



Biological coaching: Treatment with plaquet growth factors, report of a case of partial ACL tear

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Abstract

The injury of the anterior cruciate ligament of the knee represents an entity of great importance, both for its frequency and for the absenteeism at work and sport it causes. In total fractures, the resulting residual instability alters normal biomechanics and predisposes to the development of degenerative changes. In partial ruptures, described more than 50 years ago, the current management is controversial, between suturing the extremities, physiotherapy and / or regenerative therapies such as intra-articular use of platelet growth factors, and we decided for the latter to apply it in the case that we present, in a male patient of 25 years, who suffered a partial break of right ACL when injured playing soccer. The application was made 72 hours after the lesion. MRI controls were performed before and after the intra-articular application of Growth Factors.

Keywords: autologous growth factors, anterior cruciate ligament, platelet rich plasma, PRP

Introduction

We present the case of a 25-year-old male patient, a recreational athlete, who injures his right knee while performing sports activity (soccer) when performing a change of direction movement described as a pivot of the leg, is immobilized with a stabilizer rigid. He was given rest, ice and analgesia, he is seen 48 hours after the trauma, with a not very painful knee, subjectively referred instability. On physical examination I present: in the clinical maneuvers for anterior stability of the knee: positive painful anterior drawer (+), and Lachmann (-), compatible by the specified injury mechanism and the physical

examination of suspected ACL tear. An MRI was requested with a report of discontinuity of the anteromedial fibers of the ACL, that is, partial rupture of the fibers and edema of the ACL tissue (Figure 1).

The diagnosis is Partial ACL tear. The patient was offered Regenerative Therapy for intra-articular application of Platelet Growth Factors, which I accept. The patient signed his informed consent.

MRI PRE- Application of growth factors



Fig 1: Photo of MRI with partial rupture of LCA.

The control was by images, magnetic resonance imaging two days after the injury to confirm the clinical diagnosis, and post-application resonance imaging two months after the injury. Qualitative functional evaluation was performed with the Lysholms Scale in the right knee with results good at 3 months.

Technique for obtaining autologous platelet growth factors

With the pre-obtaining and post-application protocol of Platelet Growth Factors approved by the Ethics Committee and the Epidemiological Surveillance Committee of the General Hospital of Babahoyo, the Autologous Platelet Growth Factors were obtained.

Description of the Blood Collection Technique: The blood is extracted from the same patient, under the standards of Biosafety and the Epidemiological Surveillance Committee of the General Hospital of Babahoyo.

With the patient fasting, seated, the elbow flexure is aseptis and 50 cc are taken with an extraction hood in vacuum tubes with sodium citrate labeled and signed by the patient. It is processed by placing it in the centrifuge (Figure 2), in a first centrifugation at 1600 revolutions for 10 minutes, and in the same tubes a second round of centrifugation at 3000 revolutions in 10 minutes, to obtain a PRP with an increase in the value of the platelets, without red blood cells, and a minimum amount of leukocytes, this tube with the final substance is delivered and transferred by health personnel to the operating room where they are to be performed at the Babahoyo General Hospital (Figure 3).



Fig 2: HuMax centrifuge where tubes are placed.

Syringe with autologous platelet growth factors



Fig 3: Intra-articular Application of Autologous Growth Factors.

Intra-articular application technique of autologous platelet growth factors

The Intra-articular application of Autologous Platelet Growth Factors was carried out in the operating room of the Babahoyo Hospital. With the patient in supine position and the right pelvic limb placed outside the table, in flexion, the lateral region of the knee is aseptis in the lateral interarticular soft spot of the right knee, subcutaneous needle is inserted and 3 is placed. cc of local anesthesia (Figure 4). Then a synocal needle is placed since it is longer and is inserted into the interarticular space directed to the Noch until it touches soft tissue (Figure 5), a syringe with the Autologous Platelet Growth Factors 6 cc is placed. The needle is removed, gauze and sterile dressing are placed, and it is covered with a sterile bandage and a knee stabilizer is placed. During the first 3 days according to our protocol, the patient should not put ice on or go to sauna or steam baths. At 24 hours he begins with isometric exercises.

The patient begins a Rehabilitation program after the application, very similar to the one we use in ACL Surgical reconstruction. A control with MRI was performed at 3 months, it can be observed

in Photo 5, the presence of neo-formed tissue (*fibrosis apparently*) on ACL remnants such as the increase in ACL thickness of + 3mm in the sagittal section, which is what the imaging reports.



Fig 4: Mri Control of The Right Knee at 3 Months Post-Application.



Fig 5: MRI Of The Patient 3 Months After PRP Application.

Discussion

In the literature, the treatment of its ruptures, whether total or

partial, has been documented for more than 30 years. Surgical treatment of total rupture injuries is well described and established. [1, 2, 3, 4].

Conservative treatment can be effective in 50% of cases (*sedentary elderly patients*); however, it is not justified in young patients with moderate or intense sports activity [2, 3, 4]. The option of suturing the ends presents evidence of poor results due to poor healing, as reported in the literature. Partial lesions of the ACL have been published for more than 50 years [5, 6], but the evidence shows us very little literature on which is the best option in relation to the use of regenerative therapies, on the one hand the lack of consensus and on the other hand the lack of more conclusive publications on the use of regenerative therapies.

The use of tissue bioengineering in tissue repair is documented in the worldwide literature; most of what has been researched and studied is about the use of Plasma rich in Growth factors. The biological properties of PRP in tissue repair have recently been well documented in numerous studies: [7, 8, 9] Partial ruptures are the ones that present the most controversy since the anterior cruciate ligament of the knee is a structure whose spontaneous healing property is almost nil [7, 8] and synovial fluid present has inhibitory properties, acting on the clot and reabsorbing it [9]. The process is described from the proliferation of fibroblasts and the production of collagen, the formation of fibrosis occurs based on the fibers that it is not broken and plasminogen is [10], being a ligament with a cylindrical arrangement of its fibers, when it breaks a poor clot is produced and the ends are collected, it is for all these reasons of its biological response that partial ruptures are discussed and debated in as far as its treatment is concerned.

Recent clinical and animal studies suggest the possibility of ACL healing after primary ligament suture, augmented with the use of growth factors and bone marrow derived mesenchymal stem cells [11]. It could be very important in the treatment of partial ACL tears, since these bioactive proteins from plasma and bone marrow have a main role in tissue healing, because they regulate key processes in tissue repair, including cell proliferation, chemotaxis, migration, cell differentiation and extracellular matrix synthesis. [12, 13, 14, 15]

Dallo et al analyzed studies by Murray et al. where it was theorized that the fibrin clot containing platelets could have been dissolved prematurely in the intra-articular environment, and therefore the isolated PRP failed as a localized growth factor delivery system and for which the use of scaffolds to contain PRP at the site of ACL injury and protect it and I mention that Cheng et al. showed that adding PRP to the collagen hydrogel resulted in a higher metabolic cell activity, a reduction in the apoptotic index and a stimulation of collagen production in immature and adolescent animal cells [15].

Dallo highlighted the importance of the work of Seijas et al who reported a high rate of return to sport in 19 professional soccer players with a partial ACL tear treated with intra-ligamentous PRP infiltration. Fifteen patients returned to physical activity at an average of 16.20 weeks (*one re-rupture at the seventh month*), while three patients returned in 12.33 weeks. They were controlled by MRI to observe the rest of the anterior cruciate ligament with complete ligamentization one year after surgery and a good anatomical disposition, 15 Vavken, Sadoghi and Murray, 10 from Children's Hospital Boston, systematically review controlled trials evaluating the effect of platelet

concentrates on ACL graft maturation, graft-bone interface healing, and clinical outcomes. Their evidence-based findings suggest that PRP accelerates ACL graft maturation, although there is no evidence of better bone-graft interface healing, nor is there a significant difference in clinical outcomes.

As we can discuss in these preliminary works, we are encouraged by recent research on platelet rich plasma (PRP) and stem cells. We, the editors, are not microbiologists, nor bioengineers, but we believe that our understanding of the potential of "biologics" has reached a point where we better understand the relevant published research with scientific knowledge, the meaning of articles evaluating PRP and stem cells.

While some of the scientific methods can be complex or the results subtle, these articles are notable for well-written introductions, discussions, and consideration of limitations that can help patients.

There are many forms of PRP, and there is a lot to learn about preparation, application, concentration, and timing, to name just a few variables. The included studies use different methods, different outcome measures, and different lengths of follow-up. This may explain the conflicting evidence and controversy surrounding the benefits of PRP for orthopedic patients, or lack thereof. We are cautiously optimistic that with continued research, PRP may represent a step forward, and in conclusion PRP has great potential as an intra-articular PRP treatment for partial ACL tears.

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