

# *Evaluation on Clinical Effect of Platelet Rich Plasma in Treatment of Non-infective Bone Ununion*

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**Keywords:** non-infective bone ununion; platelet rich plasma; clinical effect

**Abstract:** **Objective:** to explore curative effect of platelet rich plasma on non-infective bone ununion. **Method:** this research was conducted from January 2016 to October 2017. 80 patients with non-infective bone ununion in the research period were chosen as the object of research, and they were classified into control group (40 cases, conventional therapy) and observation group (40 cases, conventional therapy + platelet rich plasma treatment) with random number method. After the treatment, the effect was observed and inter-group evaluation and comparison were conducted. **Results:** bone fracture healing time of patients in the observation group was (5.46±1.36)M, shorter than that of control group ((8.16±1.21)M). Besides, bone fracture healing rate of patients in the observation group after 3M was 82.50%, significantly higher than the control group (45.00%). The inter-group difference was significant (P<0.05). **Conclusion:** platelet rich plasma has good clinical effect on treatment of non-infective bone ununion, so it deserves to be promoted and applied in similar diseases.

There are many factors influencing non-infective bone ununion. Under the multiple factors, bone ununion may happen easily. Then, patients' recovery and prognosis will be seriously influenced. Thus, non-infective bone ununion has been the key topic of orthopedics research. This research is based on the author's practical work. This research was conducted from January 2016 to October 2017 to analyze the application effect of platelet rich plasma in non-infective bone ununion. This research aims to summarize the treatment details and offer reference for relevant clinical work. The research details are reported as follows.

## **1. Data and Method**

### **1.1 General data**

This research was conducted from January 2016 to October 2017. 80 patients with non-infective bone ununion in the research period were chosen as the object of research, and they were classified

into control group (40 cases) and observation group (40 cases) with random number method. The age of 40 patients in the observation group was 28-55, with the average age of  $42.31\pm 2.13$ . There were 19 female patients and 21 male patients. Patients' fracture gap was  $(2.65\pm 0.57)$ , and the bone union time was  $(9.58\pm 2.15)$ M. The age of 40 patients in the control group was 28-56, with the average age of  $42.48\pm 2.09$ . There were 18 female patients and 22 male patients. Patients' fracture gap was  $(2.66\pm 0.58)$ , and the bone union time was  $(9.59\pm 2.11)$ M. The patients in both groups had no infection. The inter-group age distribution, bone union time and age distribution were compared. The inter-group conditions were similar ( $P>0.05$ ).

## 1.2 Method

Conventional therapy was implemented for the control group. Patients' injured limb was immobilized, and meanwhile the patients were guided to walk with load. The patients were observed continuously.

Conventional therapy and platelet rich plasma (PRP) treatment were conducted for the patients in the observation group. The conventional therapy was same with the control group. During treatment with platelet rich plasma, plasma was prepared firstly. The disposable syringe was used to draw 50ml blood sample from patients' antecubital vein. 2ml heparin saline water was filled in the disposable syringe in advance. The model of syringe needle was 18G. The blood sample was placed in PRP centrifugal tube for centrifugal treatment. The centrifugation radius was 15cm, and the centrifugation speed was  $2000\text{r}/\text{min}$ <sup>[1]</sup>. After centrifugation, the whole blood was divided into 3 layers. The supernate was in the upper layer, and erythrocyte was in the bottom layer. The middle layer was PRP layer which presents light yellow generally. The air hole of centrifugal tube was opened, and 20ml injector was connected with the sucker hole in the centrifugal tube to draw about 18ml erythrocyte<sup>[2]</sup>. The remaining blood went through centrifugal treatment again with the above method. Then, albuginea-like substance would appear on the surface of bottom erythrocyte. The substance is the deposit layer of blood platelet and leukocyte. The upper part is plasma layer which is generally transparent. The air home was opened again, and 20min injector was chosen to connect the sucker hole in the middle of centrifugal tube. The upper plasma in the centrifugal tube was taken. The remaining 5ml plasma was put still for a while. Then, the centrifugal tube was vibrated for about 5min. The blood platelet fully suspended in the remaining plasma. Then, RPR was gained<sup>[3]</sup>.

After PRP was gained, the patients were treated in the operating room. Firstly, disinfection treatment was conducted for the patient's diseased limb. Then, lidocaine (concentration 2%) was used for local infiltration anesthesia. Meanwhile, C-type X-ray machine was used for test. The puncture needle went to the patient's fracture part, and 5ml PRP was injected. After 3W, the same injection was conducted for the patient. After the completion of treatment, conventional treatment was done for the patient's wound, and the orthosis was used to fix. In a short time, walking with load would not be implemented<sup>[4]</sup>. After 3M, the treatment conditions of both groups were reexamined.

## 1.3 Observation indexes

After the treatment for both groups, the effect was observed and inter-group comparison was carried out. (1) Fracture healing time of patients in both groups was observed. The numerical values were recorded for both groups and comparison was conducted. (2) X-ray was used to reexamine the patients, and fracture healing rate of both groups after 3M was evaluated. (3) The occurrence rate of deep venous thrombosis and other relevant complications in both groups was observed, and inter-group statistical comparison was carried out<sup>[5]</sup>.

## 1.4 Statistical analysis

SPSS 25.0 software was used to process the data. The measurement data were expressed with  $(\bar{x} \pm s)$ , and tested with t test. n statistics was used for the enumeration data, and the data were tested with  $\chi^2$ .  $P < 0.05$  means there is statistical significance.

## 2. Results

### 2.1 Comparison of fracture healing time

Fracture healing time of observation group was shorter than that of control group, and inter-group comparison had significant differences. The detailed data are shown in Tab.1.

Tab.1 Comparison of fracture healing time ( $\bar{x} \pm s$ ) (M)

Group	Fastest healing	Slowest healing	Fracture healing time
Control group	2.5	7.8	5.46±1.36
Observation group	7.0	9.5	8.16±1.21
t	/	/	9.38
P	/	/	<0.05

### 2.2 Comparison of fracture healing rate after 3M

Fracture healing rate of observation group after 3M was 82.50%, that is, 33 patients healed. Fracture healing rate of observation group after 3M was 45.00%, that is, 18 patients healed. The inter-group comparison difference was significant ( $\chi^2=12.17$ ,  $P < 0.05$ ).

### 2.3 Comparison of complication occurrence rate

There was no complication in the observation group, while deep venous thrombosis happened to 2 patients in the control group. The complication occurrence rate was 5.00%. The inter-group comparison difference was not significant ( $\chi^2=2.05$ ,  $P > 0.05$ ).

## 3. Discussion

There are many reasons for non-infective bone ununion. Firstly, muscular tissues of fracture part are few, and fracture may happen under the external load effect with high energy. Besides, local blood supply is destroyed. Secondly, in clinic, the operation is a common treatment method. If the operation in the surgery is rude, and stripping happens extensively. This may lead to bone ununion. Thirdly, patients' immunity is poor, and bone ununion may easily happen after fracture treatment<sup>[6]</sup>.

As a common complication of late period of fracture, bone ununion will cause patients' local amyotrophy and even lead to traumatic arthritis, chronic osteomyelitis or loss of limb function. These not just seriously affect patients' living quality, but also bring about heavy burden to patients' families. Hence, timely clinical treatment is required. Conventional methods include conservative exercise and orthosis intervention. Although there is certain effect, most patients are still difficult to recover in time after conventional treatment<sup>[7]</sup>. PRP is gained through autobody sample treatment. Such plasma contains multiple high-concentration growth factors. High-concentration growth factors can promote cell proliferation and differentiation. The application of PRP in non-infective bone ununion treatment can stimulate mitosis of patients' bone marrow stem cells, make the number of bone cells increase significantly in a short time, then promote the secretion and form extracellular

matrix<sup>[8]</sup>. In addition, TGF- $\beta$  in PRP can work on patients' bone marrow stem cells and enhance the activity and quantity of osteoblasts. Under the certain content, osteoblasts can further secrete TGF- $\beta$  which can well stimulate the formation of bone cells. Therefore, under the joint action of multiple factors, PRP applied in non-infective bone ununion treatment can play a role from different perspectives, facilitate patients' inostosis and help them recover<sup>[9]</sup>. The research result showed that, fracture healing time of patients in the observation group was (5.46 $\pm$ 1.36), shorter than that of control group ((8.16 $\pm$ 1.21)M). Besides, bone fracture healing rate of patients in the observation group after 3M was 82.50%, significantly higher than the control group (45.00%). The inter-group difference was significant (P<0.05). The above results are consistent with the researches of Qianf Yi and Yuan Zhi<sup>[10]</sup>. All these results prove the value of PRP in non-infective bone ununion treatment.

In conclusion, PRP has significant effect in non-infective bone ununion treatment. It can facilitate patients' fracture healing, and significantly improve healing rate within a short time. Besides, it is safe. Therefore, PRP deserves to be promoted and applied.

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