UPDATE ON ORTHOPEDIC SURGERY AND TRAUMATOLOGY GUIDE TO THE CLINICAL IMPACT OFUSE OF PRGF: PLASMA RICH IN GROWTH FACTORS

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Objective: Update on plasma rich in growth factors (PRGF) in the field of orthopedic surgery and traumatology. Method: Review of 136 studies on PRGF relevant in the field of orthopedic surgery and traumatology published in the last 10 years. Results: The largest number of studies on PRGF has been performed in the field of osteoarthritis of the knee (25%), followed closely by the comparative studies between PRGF and hyaluronic acid (19%). The studies on ligamentous and tendinous pathology (14%), the joint pathology different from the knee (10%). The remaining studies addressed pseudoarthrosis, osteonecrosis and nerve regeneration among others. The most commonly used platelet products were Plasma Rich in Platelets (73%), Plasma Rich in Growth Factors (15%) and Plasma Rich in Fibrin (12%). Conclusions: To document the preparation of platelet products, establish the precise concentration of growth factors and carry out long-term follow-up is essential for future studies.

Keywords: PRGF, PRP, Growth factors, Plasma rich in platelets, Plasma rich in growth factors, Plas ma

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INTRODUCTION

The tissue regeneration process comprises an intricate set of biological events balanced by the synergistic action of various growth factors. After the production of tissue damage, numerous intracellular pathways are activated.

lares and intercellular with the purpose of restoring the integrity of the complex cellular tissue. It is well known that the agents involved in tissue regeneration are: the matrix or "scaffold" that offers support to the new tissue under construction, the cellular component and multiple biological mediators, including cytokines and growth factors, necessary for promote angiogenesis which will supply oxygen and nutrients to damaged tissue.

The Anglo-Saxon abbreviations PRP (Plasma Rich in Platelets) and PRGF (Plasma Rich in Growth Factors) refer to all those clinical procedures that by centrifuging the patient's own blood manage to isolate a concentrate of platelets or growth factors, which It can be used in certain medical-surgical interventions in order to accelerate tissue regeneration processes.

The growth factors found in this autologous biological material play an important role in intercellular communication, carrying out a large number of biological functions, including angiogenesis, cell proliferation, differentiation, migration, and even apoptosis.

Progress in the study of the possible therapeutic applications of growth factors has made it possible to significantly increase the versatility of the clinical use of Plasma Rich in Growth Factors.

foundation.

MATERIAL AND METHODS

In this bibliographic review on the update on plasma rich in growth factors, the literature search was performed by a resident physician in orthopedic surgery and traumatology. Didactic and technical conflicts were resolved by discussion and consultation with a second review author. All published studies on growth factors that evaluated the various platelet products were included, regardless of publication status or language.

Strategy of search

Those relevant articles in the field of orthopedic surgery and traumatology published in the last ten years were included. A database was created with

imported items. The following databases and electronic libraries on potentially relevant studies were consulted: PubMed, MEDLINE,
Cochrane.

The keywords used to identify potentially relevant studies were the following: "PRGF", "PRP", "Growth factor", "Plasma rich in platelets", "Plasma rich in platelets", "Plasma rich in growth factors", "Plasma rich in growth factors", "Plasma".

The titles, objectives, methods, results and conclusions of all selected articles were independently evaluated.

nated, eliminating all those duplicate studies. The following previously determined inclusion and exclusion criteria were used:

Inclusion criteria

- The study should focus on the use of any of these platelet products: P-PRP, L-PRP, P-PRF, L-PRF, and PRGF.

- The study must be carried out by researchers in the field of orthopedic surgery and traumatology.

- The study must have been published in the last ten years.

- The study must present one of the following research designs: randomized clinical trials, non-randomized clinical trials, case report, review.

systematic review, meta-analysis.

criterion of exclusion

- The study subjects presented platelet lathe disorders.

- The platelet products used were administered through intravenous injection.

- The study was carried out by researchers in fields other than orthopedic surgery and traumatology.

- The study has been published prior to the last ten years.

- Research designs different from those previously described.

RESULTS

According to the inclusion criteria

Based on our work and after carrying out a systematic search for the articles of interest, a database was created with a total of 136 studies, of which 91 came from Medline, 42 from Pubmed and 3 from Cochrane.

The largest number of studies on platelet products have been carried out in the field of knee osteoarthritis (25%), closely followed by comparative studies between PRGF and hyaluronic acid (HA) (19%). The works that address ligamentous and tendon pathology, as well as the repercussion of their treatment with factors

of growth, represent 14% of our database. Joint pathology, sports or not, studied in a different joint from the knee

accumulates 10% of the jobs. The remaining 32% of the studies published under the medical specialty of orthopedic surgery and traumatology are divided into fields of action as disparate as pseudoarthrosis, osteonecrosis and nerve regeneration, among others.

The most widely used platelet products in the consulted bibliography were PRP (73%), PRGF (15%) and PRF (12%).

DISCUSSION

Knowledge of the correct use of growth factors is essential

to advance in the management of osteoarticular pathology. By searching-

da and the subsequent analysis of relevant articles in the field of orthopedic surgery and traumatology published in the last ten years regarding PRGF, a database has been created to obtain information that would allow us to know the recent advances in relation to growth factors.

to, involved in the clinical evolution of the pathology of the locomotor system.

The team led by Dr. Yu Tanigu chi [1], like Anitua E. et al [2], demonstrated a decrease of at least 50% in pain according to the Visual Analogue Scale (VAS) in 80% of the patients. study patients. Dr. Vaquerizo found significantly greater efficacy and safety for the group treated with PRGF, after carrying out a randomized clinical trial of three injections of PRGF versus one of HA [3]. PRGF showed superior short-term results when compared to HA in relieving osteoarthritis symptoms.

mild to moderate knee pain [4]. The success rates observed at the fifth week of study for the pain subscale reached 33.4% for the PRGF group and 10% for the AH group [5]. In the treatment of osteo lesions chondral disorders of the talus, the clinical response to PRGF was greater in all cases, although no significant differences were achieved [6].

The therapeutic potential of PRGF as a biologic therapy is based on its ability to modulate gene expression in chondrocytes [7], stimulating mi gradation of tendon and synovial fibroblasts, as well as improving the biological properties of HA [8], thus influencing the anabolic microenvironment of the synovium, maintaining joint homeostasis, improving movement and decreasing pain.

These favorable findings point to considering PRGF as a biologic therapy for knee osteoarthritis [9].

Athletes suffer frequent ankle sprains, potentially benefiting from ultrasound-guided PRP injections, with a shorter time to return to competition, due to less residual pain and greater stability of the joint syndesmosis.

[10]. The bioinductive properties of PRGF in lesions of the ligamentous ankle complex allow its use as a therapeutic alternative to conventional surgery or as an adjuvant therapy to it, since it accelerates the healing of traumatic lesions.

matic and improves postoperative conditions [11]. Galán M. et al administered PRGF adjuvant to surgical tenorrhaphy of bilateral quadriceps tendon rupture, obtaining early rehabilitation of the extensor apparatus [12].

Sometimes the clinical improvement in the treatment of tendon injuries with growth factors is not accompanied by significant findings in imaging tests, as is the case of the team led by Dr. Valentí Azcárate, who

having obtained a decrease in
edema in reconstruction with PRGF
of the anterior cruciate ligament, magnetic
resonance imaging did not show differences in
intensity or uniformity.
graft quality, and there was no clinical or painful
improvement compared with the control group
[13]. A clinical trial carried out in the arthroscopic
repair of the rotator cuff with PRGF does not
support its use in this lesion, since no significant
differences were observed in the healing of the
cuff or improvement in the functions evaluated
in the examination. clinic

and radiological one year after surgery [14]. In
contrast, Sánchez M. et al demonstrated changes

temporary histological findings during the 6- to
24-month postoperative period of PRGF-treated
tendon graft maturation, which resulted in greater
remodeling compared with grafts not treated with
growth factors [15]. Current knowledge points to
a future in which platelet-derived therapies will
continue to improve existing conventional
approaches for the treatment of osteoarticular
pathology in general and sports in particular [16].

There is controversy about the usefulness of
PRGF as a treatment for underlying pathology
in the temporomandibular joint (TMJ), which
despite being a field of maxillofacial intervention,
has been considered in this review due to its
therapeutic potential in bone. The working
group of Dr. Fernández Sanromán concluded
that the

PRGF does not add any significant improvement
to clinical outcomes at 2
years after surgery in patients with advanced
internal disorder of the
ATM [17]. In this line of work, PRGF injection
after arthroscopy is more effective than HA with
respect to pain assessment [18]. At the same
time, it is necessary to indicate that there are no
published scientific data that sufficiently support
a specific treatment protocol with growth factors
in osteoporosis.

mandibular crosis [19].

In traumatology, an important use of growth
factors is the therapeutic approach to nonunion.
The work group of Dr. Sanchez M. demonstrated
that PRGF can improve the healing of non-
hypertrophic pseudoarthrosis, describing in their
study an average healing time with this
technique of 4.9 months (2-8 months), compared
to the 21 months (9-46 months) necessary for
the healing of hypertrophic [20].

In turn, the infiltration of peripheral nerves with
PRGF is enormously useful in orthopedic
surgery, where it has been proven that the
infiltration of growth factors in peroneal nerve
palsy improves the patient's symptoms by
reducing foot drop [twenty-one].

The categorization of platelet derivatives into
four different groups based on leukocyte and
fibrinogen content is well known; Pure PRP (P-
PRP), PRP and leukocytes (L-PRP),

PRP and fibrin (P-PRF) and PRP plus leukocytes and fibrin (L-PRF) [22-25]. Magalón et al. described the DEPA classification, according to the dose of "Platelets" injected, "Efficacy" of production, "Purity" of the PRP and "Activation" of PRP [26]. Comparative studies between PRP, PRGF and PRF, determine that the texture of the PRF and its biological characteristics clearly show greater surgical versatility than the rest of platelet derivatives [27].On the other hand, Filardo G. et al state that although PRP injections produced more pain and inflammation compared to PRGF injections, the clinical results evaluate two between both compounds were similar [28].The immunocytochemical analysis after the application of these hemoderivatives has shown that the angiogenic markers and precursors of CD34 (+) and CD133 (+) cells are

kept in cultivation for a longer period of time [29], which could provide an advance in the clinical application of autologous stem cell transplantation.

As it is an autologous biological material, the administration of PRGF does not generate an immune reaction or allergy. Consequently, serious side effects are rare in the literature, the main adverse effects being pain and infection. Since the effect of this type of treatment is linked to the release of bioactive components by platelets, the use of non-steroidal anti-inflammatory drugs (NSAIDs) may modify platelet functionality and thereby limit

the efficacy of the treatment. In this sense studies have been carried out in order to to compare platelet function in PRP of people who are simultaneously taking an NSAID, in relation to that of people who have not taken it in the previous 15 days, which has led us to consider that the PRP obtained after taking NSAIDs is of lower quality.

ity and can negatively affect the regenerative effect that is intended to be achieved with this treatment [30-32].

The study and identification of the facts Growth res plays a crucial role in tissue repair. Multiple works reinforce the importance of platelet derivatives in osteoarticular pathology, defending the need to protocolize their preparation and application. Biological therapies have driven research in orthopedic surgery and traumatology towards the discovery of growth factors, and why not, new treatment strategies.

Optimization of the composition and use of PRGF is necessary to improve our understanding of the therapeutic potential of this technology. Extensive data show that the biologic effects induced by growth factors may depend on the platelet concentration and the anatomical source of the cells [33]. The next scientific step in the knowledge of tissue regeneration of the pathology of the locomotor system would be to relate to notable scientific evidence said

clinical problems with local application from PRGF.

CONCLUSIONS

Despite the fact that recent research addresses this subject with special scientific interest, there is a statistical lack regarding the clinical application of growth factors. The quality of research is progressively improving, and the fields of study on platelet products are expanding, which could lay the foundations for clinical applications of these derivatives.

The need to protocolize the preparation of platelet products, establish the precise concentration of platelets and growth factors, as well as long-term follow-up of the study subjects are the most important factors for future studies.

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