

The Use of Platelet-Rich Plasma in Management of Chronic Tendinopathies**Elsayed Said, Ali Sayed, Mohammed A. Elfakharany*, Hamdy Tammam**

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Abstract

Background: Tendinopathy is a common chronic disorder in athletes and sedentary individuals affecting almost all tendons especially wrist extensors, supraspinatus tendon and Achilles tendon.

Objectives: Assessment the usefulness and efficacy of injecting platelet-rich plasma (PRP) as an alternative way of management of chronic tendinopathies not responding to medical or conservative management.

Patients and methods: The study included 60 patients with chronic tendinopathy. 20 patients with rotator cuff tendinopathy, 20 patients with Achilles tendinopathy and 20 patients with lateral epicondylitis, selected from Orthopedic Department, Qena university hospital, South Valley University, Qena Egypt. Clinical and radiological assessments were done to the included patients. Follow up was done 1 week, 1 month and 3 months after injection.

Results: The mean pain score was 2.1 ± 0.9 in patients with Achilles tendinopathy 3 months after injection (68% decrease) while mean joint score was 75.4 ± 16.2 (21.5% increase). Patients with rotator cuff tendinopathy had mean pain score 4 ± 1.8 (31% decrease) while mean joint score was 75.7 ± 15.1 (15% increase). Patients with lateral epicondylitis had mean pain score 3.3 ± 1.5 (90.9% increase) while mean joint score was 80.3 ± 13.4 (19% increase) There was statistically significant improvement in patients with Achilles and rotator cuff tendinopathies (P value < 0.05) while patients complaining of lateral epicondylitis have shown non-significant improvement regarding joint score (P value > 0.05).

Conclusion: PRP injection is a promising method of treatment in cases of Supraspinatus and Achilles tendinopathies and to a lesser extent in cases of lateral epicondylitis.

Keywords: Platelet-rich plasma (PRP), Achilles tendinopathy, Rotator cuff tendinopathy, lateral epicondylitis.

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Chronic painful tendon disorders are common in athletes and sedentary individuals (Alfredson and Spang, 2018). They are more common in middle-aged individuals, particularly among those who participate in sports. As increasing ages, they are becoming more frequent. Achilles tendon, patellar tendon, wrist extensors, and supraspinatus tendon are the commonly affected tendons. Previously, terms as "tendinitis" and "tendinosis" were used to describe pain around the tendon (van Dijk et al., 2011). More recently this concept has evolved, and the word "tendinopathy" has been proposed for the clinical diagnosis of pain accompanied by impaired performance and sometimes swelling in the tendon (Aicale et al., 2018).

Tendinopathy may occur due to extrinsic factors such as tendon overuse, excessive mechanical stimulation or due to pathological biochemical changes associated with metabolic diseases such as diabetes mellitus, hypercholesterolemia or gouty arthritis. (Malliaras, P., & O'Neill, S. (2017).

Choices of treatment usually change in parallel with physio-pathological discoveries regarding tendinopathy. PRP injection is a promising new method of treatment which is widely accepted by patients due to its safety and minimal risk of adverse effects. It is obtained from an autologous whole-blood sample through a platelet separation process forming an increased platelet concentration compared with the original whole-blood sample. (Zhou and Wang, 2016). The purpose of the study is to assess the usefulness and efficacy of PRP injection as an alternative method of management of chronic resistant tendinopathies not responding to medical or conservative management.

Patients and methods

This was a prospective study involved 60 patients with chronic tendinopathy around elbow, shoulder or ankle.

Setting: Orthopaedic department, Qena university hospital, South Valley University, Qena, Egypt.

Inclusion criteria: individuals aged above 20 years, diagnosed as symptomatic tendinopathy around shoulder, elbow or ankle and foot by clinical and radiological examination not responding to 3-month conservative and medical treatment and they should have normal platelet count.

Exclusion criteria was individuals with active infection, severe anaemia, malignancies, immune-compromised patients or patients received steroid injections around diseased area within 6 months.

Methodology

After full general and local examination, the patients were classified into three groups: group I consists of 20 patients diagnosed to have rotator cuff tendinopathy (9 males and 11 females), Group II consists of 20 patients diagnosed to have Achilles tendinopathy (5 males and 15 females) and Group III consists of 20 patients diagnosed to have lateral epicondylitis (7 males and 13 females). Each patient evaluated pre and post injection and after 1, 4, 12 weeks interval by the Constant-Murley Score for group I, foot and ankle disability index for group II and Mayo elbow score for group III.

Ten mls of venous blood was collected from every patient aspirated by syringe with needle diameter larger than 17 gauge (to avoid trauma to platelets during blood draw). It should be collected in sufficient amounts of Sodium citrate (2.7ml) as anticoagulant. Then, samples were centrifuged at 1000 g for 15 minutes. Then centrifugation for the second time was carried out at 3000 g for 7 minutes. The centrifuged product is usually stratified into three layers in its container. The buffy coat of white blood cells is at the top of a layer of packed red blood cell. The highest level of platelet concentration in the plasma presents just above that buffy coat and decrease in concentration toward the top of the plasma layer. Injection of Platelet-rich plasma should be within 1 hour after separation (to avoid pH changes).



Fig.1. Layers of the centrifuged product of whole blood.

All patients in the study have been injected by PRP only one time.

Statistical analyses

Data were analyzed using Statistical Program for Social Science (SPSS) version 25.0. Quantitative data were expressed as mean \pm standard deviation (SD). Qualitative data were expressed as frequency and percentage. Paired t-test of significance was used when comparing pre-injection and post-injection. Level of significance was considered at $p < 0.05$.

Ethical approval

The study protocol was approved by Ethical Committee of Faculty of medicine, South Valley University and written informed consent was taken from each patient.

Results

Sixty patients including (21 males and 39 females), mean age of all studied patients was 44 ± 11.3 years. Patients were divided into three groups according to anatomical area and diagnosis. Group I consists of 20 patients diagnosed to have rotator cuff tendinopathy (9 males and 11 females). This group of patients have shown significant improvement in form of pain and the total score according to Constant-Murley Score. Pain score (VAS) mean has decreased from 5.8 ± 0.8 pre injection to 3.2 ± 1.6 three months after injection (P value is 0.02). Constant score mean has increased from 64.3 ± 13 pre injection to 80.5 ± 10.7 three months after injection. (P value is 0.009). Group II consists of 20 patients diagnosed to have Achilles tendinopathy (5 males and 15 females). This group of patients have shown significant improvement in form of pain and the total score according to FADI (foot and ankle disability index). Pain score (VAS) mean has decreased from 6.6 ± 1.1 pre-injection to 2.1 ± 0.9 three months after injection (P value 0.000). FADI mean has increased from 59.2 ± 8.7 Pre injection to 75.4 ± 16.2 three months after injection (P value is 0.005). Group III consists of 20 patients diagnosed to have lateral epicondylitis (7 males and 13 females). This group of patients show improvement in form of pain and the total score according to Mayo Elbow performance score. Pain score (VAS) mean has decreased from 6.3 ± 0.6 pre injection to 3.3 ± 1.5 three months after injection (P value is 0.04). Mayo score mean has increased from 65 ± 5 pre injection to 80.3 ± 13.4 three months after injection. (P value 0.1).

Table 1. Pain score changes for shoulder: -

Pre injection	Post injection		
	After 1 week	After 1 month	After 3 months
5.8 ± 0.8	4.8 ± 1.2	4 ± 1.8	3.2 ± 1.6
P value	0.01*	0.03*	0.02*

Percent change	20.8% decrease	31% decrease	45% decrease
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Table 2. Constant score changes for shoulder:

Pre injection	Post injection		
	After 1 week	After 1 month	After 3 months
64.3± 13	74.2 ± 17	75.7 ± 15.1	80.5 ± 10.7
P value	0.02*	0.01*	0.009*
Percent change	13.3% increase	15% increase	25% increase

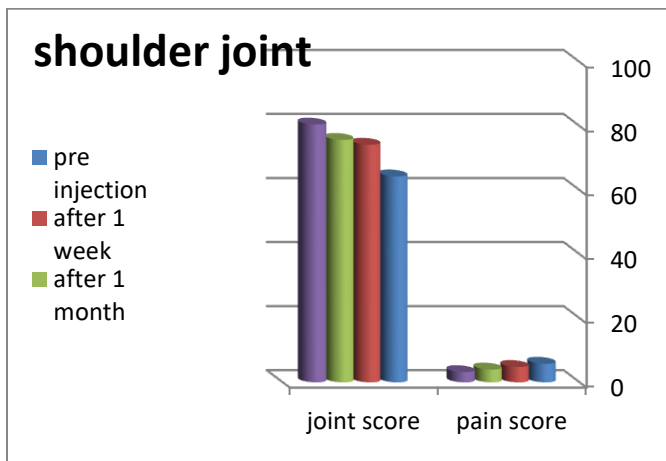


Fig.2. Comparison between pre-and post-injection pain score and constant score.

Table 3. Pain score changes for the ankle:

Pre injection	Post injection		
	After 1 week	After 1 month	After 3 months
6.6± 1.1	4.5± 1.4	3 ± 1.3	2.1 ±.9

P value	0.000	0.000	0.000
Percent change	32% decrease	55% decrease	68% decrease

Table 4. FADI changes for the ankle

Pre injection	Post injection		
	After 1 week	After 1 month	After 3 months
59.2± 8.7	64.8± 15.9	70.3 ± 16.3	75.4 ±16.2
P value	0.3	0.06	0.005*
Percent change	8.6% increase	15.8% increase	21.5% increase

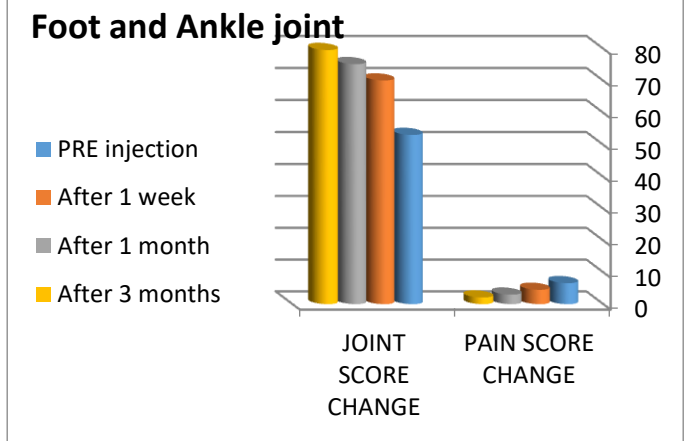


Fig.3. Comparison between pre- and post-injection pain score and FADI.

Table 5. Pain score changes for Elbow:

Pre injection	Post injection		
	After 1 week	After 1 month	After 3 months
6.3± .6	5.7± .6	3.7± 1.5	3.3 ±1.5
P value	0.4	0.05	0.04*

Percent change	10.5% decrease	70% decrease	90.9% decrease
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Table 6. Mayo score changes for elbow:

Pre injection	Post injection		
	After 1 week	After 1 month	After 3 months
65± 5	66.7 ± 2.9	66.7 ± 10.4	80.3 ± 13.4
P value	0.4	0.1	0.1
Percent change	2.5% increase	2.5% increase	19% increase

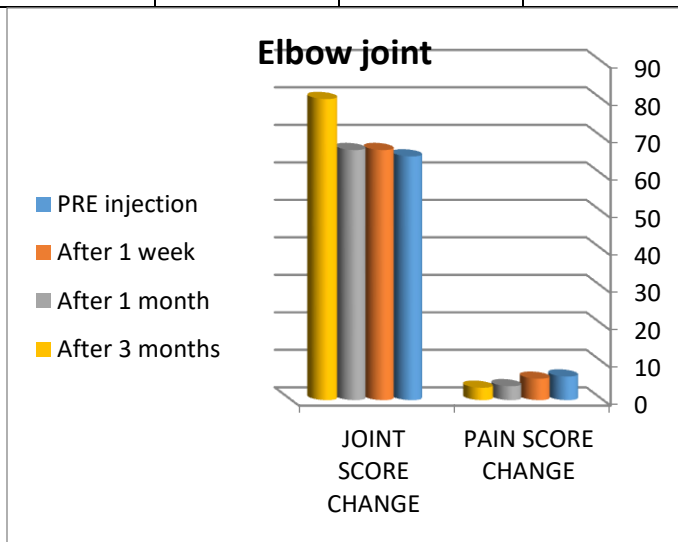


Fig.4. Comparison between pre-and post-injection pain score and Mayo score.

Discussion

Tendinopathy is a multifactorial, broad spectrum of tendon disorders characterized by chronic tendon pain and local tenderness related to activity. It is a leading cause of pain, disability and diminished daily activities in athletes and general public with strenuous use of tendons. Many trials and

modalities of treatment are studied to avoid the surgical choice such as physiotherapy, NSAIDs and/or ESWT. Local injection is widely used and studied but the diversity of results has led authors to establish further studies. PRP is recently introduced to medical field and has proved its efficacy in a lot of medical fields as orthopaedics, sport medicine, ENT, open-heart surgeries ophthalmology and wound healing. So, we -in this study- have tried to detect the efficacy of injecting PRP as an alternative method of management of chronic tendinopathies not responding to medical or conservative management through this study.

The purpose of this study is to evaluate the effectiveness of PRP injection in patient who have complained of Achilles tendinopathy, rotator cuff tendinopathy and lateral epicondylitis. This study was done over 60 patients complaining of these tendinopathies.

Concerning Rotator cuff tendinopathy, Single injection of PRP was done by (Rhaet al., 2013) to 39 patients (aged 36:79 years) who were grouped into the platelet-rich plasma injection (n = 20) and dry needling (n = 19) groups. This study revealed that the clinical effect of the platelet-rich plasma injection was superior to the dry needling from 6 weeks to 6 months after initial injection ($P < 0.05$). (Shams et al., 2016) had a study over 40 patients who is grouped into 2 groups. 20 patients were injected one time at subacromial space by PRP and the other 20 patients was injected by corticosteroid. All patients were followed up using the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES), the Constant–Murley Score (CMS), the Simple

Shoulder Test (SST) and a Visual Analog Scale (VAS) for pain. This study demonstrated that

PRP injection has significantly better results than steroid injection at long-term follow up. Our results were similar to these studies as we have injected 20 patients complaining of rotator cuff tendinopathy who have shown significant improvement in form of pain as VAS score has decreased from 5.8 ± 0.8 pre injection to 3.2 ± 1.6 three months after injection (P value is 0.02) and the functional score according to Constant-Murley Score has increased from 64.3 ± 13 pre injection to 80.5 ± 10.7 three months after injection (P value is 0.009).

Concerning Achilles tendinopathy, (Guelfi et al., 2015) evaluated 73 patients (age 43 ± 17.5 years) diagnosed to have mid-portion Chronic Recalcitrant Achilles Tendinopathies (CRAT) treated with administration of single platelet-rich plasma (PRP). This study revealed that there was a significant improvement of pain after injection of PRP at a long term follow up without any report about tendon rupture (indicates its safety).

(Filardo et al., 2014) had a study over 27 patients affected by chronic mid-portion Achilles tendinopathy. They were treated with ultrasound-guided intra-tendinous injections of PRP. This study revealed that there was a significant improvement of pain after injection of PRP at a long term follow up. Our results were similar to these studies as we have injected 20 patients complaining of Achilles tendinopathy who have shown significant improvement of pain as VAS score has decreased from 6.6 ± 1.1 pre-injection to 2.1 ± 0.9 three months after injection (P value 0.000) and functional score according to FADI has increased from 59.2 ± 8.7 Pre injection to 75.4 ± 16.2 three months after injection (P value is 0.005)

(De Vos et al., 2010) had a study over 54 patients treated at a single centre. Patients are grouped into

two groups; PRP injected group and saline injected group (placebo group). Unlike our results, this study concluded that PRP injection did not provide greater benefit compared with placebo.

Concerning Lateral epicondylitis (tennis elbow), (Lai et al., 2018) had a study of 28 patients divided into 2 groups; one was injected by autologous whole blood and the other was injected using PRP. This study concluded that PRP treatment is an effective treatment for chronic lateral epicondylitis and superior to autologous blood.

(Gautam et al., 2015) had a study over 30 patients (18:60 years old) who were randomized to receive single injection of PRP (n=15) or Corticosteroid (n=15). It showed that PRP appeared to enable biological healing of the lesion, whereas corticosteroid appeared to provide short-term relief of the symptoms but resulted in degeneration of the tendon.

We have injected 20 patients who were diagnosed to have lateral epicondylitis who have shown improvement in form of pain as VAS score has decreased from 6.3 ± 0.6 pre injection to 3.3 ± 1.5 three months after injection (P value is 0.04) and the functional score according to Mayo Elbow performance score has increased from 65 ± 5 pre injection to 80.3 ± 13.4 three months after injection. (P value 0.1).

None of our patients have shown injection site infection or tendon rupture (just local pain or discomfort after injection which was relieved in hours) which indicate its safety.

A shortcoming of the study is that the follow up was not supported with any investigation tool as ultrasound or MRI so, we could not assess if there is significant change in tendon healing or not. Another limitation of the study is that the sample size was relatively small with short term follow up.

Conclusion

PRP injection is a very efficient method of treatment of chronic tendinopathies. It achieves a significant improvement in cases of Achilles tendinopathy, Rotator cuff tendinopathy and to a lesser extent in cases of lateral epicondylitis.

Conflict of interest

The authors of the study have no conflict of interest related to this publication.

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