

Evaluation of Platelet Rich Plasma Therapy in Osteoarthritis Of Knee

Banodha L, Thareja S

Study performed at Department of Orthopaedics, Mahatama Gandhi Memorial Medical College, Indore (M.P.)

Abstract

Background: Knee osteoarthritis (OA) is common entity in adults causing disability and decreased work productivity. Management of early OA is not established showing varied results of conservative and medical treatment. We evaluated the functional outcome of intra-articular injection of platelet rich plasma (PRP) for management of early stages of OA knee.

Material and Methods: 30 patients of OA knee, Kellgren type II or III, more than 40 years' age, were treated with 4 ml of intra-articular autologous PRP injection and were assessed by improvement in functional outcome as seen by WOMAC and VAS score.

Results: The mean age was 54.17 ± 8.18 years (range 44 to 78 years). 14 (46.7%) were males and 16 (53.3%) were females. 11 (36.7%) patients had KL grade 2 and 19 (63.3%) patients had KL grade 3 osteoarthritis. The mean pre-procedural WOMAC score of 47.67 ± 6.50 improved to 23.70 ± 5.88 , 23.57 ± 5.12 and 25.80 ± 5.69 at one, three and six months after the PRP injection, respectively. The mean pre-procedural VAS score of 5.37 ± 0.85 , improved to 1.43 ± 1.04 , 1.43 ± 0.63 and 1.73 ± 0.58 at one, three and six months after the PRP injection, respectively. Pain at injection site was seen in 1 (3.3%) patient and 1 (3.3%) patient developed superficial infection.

Conclusion: PRP therapy provides pain relief and improves the functional outcome in early stages of Osteoarthritis of Knee.

Keywords: Platelet Rich Plasma, Osteoarthritis, WOMAC score

Address of correspondence:

Dr. Laxman Banodha
Associate Professor, Department of
Orthopaedics, MGM Medical College,
Indore. 452001
Email – laxmanbanodha62@gmail.com

How to cite this article:

Banodha L, Thareja S. Evaluation of platelet rich plasma therapy
in osteoarthritis of knee. Ortho J MPC. 2021;27(1):42-45



Introduction

Osteoarthritis of knee is found in 11% of population over the age of 60 years. It is one of the most common causes of disability in adults leading to decreased work productivity and is the cause of highest medical expenses of all arthritis conditions [1,2]. Osteoarthritis is characterized pathologically by localized loss of cartilage, remodeling of adjacent bone by formation of osteophytes and associated inflammation [3]. Treatment of severe arthritis is well established in form of joint replacement. But, satisfactory results have not been obtained

with various conservative and medical modalities in early stages of OA knee [4]. Hence this study was carried out to evaluate the functional outcome of intra-articular injection of platelet rich plasma (PRP) for management of early stages of OA knee.

Materials and Method

This study was conducted on 30 arthritic knees treated with PRP therapy, presenting to Department of Orthopaedics at our institute from Sept 2018 to Sept 2020. Prior to study institutional review board approval and written

well informed consent was obtained from all the patients. All patients of Kellgren (KL) type II or III osteoarthritis knee with more than 40 years' age were included in the study. Patients with less than 40 years, Kellgren type IV OA knee, OA with significant joint deformity, inflammatory arthritis, patello-femoral arthritis or associated with systemic disorders such as rheumatoid arthritis or infection were excluded from the study.

Thorough history and comprehensive clinical examination of the patients was done and details were recorded in the customized proforma designed for the purpose of the study. Weight bearing standing AP and lateral view X-rays of the affected knee were taken. Pre-procedural WOMAC knee score and VAS score were calculated.

PRP was obtained from patients own blood by drawing 20 to 30 ml of the patient's venous blood in a ACD vacutainer and subjecting this autologous blood to centrifugation (Two spins at 2400 rpm for 10 mins and 3600 rpm for 15 mins). Following this centrifugation, the PRP was separated out as the buffy coat and then PRP was extracted and filled in a sterile syringe. With the patient placed in supine position and the affected knee in slight flexion sterile painting and draping was done. Four ml of autologous PRP of the patient was injected intra-articularly into the suprapatellar bursa of the patients knee after following strict asepsis.

Post injection, the patients were prescribed ice fomentation and paracetamol orally for 3 days. Range of motion exercise, light aerobic activities and strength training exercises were started as per the patient's tolerance. Patients were followed regularly at one, three and six months and were reassessed for functional outcome by WOMAC knee score and VAS score. Statistical analysis was performed using SPSS program for statistical analysis, version 12.0 for windows, and statistical significance was set at $p < 0.05$.

Results

30 patients of OA knee with mean age 54.17 ± 8.18 years (range 44 to 78 years) were included

in the study. 14 (46.7%) were males and 16 (53.3%) were females. 13 (43.3%) patients has left side involvement and in 17 (56.7%) patients right side was affected. 11 (36.7%) patients had KL grade 2 and 19 (63.3%) patients had KL grade 3 osteoarthritis. 22 (73.3%) patients had no co morbidities. 5 (16.7%) patients had associated hypertension and 3 (10.0%) patients had diabetes mellitus.

The mean pre-procedural WOMAC score of 47.67 ± 6.50 improved to 23.70 ± 5.88 , 23.57 ± 5.12 and 25.80 ± 5.69 at one, three and six months after the PRP injection, respectively (table 1). The mean pre-procedural VAS score of 5.37 ± 0.85 , improved to 1.43 ± 1.04 , 1.43 ± 0.63 and 1.73 ± 0.58 at one, three and six months after the PRP injection, respectively (table 1). Pain at injection site was seen in 1 (3.3%) patient and 1 (3.3%) patient developed superficial infection at the site of injection which healed with antibiotics. In 28 (93.4%) patients there were no complications.

Table 1. WOMAC and VAS score after the PRP injection

	Duration	[Mean±SD]	t' value	P value
WOMAC SCORE	Preoperative	47.67 ± 6.50	15.342,	0.001*
	At 1 month	23.70 ± 5.88	df=29	
	At 1 month	23.70 ± 5.88	0.357,	0.724, NS
	At 3 months	23.57 ± 5.12	df=29	
	At 3 months	23.57 ± 5.12	-3.795,	0.001*
	At 6 months	25.80 ± 5.69	df=29	
VAS SCORE	Preoperative	5.37 ± 0.85	16.429,	0.001*
	At 1 month	1.43 ± 1.04	df=29	
	At 1 month	1.43 ± 1.04	0.000,	1.000, NS
	At 3 months	1.43 ± 0.63	df=29	
	At 3 months	1.43 ± 0.63	-3.525,	0.001*
	At 6 months	1.73 ± 0.58	df=29	

Discussion

Knee Osteoarthritis (OA) is one of the commonest problems in ageing adults, causing pain, disability and morbidity, which had been treated conservatively by oral chondro-protectives, intra-articular injections of steroids or visco-supplements [1,2].

Earlier OA was considered initially as a degenerative disorder and a natural occurrence of "wear-and-tear" on joints as a result of aging

leading to mechanical and biological events that destabilize the normal processes of degradation and synthesis of articular cartilage chondrocytes, extracellular matrix and subchondral bone leading to increased water content, decreased proteoglycan content and altered collagen matrix, finally causing degeneration of articular cartilage [3]. Recent research evidence is changing and it is suggested that impaired remodeling and repair of damaged tissue is the main cause and so if we could prevent this, it may be possible to arrest the progress and even reverse the changes [4].

PRP, an autologous blood product contains alpha granules and growth factors which activates the tissue healing and bone and cartilage regeneration changing the joint milieu, in addition to its role in hemostasis [5,6]. This effect of PRP to act at various levels to alter the joint homeostasis has been demonstrated by various studies. Higher amounts of collagen II, prostaglandin (PG) synthesis, increased chondrocyte proliferation, production of matrix molecules, increased hyaluronic acid secretion, lower level of apoptosis and down-modulation of joint inflammation and increased mRNA have been well documented by PRP therapy [7-14].

We evaluated the role of intra-articular injection of platelet rich plasma (PRP) for management of 30 early stages of OA knee patients in terms of improvement in functional score and found that mean WOMAC score of 47.67 ± 6.50 pre-procedural improved to 25.80 ± 5.69 and mean VAS score of 5.37 ± 0.85 pre-procedural, improved to 1.73 ± 0.58 at six months after the PRP injection, respectively.

References

1. Wright EA, Katz JN, Cisternas MG, Kessler CL, Wagenseller A, Losina E. Impact of knee osteoarthritis on health care resource utilization in a US population-based national sample. *Med Care*. 2010;48(9):785-91.
2. Dhillon MS, Patel S, John R. PRP in OA knee – update, current confusions and future options. *SICOT J* 2017;3:27:1-6.
3. Goyal D, Garg RS, Sagy M, Singh GD. Role of platelet rich plasma in osteoarthritis knee. *Int J Orthop sci*. 2017;3(3):280-2.
4. Bland JH. The reversibility of osteoarthritis: a review. *Am J Med*. 1983;74(6A):16-26.

Various studies have demonstrated the efficacy and advantageous effect of PRP in OA knee. Studies have compared the efficacy of PRP and steroid injection, saline, placebo, hyaluronic acid injections and found that PRP is superior and had sustained effect in comparison to other method of treatment [15-21]. Our results were similar to these studies although we haven't compared it with any other alternative treatment method. There is only one study which shows no superior results of PRP at one year in comparison to visco-supplementation which was done by Filardo [22].

Thus intra-articular PRP injection is safe, effective and feasible treatment option for management of early osteoarthritis knee. It is minimal invasive and without the risk of immunological reaction. It demonstrates clinical improvement in self-reported pain and functional capacity with no major side effects. In spite of these proven efficacy still there are some issue related to PRP administration which needs to be sorted out by further studies like, ideal PRP preparation, dosage, frequency and duration of PRP and the population and severity cohort in which it is beneficial.

Conclusion

Use of single PRP injection in the treatment of osteoarthritis knee has high efficacy and safety, being a simple, economical and short procedure, which requiring less surgical skill and can be done in OPD/Minor procedure without any major complications.

5. Lee KS, editor. Platelet-rich plasma injection. Seminars in musculoskeletal radiology. New York: Thieme Medical Publishers; 2013.
6. Boswell SG, Cole BJ, Sundman EA, et al. Platelet-rich plasma: a milieu of bioactive factors. *Arthroscopy* 2012;28(3):429–39.
7. Akeda K, An HS, Okuma M, et al. Platelet-rich plasma stimulates porcine articular chondrocyte proliferation and matrix biosynthesis. *Osteoarthritis Cartil* 2006;14(12):1272–80.
8. Pereira RC, Scaranari M, Benelli R, et al. Dual effect of platelet lysate on human articular cartilage: a maintenance of chondrogenic potential and a transient pro-inflammatory activity followed by an inflammation resolution. *Tissue Eng Part A* 2013;19(11–12):1476–88.
9. Yang SY, Ahn ST, Rhie JW, et al. Platelet supernatant promotes proliferation of auricular chondrocytes and formation of chondrocyte mass. *Ann Plast Surg* 200;44(4):405–11.
10. Spreafico A, Chellini F, Frediani B, et al. Biochemical investigation of the effects of human platelet releasates on human articular chondrocytes. *J Cell Biochem* 2009;108(5):1153–65.
11. Gaissmaier C, Fritz J, Krackhardt T, et al. Effect of human platelet supernatant on proliferation and matrix synthesis of human articular chondrocytes in monolayer and three-dimensional alginate cultures. *Biomaterials* 2005;26(14):1953–60.
12. Sundman EA, Cole BJ, Karas V, et al. The anti-inflammatory and matrix restorative mechanisms of platelet rich plasma in osteoarthritis. *Am J Sports Med* 2014;42(1):35–41.
13. Anitua E, Sanchez M, Nurden AT, et al. Platelet released growth factors enhance the secretion of hyaluronic acid and induce hepatocyte growth factor production by synovial fibroblasts from arthritic patients. *Rheumatology (Oxford)* 2007;46(12):1769–72.
14. Van Buul GM, Koevoet WL, Kops N, et al. Platelet-rich plasma releasate inhibits inflammatory processes in osteoarthritic chondrocytes. *Am J Sports Med* 2011;39(11):2362–70.
15. Sanchez M, Anitua E, Azofra J, et al. Intra-articular injection of an autologous preparation rich in growth factors for the treatment of knee OA: a retrospective cohort study. *Clin Exp Rheumatol* 2008;26:910–3.
16. Cerza F, Carni S, Carcangiu A, et al. Comparison between hyaluronic acid and platelet-rich plasma, intraarticular infiltration in the treatment of gonarthrosis. *Am J Sports Med* 2012;40:2822–7.
17. Kon E, Mandelbaum B, Buda R, et al. Platelet-rich plasma intra-articular injection versus hyaluronic acid visco-supplementation as treatments for cartilage pathology: from early degeneration to osteoarthritis. *Arthroscopy* 2011;27:1490–1501.
18. Spakova T, Rosocha J, Lacko M, et al. Treatment of knee joint osteoarthritis with autologous platelet-rich plasma in comparison with hyaluronic acid. *Am J Phys Med Rehabil* 2012;91:411–7.
19. Li M, Zhang C, Ai Z, et al. Therapeutic effectiveness of intra-knee-articular injection of platelet-rich plasma on knee articular cartilage degeneration. *Zhongguo Xiu Fu Chong JianWai Ke Za Zhi* 2011;25(10):1192–6.
20. Say F, Gürler D, Yener K, et al. Platelet-rich plasma injection is more effective than hyaluronic acid in the treatment of knee osteoarthritis. *Acta Chir Ortho Traumatol Cech* 2013;80(4):278–83.
21. Lana JF, Weglein A, Sampson S, et al. Randomized controlled trial comparing hyaluronic acid, platelet-rich plasma and the combination of both in the treatment of mild and moderate osteoarthritis of the knee. *J Stem Cells Regen Med* 2016;12(2): 69–78.
22. Filardo G, Di Matteo B, Martino Di, et al. Platelet-rich plasma intra-articular knee injections show no superiority versus visco-supplementation: a randomized controlled trial. *Am J Sports Med* 2015;43(7):1575–82.