

Intra Articular Injection of Platelet Concentrate for Treatment of Degenerative Cartilage Lesion



Medical Science

KEYWORDS : Platelet concentrate, Knee, Intra-articular injection.

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ABSTRACT

Platelet concentrate (PC) is a natural concentrate of autologous blood growth factors experimented in different fields of medicine in order to test its potential to enhance tissue regeneration. Our Aim is to evaluate the safety and efficacy of Platelet concentrate used intra-articularly. Total 26 patients affected by early degenerative change of the knee in the age group of 35-50 years were treated with intra-Articular injection of PC. Patients were evaluated by VAS (visual analog scale) before and at the end of the follow-up. No major adverse events related to the injections were observed during the treatment and follow-up period. A statistically significant improvement was obtained from the basal evaluation. VAS evaluation shows 05 patients (30%) had Excellent result with no pain, 11 patients (60%) had very Good result with occasional pain, 01 patient (05%) had Fair result with moderate pain, 01 patients (05%) had not Good result with no change in pain even after treatment. The preliminary results indicate that the treatment with PC injections is safe, has potential to reduce pain, improve knee function, quality of live in younger patients with low degree of articular degeneration.

Introduction

Articular cartilage lesions, with their inherent limited healing potential are hard to treat and remain a challenging problem for orthopedic surgeons.¹ Topical agents have only been proven useful for short term use of mild-to moderate pain in osteoarthritis.² Intraarticular injections of corticosteroids are of short-term benefit.³ The most recent knowledge regarding tissue biology highlights a complex regulation of growth factor for the normal tissue structure and the reaction to tissue damage. The influence of the growth factors in cartilage repair is now being widely investigated in vitro and in vivo.^{4,5} Platelet concentrate is a natural concentrate of autologous growth factors from the blood. Currently, a wide range of experiments is taking place in different fields of medicine in order to test the potential of enhancing tissue regeneration.^{3,6} PC is defined as autologous blood with a concentration of platelets above baseline values. Autologous PC was first used in 1987 by Ferrari et al.⁷ following open heart surgery. Since that time, Platelet rich concentrate has been used in sports medicine, orthopaedics, dentistry, dermatology, ophthalmology, and plastic, cardiothoracic and maxillofacial surgery.⁸ The benefits of this new procedure seem to be associated with the pools of GFs stored in the α-granules of platelets, including platelet-derived GF (PDGF), transforming GF beta (TGF-β), insulin-like GF-I (IGF-I), basic fibroblast GF (bFGF) and vascular endothelial GF (VEGF), which have been found to take part in the regulation of articular cartilage.⁹ (figure1) Our hypothesis is that the utilization of Platelet Concentration could bring a stimulation of the chondral anabolism and a reduction of the catabolic processes. PC may also influence the overall joint homeostasis, reducing synovial membrane hyperplasia.

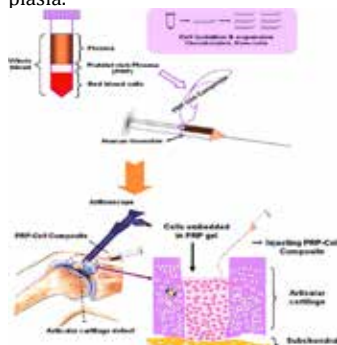


Figure1 shows how PC prepared and acts

Material & method: We have selected 26 consecutive patients in age group of 35 to 50 years with early degenerative pathology of articular cartilage of knee Came to Sir T. Hospital, Bhavnagar, Gujarat, India during period of December 2009 to January 2011. These patients had mechanical symptoms for at least 4month with grade II/III chondromalacia on Arthroscopy & persistent knee pain after arthroscopic treatment (Figure 2a). Out of 26 patients, 4 were lost at follow up & 4 were excluded from the study as they did not complete the treatment, so 18 patients who completed the treatment with good results achieved at the end of the therapy were available for follow-up at 2nd, 6th, and 12th

Arthritis	No. of patients		
	With Pain	Without Pain	Total
Yes	18	2	20
No	1	5	6
Total	19	7	26

* P value 9.16 Yets Correction

months of therapy. Exclusion criteria were major axial deviation (varus >50°, valgus >50°), Hematological diseases (Coagulopathies), use of NSAIDs or any antiplatelets within 5 days, systemic disorders, such as diabetes, rheumatoid arthritis, severe cardiovascular diseases, infections, immunosuppression, patients with Hb values of <11 and platelets values of <150,000/mm³, patients with HIV, HCV, HBsAg, Syphilis, MP. The study was approved by the Institutional Review Board, Government Medical College, Bhavnagar and the informed consent of all patients was obtained before the treatment.



figure2a) Arthroscopic image showing grade II chondromalasia treated with shaver.



Figure 2b) intra articular injection of platelet concentrate in Operation theater.

Platelet- concentrate preparation, treatment procedure and follow up: 100-ml of venous blood collected (in a bag containing 14ml CPDA) for every lesion treated every time. 2PC units of 5 ml each prepared and put at room temperature(20-240C)with continuous agitation. 1unit was sent to the laboratory for analysis of platelet concentration and quality tested (platelet count and bacteriological test), Under sterile precautions by orthopedic surgeon in Operation theater- standard lateral position using a 22-g needle (Figure 2b)used to give intra articular injection at 0,3 and 6 weeks interval. At the end of the procedure, the patient was invited to bend and extend the knee a few times, to allow the PC to distribute. After the injection, the patients sent home with instructions to limit the use of leg for at least 24 hour and to use cold therapy/ice on the affected area for pain. Patients were prospectively clinically evaluated before the treatment, at the end of the treatment ,6 and 12 month follow-ups.

Result

26 patients treated Arthroscopically out of that 18patients(70%)had arthritis on Arthroscopy had significant pain and 05(20%) with degenerative meniscal tear treated with partial meniscectomy,20patients(75%) had Grade II/III

Patient's number	Before treatment	After Treatment
1	6	5
2	5	5
3	7	5
4	7	6
5	4	4
6	5	3
7	6	4
8	8	5
9	6	5
10	7	5
11	6	4
12	6	4
13	6	5
14	5	5
15	7	6
16	8	7
17	7	5
18	8	6
Mean	6.333333	4.944444
SD	1.137593	0.937595

Chondromalacia & 01(5%) had Chondral flap. No major adverse events related to the injections were observed during the treatment and follow-up period. A statistically significant improvement was obtained from the basal evaluation, to the end of the therapy and to the end of follow-ups. VAS evaluation shows 05 patients (30%) had Excellent result with no pain, 11 patients (60%) had Very Good result with occasional mild pain, 01 patients (05%) had Fair result with moderate pain, 01 patients (05%) had not Good result with no change in pain even after treatment.(Who was 45 yrs old female with BMI>30 and has grade III chondromalacia with mild malalignment of knee). Vas score of the patient before injection: Mean+/-SD6.33+/-1.13. Vas score of the patient after injection: Mean+/-SD 4.94+/-0.93. *P<0.05 that is significant.

Discussion

Intra-articular injection of autologous PC has been increasingly implemented on patients with osteoarthritis and currently seems to be considered as one of the treatment options for osteoarthritis. This preliminary study was performed to provide potential outcome measures and provide data that could potentially be used to facilitate a blinded, randomized controlled clinical trial to determine whether PC is safe and effective for knee OA. Data demonstrated no major adverse events to injections during the treatment and follow up period. Only one patient had marked pain response with swelling after injection, which spontaneously resolved itself after 2 weeks. In some case slight pain present during first 2-3 days. VAS showed many improvements in pain after knee movement and at rest. The findings suggest that patients who benefited from the injection series maintained those positive results for at least 12 months without other medications or treatments. Our finding constantly correlates with the pilot study done on Platelet rich plasma use in 2007 by Elizaveta Kon et al.,10.TGF- β , contained in PRP has been linked to chondrogenesis in cartilage repair¹¹. New reports presented at the 2007 International Cartilage Repair Society Meeting in Warsaw indicate PRP enhancement of chondrocyte cell proliferation and positive clinical effects on degenerative knee cartilage¹¹.These studies and others suggest an important role for these potent biological regulators of chondrocytes in cartilage repair. However, for the time being, the evidence base for PC clinical use is still in its infancy, and there are only a few papers that specifically address treatment applications in medical field. Further studies are needed to confirm the results obtained and to understand the mechanism of the action, evaluating if there is only a temporary symptom improvement or if PC may also play a more important role through disease modifying properties.

The limitations of this study are the lack of a control group and the fact that the evaluation of the results only took place at a short term follow up. We analyzed our patients at a maximum follow up period of 12 months because, as for other injective therapies, the treatment can be repeated after a certain time interval. In any case, we believe that the main benefit of this type of therapy is expected in the short term. Promising results were obtained regarding safety, feasibility and the short-term effectiveness of this treatment option. This report documents our experience on autologous platelet-derived growth factor injections as a treatment of knee cartilage degeneration, which may represent a low-invasive and safe alternative in patients with chondropathy or early osteoarthritis. Conclusion : The preliminary short-term results of our pilot study are encouraging and indicate that treatment with autologous PC intra-articular injections is safe, Cheap and may be useful for the treatment of young patient with early degenerative articular pathology of the knee, aiming to reduce pain, improve knee function, quality of life. However, randomized controlled studies will be needed to confirm the real potential and to evaluate the durability of this procedure, to better identify indication criteria and to improve application modalities. Further studies evaluating this new technique for treating cartilage degenerative pathology are in progress. Still require long term results....

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