

RADIOLOGICAL AND FUNCTIONAL OUTCOME IN PROXIMAL FIBULAR OSTEOTOMY IN MEDIAL COMPARTMENT OSTEOARTHRITIS OF KNEE

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INTRODUCTION

Knee osteoarthritis is a progressive disease of the joint that causes articular cartilage degeneration, leading to pain, deformity, incapacity, and restricted range of motion. It is most commonly observed in males and females over 45 years. Contributing factors include aging, lifestyle, occupation, lack of physical activity and obesity.

Total knee replacement is typically seen to be the best course of action for elderly people with tri-compartmental osteoarthritis. Analgesic drugs, physical therapy, intra-articular visco-supplementation, and intra-articular injections of platelet-rich plasma or corticosteroids are non-operative treatments for arthritis of the knee. In contrast, younger patients with only medial compartment osteoarthritis and a varus deformity may benefit from high tibial osteotomy (HTO) or unicompartmental knee replacement.

Following these surgical procedures, there is a longer recovery period postoperatively and limitations in activity or weight bearing. It is therefore necessary to develop a simpler approach that yields satisfactory functional results, enhances the quality of life for the patients, and requires less time for recovery.

In this regard, proximal fibular osteotomy is a relatively novel and innovative surgery that has shown to be exceptionally effective in treating medial compartment arthritis of the knee based on both published and ongoing trials.

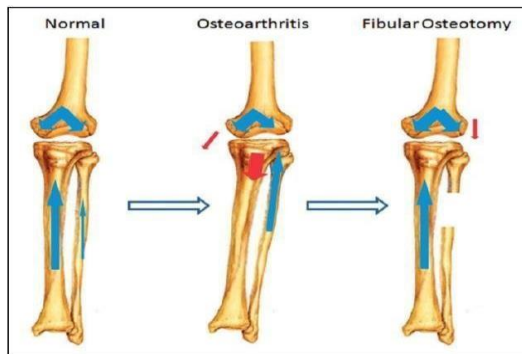
The current hypothesis suggests that the medial aspect of the knee, being primarily cancellous bone with only one cortical support, becomes insufficient over time, leading to mild collapse as the patient ages. The lateral aspect, supported by three cortices (one from the tibia and two from the fibula), is stronger, more rigid, and less prone to collapse. This structural difference may contribute to worsening varus deformity with age, causing medial compartment osteoarthritis and a gradually decreasing medial joint space.[15]



Figure - 1

With this theory in mind, we developed the technique of transecting a 20 millimeters of fibular shaft 7cms-8cms

exactly below the fibular head. This is done in order to relieve much concentrated medial compartment pressure and eventually realign the axis of the weight bearing on knee.



Possible mechanism of pain relief and joint space improvement after proximal fibular osteotomy. Left: Equal loads were distributed on the medial and lateral tibia plateau in the normal condition. Middle: A greater load was shifted to the medial tibia plateau. Right: The abnormal load was corrected after proximal fibular osteotomy.

Figure – 2

Aims and objective

The aim/ objective of the present study was

1. To Assess the Role of Proximal Fibular Osteotomy in the treatment of early stages of medial compartment Osteoarthritis of knee joint
2. To assess PFO functional and radiological outcome in medial compartmental OAknee.

Review of Literature:

The likelihood of developing osteoarthritis (OA) increases significantly with each passing decade after age 45. [A1] The onset and progression of knee OA are influenced by a combination of genetic, mechanical, environmental, structural, and social factors. During growth and development, the tibial and femoral cartilage adapts to the cyclic loading that occurs as the person begins to walk. [A2] This adaptation leads to thickening of the hyaline cartilage lining the femoral condyle in areas of maximum weight bearing, both in anterior-to-posterior and medial-to-lateral directions. [A2]

The mechanics and loading patterns of the tibiofemoral

joint during walking greatly impact the regional growth of the hyaline cartilage. Disruptions in normal gait mechanics due to minor slips, falls, ligament laxity, obesity, injuries, or poorly fitting shoes can alter these loading mechanisms. This shift can cause weight-bearing on areas of cartilage that are not well-suited to handle these loads. [A2] While healthy cartilage may respond to loading by increasing its thickness, damaged or unhealthy cartilage tends to degenerate and lose its thickness. [A2]

The beginning and development of knee OA can be influenced by a number of biomechanical variables among them the notably important factors include an increased internal femorotibial rotation and the peak knee adduction moment (Madd) during weight-bearing. Madd is recognized as a crucial measure for studying medial compartment knee OA, [A6,A7] serving as an indicator of medial contact force, [A8] disease progression, [A9,A10] and pain severity. [A11] Normal tibiofemoral loading can be altered in knees with ACL tears or OA, transferring stress to cartilage areas that were not previously suited for such loads. This stress can lead to the degradation of these cartilage regions. [A2-A5]

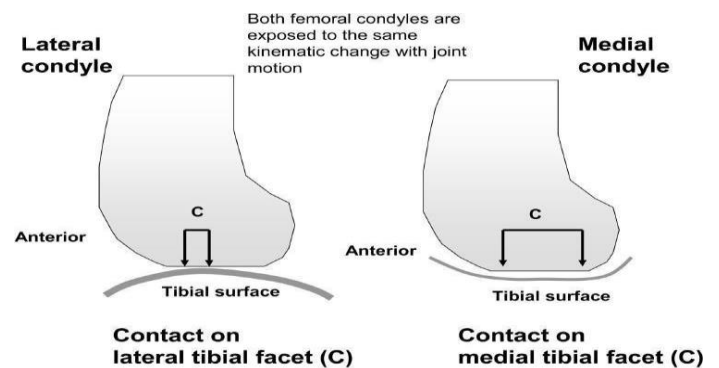


Figure 1. A comparison of the tibiofemoral contact on the lateral and medial joint compartments (lateral view). When exposed to the same kinematic change during motion, the medial femoral condyle experiences greater contact with the medial tibial facet relative to the lateral joint compartment.

Figure – 3

Knee osteoarthritis is a progressive condition that involves the degeneration of cartilage in the tibia-femoral and patella-femoral compartments of the joint. This condition can affect any joint in the body, resulting in chronic pain, functional limitations, emotional distress, and potential disability, ultimately impacting the quality of life. [A12,13]

Biomechanical research suggests that during single-leg stance, the ground reaction vector (GRV) passes medially to the knee joint center. Consequently, the medial compartment of the knee supports 64%–77% of the load, while the lateral compartment bears 23%–36%. This uneven load distribution is believed to be a contributing factor in the development of osteoarthritis. [A15]

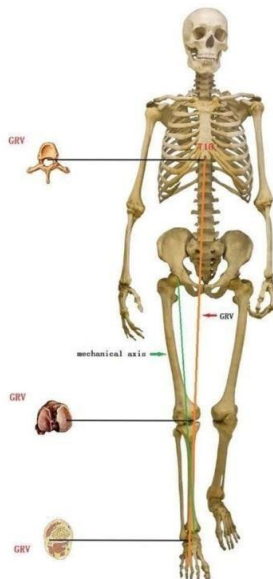


Fig. 1. Demonstration of the location of ground reaction vector (GRV) at T10, knee and ankle joint level. At knee, the GRV is medial deviated compared to the lower limb mechanical axis. At ankle, GRV approximately locates at the lateral wall of calcaneus.

Figure – 4

Knee varus deformities are common in individuals with osteoarthritis (OA), accounting for 64% of cases of idiopathic OA. [A14] These deformities are characterised by a restricted medial joint space and a mechanical femorotibial axis of less than 180 degrees on standing AP radiographs. High tibial osteotomy (HTO) is widely recognized for treating knee varus deformities due to medial femorotibial OA, especially in young and active individuals. [A16, A17] Following HTO, many patients successfully return to work and physical activities. However, the procedure's technical complexity can lead to complications, including nonunion, nerve injury, vascular injury, hardware irritation, and infection. [A18]

The knee joint begins to bear weight at the onset of the gait stance phase, and various activities can impact disease progression and treatment outcomes. [A19] A notable

concern is that pain reduction might coincide with increased knee joint force during weight-bearing. [A20, A21] Knee adduction moment is commonly used to characterise aberrant loading environment in osteoarthritis of the knee. Although this characteristic is frequently the focus of knee OA gait study, recent data indicates that other lower limb joints' kinematics and kinetics, as well as muscle activation patterns and knee kinematics, all play important roles in the disease's progression. Still, not all articular cartilage deterioration can be attributed to knee stress alone. Repeated wear and tear from excessive loading leads to continuous stress, playing a critical role in OA development. To assess this constant load-bearing, the concept of collective load combines loading exposure to illustrate the accumulated stress on knee tissues during physical activity. [A22]

Understanding the mechanical aspects of osteoarthritis progression has inspired strategies to reduce physiological loads on the weight-bearing knee, thereby potentially alleviating pain and slowing OA progression. [A23] Proximal fibular osteotomy (PFO) enhances knee wear patterns and varus biomechanics, reducing arthritic changes and pain. [A24]

Compared to other treatments, PFO has a number of advantages, including being simple, safe, affordable, and easy to execute. It also delivers significant postoperative pain relief and a shortened recovery period. Following surgery, patients can instantly bear their entire weight. [A25]

Compared to high tibial osteotomy, PFO has advantages in mean surgery time, bleeding amount, drainage volume, and time required for full weight-bearing. Both procedures show comparable functional outcomes and improvements in the Numerical Pain Rating Scale (NPRS). [A26]

Materials and Methods:

This randomized controlled prospective study was conducted at the Department of Orthopedics, Dr. D.Y. Patil Medical College and Hospital, Pimpri, Pune. The study included 32 patients with medial compartmental osteoarthritis of the knee joint who attended our outpatient clinic for follow-up. All participants were over 40 years old. Informed written consent was obtained from all patients and their attendants. The study protocol was reviewed and approved by the Institutional Ethics

Committee.

Data were collected using a structured proforma, with entries made based on observations at preoperative, intraoperative, and postoperative intervals.

Source of Funding: All investigations and procedures were performed only if clinically indicated. No additional investigations were conducted solely for the study. Most procedures and investigations were provided free of charge; any clinically indicated investigations, procedures, or implants were to be covered by the patient in accordance with hospital policy.

Inclusion Criteria:

1. Patients older than 40 years
2. Presence of medial compartment arthritis with at least 2mm medial joint space on weight-bearing X-rays
3. Varus deformity less than 15 degrees
4. Fixed flexion deformity less than 15 degrees

Exclusion Criteria:

1. Patients younger than 40 years
2. Tri-compartmental osteoarthritis
3. Varus deformity greater than 15 degrees
4. Fixed flexion deformity greater than 15 degrees

Study Procedure

Patient Evaluation:

All 32 patients underwent the following assessments:

1. Comprehensive history taking
2. Detailed clinical examination
3. Standard weight-bearing plain radiographs of the affected knee joint in two orthogonal planes: anteroposterior and lateral views
4. Routine pre-anesthetic evaluation
5. Pain assessment using the Visual Analogue Scale (VAS)
6. Functional status evaluation using the modified Oxford Knee Scoring System

Knee pain was evaluated with the Visual Analogue Scale, while knee ambulation activities were documented using the Oxford Knee Score both preoperatively and at 0, 1, 3, and 6 months postoperatively. Preoperative and

postoperative weight-bearing and whole lower extremity radiographs were taken for all patients to analyze lower extremity alignment and the medial/lateral knee joint space ratio.

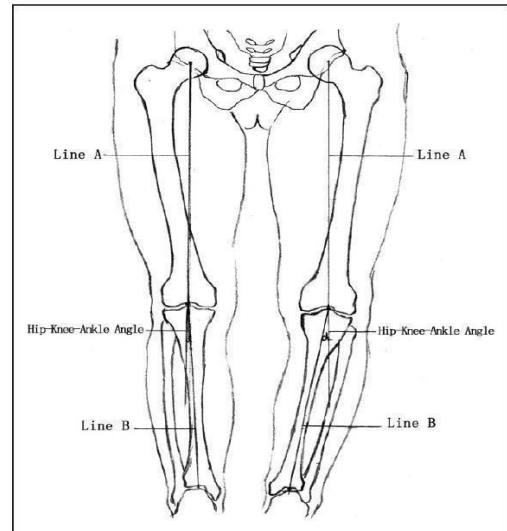


Figure 2. Measurement of the hip-knee-ankle angle. Line A was drawn from the centre of the femur to the centre of the knee, and line B was drawn from the centre of the knee to the centre of the ankle. ie hip-knee-ankle angle is the intersection angle α between lines A and B.

Figure – 5

Momentarily, the medial joint space was determined by one vertical line [-A-] between 2 horizontal lines(-C-&-D-) that is drawn from the lowest point of the medial condyle of involved side femur and medial condylar plateau of ipsilateral tibia. The lateral joint space was ascertained by one vertical line [-B-] between 2 horizontal lines[-E-&-F-] which is marked from the lowest point of the lateral condyle of the involved side femur and lateral condylar plateau of the ipsilateral tibia.

The proportion of the knee joint space (medial/lateral) can be ascertained by the division of [A]/[B]. The hip to knee ; knee to ankle angle will be calculated taking in reference of the involved side lower limb scanogram (full-limb xray). The line A must be drawn from the midpoint of head of the femur to the centre of the knee joint, and the other line B will be marked from the midpoint of the knee joint to the midpoint of the ankle-joint. The H- K-A angle will be given by the angle subtended in between lines A and B.

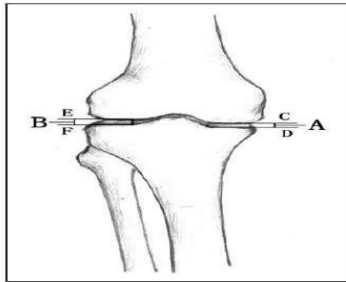


Figure 6. Measurement of ratio of knee joint space. The medial joint space was determined by a vertical line (A) between two horizontal lines (C and D) that were drawn from the lowest point of the medial condyle of the femur and medial plateau of the tibia, respectively. The lateral joint space was determined 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.

Figure - 6

Verbal Numerical Scale

If "0" is "no pain" and "10" is the worst pain you can imagine, where is your pain now? on average? at its worst? at its best?

Word Scale

None Mild Moderate Severe Excruciating

Visual Analogue Scales

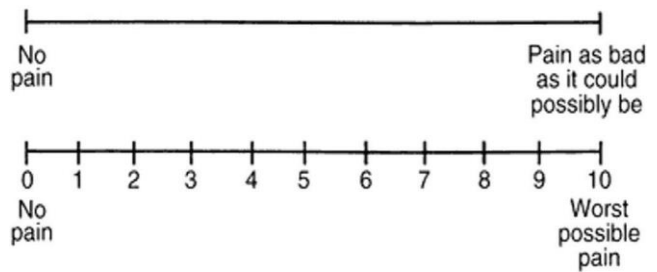


Figure - 7

VASSCORINGSYSTEM:

Figures: Tools Commonly Used to Rate Pain

Visual Analogue Scale

Choose a Number from 0 to 10 That Best Describes Your Pain

No Pain 1 2 3 4 5 6 7 8 9 10 Distressing Pain Unbearable Pain

ASK PATIENTS ABOUT THEIR PAIN
INTENSITY—LOCATION—ONSET—DURATION—VARIATION—QUALITY

"Faces" Pain Rating Scale

0 NO HURT
1 HURTS LITTLE BIT
2 HURTS LITTLE MORE
3 HURTS EVEN MORE
4 HURTS WHOLE LOT
5 HURTS WORST

Figure - 6

OXFORD KNEES CORING SYSTEM:

Oxford Knee Score

..... Clinician's name (or ref) Patient's name (or ref)

Please answer the following 12 multiple choice questions.

During the past 4 weeks.....

- How would you describe the pain you usually have in your knee?
 - None
 - Very mild
 - Mild
 - Moderate
 - Severe
- Have you had any trouble washing and drying yourself (all over) because of your knee?
 - No trouble at all
 - Very little trouble
 - Moderate trouble
 - Extreme difficulty
 - Impossible to do
- Have you had any trouble getting in and out of the car or using public transport because of your knee? (With or without a stick)
 - No trouble at all
 - Very little trouble
 - Moderate trouble
 - Extreme difficulty
 - Impossible to do
- For how long are you able to walk before the pain in your knee becomes severe? (With or without a stick)
 - No pain = 50 min
 - 15 - 30 minutes
 - 5 - 15 minutes
 - Around the house only
 - Not at all - severe on walking
- After a meal (eat at a table), how painful has it been for you to stand up from a chair because of your knee?
 - Not at all painful
 - Slightly painful
 - Moderately painful
 - Very painful
 - Unbearable
- Have you been limping when walking, because of your knee?
 - Rarely / never
 - Sometimes or just at first
 - Often, not just at first
 - Most of the time
 - All of the time
- Could you kneel down and get up again afterwards?
 - Yes, easily
 - With little difficulty
 - With moderate difficulty
 - With extreme difficulty
 - No, impossible
- Are you troubled by pain in your knee at night in bed?
 - Not at all
 - Only one or two nights
 - Some nights
 - Most nights
 - Every night
- How much has pain from your knee interfered with your usual work? (including housework)
 - Not at all
 - A little bit
 - Moderately
 - Greatly
 - Totally
- Have you felt that your knee might suddenly give away or let you down?
 - Rarely / Never
 - Sometimes or just at first
 - Often, not at first
 - Most of the time
 - All the time
- Could you do household shopping on your own?
 - Yes, easily
 - With little difficulty
 - With moderate difficulty
 - With extreme difficulty
 - No, impossible
- Could you walk down a flight of stairs?
 - Yes, easily
 - With little difficulty
 - With moderate difficulty
 - With extreme difficulty
 - No, impossible

The Oxford Knee Score is: [60]

Grading for the Oxford Knee Score

- Score 0 to 19** May indicate severe knee arthritis. It is highly likely that you may well require some form of surgical intervention, contact your family physician for a consult with an Orthopaedic Surgeon.
- Score 20 to 29** May indicate moderate to severe knee arthritis. See your family physician for an assessment and x-ray. Consider a consult with an Orthopaedic Surgeon.
- Score 30 to 39** May indicate mild to moderate knee arthritis. Consider seeing your family physician for an assessment and possible x-ray. You may benefit from non-surgical treatment, such as exercise, weight loss, and /or anti-inflammatory medication
- Score 40 to 48** May indicate satisfactory joint function. May not require any formal treatment.

Figure - 8

OPERATIVE PROCEDURE :



Figure-9

Patient placed in supine with knee flexed 45 degrees and the level of osteotomy is pre-determined and measurements marked.



Figure -10

Skin incision of length made 6-7cm with fibular head and mark and using the previously marked points.



Figure -11

The soleus and peroneus muscles are carefully retracted and blunt dissection carried out using fingers.

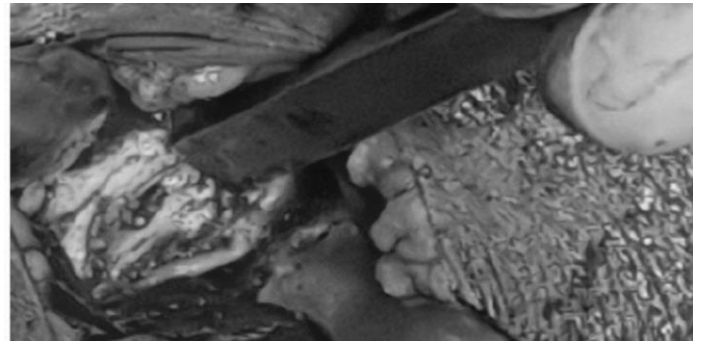


Figure -12

The periosteum is scraped off from the shaft.



Figure -13

The osteotomy level is marked using drill holes and further osteotomy can be done.



Figure -14

The oscillating saw is used to make osteotomy



Figure – 15

The osteotomised fragment being removed and ends smoothed. The wound closed using nylon interrupted sutures and compressive dressing applied.

RESULTS:

This study involved 32 patients with medial compartment osteoarthritis who underwent proximal fibular osteotomy at the Department of Orthopaedics. Out of these, 29 patients were consistently followed up at postoperative, 1 month, 3 months, and 6 months intervals. Two patients were lost to follow-up after their first month visit, and one patient did not return for follow-up after the surgery. The average BMI of the participants was 28.9, with a mean age of 57 years. The cohort comprised 19 males (59.37%) and 13 females (40.62%).

Various parameters, including the modified Oxford Knee Score (OKS), Visual Analogue Scale (VAS), Tibiofemoral Angle (TFA), Range of Motion (ROM), and Medial Joint Space (MJS), were evaluated during each visit and recorded. Outcomes were analyzed based on functional and radiological criteria.

Functionally, 18 patients who demonstrated radiological improvement also had favorable functional scores. Five patients exhibited good functional results despite no radiological improvement, while four patients showed no improvement and two experienced worsening symptoms.

The most significant increase in medial joint space was 0.3 mm by the six-month mark, which was statistically significant ($P < .001$).

Preoperatively, the average medial joint space was 2.73 mm, increasing to 2.9 mm at the three-month follow-up and 3.1 mm at six months. The average preoperative varus angulation was 10.18 degrees, which decreased to 8.62 degrees at the six-month follow-up. The average preoperative VAS score was 7.93, which remained unchanged immediately after surgery but decreased to 5.81 at one month and 4.21 by six months.

Complications:

Complications were minimal, with only superficial wound infections occurring postoperatively. These infections were effectively managed with antibiotics, and the wounds healed appropriately.

ANALYSIS OF DATA

This section focuses on analyzing and interpreting the data collected from 31 patients with medial compartment osteoarthritis who underwent proximal fibular osteotomy. The data were collected, reviewed, tabulated, and analyzed to meet the study's objectives. Statistical analysis was employed to organize the data and to determine correlations between various factors.

Data Organization

The collected data are categorized into the following sections:

Sections	Data
A	Demographic characteristics of patients.
B	Evaluation of functional scoring system components across subsequent follow up.
C	Documentation of problems encountered.

D	Correlation between radiological and functional outcomes with final results.
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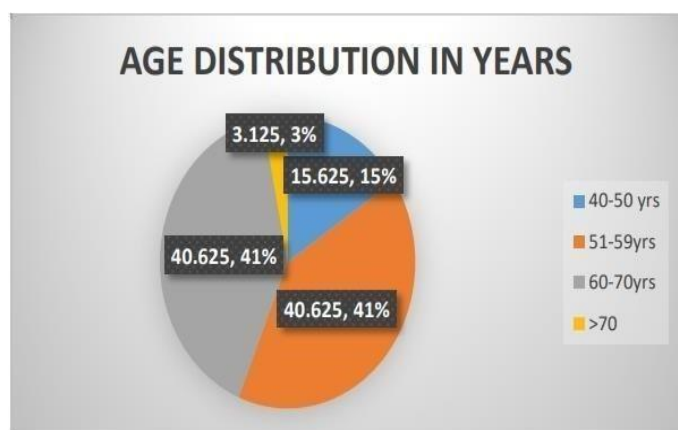
Section A: Description of Demographic Characteristics AGE:

The mean age of the participants was 43.97 years, with a 5.43-year standard deviation. The patients' ages are distributed as shown in Table 1, with a significant portion of them being in the 45–59 age group.

Table 1: Age group distribution of patients (N=32)

Age group (years)	Frequency(N)	Percentage (%)
40-50	5	15.625
51-59	13	40.625
60-70	13	40.625
>70	1	3.125

Table – 1



Graph – 1

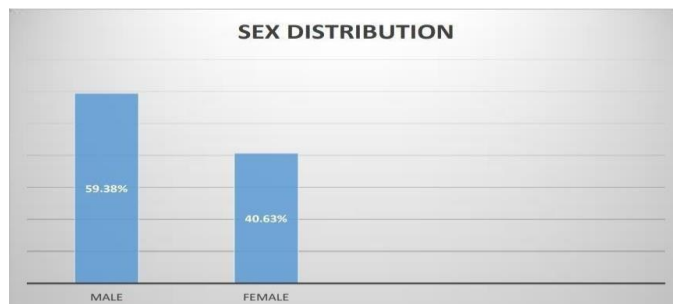
SEX DISTRIBUTION:

Table 2 illustrates the distribution of patients by gender in the study, with the majority being male (66.7%).

Table 2: Sex distribution of patients (N=32)

Gender	Frequency(N)	Percentage(%)
Male	19	59.375
Female	13	40.625

Table – 2



Graph – 2

Section B: Evaluation of Functional Scoring System Components Throughout Follow-Up Visits

Kellgren-Lawrence Grade

X-ray grading of osteoarthritis (OA) was performed before assessing all parameters.

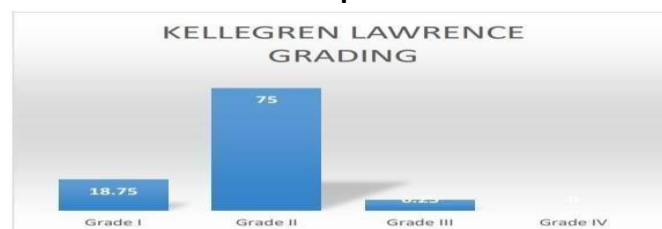
The distribution of Kellgren-Lawrence (KL) grades among study participants with osteoarthritis is shown in Table 3. Majority of the patients were diagnosed with grade 2 medial compartment OA.

Table 3: KL grade distribution of patients (N=32)

Table – 3

KL grade	Frequency(N)	Percentage(%)
Grade I	6	18.75
Grade II	24	75
Grade III	2	6.25
Grade IV	0	0

Graph - 3



VISUAL ANALOGUE SCALE:

The mean preoperative Visual Analog Scale (VAS) score among study participants was 5.93, with a standard deviation of 1.04. Table 4 depicts the distribution of these preoperative VAS scores. Most patients reported a pain level of 6, which represented 46.87% of the cohort.

Table 4: VISUAL ANALOGUE SCALE distribution of patients preoperatively (N=32)

VAS SCORE	Frequency (N)	Percentage (%)
1	0	0
2	0	0
3	0	0
4	3	9.375
5	6	18.75
6	15	46.87
7	6	18.75
8	2	6.25
9	0	0
10	0	0

Table – 4

Table 5: VISUAL ANALOGUE SCALE distribution of patients 6 MONTHS followup(N=32)

VAS SCORE	Frequency (N)	Percentage (%)
1	0	0
2	0	0
3	0	0
4	3	9.375

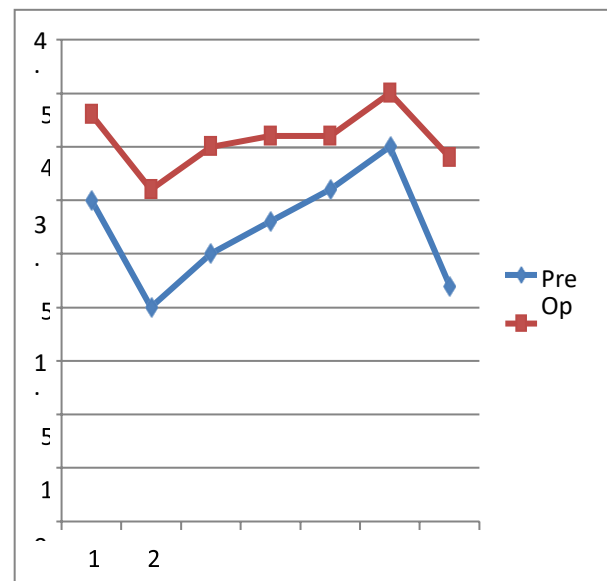
5	1	4.75
6	7	21.875
7	4	12.5
8	2	6.25
9	0	0
10	0	0

Table – 5

3 patients lost followup till end of the study. There was a decrease in pain scale in further two patients“(for a pain scale value of 8 from 6.25% to significant decrease of 3.55% which indicates that our surgery gave significant pain relief.

MEASUREMENT OF MEDIAL JOINT SPACE NARROWING:

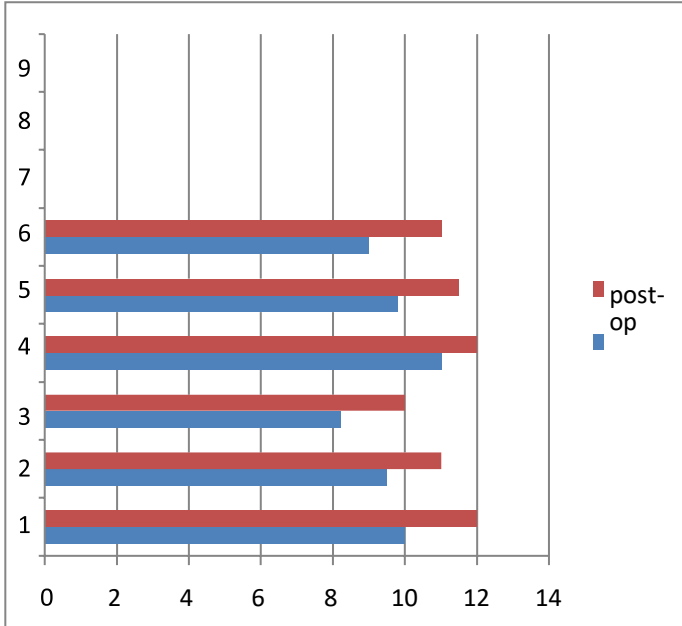
The mean medial joint space of patients who participated in the research preoperatively was 2.73 mm.



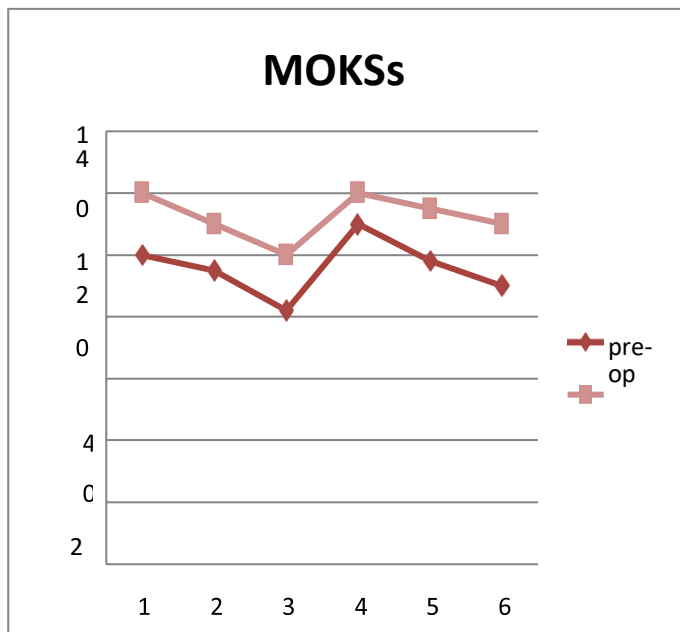
Whereas, by the end of sixth month it was 3.1mm after surgery which indicates significant increase in medial

joint space.

MEASUREMENT OF VARUS ANGULATION:



Graph - 5



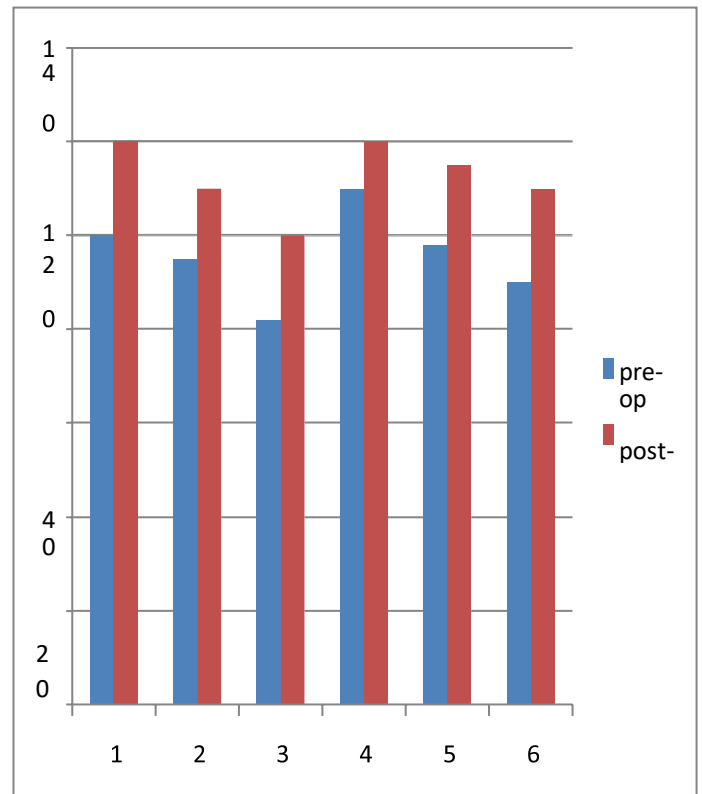
Graph -6

The average varus angle at 6months followup actually reduced to 9.7degrees from 11.5degrees.

MODIFIED OXFORD KNEE SCORE:

The figure shows average distribution of the modified oxford knee score assessed at the preoperative and 6 months follow up.

RANGE OF MOVEMENT DISTRIBUTION:



Graph -7

The figure shows average distribution of the range of motion of knee evaluated at the pre operative and immediate and 6 month follow up which shows significant improvement inROM after surgery from average 95.8to 102.5degrees.

Section C:

Analysis of the complications/ problems.

COMPLICATIONS:

Table 12 describes complications review of patients in the research. Most of patients didn't have any complications

Table 12 : complications encountered in the patients (N=32)

COMPLICATION	Frequencies(N)	Percent(%)
No complication	31	96.87
Wound Infection	1	3.125
Neuropraxia	0	0
Vascular injury	0	0
Joint infection	0	0

Table – 6

Section D: Correllating the functional and radiological outcome of the procedure done and establishing the end result.

Table 1:Analysing the functional and radiological outcome of the procedure done and establishing the end result (1month)

Months	Functional outcome	Outcome variable						Radiological		p-value
		Range of movement		Oxford knee score		Visual analogue scale		varus	Medial joint space	
		N	%	N	%	N	%			
6	Satisfactorily improvement	23		23		23			18	0.005
	Worsen	2		2		2		2		
	Remains same	4		4		4		9		

2 patients lost followup at 1 month 1 patient didn't turn up

**p<0.001highlysignificant

Table 14: Association of the functional outcome during follow-up period patients with their complications (3months)

Months	functional outcome	Outcome variable						Radiological		p-value
		Range of movement		Oxford knee score		Visual analogue scale		Varus	Medial joint space	
		N	%	N	%	N	%			
6	Satisfactory improvement	23		23		23			18	0.005
	Worsen	2		2		2		2		
	remains same	4		4		4		9		

Table 15: Association of the functional outcome during follow up visits among OAKNEE patients with their complications.(6months)

Months	Funcio nal outcom e	Outcome variable						Radiological		p-value
		Range of movement		Oxford knee score		Visual analogue scale		Varus	medial joint space	
		N	%	N	%	N	%			
6	Satisfactorily improvement	23		23		23			18	0.005
	Worsen	2		2		2		2		
	Remains same	4		4		4		9		

Table – 7

DISCUSSION:

The most frequent cause of arthritis in adults is osteoarthritis (OA) of the knee joint, which can be extremely painful and functionally debilitating. The patient's age, the disease's stage, and the state of their bones all influence the therapy option. PFO, arthroscopic debridement, high tibial osteotomy, unicompartmental knee arthroplasty, and total knee arthroplasty are among the available treatment options. For young patients with medial joint OA and a varus deformity of the knee, a high tibial osteotomy is recommended. The high tibial osteotomy is not the best option for elderly patients with medial joint OA because of concurrent osteoporosis that can result in tibial plateau fractures. Improved joint function and efficient pain management are two benefits of total knee arthroplasty. But there are a number of issues with it, and it might need to be revised. Young people with medial joint osteoarthritis (OA) frequently receive treatment with unicompartmental knee arthroplasty and high tibial osteotomy. Both, though, are linked to a number of issues. Major complications from high tibial osteotomy include deep vein thrombosis, infection, non-union, partial correction, internal fixation failure, peroneal nerve damage, and recurrence. Major side effects from unicompartmental knee arthroplasty include damage to the knee's medial or lateral collateral ligaments, dislocation of the polyethylene bearing, degenerative arthritis in the other compartment, fracture of the medial proximal tibia and prosthesis dissociation.

PFO is a relatively novel surgery that has demonstrated promising outcomes for knee medial joint OA. There is still much to learn about the precise process by which PFO corrects varus alignment and relieves discomfort. In load-bearing joints, bone mass and density tend to decline with age. The tibia's lateral condyle is supported by the fibula, which causes the tibial condyles to settle unevenly, with the medial side experiencing more settlement and cartilage degradation. PFO results in less support for the lateral side of the tibial plateau, which may rectify the varus deformity and cause the loading force to move laterally. Pain is reduced and function is improved when the loading force is transferred to the lateral half's less deteriorated cartilage.

In our trial, we saw a considerable reduction in patients' discomfort at three months, and that improvement persisted until six months. Numerous additional trials have found similar significant pain reduction after PFO as we

have [7,9,10]. The long-term effects of PFO can be clarified by a prospective study that monitors patients for a longer period of time. There have been reports that one possible side effect of PFO is injury to the CPN. The CPN branches 8.2 cm below the fibula's head, with the proximal 15 cm of the fibula containing the greatest risk of nerve damage (20). According to Yang et al., 1.8% of cases each involved CPN and superficial peroneal nerve injury [15].

Our study's inability to compare PFO with other available treatment methods for medial joint OA of the knee was hampered by the lack of a comparison group. Another drawback is that we did not make an effort to identify the variables influencing the results in PFO instances.

Regression modelling was suggested as a prospective cohort research to identify the variables influencing PFO outcomes in cases of medial joint OA of the knee. A breakdown of these variables will assist the treating surgeon in selecting the best candidates for PFO.

CONCLUSION:

With the results obtained we could conclude that the proposed technique of proximal fibular osteotomy for medial compartment osteoarthritis yielded satisfactory radiological and functional outcome at the end of 6 months follow up with significant improvement in Medial Joint space, VAS Scoring, Varus angle and Range of Motion.

REFERENCES:

1. Prakash L et al: A beginner's guide to talk knee replacement. CBS Publications, New Delhi, 2016. ISBN 978-93-86217-48-6.
2. Tierney WM, et al. Tricompartmental knee replacement: A comparison of orthopaedic surgeons' self-reported performance, indications, and expected outcomes. *Clinical Orthopaedics* 1994; 305: 209–17.
3. Felson DT, Naimark A, Anderson J, Kazis L, Castelli W, Meenan R. *Fetal*.
4. The prevalence of knee osteoarthritis in the elderly: The Framingham Osteoarthritis Study. *Arthritis Rheum*. 1987; 30(8): 914-918
5. Vincent KR, Conrad BP, Fregly BJ, Vincent HK et al. *The pathophysiology of osteoarthritis:*

- amechanicalperspectiveon the knee joint
6. ShiozakiH,KogaY, OmoriG, YamamotoG, TakahashiHEetal.
 7. EpidemiologyofosteoarthritisofthekneeinaruralJapanesepopulation Knee.1999; 6(3):183-188.
 8. AhlbäckSetal.Osteoarthrosisoftheknee: aradiographicinvestigation. ActaRadiol. 1968;277(suppl):7-72.
 9. PrakashLetal:VarusScenariointheIndianKnees. IndianAcademyofOrthopaedicSurgeons, Instructionalcourselectures2016.
 10. WuLD,HahneHJ,HassenpugTetal.Along-termfollow-upstudyofhightibialosteotomyfor medial compartment osteoarthritis. Chinese Journal ofTraumatology.2004;7:348-353.
 11. Sprenger TR, Doerzbacher JF et al. Tibial Osteotomy for the treatment ofvarusgonarthrosis: survivalandfailureanalysistotwenty- twoyears. JournalofBoneandJoint Surgery2003;85:469- 474.
 12. AgliettiP,BuzziR,VenaL M,BaldiniA, Mondaini Aetal.Ahightibial valgusosteotomyformedialgonarthrosis:a 10-to21-yearstudy.JournalofKneeSurgery.2003;16:21–26
 13. HanssenAD,StuartMJ,ScottRD,ScuderyGRetal. Surgicaloptionsforthemiddleaged patient with osteoarthritis of the knee joint. Journal of Joint Bone Spine.2000;67(6):504–508.
 14. SchnurrC,JarrousM,GuddenI,EyselP,KonigDPetal.Pre-operative arthritisseverityasapredictorfortotalkneearthroplasty patients’ satisfaction. InternationalOrthopaedics.2013; 37(7):1257-1261.
 15. PrakashLetal:OrthopedicsUsualandunusual. IndianAcademyof Orthopaedic Surgeons,Instructionalcourselectures2016.
 16. PrakashLetal:ProximalFibularOsteotomy. IndianAcademyofOrthopaedicSurgeons,Instructionalcourselectures2016.
 17. Zhang Y, Li C, Li J, et al. The pathogenesis research of non-uniformsettlementofthetibialplateauinkneedenerationandvarus.JournalHebeiMedicalUniversity.2014;35(2):218-219.
 18. HuskissonEetal.Measurementofpain.Lancet.1974;304:1127-1131.
 19. Prakash L et al: Knee Scoring and Outcome Prediction in developing asurgicalparadigmoftotalkneereplacement.IndianAcademyofOrthopedicSurgeons,Instructionalcourselectures2016.
 20. HofmannS,LobenhofferP,StaubliA,VanHeerdenRetal.
 21. Osteotomiesofthekneejointinpatientswithmonocompartmentalarthritis.DerOrthopedics.2009;38(8):755-769.
 22. ZongYouYang,MDetal:MedialCompartment DecompressionbyFibularOsteotomyto TreatMedialCompartmentKneeOsteoarthritis:APilotStudy.
 23. Wang F, Chen B-C, Gao S et al. Influence of knee lateral thrust gait totibiofemoralangleandlateraljointspaceintheknee varuspatients.ChineseJournalofOrthopedics.2005;25(9):517-519.
 24. Prakash L et al: Proximal Fibular Osteotomy in medial compartmentOsteoarthritisofthekneejoint. InstituteforSpecialOrthopedicsChennai.Firstedition 2018.ISBN978-81-924355091
 25. [A1]LawrenceRC,FelsonDT,HelmickCG,etal.Estimatesoftheprevalence of arthritisand other rheumatic conditions in the United States.Part II. Journal of Arthritis &Rheumatism.2008; 58(1):26–35.[PubMed:18163497]
 26. [A2]AndriacchiTP,KooS,ScanlanSFetal.Gaitmechanicsinfluencehealthy cartilagemorphologyandosteoarthritisoftheknee. JournalofBoneandJointSurgery.Feb;2009 91(Suppl1):95–101.[PubMed:19182033]
 27. [A3]AndriacchiT,MundermannA,SmithRetal.Aframeworkfortheinvivopathomechanicsofosteoarthritis attheknee.AnnalsofBiomedicalEngineering.2004; 32(3)

28. [A4]. Andriacchi T, Mundermann A et al. The role of gait mechanics in the initiation and progression of knee osteoarthritis. *Current Opinion in Rheumatology*. 2006; 18:514–518. [PubMed:16896293]
29. [A5]. Chaudhari AM, Briant PL, Bevill SL, Koo S, Andriacchi TP et al. Gait kinematics, cartilage morphology, and osteoarthritis after ACL injury. *Medical Sciences Sports Exercises Journal*. Feb; 2008; 40(2):215–222. [PubMed:18202582] [A6]. Cheng Y, Hootman J, Murphy L, Langmaid G, Helmick C. Prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation—United States, 2007–2009. *CDC Morbidity and Mortality Weekly Report*. 2010; 59(39):1261–1265.
30. [A7]. Andriacchi TP. Dynamics of knee malalignment. *Orthopedic Clinics of North America*. Jul; 1994; 25(3):395–403. [PubMed:8028883]
31. [A8]. Zhao D, Banks SA, Mitchell KH, D’Lima DD, Colwell CW, Fregly BJ. Correlation between the knee adduction torque and medial contact force for a variety of gait patterns. *Journal of Orthopaedic Research*. 2007; 25:789–797. [PubMed:17343285] [A9]. Miyazaki T, Wada M, Kawahara H, Sato M, Baba H, Shimada S. Dynamic load at baseline can predict radiographic disease progression in medial compartment knee osteoarthritis. *Annals of the Rheumatic Diseases*. 2002; 61:617–622. [PubMed:12079903]
32. [A10]. Sharma L, Hurwitz DE, Thonar EJMA, et al. Knee adduction moment, serum hyaluronan level, and disease severity in medial tibiofemoral osteoarthritis. *Arthritis & Rheumatism*. 1998; 41:1233–1240. [PubMed:9663481] [A11]. Thorpe LE, Sumner DR, Wimmer MA, Block JA. Relationship between pain and medial knee joint loading in mild radiographic knee osteoarthritis. *Arthritis & Rheumatism*. Oct 15; 2007; 57(7):1254–1260. [PubMed:17907211] [A12]. Heidari B. Knee osteoarthritis prevalence, risk factors, pathogenesis and features: Part I. *Caspian J Intern Med* 2011; 2:205–212. [A13]. Messier SP, Mihalko SL, Legault C, et al. Effects of intensive diet and exercise on knee joint loads, inflammation, and clinical outcomes among overweight and obese adults with knee osteoarthritis: the IDEA randomized clinical trial. *JAMA* 2013; 310:1263–73.
34. [A14]. Shiozaki H, Koga Y, Omori G, et al. Epidemiology of osteoarthritis of the knee in a rural Japanese population. *Knee* 1999; 6: 183–188. [A15]. Vander Schoot DK, Den Outer AJ, Bode PJ, et al. Degenerative changes at the knee and ankle related to malunion of tibial fractures. 15-year follow-up of 88 patients. *Journal of Bone and Joint Surgery B* 1996; 78(5):722–725
35. [A16]. Faschingbauer M, Nelitz M, Urlaub S, et al. Return to work and sporting activities after high tibial osteotomy. *International Orthopaedics* 2015; 39: 1527–1534. [A17]. Saragaglia D, Rouchy RC, Krayan A, et al. Return to sports after valgus osteotomy of the knee joint in patients with medial unicompartmental osteoarthritis. *International Orthopaedics* 2014; 38: 2109–2114. [A19]. C Prodromos, T Andriacchi, J Galante et al. A relationship between gait and clinical changes following high tibial osteotomy. *The Journal of Bone & Joint Surgery*. 67(8):1188–1194, OCTOBER 1985.
37. [A20]. Schnitzer TJ, Popovich JM et al. Effect of piroxicam on gait in patients with osteoarthritis of the knee. *Arthritis Rheum*. 1993 Sep; 36(9):1207–13. [A21]. Hurwitz DE, Ryals AR, Block JA et al. Knee pain and joint loading in subjects with osteoarthritis of the knee. *Journal of Orthopaedic Residency*. 2000 Jul; 18(4):572–9.
38. [A22]. Maly MR et al. Abnormal and cumulative loading in knee osteoarthritis. *Curr Opin Rheumatol*. 2008 Sep; 20(5):547–52. [A23]. Block JA, Sha

- koorNetal.Lowerlimbosteoarthritis:biomechanical alterationsand implications for therapy.CurrentOpin Rheumatology. 2010 Sep;22(5):544
- 50.[A24]Guoetal.Changesinanklejointalignmentaft erproximalfibular steotomy.PLoSOne.2019Mar 22;14(3):e0214002.
39. [A25] Shanmugasundaram, S., Kambhampati, S.B.S. &Saseendar, S. Proximalfibular osteotomy in the treatment of medial osteoarthritis of the knee – A narrativeriewofliterature.KneeSurg&RelatRes31, 16(2019).
40. [A26] Subash, Yeshwanth, and Gunalan K. Naidu."The role of proximal fibularosteotomyinthemanagementofmedialcomp artmentosteoarthritisoftheknee."In tJOrthopSci4.3.4(2018):369-372.
- 41.[A27]Mahadik,S.K.,Pandey,S.,Belsare,N.S.,Shinde, G.S.,&Deshpande,S.
- 42.B.(2021).ProximalFibularOsteotomyvshighTibialOst eotomyinmedialcompartment Osteoarthritis of knee. Asian Journal of Medical Sciences, 12(6), 69–74