Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

A PROSPECTIVE OBSERVATIONAL STUDY OF PLATELET RICH PLASMA AS A MODALITY OF TREATMENT FOR PRIMARY KNEE OSTEOARTHRITIS

DrAkshay Pushkar[1*], Dr SM Adil[2], Dr Aparna Jaieel[3], Dr Shambhu Singh[4], Dr. Sumit Bhandari[5], Dr Saurabh Sharma[6], Dr. KPD Jaidev[7], Dr Vishnu Kumar Sharma[8]

[1*]MS, Classified Specialist, Department of Orthopaedics, Military Hospital Kirkee, Pune.

[2]DNB, Classified Specialist, Department of Orthopaedics, Military Hospital Kirkee, Pune.

[3]MS, Classified Specialist, Department of Surgery, Military Hospital Kirkee, Pune.
[4]DNB, Classified Specialist, Trained in Arthroscopy, Department of Orthopaedics, Military Hospital Kirkee, Pune.
[5]DNB, Classified Specialist, Trained in Paediatric Orthopaedics, Department of Orthopaedics, Military Hospital Kirkee, Pune.
[6]MS, Classified Specialist, Joint Replacement Surgeon, Department of Orthopaedics, Military Hospital Kirkee, Pune.
[7]DNB, Graded Specialist, Department of Orthopaedics, Military Hospital Kirkee, Pune.
[8]Junior Resident, Department of Orthopaedics, Armed Forces Medical College, Pune.

Corresponding Author:
Dr Akshay Pushkar
MS, Classified Specialist, Department of Orthopaedics, Military Hospital Kirkee, Pune.

Abstract:

Introduction: Osteoarthritis (OA) is a leading cause of disability and doubles the number of visits to primary care practitioners for those with this condition in comparison to those without. OA affects knee joint more often than any other joint. With the ageing of the population and the growing obesity epidemic, the number of surgical procedures for knee OA will increase dramatically in the coming years, of which knee replacement is the most costly to the health care system and burdensome for the patient. Other treatment options for OA of the knee would be of great value.

Materials and Methods: This is a prospective observational study, conducted among100 patients with knee osteoarthritis who were studied in the outpatient Department of Orthopaedics, Military Hospital Kirkee, Pune. An informed written consent was taken from all the participants. Patients were diagnosed using the American College of Rheumatology (ACR) classification criteria of osteoarthritis. All patients were treated with 3 monthly intra-articular injections of autologous platelet-rich plasma into the knee joint, under local anesthesia on an outpatient basis. All these cases were treated from March 2022 to February 2023. A detailed history was taken. A preliminary general and physical examination was done. Build and nourishment was noted. Systemic examination of cardiovascular, respiratory, gastrointestinal and genitourinary examination was followed as routine. A detailed local examination of the knee joint was done. Data was entered in MS Excel 2007 and analysed.

Results: After 6 months, all patients were re-evaluated according to age, sex, BMI (Body Mass Index), side involved, severity (Grade) of osteoarthritis, pre and post-PRP injection comparison of crepitus, local temperature, joint line tenderness, effusion, range of motion, visual analogue scale for pain and International Knee

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

Documentation Committee(IKDC) score. The minimum and maximum age in this study was found to be 41 years and 70 years. The average age of the patients was calculated as the total age of patients/ no. of patients = 52.68 yrs. Out of 100 patients, 44were females, and 56 were males, Out of 100 knee joints treated, 56 were the right side and 44 were the left side. 64patients were found to be overweight, 24 were obese, and 12were normal weight. The grading of osteoarthritis of the knee was noted.

Conclusion: Platelet Rich Plasma **(**PRP) procedure showed a higher degree of efficacy as well as significant findings of more and longer pain reduction, improved function and patient satisfaction. This was particularly noticeable in the treatment of younger patients with less severe articular cartilage degeneration. All of the comparative studies suggest that PRP injections are a useful approach and an alternative in the treatment of OA. This minimally invasive procedure appears to be safe and effective. It could be utilized as a reasonable treatment option when other therapies fail or are inappropriate for the patient.

Key Words: Osteoarthritis, Platelet Rich Plasma, knee joint, BMI.

INTRODUCTION

Osteoarthritis (OA) is a major cause of disability and doubles the number of visits to primary care practitioners for those with the condition when compared to those without. OA affects knee joint more often than any other joint. With ageing of our population and the growing obesity epidemic, the number of surgical procedures for knee OA will increase dramatically in the coming years, of which knee replacement is the most costly to the health care system and burdensome for the patient. Other treatment options for OA of the knee would be of great value.[1]

Symptomatic OA of knee, which is described as having pain during most days of a month along with radiologic evidence of arthritis, has a prevalence of 22% to 39% in India.[2]

Osteoarthritis is a chronic disorder of synovial lined joints where there is progressive softening and disintegration of articular cartilage accompanied by new growth of cartilage and bone at the joint margins, cyst formation and sclerosis at subchondral regions of bone, mild synovitis and capsular fibrosis.[3]

Osteoarthritis differs from simple wear and tear in that it is asymmetrically distributed, often associated with abnormal loading rather than frictional wear. It is not an inflammatory disorder although at times there are local signs of inflammation. In its most common form, osteoarthritis is unaccompanied by any systemic illness.[4]

Most of the treatment strategies do not address the pathology and have shown only minor benefits and significant side effects. New experimental studies have begun to target the biomechanical process of osteoarthritis with the focus on repairing cartilage or replacement.[5]Autologous platelet-rich plasma therapy has got particular attention, in which high concentration of platelets is achieved in a small volume of plasma after being placed in a centrifuge. Platelets play a vital part in tissue homeostasis.[6]

Our chief aim was to study the effects of intra-articular injections of Platelet-rich plasma in the management of knee joint osteoarthritis and to compare the results with standard studies and draw conclusion.

MATERIALS AND METHODS

Study design: A prospective observational study.

Study Location: Department of Orthopaedics, Military Hospital Kirkee, Pune.

Study duration: March 2022 to February 2023.

Sample size: 100 patients.

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

This is a prospective observational study, conducted among100 patients with knee osteoarthritis who were studied in the outpatient Department of Orthopaedics, Military Hospital Kirkee, Pune. An informed written consent was taken from all the participants. Patients were diagnosed using The American College of Rheumatology (ACR) classification criteria of osteoarthritis. All patients were treated with 3 monthly intra-articular injections of autologous platelet-rich plasma into the knee joint under local anesthesia on an outpatient basis. All these cases were treated from March 2022 to February 2023. A detailed history was taken. A preliminary general and physical examination were done. Build and nourishment noted. Systemic examination of the cardiovascular, respiratory, gastrointestinal and genitourinary examination was followed as routine. A detailed local examination of the knee joint was done. Data was entered in MS Excel 2007 and analysed.

Inclusion Criteria:

Patients with history of chronic pain (of at least 4 months duration) or swelling of the knee, not responding to NSAIDs and/or physical therapy with radiographic findings of grade 1(definite osteophyte, unimpaired joint space) and grade 2(moderate diminution of joint space osteoarthritis of the knee joint) according to Kellgren- Lawrence scale were included in the study.

Exclusion Criteria:

Patients with diabetes, rheumatoid arthritis, major axial deviation (varus of more than 10 degree/valgus more than 10 degree), haematological diseases (coagulopathies), severe cardiovascular diseases, infections, immunosuppression, patients on therapy with anticoagulants–anti aggregants or nonsteroidal anti-inflammatory drugs within 5 days before donating blood for PRP preparation were excluded from the study.

After 6 months, all patients were re-evaluated by physical examination, assessment of visual analog scale for pain, international knee documentation committee (IKDC) score.

Statistical Analysis: Chi-square test was used to assess differences between quantitative and qualitative data at baseline and after 3 PRP injections. Spearman's correlation coefficient analysis was performed to identify factors associated with better functional outcomes. The clinical features were evaluated using the chi-square test. The VAS scale and IKDC score were assessed using chi square test. A statistically significant cut-off value was set at $p < 0.05$.

RESULTS

After 6 months, all patients were re-evaluated according to age, sex, BMI (Body mass index), side involved, severity (Grade) of osteoarthritis, pre and post-PRP injection comparison of crepitus, local temperature, joint line tenderness, effusion, range of motion, visual analogue scale for pain and International Knee Documentation Committee (IKDC) score. The minimum and maximum age in this study was found to be 41 years and 70 years. The average age of the patients was calculated as the total age of patients/ no. of patients = 52.68 yrs. Out of 100 patients, 44were females, and 56 were males, Out of 100 knee joints treated, 56 were the right side and 44 were the left side. 64patients were found to be overweight, 24 were obese, and 12were normal weight. The grading of osteoarthritis of the knee.

S.No	Gender	Number of patients	Percentage
1	Male	56	56%
2	Female	44	44%
3	Total	100	100%

Table 1: Gender distribution

S.No	Kellgren-Lawrence	Number of	Percentage

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

	Scale	patients	
1	Grade 1 (Doubtful)	48	48%
2	Grade 2 (Mild)	52	52%
3	Grade 3 (Moderate)	0	0%
4	Grade 4 (Severe)	0	0%

Table 2: Kellgren-Lawrence Grading of Patients with Primary Osteoarthritis

Clinical data	Baseline (No. Patients out of 100)	After 6 Months Follow Up (No. of Patients out of 100)	P Value
Local rise of temp	10	0	0.003
Tender joint line	66	30	0.004
Crepitus	66	40	0.001
Effusion	10	10	0.002
Limited range of movements	36	10	0.001

Table 3: Clinical Evaluation of Patients with Primary Osteoarthritis after PRP Injection

DISCUSSION

Osteoarthritis is a major public health issue that affects one-third of all patients and causes pain and disability. The symptoms are frequently linked with significant functional impairment as well as inflammation-related signs and symptoms such as pain, stiffness and loss of movement. Joint instability and/or malalignment, obesity, increasing age, related intra-articular crystal deposition, muscular weakness, and peripheral neuropathy are all known to influence the course of OA.[6] Advances in molecular biology enhance the prospect of discovering novel therapeutic targets that will allow for more than just symptomatic treatment. Joint replacement is the gold standard treatment for advanced and incapacitating OA.[7]

In our study 100 patients with Grade 1 or Grade 2 knee osteoarthritis treated with 3 monthly injections of platelet-rich plasma and following conclusion made after six months of follow up. The average age documented was 52.68 years. Osteoarthritis of the knee was common in 5th and 6th decade of life, the commonest in between 51 and 55 years age group. In this study, 82 patients were found to be below the age of 60 years. Also, results were found to be better in the younger patients when compared to the older.[8]

In this study64 patients (64%) were females, and 36 (36%) patients were male. The baseline visual analog score in female patients was 5.93 and 3.45 at 6 months and that in males was 5.98(Baseline) and 3.36 (at 6 Months) thus showing that there is no notable difference in response to treatment between males and females. The value of IKDC score in males was38.75 (Baseline) and 76.08 (at 6 Months) and that in females was 38.42 (Baseline) and 76.14 (at 6 Months) therefore showing no significant difference in response to treatment in between males and females.[9]

In 2013, Hart R et al. performed a sequence of nine PRP applications after undergoing arthroscopy in 100 patients with knee osteoarthritis. The assessment tools were Tegner, Lyshcolm, Cincinnati and IKDC scores. There was betterment of the indices after 6 months of treatment which was not maintained after 12 months. Another study published in 2013 led by Say F et al. compared a single PRP injection with three hyaluronic acid injections in individuals with knee osteoarthritis.[10]

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

CONCLUSION

Platelet Rich Plasma**(**PRP) procedure showed a higher degree of efficacy as well as significant findings of more and longer pain reduction, improved function and patient satisfaction. This was particularly noticeable in the treatment of younger patients with less severe articular cartilage degeneration. All of the comparative studies suggest that PRP injections are a useful approach and an alternative in the treatment of OA. This minimally invasive procedure appears to be safe and effective. It could be utilized as a reasonable treatment option when other therapies fail or are inappropriate for the particular patient.

REFERENCES

1. Murray I, Benke M, Mandelbaum B (2015) Management of knee articular cartilage injuries in athletes: Chondroprotection, chondrofacilitation, and resurfacing. Knee Surg Sports Traumatol Arthrosc 24, 1617–1626.
2. Andia I, Martin JI, Maffulli N (2018) Platelet-rich plasma and mesenchymal stem cells: Exciting, but … are we there yet? Sports Med Arthrosc Rev 26(2), 59–63.
3. Boswell SG, Cole BJ, Sundman EA, et al. (2012) Platelet-rich plasma: A milieu of bioactive factors. Arthroscopy 28(3), 429–439.
4. Akeda K, An HS, Okuma M, et al. (2006) Platelet-rich plasma stimulates porcine articular chondrocyte proliferation and matrix biosynthesis. Osteoarthr Cartil 14(12), 1272–1280.
5. Pereira RC, Scaranari M, Benelli R, et al. (2013) Dual effect of platelet lysate on human articular cartilage: A maintenance of chondrogenic potential and a transient proinflammatory activity followed by an inflammation resolution. Tissue Eng Part A 19(11–12), 1476–1488.
6. Altman R, Asch E, Bloch D, et al. (1986) Development of criteria for the classification and reporting of osteoarthritis: Classification of osteoarthritis of the knee. Diagnostic and Therapeutic Criteria Committee of the American Rheumatism Association. Arthritis Rheum 29, 1039–1049.
7. Sundman EA, Cole BJ, Karas V, et al. (2014) The anti-inflammatory and matrix restorative mechanisms of platelet-rich plasma in osteoarthritis. Am J Sports Med 42(1), 35–41.
8. Anitua E, Sanchez M, Nurden AT, et al. (2007) Platelet-released growth factors enhance the secretion of hyaluronic acid and induce hepatocyte growth factor production by synovial fibroblasts from arthritic patients. Rheumatology (Oxford) 46(12), 1769–1772.
9. Stratz C, Nührenberg TG, Binder H, et al. (2012) Micro-array profiling exhibits remarkable intra-individual stability of human platelet micro-RNA. Thromb Haemost 107(4), 634–641.
10. Ahlback S (1968) Osteoarthrosis of the knee: A radiographic investigation. Acta Radiol Diagn (Stockh) Suppl 277, 7–72.