

# Treatment of lateral ankle sprain with platelet-rich plasma - A randomized clinical study

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## Abstract

### Background

We aimed to clinically evaluate the effect of platelet-rich plasma (PRP) therapy in patients with acute lateral ankle sprain treated with rigid immobilization.

### Methods

Patients with first-time grade II lateral ankle sprain clinically diagnosed were evaluated (n = 21). A rigid immobilization was placed in all patients for ten days; previously, an application of PRP over the anterior talofibular ligament was performed in patients from the experimental group. The Visual Analogue Scale, the American Orthopedic Foot and Ankle Score, and the Foot and Ankle Disability Index were applied at 3, 5, 8 and 24 weeks of follow-up period.

### Results

The experimental group presented the highest reduction in pain and better functional scores than the control group at 8 weeks. At the end of follow-up period the results of both groups were similar.

### Conclusions

A similar evolution was observed in patients treated with rigid immobilization with or without PRP after 24 weeks.

### Trial registration

Clinical Trials.gov with ID NCT02609308.

## Introduction

The lateral ankle sprains are one of the most common orthopedic injuries, representing up to 85% of ankle injuries and accounting for approximately 40% of sports injuries [[1], [2], [3]]. The most commonly injured structure is the anterior talofibular ligament (ATFL), followed subsequently by the calcaneofibular ligament (CFL) and the posterior talofibular ligament [2,4]. The diagnosis of this lesion is mainly clinical and is usually supplemented by imaging studies, such as X-rays in two positions, mainly to rule out fractures or associated injuries [5,6]. Van Dijk et al. found that with a well-guided clinical examination and a 48-h delay to wait for the lesion to be well delimited may provide a sensitivity and specificity of 84–96% [7].

Ankle sprains are classified clinically based on the severity of the injury and are usually divided into three grades: grade I, in which the ligaments are slightly stretched, without any macroscopic ruptures or joint instability; grade II (moderate), in which the ligaments are partially ruptured, with moderate pain and inflammation, and the patient presents with difficulty supporting himself; and grade III, in which the ligaments are completely ruptured, with severe pain, edema and hematoma, and where there is inability to function with instability [3,8]. Most lateral ankle sprains of any degree can be handled orthopedically, using a plaster cast below the knee or a semirigid support. This treatment causes significant reductions in the symptoms and the disability caused by the injury. In addition, there is greater benefit with immobilization for short periods of time (10 days) than with extended periods of immobilization (for three or more weeks), as extended immobilization may have deleterious effects on muscles, ligaments and joints [3,[8], [9], [10]]. Moreover, early mobilization helps to resolve the symptomatology associated with a lateral ankle sprain and, with body weight support, allows a faster recovery in the mobility of the ankle. Therefore, this treatment strategy contributes to a more rapid incorporation into daily life activities or sports, without affecting the mechanical stability in the long term [3,10].

For the last decade, platelet rich plasma (PRP) has been a widely used treatment in orthopedics and several reports have focused on soft tissue lesions [[11], [12], [13], [14]]. PRP therapy involves an autologous infiltration of a high concentration of platelets at the site of the lesion [15]. Platelets are known to deliver growth factors and other recruiting proteins as part of a wound's healing process [16]. Some of the growth factors that have been described to be stored in platelets and that are also involved in the regeneration of ligamentous lesions include platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), transforming growth factor- $\beta$  (TGF- $\beta$ ) and basic fibroblast growth factor (bFGF). These factors have been found in greater amounts in PRP and induce cell

proliferation [17,18]. It has been reported that the application in vitro of PRP promotes positive effects in cultured tenocytes, increasing proliferation and cell migration in the anterior cruciate ligament and promoting its revascularization and reinnervation [18]. Animal studies have shown opposite PRP effects in medial collateral ligament injuries of the knee, where no differences were observed in the maturation values of PRP-treated ligaments [19]. However, a clinical study in ulnar collateral ligament injury showed that PRP is an effective option for these patients, with a success rate of approximately 90% [14]. Based on these contradictory results, in this study we focused in evaluated the clinical effect of PRP in patients with acute lateral ankle sprain treated with rigid immobilization for ten days measured with foot and ankle scales of function and pain.

## **Section snippets**

### **Patients**

This is a control randomized clinical trial with patients who attending to the emergency unit of our institution. We selected subjects with first-time lateral ankle sprains of no more than 48 h, grade II (incomplete ligament rupture with moderate functional disability, moderate edema and pain, mild to moderate ecchymosis, hypersensitivity to involved structures, light loss of mobility and function, weight-bearing pain and ambulation), mild to moderate instability, according to the classification

### **Results**

In total, 23 patients who met the inclusion criteria of the study and who complied with the follow-up were analyzed; two patients were lost for the final evaluation. Ten patients were part of the control group, while the remaining eleven patients were included in the experimental group. The mean age of the patients included in the study was  $26.71 \pm 16.12$  (range 18–54) years. We did not find differences between the groups in terms of age, gender and location of the sprain, nor did we see

### **Discussion**

Traditionally, lateral ankle sprains have been treated with immobilization by splints or short plaster casts (below the knee) for periods ranging from 10 days to 3 weeks, followed by a period of physical rehabilitation to enable the patient to reincorporate him or herself normally into daily life activities or sports. The use of PRP for the treatment of ankle sprains has been primarily described to treat

high-performance athletes. In the study by Laver et al. [24], 16 patients with syndesmosis

## **Conclusions**

We can conclude that the use of PRP therapy as an adjuvant for the treatment of lateral ankle sprains allows the patient to report less pain during his recovery time and a better functionality outcome when compared with immobilization only. A larger study, including a placebo group would be necessary to confirm these findings.