



# A Comparative Study Of Functional Outcome Of Intra Articular Platelet Rich Plasma Versus Proximal Fibular Osteotomy In Treatment Of Medial Compartment Osteoarthritis Of Knee In Post-Menopausal Women

Dr. Raja Saha<sup>1</sup>, Dr. Debojyoti Mukherjee<sup>2</sup> and Dr. Hiranmay Deb<sup>3</sup>

<sup>1</sup>Senior resident, RGKMCH

<sup>2</sup>Associate professor, RGKMCH

<sup>3</sup>Associate professor, calcutta medical college, Kolkata

**Corresponding Author**

**Dr. Debojyoti Mukherjee,**

Associate professor,

RGKMCH

Email I'd - debojyoti64@gmail.com

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## ABSTRACT

**Introduction:** Osteoarthritis (OA) of the knee joint is a chronic, degenerative problem often associated with pain involving the affected joint, decreased range of motion, and deformity. OA of the knee joint affects about half of the population over the age of 60 years and mainly women, as it is mostly because of osteoporosis as a result of decreased bone mineral density.

**Aims:** To ascertain more practical method among intra particular platelet rich plasma and proximal fibular osteotomy in treating medial compartment osteoarthritis, and to identify which of these two method gives better improvement in day to day activities and in pain management.

**Materials and Methods:** a total of hundred female post menopausal patients with grade I and grade II osteoarthritis was selected. The present study was a hospital based cross sectional observational study.

**Result:** Our study showed that in Intra Articular PRP Group, 14 (28.0%) patients had Grade 1 and 36 (72.0%) patients had Grade 2. In Proximal Fibular Osteotomy Group, 13 (26.0%) patients had Grade 1 and 37 (74.0%) patients had Grade 2. This was not statistically significant (p=0.8217).

**Conclusion:** The study highlights that both the VAS scores and WOMAC scores were significantly better at 3 and 6 months after surgery. We concluded that proximal fibular osteotomy provides only short- term relief in patients of medial compartment knee osteoarthritis of knee in post-menopausal women.

**Keywords:** Osteoarthritis, proximal fibula, medial compartment and Intra Articular Platelet.

**DOI:** 10.48047/ecb/2023.12.si12.142

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## INTRODUCTION

Osteoarthritis (OA) of the knee joint is a chronic, degenerative problem often associated with pain involving the affected joint, decreased range of motion, and deformity. Symptomatic OA affected about 3.8% of the world population according to estimates in 2010, with higher involvement in women (4.8%) as compared to men (2.8%). OA of the knee joint affects about

half of the population over the age of 60 years and mainly women, as it is mostly because of osteoporosis as a result of decreased bone mineral density <sup>1</sup>.

Knee joint is the largest and most complicated joint structurally it resembles a hinge joint, it is a condylar type of synovial joint between two condyles of femur and tibia in addition it includes a saddle joint between femur and patella, encompassed by a fibrous capsule that is thin, weak and incomplete but it is attached to margin of femoral and tibia condyles to patella and patellar ligaments and surrounds lateral and posterior aspects of joints.

This joint has an inner (medial) and an outer (lateral) compartment. The kneecap (the patella) joins the femur to form a third joint, called the patellofemoral joint. The patella protects the front of the knee joint. The global prevalence of radio graphically confirmed symptomatic knee OA in 2010 was estimated to be 3.8%. It was higher in females (4.8%) than in males (2.8%). In the USA, 33.6% people aged more than 65 years were found to have osteoarthritis of knees. ] In south Asian region the prevalence of OA of knees is 1.8% in males and 3.1% in females.] With the aging of the world's population, especially in Low & Middle Income Countries (LMIC), the number of people living with knee OA is anticipated to increase substantially over coming decades. There are multiple options for the management of knee joint OA, both conservative and surgical. Conservative options for OA of the knee include analgesics, physical therapy, intra-articular injections of steroid or platelet-rich plasma, and viscosupplementation agents. Surgical options include high tibial osteotomy and total knee arthroplasty, the main treatment options for OA of the knee. High tibial osteotomy is a technically demanding procedure and has specific problems associated with it, such as neurovascular injury, iatrogenic fracture, and nonunion. Total knee replacement is an excellent procedure in terms of relief of pain, correction of deformity, and improvement of function but not a good option for young patients with mild to moderate OA <sup>2</sup>.

### **AIMS AND OBJECTIVE**

1. To ascertain more practical method among intra particular platelet rich plasma and proximal fibular osteotomy in treating medial compartment osteoarthritis
2. To access and identify the method among intra particular platelet rich plasma and proximal fibular osteotomy, which gives better improvement in day to day activities
3. The method among intra articular platelet rich plasma and proximal fibular osteotomy which gives better pain management in medial compartment osteoarthritis
4. To identify complications among platelet rich plasma and proximal fibular osteotomy and their management

## MATERIALS AND METHODS

**Study design:** A prospective observational study.

**Study setting and timeline:** The study was conducted at R.G. Kar Medical College and Hospital. Study was conducted from July 2019 to November 2021.

**Place of study:** Orthopedics, Dept. of R.G. Kar Medical College

**Period of study:** Between July 2019 to November 2021

**Study population:** The study population includes all post-menopausal symptomatic patients presenting to trauma care unit and outdoor based admitted patients to orthopedics ward with medial compartment osteoarthritis

**Sample size:** 100 individuals

### Inclusion criteria:

1. Post-menopausal women
2. Patients with mild to moderate medial compartment osteoarthritis ( Grade1 and Grade 2 osteoarthritis)
3. Patients who were ready to give informed written consent for the study.

### Exclusion criteria:

1. Advanced osteoarthritis grade 3 and grade 4
2. Patients having inflammatory arthritis and infective arthritis
3. Patients having chronic local skin disease
4. Patients with blood dyscrasia
5. Patients having ligament injury around knee
6. Seropositive patients ( HIV 1, HIV 2, HBSAg, anti HCV)

## RESULT AND DISCUSSION

**Table: Association between Grade: Group**

GROUP			
Grade	INTRA ARTICULAR PRP	PROXIMAL FIBULAR OSTEOTOMY	TOTAL
<b>Grade 1</b>	14	13	27
Row %	51.9	48.1	100.0
Col %	28.0	26.0	27.0
<b>Grade 2</b>	36	37	73
Row %	49.3	50.7	100.0
Col %	72.0	74.0	73.0
<b>TOTAL</b>	50	50	100
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

**Chi-square value:** 0.0507; **p-value:** 0.8217;

**Odds ratio:** 1.1068(0.4575, 2.6776)

**Table: Distribution of mean Post-op VAS 6 Month: Group**

	Number	Mean	SD	Minimum	Maximum	Median	p-value

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<b>Post-op VA S 6 Month</b>	INTRA ARTICULAR PRP	50	4.0800	.8999	2.0000	6.0000	4.0000	<0.0001
	PROXIMAL FIBULAR OSTEOTOMY	50	1.2600	.4431	1.0000	2.0000	1.0000	

**Table: Distribution of mean Post-op WOMAC Score 6 Month: Group**

		<b>Number</b>	<b>Mean</b>	<b>SD</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Median</b>	<b>p-value</b>
<b>Post-op WOMAC Score 6 Month</b>	INTRA ARTICULAR PRP	50	64.7440	3.2437	52.1000	68.9000	64.6500	<0.0001
	PROXIMAL FIBULAR OSTEOTOMY	50	51.1400	3.0326	42.1000	57.8000	51.3000	

This prospective observational study was conducted at R.G. Kar Medical College and Hospital from July 2019 to November 2021. Total 100 individuals were present in this study.

We found that in Intra Articular PRP Group, 7 (14.0%) patients were  $\leq 50$  years of age, 24 (48.0%) patients were 50-60 years of age, 17 (34.0%) patient were 61-70 years of age and 2 (4.0%) patients were  $\geq 70$  years of age. In Proximal Fibular Osteotomy Group, 11 (22.0%) patients were  $\leq 50$  years of age, 24 (48.0%) patients were 50-60 years of age, 14 (28.0%) patient were 61-70 years of age and 1 (2.0%) patients were  $\geq 70$  years of age. It was not statistically significant ( $p=0.6794$ ).

In our study, in Intra Articular PRP Group, all patients [50 (100.0%)] were Female and in Proximal Fibular Osteotomy Group, all patients [50 (100.0%)] were Female.

Our study showed that in Intra Articular PRP Group, 14 (28.0%) patients had Grade 1 and 36 (72.0%) patients had Grade 2. In Proximal Fibular Osteotomy Group, 13 (26.0%) patients had Grade 1 and 37 (74.0%) patients had Grade 2. This was not statistically significant ( $p=0.8217$ ).

We observed that In Intra Articular PRP Group, 3 (6.0%) patients had Complication and in Proximal Fibular Osteotomy Group, 1 (2.0%) patients had Complication which was not statistically significant ( $p=0.3074$ ).

We found that in Intra Articular PRP Group, the mean Age (mean $\pm$  s.d.) of patients was  $58.2600 \pm 6.1869$  and in Proximal Fibular Osteotomy Group, the mean Age (mean $\pm$  s.d.) of patients was  $57.0600 \pm 6.5353$  which was not statistically significant ( $p=0.3481$ ).

**Misra RK et al<sup>3</sup>(2019)** showed that the average preoperative VAS score, KSS clinical and functional score was  $7.89 \pm 1.01$  points (range from 4 to 9 points),  $47.23 \pm 11.05$  points (range from 26 to 90 points) and  $45.85 \pm 16.62$  points (range from 0 to 90 points), respectively. At 6 months, the mean visual analogue scale scores significantly decreased to 2.742.34 postoperatively. There was significant improvement in the average postoperative KSS clinical and functional scores which is  $67.11 \pm 10.09$  points (range from 31 to 94 points) and  $65.67 \pm 12.22$  points (range from 22 to 100 points), respectively. The ratio of the knee joint space (medial/lateral compartment) increased from an average of  $0.38 \pm 0.12$  preoperatively to  $0.56 \pm 0.13$  postoperatively.

It was found that in Intra Articular PRP Group, the mean Pre-op VAS (mean $\pm$  s.d.) of patients was  $6.8400 \pm .9971$  and in Proximal Fibular Osteotomy Group, the mean Pre-op VAS (mean $\pm$  s.d.) of patients was  $6.8000 \pm 1.0302$  which was not statistically significant ( $p=0.8440$ ).

**Ahmed M et al<sup>4</sup>(2020)** showed that recorded levels of mean postoperative medial joint space improved to  $4.63 \pm 0.668$  mm, and mean postoperative lateral joint space was  $4.72 \pm 0.79$  mm. Mean recorded levels of VAS for pain postoperatively were  $2.32 \pm 0.792$ , which improved significantly from  $7.90 \pm 0.79$ . PFO is a good surgical technique for pain relief and functional improvement in patients suffering from medial compartment OA.

**Subash Y et al<sup>5</sup>(2018)** showed that post-surgery, all our patients reported dramatic pain relief with the average preoperative Visual analogue score dropping from 6.9 to a value of 2.1 in the postoperative period. There was a significant increase in the modified oxford score from a preoperative score of 52.2 to 79 in the postoperative period. Through this study they conclude that PFO is an excellent procedure in the management of younger patients with medial compartment arthritis of the knee provided the proper indications for surgery.

**Koh YG et al<sup>6</sup>(2014)** found that the patients in the MSC-PRP group showed significantly greater improvements in the KOOS subscales for pain (PRP only,  $74.0 \pm 5.7$ ; MSC-PRP,  $81.2 \pm 6.9$ ;  $P < .001$ ) and symptoms (PRP only,  $75.4 \pm 8.5$ ; MSC-PRP,  $82.8 \pm 7.2$ ;  $P = .006$ ) relative to the PRP- only group. Although the mean Lysholm score was similarly improved in both groups (PRP only,  $80.6 \pm 13.5$ ; MSC-PRP,  $84.7 \pm 16.2$ ;  $P = .357$ ), the MSC-PRP group showed a significantly greater improvement in the VAS pain score (PRP only,  $16.2 \pm 4.6$ ; MSC-PRP,  $10.2 \pm 5.7$ ;  $P < .001$ ). There were no differences in the preoperative (PRP only, varus  $2.8^\circ \pm 1.7^\circ$ ; MSC-PRP, varus  $3.4^\circ \pm 3.0^\circ$ ;  $P = .719$ ) and postoperative (PRP only, valgus  $9.8^\circ \pm 2.4^\circ$ ; MSC-PRP, valgus  $8.7^\circ \pm 2.3^\circ$ ;  $P = .678$ ) femorotibial angles or weight-bearing lines between the groups.

**Kamboj P et al<sup>7</sup>(2017)** found that mean VAS decreased significantly postoperatively to  $1.4 \pm 0.50$  from  $7.2 \pm 1.0$  ( $p < 0.001$ ). Mean walking distance increased significantly to  $1174 \pm 161.81$  from  $590 \pm 91.19$  meters preoperatively ( $p < 0.001$ ).

Our study showed that the mean Post-op VAS at 1 Month (mean $\pm$  s.d.) of patients was higher in Proximal Fibular Osteotomy Group [ $3.9400 \pm .9982$ ] compared to Intra Articular PRP Group patients [ $2.4400 \pm .6440$ ] which was statistically significant ( $p < 0.0001$ ). We observed that the mean Post-op VAS at 3 Month (mean $\pm$  s.d.) of patients was higher in Intra Articular PRP Group [ $3.1400 \pm .7287$ ] compared to Proximal Fibular Osteotomy Group patients [ $2.7200 \pm .7570$ ] which

was statistically significant ( $p=0.0057$ ). In our study, the mean Post-op VAS at 6 Month (mean $\pm$  s.d.) of patients was higher in Intra Articular PRP Group [4.0800 $\pm$  .8999] compared to Proximal Fibular Osteotomy Group patients [1.2600 $\pm$  .4431] which was statistically significant ( $p<0.0001$ ).

**Huda N et al**<sup>8</sup>(2020) found that the preoperative mean WOMAC score was 87.3, at 3 months follow-up it was 29.4 this was significantly better ( $p < 0.05$ ) but the improvement was not significant at subsequent follow-up visits. Similarly the VAS scores also showed significant improvement at 3 months, but not at 6 and 12 months follow-up. There was no significant improvement in the femoro-tibial angle (FTA) at 1 year follow-up. Conclusion: The study highlights that both the VAS scores and WOMAC scores were significantly better at 3 months after surgery. However these did not show any significant improvement at 6 and 12 months. It does not change the alignment of knee at one year follow-up. The authors conclude that proximal fibular osteotomy provides only short-term relief in patients of medial compartment knee osteoarthritis.

It was found that in Intra Articular PRP Group, the mean Pre-op WOMAC Score (mean $\pm$  s.d.) of patients was 80.2560 $\pm$  3.3770 and in Proximal Fibular Osteotomy Group, the mean Pre-op WOMAC Score (mean $\pm$  s.d.) of patients was 80.4640 $\pm$  3.0494 which was not statistically significant ( $p=0.7472$ ).

**Meheux CJ et al**<sup>9</sup>(2016) found that all but one study showed significant differences in clinical outcomes between PRP and hyaluronic acid (HA) or PRP and placebo in pain and function. Average pretreatment Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores were 52.36 and 52.05 for the PRP and HA groups, respectively ( $P = .420$ ). Mean post-treatment WOMAC scores for PRP were significantly better than for HA at 3 to 6 months (28.5 and 43.4, respectively;  $P = .0008$ ) and at 6 to 12 months (22.8 and 38.1, respectively;  $P = .0062$ ). None of the included studies used corticosteroids. In patients with symptomatic knee OA, PRP injection results in significant clinical improvements up to 12 months post-injection. Clinical outcomes and WOMAC scores are significantly better after PRP versus HA at 3 to 12 months post-injection. There is limited evidence for comparing leukocyte-rich versus leukocyte-poor PRP or PRP versus steroids in this study.

**Liu CY et al**<sup>10</sup>(2018) found that in the TKA group, Lysholm score and KSS were higher and WOMAC score was lower after 5 years than other groups. WOMAC score was lowest in the UKA group after 6 months, 1 year and 5 years of surgery. These results provide evidence that function scores of patients with KOA were improved by osteotomy, UKA, TKA, and arthroscopic surgery. And osteotomy and UKA showed better short-term efficacy, while TKA appeared better long-term efficacy.

We examined that the mean Post-op WOMAC Score at 1 Month (mean $\pm$  s.d.) of patients was higher in Proximal Fibular Osteotomy Group [65.1700 $\pm$  2.7231] compared to Intra Articular PRP Group patients [51.6820 $\pm$  3.4167] which was statistically significant ( $p<0.0001$ ). Our study showed that the mean Post-op WOMAC Score at 3 Month (mean $\pm$  s.d.) of patients was higher in Intra Articular PRP Group [60.9560 $\pm$  2.0380] compared to Proximal Fibular Osteotomy Group patients [59.7560 $\pm$  3.3319] which was statistically significant ( $p=0.0322$ ). We also found that the



mean Post-op WOMAC Score at 6 Month (mean $\pm$  s.d.) of patients was higher in Intra Articular PRP Group [64.7440 $\pm$  3.2437] compared to Proximal Fibular Osteotomy Group patients [51.1400 $\pm$  3.0326] which was statistically significant ( $p < 0.0001$ ).

## CONCLUSION

- We found that Age was not statistically significant in two groups.
- We found that in Intra Articular PRP Group and in Proximal Fibular Osteotomy Group, more patients were present in Grade 2 and this was not statistically significant.
- Complication was higher in Intra Articular PRP Group compared to Proximal Fibular Osteotomy Group though it was not statistically significant and we also found that Pre-op VAS had no significant difference with both groups.
- Our study showed that the mean Post-op VAS at 1 Month was higher in Proximal Fibular Osteotomy Group compared to Intra Articular PRP Group patients which was statistically significant ( $p < 0.0001$ ).
- We observed that Post-op VAS at 3 Month and Post-op VAS at 6 Month were significantly high in Intra Articular PRP Group compared to Proximal Fibular Osteotomy Group patients.
- Present study showed that Pre-op WOMAC Score also had no significant difference with both groups.
- We examined that Post-op WOMAC Score at 1 Month was significantly higher in Proximal Fibular Osteotomy Group compared to Intra Articular PRP Group patients and we also examined that Post-op WOMAC Score at 3 Month and Post-op WOMAC Score at 6 Month were significantly higher in Intra Articular PRP Group compared to Proximal Fibular Osteotomy Group patients.
- At 1 month, Pain was less in intra articular platelet rich plasma compared to Proximal Fibular Osteotomy but Pain was significantly less in Proximal Fibular Osteotomy both at 3 Month and 6 Month.
- The study highlights that both the VAS scores and WOMAC scores were significantly better at 3 and 6 months after surgery. We concluded that proximal fibular osteotomy provides only short- term relief in patients of medial compartment knee osteoarthritis of knee in post-menopausal women.

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