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Comparative Analysis Between Proximal Fibular Osteotomy And PRP Injection In Medial Compartment Osteoarthritis Knee Patients

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Abstract:
Introduction: *Osteoarthritis (OA) is a slowly progressive, chronic degenerative disease that is characterized with varying degrees of joint cartilage loss with local inflammation and peri-articular bone rebuild.The progression of cartilage lesions manifests with pain, stiffness, swelling, decreased joint range of motion while significantly affecting the quality of life.Osteoarthritis is the most common cause of disability in the older population. Disability is caused by pain and limitations in mobility.Patients resistant to topical and oral pharmacological treatments can benefit from intra-articular injections platelet rich plasma (PRP) and surgical techniques like Proximal Fibular Osteotomy (PFO), High Tibial Osteotomy (HTO) and Total Knee Replacement (TKR).*
Aims & Objectives: *The aim of the study is to assess the comparative analysis between proximal fibular osteotomy and PRP injection in medial compartment osteoarthritis knee patients.*
Materials and Methods: *The proposed study was conducted in the department of orthopaedics, Santosh Medical College Hospital, Ghaziabad. Total 38 patients (n=38; mean age, 62.86 +_ 7.84 years; age range, 49-75 years) with medial Compartment Osteoarthritis knee were included in the study (22 females and 16 males) conducted at our institute between April 2017 to March 2018and were retrospectively assessed. Patients diagnosed with Medial Compartment OA Knee were randomly divided into 2 treatment groups, Group Awith patients who underwent Proximal Fibular Osteotomy (PFO) and Group B with patients in whomPRP with 2% Xylocaine was administered.*
Results: *Group A (PFO) patients got better symptomatic relief at 4^{th} and 8^{th} week whereas in Group B (PRP)patients were better symptomatically better at 16^{th} and 20^{th} week post-operatively. Group B patients who were treated with PRP with 2% Xylocaine for medial compartment OA knee showed better results atlonger duration of follow-up in terms of pain, stiffness and ADL (Activities of daily living) at 16^{th} week (4^{th} month) and 20^{th} week (5^{th} month).*
Conclusion: *The hypothesis of this study was that PRP reduces pain and leads to a more effective and lasting functional recovery compared with Proximal Fibular Osteotomy (PFO). Our objective was to compare the efficacy of PRP IAI for relieving pain and improving knee function during late-stage OA with Proximal Fibular Osteotomy (PFO).*

Key Words:*Medial Compartment Osteoarthritis Knee,PFO, PRP Injection, VAS, WOMAC, OKS*

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I. Introduction

Osteoarthritis (OA) is a slowly progressive, chronic degenerative disease that is characterized with varying degrees of joint cartilage loss with local inflammation and periarticular bone rebuild[1].The progression of cartilage lesions manifests with pain, stiffness, swelling, decreased joint range of motion while significantly affecting the quality of life. Treatment is focused on reducing symptoms and slowing the progression of the disease. It includes physical therapy modalities, orthoses, pharmacological treatments, and surgical interventions. Patients resistant to topical and oral pharmacological treatments can benefit from intra-articular injections platelet rich plasma (PRP)[2].Osteoarthritis is the most common cause of disability in the older population[2, 3]. Disability is caused by pain and limitations in mobility[4]. Many surgical procedures are availablelikeTotal knee arthroplasty (TKA), High Tibial Osteotomy (HTO) and Proximal Fibular Osteotomy (PFO). Proximal Fibular Osteotomy is simple, safe and affordable, Pain relief after surgery occurs in almost all patients[5]. PFO may delay or replace TKA in a subpopulation of patients with knee osteoarthritis. In the present study, we carefully evaluated the efficacy of PFO and PRP with 2% Xylocaine in terms of pain relief and improvement of joint function[6].

II. Materials and Methods

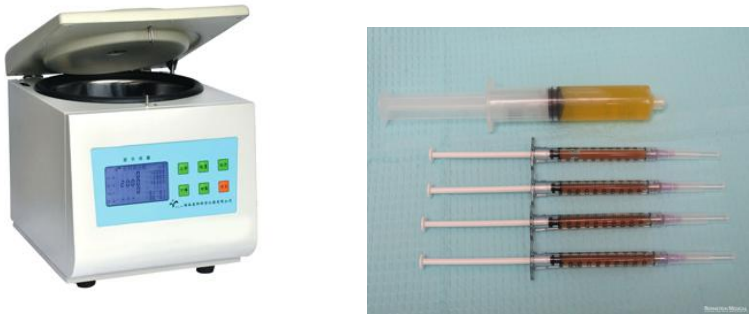
Total 38 patients (n=38; mean age, 62.86 +_ 7.84 years; age range, 49-75 years) with medial Compartment Osteoarthritis knee were included in the study (22 females and 16 males) conducted at our institute between April 2017 to March 2018 and were retrospectively studied.The diagnosis of osteoarthritis was made by a clinician according to the American College of Rheumatology criteria[7].38 Patients diagnosed with Medial Compartment OA Knee were randomly divided into 2 treatment groups, Group A with patients who underwent Proximal Fibular Osteotomy (PFO) and Group B with patients in whomPRP with 2% Xylocaine was administered.

Inclusion Criteria

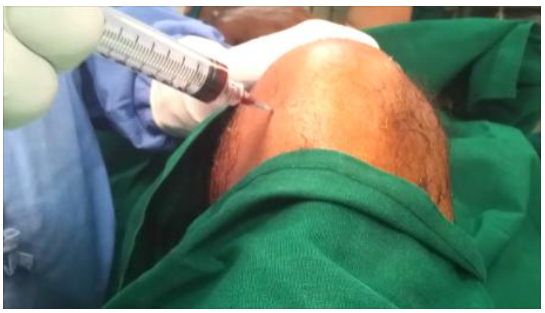
Inclusion criteria included patients with moderate to severe symptomatic medial compartment OA of the knee, who had an indication for a surgical procedure, and who were able to give informed consent for the surgery[8, 9, 10].

Exclusion Criteria

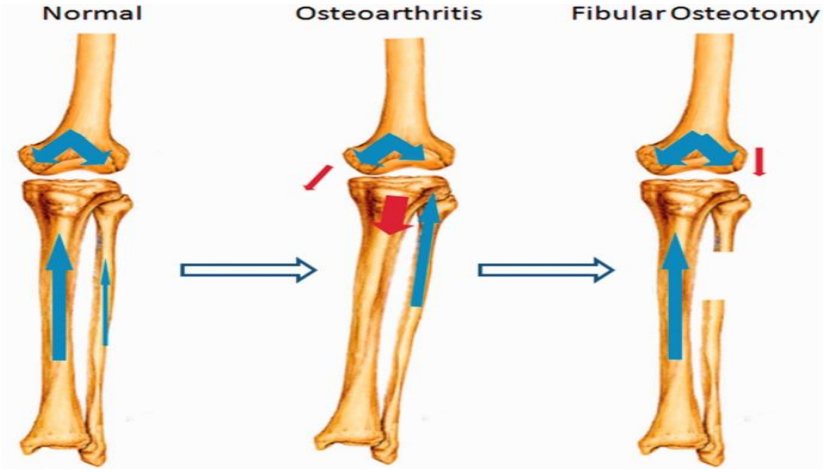
The exclusion criteria were genu valgus, acute major trauma, inflammatory joint disease, malignant tumours, and abnormal renal or liver function.Secondary OA, usage of more than three months of corticosteroids, skin lesions on the knee joint, presence of anemia or thrombocytopenia (hemoglobin<12 gr/dL, platelet <150000K/μL), diagnosis of immune suppression or collagen connective tissue disease, previous knee surgery, or intra-articular injection in last six months, diagnosis of symptomatic hip or foot-ankle OA, presence of severe chronic illness, or poor general health status (heart failure, chronic bronchitis, etc.).



A)Platelet Rich Plasma after centrifugation



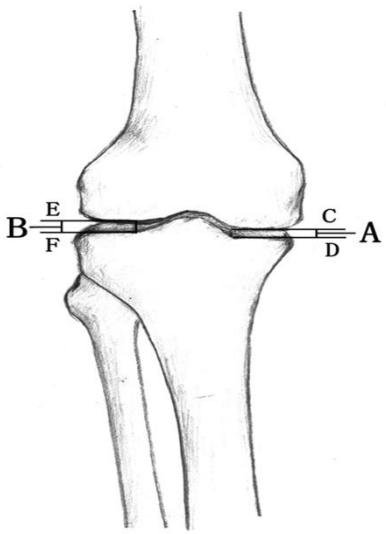
B) Knee Intra-articular infiltration



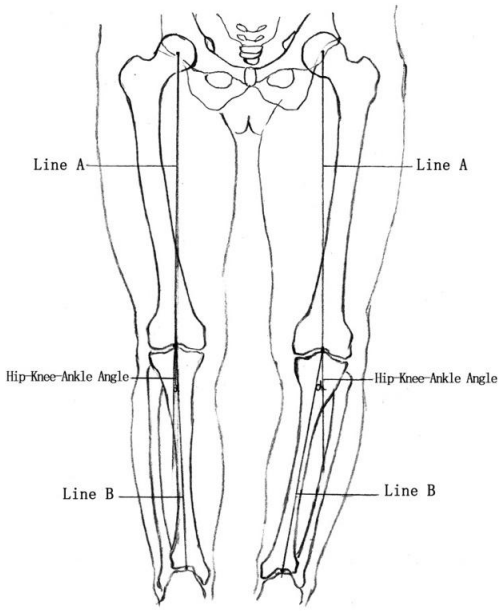
Surgical Procedure

The patients were placed in the supine position after administration of anaesthesia. An approximately 5-cm longitudinal incision was made over the lateral skin of the proximal fibula, and the fibula was exposed between the peroneus muscle and soleus muscle. PFO was performed by removing a 2- to 3-cm length of fibula at a site 6 to 10 cm from the caput fibulae. Full weight bearing and free mobilization were allowed postoperatively[11].

Preoperative and postoperative weight-bearing and whole lower extremity radiographs were obtained in all patients to analyse the alignment of the lower extremity and the ratio of knee joint space (medial/lateral compartment)[12].Briefly, the medial joint space was determined by a vertical line (A) between two horizontal lines (C and D) that were drawn from the lowest point of the medial condyle of the femur and medial plateau of the tibia, respectively. The lateral joint space was determined by a vertical line (B) between two horizontal lines (E and F) that were drawn from the lowest point of the lateral condyle of the femur and lateral plateau of the tibia, respectively. The ratio of the knee joint space (medial/lateral) was determined by the ratio of A/B. The hip-knee-ankle angle was measured based on the whole lower extremity radiograph. Line A was drawn from the centre of the femur to the centre of the knee, and line B was drawn from the centre of the knee to the centre of the ankle. The hip-knee-ankle angle was the intersection angle α between lines A and B. Data collection and assessment were performed by two independent observers who were not involved in the surgery.



Measurement of ratio of knee joint space.The medial joint space was determined by a vertical line (A) between two horizontal lines (C and D) that were drawn from the lowest point of the medial condyle of the femur and medial plateau of the tibia, respectively. The lateral joint space was determined by a vertical line (B) between two horizontal lines (E and F) that were drawn from the lowest point of the lateral condyle of the femur and lateral plateau of the tibia, respectively. The ratio of the knee joint space (medial/lateral) was determined by the ratio of A/B.



Measurement of the hip-knee-ankle angle. Line A was drawn from the centre of the femur to the centre of the knee, and line B was drawn from the centre of the knee to the centre of the ankle. The hip-knee-ankle angle is the intersection angle α between lines A and B.

Knee pain was assessed using a visual analogue scale. Knee ambulation activities were recorded using the knee and function subscores of the American Knee Society score preoperatively and at 4 weeks, 8 weeks, 16 weeks and 20 weeks postoperatively.Peripheral venous blood (18 mL) was collected with 18 gauge (G) needle under aseptic conditions from the patients in the PRP groups to an injector containing 2 mL citrate dextrose. Collected blood was transferred to the kit. The PRP kit was equilibrated with another kit of the same weight and centrifuged for five minutes at 3.600 rpm. Whole blood in the kit was separated as plasma on top, buffy coat containing platelets and leucocytes in the middle and as erythrocytes at the bottom. Before the study, a platelet count was conducted with thrombocyte rich plasma sample, obtained from the same commercial kit in our biochemistry laboratory. PRP's platelet levels were compared with levels of the peripheral blood. The platelet count was 232 10^9 L and white blood cell count was 7.85 10^9 L before centrifugation. After centrifugation, the platelet count was 862 10^9 L and white blood cell count was 8.47.All patients were treated with intra-articular injection with supra-patellar approach. The same physician performed injections by using anatomical landmarks. The knee was immobilized for 10 minutes after the injection, and the patient was observed for an hour. All patients were recommended rest for 24-48 hours after discharge. In case of pain and swelling, superficial cold application for 10 minutes per hour was recommended. Patients were informed that their use of medications to prevent platelet aggregation during treatment might adversely affect treatment responses. When necessary, oral paracetamol was recommended (maximum 1.8 g/day). Before the treatment, all patients were taught quadriceps- strengthening exercises to perform 10 repeats per day in three sets. They were instructed to start a week after the application of treatment. All patients were evaluated with Visual Analogue Scale (VAS) and Western Ontario and McMaster Universities Arthritis Osteoarthritis Index (WOMAC) pain scale, WOMAC and Oxford Knee Score for stiffness in the knee joint[13].

SAMPLE SIZE

On the basis of pilot study, VAS score of PFO at 4^{th}, 8^{th}, 16^{th} and 20^{th} weeks was 3.8 ± .447, 3 ± .707, 2.8 ± .837 and 2.6 ± .548 respectively and of PRP was 5.4 ± .547, 4.4 ± .894, 1.8 ± .837 and 1.8 ± .837. Taking these values as reference, the minimum required sample size with 90% power of study and 5% level of significance is 17 patients in each study group. So total sample size taken is 19 (38 patients per group).

Formula used is:-

For comparing mean of two groups

$$N >= 2(\text{standard deviation})^2 * (Z_\alpha + Z_\beta)^2 / (\text{mean difference})^2$$

Where Z_α is value of Z at two sided alpha error of 5% and Z_β is value of Z at power of 80% and mean difference is difference in post intervention mean values of two groups.

Calculations:-

1) VAS score at 4^{th} week
Pooled standard deviation=square root((..447*.447+.547*.547)/2)=.499
$n>=(2*.499*.499*(1.96+1.28)^2)/(5.4-3.8)^2= 2.04=3$(approx.)
2) VAS score at 8^{th} week
Pooled standard deviation=square root((.707*.707+.894*.894)/2)=.806
$n>=(2*.806*.806*(1.96+1.28)^2)/(4.4-3)^2=6.96=7$(approx.)
3) VAS score at 16^{th} week
Pooled standard deviation=square root((.837*.837+.837*.837)/2)=.837
$n>=(2*.837*.837*(1.96+1.28)^2)/(2.8-1.8)^2=14.71=15$(approx.)
4) VAS score at 20^{th} week
Pooled standard deviation=square root((.837*.837+.548*.548)/2)=.707
$n>=(2*.707*.707*(1.96+1.28)^2)/(2.6-1.8)^2=16.40=17$(approx.)

Statistical Analysis
Categorical variables will be presented in number, percentage (%) and continuous variables will be presented as mean ± SD and median. Normality of data will be tested by Kolmogorov-Smirnov test. If the normality is rejected then non parametric test will be used.
Statistical tests will be applied as follows-
1.Quantitative variables will be compared using Unpaired t-test/Mann-Whitney Test (when the data sets were not normally distributed) between the two groups. 2.Qualitative variables will be compared using Chi-Square test /Fisher's exact test.
A p value of <0.05 will be considered statistically significant.
The data will be entered in MS EXCEL spreadsheet and analysis will be done using Statistical Package for Social Sciences (SPSS) version 21.0.

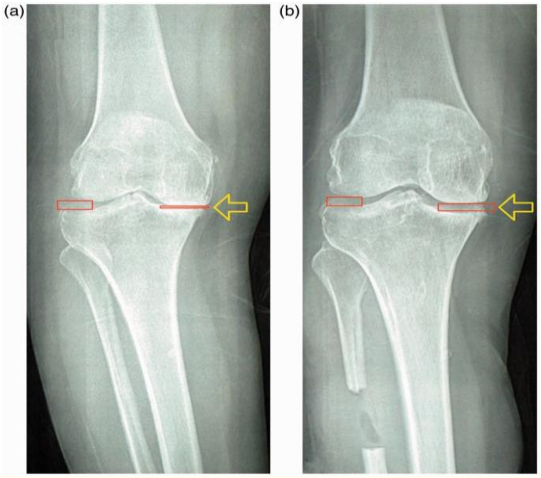
Type of Study:-Prospective and Interventional Randomized Comparative Study

Randomization Technique:-Sealed envelope system:-In this, I will prepare randomly generated treatment allocations within sealed opaque envelopes. Once a patient will consent to enter a trial an envelope will be opened and the patient will then be offered the allocated treatment regimen.

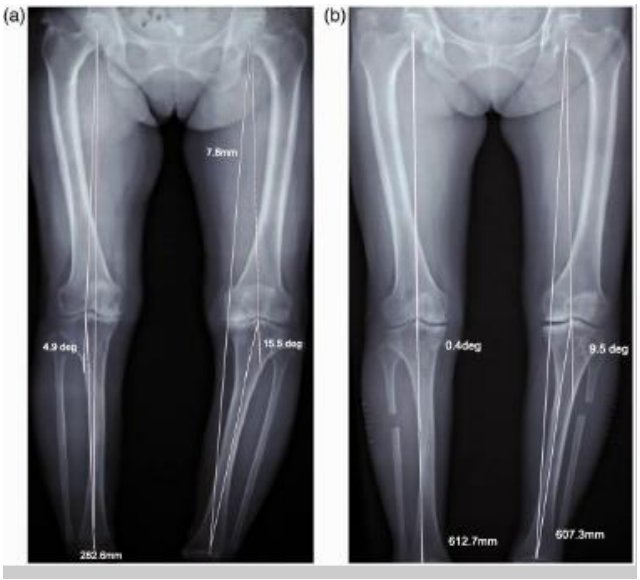
III. Results

Out of 38 patients, 19 patients underwent PFO. The duration of follow-up was 20 weeks (5 months) and range, 4-20 weeks (1-5 months). No postoperative complications were observed, including wound infection, delayed healing or nerve damage.Notably, medial pain relief was observed in all patients after PFO. Preoperatively, the mean VAS, WOMAC and Oxford Knee Scores in Group A(PFO) patients were 7, 78.42, 34.63 respectivelyand Post-operative VAS Score in Group A(PFO) patients was 3.68(4^{th} week), 3.37(8^{th} week) 3.05(16^{th} week), 2.58(20^{th} week), Post-operative WOMAC Score in Group A (PFO) was 58.26(4^{th} week), 51.21(8^{th} week), 49.74(16^{th} week), 44.84(20^{th} week), Post-operative Oxford Knee Score in Group A(PFO) patients was 43.74(4^{th} week), 44.53(8^{th} week), 44.95(16^{th} week), 45.74(20^{th} week). However,the pre-operative mean VAS, WOMAC and Oxford Knee Scores in Group B (PRP) patients were 7.21, 81.16, 33.26 respectively and the post-operative VAS, WOMAC and Oxford Knee scores in Group B (PRP) patients were different at different time duration.The Post-operative VAS Score in Group B (PRP) patients was 5.26(4^{th} week), 4.74(8^{th} week), 2.21(16^{th} week), 1.95(20^{th} week),Post-operative WOMAC Score in Group B (PRP) patients was 68.53(4^{th} week), 60.32(8^{th} week), 42.95(16^{th} week), 37.32(20^{th} week), Post-operative Oxford Knee Score in Group B (PRP) patients was 35.68(4^{th} week), 37.68(8^{th} week), 45.68(16^{th} week), 46.63(20^{th} week) respectively.In Group A (PFO) patients, the mean Visual Analogue Scale Scores significantly decreased from 7 preoperatively to 3.68(4^{th} week), 3.37(8^{th} week), 3.05(16^{th} week), 2.58(20^{th} week) post-operatively, the mean WOMAC Scores significantly decreased from 78.42 preoperatively to 58.26(4^{th} week), 51.21(8^{th} week), 49.74(16^{th} week), 44.84(20^{th} week) post-operatively, the mean Oxford Knee Scores significantly increased from 34.63 preoperatively to 43.74(4^{th} week), 44.53(8^{th} week), 44.95(16^{th} week), 45.74(20^{th} week) post-operatively. In Group B (PRP) patients, the mean Visual Analogue Scale Scores significantly decreased from 7.21 preoperatively to 5.26(4^{th} week), 4.74(8^{th} week), 2.21(16^{th} week), 1.95(20^{th} week) post-operatively, the mean WOMAC Scores significantly decreased from 81.16 preoperatively to 68.53(4^{th} week), 60.32(8^{th} week), 42.95(16^{th} week), 37.32(20^{th} week) post-operatively, the mean Oxford Knee Scores significantly increased from 33.26 preoperatively to 35.68(4^{th} week), 37.68(8^{th} week), 45.68(16^{th} week), 46.63(20^{th} week) post-operatively.Radiographs of the weight-bearing lower extremity showed an average increase in the medial knee joint space postoperatively compared with preoperatively[14]. The ratio of the knee joint space (medial/lateral compartment) improved significantly from 0.38 ± 0.26 preoperatively to 0.54 ± 0.32 postoperatively.

Additionally, an obvious correction of alignment in the whole-lower-extremity radiographs was observed in 10 out of 19 patients[15].



Obvious improvement in the joint space ratio (medial/lateral compartment) after PFO. (a) Preoperative image. (b) Postoperative image.

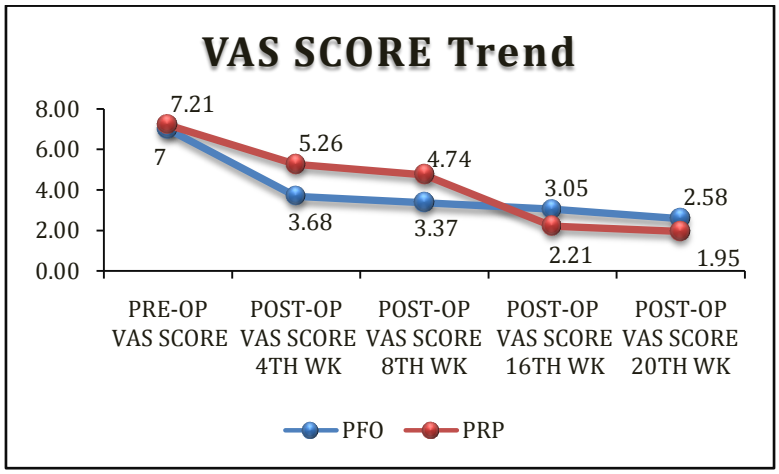


Improvement in the axial alignment of the lower extremity in a 62-year-old woman with a 10-year history of bilateral knee pain.Obvious correction of alignment (hip-knee-ankle angle: right knee, 0.4°; left knee, 9.5°) after proximal fibular osteotomy.

Group A (PFO) patients got better symptomatic relief at 4th and 8th week whereas in Group B (PRP)patients better symptomatic relief was observed at 16th and 20th week post-operatively[16]. 19 patients who were treated with PRP with 2% Xylocaine for medial compartment OA knee showed better results in terms of pain, stiffness and ADL (Activities of daily living) at longer duration of follow-up that is at 16th week (4th month) and 20th week (5th month).

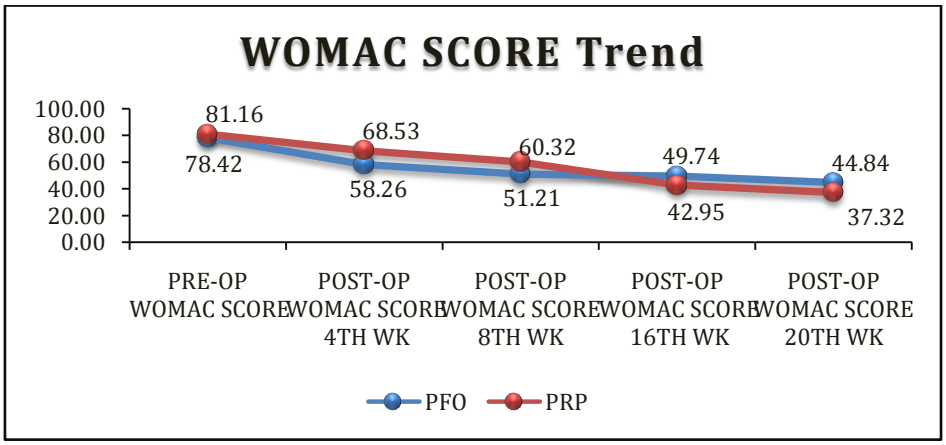
	Group A B	
	PFO	PRP
PRE-OP VAS SCORE	7	7.21
POST-OP VAS SCORE 4TH WK	3.68	5.26
POST-OP VAS SCORE 8TH WK	3.37	4.74

POST-OP VAS SCORE 16TH WK	3.05	2.21
POST-OP VAS SCORE 20TH WK	2.58	1.95



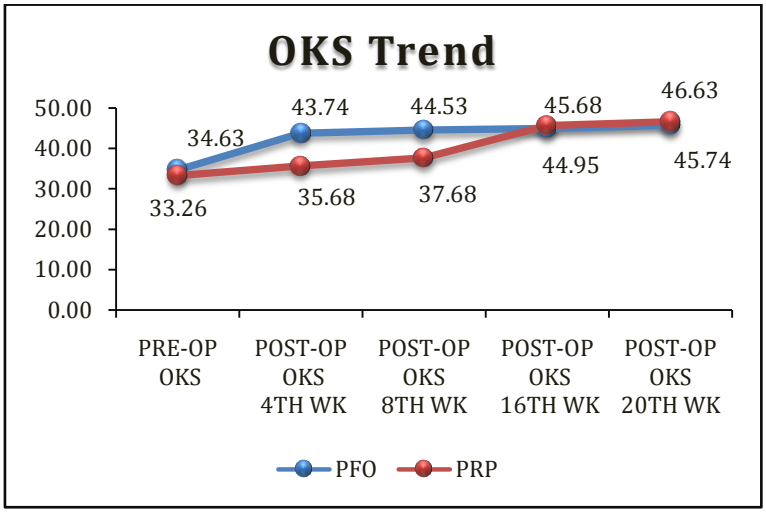
AB

	PFO	PRP
PRE-OP WOMAC SCORE	78.42	81.16
POST-OP WOMAC SCORE 4TH WK	58.26	68.53
POST-OP WOMAC SCORE 8TH WK	51.21	60.32
POST-OP WOMAC SCORE 16TH WK	49.74	42.95
POST-OP WOMAC SCORE 20TH WK	44.84	37.32

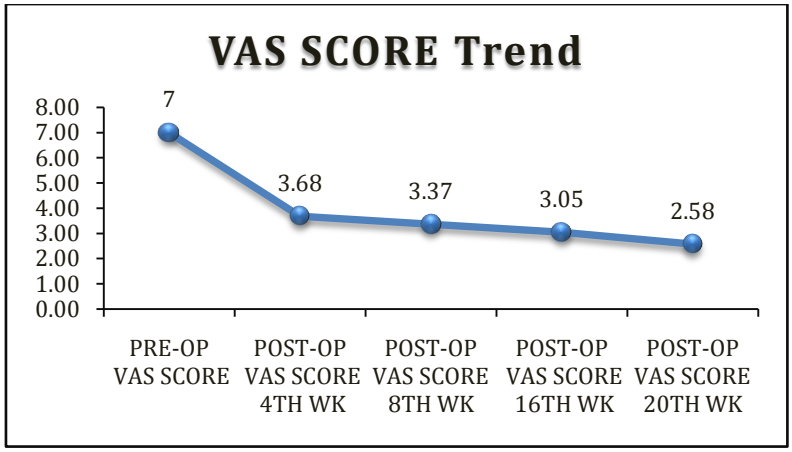


A B

	PFO	PRP
PRE-OP OKS	34.63	33.26
POST-OP OKS 4TH WK	43.74	35.68
POST-OP OKS 8TH WK	44.53	37.68
POST-OP OKS 16TH WK	44.95	45.68
POST-OP OKS 20TH WK	45.74	46.63

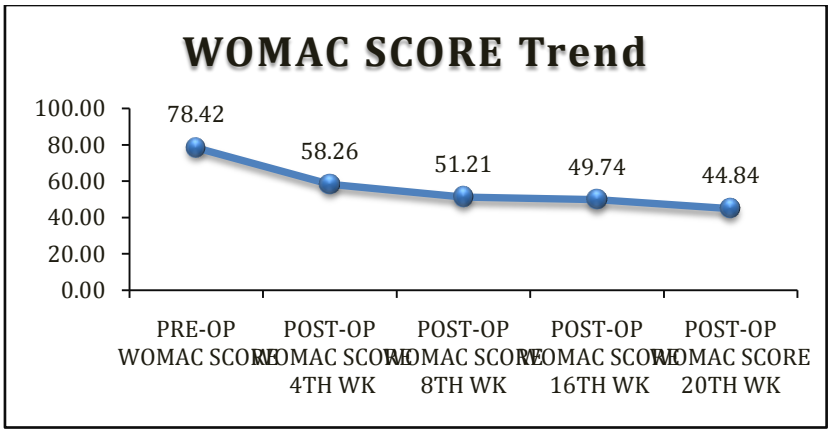


	Group A
	PFO
PRE-OP VAS SCORE	7
POST-OP VAS SCORE 4TH WK	3.68
POST-OP VAS SCORE 8TH WK	3.37
POST-OP VAS SCORE 16TH WK	3.05
POST-OP VAS SCORE 20TH WK	2.58



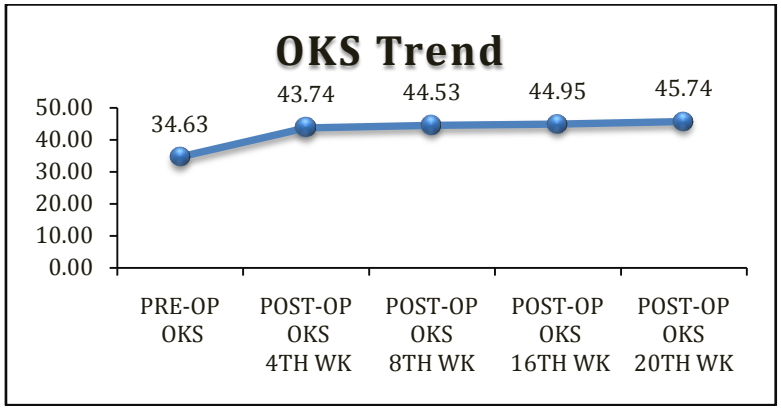
Group A

	PFO
PRE-OP WOMAC SCORE	78.42
POST-OP WOMAC SCORE 4TH WK	58.26
POST-OP WOMAC SCORE 8TH WK	51.21
POST-OP WOMAC SCORE 16TH WK	49.74
POST-OP WOMAC SCORE 20TH WK	44.84

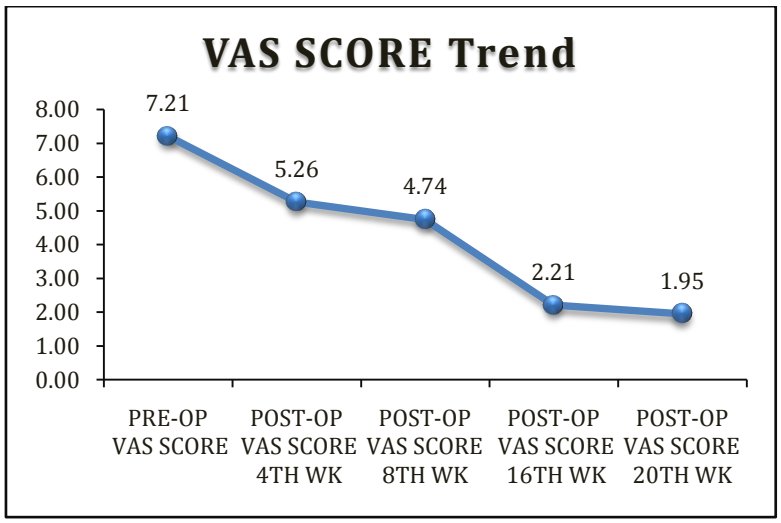


Group A

	PFO
PRE-OP OKS	34.63
POST-OP OKS 4TH WK	43.74
POST-OP OKS 8TH WK	44.53
POST-OP OKS 16TH WK	44.95
POST-OP OKS 20TH WK	45.74



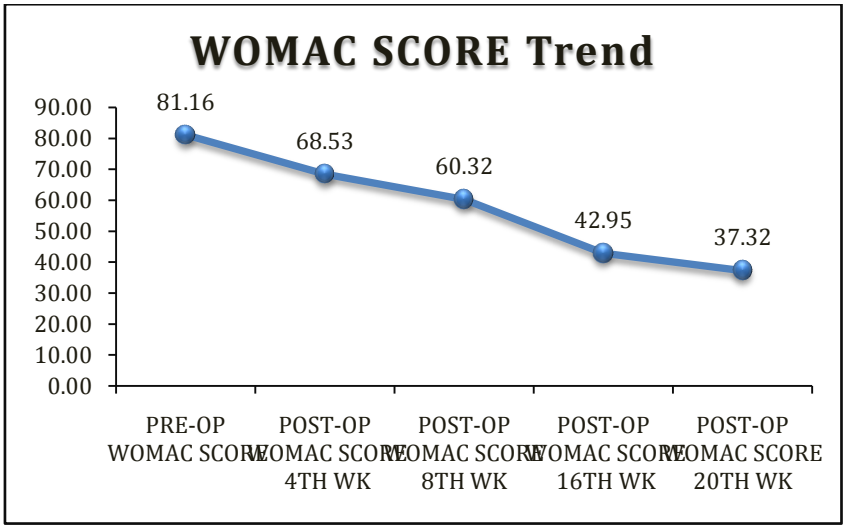
Group B	
	PRP
PRE-OP VAS SCORE	7.21
POST-OP VAS SCORE 4TH WK	5.26
POST-OP VAS SCORE 8TH WK	4.74
POST-OP VAS SCORE 16TH WK	2.21
POST-OP VAS SCORE 20TH WK	1.95



Group B

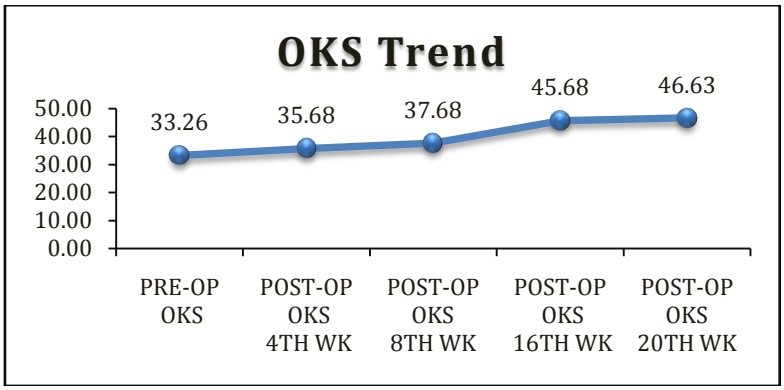
	PRP
PRE-OP WOMAC SCORE	81.16
POST-OP WOMAC SCORE 4TH WK	68.53
POST-OP WOMAC SCORE 8TH WK	60.32
POST-OP WOMAC SCORE	42.95

16TH WK	
POST-OP WOMAC SCORE 20TH WK	37.32



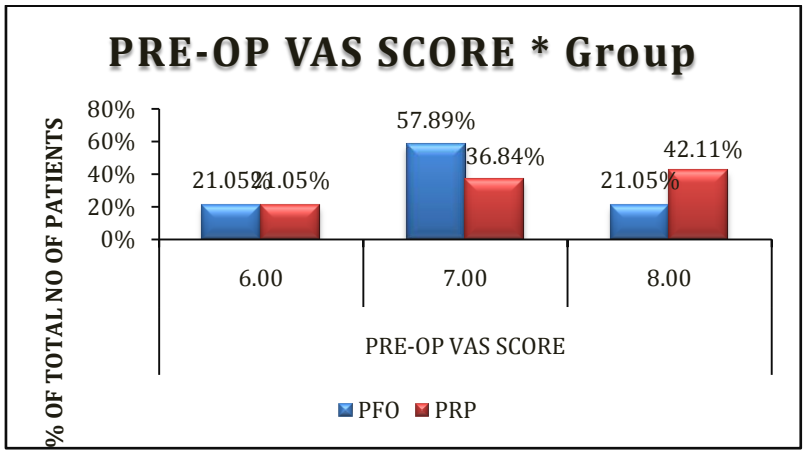
Group B

	PRP
PRE-OP OKS	33.26
POST-OP OKS 4TH WK	35.68
POST-OP OKS 8TH WK	37.68
POST-OP OKS 16TH WK	45.68
POST-OP OKS 20TH WK	46.63

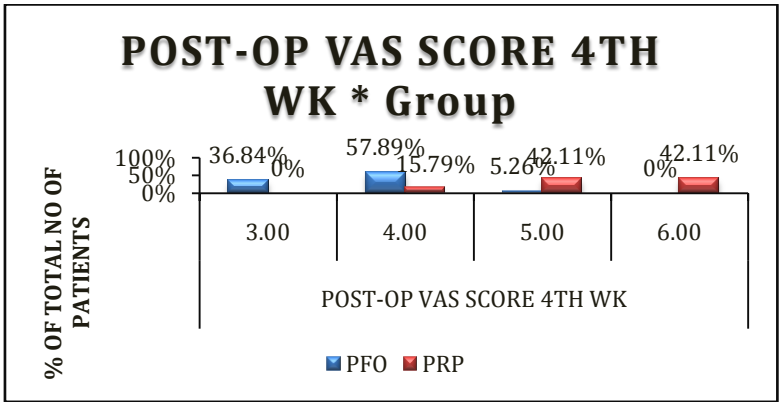


PRE-OP VAS SCORE * Group A and B				
				Total
		PFO	PRP	
PRE-OP	6.00	21.05%	21.05%	21.05%

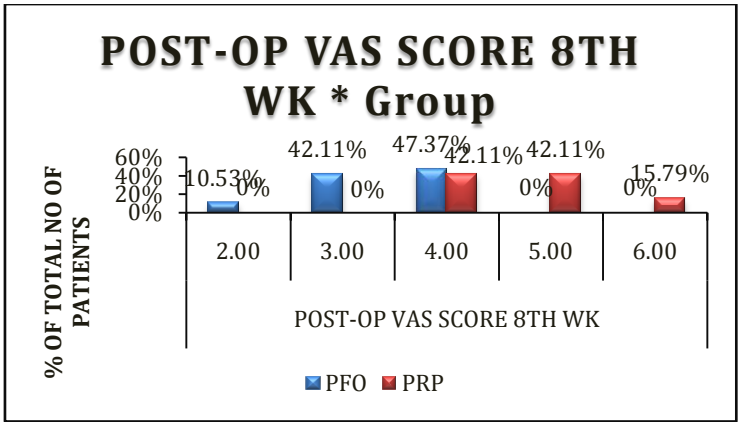
VAS SCORE	7.00	57.89%	36.84%	47.37%
	8.00	21.05%	42.11%	31.58%
Total		100.00%	100.00%	100.00%



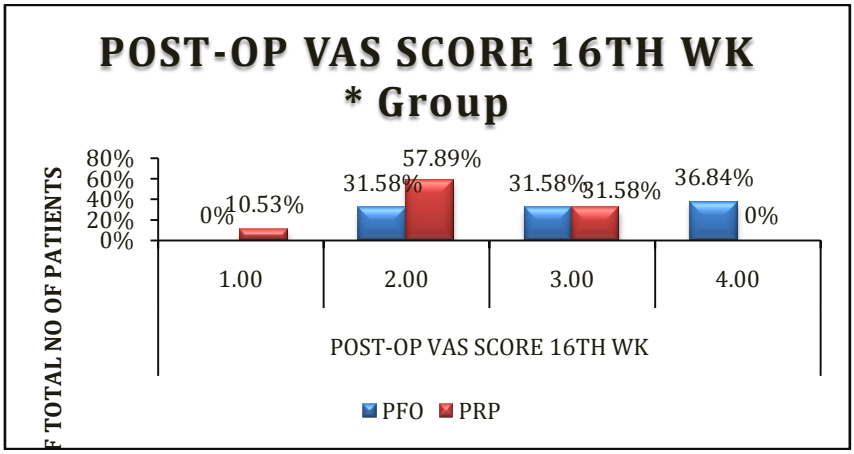
POST-OP VAS SCORE 4TH WK * Group A and B				
				Total
		PFO	PRP	
POST-OP VAS SCORE 4TH WK	3.00	36.84%	0%	18.42%
	4.00	57.89%	15.79%	36.84%
	5.00	5.26%	42.11%	23.68%
	6.00	0%	42.11%	21.05%
Total		100.00%	100.00%	100.00%



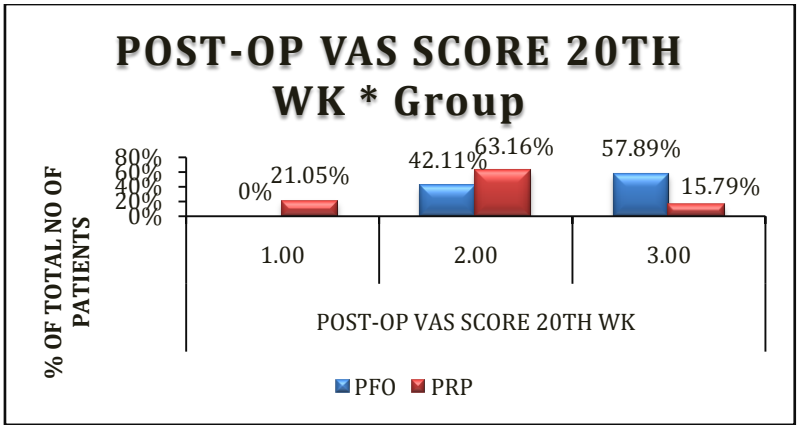
POST-OP VAS SCORE 8TH WK * Group A and B				
				Total
		PFO	PRP	
POST-OP VAS SCORE 8TH WK	2.00	10.53%	0%	5.26%
	3.00	42.11%	0%	21.05%
	4.00	47.37%	42.11%	44.74%
	5.00	0%	42.11%	21.05%
	6.00	0%	15.79%	7.89%
Total		100.00%	100.00%	100.00%



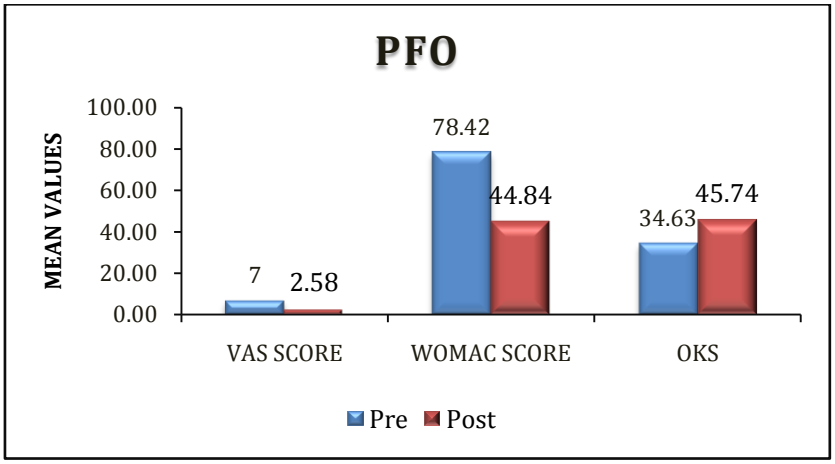
POST-OP VAS SCORE 16TH WK * Group A and B				
				Total
		PFO	PRP	
POST-OP VAS SCORE 16TH WK	1.00	0%	10.53%	5.26%
	2.00	31.58%	57.89%	44.74%
	3.00	31.58%	31.58%	31.58%
	4.00	36.84%	0%	18.42%
Total		100.00%	100.00%	100.00%



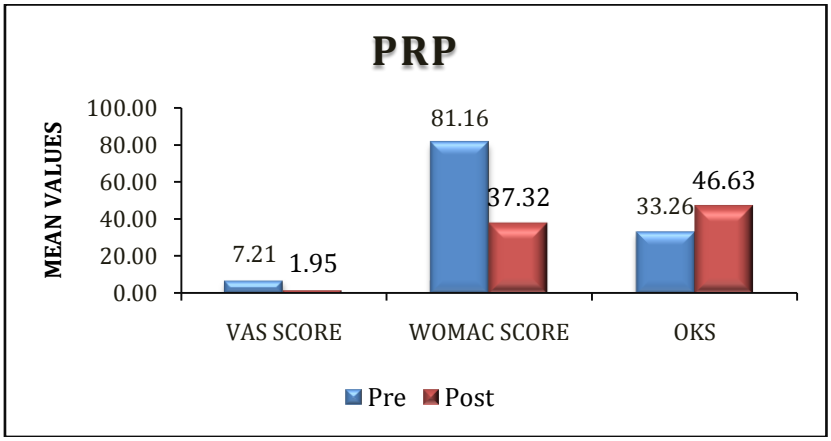
POST-OP VAS SCORE 20TH WK * Group A and B				
				Total
		PFO	PRP	
POST-OP VAS SCORE 20TH WK	1.00	0%	21.05%	10.53%
	2.00	42.11%	63.16%	52.63%
	3.00	57.89%	15.79%	36.84%
Total		100.00%	100.00%	100.00%



PFO (Group A)		
	Pre	Post
VAS SCORE	7	2.58
WOMAC SCORE	78.42	44.84
OKS	34.63	45.74



PRP (Group B)		
	Pre	Post
VAS SCORE	7.21	1.95
WOMAC SCORE	81.16	37.32
OKS	33.26	46.63



	Group A	B	
	PFO	PRP	P value
PRE-OP VAS SCORE			0.343
Sample size	19	19	
Mean ± Stdev	7 ± 0.67	7.21 ± 0.79	
Median	7	7	
Min-Max	6-8	6-8	
Inter quartile Range	7 - 7	7 - 8	
POST-OP VAS SCORE 4TH WK			<.0001
Sample size	19	19	
Mean ± Stdev	3.68 ± 0.58	5.26 ± 0.73	
Median	4	5	
Min-Max	3-5	4-6	
Inter quartile Range	3 - 4	5 - 6	
POST-OP VAS SCORE 8TH WK			<.0001
Sample size	19	19	
Mean ± Stdev	3.37 ± 0.68	4.74 ± 0.73	
Median	3	5	
Min-Max	2-4	4-6	
Inter quartile Range	3 - 4	4 - 5	
POST-OP VAS SCORE 16TH WK			0.003
Sample size	19	19	
Mean ± Stdev	3.05 ± 0.85	2.21 ± 0.63	
Median	3	2	
Min-Max	2-4	1-3	
Inter quartile Range	2 - 4	2 - 3	
POST-OP VAS SCORE 20TH WK			0.003
Sample size	19	19	
Mean ± Stdev	2.58 ± 0.51	1.95 ± 0.62	
Median	3	2	
Min-Max	2-3	1-3	
Inter quartile Range	2 - 3	2 - 2	
PRE-OP WOMAC SCORE			0.046
Sample size	19	19	
Mean ± Stdev	78.42 ± 4.32	81.16 ± 3.82	
Median	78	83	
Min-Max	72-84	76-86	
Inter quartile Range	77 - 82	78 - 84	
POST-OP WOMAC SCORE 4TH WK			<.0001
Sample size	19	19	
Mean ± Stdev	58.26 ± 5.16	68.53 ± 2.48	
Median	58	68	
Min-Max	46-67	65-72	
Inter quartile Range	57 - 63	67 - 71	
POST-OP WOMAC SCORE 8TH WK			<.0001
Sample size	19	19	
Mean ± Stdev	51.21 ± 3.29	60.32 ± 1.67	
Median	51	61	
Min-Max	45-56	58-62	
Inter quartile Range	49.250 - 52.750	59 - 62	
POST-OP WOMAC SCORE 16TH WK			0.001
Sample size	19	19	
Mean ± Stdev	49.74 ± 3.96	42.95 ± 6.72	
Median	49	43	
Min-Max	43-55	30-53	
Inter quartile Range	48 - 52	38.750 - 46.500	
POST-OP WOMAC SCORE 20TH WK			<.0001
Sample size	19	19	
Mean ± Stdev	44.84 ± 3.04	37.32 ± 2.67	
Median	44	37	
Min-Max	40-48	33-43	
Inter quartile Range	43 - 48	36 - 39.750	
PRE-OP OKS			0.084
Sample size	19	19	
Mean ± Stdev	34.63 ± 2.01	33.26 ± 2.81	
Median	34	33	
Min-Max	32-38	30-37	
Inter quartile Range	34 - 36	31 - 36	
POST-OP OKS 4TH WK			<.0001
Sample size	19	19	

Mean ± Stdev	43.74 ± 1.37	35.68 ± 2.45	
Median	44	35	
Min-Max	41-46	33-40	
Inter quartile Range	43 - 44.750	34 - 38.500	
POST-OP OKS 8TH WK			<.0001
Sample size	19	19	
Mean ± Stdev	44.53 ± 0.9	37.68 ± 2.08	
Median	45	39	
Min-Max	42-46	35-41	
Inter quartile Range	44 - 45	36 - 39	
POST-OP OKS 16TH WK			0.011
Sample size	19	19	
Mean ± Stdev	44.95 ± 0.78	45.68 ± 0.89	
Median	45	46	
Min-Max	43-46	44-47	
Inter quartile Range	45 - 45	45 - 46	
POST-OP OKS 20TH WK			0.001
Sample size	19	19	
Mean ± Stdev	45.74 ± 0.81	46.63 ± 0.5	
Median	46	47	
Min-Max	45-47	46-47	
Inter quartile Range	45 - 46	46 - 47	

PFO (Group A)						
	Sample size	Mean ± Stdev	Median	Min-Max	Inter quartile Range	P value
PRE-OP VAS SCORE	19	7 ± 0.67	7	6-8	7 - 7	
POST-OP VAS SCORE 4TH WK	19	3.68 ± 0.58	4	3-5	3 - 4	0.0001
POST-OP VAS SCORE 8TH WK	19	3.37 ± 0.68	3	2-4	3 - 4	0.0001
POST-OP VAS SCORE 16TH WK	19	3.05 ± 0.85	3	2-4	2 - 4	0.0001
POST-OP VAS SCORE 20TH WK	19	2.58 ± 0.51	3	2-3	2 - 3	0.0001
PRE-OP WOMAC SCORE	19	78.42 ± 4.32	78	72-84	77 - 82	
POST-OP WOMAC SCORE 4TH WK	19	58.26 ± 5.16	58	46-67	57 - 63	<.0001
POST-OP WOMAC SCORE 8TH WK	19	51.21 ± 3.29	51	45-56	49.250 - 52.750	<.0001
POST-OP WOMAC SCORE 16TH WK	19	49.74 ± 3.96	49	43-55	48 - 52	<.0001
POST-OP WOMAC SCORE 20TH WK	19	44.84 ± 3.04	44	40-48	43 - 48	<.0001
PRE-OP OKS	19	34.63 ± 2.01	34	32-38	34 - 36	
POST-OP OKS 4TH WK	19	43.74 ± 1.37	44	41-46	43 - 44.750	0.0001
POST-OP OKS 8TH WK	19	44.53 ± 0.9	45	42-46	44 - 45	0.0001
POST-OP OKS 16TH WK	19	44.95 ± 0.78	45	43-46	45 - 45	0.0001
POST-OP OKS 20TH WK	19	45.74 ± 0.81	46	45-47	45 - 46	0.0001
PRP (Group B)						
	Sample size	Mean ± Stdev	Median	Min-Max	Inter quartile Range	P value
PRE-OP VAS SCORE	19	7.21 ± 0.79	7	6-8	7 - 8	
POST-OP VAS SCORE 4TH WK	19	5.26 ± 0.73	5	4-6	5 - 6	0.0001
POST-OP VAS SCORE 8TH WK	19	4.74 ± 0.73	5	4-6	4 - 5	0.0001
POST-OP VAS SCORE 16TH WK	19	2.21 ± 0.63	2	1-3	2 - 3	0.0001
POST-OP VAS SCORE 20TH WK	19	1.95 ± 0.62	2	1-3	2 - 2	0.0001
PRE-OP WOMAC SCORE	19	81.16 ± 3.82	83	76-86	78 - 84	
POST-OP WOMAC SCORE 4TH WK	19	68.53 ± 2.48	68	65-72	67 - 71	<.0001
POST-OP WOMAC SCORE 8TH WK	19	60.32 ± 1.67	61	58-62	59 - 62	<.0001
POST-OP WOMAC SCORE 16TH WK	19	42.95 ± 6.72	43	30-53	38.750 - 46.500	<.0001
POST-OP WOMAC SCORE 20TH WK	19	37.32 ± 2.67	37	33-43	36 - 39.750	<.0001
PRE-OP OKS	19	33.26 ± 2.81	33	30-37	31 - 36	
POST-OP OKS 4TH WK	19	35.68 ± 2.45	35	33-40	34 - 38.500	0.0001
POST-OP OKS 8TH WK	19	37.68 ± 2.08	39	35-41	36 - 39	0.0001
POST-OP OKS 16TH WK	19	45.68 ± 0.89	46	44-47	45 - 46	0.0001
POST-OP OKS 20TH WK	19	46.63 ± 0.5	47	46-47	46 - 47	0.0001

PRE-OP VAS SCORE * Group A and B					
		Group		Total	P value
		PFO	PRP		
PRE-OP VAS SCORE	6.00	4 (21.05%)	4 (21.05%)	8 (21.05%)	0.329
	7.00	11 (57.89%)	7 (36.84%)	18 (47.37%)	
	8.00	4 (21.05%)	8 (42.11%)	12 (31.58%)	
Total		19 (100.00%)	19 (100.00%)	38 (100.00%)	
X2=2.222					
df=2					

POST-OP VAS SCORE 4TH WK * Group A and B					
		Group		Total	P value
		PFO	PRP		
POST-OP VAS SCORE 4TH WK	3.00	7 (36.84%)	0 (0.00%)	7 (18.42%)	<.0001
	4.00	11 (57.89%)	3 (15.79%)	14 (36.84%)	
	5.00	1 (5.26%)	8 (42.11%)	9 (23.68%)	
	6.00	0 (0.00%)	8 (42.11%)	8 (21.05%)	
Total		19 (100.00%)	19 (100.00%)	38 (100.00%)	
X2=25.016					
df=3					

POST-OP VAS SCORE 8TH WK * Group A and B					
		Group		Total	P value
		PFO	PRP		
POST-OP VAS SCORE 8TH WK	2.00	2 (10.53%)	0 (0.00%)	2 (5.26%)	0.0003
	3.00	8 (42.11%)	0 (0.00%)	8 (21.05%)	
	4.00	9 (47.37%)	8 (42.11%)	17 (44.74%)	
	5.00	0 (0.00%)	8 (42.11%)	8 (21.05%)	
	6.00	0 (0.00%)	3 (15.79%)	3 (7.89%)	
Total		19 (100.00%)	19 (100.00%)	38 (100.00%)	
X2=21.059					
df=4					

POST-OP VAS SCORE 16TH WK * Group A and B					
		Group		Total	P value
		PFO	PRP		
POST-OP VAS SCORE 16TH WK	1.00	0 (0.00%)	2 (10.53%)	2 (5.26%)	0.015
	2.00	6 (31.58%)	11 (57.89%)	17 (44.74%)	
	3.00	6 (31.58%)	6 (31.58%)	12 (31.58%)	
	4.00	7 (36.84%)	0 (0.00%)	7 (18.42%)	
Total		19 (100.00%)	19 (100.00%)	38 (100.00%)	
X2=10.471					
df=3					

POST-OP VAS SCORE 20TH WK * Group A and B					
		Group		Total	P value
		PFO	PRP		
POST-OP VAS SCORE 20TH WK	1.00	0 (0.00%)	4 (21.05%)	4 (10.53%)	0.009
	2.00	8 (42.11%)	12 (63.16%)	20 (52.63%)	
	3.00	11 (57.89%)	3 (15.79%)	14 (36.84%)	
Total		19 (100.00%)	19 (100.00%)	38 (100.00%)	
X2=9.371					
df=2					

IV. Discussion

Knee osteoarthritis is one of the most common joint disorders, and it causes severe pain and immobility. Many treatment modalities are available like NSAID's, physiotherapy, intra-articular steroids, PRP injections, HTO and PFO. TKA very effectively relieves pain and improves knee function in patients with late-stage knee osteoarthritis[17, 18]. However, TKA is expensive and complex, and some patients may need a second revision[19]. In the present study we compared the efficacy of PFO and PRP between two treatment groups and assessed the outcome in terms of VAS,WOMAC and Oxford Knee Score. Although PFO has emerged as a new surgery to relieve pain and improve joint function in patients with knee osteoarthritis as reported by Zhang et al. in 2015 and most striking findings in the present study included medial pain relief and an increase in the medial joint space (the mechanism was unclear and post-operative ambulation (i.e. walking) also obviously improved when compared with the preoperative state)[20, 21, 22].Yetthere have been many studies investigating the effectiveness of PRP in degenerative knee disease[23]. In their study published in 2009, Kon et al.found significant improvement in pain scores of patients who received PRP injections with follow-up at 4th, 8th, 16th, and 20th weeks[23].Time-dependent changes in Visual Numeric Scale (movement), and Western Ontario and McMaster Universities Arthritis Osteoarthritis Index pain decreased significantly at 16th week (4th month) and 20th (5th month) weeks and OKS Score increased significantly. The 20th week (5th month) scores were also significantly low. Most published works regarding the effectiveness of PRP IAI for the treatment of OA are series studies, with an average age less than 60 years and patients with early-stage OA[24,] . In the series by Kon et al[25,26]comparing PRP with HA at 6-month follow-up, the best results from the International Knee Documentation Committee questionnaire, VAS, and degree of patient satisfaction were achieved in the PRP group especially for younger patients, males, and those with early-stage OA. According to the systematic review by Meheuxet al[27], most of the studies included early-stage OA, with grades 3 and 4 being less common (9.4% of the knees were Ahlback grade 3, 37.9% K-L grade 3, and 12.6% K-L grade 4). In these studies, the worst results were obtained for K-L grades 3 to 4.Initial OA treatment combines nonpharmacological methods with oral medications. In more advanced or very symptomatic stages, intra-articular injection (IAI) is used: corticosteroid with local anesthetic (CSA), hyaluronic acid (HA), or biological products such as platelet-rich plasma (PRP)[28]. However, current studies have changed the prescribing pattern, using IAI as a first-line treatment because it has proven effectiveness for pain with fewer side effects than some oral medications.The use of PRP in the treatment of degenerative knee OA has been extended in recent years given its high margin of safety and easy production and administration[29].The primary objective of this study was to determine the clinical utility of PRP IAI in the treatment of late-stage knee OA for subjective pain relief 1 month after the infiltration compared with PFO at 4th,8th,16th and 20th week. Our study shows that, although only in absolute numbers, PRP treatment tends to improve pain and patient satisfaction at 16th week and 20th week of follow-up. In our study, we found that PRP in medial compartment OA knee has better functional outcome in longer duration 16th and 20th weeks in comparison to PFO in which patients got better symptomatic relief at initial weeks of treatment (4th and 8th week).

V. Conclusion

Proximal fibular osteotomy may reduce knee pain significantly in the varus osteoarthritic knee and improve the radiographic appearance and functional recovery of the knee joint. It may delay or even negate the need for total knee arthroplasty. It is a safe, simple, and effective procedure that is an alternative to total knee arthroplasty for medial compartment OA of the knee joint.PRP intra-articular injection is effective for relieving pain and improving activities of daily living and quality of life in patients with late-stageOA knee[30,]. For patients with late-stage OA Knee ,intra-articular injection of PRP has similar and lesser results as comparedtoPFOin the earlier phase of treatment (4th and 8th week). Although, PRP shows better results in terms of pain, stiffness and activities of daily living than PFO at longer duration of treatment and follow-up (16th and 20th week).Our objective was to compare the efficacy of PRP IAI for relieving pain and improving knee function during late-

stage OA with PFO. We have compared PRP with PFO rather than placebo so as not to leave any patient untreated (in previous published trials, placebo has been shown to be unsuccessful). For this reason, we considered PFO as having better result in earlier phase of treatmentandPRP to be better for later stages of treatment.

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