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## To analyse the clinical and radiological outcome of proximal fibular osteotomy in osteoarthritis knee

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### Abstract

**Principal Objectives:** Knee OA accounts for more than 80% of the joint disorder and as per an estimate in US population, it affects at least 19% of adults aged 45 years and older. In patients of Osteoarthritis knee there is pain and limitations in joint mobility. The pathological features of Knee Osteoarthritis (KOA) include the articular cartilage degeneration, remodelling of subchondral bone, osteophyte formation, ligamentous laxity, and weakening of periarticular muscles.

**Materials and Methods:** The present study was conducted in the Department of Orthopaedics, Rohilkhand Medical College, Bareilly to assess the effect of Proximal Fibular Osteotomy in osteoarthritis of the knee from May 2018 to May 2019.

**Results:** The operation time, blood loss during operation and post op rehabilitation period are significantly shortened in the observation Group. The VAS score (Post-Operatively) is remarkably lessens with notably decreased rate of post-operative complications such as injury to common peroneal nerve, infection, deep vein thrombosis, and deformity recurrence.

**Conclusion:** The short-term clinical and functional effects of proximal fibular osteotomy on varus KOA are excellent.

**Keywords:** Osteoarthritis knee, proximal fibular osteotomy

### Introduction

Osteoarthritis is measured to be the fourth leading cause of daily life impairment<sup>[1]</sup>. Knee OA accounts for more than 80% of the disease's total burden<sup>2</sup>. Secondary to increasing life expectancy and lifestyle modifications the number of cases of osteoarthritis is increasing significantly<sup>[3]</sup>. A survey in rural and urban areas of India shows the prevalence of osteoarthritis to be 17% to 60.6%. Osteoarthritis of the knee impacts the patient both physically and economically. Osteoarthritis knee gradually progress with increasing pain in knee, mobility restriction because of pain, and physical disability<sup>[4, 5]</sup>.

Osteoarthritis is a degenerative disease involving the articular cartilage, remodelling of subchondral bone, osteophyte formation, ligamentous laxity, weakening of periarticular muscles, and, in some cases, synovial inflammation<sup>[6]</sup>. Pain in Knee and restriction of movement are the initial complaints of patient of knee Osteoarthritis.

Because of pain in knee and limitation of movements patient choose to undergo joint replacement surgery but joint replacement is a major surgery and also associated with post operative complication and risk. Therefore, we need a surgical option which could replace or delay this major operation and make patient symptoms free till joint replacement is only option. The conservative treatment includes non-pharmacological and pharmacological treatment<sup>[7]</sup>. Pharmacological treatment in form of Intraarticular steroids are often allied with side effects and in the initial stages of disease we would prefer physiotherapy<sup>[8]</sup>, which include Quadriceps strengthening exercise, orthosis for knee, and to avoid squatting, climbing stairs and cross legged sitting.

Treatment in form of surgery include arthroscopic debridement, High Tibial Osteotomy (HTO), proximal fibular osteotomy and total knee arthroplasty. Arthroscopic debridement can relieve pain but this procedure have a high recurrence rates<sup>[9, 10]</sup>.

HTO realign the lower limbs by correcting any varus-valgus deformity, which reduce abnormal stress on single Compartment and efficiently decrease symptoms, decrease joint

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degeneration and delay joint replacement<sup>[11]</sup>.

The mode of action of Proximal fibular osteotomy is based on the 'theory of differential settlement'<sup>[12]</sup>. This treatment approach is characterised by in this form of treatment there minimal trauma to patient, decrease complications rate, definite effects<sup>[13]</sup>.

### AIM

The present study analysed the early clinical and symptomatic effect of proximal fibular osteotomy on varus Knee Osteoarthritis.

### Objective

To explore the effects of proximal fibular osteotomy for pain relief and improvement of medial joint space and function in patients with knee osteoarthritis.

**Sampling frame:** The sampling frame of the study was bound by the following inclusion and exclusion criteria:

### Inclusion criteria

1. Patients of knee osteoarthritis with a history of chronic pain affecting routine life of patient.
2. X ray findings suggestive of Osteoarthritis knee.
3. Based on Kellgren and Lawrence staging, patients with Grade 1 to grade 3 osteoarthritis knees included in this study.

### Exclusion criteria

1. Based on Kellgren and Lawrence staging, patients with Grade 4 osteoarthritis knees excluded from this study.
2. Patients with clinical feature suggestive of infectious arthritis or osteoarthritis secondary to trauma.

### Method

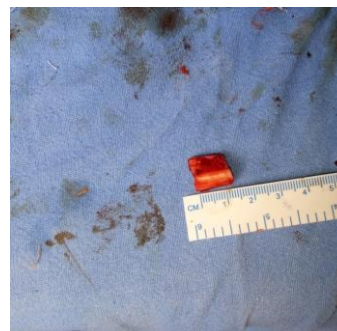
- The knees are cleaned, prepared, and draped
- Level planned is 7-8 cm below head of fibula
- The precise distance is measured with a sterile scale
- A hypodermic needle is inserted to the bone at this level
- 5 to 7 cm skin incision.
- Retract with Langenbeck retractors alone. Avoid Hohmann retractor to avoid Common peroneal nerve injury (figure 1).
- Blunt dissection to the bone, carefully splitting the muscles.
- Scrape with periosteum retractor
- Mark the level of osteotomy with proximal and distal drill Holes
- Use an oscillating saw and gently cut 1 cm of fibula (figure 2)
- Hold the cut piece with a Kocher forceps
- Closure done in layers



**Fig 1:** Use Langenbeck retractor alone (Avoid Hohmann retractor to avoid Common Peroneal nerve injury).



**Fig 2:** Preoperative measurement of size of fibula



**Fig 3:** Osteotomised Fibula of 1 cm

### Observation and Result

- The present study was conducted in the Department of Orthopaedics, Rohilkhand Medical College, Bareilly, a total number of 30 patients with osteoarthritis knee involving the medial compartment were operated in form of proximal fibular osteotomy from May 2018 to May 2019.
- There were 21 female, and 09 male patients. In standing AP and lateral views of X-rays, the medial and lateral joint space were calculated both preoperatively and next day after operation. Patients also evaluated on the basis of pre and post-operative Visual Analog Scale (VAS), the medial joint space widened from  $1.3 \pm 0.6$  mm (Figure 4) to  $4.3 \pm 2.9$  mm (Figure 5), being statistically significant ( $P < .00001$ ) Table -1.



**Fig 4:** Preoperative X-ray of Knee Osteoarthritis.



**Fig 5:** Postoperative X-ray after Proximal Fibular Osteotomy (Medial joint space improved)

- Age of patients enrolled in the study ranged from 50-70 years, median Most of the patients included in the study were females (70%) rest were males (30%).
- VAS score on a scale of one to ten, was averaged at 6.9 pre-operatively, which came down to 2.4 post operatively Table-2.
- Most of the patients in this study (n=38; 76.0%) were also advised physiotherapy and allowed for walking in same day of operation.
- No surgically related complication was diagnosed in most of the patients.

**Table 1:** Preoperative and postoperative Comparison of Radiological measurement

Radiological Measurement	Pre-Operative	Postoperative	P value
Medial Joint Space	1.3+_ 0.6	4.3 +_ 2.9	<0.0001
Lateral Joint space	7.1 +_ 1.5	5.4 +_ 1.6	0.0001

**Table 2:** Preoperative and Postoperative Comparison of VAS Score

Visit	Number of Patients	Mean VAS Score	P value
Preoperatively	30	6.9	<0.0001
Postoperatively	30	2.4	<0.0001

## Discussion

Knee osteoarthritis is one of the most common joint disorders, it causes severe pain and immobility. Total Knee Arthroplasty efficiently reduces knee pain and improves knee joint function in patients with knee osteoarthritis. Nevertheless, Total Knee Arthroplasty is extortionate and complex surgery [14, 15]. In young patients High tibial Osteotomy has been the preferred surgical treatment with osteoarthritis of the medial compartment of the knee, and it act by correcting alignment of knee and delaying the need for Total Knee Arthroplasty [16, 17]. The disadvantages associated with High tibial Osteotomy, including a delayed weight bearing and there is risks of nonunion or delayed union, neurovascular involvement and risk of wound infection also present [18, 19]. The HTO is a technically demanding surgery.

In a study by Zhang *et al.* in 2015 mentioned Proximal Fibular Osteotomy reduces symptoms and improve joint function in knee osteoarthritis. The noticeable findings in this study comprise reduce pain in medial aspect of knee and there is an improvement in the medial joint space also. The most of patients in our study had remarkably relief in knee pain on same day after Proximal Fibular Osteotomy [21], inspite of the fact that the mechanism was ambiguous and the follow-up was short. Interestingly, the pain relief continued to improve. Postoperative walking was also better when compared with the preoperative state. Compared with Total Knee Arthroplasty or High tibial Osteotomy, Proximal Fibular Osteotomy is a uncomplicated, secure, inexpensive and a surgery of less duration that does not require interposition of implants. As such, Proximal Fibular Osteotomy is more suitable surgical option for developing countries that have increasing number of Osteoarthritis patient and lack financial and medical resources. Even though the results are encouraging, the follow-up time was comparatively short. So, a long follow-up study is needed. The mechanism of action of Proximal Fibular Osteotomy is unclear. Proximal Fibular Osteotomy may relieves pain and improves the joint space secondarily to removal of fibula support that may cause genu varus. The fibula supports one-sixth of the total body weight; thus, Proximal Fibular Osteotomy may redistribute the load

on the lateral and medial tibia plateau after surgery. Yang *et al.* stated that the lateral support provided to the tibia by the fibula may lead to non uniform settlement and degeneration of the plateau bilaterally, which may cause the load from the normal distribution to shift farther medially to the medial plateau, consequently leading to knee varus and aggravating the progression of medial compartment osteoarthritis of the knee joint. With increasing age reduction of bone mass is a common occurrence. Just as in the vertebral column where there is a dorsal collapse due to a single cortical support, as opposed to stronger posterior support, in knee joints too, a gradual increasing varus occurs with age causing medial compartment arthritis. Resecting a segment of fibula, loosens the lateral side allowing the upper tibia to settle into a more favorable lateral alignment, shifting the mechanical axis towards neutral or valgus.

## Conclusion

1. Proximal Fibular Osteotomy is an efficacious treatment for osteoarthritis knee and it provides a significant symptomatic improvement without any severe side-effects.
2. In our opinion, the Proximal Fibular Osteotomy could be advocated as a treatment modality in OA of the knee, especially in grade 2 to 3
3. Long term outcomes of the Proximal Fibular Osteotomy warrants further evaluation.
4. Less operation time
5. Less bleeding
6. Early Mobilisation
7. Low Cost

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