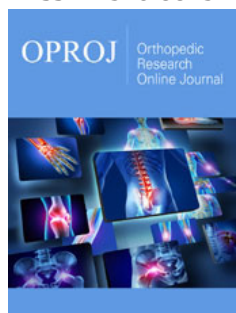


Study on Role of Platelet-Rich Plasma in Sports Injuries

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Abstract

Sports injuries are injuries that occur during sport, athletic activities, or exercising. Platelet-Rich Plasma (PRP) is derived from autologous blood and prepared so that the platelet concentration is above baseline value. Platelet-rich plasma is currently being used and promoted for many muscle injuries, ligament tears and early arthritis in sports persons and young adults. This case series studied the short-term results of PRP injections in various sports injuries. All patients received three injections one week apart as an out-patient procedure. The Sample for the Study consists of 31 sports persons with injuries. Males were 25 and females were 6. The mean age was 24.7 years. Different injuries were noted in various sports. Type of injury and number of injections and post injection complications were studied Data were collected prospectively with pre-injection Visual analogue scores (VAS) (0 to 10) for pain (VAS pain) were recorded. In addition, as part of the final follow-up questionnaire, two 'Yes/No' questions were asked: (i) are you satisfied with the result post injection and (ii) if your symptoms recurred, would you have a repeat injection? The VAS pain improved from a mean of 8.16 (7-9) pre-injection to 1.4 (range 0 to 3) at final follow-up. All patients felt that they were better than they were prior to the injection. All patients would have another injection if their symptoms recurred. Only one patient with patellar tendinitis continued to have pain (VAS 7) even with 3 injections and needed a surgical debridement procedure. He had a severe flat foot which we feel, might have put mechanical overload on the patellar ligament. No severe adverse events or complications related to the injections were observed during the treatment or follow-up period. PRP was harvested and prepared using same commercial device in all these patients. Post-injection, all patients were put on early exercise therapy. Return to sports was allowed only after complete pain relief and function. The short-term results showed good pain relief, early return to sports and function following PRP therapy in various muscle injuries, tendinopathies and grade I arthritis. PRP treatment offers the potential for a safe, convenient, and effective therapeutic option for athletes and other active persons who have musculoskeletal injuries.

Keywords: Platelet-rich plasma; Tendinopathy; Muscle injuries etc

Introduction

Clinical interventions in sports medicine needs predictable, rapid tissue repair and short recovery time for safe and early return to sports. Orthobiologics, in the form of platelet rich plasma injections offers exciting new possibilities in this regard and aims to provide supra-physiological concentrations of platelets and optionally leukocytes at injured/pathological tissues mimicking the initial stages of healing. However, before clinicians can offer this treatment with confidence, understanding the role of PrP injections in various clinical settings and different types of sports injuries will provide insights into the processes involved in physiological healing and pathological failure.

Objective

The Purpose of Research was to use autologous PRP injections for the treatment of tendon, muscle and ligament injuries and degenerative joint disorders in various sports injuries and investigate the effect of it. The Scope of Research is to delivery of platelet-Rich

Plasma (PRP) to injured muscles & tendons, ligaments and cartilage hastens recovery of function.

Methodology

Between November 2014 and April 2016, 31 patients were included in this prospective case series study. Inclusion criteria were (1) Any patient with isolated acute injury to muscle, tendon, ligament or cartilage sustained during sporting event (2) any athlete with previous failed conservative treatment for chronic injury. Exclusion criteria were previous history of other injuries or surgeries, patients with coagulopathies, recent cortisone injections, limb malalignments, patients with complete ligament or tendon tears and late arthritis and patients with local infection.

All patients had undergone a MRI scan to confirm the diagnosis. All patients underwent PrP infiltration at injury site. No local anaesthetic was used prior to giving the injection. The injections were given under strict aseptic precautions. The same treating physician at a single institution performed all injections with the same PRP preparation system. NSAIDS were avoided post injection and the pain was treated with ice pack application. Acute injuries were treated with a single injection and chronic tendinopathies received two or three injections at weekly intervals. Patients completed a course of guided physical therapy and were allowed to return to play based on their symptoms and physical examination findings. Patients were examined clinically for muscle strength and range of motion and assessed according to visual analogue scale (VAS scale) at findings recorded at baseline, 3 weeks, 6 weeks and 12 weeks. Secondary outcomes included subjective patient satisfaction & return to sports participation. Return to sports was allowed only after complete pain relief and function.

PRP is withdrawn peripherally from the patient (approximately 20mL) and placed in a centrifugation machine. Double centrifugation was done, first at 2000rpm for 4 minutes and then at 2500rpm for 9 minutes. After centrifugation, the red layer containing erythrocytes was discarded. The yellow layer is the uppermost layer, and it contains platelet rich plasma and other growth factors. It is then aspirated and 2-3ml of PrP was injected at the site of injury. The Mean is a test statistic for study.

Results

We studied 31 sports persons with injuries. Males were 25 and females were 6. The mean age was 24.7 years. Different injuries were noted in various sports. Type of injury and number of injections and post injection complications were studied. Data were collected prospectively with pre-injection Visual analogue scores (VAS) (0 to 10) for pain (VAS pain) were recorded. In addition, as part of the final follow-up questionnaire, two 'Yes/No' questions were asked: (i) are you satisfied with the result post injection and (ii) if your symptoms recurred, would you have a repeat injection? The VAS pain improved from a mean of 8.16 (7-9) pre-injection to 1.4 (range 0 to 3) at final follow-up. All patients felt that they were better than they were prior to the injection. All patients would have another injection if their symptoms recurred. Only one patient with patellar tendinitis continued to have pain (VAS 7) even with 3 injections and

needed a surgical debridement procedure. He had a severe flat foot which we feel, might have put mechanical overload on the patellar ligament. No severe adverse events or complications related to the injections were observed during the treatment or follow-up period.

Nowadays, application of autologous PRP is commonly used in sports medicine to treat injuries of the tendons, ligaments, and muscles [1-3]. In addition, the efficacy of PRP for degenerative cartilage disorders has also been investigated in several studies [4-6]. In our study, we applied autologous PRP to treat both different soft tissue injuries (tendon, muscle and ligaments) and degenerative joint disorders (knee joints). No complications or adverse effects due to PRP injection were observed. Following the treatment, all of the patients reported a significant reduction of pain at rest and movement. Additionally, all of them reported a significant subjective increase in the quality of their lives.

We have learned that platelets release many bioactive proteins responsible for attracting macrophages, mesenchymal stem cells, and osteoblasts which not only promotes removal of necrotic tissue, but also enhances tissue regeneration and healing. The potential benefits of many of the growth factors have been shown: platelet-derived growth factor is a powerful mitogen for connective tissue cells; transforming growth factor is not only morphogenic but is also strongly implicated in collagen synthesis; type I insulin-like growth factor is critical for cell survival, growth, and metabolism; and the cooperative actions of Vascular Endothelial Growth Factor (VEGF) and hepatocyte growth factor induce endothelial cell proliferation and migration, thus initiating the angiogenic response [7]. Platelets are therefore introduced to stimulate a supra-physiologic release of growth factors in an attempt to jump start healing in acute and chronic injuries. Concentrations of these growth factors rise linearly with increasing platelet concentration [8,9]. After release, the cytokines initiate intracellular signaling, which results in the expression of proteins responsible for cellular chemotaxis, matrix synthesis, and proliferation.

Conclusion

There is evidence of no significant differences between a single dose and multiple doses in case of osteoarthritis of knee [10]. In our study, multiple injections of PrP was given only in chronic tendinopathies with the rationale that the native tendons in these chronic cases are degenerated and would need more than once stimulation by growth factors to kick start healing process. As tendinopathies are now generally accepted as a degenerative rather than inflammatory process [11] the use of PRP to stimulate tendon healing is more logical than the use of corticosteroid. Mishra treated patients affected by severe chronic tennis elbow and reported promising results [12], with improvement in pain and function and no complications as in our study. There are only a few small, nonrandomized studies evaluating the beneficial effects of PRP for chronic non-healing tendon injuries including lateral epicondylitis and plantar fasciitis [13,14] or acute tendon tears [15]. PRP treatment offers the potential for a safe, convenient, and effective therapeutic option for athletes and other active persons who have musculoskeletal injuries. Studies have indicated generally positive

results and a good safety profile with PRP treatment. Our method of PRP preparation is quick, easy and reliable. It gives a platelet concentration of approximately three to four times serum. Platelet concentrations greater than five times normal may actually have a detrimental effect on tendon healing [16]. The limitations of our study are that it is a nonrandomized short term level IV study with small sample size. Also, studies have shown that it may be better to gently load the tendon in the first few weeks to enhance healing [17,18]. Therefore, further insights are needed to review the need of post-PRP injection rehabilitation protocols to produce the best overall outcomes. A randomized controlled trial comparing PRP injection to placebo would be required to further prove the efficacy of PRP injection.

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