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INTRA-ARTICULAR INJECTION OF PLATELET RICH PLASMA IN KNEE OSTEOARTHRITIS CLINICAL EVALUATION

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ABSTRACT

Objective: A prospective study with a total of 20 patients with Grade 1 or 2 osteoarthritis (Kellgren and Lawrence). All patients was treated using intra-articular applications of autologous PRP Clinical outcome was evaluated using IKDC and WOMAC, before treatment and at 6 weeks, 3 months and 6 months after treatment The visual analog scale for pain and overall satisfaction with the procedure. The aim of this study was planned to evaluate intra articular injection of PRP on primary knee osteoarthritis which were refractory to conservative Treatment. **Methods:** This study is carried out on 20 patients suffering from primaryknee osteoarthritis grade1, grade2. This study was done during theperiod from August 2011 to September 2012 with follow up periodranged from 6 months to 12 months with average follow up period 9months.There were 14 female and 6 male patients. Their age rangebetween 35 and 55 years with average 44 years. While bilateral footaffection was in 7 patients in whom the more complaining side wasinjected. The period of complaint before operation varied between 1-5 years with average 2.3years.All patients were treated by intra articular injection of PRPafter failure of conservative treatment for at least three months. Thepost injection follow up period was nine months. This short termfollow up had no statistically significant effect on the final Outcome. **Results:** The clinical results were classified on subjective base and weregraded as Excellent in seven patients (35%), Good in eight patients (40%), Fair in two patients (10%) and poor in three patients (15%).The excellent and good results were considered as satisfactory, andthe unsatisfactory included the fair and the poor results. Thus, satisfactory results were found in 15 patients (75%), and theunsatisfactory ones were found in 5 patients (25%).The average age was 44 years. The highest incidence ofsatisfactory results was in the age group (below 40 years); whileresults were close in the other age groups. Age had statisticallysignificant effect

on the results. The study included 14 female and 6 male patients. Malepatients gave better results than female. A satisfactory result infemale was 71.4 % while in male it was 83.3%. Sex had nostatistically significant effect on the results. The period of complaint before operation varies between 1-5years withaverage 2.3 years. Period of complaint had statisticallysignificant effect on results. The best result was (satisfactory 100%)in patients complaining for less than three years while the worst wasin patients complaining for more than five years (unsatisfactoryin60%).There were 13 patients with unilateral complaint and 7patients with bilateral knee osteoarthritis. Best results were inunilateral cases (84.6% satisfactory) while in bilateral cases only57.1% showed satisfactory results. Laterality had significant effect onresults. The results of this study were discussed and compared with other studies. **Conclusion:** The preliminary short-term results of this study areencouraging and indicate that treatment with autologous PRP intraarticularinjections is safe, and may be useful for the treatment of early degenerative articular pathology of the knee, aiming to reducepain and improve knee function and quality of life. However, randomized controlled studies will be needed to confirm the realpotential and to evaluate the durability of this procedure, to betteridentify indication criteria and to improve application modalities. Further studies evaluating this new technique for treating cartilage degenerative pathology are in progress.

KEYWORDS: Knee Osteoarthritis, Intra-articular injection of Platelet Rich Plasma.

INTRODUCTION

The term “osteoarthritis” refers to a heterogeneous group of joint disorders, usually signaled by symptoms of pain and stiffness. It involves both destructive and reparative metabolic processes, with a variety of biochemical triggers in addition to mechanical injury of the joint.[1]

Osteoarthritis may be broadly categorized as primary (idiopathic) or secondary. According to the American Academy of Orthopedic Surgeons, primary OA of the knee can be defined as a process in which articular degeneration occurs in the absence of an obvious underlying abnormality.[2]

The symptoms of OA result from abnormal stresses on the weigh tbearing joints or normal stresses on weakened joints, becoming progressively worse and more frequent with age. The typical joints involved with osteoarthritis include the large, weight-bearing joints such as the hip and knee, as well as selected smaller joints in the hands, feet, and spine.[3]

Unfortunately, articular cartilage lesions, with their inherent limited healing potential, are hard to treat and remain a Challenging problem for orthopedic surgeons. A variety of agents, such as non-steroidal anti-inflammatory drugs, glucosamine, chondroitin-sulphate, hyaluronic acid, and glucocorticoids have been proposed as non invasive solutions for pain treatment, improvement in function, and disability, and ultimately modification of severe chondral degeneration and osteoarthritis with varying success rates.[4]

In particular, the most recent knowledge regarding tissue biology highlights a complex regulation of growth factor for the normal tissue structure and the reaction to tissue damage. The influence of the growth factors in cartilage repair is now being widely investigated in vitro and in vivo.[5]

Platelet-rich plasma (PRP) is a natural concentrate of autologous growth factors from the blood. The method is simple, low cost, and minimallyinvasive. Currently, a wide range of experiments is taking place in different fields of medicine in order to test the potential of enhancing tissueregeneration.[6]

Autologous PRP is a volume of plasma having a platelet concentration above normative baseline values.[7] Depending on the methodused to process the PRP, it may also contain white blood cell concentrationsabove baseline values.[8] Platelets were thought to act solely in the clottingprocess. However, in addition to local hemostasis at sites of vascular injury, platelets contain an abundance of growth factors and cytokines that arecrucial in soft tissue healing and bone mineralization.[9] At present, there are limited studies documenting the safety andefficacy of anon surgical PRP injectable for intraarticular use in knee OA.

PRP therapy provides delivery of a highly concentrated cocktail of growthfactors to accelerate healing. Transforming growth factor present in PRP hasbeen associated with chondrogenesis in cartilage repair.[10]

PRP amplification of chondrocyte proliferation with convincingclinical effects on degenerative knee cartilage.[11] It was recentlydemonstrated that PRP increased hyaluronic acid concentration, stabilizingangiogenesis in ten patients with osteoarthritis knees.[12] PRP encouragedchondrogenesis as an injectable scaffold. Hard knobbles were found and seen on magnetic resonance imaging, as well as histological investigation andstaining, which confirmed cartilage cultivation.[13]

A retrospective study demonstrated that intraoperatively administrationof PRP to a reconstructed joint was associated with fewer transfusions, shorter hospitalization, and greater knee range of motion, no infections, anddecreased narcotic requirements.[14]

Multiple studies have reproduced similar findings with PRP usedintraoperatively during total knee arthroplasties.[15] we hypothesized thatintraarticular administration of PRP would improve function and decreasepain in patients suffering with knee OA. It is unknown whether PRP iscapable of inducing cartilage synthesis.

PATIENT AND METHODS

This study is carried out on 20 patients suffering from primaryknee osteo arthritis grade1, grade 2.

Duration of study: This study was done during the period fromAugust 2011 to septemper 2012 with follow up period ranged from 6months to 12 months with average follow up period 9 months.

Inclusion criteria

The patients included to this study were those suffering from:

1- Primary knee osteoarthritis with history of chronic painwith or with out swelling with imaging study of grade I and grade IIwith degenerative knee changes.
2- Patients not improved with medical treatment andphysiotherapy for 3 months.
3- Body mass index on this study ranged from 18.5 to 27.5 kg per m.

Exclusion criteria

Patient excluded from this study were those suffering from:

1- Patient with secondary osteoarthritis
2- Patient with other diseases on knee.(degenerative lateral andmedial meniscus),rheumatoid arthritis.
3- Third and fourth grade of knee osteoarthrites.
4- History of steroid injection since 3months.
5- Blood disease as Thrombocytopenia (low platelet levels).
6- Patients Using blood thinners (aspirin, ibuprofen) or anticoagulanttherapy (warfarin/Coumadin, heparin, clopidogrel/Plavix, Aggrenox).
7- Active infection which associated with blood disorder.

8- Tumor and/or metastatic disease that may be associated with blooddisorder.
9- Pregnancy which associated with anemia.

Patient: - Age of patients: ranged between 35 and 55 years withmean average: 44 years old.
- Sex of patients: patients included in this study weredivided to 14 females and 6 males.

Laterality: Patients included in this study divided to 13patients with unilateral affection and seven patients withbilateral affection in whom one side only were injected.

There were seven patients with left side and 13 patients with right sided injection.

Method of diagnosis

All patients were subjected to history taking, clinicalexamination and radiological investigations with especial emphasizeon:

Personal history

-Name, Age, Sex, Occupation and History of trauma around knee.

Clinical examination

1- Each stage of the disorder has its own characteristicphysical findings. Knee pain is the leading symptom, usually becoming worse when the affected knee is put inmotion and improving when it is at rest. Persistent pain atrest, or at night, can be a sign of advanced osteoarthritis.
2- Knee swelling.
3- Limitation of movement

We make special tests like:
● testing of the lateral ligaments with varus or valgus stress, and
● testing of the anterior and posterior cruciate ligaments with thedrawer test.

Likewise, the menisci should be diagnostically tested manually, andthe femoropatellar joint should be assessed for signs of irritation andfor normal patellar mobility. In the Zohlen test, the patient's knee isextended, and the examiner gently presses the patella into thetrochlear groove while asking the patient to tense the extensormuscles of the thigh (quadriceps femoris). If this maneuver causespain, the test is positive. Limping revealed by gait analysis may bedue to shortening of one leg.

The diagnosis was established when one or more of thefollowing conditions were present: local pain, Pain at the beginningof movement, Limitation of range of movement Impairment ineveryday activities, Stiffness. The patients were classified accordingto pre -injection clinical condition into:

Grade I: Unlikely narrowing of the joint space, possibleosteophytes

Grade II: Identified small osteophytes, possible narrowing ofthe joint.

Investigation

- Imaging x-ray on knee on standing position
- MRI for some cases to exclude other disease on knee
- CBC including Platelet count to show number of platelet onblood and HB.

Methods of treatment

The treatment started by conservative treatment in the formof NSAIDs, chondrotine sulphate, glucosamine, and physiotherapyfor three monthes before shifting to injection treatment.

Injections treatment

The injection treatment was used for 20 cases after failureof the conservative methods. The injection treatment consists of:

Platelet-rich plasma preparation

Under complete aseptic technique a 450-ml venous bloodwas collected in a bag containing 60 ml of sodium citrate from everypatient treated. Then two centrifugations (the first at 1,800 rpm for 15min to separate erythrocytes, and the second at 3,500 rpm for 10 minto concentrate platelet) produced a unit of 20 ml of PRP. All theprocedures were performed in the same office setting. One unit (5ml) was sent to the laboratory for analysis of platelet concentration andquality tested (platelet count and bacteriological test), the remainingwas used for the first injection within 2 h. The total number ofplatelets per milliliter in the PRP represented a mean increase of600% compared with whole blood values, and an average of 6.8million platelets were given to affected knee at every injection. Thewhole procedure was repeated after two months for another set ofinjection. Before the injection, 10% of Ca chloride (Ca^{2+} = 0.22mEq x dose) was added to the prp unit to activate platelets

Treatment procedure and follow-up

The skin was sterilely dressed and the injection wasperformed through a classic lateral approach using a 22-g needle.

Method of follow up and evaluation

At the end of the procedure, the patient was asked tobend and extend the knee a few times, to allow the PRP to distributeitself throughout the joint before becoming gel After the injection,the patients were sent home with instructions to limit the use of theleg for at least 24 h and to use cold therapy/ice on the affected area'for pain. During this period, the use of non-steroidal medication wasforbidden. During the treatment period, rest or mild activities (such asan exercise bike, mild exercises in pool) were indicated, andsubsequently the gradual resumption of normal sport or recreationalactivities was allowed as tolerated.

Clinical evaluation

All complications and adverse events were recorded. Patientswere prospectively clinically evaluated before the treatment, at theend of the treatment (2 months after the first injection) and at the 6and 12 month follow-ups. All results are presented as the number of knees (not the number ofindividuals). International knee documentation commitee score(IKDC), objective and subjective, were used in clinicalevaluation. The patient's satisfaction was also recorded. Post injection evaluation depended mainly on subjective criteria andgraded into:

- Excellent: patient completely satisfied;
- Good: patient Satisfied with minor complaint;
- Fair: patient satisfied with major complaint;
- Poor: patient unsatisfied.

Radiological evaluation: patients asked to make x-ray after 3monthsof injection and 6months and 9months. The changes present on xrayswere recoreded and compared with previous x-rays.

Method of statistically analysis

The data collected from this study work statiscally analysedusing the mean (average), standard deviation and t student test.ed with medica

RESULTS

The present study included 20 patients suffering fromprimary osteoarthritis grade1, grade 2, conservative treatment wastried for all patients for three months. Five patients improved byconservative treatment and the remaining 20 patients underwentplatlete rich plasma injection treatment and follow up for six months.

Clinical results

No major adverse events related to the injections wereobserved during the treatment and follow-up period. In only twocases, patients presented a marked pain response with swelling afterthe injection, which spontaneously resolved itself after 2 weeks. Insome cases, slight pain was present during first 2 or 3 days.At the end of follow up seven patient had excellent results,eight patients had good results, two patients had fair results and threepatients showed poor results The mean IKDC score passedfrom 59.42 % before injection to 76.15% ranged from 64.48% after3 months To 70.71% after 6 months To 76.15 after 9 months.A statistically significant improvement of all clinical scoreswas obtained from the basal evaluation, The difference was found tobe statistically significant (P value = 0.0001).

RESULTS

Post injection results according to IKDC score after 3 months:

Changes occur on IKDC score after injection of PRP on knee osteoarthritis after 3 months is not significant (Table5).

Table5

Score	Before injection	After injection
Mean	59.425	64.485
Stdev	7.375769	9.360009
T test	P value = 0.065614	

Post injection results according to IKDC score after 6 months

Changes occur on IKDC score after injection of PRP on knee after 6 months is significant (Table 6).

Table6:

Score	Before injection	After injection
Mean	59.425	70.71
Stdev	7.375769	12.6121
T test	P value = 0.00162	

Post injection results according to IKDC score after 9 months

Changes occur on IKDC score after injection of PRP on knee after 9 months is high significant (Table7).

Table7:.

Score	Before injection	After injection
Mean	59.425	76.15
Stdev	7.375769	15.24728
T test	P value = 0.000146	

Relation between pre injections grading and post injection results according to IKDC score

At the end of follow up all patients with gradeI knee osteoarthritis had satisfactory IKDC score after PRP injection. While six patient (55%) with gradeII knee osteoarthritis had satisfactory IKDC score after PRP injection (Table8).

Table8: Post injection results according to grading.

	Satisfactory		Unsatisfactory		
	Excellent	Good	Fair	Poor	Total
Grade I	4 (44%)	5 (56%)	0 (0%)	0 (0%)	9 (45%)
Grade II	3 (28%)	3 (27%)	2 (18%)	3 (27%)	11 (55%)
Total	7(35%)	8(40%)	2(10%)	3(15%)	20(100%)

Relation between age of the patient and the post injection results

At the end of follow up all patients below 40 years old had satisfactory IKDC functional results after PRP injection. While only two out of five patients above 50 years old had satisfactory IKDC score after PRP injection (Table 9).

Table 9 : Post injection results according to age .

	Satisfactory		Unsatisfactory		
	Excellent	Good	Fair	Poor	Total
<40 years	5(62%)	3 (38%)	0 (0%)	0(0%)	8 (40%)
40 – 50y	2(28%)	3(43%)	2 (29%)	0 (0%)	7(35%)
>50 years	0 (0%)	2 (40%)	0 (0%)	3 (60%)	5 (25%)
Total	7(35%)	8(40%)	2(10%)	3(15%)	20(100%)

Relation between period of complaint and post injection results

At the end of follow up all patients complaining of knee osteoarthritis less than 3 years had satisfactory IKDC functional results after PRP injection. While only two out of five patients complaining more than 5 years had satisfactory IKDC score after PRP injection (Table10).

Table 10 : Post injection results according to duration of complaint .

	Satisfactory		Unsatisfactory		
	Excellent	Good	Fair	Poor	Total
<3y.	4 (50%)	4 (50%)	0 (0%)	0 (0%)	8 (40%)
3 – 5y.	3 (42.8%)	2 (28.6%)	1 (14.3)	1 (14.3)	7 (35%)
>5y.	0 (0%)	2 (40%)	1 (20%)	2 (40%)	5 (25%)
Total	7(35%)	8(40%)	2(10%)	3(15%)	20(100%)

Changes in knee pain after injection of PRP

At the end of follow up all patients that had mild knee pain had satisfactory IKDC functional results after PRP injection. While only three out of six patients complaining from severe pain had satisfactory IKDC score after PRP injection (Table11).

Table 11 : post injection results according to pain

	Satisfactory		Unsatisfactory		
	Excellent	Good	Fair	Poor	Total
Mild pain	4 (50%)	4 (50%)	0 (0%)	0 (0%)	8 (40%)
Moderate pain	3 (50%)	1 (16.67%)	1 (16.67%)	1 (16.67%)	6 (30%)
Severe pain	0 (0%)	3 (50%)	1 (16.7%)	2 (33.3%)	6 (30%)
Total	7(35%)	8(40%)	2(10%)	3(15%)	20(100%)

Changes in patient activity post injection of PRP

At the end of follow up all patients who's were able to practice sternous activity had satisfactory IKDC functional results after PRP injection. While only four out of seven patients who's couldn't able to mild activity had satisfactory IKDC score after PRP injection.

Table 12 : post injection results according to activity of patient .

	Satisfactory		Unsatisfactory		
	Excellent	Good	Fair	Poor	Total
Sternous activity	4 (57.15%)	3 (42.85%)	0 (0%)	0 (0%)	7 (35%)
Moderate activity	2 (33.3%)	2 (33.3%)	1 (16.7%)	1 (16.7%)	6 (30%)
Mild activity	1 (14.2%)	3 (43.2%)	1 (14.2%)	2 (28.4%)	7 (35%)
Total	7(35%)	8(40%)	2(10%)	3(15%)	20(100%)

Relation between the sex of the patient and the post injection results

At the end of follow up five male patients of six had satisfactory IKDC functional results after PRP injection. While ten female patients out of fourteen patients had satisfactory IKDC score after PRP injection. The satisfactory results were 71.4% in female patients while it was 83.3% among male patients, the difference was found to be satistically insignificant (Table.13).

Relation between the laterality of the complaint and the post injection results

At the end of follow up four patients with bilateral knee osteoarthritis out of seven (57.1%) had satisfactory IKDC functional results after PRP injection. While eleven patients with unilateral out of thirteen patients had satisfactory IKDC score after PRP injection with percentage (84.6%). (Table 14).

Table 14: post injection results according to laterality .

	Satisfactory		Unsatisfactory		
	Excellent	Good	Fair	Poor	Total
Bilateral	2(28.57%)	2(28.57%)	2(28.57%)	1(14.29%)	7 (35%)
Unilateral	5(38.5%)	6(46.2%)	(0%)	2(15.3%)	13(65%)
Total	7(35%)	8(40%)	2(10%)	3(15%)	20(100%)

Relation between the side of injection and the post inject results

There were 13 patients with unilateral affection and seven patients with bilateral affection in whom one side only were injected. There were seven patients with left side and 13 patients with right sided injecction.

Table 15: post injection results according to side of injection.

	Satisfactory		Unsatisfactory		
	Excellent	Good	Fair	Poor	No.of p.
Right	4(30.8%)	5(38.5%)	1(7.69%)	3(23.01%)	13(65%)
Left	3(42.8%)	3(42.8%)	1(14.4%)	0(0%)	7(35%)
No. of p.	7(35%)	8(40%)	2(10%)	3(15%)	20(100%)

Relation between the body weight and the post injection results

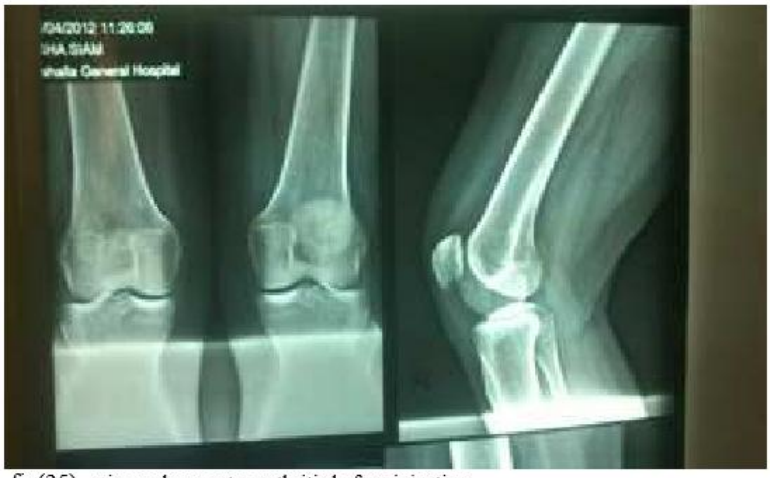
At the end of follow up all patients less than 70 kg had satisfactory IKDC functional results (100%) after PRP injection, while nine patients between (70-90 kg) had satisfactory IKDC functional results with percentage 75% after PRP injection, and One patient out of three more than 90 kg had satisfactory IKDC functional results (table 16).

Table 16: post injection results according to body weight .

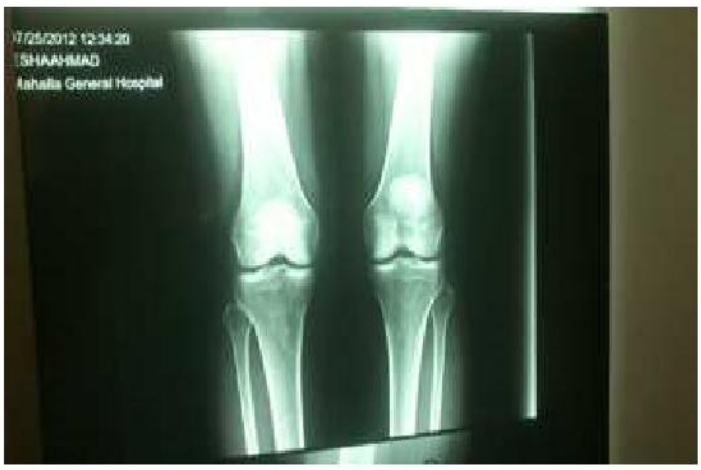
	Satisfactory		Unsatisfactory		
Body wieght	Excellent	Good	Fair	Poor	Total
<70 kg	2(40%)	3(60%)	0(0.0%)	0 (0.0%)	5(25%)
70-90 kg	5(41.6%)	4(33.3%)	2(16.67%)	1 (8.3%)	12(60%)
>90 kg	0	1(33.3%)	0(0%)	2(66.7%)	3(15%)
Total	7(35%)	8(40%)	2(10%)	3(15%)	20(100%)

Radiological changes after 9 months post injection of PRP

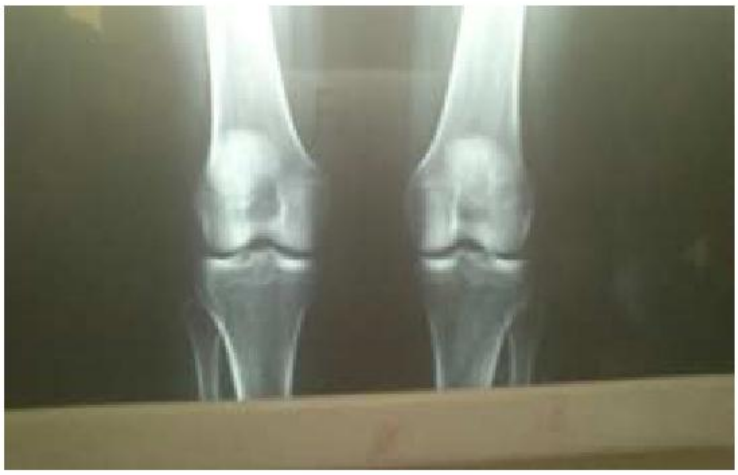
At the end of follow up there was no obvious changes on xray.



fig(25) primary knee osteo arthritis before injection.



fig(26) primary knee osteo arthritis 3 months post injection.



fig(27) primary knee osteo arthritis 9 months post injection

	G.	Period of comp.	side	Age &sex	History finding	Other abnormalities and previous treatments	Clinical result
1	I	1y	R	M.35	Pain on movement	No other abnormality .	Good
2	II	5y	L	M.35	Pain ,swelling And limitationof movement	Previous treatment by chondrortine sulphate.	Poor
3	II	1y	L	F. 37	Obese patient with mild varus deformity.	Previous treatment by NSAID .	Excellent
4	II	3y	R	F. 39	Swelling,stiffness,limitation of movement.	Previous treatment by NSAID,chondrortine sulphate	Excellent
5	I	6y	B	M. 55	Effusion of knee and stiffness.	Previous treatment by chondrortine sulphate.	Good
6	I	2y	L	F. 38	Just pain on go up stairs.	History of back pain treated with medical treatment and physiotherapy.	Excellent
7	II	2y	R	F. 42	Obese patient with swelling and pain on movement.	Previous treatment by NSAID,chondrortine sulphate	Good
8	II	3y	B	F. 51	Just pain on movement.	Nothing.	Good
9	I	1y	R	M. 38	Pain and swelling.	Nothing .	Excellent
10	I	6y	R	F.36	Pain on movement	Nothing .	Excellent
11	II	5y	B	F.55	Swelling,stiffness,limitation of movement..	Previous treatment by NSAID,chondrortin	Poor

						e sulphate and HLA injection.	
12	I	2.5y	B	M. 53	Just pain on go up stairs.	History of back pain treated with medical treatment anphysiotherapy.	good
13	II	2y	R	M. 43	Pain on movement .	No other abnormality	Excellent
14	II	6y	B	F. 53	Effusion of knee and stiffness.	Previous treatment by chondrortine sulphate and physiotherapy.	Fair
15	I	4y	R	F. 46	Pain on movement.	Previous treatment by NSAID,chondrortin e sulphate	Good
16	II	3y	R	F.38	Pain on movement	No other abnormality	Good
17	I	1y	L	F. 45	Swelling , pain on movement,stiff ness.	Previous treatment by chondrortine sulphate.	Excellent
18	II	7y	B	F.41	Pain on movement.	History of back pain treated with medical treatment	Fair
19	I	4y	B	F.44	Effusion and limitation of movement .	Back pain and disc prolapse.	Good
20	II	8Y	R	F.43	Obese patient with mild varus deformity.	Previous treatment by NSAID,chondrortin e sulphate	poor

DISCUSSION

Platelet-rich plasma (PRP) is a natural concentrate of autologous growth factors from the blood. The method is simple, low cost, and minimally invasive. Currently, a wide range of researchs is taking place in different fields of medicine in order to test the potential of enhancing tissue regeneration.[6] Autologous PRP is a volume of plasma having a platelet concentration above normative baseline values.[7] Depending on the method used to process the PRP, it may also contain white blood cell concentrations above baseline values.[8] Platelets were thought to act solely in the clotting process. However,in addition to local hemostasis at sites of vascular injury, platelets contain an abundance of growth factors and cytokines that are crucial in soft tissue healing and bone mineralization.[9]

This study tries to spot light on intra articular PRP injection of primary knee osteoarthritis showing its advantage and disadvantage. In primary osteoarthritis grade1, gradeII, conservative treatment was tried for all patients for three months. Five patients improved by conservative treatment and the remaining 20 patients underwent platlete rich plasma injection treatment and follow up for at least six months. The exclusion criteria in this study are patients with secondary osteoarthritis, 3rd and 4th grade of knee osteoarthritis, history of steroid injection, blood disease as Thrombocytopenia (low platelet levels). These exclusion criteria were close to criteria chosen by kon et al (2010),[20] Sampson,et al(2010),[17] and Sanchez,et al (2008)[21] in their studies about knee osteoarthritis. Intra-articular injection of autologous PRP has been increasingly implemented on patients with osteoarthritis and currently seems to be considered as one of the treatment options for osteoarthritis. Most of the studies on autologous PRP injection have been focused on the reduction of pain and improvement of function over time In the study done by Sampson et al.[17] Fourteen patients with primary or secondary OA were enrolled in the study 61.5% of patients satisfied after PRP injection at one year follow up.. Twelve of the fourteen patients were men. Seven of the fourteen patients had treatment on their right knee. One patient lost on follow up. Eight of the 13 patients indicated that they had achieved their individual goal with the injection. Eight of the 13 patients indicated that the injected knee had improved, 3 of the 13 patients indicated that the injected knee had stayed the same, and 2 of the 13 patients indicated that the injected knee had gotten worse, and the pain was no longer tolerable.

Wang-Saegusa et al.[18] reported improvement of EQ_Visual analogue scale (EQ_VAS) and Western Ontario and McMaster Universities (WOMAC) scores at the 6-month follow-up in 261 patients with OA symptoms more than 3 months who had 3 intraarticular injection of autologous PRP at 2-week intervals. An improvement was documented in 192 of 261 patients with percentage 73.5% of patients and 71 of 261 patients with percentage 26.5 % had worse results. Filardo et al.[19] reported that 3 injections of intra-articular PRP in (72 of 90) of the patients with percentage 80% with chronic knee degenerative conditions revealed improvement in Internatioal.

Knee Documentaion Comitee (IKDC) and EQ-VAS scores at the 2- year follow-up and that it had discernible positive effects especially on younger patients with early osteoarthritis in The IKDC objective score increased from 47% of normal and nearly normal knees before the treatment to 78% at the end, then to 73 and 67% at the 6- and 12- month follow-ups,

respectively, showing a statistically significant improvement (P<0.0005) at all these follow-up times with respect to the basal level Kon et al 2010 (20)reported that intra-articular PRP injection in 100 patients with chronic degenerative condition of the knee had positive effects on improving pain and quality life and on the scores of IKDC and EQ-VAS at the 1-year follow-up. 80% percent (73 of 91) of patients were satisfied with their treatment Results. The IKDC objective score changed from 46.1% of normal and nearly normal knees before the treatment to 78.3% of normal and nearly normal knees at the end of the therapy. A statistically significant improvement of all clinical scores was obtained from the basal evaluation,The difference was found to be statistically significant (P value = 0.0005) ranged from 0.049 to 0.0005 at end of treatment. While analyzing older patients (> 65 years) affected by advanced osteoarthritis separately, this study found a significant improvement in the IKDC subjective evaluation in only 30 % of the cases (three of ten patients). Further analysis showed worse results were shown in women (P < 0.0005) in the subjective evaluation, and a significantly lower improvement at the 2 months follow-up in patients with higher body mass index (BMI) P = 0.045. Kon et al 2011[21] divided 150 patients with knee cartilage degenerative lesions or osteoarthritis into 3 groups, those treated with injections of autologous PRP (n=50), low hyaluronic acid concentration (n=50), and high hyaluronic acid concentration (n=50) and compared scores of IKDC and EQ-VAS among the groups at the 2-month and 6-month follow-up respectively. It was reported that the group with injection of autologous PRP had better outcomes in aspects of pain reduction and recovery of articular function. Spakova et al.[22] reported a comparison study of PRP vs. hyaluronic acid in Kellgren-Lawrence grade 1, 2, or 3 osteoarthritis patients with better result in PRP group. The authors concluded that their preliminary findings supported the application of autologous PRP as an effective and safe method in the treatment of the initial stages of knee osteoarthritis and further studies were necessary to confirm these results and to investigate the persistence of the beneficial effects observed.

Gobbi et al.[23] All patients showed significant improvement in all scores at 6 and 12 months (P < 0.01),(P< 0.001.) and returned to previous activities, including recreational sports. No adverse reactions (eg, swelling or acute pain) or any major complications (eg, infection) were noted. The IKDC objective score changed from 48.2± 3.5 of normal and nearly normal knees before the treatment to 75.4± 3.4 of normal and nearly normal knees at the end of the therapy. In the present study seven patients had excellent results, eight patients had good results, two patients had fair results and three patients showed poor results. Excellent and good are

considered satisfactory (75% of cases) while fair and poor are considered unsatisfactory (25% of cases). Kon study[20] results were had satisfactory improvement on 73 of 91 patients in pecentage 85% and Gobbi et al.[23] results were had satisfactory improvement on all patients. This difference in results can be explained by large count of patients on kon study and Gobbi et al.

In the present study the average age was 44 years old varying from 35 to 55 years. This age was associated with higher incidence of knee osteoarthritis, 100% of patients less than 40 years had satisfactory results and 60% of patient between 40 – 55 years had poor results. Kon et al 2010 reported that their patients age ranged between 20-80 years old with mean age 47 years. Seventy patients of 81 with percentage 86.5% below 65years had satisfactory results and 3 of 10 with percentage 30% above 65 years had poor results, Sampaon et al reported that their patients age ranged between 18 – 87 years, with a mean of 51.8 years, Filorado et al reported that their patients age ranged between 24-80 yrs, with a mean of 50 yrs. and has better results on younger patients according to IKDC patients below 35 years had 65% statiscally improvement while patients above 55 years had 50 % statiscally improvement. In the present study the mean IKDC score was 59.42 % before injection and 76.15% after injection. IKDC score is score that measure the patient activity, pain and range of movement. this scores was close to that the results obtained by Kon study[20] IKDC objective score changed from 46.1% to78.3%, Gobbi et al.[23] IKDC objective score changed from 48.2 to 75.4% and Filardo et al.[16] IKDC objective score changed from 50.2 to 70.3%. In the present study a statistically significant improvement of all clinical scores was obtained from the basal evaluation, The difference was found to be statistically significant (p value = 0.0001) ranged from (p=0.065) after 3 months to (P=0.001) after 6 months to (p=0.0001) after 9 months. These evaluation was close p value on Kon study[16] (p value < 0.0005), Gobbi et al.[23] (p < 0.01) and Filardo et al (p value < 0.0005).

In this work, there were 14 female patients and 6 male patients with ratio 2.33: 1. The satisfactory results were 71.4% in female patients while it was 83.3% among male patients. In Sampson S et al.[104] study; there were 12 male and 2 female with ratio 1: 6. The improvement was 100% among female while it was 72.7% among male patrients. In the study of Filardo et al.[19] there were 33 female patients and 57 male patients with ratio 1: 1.73. The worst results were obtained from women in the subjective evaluation 56% of patients (P = 0.0002). while on Gobbi et al study[23] there were 31 male and 19 female with ratio 1: 2. No

significant difference in improvement between men and women. In Egypt there is higher incidience of osteo arthritis in females than males.

The weight of patients on this study ranged from 70 kg to more than 90 kg body mass index on this study ranged from 18.5 to 27.5 kg per m. The best result was in patients body weight < 90 kg and satisfactory percentage declines with increased weight > 90kg.

This result is close to that by Sampson S et al.[104] The average (standard deviation) body mass index for participants was 25.0 kg/m2, with a range of 20.9 –32.5 kg/m2., Gobbi et al.[23] the mean body mass index was 26.2 (ranging from 18 to 32). Filardo et al.[19]

The mean BMI was 25 ± 3 (range 18–32) and Kon study[20] The mean BMI was 25 ± 3 (ranging from 18 to 32). This is can be explained the large body mass index the less statiscally improvement as the large body weight is the important risk factor on knee osteo arthritis as it was causing degeneration of cartilage.

SUMMARY

The aim of this study was planned to evaluate intra articular injection of PRP on primary knee osteo arthritis which were refractory to conservative treatment. This study is carried out on 20 patients suffering from primary knee osteo arthritis grade1, grade2. This study was done during the period from August 2011 to septemper 2012 with follow up period ranged from 6 months to 12 months with average follow up period 9 months.

There were 14 female and 6 male patients. Their age range between 35 and 55 years with average 44 years. while bilateral foot affection was in 7 patients in whom the more complaining side was injected. The period of complaint before operation varied between 1-5 years with average 2.3years. All patients were treated by intra articular injection of PRP after failure of conservative treatment for at least three months. The post injection follow up period was nine months. This short term follow up had no statistically significant effect on the final outcome. The clinical results were classified on subjective base and were graded as Excellent in seven patients (35%), Good in eight patients (40%), Fair in two patients (10%) and poor in three patients (15%). The excellent and good results were considered as satisfactory, and the unsatisfactory included the fair and the poor results. Thus, satisfactory results were found in 15 patients (75%), and the unsatisfactory ones were found in 5 patients (25%). The average age was 44 years. The highest incidence of satisfactory results was in the age group (below

40 years); while results were close in the other age groups. Age had statistically significant effect on the results. The study included 14 female and 6 male patients. Male patients gave better results than female. A satisfactory result in female was 71.4 % while in male it was 83.3%. Sex had no statistically significant effect on the results.

The period of complaint before operation varies between 1-5 years withaverage 2.3 years. Period of complaint had statistically significant effect on results. The best result was (satisfactory 100%) in patients complaining for less than three years while the worst was in patients complaining for more than five years (unsatisfactory in60%).

There were 13 patients with unilateral complaint and 7 patients with bilateral knee osteo arthritis. Best results were in unilateral cases (84.6% satisfactory) while in bilateral cases only 57.1% showed satisfactory results. Laterality had significant effect on results. The results of this study were discussed and compared with other studies.

CONCLUSION

The preliminary short-term results of this study are encouraging and indicate that treatment with autologous PRP intraarticular injections is safe, and may be useful for the treatment of early degenerative articular pathology of the knee, aiming to reduce pain and improve knee function and quality of life. However, randomized controlled studies will be needed to confirm the real potential and to evaluate the durability of this procedure, to better identify indication criteria and to improve application modalities.

Further studies evaluating this new technique for treating cartilage degenerative pathology are in progress.

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