

Original Article

Comparative study between Platelet-rich plasma and corticosteroid in Osteoarthritis Knee Joint: A study in Zainul Haque Sikder Women's Medical College & Hospital, Dhaka, Bangladesh

*Hoque MJ¹, Ahsan P², Ahmed JM³, Chowdhury A⁴

Abstract

Introduction: Platelet-rich plasma (PRP) uses injections of a concentration of a patient's own platelets to accelerate the healing of injured tendons, ligaments, muscles and joints. Corticosteroids (also known as steroids) are medicines that can be used to treat inflammation. Osteoarthritis disease is a painful condition that affects the articular cartilage of knee joint.

Objective: To compare the efficacy of PRP injection versus corticosteroid injection for Osteoarthritis Knee Joint.

Materials and method: 25 male and 35 female (Mean Age 35.2 yrs.) presenting with Osteoarthritis Knee Joint were randomized to receive there PRP injection (1ml PRP with 1ml of 2% xylocaine) given by a single surgeon. Patients were assessed before (Days 0) and after (Days 15, 30, 60) treatment for knee pain and function and knee strength. Patients where follow up 1 yr. to assess knee pain.

Result: In the present study of 60 patients there were 25 male and 35 female. In the present study of 60 patients the mean age was 35.2 years (Range between 15 to 55 years). Infection, tendon rupture and neurovascular damage where not found. Five patient reported pain for unto 3 days after PRP injection. In both groups knee pain improved dramatically after treatment, but the mode of improvement different. Compared with PRP injection. corticosteroid injection improve at a faster rate over the first 15 days and then started to decline slightly until 60 day. After PRP injection pain, function and knee strength improve steadily and where eventually better. PRP injection and Corticosteroid injection 30 days and faster rate 60 days of both group P-Value 0.0001. Almost high grater rate 30 days Group comparison with pain, function and knee strength patients.

Conclusion: PRP was more effective over the long term follow up period than corticosteroid injection in improving pain, function and knee strength. That's way we recommend this in a first line injection treatment because it is very simple, cheap and more effective.

Keywords: PRP Injection, Osteoarthritis Knee Joint, corticosteroid injection

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Introduction

Platelet-rich plasma (PRP) uses injections of a degree of a patient's own platelets to accelerate the healing of degenerated tendons, ligaments, muscles and joints⁹. During this approach, PRP injections use every individual patient's own healing system to boost contractor issues. PRP injections are ready by taking anyplace from one to a number of tubes of your own blood and running it through a centrifuge to concentrate the platelets. These activated platelets are then injected directly into your degenerated or unhealthy body tissue. OA is caused by Degeneration of articular cartilage. It may be initiated

by overuse but it also occurs spontaneously, particularly in middle age women and sometimes during pregnancy or is associated with rheumatoid arthritis^{1,4}. Patient usually present with complains with knee joint pain knee stiffness. PRP releases growth factors that stimulate and increase the quantity of reparative cells your body produces. Corticosteroids (also called steroids) are medicines that may be related to treat inflammation. Once corticosteroids are injected into or around a painful space (such as a joint or muscle) they'll scale back the inflammation in this space, relieving pain, reducing tissue swelling, and up operate and quality². Diagnosis is usually established by clinical features restricted knee

Author's affiliation

1. *Md. Johurul Hoque, Associate Professor, Department of Orthopedic, Zainul Haque Sikder Women's Medical College and Hospital, Dhaka, Bangladesh
2. Pervez Ahsan, Professor, Department of Orthopedic, Ibn Sina Medical College & Hospital, Dhaka, Bangladesh
3. Javed Munjur Ahmed, Indoor Medical Officer, Orthopedics, Zainul Haque Sikder Womens Medical College and Hospital, Dhaka, Bangladesh
4. Ananya Chowdhury, Indoor Medical Officer, Orthopedics, Zainul Haque Sikder Womens Medical College and Hospital, Dhaka, Bangladesh

***Address of correspondence:** *Md. Johurul Hoque, Associate Professor, Department of Orthopedic, MBBS,D-Ortho (DU), AO Trauma Basic), Zainul Haque Sikder Women's Medical College & Hospital, Dhaka, Bangladesh

joint movement and x-ray findings. The conservative treatment can be an option with rest, bracing, physical therapy, NSAID. The most common practice that is given by orthopedic surgeons is corticosteroid combined with local anesthetics¹³. PRP delivers blood borne cellular and humoral mediators to stimulate the regeneration process within the articular cartilage. PRP also contain anti-inflammatory and antimicrobial mediators, interleukin 1 receptor antagonist, thymosin beta4-TNF blocker, microbiocidal peptides, Phospholipade A2, Serotonin, Thromboxane A2, and Adenosine. Our study compare the efficacy of PRP VS corticosteroid injection for the treatment of Osteoarthritis Knee Joint. The general management process is as follows: conservative measures such as limiting usage of knee, supports and intra-articular steroid injections, and, if those procedures are unsuccessful, surgical intervention.⁶

Objective

To compare the efficacy of PRP injection versus corticosteroid injection for Osteoarthritis Knee Joint.

Materials and Methods

The prospective cross sectional study was carried at Department of Orthopedic, Zainul Hague Sikder Womens Medical College & Hospital, Dhaka, Bangladesh Diagnosis of Osteoarthritis Knee Joint was made on the basis of pain, restricted movement and investigations. Between January 2018 to December 2018 twenty five male and thirty five women (Mean age 35.2 yrs.) presenting with Osteoarthritis Knee Joint were randomized to get either PRP injection (1.5 -2ml) or triamcinolone actinide steroid injection 1ml mixed with 1ml of 2% xylocaine hydrochloride, given by a single orthopaedic surgeon. There are many types of method to prepare the PRP. In our study we used to Ycellbio PRP system. For PRP preparation 20 ml venous blood was drawn from the antecubital vein with an aseptic technique and mixed with the anticoagulant citrate phosphate dextrose adenine (CPDA 1) (1.5cc). The blood was then placed into the PRP tube and centrifuge for four minute at 3400 rpm to separate it into platelet poor plasma, red cell and PRP. After blood was collected I.5-2ml PRP was made and used for injection. A sterile field set up and ensure throughout the procedure depending upon the clinical examination. Patients were advised to abstain from heavy work, NSAID. Patient's occupations were individualized according to sedentary, light medium. Heavy and very heavy. Patients were assessed before (day 0) and after (days 15.30 and 60) treatment for knee pain, function and knee strength. Patients were followed up at 1 year to assess knee pain.

Result

The male to female ratio was 1:1.4. In the present study of 60 patients there were 25 male and 35 female (Mean Age 35.2 yrs.) presenting. Maximum number of patients were in the age group of 46- 55 years 22(36.8%) patients,

followed by 13 (21.6%) patients in the age group between 36-45 years and minimum age group 15-35 yrs. 25(41.6%) (Table 1). In the present study of 60 cases, 15 (8.30%) patients had involvement of the dominant right side whereas left side was involved in 15 (10.20%) patients. The characteristics of both group were similar (table 2). Physical Demands of patient's comparison high level of Medium Group and lowest level of Light category (Table 3). De Quervain's disease were randomized to receive there PRP injection (1ml PRP with 1 ml of 2% xylocaine) given by a single surgeon. Patients were assessed before (Days 0) and after (Days 15, 30, 60) treatment for knee pain and function. Patients where follow up 1 yr. to assess knee pain over knee joint space 10 men and 15 women received PRP injection. Whereas 15 men and 20 women received corticosteroid injection. All patients completed the 1 year follow up (table 4).

Table 1: Distribution patients of age group (n=60).

Age Group	Frequency	Percentage
15-35	25	41.6
36-45	13	21.6
46-65	22	36.8

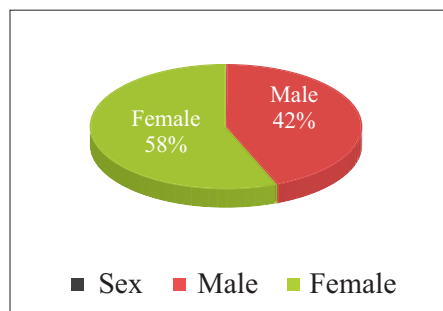


Fig 1: Sex distribution study of patients.

Table 2: Characteristics of both groups (n=60)

Category	PRP (N=15)	Triamcinolone Acetonide corticosteroid injection (N=15)	P value
Age (Year's)	35±2.1	42±7.3	0.095
No of Mate: Female	7:28	6:20	0.400
No of left Right side	8:30	10:20	0.160

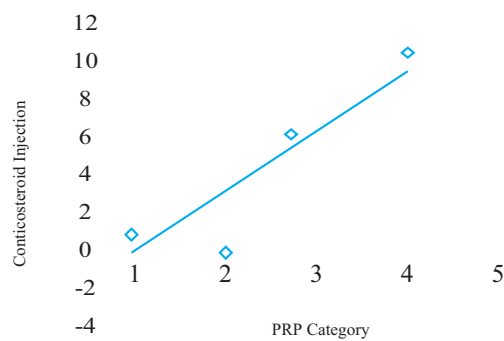


Fig 2: PRP and Triamcinolone Acetonide corticosteroid injection level

Table 3: Physical Demands of patient's comparison (n=60)

Sedentary	Light	Medium	Heavy	Very heavy
1	1	10		2
2	0	11	1	4

Table 4: Group comparison with pain, function and knee strength (n=60)

Category	Day 0	Day 15	Day 30	Day 60	P value
Wrist pain:					
PRP	5.8 ± 1.3	4.3 ± 1.2	3.5 ± 1.1	1.1 ± 1.0	0.0001
Corticosteroid injection	5.7 ± 1.2	1.6 ± 0.8	1.5 ± 1.0	2.7 ± 1.0	0.0001
p value	0.578	0.0001	0.0001	0.0001	
Function					
PRP	65.6 ± 11.7	50.2 ± 15.2	30.3 ± 10.2	18.2 ± 8.1	0.0001
Corticosteroid injection	60.1 ± 12.4	15.5 ± 8.6	20.0 ± 10.2	30.5 ± 16.5	0.0001
p value	0.155	0.0001	0.0001	0.0001	
Grip strength:					
PRP	-	7.2 ± 12.2	20.7 ± 18.0	12.8 ± 28.1	0.0001
Corticosteroid injection	-	23.2 ± 20.8	18.3 ± 20.7	18.0 ± 20.7	0.0001
p value	-	0.001	0.647	0.016	

No complication were noted. In both groups knee pain, function and knee strength improved dramatically after treatment but the mode of improvement differed compared with PRP injection, corticosteroid injection improved all three scores at a faster rate after the first 15 days and then started to decline slightly until 60 day. After PRP injection all three score (Pain, function and knee strength) improved steadily and were much better (table 4). (knee pain): PRP injection and Corticosteroid injection 15 days and 30 days faster rate and (Function): pain PRP injection and Corticosteroid injection 0 days and 15 days faster rate and (Knee strength): PRP injection and Corticosteroid injection 30 days and faster rate 60 days of both group P-Value 0.0001. Almost high grater rate 30 days Group comparison with pain, function and knee strength patients.

Discussion

Injection of PRP was more effective then corticosteroid injection in case of pain control, function and knee strength. The complete recovery rate at 2 months was 90% after PRP injection and 55% after corticosteroid injection. Corticosteroid injection gives rapid recovery but temporary improvement in the first month. PRP injection stimulate the inflammatory cascade within the articular cartilage by providing cellular and humoral mediators for regeneration. Histological studies shows non inflammatory angiofibroblastic tendinosis, neurovascularization and mucoid degeneration in first dorsal compartment. However, results as to whether PRP, autologous whole blood or corticosteroids is more beneficial are still unclear. Hechtman *et al.*, (2011) [34]

in a similar study using PRP, treated 31 patients with OA Knee not responding to conservative treatment for 6 months. Two cases elected surgery 1 month post-injection and 29 cases continued follow up⁶. The overall success rate was 90% (28 of 31 elbows). Patient satisfaction improved from 5.1 ± 2.5 at 1 month to 9.1 ± 1.9 at last follow up. Alisara Arirachakaran *et al.* (2015) [35] did a systematic review and network meta-analysis of randomized controlled trials, conducted with the aim of comparing relevant clinical outcomes between the use of PRP, autologous blood and corticosteroid injection. They concluded that the network meta-analysis provided additional information that PRP injection can improve pain and lower the risk of complications, whereas autologous blood injection can improve pain, disabilities

scores and pressure pain threshold but has a higher risk of complications⁹. The level of evidence of the study was Level I evidence. The result of the present study was that PRP injection significantly improves score. In this study after 6 months of PRP injection, when asked about overall subjective satisfaction among the patients of Osteoarthritis Knee Joint. These findings are consistent with previous prospective studies that demonstrate benefits conferred by intra articular PRP insertional tendinopathies. And provides satisfactory results in young subject's recalcitrant noninsertional tendinopathy reducing pain and improving function [‘J. And these findings also are in agreement with previous literature data in patients suffering from Achilles, patellar, and elbow tendinopathies. The PRP treatment should be adapted as a best of therapy for relief symptoms. Though this must be advised merely next other type of nonsurgical treatment failed because lower involvement of tools/ technologies & fewer contact to blood products in other type of therapies. The main findings of this study are that PRP injection resulted in better pain control and the improvement in functional outcome was stable and maintained up to a midterm follow-up. It is current opinion that the therapeutic activity of PRP is mainly due to the release of many growth factors (GFs), which can act on many aspects of tendon repair, including angiogenesis, chemotaxis, and cell proliferation by activating intracellular signal-transduction pathways 130’ 31J. In the short term (1-33 months) effect, GFs can directly stimulate tenocytes to produce extracellular matrix, and promote neofibrils formation and remodeling. Insulinlike GF-12 stimulates production of collagen 1311. in long-term (62- 122 months), depend on a direct stimulation, probably relies on the activation of resident tendon stem/progenitor cells (TSPCs), which have been recently identified in tendons tissue from different animal species. Like stem cells found in adult tissues, TSPCs are believed to be the source of recent differentiated tenocytes, responsible for maintaining adequate tenocyte numbers in the tissue throughout life and replenishing them after injury 1201. Regarding the amount of injection, Although smaller volume (2-32 ml) of PRP was injected in present study or even 1.52 ml such as in previous study, the proportion of spread beyond tendon was little, so the amount of PRP is even 1.52 ml is adequate to achieve good result on the other hand the greater volume of PRP could be an option. However, large volume can lead to further diffusion and require much more blood collectionx, which is undesirable. In our study, we not used ultrasonographic injection technique and the accuracy of :ejection was not to be guaranteed. Therefore, we increase tie volume of injection up to 33ml so we can get maximum distribution of PRP in the area of maximal tenderness, in comprising with ultrasound injection which use 1.52 ml. Other therapies modalities want few expertise in contrast to injection PRP therapy. All staff should be good trained to make PRP from blood

while these is not required in steroid injections or others. Corticosteroid injections have also been used extensively for this problem, but studies showed that there is controversy about their efficacy². There is essential of long-time trials to found PRP as a best of treatment for long term permanent heal from tendinitis due to mechanical causes. The study was limited by a minor sample size and absence of a control group. Larger-scale randomized controlled studies are required to assistance elucidate PRP as a good management for this musculoskeletal injury. To diagnose Osteoarthritis Knee Joint, Treatment for Osteoarthritis Knee Joint focuses on reducing pain and swelling. It includes: Applying heat or ice to the affected area. Taking a nonsteroidal anti-inflammatory drug (NSAID). These include ibuprofen (Advil, Motrin) or naproxen (Aleve). Avoiding activities that cause pain and swelling. Especially avoid those that involve repetitive knee motions. Getting injections of steroids or a local anesthetic (numbing medicine) into the joint space. These injections are very effective and are used regularly. A physical therapist or occupational therapist can show you how to change the way you move. This can reduce stress on your knee. He or she can also teach you exercises to strengthen your muscles. Most people notice improvement after 4 to 6 weeks of treatment. They are able to use their knee without pain once the swelling is gone. You might need surgery if your case is severe or if other treatments don't relieve your pain. After surgery, you will need to do physical therapy to strengthen your knee. This will help keep the problem from coming back. Once the area has healed and returned to full strength, you should have normal use of your knee.

Conclusion

PRP injection is more effective then corticosteroid injection in improving pain, function and knee strength. So that is why recommend it as a first line treatment because it easy to push very effective for long term treatment. We believe that PRP injection should be offered to all patients with Osteoarthritis Knee Joint e after failure of other conservative treatment. Further comparative studies with other type of injection or surgery are required to evaluate the long-term outcomes.

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