International Journal of Medical Research Professionals

Original Article

Staged Platelet Rich Plasma injection for short term treatment of Mild to Moderate Osteoarthritis of Knee

Khajotia BL[1], Nag R[2], Arya DR[3], Yadav R[2], Sharma P[2], Sharma L[4]
[1]Professor & Head, [2]Post Graduate Resident, Department of Orthopaedics,
[3]Professor & Head, [4]Resident, Department of Immuno-haematology & Transfusion Medicine,
S. P. Medical College, Bikaner, Rajasthan, INDIA.

Article History
Received: 24 Mar2016
Revised: 28 Mar2016
Accepted: 31 Mar2016

***Correspondence to:**
Dr. B.L Khajotia
Prof. & Head,
Department of Orthopaedics
S.P medical college,
Bikaner, Rajasthan.
drkhajotia@gmail.com

ABSTRACT

Background: Autologous platelet-rich plasma (PRP) has been advocated as one the recent treatment modalities for cartilage tissue regeneration.

Objective: To study the effect intra-articular platelet rich plasma injections in knee osteoarthritis (OA).

Methods: Prospective randomized control trial of fifty patients divided into two groups viz. group A and group B of twenty-five patients each with mild to moderate osteoarthritis of knee. Patients in group A were given two injections of PRP at an interval of 16 weeks and patients in group B were given single injection of PRP at the start. The Results were evaluated on the basis of the Western Ontario and McMaster Universities Arthritis Index (WOMAC) questionnaire and visual analog scale (VAS) before treatment and at 3weeks, 8 weeks, 16 weeks and final follow-up at 24 weeks after treatment.

Results: Statistically significant improvement in all WOMAC parameters and VAS scores were noted in the patients with both the group. The patients in group A had mean WOMAC and VAS scores statistically significantly lower than Group B patients on final follow-up at 24 weeks. However patients in group B, the WOMAC and VAS scores slightly deteriorated at 24 weeks when compared to 16 week follow-up.

Conclusions: Staged intra-articular injection of autologous PRP at interval of 16 weeks provides pain relief and improves overall joint function in patients with mild to moderate knee osteoarthritis when compared to single injection of PRP.

KEYWORDS: Knee Joint, Platelet rich plasma, Osteoarthritis, Visual Analogue Scale.

INTRODUCTION

Articular cartilage lesions are difficult to treat and remain one of the most challenging problems for orthopaedic surgeons around the globe.[1,2] Currently, Osteoarthritis is a major cause of disability in the elderly; the prevalence of this disease is expected to increase dramatically over the next 20 years as the burden of elderly people is bound to increase[3]. Because of the complex pathophysiology of OA a wide variety of treatment options are available; Pharmacologic and non-pharmacologic treatments are used for early and moderate cases of OA, but protection of articular cartilage has so far not been convincingly shown[4,5]. These inadequacies of current therapy further exacerbate the burden of OA. Surgical intervention is often indicated when the symptoms cannot be controlled and the disease progresses. Whether arthroscopic lavage and/ or debridement can provide symptomatic relief is unclear[6]. In the case of joint mal-alignment, osteotomy can provide pain relief for several years, until the new weight bearing articular cartilage erodes, but this tactic merely buys time until a total knee replacement becomes necessary. The challenge for researchers to develop disease modifying OA treatments is, therefore of paramount importance. Because of limitations in the effectiveness of conventional management options, alternative options such as biological and regenerative methods are coming into vogue. Autologous platelet-rich plasma (PRP), which contains a pool of growth factors, appears to offer an easy solution for delivering multiple growth factors needed for tissue repair.

MATERIALS AND METHODS

The study was prospective study carried out in Department of Orthopaedics, Sardar Patel Medical

College and Associated Group of Hospitals, Bikaner. Twenty-five patients with unilateral or bilateral knee osteoarthritis having Kellgren and Lawrence grade I to grade III were included in study.

The inclusion criteria were Male and female subjects aged 35 -70 years with mild to moderate Primary osteoarthritis, radiological Kellgren and Lawrence[7] GRADE I to III and not responding to conventional analgesics for 2 months. Rest all others were excluded from the study. All the patients were given single intra-articular injection of freshly prepared autologous PRP. Baseline characteristics are described in Table no 1.

PRP required for the procedure was prepared by Department of Transfusion Medicine, S.P.M.C, Bikaner. 40 cc of blood was collected from antecubital vein under aseptic conditions and divided into 4 syringes of 10 cc each (that contained 1.4 cc of acid citrate dextrose each) and the piston of syringes were then cut with the help of hacksaw blade and capped with the cap of insulin syringe; these modified syringes were centrifuged at 1800 rpm for 5 minutes.

The supernatant plasma and the buffy coat were extracted into another syringe with the help of 3-way adaptor; approximately 20 cc of plasma was obtained and was divided into two syringes of 10 cc each; these syringes were modified again as described above and were again centrifuged at 3500 rpm for 10 minutes. Then again 6 cc of supernatant was discarded from each syringe and bottom 4 cc was preserved, a total of 8 cc of PRP was obtained. 7 cc of this autologous PRP was injected intraarticularly in knee by supra-lateral approach under aseptic conditions and 1 cc was sent for culture and counts. 1 cc of calcium chloride was also injected in the affected knee for activation of platelets. The patients were observed for one hour and then discharged.

Assessment of the patients was done on the basis of Western Ontario and McMaster Universities Arthritis Index (WOMAC) [8-11] questionnaire that measured joint pain, joint stiffness and physical function and visual analog scale (VAS) for joint pain at pre-injection, 3 weeks, 8 weeks 16 weeks and final follow-up at 24 weeks. No NSAIDs was prescribed during follow up period and paracetamol (dosage, 500 mg tds) was given in case of discomfort.

Data analysis was done with the help of computer using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, version 22.0 for Windows). ANOVA test was used to test the significance of difference for quantitative variables and Yate's or Fisher's chi square test for qualitative variables. 'p' value less than 0.05 was taken to denote significant difference.

RESULTS

This study show that 72% (18/25) were satisfied with the treatment and no adverse effect was noted during the follow up period. The VAS score decreased from the baseline value of 6.32 to 4.54 at the end of 24 week follow-up. Similar improvements were seen in WOMAC sub-scores also wherein pain decreased from 12.0 to 9.04, stiffness decreased from 6.12 to 4.96, physical function decreased from 39.8 to 25.76 and total score decreased from baseline value of 57.92 to 39.76 at the end of 24 weeks (Table 2). The results showed slight deterioration in values at 24 weeks when compared to 16 weeks.

Table 1: Baseline characteristics of the patients.

Age (Mean±S.D), years		**54.1±6.0**
Sex (M:F)		2:1 (approx.)
Radiological grade	I	4
Kellgren and	II	14
Lawrence	III	7
Conc. of platelets in PRP Mean±S.D (Range)		692.9±132.6 (450-900)
VAS (Mean±S.D)		6.32±0.53
WOMAC	Pain	12±1.61
	Stiffness	6.12±0.44
	Physical function	39.80±3.71
	Total Score	57.92±5.35

Table 2: Mean score changes of VAS and each parameter of WOMAC scores.

Scores	**VAS**	**WOMAC**			
Duration		**Pain**	**Stiffness**	**Physical function**	**Total Score**
3 week	6.02	11.24	5.84	36.52	53.36
8 week	5.10	9.0	5.08	29.72	43.88
16 week	4.11	8.12	4.20	23.44	35.76
24 week	4.54	9.04	4.96	25.76	39.76

DISCUSSION

The lesions of articular cartilage and degenerative changes are difficult to treat and pose a challenge for the orthopedists around the world because of distinct structure and function of hyaline cartilage and its inherent low healing potential. The results of this study showed positive effect of autologous PRP injection in patients affected with mild to moderate osteoarthritis, with improved pain and symptom.In our study, PRP was prepared in lab using sterile disposable syringes and tabletop centrifuge (REMI-PR23). The PRP obtained was leucocyte rich PRP (Type B) according to Dohan Ehrenfest[12] classification as leucocyte filter was not used and type 2a according to Mishra's classification[13] as platelet concentration in PRP was 2.70 times the baseline value and PRP was activated using calcium chloride. Only one patient in had adverse effect of shivering. Few patients reported localised pain at injection site and localized inflammation for few days.

Mean VAS decreased from 6.32 at start of study to 4.54 at 24 weeks ($p<0.001$); however there was slight deterioration in VAS scores at 24th week follow up when compared to 16th week. Similarly, WOMAC score decreased from 57.92 at beginning to 39.76 at the end of study ($p<0.001$)Patel[14] et al also reported slight deterioration of VAS and WOMAC scores at 6th month follow up when compared to 3rd month. Similar findings were reported by Kon[15] et al as they noticed slight worsening of International Knee Documentation Committee (IKDC) subjective and objective scores from second to sixth month follow up which was not significant thereafter significant deterioration was found at one year of follow up. The results of our study support the short term effectiveness of intra-articular injection of Platelet Rich Plasma (PRP) as effective measure in improving pain, stiffness and overall physical function in mild to moderate knee osteoarthritis. Thus it is observed that the therapeutic benefit of PRP is temporary as there is no sustained long-term effect and therapeutic effect begins to wane after a period of time.

CONCLUSION

In our study majority of patients had bilateral knee osteoarthritis and highest VAS and WOMAC scores were considered amongst each knee. There is no conflict of interest, no sponsorship or any disclosures for this study. Long-term studies involving multiple sessions of PRP injection is required for further research.

REFERENCES

1. Buckwalter JA. Articular cartilage: injuries and potential for healing. J Orthop Sports Phys Ther. 1998 Oct; 28(4): 192-02.

2. Marcacci M, Filardo G, Kon E. Treatment of cartilage lesions: what works and why? Injury.2013;44(Suppl 1):S11-5.

3. Brooks PM. Living with osteoarthritis: patient expenditures, health status, and social impact. Arthritis Rheum 2001; 45:301–6.

4. Hochberg MC, Altman RD, Brandt KD et al. Guidelines for the medical management of osteoarthritis. Part II. Osteoarthritis of the knee. American College of Rheumatology. Arthritis Rheum 1995;38:1541–6.

5. Gerwin N, Hops C, Lukas A. Intraarticular drug delivery in osteoarthritis. Adv Drug Deliv Rev 2006;58:226-42.

6. Moseley JB et al. A controlled trial of arthroscopic surgery for osteoarthritis of the knee, N Engl J Med.2002;347(2):81-8.

7. J. H. Kellgren, Frida Bier et al. Radiological Signs of Rheumatoid Arthritis: A Study of Observer Differences in the Reading of Hand Films : Annals of rheumatology disease. (1956), 15, 55.

8. Bellamy N Buchanan WW et al. Validation study of WOMAC: A health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. J Rheumatol. 1988; 15:1833-40.

9. Bellamy N. Pain assessment in osteoarthritis: Experience with the WOMAC osteoarthritis index. Semin Arthritis Rheumatism. 1989;18 (2):14-7.

10. Bellamy N Kean WF et al. Double blind randomized controlled trial of sodium meclofenamate (Meclomen) and diclofenac soidum (Voltaren): Post validation reapplication of the WOMAC osteoarthritis index.JRheumatol.1992;19:153-59.

11. Hawker G Melfi C et al. Comparison of a generic (SF-36) and a disease specific (WOMAC) instrument in the measurement of outcomes after knee replacement surgery. J Rheumatol. 1995;22:1193-96.

12. David M. Dohan Ehrenfest et al. Classification of platelet concentrates (Platelet-Rich Plasma-PRP, Platelet-Rich Fibrin-PRF) for topical and infiltrative use in orthopedic and sports medicine: current consensus, clinical implications and perspectives: Muscles Ligaments Tendons Journal. 2014;4(1):3–9.

13. Allan Mishra et al. Sports Medicine Applications of Platelet Rich Plasma: Current Pharmaceutical Biotechnology, 2012;13:1185-95.

14. Patel S, Dhillon MS, Aggarwal S, Marwaha N, Jain A. Treatment with platelet-rich plasma is more effective than placebo for knee osteoarthritis: a prospective, double-blind, randomized trial. Am J Sports Med 2013;41:356-64.

15. Kon E, Buda R, Filardo G, Di Martino A, Timoncini A, Cenacchi A, et al. Platelet-rich plasma: intra-articular knee injections produced favorable results on degenerative cartilage lesions. Knee Surg Sports Traumatol Arthrosc Off J ESSKA 2010;18:472-9.

Source of Support: Nil.

Conflict of Interest: None Declared.

Cite this article as: Khajotia BL, Nag R, Arya DR, Yadav R, Sharma P, Sharma L. Staged Platelet Rich Plasma injection for short term treatment of Mild to Moderate Osteoarthritis of Knee. Int J Med Res Prof. 2016, 2(2); 280-82.