A STUDY TO ASSES THE FUNCTIONAL AND RADIOLOGICAL OUTCOME OF PROXIMAL FIBULAR OSTEOTOMY IN PATIENTS WITH MEDIAL COMPARTMENT KNEE OSTEOARTHRITIS.

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ABSTRACT:

BACKGROUND: Osteoarthritis (OA) is the most prevalent type of arthritis in the world. With the progressive aging of the population, it is becoming a major problem of public health. Symptomatic Knee osteoarthritis (OA) is chronic, progressive degenerative joint disease with accompanying pain, stiffness, and deformity of the knee joint. Osteoarthritis is the most frequent joint disease with a prevalence of 22% to 39% in India. **OBJECTIVE**: To evaluate the pain relief and radiological improvement in medial joint space following proximal fibular osteotomy in medial compartment knee osteoarthritis. **METHODS:** From November 2018 to May 2020, 25 patients (four cases were bilateral so total of 29 knees) who underwent proximal fibular osteotomy for medial compartment osteoarthritis in teaching hospitals attached to Bangalore Medical College & Research Institute, were followed up. Preoperative and postoperative weightbearing and entire lower extremity X-rays were obtained to analyze the alignment of the lower extremity and ratio of the knee joint space (medial/lateral compartment). Functional assessment was done using Visual Analogue Scale (VAS) & American Knee Society Score. (KSS). **RESULTS:** A total of 25 patients and 29 knees were followed-up. Of these, 6 were male and 19 were female patient. The average age was 58.72 years. The average preoperative VAS score, KSS clinical & KSS functional score were 6.75 points, 40.31 points & 44.82 respectively. According to KL grading, there were 20 knees of grade 2 and 9 knees of Grade 3. The average postoperative VAS score, KSS clinical & KSS functional score were 2.34 points, 76.79 points & 76.72 points respectively. The medial joint space has improved significantly from a preoperative value of 1.22 mm to postoperatively 3.71 mm. The ratio of medial to lateral joint space improved from a preoperative value of 0.20 to 0.67. **CONCLUSION:** Patients who underwent Proximal Fibular Osteotomy showed statistically significant improvement in functional & radiological

outcome at 6 months follow up. We conclude by stating that PFO is an attractive option for pain relief in patients with medial compartment osteoarthritis of knee. The procedure is simpler, effective, and easy to perform. It is less expensive and requires lesser rehabilitation than alternative procedures like HTO, UKA & TKA. It gives excellent pain relief postoperatively & is associated with fewer complications. **KEYWORDS –Proximal Fibular Osteotomy; Medial compartment; Osteoarthritis of knee; Ratio of knee joint space**

Introduction:

Osteoarthritis (OA) also known as degenerative joint disease, primary OA, wear-and-tear arthritis, or age-related arthritis, is the most prevalent form of arthritis in the world. With the progressive aging of the population, it becomes a major problem of public health. Knee is the most common joint to be affected.

Symptomatic Knee osteoarthritis (OA) is a chronic, progressive degenerative joint disease with accompanying pain, stiffness, and deformity of knee joint. [1] Osteoarthritis is the most frequent joint disease with a prevalence of 22% to 39% in India. [2] OA is more common in women than men, but the prevalence increases dramatically with age.[3, 4, 5]

Approximately, 45% of women above the age of 65 years have symptoms while radiological changes are seen in 70% of those above 65 years. [4, 5, 6] The initiation and progression of knee OA involve mechanical, structural, genetic, and environmental factors. [7] Medial compartment OA is very 2 common, almost the commonest non-communicable disease in India, and around 50% of the Indian Population have Varus knees.[8]

Knee varus deformities, characterized by a mechanical femorotibial axis of less than 180° on weight-bearing anteroposterior (AP) radiographs and narrowed medial joint space, are commonly seen in patients with knee OA. [9]

It has been reported that even in healthy knees the medial compartment bears 60% to 80% of the load. [10] No one has precisely documented what contributes to this uneven load distribution. Currently, it is believed that the load is distributed along the mechanical axis, which is generally medial to the center of the knee. Non-uniform medial and lateral supports in Varus knees is because of osteoporotic tibia medially and three cortex supports laterally. This leads to the non-uniform settlement which results in the load from the normal distribution, shifting more medially to the medial plateau and consequently leads to varus knee, aggravating the progression of medial compartment OA of the knee joint. [11]

OBJECTIVE: To evaluate the pain relief and radiological improvement in medial joint space following proximal fibular osteotomy in medial compartment knee osteoarthritis

Materials and Methods :

The present prospective study was conducted in the hospitals attached to Bangalore Medical College & Research Institute by the Department of Orthopedics during the period from November 2018 to May 2020.

The study includes patients admitted to Bangalore Medical College And Research Institute, Department of Orthopedics with medial compartment osteoarthritis of the knee.

Estimated to be 24, rounded off to 25, considering preoperatively mean knee society score to be 40 and SD 13, and estimated score by 6 months postoperatively as 50 and SD 13, power of 95%, alpha error of 5% a total of 25 cases were taken and the patients were informed about the study in all respects and informed consent was obtained from each patient.

Inclusion Criteria: • Patients aged 30 years and above, and both sexes. • Patient willing to give informed consent for surgery. • Patients with moderate to severe knee pain with difficulty walking due to medial compartment osteoarthritis of the knee or genu varus. • Radiological findings consistent with medial compartment knee osteoarthritis based on Kellgren-Lawrence grade 1, grade 2 & grade 3.

Exclusion Criteria: • Patient not willing to give informed consent • Post-traumatic knee osteoarthritis • Inflammatory joint disease • Patients with a history of previous operations or fractures • Genu valgus deformity • Lateral joint space less than medial joint space

Patients with OA knee attending OPD or those admitted in the ward were explained the details of the procedure. Patients satisfying the inclusion criteria and those willing for participating in the study were included. They were asked to sign the consent forms expressing their willingness to participate in the study.

The patients were then assessed clinically to evaluate their general condition. The general condition of the patient and the vital signs were recorded. Local examination of the affected knee was done for swelling, distal neurovascular status, operative site. Preoperative VAS and American Knee Society Score (KSS) score were documented. Weight-bearing Radiographs of knee AP view was done for evaluation of FTA and medial joint space. The patient was taken for surgery after routine investigations and after obtaining fitness for the surgery by a physician/anesthesiologist and any other related specialty. The investigations were as follows: Serum Hb%, TLC, DLC, Urine for sugar, FBS, Blood Urea, Serum Creatinine, Serum electrolytes, Blood Grouping, and Rh typing, PT, INR, HIV, HBsAg, and ECG.

The consent for surgery was taken from the patients and their attendants after explaining the procedure and the possible complications. Preoperative prophylactic intravenous antibiotics were administered as per hospital protocol. Patients then underwent Proximal Fibular Osteotomy. Post-operative physiotherapy was followed according to the protocol to evaluate the functional outcome. After completion of the hospital treatment patients were discharged and called for follow-up at the outpatient level at 1, 3 & 6 months for serial clinical and radiological evaluation.

The Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis of the data, and Microsoft Word and Excel have been used to generate graphs, tables, etc.

Results :

A total of 25 cases were selected for the purpose of the study and analysed

Table 1: Social Profile of the study subjects

		No. of Patients	%
Age in years	40-50	2	8.0
	50-60	12	48.0

	60-70	11	44.0
Gender	Female	19	76.0
	Male	6	24.0
Side	Left	11	44
	Right	10	40
	Bilateral	4	16
Kellgren Lawrence Grade	1	0	0.0
	2	20	68.9
	3	9	31.1
	4	0	0.0

In the present study nearly 8% of patients were from 40-50 years, 48% of patients from 50-60 years & 44% from 60-70 years. The majority of the patients were from the 50-60 age group. The youngest patient was 49 years and the oldest was 70 years. The average age was 58.72 years. Our study noted a profound female preponderance in the gender distribution, with 76% of the patients being female and 24 % being male. In our study, a total of 25 patients were operated on.11 underwent surgery for the left knee and 10 for the right knee. 4 patients underwent bilateral surgery . In our study, 68.9 % of patients operated on had grade 2, and 31.1% of patients had grade 3 osteoarthritis according to Kellgren & Lawrence Classification.

Table 2: VAS SCORE: distribution of patients at different study points

VAS SCORE	PRE OP	1 MONTH	3 MONTHS	6 MONTHS	% Difference
0	0(0%)	0(0%)	0(0%)	0(0%)	0%
1-3	0(0%)	16(55.2%)	22(75.9%)	29(100%)	100%
4-6	12(41.4%)	13(44.8%)	7(24.1%)	0(0%)	-41.4%
7-10	17(58.6%)	0(0%)	0(0%)	0(0%)	-58.6%
Total	29(100%)	29(100%)	29(100%)	29(100%)	0%

In our study, the preoperative mean was 6.75. The patients were assessed again at 1, 3 & 6 months postoperatively. The mean VAS score at 1 month was 3.41, at 3 months was 2.96 which significantly reduced to 2.34 at 6 months post-surgery. P < 0.001 , Significant, Paired Proportion Test

Table 3: A comparison of KSS Score at Pre-op/ post-op of patients studied

Variables	PRE OP	POST OP	Difference	t Value	P Value
KSS SCORE –CLINICAL	40.31±6.58 (28-52)	76.79±5.12 (70-87)	36.48276	-52.160	<0.001**
KSS SCORE –FUNCTION	44.82±10.73 (30-60)	76.72±8.58 (65-90)	31.89655	-20.474	<0.001**
KSS TOTAL	85.14±16.33 (58-112)	153.52±11.75 (136-177)	68.37	36.661	<0.001**

The mean pre-operative value of KSS Score – clinical in our study was 40.31±6.58, and the mean postoperative value of KSS Score – clinical was 76.79±5.12 and the p value was <0.001** . The mean pre-operative value of KSS Score –functional in our study was 44.82±10.73, and the mean postoperative value of KSS Score – functional was 76.72±8.58 and the p value was <0.001** . The mean pre-operative value of KSS Score – total in our study was 85.14±16.33, and the mean postoperative value of KSS Score – total was 153.52±11.75 and the p value was <0.001** .The KSS scores in patients in our study showed a statistically significantimprovement during the 6th month follow up.

Table 4: Distribution of Outcome by KSS Scores in patients studied

OUTCOME	PRE OP	POST OP	% Difference
POOR	29(100.0%)	0	-100.0%
FAIR	0	0	0.0%
GOOD	0	21(72.4%)	+72.4%
EXCELLENT	0	8(27.6%)	+27.6%
Total	29(100.0%)	29(100.0%)	0%

In our study, 100% of patients had poor score preoperatively (KSS Score < 60) . At the final follow up, 72.4 % of patients had good outcome (KSS Score 70-79)& 27.6 % of patients had excellent outcome (KSS Score 80-100) P<0.001** ,Significant,   Paired Proportion

test,   showing   100   %IMPROVEMENT.

Table 5 : COMPLICATIONS distribution of patients at different study points

COMPLICATIONS	No. of Knees	%
NO	26	89.6
YES	3	10.3
• EHL WEAKNESS	2	6.8
• NUMBNESS	1	3.4
Total	29	100.0

A total of 3 patients out of the 25 developed complications.2 patients developed EHL weakness and 1 had numbness. All the complications were completely resolved within 6 months.

Discussion:

The complex biomechanics of knee cannot be simulated by any prosthetic design and a replaced knee will always be second best to the normal natural knee. Hence knee conservation and repairing the damage provides us with an extra chance of achieving our goal of healthy knees and better long-term results than the artificial replaced knee. Moreover, there are always chances of failure of the prosthesis. Other surgical options available for the management of medial compartment arthritis of the knee are limited to High tibial osteotomy and Unicondylar knee replacement

Unicondylar knee replacement is another procedure in the management of medial compartment arthritis of the knee which has produced mixed results according to various studies as found in the literature. This procedure could be associated with problems such as poly wear, progression of arthritis or loosening of components. Certain studies have demonstrated a high rate of revision for unicondylar knee replacement as compared to a Total knee replacement.[12,13]

In our study, the average age of patients was 58.72 years per knee with a range of 40 to 72 years. This correlates well with Zong-You Yang et al [14] (2015) as 59.2 years, Xiaohu Wang et al [15] (2017) as 63.96 years, Guoping Zou et al [16] (2017) as 62.3 years. Male to female ratio of knees in our study was 1:3.1 similar to Zong-You Yang et al [14] (2015) as M: F ratio was 1:2.23, Guoping Zou et al [16] (2017) as M: F ratio was 1:2.33. Maximum cases were distributed among second and third Kellgren Lawrence grade of OA knee.

KSS score and Visual Analogue Scale (VAS) were used to assess functional results. Pain being a single most important factor of functional outcome was assessed using the Visual analogue scale. In our study mean preoperative VAS score was 6.75 and the mean VAS score at 1 month was 3.41, at 3 months was 2.96 which significantly reduced to 2.34 at 6 months post-surgery, the decrease was statistically significant with a p value of <0.001.

In the study by Xiaohu Wang et al [15] (2017) the mean visual analogue scale scores significantly decreased from 8.02±1.50 preoperatively to 2.74±2.34 postoperatively with p value <0.001. In the study by Guoping Zou et al [16] (2017) mean visual analogue scale scores significantly decreased from 4.6 ± 1.3preoperatively to 0.5 ± 0.2 postoperatively. In the study by Zong-You Yang et al [14] (2015) mean VAS score and interquartile range at final follow-up were 2.0 and 2.0, respectively, which were significantly lower than the preoperative data (7 and 1.0, respectively; P<.001.

In our study, Preoperative mean KSS Score- clinical was 40.31±6.58 and postoperative mean KSS Score- clinical was 76.79±5.12 which was a significant increase with p value <0.001. The mean pre-operative value of KSS Score –functional in our study was 44.82±10.73, and the mean postoperative value of KSS Score – functional was 76.72±8.58 and the p value was <0.001.

In our study, 100% of patients had poor score preoperatively (KSS Score < 60). At the final follow up, 72.4 % of patients had good outcome (KSS Score 70-79) & 27.6 % of patients had excellent outcome (KSS Score 80-100) In a study by Yang et al34, the preoperative KSS score was 45±21.3 while postoperatively it was 92.3±31.7. In a study by Bo Liu et al [17] , the average preoperative KSS and functional scores were 49.14±10.95 and 44.97±17.1 while postoperatively it was 67.77±11.08 and 64.66±13.12 respectively. 51 knees were associated with a satisfactory clinical outcome while 77 knees had a significant improvement.

In the study by Zong-You Yang et al [14] (2015), 4 (3.6%) patients reported numbness in the ipsilateral lower leg due to common peroneal nerve palsy (n=2) and superficial peroneal nerve injury (n=2). Xiaohu Wang et al [15] (2017) no postoperative complications were observed, including wound infection, delayed healing or nerve damage.

Conclusion:

In this study, all patients showed an appreciable and statistically significant improvement in functional outcome at 6 months follow-up period as evidenced by the baseline and follow-up values of functional indices i.e. VAS Scores and Knee Society Scores. Therefore, proximal fibular osteotomy is an alternative to HTO. It is simple, safe, and effective and can delay or even negate the need for total knee arthroplasty for medial compartment OA of knee joint. It does not need any implants, the surgical costs are low, and can be performed in any setup. Care must be taken to avoid common peroneal nerve injury. More randomized control trials and multicenter trials need to be undertaken with larger sample sizes to further confirm and establish the clinical protocols, safety, efficacy & long-term effects of PFO in the management of isolated medial compartment knee osteoarthritis.

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