

Effectiveness of Injection of Trigger Points with Platelet Rich Plasma as A Pain Management Method in Rotator Cuff Syndrome

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Abstract: Objective The aim of the current study is to evaluate the effectiveness of the injection of trigger points with platelet-rich plasma as a pain management method in chronic pain resulting from rotator cuff syndrome.

Methodology A retrospective study was designed for the period from August 1, 2016, until July 31, 2019, 36 patients (21 females and 15 males) visited our private clinic in Kirkuk, Iraq because of chronic shoulder pain, they received trigger points PRP injections. The PRP was prepared by centrifuging the patient's own blood. The response to therapy was graded: excellent, good, fair and poor.

Results The mean age was 52.3 ± 1.9 years. Most of the patients ($n: 33, 92\%$) had either overweight or obesity and ($n: 16, 44.6\%$) had hypertension either alone or in combination with diabetes mellitus. Most of the patients ($n: 30, 83.3\%$) received three sessions while ($n: 6, 16.7\%$) received one session of PRP injections. Most of the patients ($n: 28, 77.8\%$) yielded either good or excellent response to treatment, while ($n: 8, 22.2\%$) from the patient had an either fair or poor response to treatment, there was a statistically significant difference ($p < 0.01$) between the 2 groups.

Conclusion PRP injections of trigger points in patients complaining from chronic pain as a result of rotator cuff syndrome seem to be an effective, safe and cheap pain management method.

Keywords: Rotator cuff syndrome, Pain Management, Platelets Rich Plasma, Iraq.

إدارة الآلام المزمنة في متلازمة الكفة المدورة بواسطة زرق نقاط التوتربالبلازما الغنية بالصفائح الدموية

حيدرغالي الغوام

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المخلص: هدفت الدراسة إلى تقييم فعالية حقن نقاط التوتربالبلازما الغنية بالصفائح الدموية كطريقة لمعالجة الآلام المزمنة في مرضى متلازمة الكفة المدورة، طريقة البحث صممت الدراسة بأثر رجعي للفترة من 1 آب 2016 لغاية 31 تموز 2019، 36 مريض (21 أنثى و15 ذكور) راجعوا العيادة الخاصة للباحث في محافظة كركوك، العراق بسبب شكاوهم من الآلام مزمنة في الكتف، تم حقن نقاط التوتربالعضلي عند المرضى بالبلازما الغنية بالصفائح الدموية التي تم تحضيرها بواسطة الطرد المركزي للدم المسحوب من المرضى. وصنفت الاستجابة للعلاج إلى: ممتاز وجيد ومقبول وضعيف

النتائج معدل العمر للمرضى هو $1,9 \pm 52,3$ سنة. معظم المرضى (عدد 92,33%) لديهم زيادة في الوزن أو سمنة و (عدد 44,6,16%) مصابون بارتفاع ضغط الدم لوحده أو مع داء السكري. معظم المرضى (عدد 83,3,30%) تلقوا ثلاث جرعات بينما (عدد 16,7,6%) تلقوا جرعة واحدة من البلازما الغنية بالصفائح الدموية. معظم المرضى (عدد 77,8,28%) أظهروا أما استجابة جيدة أو ممتازة للعلاج، بينما (عدد 22,2,8%) من المرضى أظهروا أما استجابة مقبولة أو ضعيفة وبينت النتائج وجود فروق معنوية بين المجموعتين بدلالة $p < 0.01$.

الاستنتاج ان حقن نقاط التوتر العضلي بالبلازما الغنية بالصفائح الدموية هي طريقة فعالة وأمينة ورخيصة لمعالجة الآلام المزمنة الناتجة من متلازمة الكفة المدورة

الكلمات المفتاحية: متلازمة الكفة المدورة، معالجة الآلام، البلازما الغنية بالصفائح الدموية، العراق.

Introduction

Rotator cuff syndrome can be defined as acute or chronic tears or degeneration of the rotator cuff, it is the most common cause of shoulder pain seen by family medicine physicians. Also rotator cuff syndrome is ranking second in work-related injuries, and it is one of the most common causes for time lose from physical occupations, the rotator cuff syndrome can be asymptomatic in the beginning, then the shoulder pain often develops in individuals within 5 years of the injury [1]. In symptomatic patients, rotator cuff pathology can be long-lasting, debilitating, and costly [2].

Rotator cuff pathology as a chronic condition has draw awareness as a result of the significant disability, poor quality of life and costly consumption of health care resources [3].

A lot of the patients with chronic pain in the shoulder region are managed under supervision of orthopedic surgeons because 30–70% of painful shoulders patients are correlated cases of rotator cuff disorders [4]. Clinical tests like the external rotation lag test and positive painful arc used to evaluate the rotator cuff syndrome but frequently insufficient to predict the morphology and size of rotator cuff [5].

In rotator cuff syndrome the most helpful diagnostic imaging techniques are magnetic resonance imaging (MRI) and ultrasound. MRI is inadequate for partial tears [4] and have poor physicians agreements for diagnosis, so ultrasound of shoulder has become as a high-quality diagnostic method for assessment of rotator cuff syndrome [6].

Conservative management for rotator cuff to reduce the pain include exercise, medication and steroid injection therapy. These methods used to manage pain with all its potential side effects except physical exercise which is effective and has no side effect of course, so it is considered as a helpful treatment for regaining function in addition to reduction of pain especially in rotator cuff tendinopathy. However, exercise takes a long time for improvement and the compliance of patients is very important to achieve the utmost outcome [7].

For many years now, autologous growth factors like platelet derived growth factor and vascular endothelial growth factor found in platelet rich plasma (PRP) have been recognized to take part in a critical role in cell proliferation, chemotaxis, cell differentiation, and angiogenesis [8]. Many studies stated

the positive clinical results with the use of PRP in the treatment of acute and chronic pain related to rotator cuff syndrome [9].

Autologous platelet-rich plasma (PRP) has been used widely in bone and tendon tissue healing and reconstruction. more than 1500 bioactive proteins are known to be contained in PRP which are so important for tendon healing, including growth factors such as transforming growth factor beta (TGF- β), fibroblast growth factor (FGF), and platelet-derived growth factor (PDGF) [10].

The aim of this study is to investigate the clinical and imaging outcomes of PRP treatment for rotator cuff syndrome chronic pain. Our hypothesis is that PRP application decreases the pain and improves clinical outcomes.

Study Design

This is a retrospective study of a group of patients with chronic shoulder pain as a result of rotator cuff syndrome, they were managed by trigger points PRP injection in Dr Abdullah Al-Karboli Medical Center for Family Medicine and Pain Management in Kirkuk, Iraq. Over three years period (August 1, 2016–July 31, 2019), 36 patients received trigger points PRP injection. (21 females and 15 male) were enrolled in the study. A detailed history was taken according to a questionnaire and a complete physical, radiological and ultrasound examination was done. The clinical notes were reviewed to ascertain the clinical presentations and response of patients to PRP therapy.

Methods

In order to prepare PRP, the autologous blood from the patient's own vein was drawn by a 50-ml syringe; the amount of blood determined by the size of the area to be treated. The withdrawn blood was then placed in aseptic tubes, each one filled with 9 ml blood and 1 ml 3.8% sodium citrate as an anticoagulant. The tubes were centrifuged at 1500 rpm for 10 min separating the sample into three parts; the upper part made of plasma, the middle part (puffy coat) made of white blood cells (WBCs) while the lower part made of red blood corpuscles (RBCs). The upper two thirds of plasma were discarded while the lower third was transferred to another tube and placed in a centrifuge again. After 15 min of centrifugation at 3000 rpm, the upper half of the sample was discarded while the lower half would form the PRP.

A rotating stool was used to seat the patient, the arm of patient was kept in that position so that all structures could be evaluated. Real-time ultrasonography was done utilizing an LOGIC P6 Ultrasound Machine with ML6-15 linear transducer (GE Healthcare, USA) for the acromioclavicular joints, biceps, infraspinatus, posterior labrum, subscapularis, supraspinatus and teres minor tendon. Each tendon was assessed via scanning planes in orientation as per longer axis, shorter axis, and by the myotendinous

junction of shoulder to bony insertions. Standardized ultrasonography technique and diagnosis were used. Ultrasound were conducted by researchers (3 years of experience).

Patients received 1 to 3 doses of PRP extracted from patient's own blood intramuscular injections in trigger points in shoulder region, 4 weeks interval between each dose and using 30G needle after marking trigger points numbing the skin injecting 1/2 cc of lidocaine & 1/2 cc of PRP in each point, procedures done under aseptic condition.

In this study, follow up of patients continue for six months after the last injection session, the author used a symptom based patient directed questionnaire to assess the outcome after PRP therapy. The questionnaire was similar to that described by Bhattacharya et al in their study of thoracic outlet compression but slightly modified. The questionnaire asked patients to grade their perception of symptomatic relief using the terms "Excellent" for complete relief of symptoms, "Good" for relief of most major symptoms, "Fair" for relief of some symptoms, but persistence of others and "Poor" for no improvement [11].

Inclusion criteria

Inclusion criteria for the study included: patients age 18 years and older with chronic shoulder pain for at least six months.

Exclusion criteria

Exclusion criteria included: patients who had fracture history of acromion or humerus bone, affected shoulder surgery/dislocation, shoulder problems due to rheumatic disorder, referred pain or extraneous causes, medical history of bleeding tendency and patients on anticoagulants.

Body mass index (BMI) of the patients was calculated by the equation: Weight in kilogram/(Height in meter)² and accordingly, the patients were classified as having a healthy body weight (18.5-24.9), overweight (25-29.9), obesity I (30-34.9), obesity II (35-39.9) and obesity III (≥ 40) [12].

All the data were recorded in Microsoft Excel 2010, the data were analyzed by using of computer SPSS 11 program and the www.socscistatistics.com, the differences were considered significant when the probability (P) was less than 0.01 ($p < 0.01$) by using z test for 2 population proportions.

Results

There were 36 patients (21 females and 15 males) with a female: male ratio of 1.4:1. The age ranged between 22 and 78 years with a mean of 52.3 ± 1.9 years. Figure (1) displays the age and sex distribution of the studied patients.

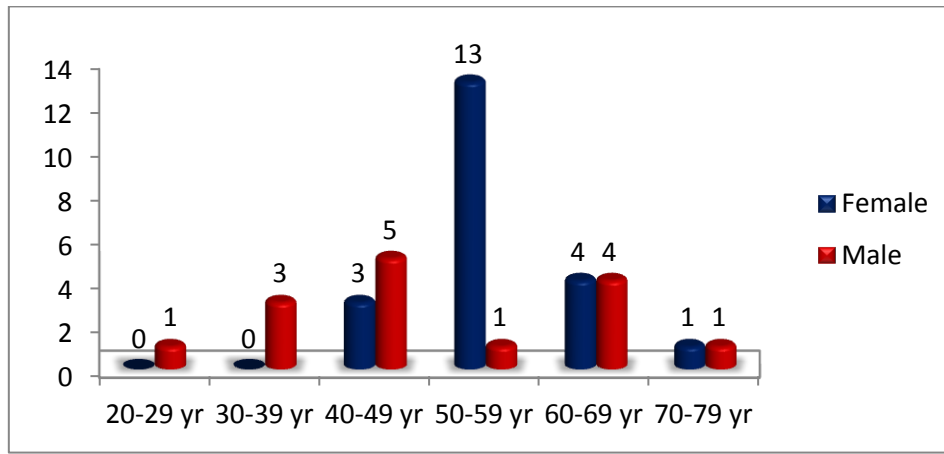


Figure (1) Patients Age & Sex Distribution.

The female patients were housewives (n: 13, 62%), governmental employee (n: 8, 38%) while most males were either government employees (n: 7, 46.6%) or free workers (n: 7, 46.6%) as shown in Figure (2).

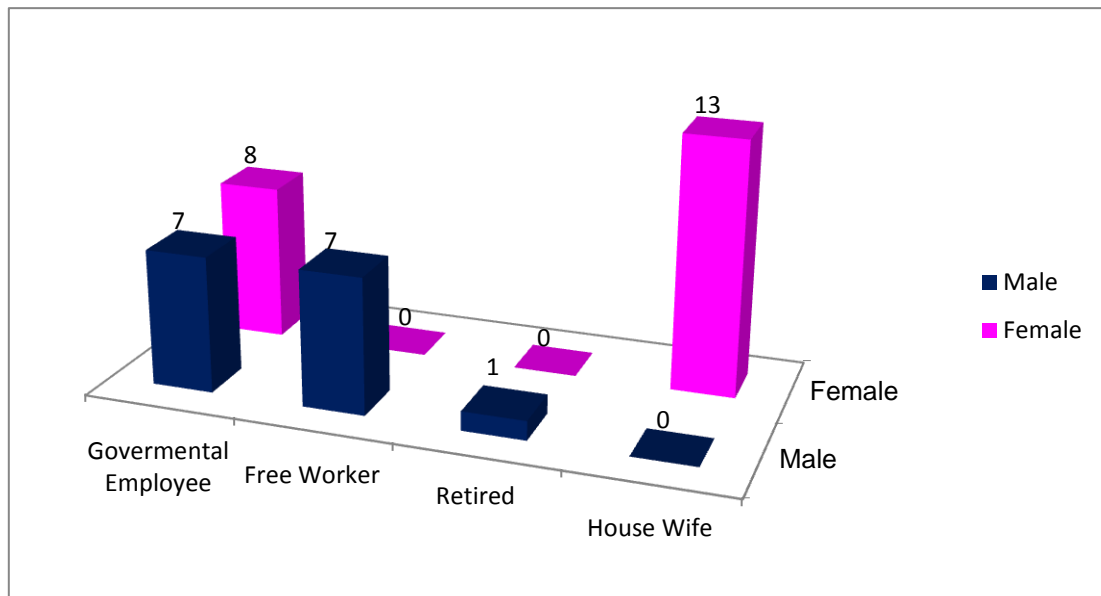


Figure (2) Patients Job Distribution.

Most of the patients were overweight or obese (n:33, 91.7%) while the patients with normal healthy weight were (n: 3, 8.3%) as shown in Figure (3).

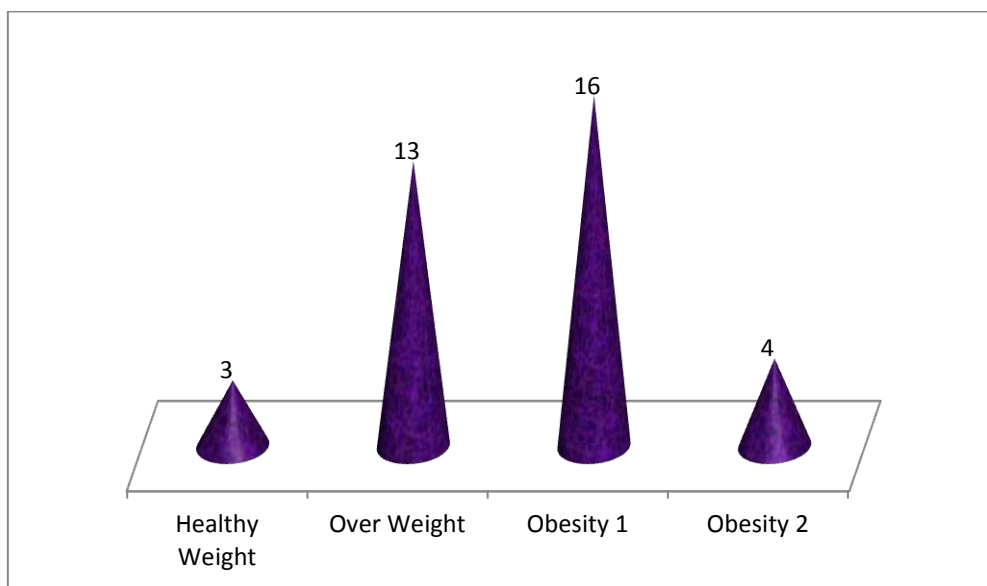


Figure (3) Patients BMI distribution.

Table (1) shows the co-morbidities encountered in the studied patients.

Co-morbidity	Sex		Total
	Male	Female	
Overweight or Obesity	14 (39%)	19 (53%)	33 (92%)
Hypertension	5 (14%)	7 (19.5%)	12 (33.5%)
DM & HT	1 (2.8%)	3 (8.3%)	4 (11.1%)
Hypothyroidism	0 (0.00%)	3 (8.3%)	3 (8.3%)

The top co-morbid condition was obesity as most of the patients (n: 33, 92%) were either overweight or obese. Hypertension ranked second (n: 16, 44.6%) had HT either alone or in combination with DM, while three patients (8.3 %) had hypothyroidism as shown in Table (1).

Figure (4) shows that (n: 30, 83.3%) from patients received three sessions while (n: 6, 16.7%) received one session of PRP injections.

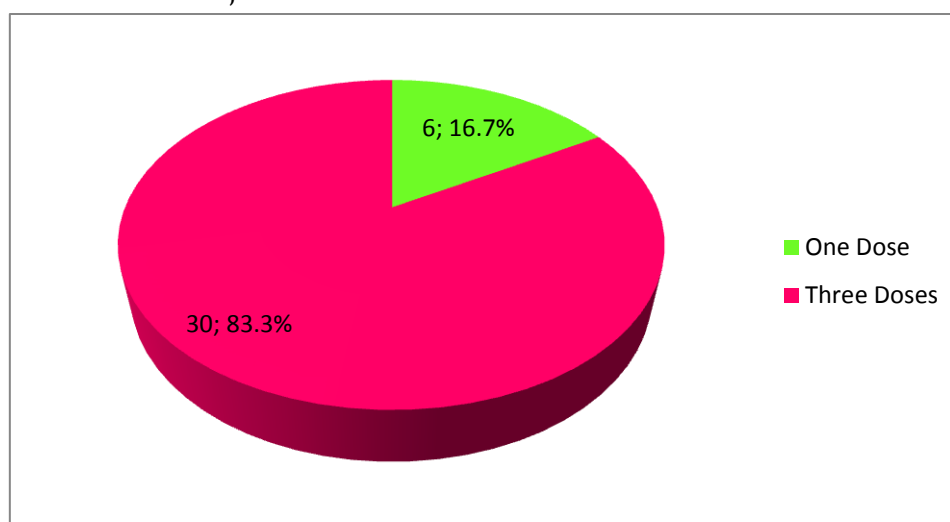


Figure (4) Distribution of patients treated with one, two or three sessions of PRP injections

As shown **Figure (5)** (n: 28, 77.8%) from patients had either excellent or good response to treatment, while (n: 8, 22.2%) from patient had either fair or poor response to treatment, there was statistically significant difference between the 2 groups ($p < 0.01$).

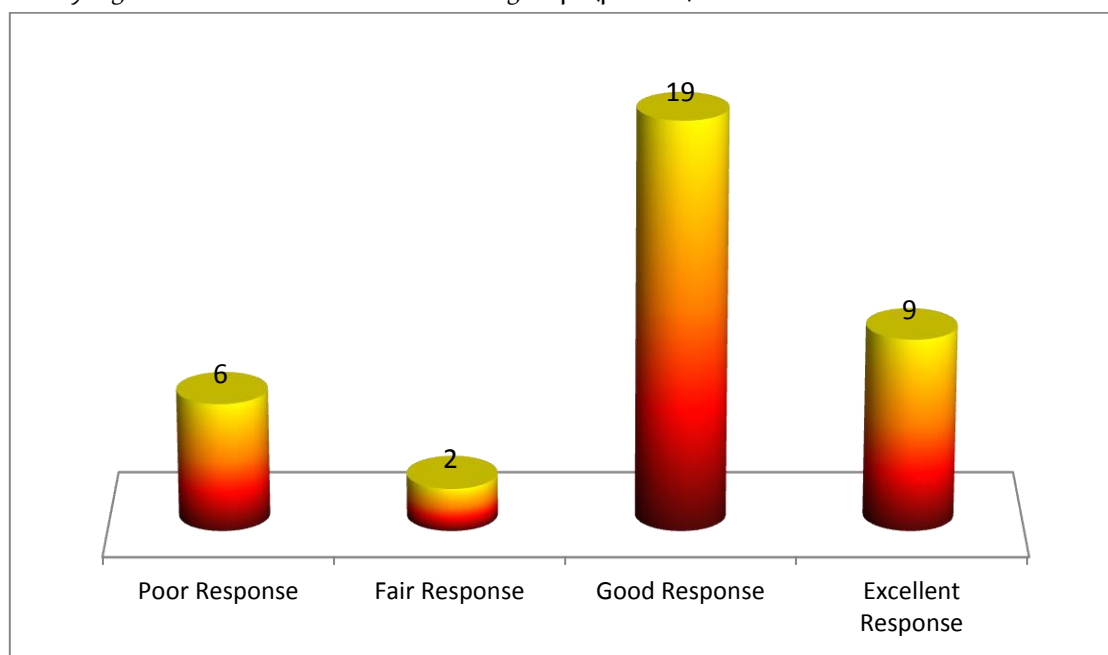


Figure (5) Distribution of patients according to response to treatment.

Discussion

Rotator cuff pathology can cause significant chronic pain, distress, and disability that impede with activities of daily action and may lead to deprived quality of life. Management of shoulder disorders using biological factors like PRP increased over the last years. This interest reveals the need of effective treatments for shoulder pain as a result of degenerative disorders and emphasizes the significance of a full and detailed understanding of the rapidly increasing information in the ground [13].

The popularity of musculoskeletal disorders appears to be higher in women. Regarding rotator cuff syndrome, sex related studies have rarely been conducted and those that do tend to simply assess the effect of males as compared to females [14]. This study shows that 36 patients (21 females and 15 males) with a female: male ratio of 1.4:1 which means that rotator cuff were more common in females than male,

Patients who are overweight or obese with or without rotator cuff syndrome have more fatty infiltration seen on MRI. Other factors like old age and diabetes mellitus can be predictive of fatty infiltration in RCM [15] in this study Most of the patients were overweight or obese (n:33, 91.7%).

The popularity of Platelet rich plasma as treatment option in shoulder pathology increased in the last years as a biological factor that could potentially improve rotator cuff tendinopathy [16]. PRP is a small portion from whole blood with supra physiological concentration of platelets, that, when activated, releases various growth factors, inflammatory cells, and proteins, which subsequently boost stromal and mesenchymal stem cell proliferation and prevent fibrous scar tissue healing [17].

We found in our study that (n: 28, 77.8%) from patients had either excellent or good response to treatment, while (n: 8, 22.2%) from patient had either fair or poor response to treatment, there was statistically significant difference between the 2 groups ($p < 0.01$), these findings are in agree with results founded in study done by Rha DW *et al* (2013) who stated that: injections using platelet rich plasma lead to a progressive decrease in the pain and disability when compared to dry needling. This advantage is certainly still present for six months after treatment. These results suggest that management with platelet rich plasma injections is safe and effective for rotator cuff disease [18]. The above mentioned results are also in agreement with results founded in study done by Maniscalco *et al* (2008) who stated that: injection of platelet rich plasma demonstrate optimistic effect on improving rotator cuff syndrome from aspect of pain and function and it can be used to treat rotator cuff syndrome widely because of platelet rich plasma components are safe and easy to prepare and apply [17].

In summary, the use of platelet rich plasma in management of chronic pain in rotator cuff syndrome appears as promising method for enhancing biological repair, improving function and reduction of chronic pain. However, data from clinical studies are still poor, and future studies need to improve understanding of the repair and pain reduction process in cellular and clinical levels and evaluate the effectiveness of biologic factors in the management of shoulder disorders.

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