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CLINICAL STUDY OF PLATELET RICH PLASMA INJECTION IN SHOULDER ELUCIDATION IN PARTIAL ROTATOR CUFF TEARS - CURRENT CONCEPTS

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ABSTRACT

One of the most common reasons for shoulder aches and incapacity is partial thickness tear of the rotator cuff. It is gold standard for treatment is arthroscopic restoration while traditional remedy fails. Even if the surgical method has been continually stepped forward, the retear fee remains excessive at thirty four–ninety four percentages, as discovered through numerous studies. The aim of study efficacy and verify the safety of PRP injection within the treatment of sufferers with rotator cuff pathology who have failed conservative treatment. This study was done in Chettinad Hospital and Research Institute (CHRI) **i**ncluded 25 patients recruited from the outpatient clinics of orthopedic department.This study included all patients aged below 18 and upto 45 years who had shoulder pain with overhead activity and pain score greater than 5 on visual analog scale (VAS) in addition to painful arc or impingement signs and were diagnosed by MSUS to have partial rotator cuff tear. The mean age of the study participants was 53 ± 4.3 years and that patient age range was similar across the treatment groups. There were 13 men and 7 women, and sex was also distributed similarly across the treatment groups. Seventeen patients had RC tear in their dominant arm. Every one of patients had either a degenerative RC tear (68%) or a traumatic tear (32%).Out of 25,15patients were having supraspinatus tear and five patient was having subscapularis tear and five patients with infra spinatus tear. Benefit for lowering ache and improving shoulder function in partial RC tears with ultrasound-guided PRP. Nowadays PRP works on a partially tear RC remains a project and deserves ongoing research.

Key words: Ultra sonogram Rotator cuff tears, infraspinatus, platelet-rich plasma.

INTRODUCTION

Usually Rotator cuff tear reasons ache and restrained motor feature of shoulder.[1]It is gold standard for treatment is arthroscopic restoration while traditional remedy fails. Even if the surgical method has been continually stepped forward, the retear fee remains excessive at thirty four–ninety four percentages, as discovered through numerous studies.[2] Sometimes disasters to heal is considered a primary reason of continual shoulder pain and hinder successful results from both non-operative and surgical treatment.[3]

The rotator cuff (RC) consists of 4 muscle tissues; the supraspinatus, infraspinatus, teres minor, and subscapularis whose distal tendon attached tubercles of the humerus. The number one characteristic of the RC is to preserve the humeral head in the glenoid cavity of the scapula throughout all moves of the glenohumeral joint.[4]

A healthy rotator cuff is a pain-unfastened, structurally organized tendon able to appear routine and purposeful responsibilities. Tendinopathy is an overuse disorder characterized by using the pain in and across the tendon with impaired tendon function. Patient money owed of pain and impairment is the maximum essential function of tendinopathy.[5]

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Currently, in regenerative medicinal drugs, two new treatments could restore and repair broken tissues, particularly platelet-rich plasma (PRP) and stem mobile primarily based treatment options. Platelets are wealthy in growth factors and play an essential position by forming blood clots at some point of damage.[6]

Platelets are the frontline restoration reaction to accidents as they're wealthy in granules that incorporate an abundance of enzymes and growth factors that sell tissue restoration. Hence, wound recovery of broken tissues relies upon at the platelet concentrations. PRP acts via inducing cells which can heal on their personal or can augment the recovery system main to resolution of damaged tissues. One of the widely used packages of PRP is within the regeneration and reconstruction of skeletal and connective tissues inside the periodontal and maxillofacial sicknesses and in sports associated accidents.[7] The aim of this look at is to look at the efficacy and verify the safety of PRP injection within the treatment of sufferers with rotator cuff pathology who have failed conservative treatment.

MATERIAL AND METHODS

This study was done in **Chettinad Hospital and Research Institute (CHRI), Kelambakkam** after getting approval from Ethical Committee and study included 25 patients recruited from the outpatient clinics of orthopedic department.This study included all patients aged > 18 and < 45 years who had shoulder pain with overhead activity and pain score ≥ 5 on visual analog scale (VAS) in addition to painful arc or impingement signs and were diagnosed by MSUS to have partial rotator cuff tear.

The exclusion criteria in this study

- Shoulder pain and dysfunction as fracture, bone disease, gouty arthritis and rheumatoid arthritis.
- Systemic diseases, such as hepatitis, diabetes mellitus, or blood diseases, referred pain from cervical spine.
- History of steroid injection within 6 weeks
- Non-steroidal use within the last 2 weeks,
- Hemoglobin level less than 11 gm/dl
- Platelet less than 150,000 IU,
- Pregnancy.

Active and passive ranges of motion of the shoulder were assessed using goniometer. Shoulder pain was assessed by visual analog scale (VAS). Shoulder function was assessed by Shoulder Pain and Disability Index (SPADI), which has two items the first is pain scale consists of four grades; each of them was graded from 0 to 10 (0 = no pain while 10 = maximum pain), and then we calculate the total pain score = …../50 × 100=…...%.[8]

The second item is disability scale which consists of eight items; each of them was graded from 0 to 10 (0 = no difficulty while 10 = marked difficulty), and then we calculate the total disability score = …./80 × 100 = …..% followed by calculating the total SPADI = …../130 ×100=……%.

High-resolution MSUS assessment of the shoulder

It was performed using a high-frequency (0–12 MHZ) linear transducer (LOGIQ 500 pro series, GE Medical Systems, USA). The examination started while the patient was setting for proper visualization of the shoulder. The transverse and longitudinal scans were applied to the shoulder for assessment of rotator cuff tendons.

Rotator cuff findings were described as follows: normal, tendinosis, tendinitis, partial tear, or full thickness tear. Ultrasound grading of rotator cuff tendon in which [9]

- Grade 0: normal (hyperechoic, fibrillary echotexture),
- Grade 1: mild tendinosis (heterogeneous echo texture with ill-defined hyperechoic regions),
- Grade 2: severe tendinosis (diffuse abnormal hypoechogenicity without tendon volume loss),
- Grade3: intrasubstance abnormality (focal, well-defined, hypoechoic, or anechoic area not extending to either the bursal or articular tendon surface),
- Grade 4: partial thickness tendon tear (focal, well-defined, hypoechoic, or anechoic area extending to either the bursal or articular surface of the tendon),
- Grade 5: focal full-thickness tendon tear (focal, well-defined, hypoechoic, or anechoic area extending to either the bursal or articular tendon surface with tendon volume loss),
- Grade 6: full-thickness tear (nonvisualization of tendon with retraction).

PRP was prepared using standard techniques. Initially, patient's whole blood was collected with aseptic precautions in acid citrate dextrose tubes. Around 20 ml of patient's whole blood is collected. This whole blood was subjected to centrifugation at 2000 rpm (soft spin).The whole blood will separate into three layers. The supernatant layer of plasma and buffy coat were separated and subjected to centrifugation at 3000 rpm (hard spin). In the fi nal end product, the upper two-third of the tube will be containing platelet poor plasma which is removed, and the lower one-third will be PRP enhanced with superfi cial buffy coat which will be used for injection. The procedure was performed by a team of radiologist and orthopedic surgeon. The cuff tear size was evaluated using a high-frequency musculoskeletal probe.

The procedure initiated with a diagnosticultrasonogram of the glenohumeral joint. Using a 22-to25-gauge needle, 2–3 ml of the leukocyte-rich PRP product was injected at the RC tear site, and under ultrasound guidance. All injections were performed after painting the patient with betadine and sterilizing the USG probe with betadine and surgical spirit, with patients positioned in sitting position.

This is executed as an OP technique. After injection, patient's arms were supported with a simple sling until pain subsides. Patients were requested to

mobilize the shoulder at the earliest. All pain management methods were avoided, including oral and injections of pain medication. Patient follow-up was done by attending surgeon at 8 weeks and 3 months post injection. The patients completed the VAS for pain, Constant shoulder score, and UCLA shoulder score for quality of shoulder function.They were also asked about adverse events and this information was verified by their surgeon and by a review of their medical records. All injections were performed after painting the patient with betadine and sterilizing the USG probe with betadine and surgical spirit, with patients positioned in sitting position.

The primary outcome was change in pain severity, measured using a VAS at 7 weeks and 3 months post injection. Patients had to think their worst pain in their shoulder for the past 24 h on a 10-cm vertical scale, with "0" indicating no pain at all and "10" indicating the maximum pain the patient could imagine using a series of smilies. The VAS is a simple and sensitive measure that can detect minor changes in an individual's perception of pain severity and easy to understood.[10]

This scale is widely used and considered to be best in determining fluctuation of pain over time than a questionnaire with a selected number of responses, with good construct validity and high internal consistency. Secondary outcome measures include the Constant and UCLA shoulder score at 8 weeks and 3 months postinjection, as well as the incidence of surgeries and adverse events. Briefly, the constant shoulder score is a questionnaire about the past 4 weeks of shoulder function.[11]

It considers shoulder function under 8 headings pain, activity level, arm positioning, forward fl exion, lateral elevation, internal rotation, and external rotation. A score difference of >30 is considered as poor, 21–30 fair, 11–20 good, and <11 is excellent. The UCLA shoulder score has questions regarding the past 4 months of shoulder activity under the headings pain, function, active forward flexion, strength of forward flexion, satisfaction of the patient. A score above 27 is graded as excellent/good and below 27 is considered as poor/fair. All adverse events and complications are noted down by the team.

In addition, other tests were performed: complete blood profile (Coulter counter), erythrocyte sedimentation rate (ESR) (Westergren method), 2 h post-prandial blood sugar level (glucose oxidase method), and serum uric acid (uricase method).

RESULTS

The mean age of the study participants was 53 ± 4.3 years and that patient age range was similar across the treatment groups. There were 13 men and 7 women, and sex was also distributed similarly across the treatment groups. Seventeen patients had RC tear in their dominant arm. Every one of patients had either a degenerative RC tear (68%) or a traumatic tear (32%).Out of 25,15patients were having supraspinatus tear and five patient was having subscapularis tear and five patients with infra spinatus tear.

An investigative analysis of VAS pain scores at 7 weeks includes data of only eligible patients were analyzed. The dissimilarity among preinjection and postinjection VAS scores was exceedingly statistically significant ($P < 0.001$). The preinjection, mean ± SD VAS pain scores were 6.4 ± 0.92, and after 7 weeks, it is 2.3 ± 0.94, respectively. After 3 months, the mean ± SD VAS pain scores were 3.55 ± 1.83 with a ($P < 0.001$).

The UCLA shoulder score and Constant shoulder score showed statistically significant improvement at 7 weeks and 2 months, respectively ($P < 0.001$). The UCLA shoulder score was increasing from baseline to 7 weeks with initial mean ± SD of 16.05 ± 2.05and at 7th week 35.75 ± 3.57 at ($P < 0.001$). There was also significant improvement from 7th week to 2months(30.10 ± 4.34) at P value <0.0001. After 3 months,16 patients had excellent UCLA score, 6 patients had good, 1 had fair, and two patient had poor score.

The Constant shoulder also showed improvement from baseline (42.80 ± 3.53–64.7 ± 4.1 in 7 weeks and 77.50 ± 4.45 in 3 months). This was also statistically significant improvement in 7th week and in 2nd month with $P < 0.0001$. An ultrasonogram done at 7 weeks also showed complete healing in 11 patients and partial healing in 7 patients. Nearly 70% of the completely healed RC tears are intratendinous tears.

DISCUSSION

In present study observed a considerable change in the preinjection and postinjection VAS scores at 7 weeks and 2 months even as the study was able to exhibit that the injected product influenced the pain score, the overall decrease in pain from baseline for group demonstrates that ultrasonogram-guided injection can be effective in pain control. The majority of the people were satisfied due to the adequate pain control by 2nd month.

The Constant score shows improvement in 7th week and 2nd month compared to baseline showing improved range of motion in the shoulder.The secondary objectives, which assign the shoulder function exhibit unique progressive pattern. The UCLA shoulder score increases from baseline to 7th week with good patient contentment. The 3rd month review also shows a unanimous increase in the score with a specific difference in shoulder abduction in this study.

No reconsideration procedures were necessary till the 3rd month except for two patients for whom arthroscopic RC repair was done because of the unsatisfactory result. The most common adverse effect was post-injection pain which was mainly treated with ice packing. Sometimes pain is not clear to study event, it might be technically related. These overall findings are consistent with the mounting literature examining the use of PRP in RC injuries.

Shoulder functions and pain scores were collected at frequent time points post-injection, allowing for an increased possibility that restrained changes may be noticed.In addition, the follow-up was 91% at 7weeks. The primary outcome measure used for assessing the effect of PRP, was not able to represent each RC muscles individually using specific data.

When PRP is used to augment rotator cuff repair, it resulted in decreased retear rates, early going back to day-to-day activity and improvement in pain in present study which is correlated with Saltzman et al[12] concluded that there is improvement in pain and reduction in rehabilitatory period in cases where PRP augmentation was done in patients with RC tear.

Randelli et al[13] take a look at discovered that after PRP is used for the augmentation of arthroscopically performed cuff repair, all of the fourteen sufferers had discount in pain and purposeful development and had no adverse effect as proven by way of improvement in steady rating at 12 weeks following the repair. Preliminary statistics advocate that the administration of PRP into injured tissues promotes natural restoration mechanisms via launch of boom elements and different bioactive materials. This prospective examine demonstrates that ultrasound-guided PRP injection resulted in markedly progressed clinical, functional, and radiological outcomes.

CONCLUSION

In conclusion use of PRP injections enables avoids surgical treatment, produces benefits for 2 years, and forestalls worsening signs and symptoms indicative of whole tearing of the rotator cuff. It also presents exact palliation of full-thickness rotator cuff tears for patients who are not candidates for surgical repair for at least years. Benefit for lowering ache and improving shoulder function in partial RC tears with ultrasound-guided PRP. Nowadays PRP works on a partially tear RC remains a project and deserves ongoing research.

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