

A Comprehensive Review on Platelet Rich Plasma in Knee Osteoarthritis

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ABSTRACT:

Knee osteoarthritis (OA) is estimated to affect more no of the population, Contemporary guidelines advise control of body weight, therapeutic physical exercise, drug treatment (oral non-steroidal anti-inflammatory drugs, paracetamol, opioids), and mechanical aids. Nevertheless, these treatments typically have only short-term benefit. The efficacy of hyaluronic acid is controversial. When the aforesaid options failure, total knee arthroplasty is generally recommended as an efficacious treatment. However, it is costly and can involve medical and postoperative complications. Therefore, determining alternate safe and effective treatments for knee OA is paramount. Platelet-rich plasma (PRP) has lately been investigated for the treatment of knee OA¹. Platelet-rich plasma (PRP) is a concentrate of autologous blood growth factors which has been shown to provide some symptomatic relief in early osteoarthritis (OA) of the knee².the

article discusses about the overview of treatment parameter in osteoarthritis.

KEY WORDS: Knee osteoarthritis, hyaluronic acid, autologous, Platelet rich plasma.

I. INTRODUCTION:

Osteoarthritis (OA) is the most common chronic articular disease with an increasing in age and increased obesity population. Osteoarthritis is characterized by articular cartilage degeneration and persistent pain, causing disability, loss of function, decreased quality of life (QoL), and economic burden³.nowadays one of the most frequent chronic diseases and, with the increase in life expectancy & leads to functional decline and loss in quality of life⁴. Osteoarthritis (OA) is a multi-factorial, mostly slowly progressing, and primarily non-inflammatory degenerative disorder of the synovial joints that is often age related and/or trauma induced⁵.



Figure 1 KNEE OSTEOARTHRITIS

Osteoarthritis is the second most common rheumatology problem and it is more frequent joint disease with prevalence of 22% to 39% in India⁶. Globally estimates are that 9.6% of men & 18% of women⁷. Nearly 45% of women over age of 65 years have symptoms. OA is more common in women than men⁶. 80% of patients with osteoarthritis have limitations in movement and 25%

cannot perform their major daily activities⁷. In general osteoarthritis is more prevalent in Europe and USA than other parts of world. African American women are more prone than the hip occur more often in European whites than in Americana blacks, African blacks or Chinese⁸

It is well known that etiology of osteoarthritis is multi-factorial with inflammatory,

metabolic and mechanical causes⁹. factors associated with osteoarthritis have been broadly divided into person level factors and joint level-factor, person level factors include age,sex,obesity,genetics & diet. Joint level factors include they are unique to a particular joint such as injury, activity & muscle strength¹⁰. A no of environmental risk factors includes bone marrow, edema, synovial & joint erosion⁹. other risk factors include genetic susceptibility, joint laxity, kneeling, squatting & meniscal injuries¹¹.

Treatment choices of osteoarthritis fall into four main categories: non pharmacologic, pharmacologic, complementary and alternative, and surgical. Non pharmacologic therapy often starts with exercise. The exercise program consisted of muscle strengthening and range-of-motion exercises. pharmacological treatment for mild osteoarthritis is acetaminophen and few other NSAIDS (non-steroidalanti-inflammatory) and opioids. Intra-articular injections of corticosteroids or hyaluronic acid are another option for treating osteoarthritis. The use of intra-articular corticosteroids primarily provides short-term relief lasting four to eight weeks.

Surgery should be reserved for patients whose symptoms have not responded to other treatments. The well-accepted indication for surgery is continued pain and disability despite conservative

treatment. The most effective surgical intervention is total joint replacement, with excellent patient outcomes following total joint replacement of the hip, knee, and shoulder. There are other surgical approaches to osteoarthritis treatment, but they have not equaled the success of total joint replacement¹².

PLATELET RICH PLASMA (PRP)

Platelet-rich plasma (PRP) is emerged as a promising treatment modality and classified as “Ortho biologics”. PRP enhances tissue recovery, by catalyzing the body’s natural healing response and tissue repair process¹³. Platelet alpha-granules contain and release numerous growth factors such as platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), transforming growth factor-B (TGF-B), and hepatocyte growth factor (HGF), which can potentially change the joint environment in OA. PRP promotes chondral remodeling and chondrocyte proliferation as it increases the synthesis of collagen II, prostaglandin (PG), and matrix molecules. In platelets micro vesicles, different microRNAs involved in mesenchymal tissue regeneration are also present and microRNA-23b has been hypothesized to be strictly involved in the differentiation of MSC into chondrocytes.

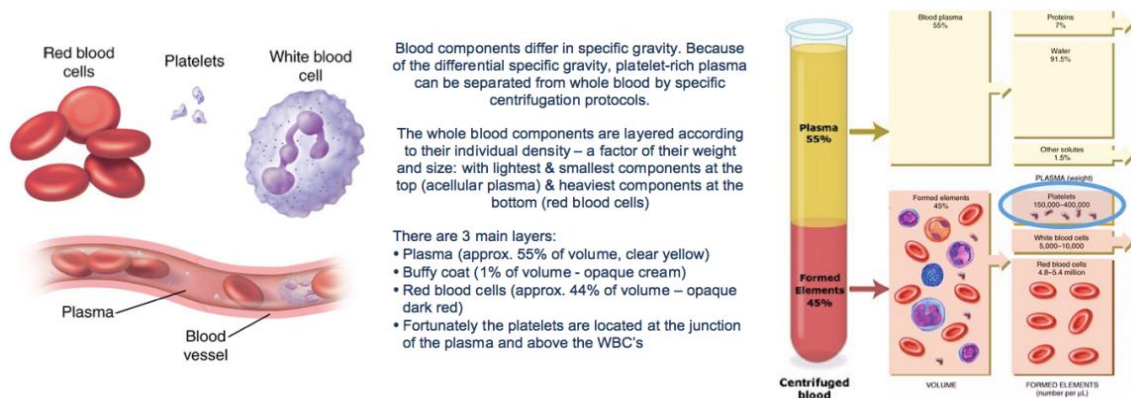


Figure 2 platelet rich plasma

PRP helps to create a highly favorable and balanced environment for angiogenesis by increasing hyaluronic acid (HA) secretion, and at the same time, it decreases interleukin-1 (IL-1)-mediated increase of some matrix metalloproteinases (MMPs). PRP has been used in the treatment of osteoarthritis knee and has shown promising clinic-radiological outcomes, both in comparison to pharmacological and non-pharmacological treatment modalities. This clinical

study was designed to find the role of PRP in knee OA. The primary objective was a percentage reduction in mean pain scores at one year. Secondary objectives were Safety (side effects), and the effect of PRP on the different grades of knee degenerated¹⁴.

PREPARATION OF PLASMA RICH PROTEIN:

We used a 20-cc syringe with 2 cc of anticoagulant and 18 cc venous blood was drawn

and mixed well. Blood was injected into the PRP centrifuge vial through the upper port. After 1st centrifugation PRP centrifuge, the height was adjusted to separate the boundary by pulling the knob up and down. Plasma and the RBC layer were blocked completely. After the 2nd centrifugation in “REMI” PRP centrifuge, the upper silicone lid was opened and the PRP was then extracted done by a pipette. A leucocyte filter was then used to filter off the leucocytes, PRP activation was done

immediately before injection by adding 10% calcium chloride. PRP was administered using a 10 mL syringe. Finally, the platelet concentrate was mixed and drawn. The Platelet-rich plasma was divided into 2 units in disposable syringes. One unit was sent for analysis of platelet concentration and quality test and the second part was used for the first dose of intra-articular infiltration in patients within two hours of preparation.

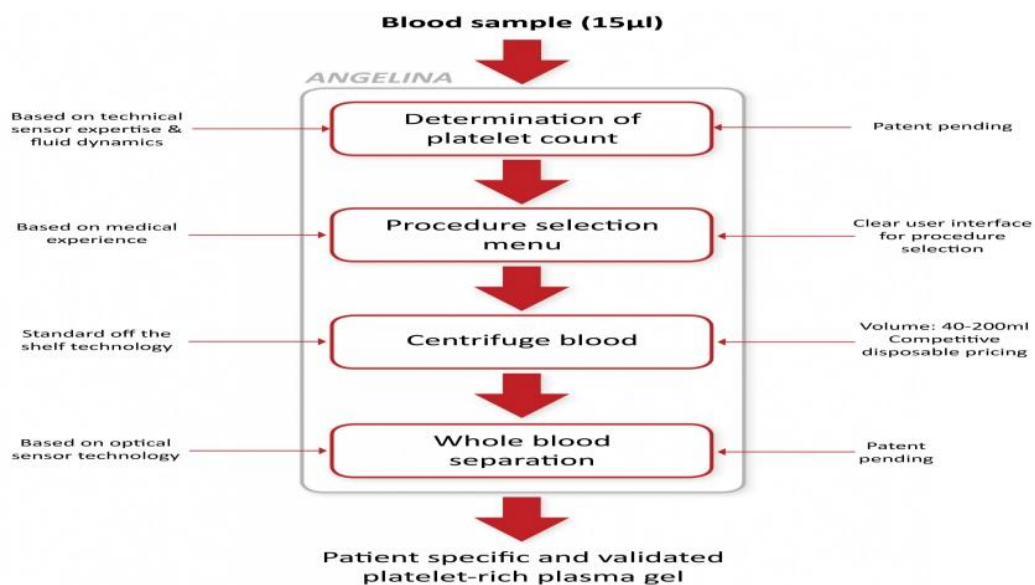


Figure 3 Preparation of platelet rich plasma

The first injection was given on the same day, under aseptic conditions. 10 mL of PRP was injected into the knee joint through the anterolateral approach with a 22-gauge needle. After the injection, the patient was encouraged to move the knee a few times to allow the Platelet-rich plasma to spread in the knee joint after that knee was kept in extension for 20 min. After injection, some patients developed complications like sweating, dizziness, and nausea, were observed and discharged when fully recovered. All patients were followed up at 6 weeks, 3 months 6 months, and at 1 year. The quality of life was assessed using Western Ontario and McMaster Universities Arthritis Index (WOMAC) scoring and Visual Analog Scale (VAS) for pain, before starting the treatment and then at 6 weeks, 3 months, 6 months, and 1 year of treatment.

Data analysis was done with the SPSS 26. The descriptive analysis (e.g., mean and standard deviation) was done for normally distributed parameters and their means were compared using the analysis of variance (ANOVA) tests. Within the

groups, the data on pre and post levels were compared using the student-t-test. Data of subsequent follow-ups were analyzed using repeated-measures ANOVA which was followed by post hoc tests. *P*-value of less than 0.05 was taken as significant in all the tests.

ADVANTAGES:

The advantages of PRP for the treatment of knee OA are the following: it is reasonably easy to use because its preparation is rapid and it is minimally invasive; it is a relatively affordable technique, thanks to use of existing public health service structures and equipment; and it is likely to be safe because it is an autologous product. Previous publications have reported only minor and transitory complications. The purpose of this article is to review the current molecular mechanisms of action and the degree of efficacy of PRP intra-articular injections in patients¹⁵.

DISADVANTAGES:

However, although the usefulness of PRP treatment has been demonstrated, there have been recent reports of adverse events (AEs) possibly related to PRP treatment. The causal relationship between PRP therapy and AEs has not been fully elucidated, and AEs associated with PRP treatment range from postoperative infections to severe cases such as blindness. Therefore, this review discusses the risks inherent in PRP therapy and the current issues by surveying reports on AEs associated with PRP treatment within different fields. There have been two reported cases of inflammatory reactions after PRP treatment¹⁶.

II. DISCUSSION:

PRP has gained popularity in the treatment of large joint OA due to its relative. PRP contains a concentrated pool of platelets and growth factors such as platelet derived growth factors (PDGF), transforming growth factor- β (TGF- β), vascular endothelial growth factor (VEGF), and insulin-like growth factor (IGF). These mediators are believed to promote chondrocyte proliferation, enhance extracellular matrix synthesis, and modulate synovial inflammation. simplicity and acceptable cost when compared to other invasive procedures. Several animal studies have shown that intra-articular PRP injections can promote cartilage regeneration by enhancing chondrogenic differentiation, inhibiting chondral degeneration, and decreasing synovial inflammation. Due to the invasive nature of PRP administration, patient safety is an important aspect to be considered. Musculoskeletal PRP applications have been related to infection in the treated area. No systemic reactions or serious adverse events following PRP applications¹⁷.

III. CONCLUSION:

Platelet-rich plasma (PRP) injections have emerged as a promising biologic therapy for the management of knee osteoarthritis (OA), particularly in patients with mild to moderate disease. Current evidence suggests that PRP may provide superior pain relief and functional improvement compared with placebo and some conventional intra-articular therapies such as hyaluronic acid and corticosteroids in selected patients. The use of allogenic PRP should also be explored, provided safety and regulatory issues can be resolved satisfactorily in order to make PRP available for the highest number of patients possible.

PRP represents a safe and minimally invasive adjunctive option for symptomatic

management of early knee OA, but it should not be considered a definitive disease-modifying therapy at present. Future large-scale, high-quality randomized controlled trials with standardized PRP formulations and longer follow-up are required to clarify optimal protocols, durability of benefit, and its precise role in the knee osteoarthritis treatment¹⁸.

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