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Platelet Rich Plasma Injection in Knee Osteoarthritis: An Observational Study

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Abstract

Background: Knee osteoarthritis (KOA) is a progressive degenerative disease and a leading cause of disability worldwide. Intra-articular injection of platelet-rich plasma (PRP) is still a debatable symptomatic treatment and has provided mixed results in multiple publications in the literature.

Aim: To evaluate the effects of intra-articular injection of PRP on pain and functional status of the knee joint as measured by the visual analogic scale (VAS).

Patients and methods: Twenty patients with primary Kellgren-Lawrence grade 2 or 3 KOA were assessed using the visual analogue scale for pain (VAS). Three PRP injections were administered, monthly once followed by a reassessment of VAS after the injection. After three months, patients were assessed with VAS.

Results: Fifteen males and five females with a mean age of 60 years (ranging from 44 to 74 years) were enrolled. After a single PRP injection, there was a significant improvement in VAS. Before the injection, the VAS medium score was 7 and we observed improvements in all assessments at the first, second, and third month

Conclusion: PRP injection achieves good results in the symptomatic treatment of Kellgren-Lawrence grade 2 or 3 KOA. This study confirmed that a three PRP injection can provide a long-term effect in pain reduction and functional status improvement in KOA, despite the progression of the disease.

Keywords: Platelet-Rich Plasma, Knee, Osteoarthritis, Pain, Visual Analogue Scale.

1. INTRODUCTION

Blood derivatives are increasingly used to modulate the intra-articular environment, allowing the reduction of inflammatory distress and stimulating anabolism in different tissues. Platelet-rich plasma (PRP) is a simple and minimally invasive way to obtain a natural concentration of growth factors and bioactive molecules.[1]

Platelet-rich plasma has been used in a variety of medical fields, to stimulate tissue healing through platelet derived growth factors and other bioactive molecules and cytokines. These can stimulate growth and cellular proliferation, tissue regeneration and collagen production.[2] the use of biological agents, including PRP and mesenchymal stem cells (MSCs), in orthopedics has increased exponentially over the last few years due to their autologous nature, supposed effectiveness, and lack of side effects.[3]

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Driven by the possibility of delaying the progression of knee osteoarthritis (KOA) with positive results, mainly in the reduction of pain and improvement of the knee function, some studies included PRP injections in the hospital outpatients practice as an alternative to more traditional intra-articular products, such as corticosteroids and hyaluronic acid (HA), in 2019.[4] Good results have been reported in multiple studies using PRP in KOA compared to hyaluronic acid, other intra-articular injections, and placebo.[4] In our study, we treated 20 patients with PRP injections with a gap of one month in BIRRD hospital and evaluated the initial results related to the reduction of pain and improvement of functional status at four, eight, and twelve weeks using the visual analogic pain scale.

2. PATIENTS AND METHODS

This is prospective longitudinal work in which we reviewed the charts of the 20 patients treated with three PRP injections to the knee and then reevaluated all patients monthly. All patients had previous weight-bearing x-rays documented Kellgren-Lawrence grade 2 or 3 knee osteoarthritis (KOA). At baseline, personal information (age and gender) and grade of KOA were recorded. Before the first injection, all patients were evaluated and none declared the use of medications that could modify the action of the platelets (anticoagulant drugs).

No patient had a corticosteroid injection in the six months before the PRP injection. Before PRP injection, all patients were treated with painkillers, physiotherapy, and common conservative treatments. Our initial approach was to evaluate knee pain before the injection in accordance with the visual analogic pain scale (VAS).

All patients were followed up in monthly intervals and VAS was repeated in the fourth week, in the eighth week, and the twelfth week after injection. All patients received 8mL PRP for the painful knee. When there was pain in both knees, the patient opted for the most painful one to receive the injection.

PRP was prepared as follows: a 20mL blood sample was collected from each patient and centrifuged for 20 minutes at 3200 rpm. This could generate around 8 mL of pure PRP to be injected. The injection was made in an outpatient basis with an aseptic technique to avoid injection site infection. The site of injection was located in the lateral aspect of the knee, similar to the lateral portal in knee arthroscopy, with the knee flexed 45 degrees. This anatomically guided procedure does not require the use of ultrasound any complication or discomfort by the patients was noted. Active flexion-extension exercises were recommended.
Informed consent was obtained from all study participants. The collected data was entered in Microsoft Excel 2019. Continuous variables were presented as mean and standard deviation. Categorical variables were presented as frequency and percentages. Repeated measures ANOVA was used to test the significance difference between VAS at different time points. IBM SPSS 26th version was used to do the statistical analysis. A p value less than 0.05 was considered as statistically significant.

3. RESULTS

Among the 20 patients, there were 15 (75%) males and 5 (25%) females.(Figure 1) The mean age was 60 years, ranging from 44 to 76 years. (Figure 2)

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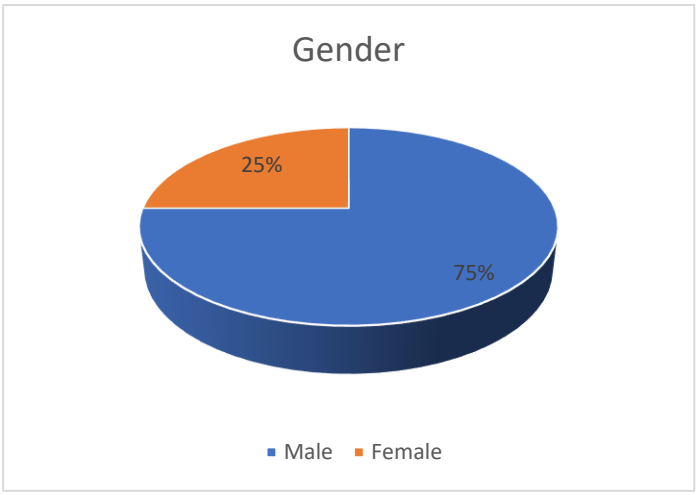

Figure 1: Gender-Wise Distribution

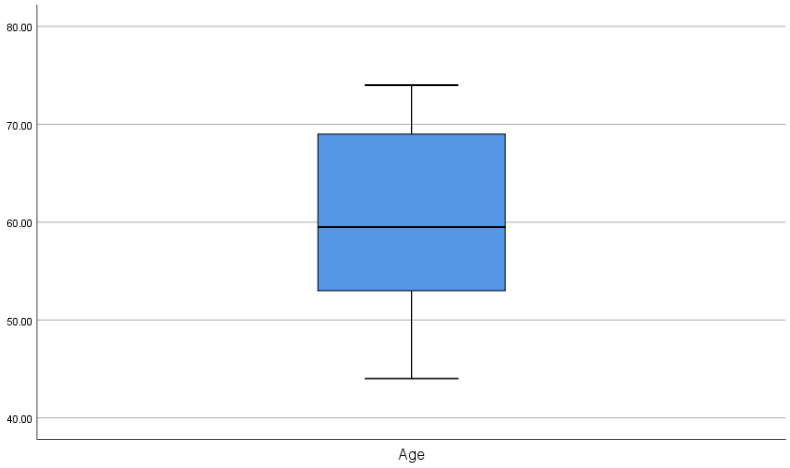

Figure 2: Age Distribution

All patients had grade 2 or 3 Kellgren-Lawrence KOA. Comparing pre- and post-PRP injection we observed improvement in VAS scale scores.

Time point	VAS Mean±SD	P value
Pre injection	6.80±0.89	<0.001
4 weeks	2.45±0.68	
8 weeks	2.30±0.57	
12 weeks	2.25±0.64	

Pre-injection Mean VAS median score was 7 VAS improved to 2. In Figure 3, the distribution of pain scores according to the VAS is shown.

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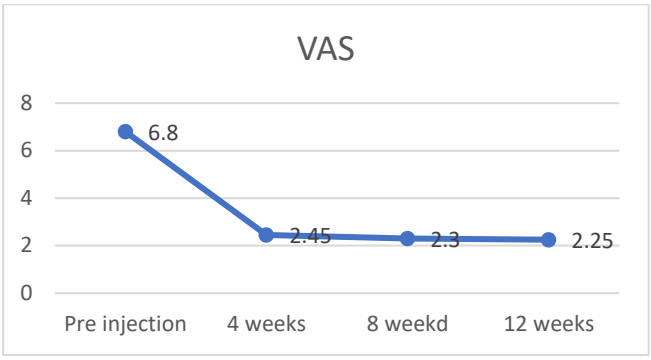

Figure 3: Visual Analogic Pain Score before the Injection and in the Follow-Up Evaluations at 4 Weeks, 8 Weeks and 12 Weeks.

VAS scores were higher in the pre-injection evaluation. The majority of patients reported pain scores over 7. After three months, we observe a wide reduction of pain scores but with great variability among patients. This improvement was statistically significant.

4. DISCUSSION

Osteoarthritis is the most common form of degenerative joint pathology and is a major cause of pain and functional disability. There are several publications in the literature demonstrating the therapeutic and regenerative benefits of platelet-rich plasma (PRP) injections as a treatment for knee osteoarthritis (KOA). In the present study, we compared pre- and post-PRP injection VAS scores in a series of 20 patients that were available to be reevaluated every month after the injection. We observed an important improvement in VAS scores at twelve weeks.

After three months from the injection, 20 patients were evaluated and our results demonstrated a long-term maintenance of this improvement in VAS scores. These results are similar to the findings of Ahmad et al and Jevsevar et al (Jevsevar 2013).[5,6] These authors noted that at the 6-month (Ahmad et al.)[5] and 1-year (Jevsevar et al)[6] reevaluation after PRP injection there was functional improvement and pain relief, according to the International Knee Documentation Committee (IKDC) and VAS scores. As in our study, Küffer and Ziltener corroborate that intra-articular injections of PRP allow a significant analgesic effect and functional improvement. [7] In a systematic review containing 739 patients, Meheux et al reported significant improvements in clinical outcomes including pain and physical function post-injection, with an average follow-up of 38 weeks. [8]

This was also observed in our series of patients, who had pain and functional scores still better than the initial pre-injection scores after three months. Moretti et al highlighted that PRP injections represent a useful conservative treatment to reduce pain, and improve quality of life and functional scores at the midterm of six months follow-up in patients with knee osteoarthritis. They observed the reduction of pain was obtained already one month after injection with the best results observed after six months.[9]

In the present paper, we observed the same results, but in a shorter time and which lasted for more than six months period. We observed similar results as Guillibert et al. These authors performed a single PRP injection (in their study 8.8mL ± 1.1mL) which provided significant clinical benefit to more than 80% of patients at three months, in stage 2 or 3 Kellgren–Lawrence KOA. [10] In our study, in including Kellgren-Lawrence grade 2 or 3 KOA, the PRP injection contained 8mL of pure PRP, which gave similar results to Guillibert et al. [10]

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Patel et al evaluated 78 patients (156 knees) with bilateral KOA. They observed there was no statistically significant difference between a single injection and two injections in their work, implying equal benefit of treatment in both.[11]

Rastogi et al on the other hand recommended that the volume for knee-specific injection should be 9 mL.[12]

Halpern et al noted clinical and VAS improvement with only one PRP injection. In their work, they used a 6mL PRP injection and evaluated 15 patients at six months and one year after the injection. All patients were evaluated by the VAS and WOMAC (Western Ontario and McMaster Universities Arthritis Index) scales. Their results were similar to our observation. [13]

During the preparation of this manuscript, we observed a few papers reporting long-term results after a single PRP injection. We reevaluated 20 patients every month from the injection. Our results showed improvement in pain and functional scores in the long-term, even though with a slight increase in pain in comparison to the short-term results. This study has some weaknesses in that the sample size was small and there was no control group.

We conclude that in our group of patients with KellgrenLawrence grade 2or 3 knee osteoarthritis, three PRP injections can provide a long-term effect in pain reduction and functional status improvement in KOA, despite the progression of the disease.

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