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Effectiveness of platelet-rich plasma in the treatment of conditions foot orthotics

Abstract

Introduction: In orthopedics, the use of rich plasma is still controversial, there is no consensus regarding its indications, and use, although its therapeutic usefulness for various conditions is proven, much remains to be studied on this promising topic.

Purpose: With our study we intend to assess the clinical effectiveness and efficacy of the treatment imposed according to study groups. Method. A prospective pre-experimental study was carried out in adults with a diagnosis of orthopedic foot injuries, treated at the Orthopedics and Traumatology Service of the General University Hospital "Mártires del 9 de Abril", from January 2018 to December 2022, where the utility of the PRP is used and valued.

Results Orthopedic foot injuries are more common in women between 41 and 60 years of age, 15.9% of the sample was treated with infiltration of platelet-rich plasma, pain decreased in all study groups, without However, the group where PRP infiltration is used represents the one with the best evolution of the patients seen in the clinic.

Conclusions The results obtained in this study show that the treatment protocol applied is positive in each of the therapeutic options used from the point of view of pain improvement according to the visual analogue scale, highlighting the option of using PRP.

Keywords: platelet-rich plasma, musculoskeletal diseases, foot conditions

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Introduction

Platelets, in addition to being key elements in hemostasis, also play an active role in tissue regeneration through the release of various growth factors and cytokines that modulate angiogenesis, extracellular matrix remodeling, and recruitment, proli-feration and differentiation of stem cells. Based on this foundation, platelet-rich plasma (PRP) derivatives are used in regenerative medicine for the treatment of various clinical conditions including muscle tissue repair, treatment of bone diseases, other SOMA lesions, and tissue recovery after surgical interventions.

PRP can be defined as a volume of autologous plasma that contains a concentration of platelets above the basal level. After the application of PRP, 95% of the growth factors are released within an hour. Additionally, the synthesis and secretion of proteins lasts between 5 to 10 more days. Then, the macrophages that arrive at the focus due to the vascular growth promoted by the platelets, assume the regulation of tissue repair through the secretion of their own factors.[1] The use of autologous PRP is an effective and safe treatment, with few mild adverse effects. There have been multiple clinical experiences in relation to the use of autologous PRP in the field of sports medicine and traumatology.[2] The proteins contained in the alpha granules have a strong influence on the reparative phenomena of soft tissue injuries. These proteins include platelet-derived growth factors (PDGF), transforming growth factor beta (TGF-ß), platelet factor 4 (FP4), interleukin-1 (IL-1), platelet-derived angiogenic factor (PDAF), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), platelet-derived endothelial growth factor (PDEGF), epithelial cell growth factor (ECGF), insulin-like growth (IGF), osteocalcin, osteonectin, fibrinogen, fibronectin, and thrombospondin (TSP). Some of these proteins are absent in chronic lesions that do not heal properly.[3]

Heel pain, called heel pain, is a very common pathology in daily clinical practice with an incidence of 10% in the population. This area corresponds anatomically to the posteroplantar tuberosity of the calcaneus, Achilles tendon and its ligamentous insertions. tendon, serous bursae and fibrofatty tissue.[4,5]

Heel pain and metatalsagia are common causes of discomfort. It may be due to mechanical or inflammatory enthesopathy, bursitis, nerve compression, or bone or soft tissue involvement. In orthopedics, the use of rich plasma is still controversial and there is no consensus regarding its indications and use, although its therapeutic usefulness for various conditions is proven, much remains to be studied on this promising topic. With our study we intend to assess the clinical effectiveness and efficacy of the treatment imposed according to study groups.

Method

A development investigation was carried out that concluded with a prospective pre-experimental study with elements of a qualitative and quantitative approach, with the analysis units being adults diagnosed with orthopedic foot injuries, treated in the Orthopedics and Traumatology Service. of the General University Hospital "Mártires

del 9 de Abril", during the period from January 2018 to December 2022.

Population and study sample

The study population consisted of the total number of patients with a diagnosis of some orthopedic foot injury (201 patients), treated in the consultations of the Orthopedics and Traumatology Service of the General Provincial University Hospital "Mártires del 9 de Abril", during the period from January 2018 to December 2022, those who gave their consent to participate is the study.

An updated literature search since January 2018 on the use of platelet-rich plasma (PRP) in orthopedic pathologies of the lower limb was carried out in MedLine, The Cochrane Library, International Clinical Trials Registry Platform-ICTRP, EU Clinical Trials Register. Information from Cuban magazines was also explored. The search for documents was limited to the languages English, French and Spanish.

A simple random sampling was used, where patients with different foot conditions were divided, they were included in four different study groups, each one of the groups with a different therapeutic option.

Group # 1: Conservative pharmacological and/or rehabilitative treatment. Change of style and way of life.

Group # 2: Treatment with shock waves or ultrasound.

Group # 3: Conventional minimally invasive treatment. Infiltration of corticosteroids

Group # 4: Infiltration of platelet-rich plasma (PRP)

Techniques and procedures

The research included patients diagnosed with some orthopedic foot injury, randomly, in four groups with different therapeutic options, with the aim of comparing the results obtained and differentiating which therapeutic option offers the best evolution and clinical improvement of the patients. The patients, after being diagnosed with some orthopedic condition of the foot, were included in some of the groups created, with the attending doctor being responsible for choosing randomly, according to the severity and time of evolution of the signs and symptoms. Said doctor will estimate the convenience of any of the therapeutic options that we include in the investigation. Each group was assigned a different therapeutic option, which increased its degree of invasiveness as the group number increased.

Intervention. Infiltration of platelet-rich plasma (PRP)

Comparison

Conservative pharmacological and/or rehabilitation treatment

Shock waves

Infiltration of corticosteroids

Effectiveness

Pain relief

Functional restoration

Need for surgery.

Safety

Adverse events

The scientific research method was used, theoretical level and empirical level methods were used.

The information was organized in a database that contemplated the variables of interest used for the study. Percentage calculation and descriptive statistics were used for information processing, as well as the EPIDAT program (Program for the epidemiological analysis of tabulated data), version 3.0. The non-parametric Chi Square test was also applied as inferential statistics to determine if the differences found in the distributions of variables are significant, taking the values of X2 where $p > 0.05$ non-significant differences; when $p < 0.05$ the differences found were called significant, when $p < 0.01$ they were considered highly significant and if $p < 0.001$ they were highly significant. The information will be presented through statistical tables and graphs (tables and figures) for better understanding.

Results

Table 1 shows the distribution of the selected patients according to age and sex. Patients with orthopedic foot disease who are between 41-50 years of age predominate with 67 patients, which represents 26.4%, followed by those aged 51-60 years with 64 very close patients for 25.2%. Regarding sex, females predominated with 179 patients, which represents 70.7%. The results of the statistical analysis show that there are no significant differences between age and sex (p=0.5815).

Table 1 Distribution of patients according to age and sex.

Age	Sex				Total	
	Female		Male			
	No.	%	No.	%	No.	%
20-30	5	1.9	4	1.6	9	3.5
31-40	8	3.2	4	1.6	12	4.7
41-50	47	18.6	20	7.9	67	26.4
51-60	45	17.8	19	7.5	64	25.2
61-70	35	13.8	16	6.3	51	20.1
71-80	21	8.3	7	2.8	28	11.1
80	19	7.5	4	1.6	23	9
Total	179	70.7	74	29.3	253	100

$X^2 = 4.7098$ gl=6 p=0.5815

Fountain: Data collection model.

Table 2 divides the therapeutic options into four groups, increasing in degree of invasiveness as the group is larger. Here we can verify that the most used option was the one corresponding to Group 1, with some 123 cases included, corresponding to 48.9%. Group 4, which represents the patients treated with infiltration of platelet-rich plasma, represents 15.9% of the sample.

Table 2 Distribution of patients according to therapeutic option

Therapeutic option	Patients	%
Group 1. Conservative pharmacological and/or rehabilitation treatment	123	48,9
Group 2. Treatment with shock waves or ultrasound	62	24,7
Group 3. Infiltration of corticosteroids	27	10,5
Group 4. Infiltration of platelet-rich plasma	41	15,9
Total	253	100

Fountain: Data collection model.

Table 3 shows that all patients perceived an improvement or eradication of symptoms at the end of their treatment. This positive modification of the evaluation of pain was highly significant according to the interpretation of the result of the statistical test used because p is less than 0.01.

Table 3 Assessment of pain according to the visual analogue scale before and after treatment.

Scale	Pain assessment			
	Before		After	
	No.	%	No.	%
Mild	46	18.2	159	62.8
Moderate	71	28.2	57	22.7
Severe	136	53.6	37	14.5

X^2 =52.2737 gl=2 p=0.0000

Fountain. Data collection model.

At the conclusion of the study, it was confirmed that 156 patients achieved a good clinical evolution, represented by 62.8% of the total, results that are shown in Table 4. It is appreciated as the therapeutic option of group 4, that is, PRP infiltration, represents the highest percentage of good results of all groups (92.7%). The interpretation of the result of the statistical test when evaluating the variables was highly significant.

Table 4 Clinical evolution of treatment according to therapeutic options

Clinical evolution	Group 1 (n=143)		Group2 (n=62)		Group3 (n=27)		Group4 (n=41)		Total (253)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Good	64	44.8	35	56.4	19	70,4	38	92.7	156	62.8
Regular	59	41.3	18	29.1	6	22.2	3	7.3	60	22.7
Bad	20	13.9	9	14.5	2	7,4	-	-	37	14.5
TOTAL	143	100	62	100	27	100	41	100	253	100

X^2 =32.7683 gl=8 p=0.0001

Fountain. Data collection model.

Discussion

Gadañón García and Bonilla Díez[6] refer in their study that Du Vries established that between 50% and 70% of the population belonging to civilized societies suffered and/or would suffer from some type of foot problem and that 90% of These alterations occurred in the front area of the foot, just as Moreno de la Fuente determined that pain in the metatarsal area is so frequent that it is estimated that at least 80% of people suffer from it sometime in life -gives. However, despite the fact that metatarsalgias constitute one of the main reasons for consultation in the field of Podiatry with 15.6% of total consultations, as reflected by Ramos et al, there is insufficient scientific evidence on the efficacy of the treatments.

People's foot problems can generally become chronic, take many years to develop and have a major impact on their quality of life; even so, it is difficult to determine exactly what causes the increase in these diseases. In medical reviews, on many occasions, the review of the foot is overlooked as a vital organ and, therefore, the orientation of care.[7] The use of inappropriate footwear has a great impact on the biomechanics of the foot, which is to be expected considering that when used chronically they can modify its anatomy, with consequent deformities.[8] The group that received PRP showed a significant reduction in the use of pain relievers. He also noted a faster recovery of functional range of motion.[9]

Platelet-rich plasma (PRP) therapy has accumulated considerable attention over the past two decades, primarily in the area of regenerative medicine, including oral, maxi-lofacial surgery, sports medicine, gynecology, andrology, traumatology, ophthalmology, cica -trization of wounds and others.[10,11] PRP regulates the cytokines involved in neovascularization processes, proliferation of tenocytes, fibroblasts, monocytes, and chondrocytes, as well as the recruitment effect of inflammatory cells with an inhibitory effect of proinflammatory cytokines (IL-8) with anti-inflammatory activity. and regenerative, being an interesting option in patients with foot injuries that require an anti-inflammatory, but without surgical treatment. These biological and molecular mechanisms have proven to be clinically efficient when applied in various acute and chronic joint diseases.[12]

Shetty et al.[13] conducted a non-randomized prospective study to compare the efficacy of traditional corticosteroid injections versus PRP injections in different clinical situations, including plantar fasciitis. Jain et al.[14] present a prospective study with 30 patients treated with PRP, in whom conservative treatment had not given results, who were compared with another 30 patients treated with cortisone, and evaluated using the VAS, Maudsley, and AOFAS scale, with promising results in favor of PRP, in a follow-up of up to 12 months after treatment. Hisao et al,[15] through a meta-analysis of seven randomized controlled studies and three quasi-experimental studies that included a total of 604 patients; concluded that autologous blood-derived products provided the best results in the treatment of forefoot orthopedic lesions, followed by corticosteroid infiltration. Say et al.[16] conducted a study with 50 patients, 25 treated with corticosteroids and 25 treated with PRP activated with calcium chloride, both groups treated with a single dose or infiltration and a 6-month follow-up, in which it was demonstrated that the patients treated with PRP obtained better clinical results, in analgesic and functional terms, than those treated with corticosteroids.

The potential role of PRP in the healing of musculoskeletal injuries is an exciting goal, which may eventually lead to superior therapies, but caution should be exercised until adequate clinical evidence is established. The reviewed studies on the use of PRP in soft tissue, muscle or ligament injuries had a high level of evidence; 90% of the reports showed level 1 and a good to favorable grade of recommendation. However, 70% of the studies concluded that they did not find sufficient evidence to support the use of PRP in this group of injuries.[2,17]

The results obtained in this study show that the treatment protocol applied is positive in each of the therapeutic options used from the point of view of pain improvement according to the visual analogue scale (VAS), that is, patients improve their pain. to a greater or lesser degree, although some of the therapeutic options develop a better recovery of symptoms in less time, as was the case in the patients who made up group 4 (conservative treatment with PRP infiltration). We recommend extending the use of this therapeutic option in the country's orthopedic and trauma services.

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None.

Conflicts of interest

The authors declare that they have no conflict of interest with the approaches of the work presented.

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