

Original research paper

## A study on clinical profile of patients with medial compartment knee osteoarthritis

<sup>1</sup>Dr. Harshavardhan BR, <sup>2</sup>Dr. Sachin K, <sup>3</sup>Dr. Prakash Sasnur

<sup>1</sup>Senior Resident, Department of Orthopedics, SGITO, Bangalore, Karnataka, India

<sup>2</sup>Fellow in Arthroscopy and Sports Medicine, Department of Orthopedics, Sanjay Gandhi Institute of Trauma and Orthopaedics, Bangalore, Karnataka, India

<sup>3</sup>Professor, Department of orthopedics, Al-Ameen Medical College, Bijapur, Karnataka, India

### Corresponding Author:

Dr. Prakash Sasnur

### Abstract

Knee osteoarthritis is one of the most common joint disorders, and it causes severe pain and immobility. Total knee replacement (TKA) is very effectively relieves pain and improves knee function in patients with late-stage knee osteoarthritis. However, TKA is expensive and complex, and some patients need a second revision. The study included patients with medial compartment osteoarthritis, who were treated by proximal fibular osteotomy. The patients were diagnosed of knee osteoarthritis by American College of Rheumatology criteria and severity of disease was graded by Kellgren and Lawrence grading system. In our study, total number of patients was 27. Among them 3 were bilateral cases. Hence total number of knees was 30. Among 30 knees, 14 were right knees and 16 were left knees. The diagnosis of stage of osteoarthritis was done by using Kellgren and Lawrence classification system. Among 30 knees, 16 cases were in Stage 2, 13 cases were in Stage 3 and 1 case was in Stage 4.

**Keywords:** Knee osteoarthritis, medial compartment, total knee replacement

### Introduction

The knee is the largest joint in the body. It is a complex hinge joint made up of the lower end of the femur, the upper end of the tibia and the patella, which slides in a groove on the end of the femur <sup>[1]</sup>.

Knee osteoarthritis is one of the most common joint disorders, and it causes severe pain and immobility. Total knee replacement (TKA) is very effectively relieves pain and improves knee function in patients with late-stage knee osteoarthritis. However, TKA is expensive and complex, and some patients need a second revision <sup>[2]</sup>.

High Tibial Osteotomy (HTO) has been the surgical treatment of choice for young patients with osteoarthritis of the medial compartment of the knee, and it is aimed at correcting alignment and delaying the time until TKA is required. However, HTO also has some disadvantages, including a delayed time to full weight bearing and risks of nonunion or delayed union, peroneal nerve paralysis and wound infection.

Proximal fibular osteotomy (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.

Zhang Y *et al.* in their study conducted on 8 patients concluded that the proximal fibular

osteotomy and HTO using the originally designed wedge-shape absorbable spacer, was a minimally invasive, safe, simple and effective procedure for the management of medial compartment OA of the knee joint [3].

Yang ZY *et al.* in their study concluded that proximal fibular osteotomy may reduce knee pain significantly in the varus osteoarthritic knee and leads to improvement in radiographic appearance and functional recovery of the knee joint. PFO may delay or even negate the need for total knee arthroplasty as it is a safe, simple and effective procedure that is an alternative to total knee arthroplasty for medial compartment OA of the knee joint if proper care is taken to avoid potential nerve injuries. Their study confirms the safety and efficacy of partial fibular osteotomy in the treatment of medial compartment OA. Proximal osteotomy of the fibula weakens the lateral fibular support and leads to a correction of the varus deformity, which can subsequently shift the loading force from the medial compartment more laterally, leading to decreased pain and a satisfactory functional recovery [4].

High tibial osteotomy is a commonly used method to treat knee varus deformities due to OA. It aims to improve the mechanical axis passing from the center of the hip, through the knee joint, to the center of the tibiotalar joint in the coronal plane. Osteotomies performed proximal to the tibial tubercle may interfere with function of the patellar tendon [26-30]. This patella-femoral disturbance is common in patients who have previously undergone proximal tibial osteotomies. In the authors' experience, a simple fibular osteotomy can relieve knee pain and correct varus deformity as effectively as high tibial osteotomy [5].

Bone mass decreases as part of the normal aging process. Varying degrees of settlement of bone mass exist in the load-bearing joints, such as the knees, hips, ankles and spine. In the proximal tibia, the lateral support of the fibula to the lateral tibial plateau routinely leads to non-uniform distribution of weight, which is more severe in the medial plateau than in the lateral plateau. The slope of the tibial plateau arising from non-uniform distribution of weight, results in a transverse shearing force, with the femoral condyle shifting medially during walking and sports. There is also evidence that tibiofemoral articular stress distribution is related to the progression of knee OA [6].

## Methodology

The study included patients with medial compartment osteoarthritis, who were treated by proximal fibular osteotomy.

The patients were diagnosed of knee osteoarthritis by American College of Rheumatology criteria and severity of disease was graded by Kellgren and Lawrence grading system.

The patients were selected by the help of following inclusion and exclusion criteria:

All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean  $\pm$  standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries and diagrammatic presentation.

The difference of the means of analysis variables between two time points in same group was tested by paired t test.

If the p-value was  $< 0.05$ , then the results were considered to be statistically significant otherwise it was considered as not statistically significant.

## Inclusion criteria

1. Predominantly medial compartment osteoarthritis with Varus knees.
2. Patients with Kellgren-lawrence grade 1, 2 and 3.
3. At least 2mm gap in AP stress varus xrays.
4. Good lateral joint space in weight bearing xrays.
5. A motivated patient, who understands that this is a simple procedure that buys time and

- delays knee replacement surgery.
6. Patients who are medically fit and willing for surgery.
  7. Patients with BMI less than 23.
  8. Patients in whom conservative management has failed and who have radiographic evidence of significant Varus.

### Exclusion criteria

1. Patients with post traumatic knee osteoarthritis or inflammatory joint disease.
2. Patients with history of previous operations or fractures of knee joint.
3. Kellgren- Lawrence Grade 4 osteoarthritis.
4. Septic or tubercular arthritis and genu valgus of knee joint.
5. Local infection.
6. Anatomic anomalies.
7. Patients refusing informed consent.
8. Patients with irregular follow up.

### Results

In our study, the youngest patient was 40 years and the oldest patient was 76 years. The mean age was 57.9 years. The different age groups were categorized into 40-50, 51-60, >60years.

**Table 1:** Distribution of Cases According to Age

Age (YRS)	N	Percent
40-50	5	16.7
51-60	15	50
>60	10	33.3
Total	30	100

Out of 30 knees, 16 were females and 14 were males. Females constituted 53.3% of cases and males were 46.7% of cases.

**Table 2:** Distributions of Cases According to Sex

Sex	N	Percent
Male	14	46.7
Female	16	53.3
Total	30	100

In our study, total number of patients was 27. Among them 3 were bilateral cases. Hence total number of knees was 30. Among 30 knees, 14 were right knees and 16 were left knees.

**Table 3:** Distribution of Cases According to Side

Side	N	Percent
Left	16	53.3
Right	14	46.7
Total	30	100

Patients were also divided based on their presentation i.e. duration of pain suggesting chronicity in years. The mean duration of pain suffered in years was 2.4 years.

**Table 4:** Distribution of cases according to years of pain

Years of Pain	N	Percent
1	9	30
2	9	30
3	6	20
4	5	16.7
>4	1	3.3
Total	30	100

The diagnosis of stage of osteoarthritis was done by using Kellgren and Lawrence classification system. Among 30 knees, 16 cases were in Stage 2, 13 cases were in Stage 3 and 1 case was in Stage 4.

**Table 5:** Distribution of Cases According to Staging (K&L)

Staging (K&L)	N	Percent
Stage 2	16	53.3
Stage 3	13	43.3
Stage 4	1	3.3
Total	30	100

## Discussion

The mean age of the patient at the time of surgery was 57.9 years, with the range of 40 to 76 years. Majority of studies showed that the fifth and sixth decades are the most affected age group. The following table compares the incidence of age observed by various authors to that of our study.

**Table 6:** Comparison of Age Incidence

Study	Year of Study	Mean Age
Zong-You Yang, Y Zhang <i>et al.</i> <sup>[7]</sup>	2015	59.2 years (Range 47-69 years)
Xioahu Wang, Lei Wei <i>et al.</i> <sup>[8]</sup>	2016	63.96+-7.48 years (Range 48-78 years)
Guoping Zou, Weibin Lan <i>et al.</i> <sup>[9]</sup>	2017	62.3+-13.5 years
Y. Zhang, Y. Yu <i>et al.</i> <sup>[10]</sup>	2017	61.8 years (Range 49-76 years)
DI Qin, Wei Chen <i>et al.</i> <sup>[10]</sup>	2018	62.5+-6.7 years
Present Study	2018-2020	57.9 years (Range 40-76 years)

In our study, out of 20 patients, 16 patients (53.3%) were females whereas 14 patients (46.7%) were males. Our findings for sex incidence were comparable to the results in various studies done all over the world.

The following table compares the sex incidence by various authors to that of our findings.

**Table 7:** Comparison of Sex Incidence

Study	Year of Study	Sex	
		Male	Female
Zong-you Yang , Y Zhang <i>et al.</i> <sup>[7]</sup>	2015	34 (30.9%)	76 (69.1%)
Xioahu Wang, Lei Wei <i>et al.</i> <sup>[8]</sup>	2016	12 (25.53%)	35 (74.47%)
Guoping Zou, Weibin Lan <i>et al.</i> <sup>[9]</sup>	2017	12 (30%)	28 (70%)
Y. Zhang, Y. Yu <i>et al.</i> <sup>[10]</sup>	2017	1 (12.5%)	7 (87.5%)
Di Qin, Wei Chen <i>et al.</i> <sup>[11]</sup>	2018	7 (13.46%)	45 (86.54%)
Present Study	2018-2020	14 (46.7%)	16 (53.3%)

In our study we found that right side had higher incidence as compared to the left. Various studies have difference in side predominance that is evident from the following table.

**Table 8:** Comparison of Side Involvement

Study	Year of Study	Side	
		Right	Left
Zong-You Yang, Y Zhang <i>et al.</i> [7]	2015	62 (56.36%)	48 (43.63%)
Di Qin, Wei Chen <i>et al.</i> [11]	2018	35 (52.24%)	32 (47.76%)
Present Study	2018-2020	14 (46.7%)	16 (53.3%)

The stage of osteoarthritis was diagnosed by help of the Kellgren and Lawrence scoring system. In our study, the majority (96%) of the patients belongs to type 2 and type 3 of osteoarthritis. The pre-operative stage of osteoarthritis is also associated with the functional outcome of the patients. In our study, the patients belonging to stage 2 and stage 3 are associated with good outcome; and poor outcome patients are mostly associated with stage 4 osteoarthritis [12].

Our study is comparable with the following studies.

**Table 9:** Incidence of Stage of Osteoarthritis

Study	Year of Study	Stage	
		I And IV	II and III
Guoping Zou, Weibin Lan <i>et al.</i> [7]	2017	30 (75%)	10 (25%)
Y. Zhang, Y. Yu <i>et al.</i> [10]	2017	0 (0%)	8 (100%)
Di Qin, Wei Chen <i>et al.</i> [11]	2018	0 (0%)	67 (100%)
Present Study	2018-2020	1 (3.3%)	29 (96.6%)

## Conclusion

- Maximum number of cases were in the age group of 51 to 60 years (15 knees, 50%) with an average age of 57.9 years.
- Female outnumbered male (female 16 knees, male 14 knees)
- Incidence among left knee was more common (53.3%) than right knee (46.7%)
- In our study stage 2 OA were found to be more (53.3%) than stage 3(43.3%) and stage 4(3.3%).

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