CASE REPORT

Platelet-Rich Plasma for Frozen Shoulder: A Case Report

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Abstract

Frozen shoulder is a glenohumeral joint disorder that movement because of adhesion and the existence of fibrosis in the shoulder capsule. Platelet-rich plasma can produce collagen and growth factors, which increases stem cells and consequently enhances the healing. To date, there is no evidence regarding the effectiveness of platelet-rich plasma in frozen shoulder. A 45-year-old man with shoulder adhesive capsulitis volunteered for this treatment. He underwent two consecutive platelet-rich plasma injections at the seventh and eighth month after initiation of symptoms. We measured pain, function, ROM by the visual analogue scale (VAS), scores from the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire and goniometer; respectively. After first injection, the patient reported 60% improvement regarding diurnal shoulder pain, and no night pain. Also, two-fold improvement for ROM and more than 70% improvement for function were reported. This study suggests the use of platelet-rich plasma in frozen shoulder to be tested in randomized trials.

Keywords: Disability, Frozen shoulder, Pain, Platelet-rich plasma, Range of motion

Introduction

Frozen shoulder (FS) is a common disease that causes significant morbidity (1). The term frozen shoulder was first described in 1934 by Codman (2). Frozen shoulder affects the glenohumeral (GH) joint and limits active and passive movement because of adhesion and fibrosis in the GH capsule, which decreases joint space (3). Frozen shoulder is thought to have an incidence of 3-5% in the general population (4). The prevalence of FS in diabetic patients has been reported between 10-20% (5). No difference was found regarding the level of pain and disability of FS patients with or without diabetes (6). Although this disorder has a benign period and physicians think that this kind of disease improves after two or three years, in some cases disease symptoms and signs are permanent for patients. To the best of our knowledge, up to 40% of patients have permanent symptoms after three years (7, 8).

Accurate diagnosis is of particular importance because the treatment approaches for these separate entities (subgroups) are different. Recent studies showed that magnetic resonance imaging (MRI) might provide reliable imaging indicators of FS. MRI is a satisfactory method for coracohumeral ligament (CHL) depiction so that a thickened CHL is highly suggestive of FS (9). Non-surgical treatment has been demonstrated to be beneficial for a great majority of patients with FS. The first treatment option for the recovery of these patients is rehabilitation. Passive mobilization and capsular stretching are two of the most commonly used techniques (1). Furthermore, corticosteroid injections might be the reason for long-term clinical problems such as increased probability of rupture, post-injection pain, subcutaneous atrophy

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and skin depigmentation (10).

Platelet-rich plasma (PRP) is an autogenous concentration of human platelets in a small volume of plasma. Platelet-rich plasma development via centrifugation has been greatly simplified so that it can be used in office settings as well as operating rooms (11). The use of PRP has increased, given its safety as well as the availability of new devices for outpatient preparation and delivery (12). Platelet-rich plasma can produce collagen and growth factors and might increase stem cells, which consequently enhances the healing process by delivering high concentrations of alpha-granules containing biologically active moieties (such as vascular endothelial growth factor and transforming growth factor-β) to the areas of soft tissue damage (13).

As this method has good results in the repair of tendons, muscles and ligaments and even fractures; and because there is no evidence of complications related to PRP injections and since we are not aware of the efficacy of the PRP injection on FS, we used PRP on a patient with FS.

Case Report

A 45-year-old man who has had FS for seven months volunteered for this study. He had painful stiff shoulder and was unable for abduction, flexion and lateral rotation more than 50% in comparison with the opposite unaffected side. After plain radiography and MRI, FS was confirmed. The patient did not have diabetes mellitus, stiff painful shoulder after trauma, osteoarthritis or any signs of bony damage. The interval time between the onset of symptoms and the start of the first injection was seven months. The patient was right-handed, and the left shoulder was affected. The study was approved by the Ethics in Research Committee of our institute. Written informed consent was obtained from the patient according to the Declaration of Helsinki.

Treatment and Experimental protocol

First, 20 ml of the patient's blood was drawn from the superficial saphenous vein by double syringe (syringe was distributed by Arthrex, Inc. USA). Next, the blood sample was centrifuged at 5000 rpm for five minutes to separate the blood into layers of red blood cells, buffy-coat of leucocytes, and plasma (Arthrex, Inc.USA) and lastly PRP was collected. We injected this product in the subacromial bursa and intra-articular space initially (seven months after symptoms initiated), then we repeated this process after four weeks. In this phase, PRP was injected only in the GH joint. We recommended shoulder stretching exercise to the patient after every injection.

Passive ROM and function were evaluated before the treatment and one month after the second injection, but pain assessment was performed at each phase. Passive ROM was measured by the goniometer, and the patient's pain was measured by the visual analogue scale (VAS), and the Iranian version of the Disability of Arm, Shoulder and Hand (DASH) questionnaire was used for functional assessment (14). Finally, the patient was asked about to rank his satisfaction by a question on a Likert scale.

Clinical Outcome

The average pre-treatment ROM was 70 degrees for flexion, 75 degrees for abduction, and 25 degrees for external rotation. After the first treatment, the patient reported 60% improvement in shoulder pain during the daytime, and 100% at night. After the second injection, post-treatment mean ROM value showed: 150 degrees of flexion, 135 degrees of abduction, and 50 degrees of external rotation. Also, the patient reported improvements more than 70% regarding his function based on the DASH questionnaire. He was also 70% satisfied with the treatment.

Discussion

Frozen shoulder is caused by adhesion in the capsule, which creates pain, joint stiffness and limitation in range of motion (3). Although using corticosteroid and sometimes hyaluronic acid injections for FS could produce good outcomes, some physicians recommend physical therapy (15). Also, some researchers such as Calis et al. have reported the superiority of physical therapy to hyaluronic acid and corticosteroid injections (16). Oppositely, Hsieh et al. have reported that intra-articular hyaluronic acid injections did not produce extra benefits for patients with FS who were already receiving physiotherapy (17). The systematic reviews in this field have not yet confirmed the superiority of physiotherapy or those medications (10). In a comparison study, Rovetta and Montforte reported no major differences between corticosteroid alone and in combination with hyaluronic acid in patients with FS after 6 months of treatment. Also, they recommended patients who are receiving regular conventional treatment should be evaluated regularly concerning the side effects (18).

On the other hand, recently using PRP for soft tissue treatment has increased. Platelet-rich plasma is a fraction of whole blood containing concentrated growth factors and proteins and generally has a higher concentration of platelets compared with baseline blood (19, 20). Connective tissue healing for example tendon healing, occurs in three phases: inflammation, proliferation, and remodeling. The unique combination and concentration of bioactive molecules that exist within PRP have profound effects on the inflammatory, proliferative, and remodeling phases of wound healing. Researchers have shown the positive effects of PRP on different soft tissue damages such as chronic elbow tendinopathy, chronic achilles tendinopathy, and rotator cuff tendon tears (19).

We evaluated the efficacy of the PRP injection in a patient with FS in this study. The result showed improvement in the ROM of all directions and functional improvement of the patient. Also, the result showed decreases in pain during the daytime and complete pain improvement at night. Physicians usually recommend injections of corticosteroid and hyaluronic or physiotherapy for FS management,

but such injections have some side effects, and physiotherapy has not showed a superior efficacy according to the literature. However, in this report we have suggested a new effective intervention for improvement which seems to have no side effects. This study was a case report and we suggest evaluating PRP in more patients using randomized trials, and we suggest comparing the efficacy of corticosteroids, hyaluronic acid, and physiotherapy with PRP in patients with FS.

The results of this study support the use of PRP in frozen shoulder. We found that PRP has positive effects on healing during shoulder capsulitis. This intervention decreases pain and increases upper limb function. Also, it can improve range of shoulder motion in various directions.

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