

## Functional Outcome And Results Of Platelet Rich Plasma (Prp) In Rotator Cuff Tendinopathy



### Medical Science

KEYWORDS : PRP, RCT, VAS, VEGF

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### ABSTRACT

**Objective:** To assess functional outcome & results of injection of platelet rich plasma (PRP) in rotator cuff tendinopathy (RCT).

**Design:** Prospective clinical study with 3 months of follow-up.

**Methods:** Clinically proven twenty patients of rotator cuff tendinopathy (RCT) participating in study included in study according to inclusion and exclusion criteria on OPD basis after getting written and informed consent, treated by 4 mL of autologous PRP intralesionally by single author\* and in surrounding tendons, evaluation of functional outcome and results done by visual analog scale (VAS) 0-10 points (at baseline, 1 month and 3 months interval) and functional shoulder tests assessing rotator cuff strength and endurance (at baseline, 1 month and 3 months interval).

**Results:** Twenty patients participated in study and reported improvement in VAS score from  $7.8 \pm 0.6$  points pretreatment level to  $0.6 \pm 0.4$  points at three months post PRP injection follow up, improvement in functional outcome was also clinically as well as statistically significant eg Empty cane test in seconds till fatigue improved from  $54.5 \pm 7.6$  pretreatment to  $75.9 \pm 9.7$  at three months follow-up, Drop arm test in seconds till fatigue improved from  $41.7 \pm 7.5$  pretreatment to  $78.6 \pm 11.9$  at three months follow-up, Theta band external rotation at  $90^\circ$  in seconds till fatigue improved from  $31.2 \pm 5.5$  pretreatment to  $64.7 \pm 7.4$  at three months follow-up, Mean analgesic use declined from  $8.6 \pm 2.03$  units/week pretreatment level to  $1.1 \pm 1.3$  units/week at three month post PRP injection followup.

**Conclusions:** A single injection of autologous PRP is safe and effective mean of treatment of refractory Rotator Cuff Tendinopathy.

### INTRODUCTION

Shoulder pain is one of the most commonly occurring musculoskeletal complain. Rotator Cuff Tendinopathy (RCT) is the most common cause of shoulder pain in adults and sports persons<sup>1,2,3</sup>. Initially pain usually settles down with rest or anti-inflammatory treatment and recurs with more demanding activities. Characteristically pain is worse at night; the patient cannot lie on the affected side and often finds it more comfortable to sit up out of bed. Pain and slight stiffness of the shoulder may restrict even simple activities such as hair grooming or dressing. As disease progresses pain and stiffness increases in intensity<sup>3,4</sup>. In long-standing cases coarse crepitation and palpable snapping on passive rotation of shoulder indicates fibrosis or partial/ complete rupture of rotator cuff, secondary osteoarthritis of the shoulder may supervene and movements are then severely restricted. Pathophysiology of RCT is characterized by progressive, degenerative changes within the tendon as a result of overuse, altered shoulder mechanics, and a limitation of the normal tendon repair system with a fibroblastic and a vascular response known as angiofibroblastic degeneration<sup>11</sup>. RCT is diagnosed by clinical tests eg 'abduction paradox' and 'drop arm sign' for diagnosis of a complete rupture of the cuff and for weakness of isolated components of the cuff done by the 'empty can' test (Supraspinatus)<sup>6</sup>, resisted external rotation (Infraspinatus), the 'lag sign'<sup>5</sup> and the 'drop sign' (Infraspinatus and posterior cuff), 'the lift-off' test (Subscapularis) and radiologically by means of X-rays, MRI and Ultrasonography<sup>8</sup>. RCT is treated conservatively by means of rest, physiotherapy, analgesics, steroid inj and surgically<sup>7,8,9,10</sup>. But still no satisfactory treatment available which can improve degenerative pathology of RCT clinically, functionally, histologically<sup>12</sup>. Autologous Platelet Rich Plasma (PRP) injection contains high concentration of platelets with various growth factors and bio active substances like VEGF, TGF- $\beta$ , IGF1, alfa granules etc which stimulates natural healing cascade and halts or even revert degenerative process of RCT<sup>11,13,14,15</sup>.

### MATERIALS AND METHODS-

After approval from institutional ethical committee (IEC), clinically diagnosed twenty adult patients of both sexes of Rotator cuff tendinopathy (RCT) symptomatic for more than 2 months

or more and refractory to 3 weeks of conservative treatment in form of physiotherapy included in study and patients with any history of local steroid injection in past 3 months, Patient having significant cardiovascular disease anemia, renal or hepatic disease, pregnancy, any local infection or malignancy, diabetes, hypothyroid, neuropathy or any vascular insufficiency, bleeding or platelet disorder, Patient who had previous surgery around shoulder, joint instability and significant co morbidity of upper limb excluded from study. All the patients were explained about the study and an informed consent was obtained. Only those providing consent to participate in the study were enrolled in the study. Participants were treated with 4 ml of autologous injection PRP intralesionally and in surrounding tendons by single author\*. Patients were followed up for 3 months post injection PRP. No analgesic was prescribed during follow up except tab paracetamol (650 mg) SOS.

At baseline, the demographic information and medical history of the patients was obtained. Assessment of results done on the basis of VAS score<sup>16</sup> and Functional shoulder tests assessing rotator cuff strength & endurance<sup>17,18,19,20</sup> at pretreatment, 3 months interval.

The PRP was prepared by withdrawing 20 cc of whole blood under aseptic precautions from antecubital vein, mixed with 2.8 ml of Acid Citrate Dextrose solution (ACD solution)<sup>21</sup> in sterile vials, centrifuged in centrifuge machine @ 1500 rpm for 15 minutes<sup>22</sup>, PRP was made and collected in fresh vial by pipette. After waiting for one hour at 20-22° (air condition room) so that platelets come in resting phase<sup>23</sup> PRP was injected intralesionally and surrounding tendons by aseptic technique without prior activation by mean of pharmacological agents<sup>24</sup>. In PRP, concentration of platelets should increase 3-5 times than that in whole blood for proper effect.

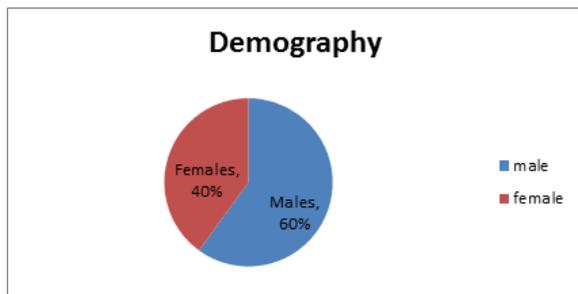
### STATISTICAL ANALYSIS-

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software. The values were represented in Number (%) and Mean $\pm$ SD.

**RESULTS-**

**I Baseline data-**

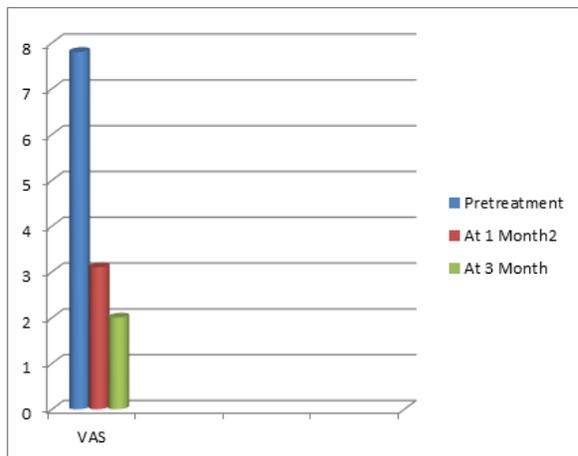
Demography Male/Female	12/8 Total 20
Age of patients Mean/SD	45.7(11.6) yrs, Range 24-67 yrs
Duration of shoulder pain	Mean 5.7 (2.6) months (Range 2.1- 11.6 months)
Prior physiotherapy	100%
Corticosteroid injection in past 3 months	0
Surgery on or around shoulder	0



Out of 20 enrolled patients 12 were male (60%) and 8 were females (40%) and mean age of participants was 45.7± 11.6 years, age of participants ranged from 24 to 67 years. Mean duration of shoulder pain was 5.7 ± 2.6 months ranged between 2.1 to 11.6 months. All the participants received prior physiotherapy and none of them received corticosteroid injection in past 3 months and had undergone any surgery around shoulder joint.

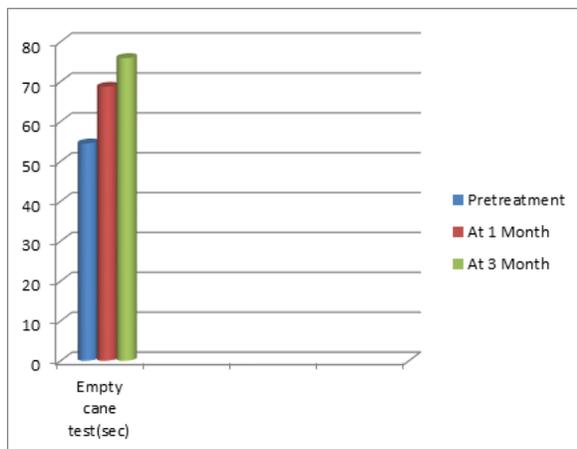
**2 VAS & Functional outcome-**

S.No	Tests	Pretreatment Mean/SD	At 1 month Mean/SD	At 3 month Mean/SD
1	VAS (0-10)	7.8 (0.6)	2.9 (0.5)	0.6 (0.4)
2	Empty cane test (seconds to fatigue)	54.5 (7.6)	68.7 (4.1)	75.9 (9.7)
3	Drop Arm test (seconds to fatigue)	41.7 (7.5)	66.9 (6.1)	78.6 (11.9)
4	Theta band external rotation at 90° (seconds)	31.2 (5.5)	52.4 (3.3)	64.7 (7.4)
5	Analgesic use (units/week)	8.6 (2.03)	3.1 (1.8)	1.1 (1.3)

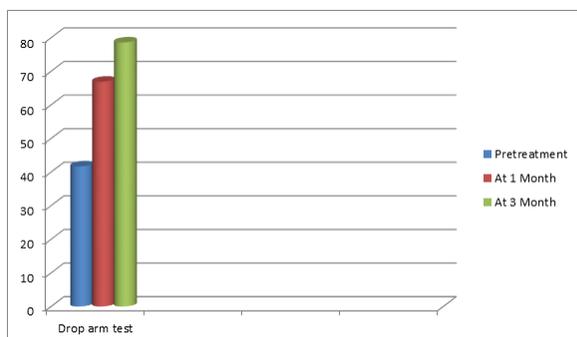


Mean VAS score improved from severe category 7.8±0.6 points pretreatment to mild 2.9±0.5 points at one month to none 0.6±0.4 points at three months post PRP injection which is a

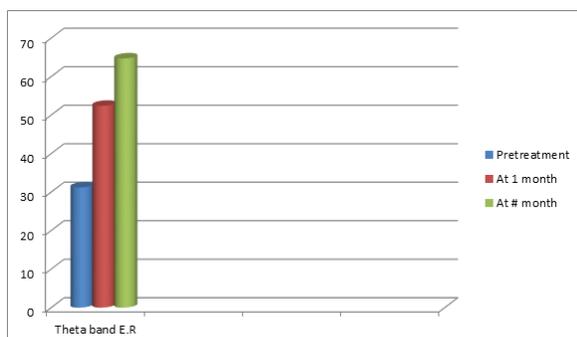
meaningful change.



Empty cane test in seconds till fatigue improved from mean 54.5±7.6 seconds pretreatment to 68.7±4.1 seconds at one month to 75.9±9.7 seconds at three months post PRP injection which is a meaningful change.



Drop arm test in seconds till fatigue improved from mean 41.7±7.5 seconds pretreatment to 66.9±6.1 at one month to 78.6±11.9 at three months post PRP injection which is a meaningful change.



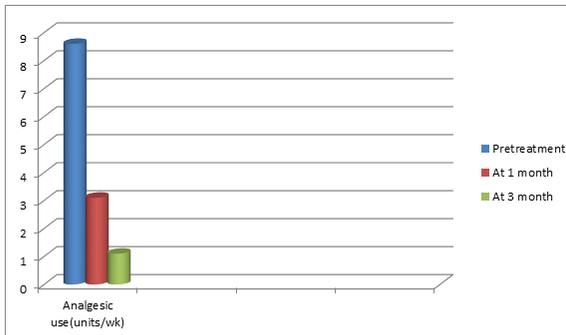
Theta band external rotation at 90° in seconds till fatigue improved from 31.2±5.5 seconds pretreatment level to 52.4±3.3 seconds at one month to 64.7±7.4 seconds at three months post PRP injection which is a meaningful change. This shows improvement in function and endurance of patient.

28.29.30

In our study sample size and follow-up duration is less so we suggests further study should be carried out with larger sample size and longer follow up for making autologous injection PRP as a definitive treatment option for RCT.

### CONCLUSION-

A single intralesional injection of PRP significantly decreases pain (improves VAS score), functional outcome and reduces the need of analgesics. Autologous PRP is safe deprived of side effects and effective mean of treatment in refractory cases of RCT not responding to conventional treatment.



Mean analgesic use declined from  $8.6 \pm 2.03$  units/week pretreatment to  $3.1 \pm 1.8$  units/week at one month which further declined to  $1.1 \pm 1.3$  units/week at three month post PRP injection, it means that after PRP injection patients needed significantly less analgesic and overall improvement in quality of life.

No side effect during treatment with injection PRP was noticed except pain at injection site in one patient which lasted for ten minutes and relived spontaneously.

### DISCUSSION-

In our study there was more than 90% reduction in pain and analgesic use and significant improvement was also seen in functional outcome & endurance of patient after treatment with single injection of PRP. This is consistent with studies which state that a single injection of autologous PRP is an effective mean of treatment of RCT as it improves pain score and functional outcomes<sup>25</sup>. In our study no side effect of PRP injection noted except pain in injection site which lasted for ten minutes is consistent with studies which states that autologous PRP is devoid of potential side effects<sup>26</sup>. In vivo studies also suggest that PRP has several growth factors and cytokines which helps in healing of musculoskeletal system and even promotes regeneration<sup>27</sup>.

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