



International Journal of Orthopaedics Sciences

ISSN: 2395-1958

IJOS 2018; 4(4): 885-887

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www.orthopaper.com

Received: 11-08-2018

Accepted: 15-09-2018

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Effect of proximal fibular osteotomy in medial compartment decompression in osteoarthritic knees: Case series study

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DOI: <https://doi.org/10.22271/ortho.2018.v4.i4l.115>

Abstract

Background: Knee osteoarthritis (OA) is a major cause of pain, disability and impaired quality of life. Technically demanding procedures like Total knee replacement and proximal tibial osteotomy are the main stay of treatment of severe OA knee. In 2015, Yang ZY *et al.* Reported Proximal Fibular osteotomy (PFO) as a novel procedure that is simple, relieves pain and also corrects varus deformity in medial compartment osteoarthritis. Hence, we aimed to study the outcome of proximal fibular osteotomy in management of severe medial compartment OA knee.

Materials and Methods: Our study is a prospective analysis on 40 patients, aged 42 to 76 years with moderate to severe medial compartment osteoarthritis, treated with PFO. The patients were evaluated for 12 months for using AKSS Score and VAS for pain. Radiological parameters like medial compartment space and femoro-tibial angle measured to estimate deformity correction.

Results: Significant improvement was seen in mean KSS score. KSS function score improved from an average of 53 to 77 post operatively. VAS score for pain improved from 7.5 to 3. Lateral angle at femoro - tibial axis changed from 182.4 pre-operatively to 179.6 at 12 months follow up. There was improvement in range of motion and ability to squat cross legged.

Conclusion: Our study showed promising results for PFO with improved pain and range of motion in the affected knee. PFO is a technically simple procedure that can be made available to patients with debilitating OA knee at primary centers of health care. The studies available show it to be an effective therapy in Uni-compartmental OA knee. If similar results are obtained in large scale randomized control trials, PFO can emerge as an alternative for patients unable to undergo TKR due to comorbidities or economic constraints.

Keywords: proximal fibular osteotomy, alternative, osteoarthritis, medial compartment knee

Introduction

Osteoarthritis (OA) knee is the most frequent joint disease, with prevalence of 22 to 39% in India, causing pain and disability. It is the 4th leading cause of Years Lived with Disability (YLD) accounting for 3% of YLD [2]. It is the leading cause of total knee replacement [3] (TKR) which is a complex and expensive procedure. High Tibial Osteotomy, though the choice of treatment in younger patients with medial compartment OA, is a technically demanding procedure and associated with complications. In 2015, Yang ZY *et al.* [1] reported that proximal fibular osteotomy (PFO) as a safe simple and effective procedure for treatment of pain and deformity correction in OA knee. In our study, we evaluated the short-term efficacy of PFO in terms of pain relief, improved function and deformity correction in medial compartment OA knees.

Materials and Methods

Our study included 40 patients (23 – male and 17- female) with moderate to severe OA knee, who underwent proximal fibular osteotomy. It is a prospective analysis conducted between September 2016 and September 2017. The mean age of patients was 55 years (42 to 70 years). The patients were thoroughly examined, routine blood investigations, weight bearing radiographs of the affected knees performed and Femoro-tibial angle (Fig.1) was measured.



Fig 1: Femoro-tibial angle

Classification was based on Kellgren Lawrence [4] grading. Patients with predominately medial compartment OA classified as grade three and four, with medial joint space narrowing and varus deformity were included in our study. Follow up was done for a minimum period of 12 months. Patients with genu valgus, acute major trauma, inflammatory joint disease, malignant tumors, deformity due to previous trauma were excluded from the study. Informed consent from all patients and ethics committee approval was obtained.

Procedure: Under the effect of spinal anesthesia, patient was placed in supine position. Head of fibula was identified. At a point 6 cm from the head of fibula, incision of size 5 cm was given over the lateral aspect of fibula (Fig 2). Fibula was exposed between peronei muscles and soleus muscle. PFO was performed by removing 2 to 3 cm of fibula at 6 to 8 cm from fibular head.



Fig 2: Incision site

Patients were allowed weight bearing and return to normal activities immediately after surgery subject to pain. Antibiotic and NSAIDS were given for 3 days post operatively. American knee society score and VAS for pain was used to measure outcome. Patient follow up was done at two weeks, three, six, and 12 months. Score was recorded prior to surgery and at every follow up. Weight bearing radiographs of the knee joints done at every follow up to observe for increase in medial joint space pre and post PFO (Fig.3) and changes in femoro-tibial angle was taken to assess the extent of deformity correction.



Fig 3: Weight bearing radiograph

Two horizontal lines were drawn from the lowest point on the medial condyle of femur and medial plateau of tibia respectively. The vertical line 'A' measures the medial joint space and is used to detect changes in medial joint space. Femoro-tibial angle was drawn using a line from a point 10 cm proximal to joint bisecting the medullary canal of the femur and second line is the anatomical axis of tibia. The lateral angle is the tibiofemoral angle [5, 6].

Results: In our study of 40 patients, 28 patients had grade three and 12 had grade four OA knees (Fig.4).

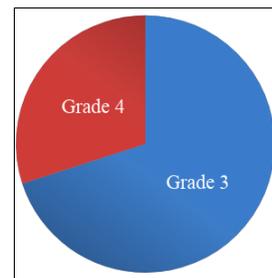


Fig 4: Distribution

The mean duration of surgery was 35 minutes. One patient had foot drop which recovered at 3 months. One patient had weakness in dorsiflexion of great toe which persisted for 12 months. Two cases reported tingling sensation over lateral aspect of leg which subsided at 6 months follow up. No cases had infection. There were no drop outs in our study. Average pre-PFO KSS score was 52 which improved to 77 at six months follow up (Fig.5).

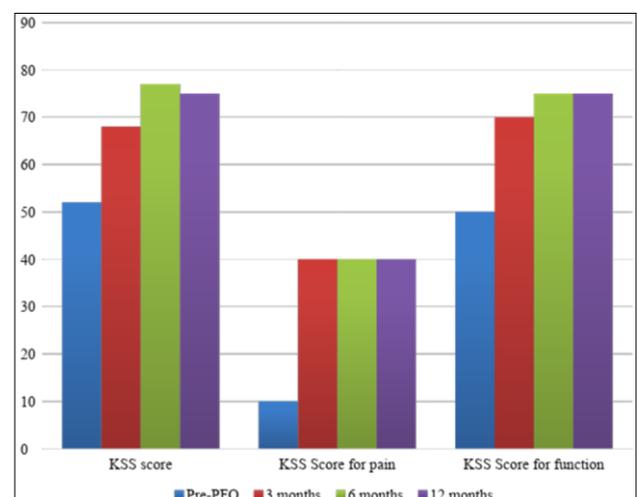


Fig 5: KSS scores

VAS score improved from 7.5 to 3 at six months follow up. Average KSS function score pre-operatively was 50. It improved to 75 post-PFO. In 10 patients FTA reduced from a mean of 182.4 degrees to 179.6 degrees (Fig.6). Weight bearing radiographs showed increased medial joint space compared to pre-operative radiographs (Fig.6). Ninety percent patients had increased painless range of movement and 75% were able to squat and sit cross legged post- surgery. The improvement persisted throughout the follow-up period.



Fig 6: Weight bearing radiographs

Discussion

Knee osteoarthritis causes pain and impaired mobility of the joint leading to difficulties in activities of daily living. The significance of varus or valgus deformities in the coronal plane has been recognized as an important factor in the progression of osteoarthritis of the lateral and medial compartments of the knee (Maquet 1976) [7]. Osteotomies around the knee are used for the treatment of uni-compartmental OA with associated varus or valgus deformity. Osteotomies around knee were considered demanding procedures with unpredictable outcome. Hence there was a setback for osteotomies in early 90s due to success of arthroplasty. Development of newer techniques for deformity calculation led to revival of osteotomies in recent years [8]. Osteotomies alter the weight bearing axis of knee [9] and are effective procedures in young and active patients with uni-compartmental OA with associated varus or valgus deformities. They unload the damaged compartment and transfer weight to reduce pain and slow the degenerative process, hence delaying arthroplasty. High Tibial Osteotomy (HTO) is associated with complications like neurovascular injury, iatrogenic fracture and use of implant for stabilization in open wedge osteotomy. Furthermore, primary total knee arthroplasty gave better results than total knee arthroplasty following HTO [10].

In 2015 PFO has been suggested as new surgery for OA of knee [2] with pain relief and medial joint space widening. Yang *et al.* [11] proposed that the lateral support provided to the tibia by the fibula-soft tissue complex may lead to non-uniform settlement and degeneration of the plateau. This causes the load from the normal distribution to shift farther medially to the medial plateau leading to knee varus. This aggravates the progression of medial compartment osteoarthritis of the knee joint. This is further aggravated by medial shifting of femoral condyle during walking and sports activities.

It is proposed that PFO improved the axial alignment in patients with genu varum [12] as it removes the lateral support thereby shifting loading force laterally. As it is performed on the fibula there are no patellar tendon issues [13] and it does not affect a future replacement surgery. Appropriate patient selection, good preoperative planning, correct surgical technique and correct postoperative management minimize the risk of complications and lead to satisfactory outcome.

Our study was a short-term study with on small sample of

patients. Our follow up does not allow for observing long term effects of PFO on progression of arthritis and its effect on hip and ankle. Substantiating deformity correction was not possible as only 25% had correction in our small sample. Large scale RCTs with long follow up are necessary to prove the efficacy of the procedure.

Conclusion

PFO is a novel procedure in knee OA management. We observed PFO reduced pain and improved function with 80% patients reporting good and excellent results. Weight bearing radiographs showed deformity correction in 25% and increased medial joint space. The surgery is a relatively simple procedure which can be made easily available for all economic strata. Positive results persisted throughout the duration of our follow up. PFO may emerge as an effective therapy for patients with medial compartment OA if proven by further studies.

Conflict of Interest

All authors have no financial conflict of interest in connection with this article.

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