.5 times) in PRP preparation.

Outcome measures:

All outcomes including VAS and Mayo scores and PPT were measured before intervention, then they were measured 4 and 8 weeks after initiating therapy in each group.

VAS score:

Pre intervention:

Pretreatment VAS score was 7.2±1.4 (mean± sd) in PRP group and 6.8±1.7(mean± sd) in AWB group.
Post intervention (4 week follow up):
Mean VAS score decreased to 4±2.4 (mean± sd) in PRP group and 3.6±2.4 (mean± sd) in AWB group, which was statistically significant for both groups (P<0.05).

Post intervention (8 week follow up):
Mean VAS score decreased to 2.7±2.4 (mean± sd) in PRP group (P<0.05). VAS score didn’t change significantly at 8 week follow up in AWB group.

Mayo score:

Pre intervention:
Mayo score was 58.4±15.1 (mean± sd) in group PRP and 50.9±20.4(mean± sd) in group AWB.

Post intervention (4 week follow up):
Mayo score improved to 72.2±16.4 in PRP group and 73.7±15.7 in AWB group which were statistically significant for both groups (P<0.05).

Post intervention (8 week follow up):
Mayo score improved to 82±12.3 in PRP group which was statistically significant (P<0.05). However, Mayo score didn’t change significantly in AWB group at 8 week follow up (P>0.05).

PTT score:

Pre intervention:
PTT score was 17.8±8.9 Kg/Cm$^2$ (178±89 N/Cm$^2$) (mean± sd) in PRP group and 15.5±5.2 Kg/Cm$^2$ (155±52N/Cm$^2$) (mean± sd) in AWB group.

Post intervention (4 week follow up):
Mean PPT score improved to 20±5.9 Kg/Cm$^2$ (200±59 N/Cm$^2$) (mean± sd) in PRP group and 19.7±5.9 Kg/Cm$^2$ (197±59N/Cm$^2$) (mean± sd) in AWB group, which were statistically significant for both groups (P<0.05).

Post intervention (8 week follow up):
PTT scores didn’t improve significantly in both groups at 8 week follow up (P>0.05).

Between group comparisons:
No statistically significant difference was noted between two groups regarding pain scores in 4 week follow up examinations (table-2, fig1-3).

However, at 8 week evaluations, pain improvement according to VAS and Mayo scores remained significant only in PRP group (Table-2, fig 1-3). PPT score did not improve significantly any further at 8 week follow up compared to 4 week in both groups.

Table-2:
Mean of VAS, Mayo and PPT scores compared between three group at baseline (VAS0,MAYO0, PPT0), at 4 week follow up(VAS4, MAYO4,PPT4) and at 8 week follow up (VAS8, MAYO8,PPT8). As it can be read from the table, at baseline and there is no difference between two groups regarding these variables, at 4 week follow up examinations, pain scores improved significantly in both groups but at 8 week follow up after, VAS and Mayo scores improved significantly only in PRP group.

<table>
<thead>
<tr>
<th>Group</th>
<th>VAS0</th>
<th>VAS4</th>
<th>VAS8</th>
<th>MAYO8</th>
<th>MAYO4</th>
<th>MAYO8</th>
<th>PPT0</th>
<th>PPT4</th>
<th>PPT8</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP</td>
<td>Mean ±SD</td>
<td>7.2±1.4</td>
<td>4±2.4</td>
<td>2.7±2.2</td>
<td>58.4±15.1</td>
<td>72.2±16.6</td>
<td>82.4±12.3</td>
<td>17.8±8.9</td>
<td>20±5.9</td>
</tr>
<tr>
<td>AWB</td>
<td>Mean ±SD</td>
<td>6.8±1.7</td>
<td>3.6±2.2</td>
<td>50.9±20.4</td>
<td>73.7±15.7</td>
<td>77.2±16.5</td>
<td>15.2±5.2</td>
<td>19.7±5.9</td>
<td>21±6.8</td>
</tr>
<tr>
<td>Test</td>
<td>GLM: repeated measure</td>
<td>Greenhouse-Geisser</td>
<td>Greenhouse-Geisser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-value</td>
<td>0.51</td>
<td>0.6</td>
<td>0.02</td>
<td>0.2</td>
<td>0.8</td>
<td>0.01</td>
<td>0.3</td>
<td>0.7</td>
<td>0.09</td>
</tr>
</tbody>
</table>
Discussion:

According to the results of our study, local injection of PRP and autologous whole blood into lateral epicondyle both leaded to significant improvement in subjective (VAS) and objective pain scores (pain pressure threshold (PPT) measured by algometer) at 4 week follow up examination in patients with lateral epicondylitis. Improvement in functional score was also noted according to Mayo Score. There was no statistically significant difference between these two groups regarding pain and functional improvement in short term follow up. However, at 8 week follow up examinations, this improvement in pain and functional status continued to be noted in VAS and Mayo scores only in PRP but not in control group. Mayo score improvement reached minimally clinically important difference reported for Mayo score change following therapy in inflammatory joint disease [17].

PPT score did not improve any further at 8 week follow up compared to 4 week significantly in both groups.

In a study by Edwards and Connell, the efficacy of autologous whole blood injection for pain relief in lateral epicondylitis was evaluated subjectively via Nirschl and VAS scale. Pain severity improved at the end of study, however, the mentioned studies lacked a control group [10,11]. In 2006, Mirsha and his colleagues evaluated treatment of chronic severe elbow tendinosis with PRP. Eight weeks after the treatment, patients who had received PRP noted 60% improvement in their visual analog pain scores versus 16% improvement in control patients[1]. Pain and functional improvement were not evaluated objectively in above-mentioned studies. The strong point of our study compared to previous similar ones is that pain improvement was assessed via objective measures in addition to subjective scales.

In another double blind randomized clinical trial in 2010, the greater effect of PRP versus corticosteroids injection was shown. According to visual analog scores and DASH Outcome Measure scores (DASH: Disabilities of the Arm, Shoulder, and Hand), treatment of patients with chronic lateral epicondylitis with PRP reduced pain and significantly increased function, more than corticosteroids[4].

Two RCTs were recently published in 2011 comparing autologous whole blood injection with PRP. In one of these RCTs, Thanassas evaluated the efficacy of PRP versus autologous blood in twenty-eight patients...
with tennis elbow. PRP and autologous groups received 3 ml of PRP and autologous whole blood respectively. Evaluation using VAS and Liverpool elbow score was performed at 6 weeks, 3 months and 6 months. Regarding pain reduction, PRP treatment seemed to be more effective and superior to autologous blood in the short term at 6 weeks [12] which is in agreement with the results of our study. However, in another study by Creaney L, no differences were noticed in pain and disability up to six months after PRP or autologous blood injection in 150 patients, but there was a higher rate of conversion to surgery in the autologous blood group (20%) versus the PRP group (10%) [19].

The differences in sample size, 28 in Thanasas and 150 in Creaney may be a potential reason for differences between these two studies. The method of PRP preparations could be another source of different results obtained by these studies. As it was stated, therapeutic PRP should have a platelet concentration 4-6 times greater than whole blood and that concentrations lower than this may suppress healing. Hence, lower concentration of PRP preparations (2.8 times whole blood) in the study by Creaney could contribute to the lack of significant differences found in their study compared to Thanasas and our study [12,19].

The effectiveness of PRP compared with corticosteroid injections in patients with chronic lateral epicondylitis was determined in a study by Peerbooms. He found that regarding pain reduction and functional improvement, corticosteroid was better initially and then declined, whereas the PRP group progressively improved, however this study also lacked a control group[4].

In a systematic review published in 2008, Thomas M Best evaluated the results of five prospective case series and four controlled trials (three prolotherapy, two polidocanol, three autologous whole blood and one platelet-rich plasma) for the treatment of refractory tennis elbow [20].

Three prospective case series assessing autologous whole blood reported significant (p<0.05) improvement compared with baseline.

In a non-randomised controlled trial[20] comparing a single treatment session of PRP with control injections, PRP subjects improved by a mean of 81% by 27 weeks. At 25.6 months, PRP patients further improved to 93% pain reduction compared with baseline.
Secondary outcome measures also improved in both PRP and whole blood groups. Mishra et al reported significant improvement on the Mayo Elbow-Performance Index after PRP therapy[3]. In the studies evaluated in this systematic review, whole blood injections reported significant improvement in functional scores and in maximal grip strength compared with baseline in the intervention groups.

They concluded that according to existing data for autologous whole blood and PRP injection, these therapies could be effective in treating tennis elbow, but as the authors concluded the results of this systematic review were limited by lack of large definitive clinical trials [20].

The exact mechanisms by which PRP initiates cellular and tissue changes are presently being investigated[22]. There is enough laboratory evidence of PRP effect on tendon healing [21]. PRP can stimulate processes associated with tendon healing. The proposed mechanism of action is the elicitation of a healing response in the damaged tendons by growth factors present in the blood [22]. These growth factors trigger stem cell recruitment, increase local vascularity and directly stimulate the production of collagen by tendon sheath fibroblasts. Increased production of endogenous growth factors have been found in human tendons treated with PRP [3,12,21]. The above mechanism helps explain why a single PRP application can have a lasting effect on the healing process as it was shown in previous works of other authors investigating the long term effect of PRP injection in chronic patellar or achille tendinopathy [23,24,25].

Conclusion:

The beneficial efficacy of autologous blood injection in reducing pain and improving function in patients with chronic lateral epicondylitis in 4 week follow up was similar and comparable to PRP injection. However, at 8 week follow up reexaminations, PRP treatment seems to be a more effective treatment with more persistent efficacy than autologous blood in relieving pain and improving function. Because PRP and whole blood are autologous and are prepared at the point of care, they have an excellent safety profile.

The limitation of our study was the relatively small number of cases included, absence of a control group receiving no intervention and short term follow up evaluations. The second phase of this study is now being conducted to evaluate the long term efficacy of PRP versus autologous blood at 8 months following...
Another limitation of current study, also all similar studies mentioned above is lack of control
group, hence whether these treatment approaches are superior to natural recovery remains unjustified.
We encourage more randomized clinical trials on this topic investigating the best technique of injection,
number and time of injections and number of platelets. Additionally, including control group who receive no
therapy may let investigate the real efficacy of PRP compared to no treatment.

Conflict of interests:

There was no contributorship or conflicts of interest for this study.

Funds: This research received no specific funding.

Figure legends:

Fig1. Mean of VAS at baseline in PRP and Autologous Whole Blood (AWB) groups at baseline, 4 weeks and 8 weeks
after therapy 4 weeks and 8 weeks after therapy

Fig2. Mean of Mayo score in PRP and Autologous Whole Blood (AWB) groups at baseline, 4 weeks and 8 weeks after
therapy

Fig3. Mean of Pain Pressure Threshold (PPT) in PRP and Autologous Whole Blood (AWB) groups at baseline, 4 weeks
and 8 weeks after therapy

Supplementary file: CONSORT flow chart

References:


8. Tate K, Crane D. Platelet rich plasma grafts in musculoskeletal medicine. *J Prolotherapy* 2010;2:371-6


Figure 1 - Estimated marginal means of VAS
Figure 1: Estimated marginal means of VAS
Figure 3 - Estimated marginal means of PPT
Additional files provided with this submission:

Additional file 1: PRP CONSORT.docx, 14K
http://biomedcentral.com/imera/1102465908107513/supp1.docx