Platelet-Rich Plasma Intra-Articular Injection Versus Hyaluronic Acid Viscosupplementation as Treatments for Cartilage Pathology: From Early Degeneration to Osteoarthritis
Kon E, Mandelbaum B, Buda R, Filardo G, Delcogliano M, Timoncini A, Fornasari PM, Giannini S, Marcacci M.

Abstract

PURPOSE:
The aim of our study is to compare the efficacy of platelet-rich plasma (PRP) and viscosupplementation (hyaluronic acid [HA]) intra-articular injections for the treatment of knee cartilage degenerative lesions and osteoarthritis (OA).

METHODS:
The study involved 150 patients affected by cartilage degenerative lesions and early and severe OA. Fifty symptomatic patients were treated with 3 autologous PRP intra-articular injections and were evaluated prospectively at enrollment and at 2- and 6-month follow-up. The results obtained were compared with 2 homogeneous groups of patients treated with HA injections. One group was treated with injections of high-molecular weight HA; the other group was treated with low-molecular weight (LW) HA. International Knee Documentation Committee and EQ VAS scores were used for clinical evaluation; adverse events and patient satisfaction were also recorded.

RESULTS:
At 2 months' follow-up, the PRP and LW HA groups showed a similar improvement, with higher results compared with the high-molecular weight HA group (P < .005). At 6 months' follow-up, better results were observed in the PRP group (P < .005). PRP and LW HA treatments offered similar results in patients aged over 50 years and in the treatment of advanced OA. PRP showed a better performance compared with HA in younger patients affected by cartilage lesions or early OA.

CONCLUSIONS:
Autologous PRP injections showed more and longer efficacy than HA injections in reducing pain and symptoms and recovering articular function. Better results were achieved in younger and more active patients with a low degree of cartilage degeneration, whereas a worse outcome was
obtained in more degenerated joints and in older patients, in whom results similar to those of viscosupplementation have been observed.

**LEVEL OF EVIDENCE:**
Level II, prospective comparative study.

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**Platelet-rich plasma: intra-articular knee injections produced favorable results on degenerative cartilage lesions.**

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**Abstract**

Platelet-rich plasma (PRP) 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. The aim of our study is to explore this novel approach to treat degenerative lesions of articular cartilage of the knee. One hundred consecutive patients, affected by chronic degenerative condition of the knee, were treated with PRP intra-articular injections (115 knees treated). The procedure consisted of 150-ml of venous blood collected and twice centrifugated: 3 PRP units of 5 ml each were used for the injections. Patients were clinically prospectively evaluated before and at the end of the treatment, and at 6 and 12 months follow-up. IKDC, objective and subjective, and EQ VAS were used for clinical evaluation. Statistical analysis was performed to evaluate the significance of sex, age, grade of OA and BMI. A statistically significant improvement of all clinical scores was obtained from the basal evaluation to the end of the therapy and at 6-12 months follow-up (P < 0.0005). The results remained stable from the end of the therapy to 6 months follow up, whereas they became significantly worse at 12 months follow up (P = 0.02), even if still significantly higher respect to the basal level (P < 0.0005). The preliminary results indicate that the treatment with PRP injections is safe and has the potential to
reduce pain and improve knee function and quality of live in younger patients with low degree of articular degeneration.

3-


Intraarticular administration of platelet-rich plasma with biodegradable gelatin hydrogel microspheres prevents osteoarthritis progression in the rabbit knee

Abstract

OBJECTIVE:
To investigate the therapeutic potential of administration of gelatin hydrogel microspheres containing platelet-rich plasma (PRP), by examining its effects on progression of osteoarthritis (OA) in a rabbit model.

METHODS:
PRP and platelet-poor plasma (PPP) were prepared from rabbit blood. Adult rabbit chondrocytes were cultured in the alginate beads with the presence of 3% PRP or 3% PPP. Glycosaminoglycan (GAG) synthesis was quantified using dimethylmethylene blue assay. To confirm the anabolic effect of PRP in vivo, cartilage matrix gene expression was examined after intraarticular administration of PRP contained in gelatin hydrogel microspheres. The PRP contained in gelatin hydrogel microspheres was administered into the rabbit knee joint twice with an interval of 3 weeks, beginning 4 weeks after anterior cruciate ligament transection (ACLT). Ten weeks after ACLT, gross morphological and histological examinations were performed.

RESULTS:
PRP significantly stimulated chondrocyte GAG synthesis in vitro. In the knee joint, expression of proteoglycan core protein mRNA in the articular cartilage increased after administration of PRP contained in microspheres. Intraarticular injections of PRP in gelatin hydrogel microspheres significantly suppressed progression of OA in the ACLT rabbit model morphologically and histologically.
CONCLUSION:
The present findings indicate that sustained release of growth factors contained in PRP has preventive effects against OA progression. These preventive effects appear to be due to stimulation of cartilage matrix metabolism, caused by the growth factors contained in PRP.

4.


**Autologous protein solution inhibits MMP-13 production by IL-1? and TNF?-stimulated human articular chondrocytes.**

Abstract

Catabolic inflammatory cytokines are prevalent in osteoarthritis (OA). The purpose of this study was to evaluate an autologous protein solution (APS) as a potential chondroprotective agent for OA therapy. APS was prepared from platelet-rich plasma (PRP). The APS solution contained both anabolic (bFGF, TGF-?1, TGF-?2, EGF, IGF-1, PDGF-AB, PDGF-BB, and VEGF) and anti-inflammatory (IL-1ra, sTNF-RI, sTNF-RII, IL-4, IL-10, IL-13, and IFN?) cytokines but low concentrations of catabolic cytokines (IL-1?, IL-1?, TNF?, IL-6, IL-8, IL-17, and IL-18). Human articular chondrocytes were pre-incubated with the antagonists IL-1ra, sTNF-RI, or APS prior to the addition of recombinant human IL-1? or TNF?. Following exposure to inflammatory cytokines, the levels of MMP-13 in the culture medium were evaluated by ELISA. MMP-13 production stimulated in chondrocytes by IL-1? or TNF? was reduced by rhIL-1ra and sTNF-RI to near basal levels. APS was also capable of inhibiting the production of MMP-13 induced by both IL-1? and TNF?. The combination of anabolic and anti-inflammatory cytokines in the APS created from PRP may render this formulation to be a potential candidate for the treatment of inflammation in patients at early stages of OA.

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Treatment of knee joint osteoarthritis with autologous platelet-rich plasma in comparison with hyaluronic acid.

Spaková T, Rosocha J, Lacko M, Harvanová D, Gharaibeh A.

Abstract

OBJECTIVE:
This study aimed to find a simple, cost-effective, and time-efficient method for the preparation of platelet-rich plasma (PRP), so the acquired benefits will be readily available for multiple procedures in smaller outpatient clinics and to explore the safety and efficacy of the application of PRP in the treatment of degenerative lesions of articular cartilage of the knee.

DESIGN:
The study was designed as a prospective, cohort study with a control group. A total of 120 patients with Grade 1, 2, or 3 osteoarthritis according to the Kellgren and Lawrence grading scale were enrolled in the study. One group of patients was treated using three intra-articular applications of PRP, and the second group of patients was given three injections of hyaluronic acid. Outcome measures included the Western Ontario and McMaster Universities Osteoarthritis Index and the 11-point pain intensity Numeric Rating Scale.

RESULTS:
On average, a 4.5-fold increase in platelet concentration was obtained in the PRP group. No severe adverse events were observed. Statistically significantly better results in the Western Ontario and McMaster Universities Osteoarthritis Index and Numeric Rating Scale scores were recorded in a group of patients who received PRP injections after a 3- and 6-mo follow-up.

CONCLUSIONS:
Our preliminary findings support the application of autologous PRP as an effective and safe method in the treatment of the initial stages of knee osteoarthritis. Further studies are needed to confirm these results and to investigate the persistence of the beneficial effects observed.
PRP and Elbow

Ongoing positive effect of platelet-rich plasma versus corticosteroid injection in lateral epicondylitis: a double-blind randomized controlled trial with 2-year follow-up.

Abstract

BACKGROUND:
Platelet-rich plasma (PRP) has been shown to be a general stimulation for repair and 1-year results showed promising success percentages.

PURPOSE:
This trial was undertaken to determine the effectiveness of PRP compared with corticosteroid injections in patients with chronic lateral epicondylitis with a 2-year follow-up.

STUDY DESIGN:
Randomized controlled trial; Level of evidence, 1.

METHODS:
The trial was conducted in 2 Dutch teaching hospitals. One hundred patients with chronic lateral epicondylitis were randomly assigned to a leukocyte-enriched PRP group (n = 51) or the corticosteroid group (n = 49). Randomization and allocation to the trial group were carried out by a central computer system. Patients received either a corticosteroid injection or an autologous platelet concentrate injection through a peppering needling technique. The primary analysis included visual analog scale (VAS) pain scores and Disabilities of the Arm, Shoulder and Hand (DASH) outcome scores.

RESULTS:
The PRP group was more often successfully treated than the corticosteroid group (P < .0001). Success was defined as a reduction of 25% on VAS or DASH scores without a reintervention after 2 years. When baseline VAS and DASH scores were compared with the scores at 2-year follow-up, both groups significantly improved across time (intention-to-treat principle). However, the DASH scores of the corticosteroid group returned to baseline levels, while those of the PRP group
significantly improved (as-treated principle). There were no complications related to the use of PRP.

CONCLUSION:
Treatment of patients with chronic lateral epicondylitis with PRP reduces pain and increases function significantly, exceeding the effect of corticosteroid injection even after a follow-up of 2 years. Future decisions for application of PRP for lateral epicondylitis should be confirmed by further follow-up from this trial and should take into account possible costs and harms as well as benefits.

PRP and Hip
1.


Abstract

OBJECTIVE:
To assess the safety and symptomatic changes of IA injections of platelet-rich plasma (PRP) in patients with OA of the hip.

METHODS:
Forty patients affected by monolateral severe hip OA were included in the study. Each joint received three IA injections of PRP, which were administered once a week. The primary end point was meaningful pain relief, which was described as a reduction in pain intensity of at least 30% from baseline levels as evaluated by the WOMAC subscale at 6-months post-treatment. The visual analogue scale (VAS) and Harris hip score subscale for pain were used to verify the results. Secondary end points included changes in the level of disability of at least 30% and the percentage of positive responders, i.e. the number of patients that achieved a >30% reduction in pain and disability.

RESULTS:
Statistically significant reductions in VAS, WOMAC and Harris hip subscores for pain and function were reported at 7 weeks and 6 months (P?<0.05). Twenty-three (57.5%) patients reported a clinically relevant reduction of pain (45%, range 30-71%) as assessed by the WOMAC subscale. Sixteen (40%) of these patients were classified as excellent responders who showed an early pain reduction at 6-7 weeks, which was sustained at 6 months, and a parallel reduction of
disability. Side effects were negligible and were limited to a sensation of heaviness in the injection site.

**CONCLUSIONS:**
This preliminary non-controlled prospective study supported the safety, tolerability and efficacy of PRP injections for pain relief and improved function in a limited number of patients with OA of the hip.


**Platelet-rich plasma for managing calcaneus tendon tendinopathy and plantar fasciitis**

López-Gavito E, Gómez-Carlín LA, Parra-Téllez P, Vázquez-Escamilla J

**Abstract**

**INTRODUCTION:**
Non-surgical treatment of Achilles tendinopathies ad plantar fasciitis has shown good results in up to 90% of cases. However, the remaining 10% of patients with these conditions represent a true challenge for the orthopedic surgeon. New technologies for the development of orthobiologic materials make it possible to use platelet-rich plasma (PRP) as an alternative to treat cases that have been refractory to prior treatment and that have a chronicity exceeding 12 months.

**MATERIAL AND METHODS:**
Prospective, analytical study. Patients with diagnosis of Achilles tendinopathy, plantar fasciitis or both, with a course of more than 12 months, previously treated with non-surgical alternatives, without any clinical improvement. The AOFAS hindfoot scale was used, together with the Visual Analog Scale (VAS) for pain, and photographic documentation at 2, 4, 8 and 12 months after infiltration. A treatment program that included immobilization, NSAIDs, eccentric exercises for the Achilles-calcanear-plantar system and strengthening of the sural triceps was established. The statistical analysis included measurements of the central trend and scatter with the SPSS 15.

**RESULTS:**
A sample consisting of 10 patients (12 feet) that met the diagnostic and inclusion criteria was obtained. Mean age at the time of presentation was 43 years (range 23-56), with females being predominant (70%) and 50% laterality for the right and left feet. The initial AOFAS score was 39 (range 28-68) and the VAS score was 9 (range 7-10). By week 16 the AOFAS score had increased to 97 (range 88-99) and the VAS score was 2 (range 1-4). All patients resumed independent gait.
CONCLUSION:
The use of PRP in patients with Achilles tendinopathy and plantar fasciitis is an effective and safe alternative for the management of patients with a poor response to conventional non-surgical treatment. Other non-surgical modalities are recommended besides PRP for the treatment of these patients to achieve appropriate results.