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"Comparative study between Platelet-rich plasma and corticosteroid in De Quervain's disease: A study in Zainul Haque Sikder Womens Medical College & Hospital, Dhaka, Bangladesh"

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Abstract

Introduction: Platelet-rich plasma (PRP) uses injections of a concentration of a patient's own platelets to accelerate the healing of injured tendons, ligaments, muscles and joints. Corticosteroids (also known as steroids) are medicines that can be used to treat inflammation. De Quervain's disease is a painful condition that affects the tendons sheath of first extensor compartment in your wrist. It occurs when the 2 tendons of first compartment around the base of your thumb become swollen.

Objective: To compare the efficacy of PRP injection versus corticosteroid injection for de Quervain's disease.

Materials and method: 25 male and 35 female (Mean Age 35.2 yrs.) presenting with de Quervain's disease where randomized to receive there PRP injection (1ml PRP with 1ml of 2% xylocaine) given by a single surgeon. Patients were assessed before (Days 0) and after (Days 15, 30, 60) treatment for wrist pain and function and grip strength. Patients where follow up 1 yr. to assess wrist pain over the radial styloid process.

Result: In the present study of 60 patients there were 25 male and 35 female. In the present study of 60 patients the mean age was 35.2 years (Range between 15 to 55 years). Infection, tendon rupture and neurovascular damage where not found. Five patient reported pain for unto 3 days after PRP injection. In both groups grip strength improved dramatically after treatment, but the mode of improvement different. Compared with PRP injection. corticosteroid injection improve at a faster rate over the first 15 days and then started to decline slightly until 60 day. After PRP injection pain, function and grip strength improve steadily and where eventually better. PRP injection and Corticosteroid injection 30 days and faster rate 60 days of both group P-Value 0.0001. Almost high grater rate 30 days Group comparison with pain, function and grip strength patients.

Conclusion: PRP was more effective over the long term follow up period then corticosteroid injection in improving pain, function and grip strength. That's way we recommend this in a first line injection treatment because it is very simple, cheap and more effective.

Keywords: PRP Inection, De Quervain's disease, corticosteroid injection

1. Introduction

Platelet-rich plasma (PRP) uses injections of a degree of a patient's own platelets to accelerate the healing of degenerated tendons, ligaments, muscles and joints. During this approach, PRP injections use every individual patient's own healing system to boost contractor issues. PRP injections are ready by taking anyplace from one to a number of tubes of your own blood and running it through a centrifuge to concentrate the platelets. These activated platelets are then injected directly into your degenerated or unhealthy body tissue. Fritz de Quervain first describe de Quervain disease 1985 [1]. It is caused by reactive thickening of the sheath around the extensor pollicis brevis and abductor pollicis longus tendons within the first extensor compartment. It may be initiated by overuse but it also occurs spontaneously, particularly in middle age women and sometimes during pregnancy or is associated with rheumatoid arthritis. Patient usually present with complains of radial wrist pain with thumb movement and tenderness over the first dorsal compartment tendons (zabductor pollicis longusz or APL, and extensor pollicis brevis or EPB) under the sheath of the first compartment above the styloid of the radius cousing to thickening of the extensor retinaculum of wrist [14, 15, 16]. Influencing movements enclose powerful grasping with ulnar deviance or repetitive usage of the thumb (like sporty pursuits, such as golf, flyfishing and row sports) [15]. This releases growth factors that stimulate and increase the quantity of reparative cells your body produces. Corticosteroids (also called steroids) are medicines that may be won't to treat inflammation. Once corticosteroids are injected into or around a painful space (such as a joint or muscle) they'll scale back the inflammation in this space, relieving pain, reducing tissue swelling, and up operate and quality. DE Quervain's unwellness could be a painful condition that affects the tendons in your carpus. It happens once the two tendons round the base of your thumb become swollen. The swelling causes the sheaths (casings) covering the tendons to become inflamed. This puts pressure on near nerves, inflicting pain and symptom. Diagnosis is usually established by a positive Finkelstein's test, as well as presence of a tender nodule over the radial styloid process. The conservative treatment

can be an option with rest, bracing, physical therapy, NSAID. Sometimes resistance case need an operation which consist of slitting the thickened tendon sheath. The most common practice that is given by orthopedic surgeons is corticosteroid combined with local anesthetics. PRP delivers blood borne cellular and humoral mediators to stimulate the regeneration process within the tendon sheath. PRP also contain anti-inflammatory and antimicrobial mediators, interleukin 1 receptor antagonist, thymosin beta4-TNF blocker, microbiocidal peptides, Phospholipade A2, Serotonin, Thromboxane A2, and Adenosine. Our study compare the efficacy of PRP VS corticosteroid injection for the treatment of de-Quervains disease. Patients frequently complaining of radial 0.52% of them is males and 1.3% in females [21]. De Quervain's typically present in the fifth and sixth decades of life, and common in pregnant and lactating females [16]. The general management process is as follows: conservative measures such as limiting usage of thumb, supports and intra-sheath steroid injections, and, if those procedures are unsuccessful, tendon sheath of the first dorsal compartment is surgically freed [22, 24].

2. Objective

a) To compare the efficacy of PRP injection versus corticosteroid injection for de Quervain's disease.

3. Materials and Methods

The prospective cross sectional study was carried at Department of Orthopedic, Zainul Haque Sikder Womens Medical College & Hospital, Dhaka, Bangladesh Diagnosis of de Quervain's disease was made on the basis of pain over the radial styloid process in anatomical snap box or develop hurt with thumb movement that cause tenderness above the first dorsal compartment and positive Finkelstein's test. Between January 2018 to December 2018 twenty five male and thirty five women (Mean age 35.2 yrs.) presenting with de- Quervain's disease were randomized to get either PRP injection (1.5 -2ml) or triamcinolone acetonide steroid injection 1ml mixed with 1ml of 2% xylocaine hydrochloride, given by a single orthopaedic surgeon. There are many types of method to prepare the PRP. In our study we used to Ycellbio PRP system. For PRP preparation 20 ml venous blood was drawn from the anticubital vein with an aseptic technique and mixed with the anticoagulant citrate phosphate dextrose adenine (CPDA 1) (1.5cc). The blood was then placed into the PRP tube and centrifuge for four minute at 3400 rpm to separate it into platelet poor plasma, red cell and PRP. After blood was collected I.5-2ml PRP was made and used for injection. A sterile field set up and ensure throughout the procedure depending upon the clinical examination. Patients were advised to abstain from heavy work, NSAID. Patient's occupations were individualized according to sedentary, light medium. Heavy and very heavy. Patients were assessed before (day 0) and after (days 15.30 and 60) treatment for wrist pain, function and grip strength. Patients were followed up at 1 year to assess wrist pain.

4. Result

The male to female ratio was 1:1.4. In the present study of 60 patients there were 25 male and 35 female (Mean Age 35.2 yrs.) presenting. Maximum number of patients were in the age group of 46- 55 years 22(36.8%) patients, followed by 13 (21.6%) patients in the age group between 36 – 45 years and minimum age group 15-35 yrs. 25(41.6%) (Table 1). In the present study of 60 cases, 15 (8.30%) patients had involvement of the dominant right side whereas left side was involved in 15 (10.20%) patients. The characteristics of both group were similar (table 2). Physical Demands of patient's comparison high level of Medium Group and lowest level of Light category (Table 3). De Quervain's disease where randomized to receive there PRP injection (1ml PRP with 1ml of 2% xylocaine) given by a single surgeon. Patients were assessed before (Days 0) and after (Days 15, 30, 60) treatment for wrist pain and function and grip strength. Patients where follow up 1 yr. to assess wrist pain over the radial styloid process. 10 men and 15 women received PRP injection. Whereas 15 men and 20 women received corticosteroid injection. All patients completed the 1 year follow up (table 4).

Table 1: Distribution patients of age groups (n=60).

Age Group	Frequency	percentage
15-35	25	41.6
36-45	13	21.6
46-55	22	36.8

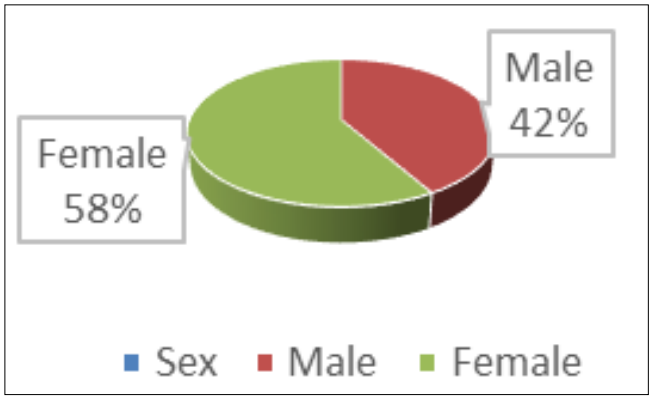

Fig 1: Sex distribution study of patients.

Table 2: characteristics of both groups (n=60)

Category	PRP(N=15)	Triamcinolone Acetonide corticosteroid injection (N=15)	P value
Age (years)	35±2.1	42±7.3	0.095
No of male: Female	7:28	6:20	0.400
No of left: right side	8:30	10:20	0.160

Fig 2: PRP and Triamcinolone Acetonide corticosteroid injection level.

Table 3: Physical Demands of patient's comparison (n=60)

Sedentary	Light	Medium	Heavy	Very heavy
1	1	10	1	2
2	0	11	1	4

Table 4: Group comparison with pain, function and grip strength (n=60)

Category	Day 0	Day 15	Day 30	Day 60	P value
Wrist pain:					
PRP	5.8 ± 1.3	4.3 ± 1.2	3.5 ± 1.1	1.1 ± 1.0	0.0001
Corticosteroid injection	5.7 ± 1.2	1.6 ± 0.8	1.5 ± 1.0	2.7 ± 1.0	0.0001
p value	0.578	0.0001	0.0001	0.0001	
Function					
PRP	65.6 ± 11.7	50.2 ± 15.2	30.3 ± 10.2	18.2 ± 8.1	0.0001
Corticosteroid injection	60.1 ± 12.4	15.5 ± 8.6	20.0 ± 10.2	30.5 ± 16.5	0.0001
p value	0.155	0.0001	0.0001	0.0001	
Grip strength:					
PRP	-	7.2 ± 12.2	20.7 ± 18.0	12.8 ± 28.1	0.0001
Corticosteroid injection	-	23.2 ± 20.8	18.3 ± 20.7	18.0 ± 20.7	0.0001
p value	-	0.001	0.647	0.016	

No complication were noted. In both groups wrist pain, function and grip strength improved dramatically after treatment but the mode of improvement differed compared with PRP injection, corticosteroid injection improved all three scores at a faster rate after the first 15 days and then started to decline slightly until 60 day. After PRP injection all three score (Pain, function and grip strength) improved steadily and were much better (table 4). (Wrist pain): PRP injection and Corticosteroid injection 15 days and 30 days faster rate and (Function): pain PRP injection and Corticosteroid injection 0 days and 15 days faster rate and (Grip strength): PRP injection and Corticosteroid injection 30 days and faster rate 60 days of both group P-Value 0.0001. Almost high grater rate 30 days Group comparison with pain, function and grip strength patients.

5. Discussion

Injection of PRP was more effective then corticosteroid injection in case of pain control, function and grip strength. The complete recovery rate at 2 months was 90% after PRP injection and 55% after corticosteroid injection. Corticosteroid injection gives rapid recovery but temporary improvement in the first month. PRP injection stimulate the inflammatory cascade within the generated tendon sheath by providing cellular and humoral mediators for regeneration. Histological studies shows non inflammatory angiofibroblastic tendinosis, neurovascularization and mucoid degeneration in first dorsal compartment. However, results as to whether PRP, autologous whole blood or corticosteroids is more beneficial are still unclear. Hechtman *et al*., (2011) [34] in a similar study using PRP, treated 31 patients with epicondylitis not responding to conservative treatment for 6 months. Two cases elected surgery 1 month post-injection and 29 cases continued follow up. The overall success rate was 90% (28 of 31 elbows). Patient satisfaction improved from 5.1 ± 2.5 at 1 month to 9.1 ± 1.9 at last follow up. Alisara Arirachakaran *et al*. (2015) [35] did a systematic review and network meta-analysis of randomized controlled trials, conducted with the aim of comparing relevant clinical outcomes between the use of PRP, autologous blood and corticosteroid injection. They concluded that the network meta-analysis provided additional information that PRP injection can improve pain and lower the risk of complications, whereas autologous blood injection can improve pain, disabilities scores and pressure pain threshold but has a higher risk of complications. The level of evidence of the study was Level I evidence. The result of the present study was that PRP injection significantly improves score. In this study after 6 months of PRP injection, when asked about overall subjective satisfaction among the patients of de Quervain's disease. These findings are consistent with previous prospective studies that demonstrate benefits conferred by intratendinous PRP insertional tendinopathies [27]. And provides satisfactory results in young subject's recalcitrant noninsertional tendinopathy reducing pain and improving function [28]. And these findings also are in agreement with previous literature data in patients suffering from Achilles, patellar, and elbow tendinopathies. The PRP treatment should be adapted as a best of therapy for relief symptoms. Though this must be advised merely next other type of nonsurgical treatment failed because lower involvement of tools/technologies & fewer contact to blood products in other type of therapies [28, 29, 30, 31]. The main findings of this study are that PRP injection resulted in better pain control and the improvement in functional outcome was stable and maintained up to a midterm follow-up. It is current opinion that the therapeutic activity of PRP is mainly due to the release of many growth factors (GFs), which can act on many aspects of tendonrepair, including angiogenesis, chemotaxis, and cell proliferation by activating intracellular signal-transduction pathways [30, 31]. In the short term (1–33 months) effect, GFs can directly stimulate tenocytes to produce extracellular matrix, and promote neofibrils formation and remodeling. Insulinlike GF-12 stimulates production of collagen [31]. in long-term (62– 122 months), depend on a direct stimulation, probably relies on the activation of resident tendon stem/progenitor cells (TSPCs), which have been recently identified in tendons tissue from different animal species. Like stem cells found in adult tissues, TSPCs are believed to be the source of recent differentiated tenocytes, responsible for maintaining adequate tenocyte numbers in the tissue throughout life and replenishing them after injury [20]. Regarding the amount of injection, Although smaller volume (2-32 ml) of PRP was injected in present study or even 1.52 ml such as in previous study, the proportion of spread beyond tendon was little.so the amount of PRP is even 1.52 ml is adequate to achieve good result on the other hand the greater volume of PRP could be an option. However, large volume can lead to further diffusion and require much more blood collectionx, which is undesirable. In our study, we not used ultrasonographic injection technique and the accuracy of injection was not to be guaranteed. Therefore, we increase the volume of injection up to 33ml so we can get maximum distribution of PRP in the area of maximal tenderness, in comprising with ultrasound injection which use 1.52 ml. Other therapies modalities want few expertise in contrast to

injection PRP therapy. All staff should be good trained to make PRP from blood while these is not required in steroid injections or others. Corticosteroid injections have also been used extensively for this problem, but studies showed that there is controversy about their efficacy [33]. There is essential of long-time trials to found PRP as a best of treatment for long term permanent heal from tendinitis due to mechanical causes. The study was limited by a minor sample size and absence of a control group. Larger-scale randomized controlled studies are required to assistance elucidate PRP as a good management for this musculoskeletal injury. To diagnose de Quervain's disease, your doctor may do a simple test. It is called the Finkelstein test. First, you bend your thumb so it rests across your palm. Then you make a fist, closing your fingers over your thumb. Last, you bend your wrist toward your little finger. If you have tenderness or pain at the base of your thumb, you probably have de Quervain's disease. Treatment for de Quervain's disease focuses on reducing pain and swelling. It includes: Applying heat or ice to the affected area. Taking a nonsteroidal anti-inflammatory drug (NSAID). These include ibuprofen (Advil, Motrin) or naproxen (Aleve). Avoiding activities that cause pain and swelling. Especially avoid those that involve repetitive hand and wrist motions. Wearing a splint 24 hours a day for 4 to 6 weeks to rest your thumb and wrist. Getting injections of steroids or a local anesthetic (numbing medicine) into the tendon sheath. These injections are very effective and are used regularly. A physical therapist or occupational therapist can show you how to change the way you move. This can reduce stress on your wrist. He or she can also teach you exercises to strengthen your muscles. Most people notice improvement after 4 to 6 weeks of treatment. They are able to use their hands and wrists without pain once the swelling is gone. You might need surgery if your case is severe or if other treatments don't relieve your pain. During outpatient surgery, the surgeon makes a small cut in the sheath around the swollen tendons. This provides more room for the tendons to move. After surgery, you will need to do physical therapy to strengthen your wrist and thumb. This will help keep the problem from coming back. Once the area has healed and returned to full strength, you should have normal use of your hand.

6. Conclusion

PRP injection is more effective then corticosteroid injection in improving pain, function and grip strength. So that is why recommend it as a first line treatment because it easy to push very effective for long term treatment. We believe that PRP injection should be offered to all patients with de Quervain's disease after failure of other conservative treatment. Further comparative studies with other type of injection or surgery are required to evaluate the long-term outcomes.

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