Intra articular platelet rich plasma's functional outcome in early knee osteoarthritis

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ABSTRACT

Knee osteoarthritis (KOA) is a low-grade, functional inflammatory disease that causes functional impairment and dysfunction. Obesity and age are two of the main risk factors, with costs ranging from 1.0% to 2.5% of gross domestic product. KOA was previously thought to be an autoimmune disease; however, the growing body of data shows that two well-connected parts of the synovial joint, the subchondral bone (SB) and the synovial membrane (SM), are directly involved in the degeneration of articular cartilage (AC). Intra-articular delivery is the most common way to get platelet-rich plasma (PRP) into AC, SM, and synovial fluid (SF), and has been shown to be safe and effective in reducing pain and increasing joint function in patients with mild KOA. SB, on the other hand, deals with structural changes in people with severe KOA, including gradual subchondral bone marrow transplantation by fibro neurovascular mesenchyme tissue, bone marrow transplantation, bone marrow lesions (BMLs), osteophytes, sclerosis, and stiffness of SB. Intrusion into PRP is not enough to reach SB in this situation, reducing its effectiveness. This is an upcoming study that followed 50 knees for about six months. At one-month intervals, two intra-articular injections were given. Outcome was measured using the WOMAC and Visual Analogue Scale (VAS) before and after the second injection, and at 1, 3 and 6 months following the second injection. All scores improved significantly over time compared to pre-treatment rates (p 0.001). The baseline VAS score was 7.62, which decreased significantly to 3.56 at the end of the study (pain reduction by 48 percent). PRP injections in the knees help to treat osteoarthritis of grade I and II. The results of the study showed a significant decrease in symptoms in people aged 40 to 60 years.

Keywords: Osteoarthritis, Intra-articular, PRP, Subchondral Bone and Synovial Membrane

INTRODUCTION

In recent years there has been an increase in interest in the treatment of biological knee injuries, especially the use of platelet-rich plasma. Over the past decade, a number of papers have been evaluated for the performance of platelet-rich (PRP) rehabilitation and knee surgery. Selected trials of local PRP injections to the knee were tested in a systematic review including meta-analysis. The study followed selected reporting materials for systematic reviews and guidance of Meta-Analyses (PRISMA) since 2009. PRP was found to have a positive effect on seven different Meta-analyses. Ten small analyzes found significant changes in PRP activity compared with control groups (p 0.05). This study found that PRP has beneficial benefits in rehabilitating knee infections and during knee surgery; however, other upcoming and random trials with large numbers of participants and reduced discrimination are needed.1 Knee problems are one of the most common cases faced by orthopedic surgeons. Knee strain and traumatic knee injuries both require special attention and treatment. Physical therapy, rehabilitation, braces, or standard anti-inflammatory medications are used as the first line of treatment. Orth biologics, or chemicals that naturally occur in the body, have recently been introduced to clinics.2,3 Plasma-rich plasma (PRP), a type of ortho biologic material, has shown promise in the minimally invasive treatment of knee injuries by increasing the healing capacity of injured cartilage, muscles, and tendons.2 PRP, also known as platelet-rich fibrin (PRF), platelet concentrate, or platelet-rich growth factors (PRGFs), is a concentrated platelet concentrate extracted from the entire patient's blood and centrifuged prior to use.3,4 Interleukin β1, interleukin 8, tumor necrosis factor (TNF-α), platelet derived growth factor (PDGF), platelet derived from endothelial growth factor (PDEGF),
Transforming growth factor β1 (TGF-β1), fibroblast growth factor 2 (FGF-2), hepatocyte growth factor (HGF), converts growth factor 1 (TGF-1), insulin-like factor 1 (IGF-1), fibroblast growth (VEGF-A). This enhances treatment by promoting cell proliferation, migration, and differentiation, as well as immune system interactions, inflammation and angiogenesis. PRP in knee pain and knee surgery can be caused by cartilage damage in osteoarthritis as well as soft tissue injuries in sports medicine. Decreased meniscus lesions, patellar tendinopathy, graft correction in the anterior cruciate ligament (ACL) surgery, tendinopathy tendon, and medial collateral ligament (MCL) were all detected. Several systematic reviews and meta-analyses were published, with mixed results; therefore, we are committed to addressing these thorn problems by conducting systematic reviews and meta-analyses on the effectiveness of PRP treatment for knee diseases.

**Aim**

Intra Articular Platelet Rich Plasma's Functional Outcome in Early Knee Osteoarthritis

**Objectives**

Using intra-articular platelet-rich plasma (PRP) injections as a control group, researchers evaluated the therapeutic benefits of PRP injections in severe knee osteoarthritis (KOA).

**MATERIALS AND METHODS**

This is an upcoming study that followed 50 knees for about six months. At one-month intervals, two intra-articular injections were given. Outcome was measured using the WOMAC and VAS before and after the second injection, and at 1, 3 and 6 months following the second injection.

**Platelet-rich plasma preparation**

Depending on whether the intrusion was intra-articular or intra-osseous, 32 or 90 milliliters of painful blood were collected from the patient. The blood is drawn from 9-mL tubes containing 3.8 percent sodium citrate (w/v) and centrifuged at 580 g at room temperature for 8 minutes. A 2-mL fraction of plasma just above the red blood cells, but without a buffy coat, was collected in a tube and sent to the injection chamber. This plasma fraction preparation had moderate blood clots (between 1.5 to 2.5 times the border blood, depending on the number of platelets and size and hematocrit) and did not contain erythrocytes or leukocytes. Patients in the IA group received a product with a mean platelet / mL content of 377.65 74.60 (range 250-552 platelets / mL) while patients in the IO group received a product with a mean platelet / mL product of 363.30 71.13 / mL (width of 198-518 / mL). Calcium chloride (10 percent w/v) is added to liquid PRP aliquots immediately before injection to activate platelet blocking. All these operations are performed in a sterile environment.

**Injection technique**

At the highest level, the patient. The knees are painted and pulled in the right places. An 18 gauge needle was inserted into the supra patellar sac on the upper side of the knee. Combined compounds, if any, were desired using a sterile syringe. The joint was injected with 5ml PRP. Where the injection was inserted, sterile clothing was placed. After the injection, the knee was folded several times with a compression bandage.

**Treatments**

The first PRP injections in IO group patients were performed in the operating room and involved three different injections in a variety of compounds. One intra-articular PRP injection was performed first, followed by two intra-osseous PRP injections using the method described by Sánchez et al.8 The patient's stay is temporarily placed under the watchful eye of an anesthesiologist, reaching a level of 4 or 5 pulls on the Richmond Sedation Scale. The patient was placed on top, and two marks were made in the inner area of the knee, 2 cm one close to the joint line of each other 2 cm distal. A povidone-iodine solution was used to prepare the entrance, and a local anesthetic was given to the periosteum of the condyle and tibial plate. First, after draining all the synovial fluid, 8 M of PRP penetrated internally. Due to past experience and research using this technique to treat KOA, this volume was given.9,10 In addition to being a well-tolerated value, eight milliliters of PRP is enough to fill the inner surface and cover the synovial membrane following thickening. Afterwards, a 13G trocar used for bone biopsy was inserted by hand into the bone and placed 2 cm in the medial tibial plate and the femoral condyle for internal osseous entry. 5 mL of PRP was added to the SB after the trocar was in the desired position. A fluorescope was used to assist in the management of trocar placement. Because PRP spreads to the entire subchondral region with abnormal tissue, intra-osseous penetration did not focus on specific lesions but was performed in the same area in all treatment modalities. Seven to fourteen days after the initial treatment, further intra-articular PRP inflation was performed.

**RESULTS AND DISCUSSION**

**Table 1: Visual analogue score**

| Visual analogue score | Mean ± SD | H value | P value |
|----------------------|-----------|---------|---------|
| Before PRP injection | 7.82±0.568 | 150.65 | <0.0001 |
| Follow up At 1st month | 4.97±0.622 |         |         |
| Follow up At 3rd month | 4.01±0.610 |         |         |
| Follow up At 6th month | 3.56±1.110 |         |         |

**Table 2: Comparison of Baseline Characteristics**

| Baseline Characteristics | Mean ± SD | H value | P value |
|-------------------------|-----------|---------|---------|
| Mean Age                | 50.32±5.46 |         |         |
| Sex                     | Male      | 31      |         |
|                         | Female    | 19      |         |
| Mean height (CM)        | 153.28±7.64 |         |         |
| Mean weight (Kg)        | 62.66±5.12 |         |         |
| Mean BMI                | 24.21±2.65 |         |         |
| WOMAC score             | Mean pain | 16.98±0.799 |         |
|                         | Mean stiffness | 6.01±0.86 |         |
|                         | Mean physical function | 57.51±5.02 |         |
| Mean total WOMAC        | 78.92±5.78 |         |         |
| Mean VAS                | 7.62±0.568 |         |         |
A total of 50 knees followed during the first, third and sixth months. There were no patients missing in the follow-up procedure. In the study, efficacy was assessed in terms of age, gender, BMI, and osteoarthritis scores. All patients in this study were between the ages of 40 and 60. It shows that men make up the majority of patients (62%) and women make up only 12%. (38%).

All scores improved significantly over time compared to pre-treatment rates (p<0.001). The baseline VAS score was 7.62, which decreased significantly to 3.56 at the end of the study (pain reduction by 48 percent).

At the outset, the mean overall WOMAC score was found to be 78.92. During the follow-up period, the WOMAC score decreased. At the conclusion of the trial, the WOMAC score was 37.66, indicating a significant decrease. The VAS and WOMAC scores both improved significantly after the third month of follow-up (VAS score - p value was less than 0.001, WOMAC- p value was 0.0001).

The most prevalent form of degenerative artroses, osteoarthritis, affects the elderly, causing physical, emotional, and social suffering. The knee is the most prevalent site of osteoarthritis, which is more common in older women.

Various therapies have been used in the past to reduce pain and improve joint function. Physiotherapy, lifestyle modification includes weight loss and increased activity, as well as medications such as oral NSAIDs, Opioids, glucosamine and chondroitin supplements, as well as intra-articular injections of steroids and hyaluronic acid, all that was an opportunity. Other treatments include arthroscopic cleansing, weight loss in open bodies, osteotomies, and knee replacements, reserved for patients with uncontrollable pain and inability to function and who have failed to respond to treatment.

Corticosteroids, hyaluronic acid viscosity augmentation, and autologous plasma-rich platelet are among the intramuscular injections. Intra articular autologous Platelet rich plasma is a rich-growing organ that has been shown to be a therapeutic treatment of cartilage repair in patients with osteoarthritis of the knee. It also has anti-inflammatory properties and reduces pain in patients with osteoarthritis of the knee. Doctors are increasingly focusing on treatment options that can reverse the progression of the disease and restore damaged tissue. The injection of the autologous platelet-rich intra-articular platelet injection, which is new and offers significantly significant relief to patients, has been one of the alternatives.

When it comes to PRP, we inject 5-6 ml of newly produced PRP every four weeks. Because ours was an open system and we had doubts about the effectiveness of the platelet due to cold storage, we prepared a new PRP by drawing blood each time, rather than keeping cold PRP obtained from the first injection as Kon et al.12, because ours was an open system and we had doubts about the effectiveness of the platelet due to cold storage, but different authors used different PRP injection programs. Filardo et al.13 use two 5-ml injections divided into four weeks apart. Cerza et al.14 use four 5.5 ml injections separated in one week. Kon et al.12 use three 5-ml injections separated by two weeks apart. Spakova et al.15 used three injections in a volume of 3 ml, separated for one week. The mean age of our study was 50.32 years, which is consistent with previous research. The platelets in the PRP produced for this study were increased by an average of 4.07 times the original figure. All stages of the PRP preparation process are performed with aseptic methods in mind. In their study, Spakova et al15 found that platelet count increased 4.5 times on average. The basic VAS in our research book was 7.62, and it decreased over time. The VAS rating was 4.97 at the first month follow-up, 4.01 at the third-month follow-up, and 3.56 at the sixth-month follow-up. In a study conducted by Gobbi et al. 2 patients, the baseline in the VAS value was 4.1 0.7, which is improved to 2.2 to 0.4, more than 6 months, and 1.2, 0.3, more than 12 months. In our study, the mean initial pain score was 16.98, which has been drastically reduced, in order to 8.54 for a follow-up. In the early days, the average stiffness score was 6.01, but, after using it for 6 months, it is reduced to 2.18. After the first level, the mean physical function score was 57.51, with a significant reduction of 26.94, more than 6 months of age.

There was a significant drop in VAS and WOMAC scores in our research from the third month follow up (VAS score-p value was less than 0.001, WOMAC-p=0.0001). Individuals in our study were split into three groups based on their age. Cluster one has a lifespan of 40-50 years, cluster two has a lifespan of 51-60 years, and cluster three has a lifespan of 61-70 years. In all three clusters, the VAS and WOMAC indexes show a downward tendency. At the end of the research, however, clusters one and two showed a significant reduction compared to cluster three. i.e. a six-month follow-up.

Both grade I and grade II patients in our research had a much improved result with PRP injections, with VAS and WOMAC scores significantly decreasing from baseline to 6 month follow-up in both grades. In their study, Filardo et al.13 discovered that PRP performed better in grades I and II than in grades III and IV.

CONCLUSION

PRP injections in the knees help to treat osteoarthritis of grade I and II. The results of the study showed a significant reduction in symptoms in people aged 40 to 60 years. Our research team did not need analgesics during the first week after the injection until six months later. In this study, there were no complications such as infection, severity, or function. Not so, unlike steroids, which raise the risk of infection during subsequent performance? This is a minimally invasive procedure that improves the quality of life of
patients by providing relief from pain and delaying the need for surgical intervention.

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