



## PERCEIVABLE RADIOLOGIC IMPROVEMENT BY PLATELET-RICH PLASMA TREATMENT IN SEVERE KNEE OSTEOARTHRITIS

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### Article Info

Received 15/07/2015

Revised 27/08/2015

Accepted 05/09/2015

**Key words:** Platelet-rich plasma, Knee, Osteoarthritis, Roentgenogram.

### ABSTRACT

Osteoarthritis is a common cause of physical disability after 65 years old. Due to the possible contribution to the healing process, it is important to investigate platelet-rich plasma (PRP) method which is based on obtaining a high concentration of platelets from a patient's own blood plasma and being applied to the damaged area. Here we presented a 66 years old patient with a perceivable radiologic improvement in knee roentgenogram 2 years after the application of PRP. It is known that PRP delays the progression of the osteoarthritis, but we think that possibility of such a significant improvement in roentgenograms is very low.

### INTRODUCTION

Osteoarthritis (OA) affects 12.1 % of the population from 25 to 74 years old and it is the primary cause of physical disability after 65 years old. (Gobbi A et al) [1]. Physical therapy, oral and topical non-steroidal anti-inflammatory drugs, intra-articular corticosteroids and hyaluronic acid (HA) are the conservative treatment options of OA and these options have yielded short-term efficacy with local or systemic side effects. (Gobbi A et al) [1]. Importance of the preventive interventions and the therapeutic options for bone and cartilage pathologies that regenerate tissue homeostasis and retard progression to OA is increased. (Gobbi A et al) [1]. Important phases of soft tissue and bone injuries are inflammation and cell proliferation. Due to the possible contribution to this healing process, it is important to investigate platelet-rich plasma (PRP) method which is based on obtaining a high concentration of platelets from a patient's own blood plasma and being applied to the damaged area. Platelet and the plasma include growth factors and cellular signal factors supporting homeostasis and wound healing. (De Vos RJ et al, Foster TE et al) [2,3]. In animal models,

application of PRP has been shown to promote cartilage healing. (Milano G et al) [4]. In spite of the positive results, studies in humans are limited because of the study designs and the lack of number of subjects.

Here we presented a patient with a perceivable radiologic improvement 2 years after the application of PRP.

### CASE REPORT

A 66 years old female patient who had pain and stiffness complaints in her both knees for 7 years admitted to our clinic. Body mass index of the patient was 31. Flexion of the knees was 130 degrees and the extensions were not limited. According to visual analog scale (VAS) pain at activity was 7 and pain at rest was 5. Patient's Western Ontario and McMaster Universities (WOMAC) (Bellamy N et al) [5] score was 75. In the roentgenogram, she had grade 4 (*grade 4*: large osteophyte, severe narrowing of joint space, distinct subchondral sclerosis of the bone and cysts) knee osteoarthritis according to the Kellgren-Lawrence classification. (Kellgren JH et al) [6]



(Figure 1). She didn't have systemic disorders such as coagulopathy), cardiovascular diseases, infections, immunodeficiency, use of anticoagulants or anti-aggregants and complete blood count values were normal. In the past years, she didn't benefit from conservative treatment regimens including physical therapy, various medications and intra-articular corticosteroid injections. She didn't want a surgical intervention.

We decided to apply PRP injection after obtaining the consent of the patient. Three intra-articular PRP injections with an interval of one week were applied. For preparing PRP, after extraction of 15 ml of peripheral blood, the sample was centrifuged for 9 minutes at 3500 revolutions per minute. We obtained 6 ml of PRP and we proceeded to the intra-articular infiltration under sterile aseptic conditions. Before every injection, calcium-chloride was added to the PRP concentrate to activate platelets for inducing rapid formation of fibrin clot. After the injection, patient was sent home with instructions to

diabetes, rheumatoid arthritis, hematological diseases (limit the use of the leg for at least 24 hours and to use cold therapy for pain. After the third injection stretching exercises were allowed and one month after the end of injections, patient was recommended to begin strengthening program as tolerated. There were no adverse effects related to PRP infiltration.

After 6 months, there was no limitation in the range of motion of both knees, VAS at activity was 3, VAS at rest was 1 and WOMAC score was 37. Two years after the application of PRP, VAS at activity was 1, VAS at rest was 0 and WOMAC score was 4. Body mass index of the patient was 29. Surprisingly, in the knee roentgenogram of the patient there was significant radiologic improvement, such that according to the Kellgren-Lawrence classification it was grade 3 (*grade 3: moderate osteophyte, moderate narrowing of joint space, minimal sclerosis*). (Kellgren JH et al)[6] (Figure 2).

**Figure 1. Knee roentgenogram of the patient before platelet-rich plasma treatment.**



**Figure 2. Knee roentgenogram of the patient 2 years after the platelet-rich plasma treatment.**



## DISCUSSION

Platelets are rich of platelet growth factors, cytokines, chemokines and other mediators. (Foster TE et al, Sanchez AR et al, Mishra A et al, Anitua E et al, Senet P et al, Woodell-May J et al) [3,7-11]. In vitro and in vivo animal studies have showed the potential impact of PRP on cellular anabolism and tissue regeneration. (Kon E et al, Torricelli P et al) [12,13]. PRP is a promising treatment method for early osteoarthritis and chondropathies with an increasing use. (Filardo G et al) [14]. In a study, PRP treatment was found effective in knee osteoarthritis at every age and every stage, but better results are reported especially at young age and early cartilage damage. (Filardo G et al) [15]. Also, in a study conducted with 70 patients PRP was found effective in severe knee OA. (Ilhanli I et al) [16]. However, in a study including 65 patients suffering from OA, who were treated with intra-articular PRP injection, authors stated that, increasing age and developing degeneration result in a decreased potential for PRP injection treatment. (Jang SJ et al) [17].

In a study, it has been reported that after 1 year follow-up, PRP application reduced pain and improved function. Longitudinal studies suggest a 4 to 6 % progression of OA at one year, but in this study which was conducted with magnetic resonance imaging, PRP application delayed the progression of the disease in 73% of patients with knee osteoarthritis. (Halpern B) [18]. In addition to the outcomes of this study, we found not only a delayed progression of OA, we found significant improvement in knee roentgenogram. We think that such a surprising, perceivable improvement wasn't reported in the literature before. PRP delivers a high concentration of growth factors to arthritic cartilage that can potentially enhance healing. Recovery of the cartilage may induce the healing of the subchondral bone and/or the growth factors may induce the healing of the subchondral bone directly.

Subjective premises in the Kellgren-Lawrence classification, like "equivocal, uncertain, moderate or severe" can lead to an inconsistency between measurements. Combination of the structural aspects is a drawback and also it is generally accepted that, it takes at



least a year before a change of one grade becomes evident. (Boegard TL et al, Vignon E et al) [19,20]. In our patient, improvement was very clear and acceptable for all physicians. We don't know the initial time of the improvement, whether in 2 years or shorter, because we didn't have a roentgenogram until 2 years after the PRP treatment. We have to keep in mind that, exercise program applied to the patient may contribute to the well being but we can't explain the improvement in the roentgenogram just by the exercise program. Also, body mass index was decreased approximately 2 points after 2 years. Decrease of body mass index may contribute to the improvement, but according to the patient's comments we think that decrease of the body mass index is due to increased physical activities of the patient by the pain relief and improvement of the OA.

## CONCLUSIONS

Possibility of such a significant improvement in roentgenograms is very low but we think that, although evidence is insufficient, due to being an autologous

application with low risk, low cost and potential contribution to the improvement, PRP is emerging as a method to be investigated more. Objective assessment methods, like measuring the cartilage thickness or measuring the joint space areas should be added in the further studies.

**ACKNOWLEDGEMENT:** None.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

## STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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