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Research Article

Functional Outcome Assessment of Platelet Rich Plasma Versus Corticosteroid Injection in the Treatment of Rotator Cuff Injuries

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Abstract

Introduction: Conventionally local corticosteroid injection is the mainstay treatment in the management of rotator cuff tears. Intra-articular instillation of platelet rich plasma is an upcoming treatment modality in the management of rotator cuff injuries.

Aim: The aim of this study is to compare the functional outcome between platelet rich plasma and corticosteroid injection in rotator cuff injuries.

Methodology: 28 patients with rotator cuff tear who met the inclusion criteria were divided into 2 study groups by simple, random sampling. The first group of patients received 40mg of triamcinolone acetonide. The other group received PRP as intra articular injections. After the procedure the patients were evaluated immediately post intervention and at an interval of 3 weeks, 6 weeks and 12 weeks using the visual analogue scale for pain and the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire to assess the functional outcome.

Results: When compared to the baseline (pre intervention), both groups had statistically significant better VAS for pain and DASH score after injection. The PRP group experienced more pain immediately post intervention, but ultimately had better VAS and DASH score at 3, 6, and 12 weeks as compared to the corticosteroids group.

Conclusion: Platelet rich plasma appears to be more effective in the management of rotator cuff tears when compared to corticosteroids.

Keywords: Rotator Cuff Tear; Corticosteroids; Platelet Rich Plasma; PRP; Visual Analogue Scale for Pain (VAS); Disabilities of the Arm; Shoulder and Hand (DASH)

Introduction

The shoulder joint is the most movable and the least stable joint in the body [1]. It has a wide range of movements and is considered as the one of the complex joints of the body [2]. There is a 7-28% prevalence of shoulder pain seen in general population. After lumbar spine and neck diseases shoulder pain is the third most common disorder of musculoskeletal system [3]. The injuries of rotator cuff is the major pathology of shoulder joint causing pain and disability [4]. It is seen in one out of five people. The aetiology of rotator cuff injuries can be classified as intrinsic and extrinsic factors, in younger age group the rotator cuff tendinopathies are due to trauma or recurrent overuse and in older population it is because of degeneration

in old age without any trauma [5]. There are variety of treatment modality available for rotator cuff injuries, they include conservative managements like rest, massage, physical therapy, modification of regular tasks performed by the patients and NSAIDS in pain management. Conventionally local corticosteroid injection is the mainstay treatment in the management of rotator cuff tears [6]. Even though corticosteroids are effectively used in the initial stages of the disease, they have poor long term control of symptoms also corticosteroids have number of side effects like tendon rupture, nerve atrophy, systemic absorption causing hyperglycaemia, inhibition of hypothalamic pituitary axis, hypopigmentation of skin and infections [7]. Intra articular application of platelet rich plasma is an upcoming treatment modality in the management of rotator cuff injuries. Since tendons are a relatively avascular structure they have poor regenerative ability [8]. PRP is a biological agent that accelerates healing and tissue regeneration by increasing the concentration of various growth factors like TGF, VEGF, PDGF, IGF-1 in the body. Therefore, PRP is presumed to revascularize the area of injury, promote the tendon healing which in turn reduces the pain and improves the functional outcome [9]. The aim of this study is to compare the functional outcome between platelet rich plasma and corticosteroid injection in partial rotator cuff tears.

Methodology

An open label randomised control trial was conducted among 28 patients who attended the orthopaedics out patient department in Saveetha medical college and hospital between March 2021 to August 2022.

- **Inclusion criteria:** Patients above the age of 18 with complaints of persistent shoulder pain in one shoulder for 2 or more months not responding to NSAIDS or physiotherapy, supported with an MRI evidence of partial supraspinatus tear.

  The study was approved by the ethics committee of the institution. All the included subjects signed an informed consent before enrolling in the study.

- **Exclusion criteria:** Patients were excluded if they were suffering from any severe infections, osteoarthritis of shoulder, generalised inflammatory arthritis, previous supraspinatus tear, ankylosing spondylitis, pregnancy, patients on anti-platelet or anticoagulant therapy, rheumatoid arthritis, known malignancy and bleeding diathesis.

Procedure

The patients were assessed before the intervention with three different questionnaires. The visual analogue scale for pain was used to detect the severity of pain at rest and during activity, and the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire was used to assess the quality of life. The study subjects were divided equally into two parallel sample groups by simple random sampling. The first group of patients received 40mg of triamcinolone acetonide. The other group received PRP which was obtained using patient's peripheral blood ,10 ml of blood was withdrawn from patient's antecubital vein, it was added with 2ml of citrate dextrose to prevent coagulation. The collected anti coagulated blood was then centrifuged at 1500 rpm for 5 minutes. The poor plasma after the first centrifugation was discarded from the tube. The tube was centrifuged for the second time at 3500 rpm for 10 minutes, this yielded about 3ml of platelet rich plasma. The injections containing about 2ml of corticosteroids and PRP were administered in the subacromial space below the lateral border of the acromion in the respective groups. After the injection, the patients were advised to avoid strenuous exercise, no NSAIDS and physiotherapy were prescribed.

Clinical evaluation

After the intervention patients were evaluated immediately post intervention and at an interval of 3 weeks, 6 weeks and 12 weeks in the outpatient department using the visual analogue scale for pain and the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire to assess the functional outcome.

Statistical analysis

An independent sample two tailed t test was used to analyse the mean differences of DASH and VAS scale between the corticosteroids and the PRP groups. The p values ≥ 0.05 are statistically non-significant, p values ≤ 0.05 are significant and p values ≤ 0.01 are highly significant.

Statistical analysis was done using SPSS software.

Results

Around 79 patients with rotator cuff injuries were assessed for eligibility, 28 patients were found to eligible for the study and they were randomised into 2 study groups by simple random sampling. 4 participants were lost to follow up. The results of 21 participants who completed the study were analysed. 12 patients (mean age = 53.3 ± 2.5) were in the PRP group and 12 patients (mean age = 52.7 ± 2) were in the corticosteroids group. There were 5 male and 7 female participants in the corticosteroids group and there were 6 male and 6 female participants in the PRP group.

In the corticosteroids group 4 injections were given in the left shoulder and 8 injections were given in the right shoulder. Similarly in the PRP group 7 injections were given in the right shoulder and 5 injections were given in the left shoulder. After the intervention no sign of infections were identified in any of the participants.

When compared to the baseline (pre intervention) all the patients in both corticosteroids and PRP groups had statistically significant better DASH score and pain relief in VAS after the injection. However one participant from the corticosteroids group had progressive worsening of the symptoms post intervention had a total rotator cuff tear. The PRP group experienced more pain immediately post intervention, but ultimately had better VAS and DASH score at 3, 6, and 12weeks as compared to the corticosteroids group.

Groups	Mean ± S. D
Mean age group in corticosteroids group	52.7 ± 2
Mean age group in PRP groups	53.3 ± 2.5

Table 1: Mean and standard deviation of corticosteroids and PRP groups.

Figure 1

VAS*DASH	Mean ± S. D	p value
Pre intervention/pre injection	7.9 ± 0.7	<0.001
	57.1 ± 2.6	
Immediate post intervention	7.5 ± 0.5	<0.001
	56.8 ± 2.5	
3 weeks post intervention	3.6 ± 1.6	<0.001
	37.5 ± 8.7	
6 weeks post intervention	3.4 ± 1.6	<0.001
	36.0 ± 9.2	
12 weeks post intervention	3.5 ± 1.9	<0.001
	35.1 ± 9.5	

Table 2: Mean and standard deviation of VAS and DASH for corticosteroids group.

VAS*DASH	Mean ± S. D	p value
Pre intervention/pre injection	7.3 ± 0.9	<0.001*
	57.4 ± 2.1	
Immediate post intervention	8.6 ± 0.7	<0.001*
	61.2 ± 1.9	
3 weeks post intervention	2.8 ± 0.7	<0.001*
	16.3 ± 1.6	
6 weeks post intervention	1.8 ± 0.7	<0.001*
	14.7 ± 1.5	
12 weeks post intervention	1.2 ± 0.4	<0.001*
	12.8 ± 1.3	

Table 3: Mean and standard deviation of VAS and DASH for PRP group.

Figure 2

VAS (intervention)	Corticosteroids group		PRP group		P value
	Mean	Std. Deviation	Mean	Std. Deviation	
Pre intervention	7.92	.669	7.33	.888	.083
Immediate post intervention	7.50	.522	8.58	.669	<0.001*
3 weeks post intervention	3.58	1.564	2.83	.718	0.145
6 weeks post intervention	3.42	1.621	1.83	.718	0.005*
12 weeks post intervention	3.500	1.8829	1.167	.3892	<0.001*

Table 4: VAS Intervention among two groups.

DASH (intervention)	Corticosteroids group		PRP group		P value
	Mean	Std. Deviation	Mean	Std. Deviation	
Pre injection	57.08	2.575	57.42	2.065	0.730
Immediate post intervention	56.83	2.480	61.17	1.899	<0.001*
3 weeks post intervention	37.50	8.733	16.33	1.557	<0.001*
6 weeks post intervention	36.00	9.215	14.67	1.497	<0.001*
12 weeks post intervention	35.08	9.510	12.75	1.288	<0.001*

Table 5: DASH Intervention among two groups.

Discussion

Corticosteroids is one of the most widely used drugs for shoulder pain and other pathologies [10]. However there are many potential risks to be taken into consideration despite the short term pain relief provided by corticosteroids [11]. Complications include tendon rupture and weakening of tendons [12]. Agents like bone morphogenic protein (BMP), transforming growth factor (TGF), fibroblast growth factor (FGF) and platelet concentrates are some of the newer treatment modalities used as targeted therapy [13,14]. These newer biological agents have been proven to promote collagen synthesis and tendon cell proliferation [15,16]. This current open label randomised control, longitudinal study demonstrates the effects of corticosteroids and PRP usage in rotator cuff injuries. The results indicate better outcome in PRP group after 3, 6 and 12 weeks when compared to corticosteroids group. Likewise many studies recommends the use of PRP for rotator cuff injuries [17-19]. A similar study Scarpone., *et al*. [20]. found statiscally significant improvement in pain and MRI results in patients with rotator cuff tendinopathies. Rha., *et al*. [21] also identified better results with PRP injections than with dry needling in rotator cuff injuries. On the other hand apart from the above mentioned studies which supports the use of PRP in rotator cuff injuries, there are several other studies like, Kesikburun., *et al*. [22] found no statistically significant difference after 1 year of follow up when comparing PRP and saline for the treatment of rotator cuff tendinopathies. Other literatures which evaluated the use of PRP in rotator cuff injuries also found no additional advantages [23-33]. Some of the shortcomings of this study are the injections were not ultrasound guided, there is no MRI studies done to collaborate with the study results and the study was conducted with a small number of patients with short term follow up.

This study adds more data to the discussion about the value of corticosteroid therapy and PRP therapy in rotator cuff tears.

Conclusion

In conclusion, the usage of autologous platelet rich plasma injection over the standard corticosteroids injection in rotator cuff tears is advocated. More favourable clinical development was observed in the PRP group after 3-6 weeks after the therapy. Therefore PRP can be used as an effective alternative to corticosteroids in shoulder pain especially in patients with contraindications for the use of corticosteroid injection.

Informed Consent

Informed consent was obtained from all the participants of the study.

Conflict of Interest

The authors declare that there are no conflict of interest in the study.

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