

## A new treatment method of chronic Achilles tendinitis: PRP trigger point injection

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**Abstract: Objective:** To investigate the clinical efficacy of treatment of chronic Achilles tendinitis with PRP local trigger point injection. **Methods:** 8 chronic Achilles tendinitis patients were included in our study from December, 2010 to March, 2012, all patients were treated with autologous PRP trigger point injection, the follow-up time was 3-15 months and the average time was 7.5 months. The function of foot ankle was evaluated with VISA-A score, FFI index and MRI image before and after injection. There were no other medications and functional exercise of patients followed the guidance of the physician. **Results:** one week after injection, the pain relieved obviously, but the pain still existed in non-injection site. All patients underwent trigger point injection more than 2 times. The Validated Victorian Institute of Sports Assessment-Achilles (VISA-A) score and foot function index (FFI) of patients were improved significantly at 3 months and the final follow-up time ( $P < 0.001$ ). At last, 3 patients have resumed normal work, 2 students have been able to walk properly and reached the functional requirements for school, another 3 patients have good function. All patients have residual pain inside of heel, but it does not affect their normal life. MRI results showed that the soft tissues around the Achilles tendinitis have been significantly improved. **Conclusion:** Treatment of chronic Achilles tendinitis with autologous PRP achieved good results. MRI results showed significant improvement of the local soft tissue inflammation.

[Guoyou Zou, Minqian Zhen, Ruli Zhu, Jun Yin, Biao Ji, Xiaozu Xu. **A new treatment method of chronic Achilles tendinitis: PRP trigger point injection.** *Life Sci J* 2013;10(3):2274-2277]. (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 335

**Keywords:** chronic Achilles tendinitis; PRP trigger point; MRI

### 1. Introduction

Achilles tendinitis is a common disease for sports enthusiasts (Alfredson et al., 1998; Castillo et al., 2011), it is estimated that 30-50% sports injuries are tendon disorders (Costa et al., 2005). Achilles tendon injuries often stop movement and affect daily life (Courville et al., 2009). For this disease, conservative treatment has poor outcome, 25-40% patients require surgical treatment (Alfredson et al., 1998; Courville et al., 2009). The mechanism of Achilles tendinitis is still unclear (Alfredson et al., 1998; Castillo et al., 2011). The histological examination showed the existence of abnormal tissue repair and degeneration. Anti-inflammatory drugs didn't achieve good results for chronic tendon diseases (Alfredson et al., 1998), so people place high hopes on PRP local injection (Gaweda et al., 2010). The blood platelet which was extracted from whole blood can release a variety of growth factors to repair soft tissues (Roukis et al., 2006).

This study is to investigate the clinical effects of therapy of chronic Achilles tendinitis with PRP trigger point injection, including pain relief, functional improvement and imaging changes.

### 2. Materials and methods

#### 2.1 General information

Eight chronic Achilles tendinitis patients were included in our study, the diagnosis of chronic

Achilles tendinitis was confirmed, according to medical history and imaging data. The clinical manifestations of Achilles tendinitis are as follows: abnormal gait, pain exists with walking, the painful point located around Achilles tendon and heel; tenderness, local swelling, low skin temperature. MRI shows high signal intensity of T2 in and around Achilles tendon attachment point. The gout, Achilles tendon rupture, rheumatoid and osteoarthritis were excluded during diagnostic process. The medical history of all patients was more than one year (1-3 years, the average time was 1.5 years), 5 patients stopped study and work as pain (3 cases of students, one case of soldiers, and one case of worker). Before PRP therapy, patients tried a variety of treatments, including non-steroidal analgesic drug, local blocking of glucocorticoid, physical therapy, microwave shock, the effects are not ideal.

This study was approved by the ethics committee of our hospital. Before therapy, all patients were informed: 1) Achilles tendinitis treatment with PRP is a new treatment program, but it has theoretical basis; 2) Patients should cooperate researchers to accept follow-up, in order to summarize the clinical experience; 3) PRP use autologous blood, there is no risk of infection and rejection; 4) All patients sign informed consent.

## 2.2 PRP preparation

20 ml venous blood were extracted from patients, and placed into 5 ml anticoagulant tube, then PRP were prepared with two-step centrifugal method (Landesberg et al.,2000;Petrunaro et al.,2001), the centrifugal conditions were 250 g, 10 min and 1500 g, 6 min. After the first centrifugation, leukocytes and erythrocytes were collected in a new tube for the second centrifugation. The whole blood, PRP and platelet-poor plasma (PPP) were added in automatic blood analyzer to detect the content of platelet and leukocyte. 0.5 ml PRP were extracted from one tube.

## 2.3 Local trigger point injection

PRP was performed aseptic detection firstly. Then the patients were local disinfected, and the pain points were determined (3-5 points, the average was 4.5 points). The trigger point injection was conducted with 22 gauge needle, and the amount of PRP was assigned based on pain. After local injection, patients did ankle activities, the no heavy burden activities of ankle were not restricted and patients didn't need other medications. Patients could loaded walk one week after injection. If pain appeared one and two week after the first injection, patients would perform PRP injection again.

## 2.4 Follow-up

The patients were followed-up at outpatient three months after treatment. 6 months and 12 months later, patients were followed-up by telephone or at outpatient. Validated Victorian Institute of Sports Assessment-Achilles (VISA-A) score system (0-100 points, the higher the score, the less obvious the pain, the stronger the activity) and foot function index (FFI, 0-100 points, the higher the score, the more obvious the pain, the weaker the activity) were used to evaluate the function of ankle before injection and at each follow-up.

## 2.5 MRI examination

All patients underwent MRI to confirm Achilles tendonitis before treatment, and did MRI again to observe the changes of local soft tissues 3 months after treatment.

## 3. Results

### 3.1 Blood cell composition

The contents of platelet and leukocytes were  $(257\pm 40)\times 10^9/L$  and  $(7.2\pm 0.6)\times 10^9/L$  in whole blood, respectively, and  $(1643\pm 180)\times 10^9/L$  and  $(40.6\pm 2.4)\times 10^9/L$  in PRP, respectively; and the contents in PRP were 6.8 times and 5.5 times of whole blood ( $P<0.05$ ). The contents of platelet and leukocytes were  $(28.0\pm 4.0)\times 10^9/L$  and

$(0.4\pm 0.1)\times 10^9/L$  in PPP, which were significantly less than the contents in whole blood and PRP ( $P<0.05$ ).

### 3.2 Bacterial detection

There were no bacteria in PPP culture, and there were no symptoms of redness, swelling, heat and pain in the PRP injection site.

### 3.3 Clinical results

All patients were followed-up for at least 3 months (3-12 months, the average time was 6.5 months), all of them didn't take non-steroidal drugs. The pain was significantly improved within one week, but still existed, the examination revealed the location of pain was not the previous injection site; however, it still needs to inject PRP again. After the second therapy, the pain has not disappeared in three patients at the third week, so using local injection again. The pain points of the third week had some overlap with the previous two times. There was no tenderness in four patients after three treatments; another four patients presented limitation of tenderness, however, the pain was not serious, the gait was normal, it didn't affect the normal life and work. The swelling was significantly regressed at Achilles tendon attachment points and heel one week after treatment, there was no difference compared with contra lateral. At last follow-up, the soldier continued to service of clerical work; the worker returned to work, the pain existed inside of heel with walking; one student resumed his study; another 2 students will be back to school soon. All patients felt pain inside of heel when they walk over 30 min, and the pain will increase if they walk over 2 h, however, the symptoms will be relieved if patients reduce activity.

### 3.4 Scoring results

The average of VAS-A was  $16.2\pm 4.4$  points before treatment, and  $54.4\pm 6.5$  points 3 months after treatment ( $P=0.001$ ). There was no significant difference between 3 months after treatment and the last follow-up ( $P=0.45$ ). The FFI was  $64.5\pm 5.2$  points before treatment, and  $32.3\pm 4.5$  points 3 months after treatment ( $P=0.005$ ). The FFI was  $34.3\pm 2.5$  points at the last follow-up, there was no significant difference between 3 months after treatment and the last follow-up ( $P=0.62$ ).

### 3.5 MRI results

The MRI showed that the inflammation around Achilles tendon was faded away (Figure 1 and 2). The disease was improved by MRI through the diagnosis of two experts. The main feature was that T2-weighted high signal intensity of soft tissues around the Achilles tendon subsided; the disorders of

heel soft tissues were improved. The calcaneus marrow of Achilles tendon attachment points have also improved.

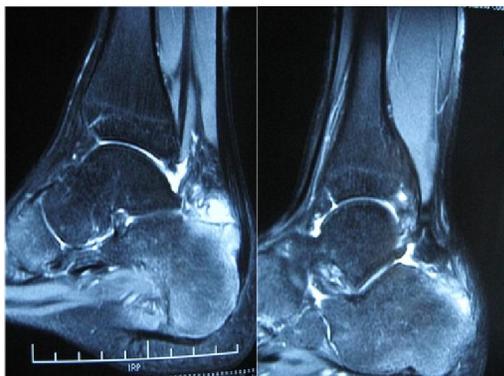


Fig 1. Before treatment.



Fig 2. After treatment.

#### 4. Discussion

For chronic Achilles tendinitis, there are lots of conservative treatments, including non-steroidal drug, extracorporeal shock wave therapy, local blocking, physical therapy, botulinum toxin treatment, local injection of glucocorticoid, but the effects are not ideal; therefore, about 25-40% patients need surgical treatments(Alfredson et al.,1998;Castillo et al.,2011;Costa et al.,2005). Autologous PRP have features of simple operation, low complications, relatively effective and inexpensive. It has been reported that PRP could promote the healing of the tendon tissues (Anitua et al.,2005;Smith et al.,1994), from chronic Achilles tendinitis samples researcher found that the inflammatory cells didn't exist in the tissues, and the normal tissue repair process was inhibited, vascular endothelial growth factor receptor-1 and 2 (VEGFR-1 and 2) were significantly increased, which might be the mechanism of chronic Achilles tendinitis. Theoretically, PRP can release a variety of biologically active growth factors, such as platelet-derived growth factor, deformation growth factor-beta, fibroblast growth factor, vascular endothelial growth factor, insulin-like growth

factor-1 and epidermal growth factor, which play an important role in tissue regeneration.

It has been reported that the effects of treatment of chronic Achilles tendinitis with PRP were different. *Devos*, et al(2010)reported that there was no significant difference of treatment of Achilles tendon between PRP group and saline control group, although the treatment of two groups has been improved. On the contrary, *Monto*, et al proved that PRP had good effects for chronic Achilles tendinitis through functional assessment and MRI (Monto 2010). *Gaweda*, et al followed-up 14 patients who had central Achilles tendon diseases for 18 months, and found that the AOFAS hindfoot score had been improved significantly, so did the ultrasound(*Gaweda* et al.,2010). *Richard F. O* found that the pain was relieved significantly after PRP injection, but MRI wasn't improved (*Richard* et al.,2011).

In our study, the pain still existed after the first PRP injection, but not located in the injection site. We believed that our patients had long medical history and extensive pain, and the tenderness of pre-treatment was serious, it needs multi-point injection. The average injection points were 4.5 at the first time, and the injection site was the most obvious parts of the palpation pain. The average injection points were 2.5 at the second time, and the pain was less serious than the first time. We concluded the experience after treatment of two patients, we informed patients that pain would occur in non-injection sites, so the patients found that the pain was not the same as the previous one, they had confidence for the treatment and would like to cooperate with treatment, and this is also why we didn't lose the follow-up. Some researchers used ultrasound to locate the lesion site and inject PRP(*Thanasas* et al.,2011), we believed the pain sites were too wide in those patients; it was not punctuate pain or punctuate lesions. The reason for different results is that one PRP injection with ultrasonic location could not effectively relieve pain. The specific PRP injection times and injection sites are not still reported (*De Vos* et al.,2010;*Monto* 2010). We believe the pain range of chronic Achilles tendinitis is wide and single injection is not able to achieve good results.

The foot heel had different degrees of swelling compared to contra lateral in our patients, the swelling was significantly subsided after the first PRP multi-point injection, and it disappeared one week later. Even the local pain increased with walking, there was still no swelling, and the specific mechanism is unclear.

The MRI quality has been greatly improved 3 months after injection, but there was still difference compared to normal MRI imaging. MRI is an

important and sensitive method in diagnosis of soft tissue diseases; it is able to detect lesions through local signal changes (Richard et al.,2011). Scholars found that the plantar fasciitis was improved gradually with time (Peter 2012), which is inconsistent with our results. However, the follow-up time of our study is not long, it still needs further observation.

The chronic Achilles tendinitis is a disease with extensive lesions, therefore, it needs multiple injection of PRP to obtain better clinical and imaging results.

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9/14/2013